

Contents

Characterology and Immorality as Postmodernist Existentialism in Wale Okediran's Fiction <i>Akin Olaniyi</i>	1
Literary Semiotics: The Actantial Narrative Schema in Chimamanda Ngozi Adichie's <i>Purple Hibiscus</i> Amaechi, Cyprian Chukwuma	10
Analyzing Politeness and Face Management Strategies in President Obasanjo's Open Correspondence with President Goodluck Jonathan Aworo-Okoroh, Joy Oghogho	16
Influence of Perceptual Acuity, Perceptual Store Power and Memory-Matching Intelligences on Language Learning among Nomadic Pupils in Abaji, Abuja Bello, Yekeen	33
Bilingualism and Cognition in Osundare's Poetry Ezekiel Bolaji, Kikelomo Adeniyi and Femi Adesanya	44
Saying the Unsaid from the Said: A Critical Discourse Analysis of Chinua Achebe's <i>Things Fall Apart</i> Muhammed-Badar Salihu Jibrin, Ph.D and Chibabi, Makedono Darlington	51
The Use of Profane Language in Nigerian Politics: A Study of Selected 2015 Political Statements Dajang Innocent Nasuk	67
Interrogating Stealing and Punishment in Yoruba and Hausa Literature Using Selected Folktales Daniel Ibrahim	73
An Application of Reader-Response Theory to the Use of Oppressive Language in George Orwell's <i>Nineteen Eighty Four</i> (1984) and Festus Iyayi's <i>The Heroes</i> Christiana Bosede Kinrin and Daniel Abuh	83
Morpheme Structure Constraints in Uşen Language Ikhimwin G. A.	92
A Contrastive Analysis of Some Sociolinguistic Aspects of Yoruba and English Languages Joseph Alagbe and Asaolu, Oladele Raphael	99
A Morphological Analysis of Agatu Personal Names John, Moses Ocheje	110
Perceptions on Code-Switching as a Pedagogical Tool in Secondary School Science Classroom Mohammed Ayodeji Ademilokun	115
Picaresque Technique in Chukwuemeka Ike's <i>EXPO '77</i> Moses Joseph and Martha A. Okoro	126
A Stylistic Study of Niyi Osundare's <i>Not My Business</i> Olaleye, George Abiodun	132
The Role of Children's Literature in Conflict Resolution and Peace Onuoha Beatrice N.	140
An Assessment of Accessibility Hierarchy of Idómà Relative Clauses Umaru Jacob Yakubu	147
The Construal of Non-explicit Meaning in Context: A Study of Selected Situation -Bound Utterances in Terminus Market, Jos. Blessing Vou Dakat	152
Effective Teaching of English Language through the Application of Relevance Theory Lateef Iyanda Kugbayi and Salamat Adamu Wudah	160



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Influence of Perceptual Acuity, Perceptual Store-Power and Memory-Matching Intelligences on Language Learning among Nomadic Pupils in Abaji, Abuja

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The focus of this study was to investigate the influence of perceptual acuity and perceptual store power and memory-matching intelligence on language learning among nomadic pupils in Abaji Area Council of Abuja, Nigeria. The study adopted descriptive survey research type. The population for the study was all the pupils of upper primary (primaries 4-6) in the Area Council. 20 pupils (males and females) were randomly selected from each of the three schools in the area, making a total of 60 participants. The design for the study was pre-test control group quasi-experimental design. The data collected were analysed using Analysis of Covariance (ANCOVA) at $p < 0.05$ level of significance in order to observe post experimental differences in perceptual acuity and perceptual store power and memory-matching intelligence. The finding in table1 indicates that treatment was found to have contributed significantly to variations in memory-matching power having $F = 52.638$, $P < 0.05$. The ANCOVA as shown in table2 indicates that treatment was found to have contributed significantly to variations in subject scores ($F = 119.117$), $P < 0.05$. The summary of ANCOVA on experimental group A scores in memory-matching power as shown in table3 reveals an F ratio of 108.189 which was found to be significant at $P < 0.05$. The treatment was therefore found to have significant effect on experimental group A in memory-matching power. The summary of ANCOVA effect of treatment on experimental group B in memory-matching power in table 4 indicates that an F ratio of 8.991 was found to be significant at $P < 0.05$. The treatment was therefore found to have a significant effect on the variations in memory-matching power scores in experimental group B. The summary of ANCOVA on effects of treatment on experimental group A in intelligence in table 5 indicates that F ratio of 7.121 was therefore found to be have a significant effect on the variations in experimental group A. From the summary of ANCOVA in table 6, it could be deduced that an F ratio is 22.674 and was found to be significant at $P < 0.05$. The effect of treatment was therefore found to have a significant effect on the variations in intelligence in experimental group B. In conclusion, the results indicate that treatment has significantly contributed to variations in memory-matching power and experimental groups A and B. Also, treatment has significantly contributed to variations in memory-matching power and intelligence. Considering the findings and conclusion of this study, it is therefore recommended that psychology teachers should be appointed in primary schools (i.e. the foundational level of education), perceptual store power training must be given more attention in schools because most often primary school pupils are made to learn some definition of things from home, which many of them do not usually do, to the disappointment of the teachers, whereas if perceptual store power (PSP) is used learning will be more effective, primary school curriculum should be structured to incorporate perceptual acuity training as a separate subject, among several other recommendations.

Introduction

Unless something is wrong with them mentally or physically, all children acquire a language as they develop. Indeed, many children around the world acquire more than one language and by the age of six or seven are speaking as confident bilingual or trilingual. This miraculous language instinct seems at first glance to happen effortlessly (Pinker, 1994). The question that language teachers want answered, therefore is whether second language (L2) acquisition i.e. the language learned in the classroom can hope to replace the conditions in which children acquire their first language(s) (L1).

Studies have shown that children are not taught language, nor do they set out to learn it consciously, rather, they acquire it subconsciously as a result of the massive exposure to it which they get from adults and other children around them. Their instinct, the mental capability we are all born with, acts upon the language they hear and transforms it unto knowledge of the language and an

ability to reason with it and speak it. It is that simple, or rather, it is not all that simple, for example, if we consider the language exposure that the children receive, we find that it is a special kind of language. We do not speak to two or three years old the way we speak to adults. Instead, they (the parents especially) use exaggerated intonation with higher pitch than is customary. This conveys special interest and empathy. They simplify what they say, too, using shorter sentences and matching cues to enhance their intellectual reasoning to enhance language learning. They choose special vocabulary which the children can understand, rather than more sophisticated lexical items which would be so tasking. They intend to include the children in the conversation, drawing them into interactions so that the language use is an integral part of the interaction itself. And even before children can themselves speak, parents act as if they are taking part in the conversation as when a mother says for instance "do you want some more milk"? (matching finger with the breast for need of more milk). So in essence, children are being taught rules of discourse via the use of matching actions with words that are easily interpreted with their developing intelligence thus giving additive opportunity for children to have a powerful incentive communication device (Harmer, 2007).

Based on the variables (perceptual acuity, perceptual store power, memory-matching and intelligence), Bakare (1979) and Aliu (2008) submit that intellectual development starts with perceptual, followed by conception, memory storage, language, reasoning and ends with creativity. Perception is therefore, a prerequisite for the development of all the other cognitive processing skills. Similarly, cognitive Theorists contend that behaviour is related to perceptual experiences, information storage, transformation according to the cognitive schemata and retrieval for memory matching and intellectual functioning. In the same vein, contemporary psychologist Eysenck (1992) and Broadbent (1997) place great emphasis on the indispensable role that perception plays in memory information and information processing. To them, the problem of learning is considered to be secondary to the problem of perceptual. This is because the laws of organisation of perception also determine significantly the structure of the information laid down in memory, because consciousness itself is regarded as internal perception.

In support of the above, Velmans (1999) expresses the opinion that consciousness is the result of perceptual processing. While lending voice to the above, Marks (1999) and Aliu (2008) also claim that the primary function of consciousness is the mental rehearsal of goals-directed action through the experimental manipulation of perceptual motor images under the control of the schemata and environmental cues which serves the function of enhancing the adaptive competence of the organism. In line with the above assumptions, the approach used by these psychologists involved the investigation of the processes by which sensory inputs were identified, transformed, coded, stored, retrieved and used for memory-matching and rationalisation. Important to these psychologists was transformation or memorial mediation which occurred between the stimuli and memory storage. They believe that it is the meaning assigned to the stimuli by memorial processes that are important to perception and storage, and not the perceptual objective itself.

Piaget's theory in particular hinges on perception, memory storage, retrieval and memory matching. So also, Elkind (1975) opines that all perceptual processes involved in logical operations and the components of these logical structures are perceptual organisation which Piaget refers to as assimilation, perceptual exploration and perceptual schematisation.

Perceptual acuity and memory storage are also prerequisites for effective expository learning. This learning approach depends on the behaviour modification strategies of the stimulus-response theories. In the first place, the stimulus has to be perceived and stored before response can be initiated. The stored information then guides future responses which eventually determine the overall intellectual ability and personality of the respondent. This implies that without adequate perceptual disposition, the individual will not learn much from the teacher. Training in perception is therefore, necessary for the removal of distractive tendencies that impair attention in the class especially among African children who have been found by many researchers to have perceptual deficit (Jensen, 1993, Bates and Sough 1977, Choudhury and Gorman 1999). Recent investigations also reveal perceptual deficit among Africans and people in non-industrialised countries. The result of a study by Choudhury and Gorman (1999) indicate that though reaction time measures were related to intelligence in non-industrialised countries as it did in industrialised countries, they accounted for a relatively small percentage of the variance in intellectual functioning. The magnitude of the relationship had been found to vary from culture to culture. Consequently, Choudhury and Gorman recommended research

to establish validity of reaction time measures as alternative to intelligence tests in non-industrialised countries. This was necessary because Western population might be influenced by factors such as motivation (Calson and Jenson 1982); previous experience with similar task (Detterman 1987); the amount and type of verbal instructions provided before the task (Detterman 1999); literacy (Grossi, Corraera, Calise and Ruscitto, 1993) and various aspects of the ecology.

Similarly, studies have indicated that this deficit can be eliminated through the appropriate use of perceptual training. For instance, Ohuche (1976) in Aliu 2008 found that spatial perception could be easily improved through training and could even be raised above Western norms. This refuted earlier claims by researchers that the African child was genetically inferior in spatial perceptual abilities. Scholars such as Lunnerborg (1977), Hunts, Lunnerborg and Lewis (1975) and Keating and Bobbit (1978) submit that the importance of perception to intellectual functioning can also be seen in the attempts of psychologists to relate perception to intelligence, but they fail to obtain any significant correlation between the information processing tasks and the ability measures. However, Lunnerborg once obtained relative high correlation between -0.55 and -0.28 between perceptual processing ability and intelligence. This negative correlation obtained by Lunnerborg probably contradicted earlier assumptions that perception was unrelated to intelligence. It probably points to the existence of perceptual deficit among high intelligent people. It also indicated that perception might be intensely related to intelligence, even though the ability to perceive is itself not positively related to intelligence; this implies that speed of perception has been found to correlate highly with intelligence. However, this relationship varies from culture to culture as a result of varying degrees of perceptual deficit; rural dwellers being more affected than urban dwellers (Bates and Stough 1997); Knorr and Nebauer 1996; Choudhury and Gorman 1999 and Aliu 2008).

The above therefore kindled this researcher's interest in the investigation of the relationship between intelligence and perception. Based on this, perception is divided into two stages of perceptual acuity (PA) and perceptual store power (PSP) under the assumption that the two constructs together constituted perceptual power (PP) i.e. $(PA+PSP=PP)$. This result corroborated the relatively high negative correlation obtained by Lunnerborg (1977). This result definitely indicated that perceptual acuity had something significant to contribute to intelligence. It probably meant that high intelligent people among the study population have perceptual deficit that affected the nature of the relationship between the two variables. Unlike perceptual acuity, perceptual store power correlated highly with intelligence implying that the low ability participants have problem with memory storage, whereas if the perceptual deficit of high ability participants could be removed by training, the subjects would be able to realise their intelligence potentials fully. However, if this storage problem could also be removed by training, the low ability participants who have higher perceptual acuity could realise their potentials fully and also would be able to contribute to technological development. In the light of this, it is pertinent to note that if perceptual acuity and storage could be improved through training, the improvement of the two variables could result in the improvement of memory matching power and intelligent behaviour (Aliu, 2008).

In another development, it is believed that perceptual power (i.e. $PA+PSP$) training could help normal pupils to improve attention by reducing distractive tendencies such as hyperactivity, impulsivity and field independence which have been found to affect conceptual and perceptual performance adversely including social-inter personal behaviour, learning, memory, defence control and concept attainment (Witkin, More, Good Enough and Cox, 1977, O'Connor and Blowers 1980).

Perceptual Acuity and Perceptual Store Power on Memory-Matching Intelligence

Traditional conceptual sensation views it as being different from perception. Some modern psychologists also regard sensation as a separate phenomenon from perception. They reject the hypothesis that sensation is part of perception. On the other hand, Roadiger, Knight and Kanto Witz (1984) view reception of stimulation from the environment was referred to as sensation while perception describes the interpretation and the understanding of the stimulation. However, cognitive psychologists regard sensation as an integral part of perception. This study however, considers perception as not being complete without memory storage either in the iconic or the short-term memory. Perception is, therefore, regarded as the process whereby stimuli are received, transformed and stored. Reception of stimuli here refers to the stimulation of the sense organs either from the environment or from internal sources within the organism.

Another source of disagreement about the nature of perception is the controversy about whether the sensational mechanism is completely responsible for what the organism senses or is first evaluated and interpreted by memory processes. The naive realists such as Roadiger believe that our senses and organs are completely responsible for what we sense. The critical realists, however, support the view that what an individual senses or perceives depends on the meaning assigned to the stimuli by the mind and also what an individual perceives depends on the meaning the mind assigns to the stimuli and it is this meaning that is important to information processing and not the object itself. But radical behaviourists and the naive realists however, it is the object itself that is important to perception and not subjective experiences. There is no substratum of meaning apart from the object word itself. For radical behaviourism, no unobservable should be introduced into an explanation. The approach is what Bower (1973) refers to as situationalism which implies that explanation should be given in terms of any individual characteristics which is independent of the description of the observable situation. This standpoint which disregards the concept of memorial mediation is referred to as extensionalism. It is what is externally observable that is important to perception, thus implying that it is only the physical characteristic of the object that influences behaviour.

Nature of Recognition and Memory Matching

Perception recognition is very important to recognition and memory matching. Before an individual can recognise an object, memory representation has to be used to match the stimuli. To draw valid and sensible conclusion about the stimuli, rationalisation had to be employed. Recognition and memory-matching are regarded as being analogous except that recognition refers to the identification of the stimuli while memory-matching is a global term that encompasses all the processes that lead to recognition or identification (Aliu, 2008). The term recognition is more commonly found / encountered in psychology than memory-matching and the two terms are sometimes used interchangeably. In support of the above, Aliu (2008) submits that repetition priming has recently been the method extensively used to investigate the nature of the processes involved in memory-matching and recognition via the means of presentation of stimuli as primes to be stored in the memory and later used to match a target stimulus from a number of alternatives. The time between the presentation of stimulus and target (the inter-stimulus interval) (ISI) can be viewed and the effect on recognition noted. The instrument that can be used include slide projector linked to automatic timer which determines exposure duration and the ISI, computer and tachistoscopes.

In a similar vein, Batram in Aliu (2008) posits that one of the methods of investigating memory involves picture matching in which paired stimuli could be of identical views, or different views of the same objects or different objects having the same name. In this study, visual and memory matching were compared. The pattern of relative advantage in processing time depends on whether the semantic code has to be consciously retrieved from memory or not, and Batram observes this in terms of differing availability of three codes, viz: a viewer-centred pictorial code; an object-centred code and a non-visual- semantic code at which level objects having the same name are matched. Similarly, Bruce and Young (1986) propose a model of face recognition in memory-matching. They propose that when we encounter a familiar face, there is an initial structure encoding which results in a face-centred representation which is compared with sets of structural code stored at the level of face recognition unit (FRU), thus FRU exists for each familiar face and allows its recognition in a range of differing views. They argue further that FRUs are triggered discretely when there is a match between the input and structural codes which also trigger off access to a personal identity node (PIN) at a higher level of semantic information about the person is stored as identity-specific semantic codes. The name of the person is stored separately and is in the final code to be accessed. Face recognition therefore, involves successful access to structural semantic and name codes.

Effects of Impulsivity and Field-Dependence on Perception, Intelligence and Creativity

The perceptual style dimensions of impulsivity and reflectivity as well as fields defence has been found to be strongly related to intelligence and creativity. Witkin, More, Good Enough and Chastain (1997) postulate that field dependence (FD) cognitive style is characterised by performance differences over a range of cognitive areas including socio-interpersonal learning, memory defence control, concept attainment behaviour, and adaptive flexibility matching problems and analytical subject intelligence. In another development, Scott (1985) in Aliu (2008) holds the view that like field

dependence, impulsivity has also been found to strongly related to perception and intelligence in several experiments. Scott just goes further that impulsivity influences significantly selective attention, response interference and information interpretation. He proposes that highly impulsive individuals are especially influenced by global dimensions of stimuli because they have particular difficulty in focusing their attention on the local dimensions and ignoring the global ones, and that they are especially influenced by the global dimension because of their vulnerability to stoop-like response interference produced by the dimensions, and that the global quality of their perceptual processing reflects a failure to adequately integrate the information provided by the local and global dimensions.

On relationship between impulsivity and creativity, Aliu's (2008) study affirms that students were classified as impulsive or reflective on the basis of response time and response accuracy. The result indicated a significant relationship between the impulsivity/reflectivity dimensions and creativity on one hand and academic achievements on the other.

The Nature of Memory, Its Coding and Storage System

Modern psychologists, according to Aliu (1995), divide memory into two main parts: The short term memory (STM) and long term memory (LTM). The STM is so regarded because it holds information for a short time while LTM is able to keep information for unlimited period. The capacity of the STM is limited to nine items, while the LTM has unlimited capacity. Despite the few items the STM can store at any given time, it is able to process large amount of information as the executive of personality and working memory. The third, but controversial aspect of memory is sensory memory (SM), but the location of SM still remains controversial. While modern psychologists base their distinction of memory on duration and capacity of storage, early psychologists such as Freud based their dichotomy on conscious and unconscious aspects of memory.

Studies by scholars such as Aliu (2008) and Shallice and Warrington (1970) show that a separate STM has been found in amnesic patients (patients with loss of memory), and this supports STM/LTM dichotomy. Patients with LTM defect perform poorly in tasks involving delayed recall but have normal recency effect on STM recall. Those with impaired STM have normal primary effect but poor recall of recent items. Shallice and Warrington (1970) report the case of a patient whose retention of everyday events was unimpaired but could not repeat back sequences of more than two digits in free recall, the result showed a recency effect the only one items.

In support of STM/LTM dichotomy is the observation carried out by Miller (1986) on a very intelligent man but become amnesic following an infection in the brain. He was incapable of remembering anything from more than one minute or two before and had to be continually reminded. He was observed when his wife left the room for just five minutes and returned later, the man greeted his wife as if he had not seen her for months, and this implies that the man lives in perpetual present, his STM was functioning perfectly but the LTM was not capable of storing new information.

STM Coding System

Solso (1991) opines that many psychologists believe that the predominant coding in STM is acoustic. This means that visual information is translated into auditory codes before storage. However, Wicken (1970, 1972 and 1992), through studies challenges the contention that STM information is predominant auditory. The results of the studies indicated that visual and semantic codes are also employed. Most of these studies were based on the proactive inhibition (PI) design. The PI designates reduction in the ability to recall later members of a series, say dogs because of the inhibition caused by the storage of earlier members. Thus, recall is best during the first set and gradually reduces with each subsequent set. However, if a new set of items say flowers is introduced recall will be improved. Again because the inhibitory effect of the earlier series is drastically reduced as a result of novelty. This reduction in inhibition is referred to as the release from PI.

LTM Coding System

Studies in memory storage mainly concentrate on recall and recognition of auditory and visual displays. Traditional memory experiments make use of memorisation of phonological information even when visual displays were used. Such visual displays were the ones that could easily be given acoustic codes before storage because they were familiar objects. Research by Wicken (1992) has

proved that visual and meaning codes are also used in both LTM and STM coding and storage. However, the form that visual representation takes has generated some controversies. Behaviourists are of the view that the images in the mind are not useful to psychology. Some psychologists assert that images were in form of pictures like the slides of projector and could easily be called up and visualised. On the other hand, cognitive psychologists also assert that an image is a representation in the mind that gives rise to the experience of seeing even though the codes are not picture-like at all, just like data that are stored in form of symbols (electronic representation) gives rise to images on the screen of a computer.

Aliu (2008) postulates that psychologists use stimuli which cannot be given psychological content to demonstrate the existence of a square memory store for visual representation. Such materials (stimuli) include unfamiliar figures that could not be given names or verbal codes easily. Examples are matrices of black and white squares, free-form outline drawings of nonsense figures or a single dot whose position relates to the edge of a square displays field has to recall. Such studies have demonstrated that a difficult to visualise stimulus could be effectively retained in the memory. Similarly, Scarborough (1972) in Aliu (2008) affirms that experiment also gives support to visual representation; his intent separates the two methods of encoding by occupying the phonological system with irrelevant task while the visual is left for durable storage. The subjects first hear a sequence of auditory digits followed by a display of six letters of digits which were preceded by a visual noise mask. Duration of the display was 25m 9 sec. A tone was used to indicate whether to report the visual or auditory list. Control conditions involving the report of a visual display without an auditory load and vice versa were run. The finding showed that the report of a visual display was not significantly influenced by whether or not an auditory list was in memory. This was interpreted to mean that the visual and auditory systems were completely independent of each other.

Sensory Memory

Although psychologists know about the existence of sensory memory since 1880, systematic investigation into it did not begin until recently (Aliu, 2008). Research about the exact location of the sensory memory is not conclusive. Some psychologists such as Long (1980) suggest that it is located in the retinal cells of the eye, while others argue that it is located temporarily and centrally at buffer within the nervous system. Others also suggest that there has been the existence of a separate sensory memory outside the STM, while some link sensory memory to the receptor and sensory projection areas of the brain which cause stimuli like a click or a flash, to persist as an after image unconsciously for brief moments after the stimulus itself has terminated.

Statement of the Problem

Studies have indicated that many learners have inadequate perceptual behaviour due to the poor perceptual environment in which they live and develop, thus their inability to articulate language correctly in instruction (English language by implication) (Jahode, 1979 & Determann, 1999). Research therefore shows that this poor perceptual style affects the realisation of their intelligent potentials. Similarly, Onyejiaku (1980) observes that intelligent potentiality itself is not as important in problem-solving as the way learners perceive, analyse and understand the problem. This study therefore, seeks to find out if training in perceptual acuity and perceptual store power can lead to improvement in intelligence and memory-matching tests via the use of English language and vice versa. This was determined by the statistical comparison of pre-test and post-test scores of the participants.

Purpose of the Study

The main purpose of this study is to find out if training in perceptual acuity and perceptual store power could remove the problem of perceptual deficit among a sample of pupils of upper primary (primaries 4-6) school. It was hoped that improvement in the afore-mentioned variables would lead to significant improvement in performance in the memory-matching tests and in the test of intelligence to enhance language learning. This assumption is appropriate because several studies have shown that African learners (pupils and students) have perceptual deficit which does reduce their intellectual ability especially in language learning, and which could be removed by appropriate training methods.

Research Questions

The following research questions were drawn to give this study a focus:

1. Is there any statistically difference between the pre-test and post-test scores of the control group in memory-matching power?
2. Is there any significant effect on the following:
 - a. Experimental group A in memory-matching power?
 - b. Experimental group B in memory-matching power?
 - c. Experimental group A in intelligence?
 - d. Experimental group B in Intelligence?

Research Hypothesis

H01: There is no statistical difference between the pre-test and post-test scores of the control group in memory-matching power.

H02: There is no significant effect of treatment on.

- a. Experimental group A in memory-matching power?
- b. Experimental group B in memory-matching power?
- c. Experimental group A in intelligence?
- d. Experimental group B in Intelligence?

To test hypothesis one (H01) scores of the pre-test and post-test scores of the control group in memory-matching power were subjected to analysis of covariance (ANGOVA). The result is presented below.

Methodology

This study is a descriptive survey type. The population for this study was all the pupils of the upper primary (primaries 4-6) in Abaji Area Council of Abuja. 20 pupils (both males and females) were randomly selected from each of the three upper classes (4-6) making a total of 60 pupils in all. The design of this study is the pre-test control group quasi-experimental design.

Data Analysis and Results

The data collected were analyzed using analysis of covariance (ANCOVA) at ($p < 0.05$) level of significance in order to observe post experimental differences in the memory-matching power.

H01: There is no significant effect on the pre-test scores of the control group in memory-matching power.

Table 1: Analysis of covariance on the pre-test scores of the control group in memory-matching power

Source of variation	Sum of squares	Df	Mean Square	F	Signi. of F
Covariates	844.19	1	844.19	18.051	.0000*
Main Effects	2433.811	3	1015.61	20.067	.0000*
Treatment	2112.417	1	2112.417	52.638	.0000*
Explained	3425.176	5	442.148	8.136	.0000
Residual	6656.175	55	38.151		
Total	11405.333	60	39.364		

*Significant at $P < 0.05$

The ANCOVA as indicated in table 1 above reveals that treatment was found to have contributed significantly to variations in memory-matching power ($F = 52.638$, $P < 0.05$). Based on this, the null hypothesis is rejected.

H02: There is no significant effect of treatment on post-test scores of the control group on

memory-matching power.

Table 2: Analysis Covance on the post test score of treatment of the control group on memory matching power

Source of variation	Sum of squares	Df	Mean	F	Signi. of F
Covariates	964.21	1	964.21	4.061	0.91
Pre-test	964.21	1	964.21	4.061	0.91
Main Effects	323.559	1	323.559	119.117	0.000*
Group	323.559	1	323.559	119.117	0.000*
Explained	323.250	2	146.122	48.638	.000
Residual	598.365	58	3.999		
Total	1020.501	60			

*Significant at $P < 0.05$

The ANCOVA as shown in table 2 above indicates that treatment was found to have contributed significantly to variations in subject scores ($F=119.117$), $P < 0.05$), to this end, the null hypothesis is rejected.

To test hypothesis three (H_{03}), analysis of covariance was used and the summaries are presented in Table 3, 4, 5 and 6

Table 3: Analysis of covariance on experimental group in memory- matching power

Source of variation	Sum of squares	Df	Mean	F	Signi. of F
Covariates	9.141	1	9.141	3.061	0.82
Pre-test	9.141	1	9.141	3.061	0.82
Main Effects	323.109	1	323.109	108.189	0.000*
Group	323.109	1	323.109	108.189	0.000*
Explained	323.250	2	166.125	55.625	.000
Residual	588.345	58	2.982		
Total	920.595	60	4.626		

*Significant at $P < 0.05$

The summary of ANCOVA on experimental group A scores in memory-matching power as shown in table 3 above reveals an F ratio of 108.189 which was found to be significant at $P < 0.05$. The treatment was therefore found to have significant effect on experimental group A in memory-matching power, on this basis, the null hypothesis is therefore rejected.

To determine the effect of treatment on experimental group B in memory-matching power an analysis of covariance was computed as shown in table 4.

Table 4: Analysis of covariance on group B in memory-matching power

Source of variation	Sum of squares	Df	Mean	F	Signi. of F
Covariates	21.664	1	21.664	6.820	0.10
Pre-test	21.664	1	21.664	6.820	0.10
Main Effects	28.560	1	28.560	8.991	0.03*
Group	28.560	1	28.560	8.991	0.03*
Explained	50.224	2	25.112	7.905	.000
Residual	625.776	58	3.177		
Total	676.000	60	3.397		

*Significant at $P < 0.05$

The sununary of ANCOVA effect of treatment on experimental group B in memory-matching power in table 4 indicates that an F ratio of 8.991 was found to be significant at $P < 0.05$. The treatment

was therefore found to have a significant effect on the variations in memory-matching power scores in experimental group B. The null hypothesis is therefore rejected.

Effect of treatment on experimental group A in an analysis of covariance were computed and shown in table 5.

Table 5: Analysis of covariance on effect of treatment on experimental group A in intelligence

Source of variation	Sum of squares	Df	Mean	F	Signi. of F
Covariates	47.381	1	47.381	15.905	0.000
Pre-test	47.381	1	47.381	15.905	0.000
Main effect	211.892	1	211.892	71.126	0.000*
Group	211.892	1	211.892	71.126	0.000*
Explained	259.273	2	29.636	43.515	0.000
Residual	586.883	58	2.979		
Total	846.155	60	4.252		

*Significant at $P < 0.05$

The summary of ANCOVA on effects of treatment on experimental group A in intelligence in table 5 indicates that F ratio of 7.121 was therefore found to have a significant effect on the variations in experimental group A on this basis, the null hypothesis is therefore rejected.

Effect of treatment on experimental group B in intelligence, an analysis of covariance was computed as shown in table 6.

Table 6: Analysis of covariance on effect of treatment on experimental group B in intelligence

Source of variation	Sum of squares	Df	Mean	F	Sing % F.
Covariates	12.280	1	12.580	3.637	0.55
Pre-test	12.280	1	12.580	3.637	0.55
Main Effects	76.222	1	76.222	22.674	.000*
Group	76.222	1	76.222	22.674	.000*
Explained	89.884	2	44.866	22.674	0.000*
Residual	568.003	58	3.333		
Total		60			

*Significant at $P < 0.05$

From the summary of ANCOVA in table 6, it could be deduced that an F ratio is 22.674 and was found to be significant at $P < 0.05$. The effect of treatment was therefore found to have a significant effect on the variations in intelligence in experimental group B. On the basis of this, the null hypothesis is therefore rejected.

Discussion

The finding as shown by analysis of covariance in table 1 indicates that treatment was found to have contributed significantly to variations in memory-matching power having $F = 52.638$, $P < 0.05$. This finding is consistent with research findings on the fact that treatment has significantly contributed to variations in memory-matching power as was postulated by Aliu (2008). Result in table 2 also agrees with Bakare (1979) and Aliu (2008) who submit that intellectual developments start with perception, followed by conception, memory storage, language reasoning and ends with creativity. Perception is therefore a prerequisite for the development of all the other cognitive reasoning and ends with creativity. Perception is therefore processing skills. Result in table 3 is in agreement with the assertions of Witkin, More, Good Enough and Cox (1997) who postulate that FD cognitive style is characterised by performance differences over a range of cognitive areas including

socio-inter-personal learning, memory defence control, concept attainment behaviour, adaptive flexibility matching problems and analytical subjects of intelligence. Finding in table 4 is consonance with Scott (1985) in Aliu (2008) that like field-dependence (E.D), impulsivity had been found to strongly relate to perception and intelligence in several experiments. Scott asserts of further that impulsivity influences significantly selective attention response interference and information interpretation. Findings in table 5 connotes the positions of Witkin, More, Good Enough and Croft (1997) who posit that field dependence cognitive style is characterised by performance differences over a range of cognitive areas including socio-inter-personal learning, memory defense control, concept attainment behaviour, adaptive flexibility matching problems and analytical subjects of intelligence. Result in table 6 lends credence to scholars such as Lunnerborg (1977), Hur Lunnerborg and Lewis (1975) and Keating and Bobbit (1978) who argue that the importance of perception to intellectual functioning can also be seen in the attempts of psychologists to relate perception to intelligence.

Conclusion

In conclusion, the findings of this study indicate that treatment significantly contributes to variations in memory-matching power. Also treatment significantly contributes to variations in memory-matching power and intelligence.

Recommendations

Considering the findings and conclusion of this study, it is therefore recommended that:

- i. Psychology teachers should be appointed in primary schools, i.e. the foundational level of education.
- ii. Perceptual store power training must be given more attention in schools because most often primary school pupils are made to learn some definition of things from home, which many of them do not usually do, to the disappointment of the teachers, whereas perceptual store power (PSP) is used learning will be more effective.
- iii. Primary school curriculum should be structured to incorporate perceptual acuity training as a separate subject.
- iv. Attention of teachers should be drawn to the use of PSP training so that discovery learning and technological ability can be improved.
- v. These days, no teaching aids and observable practical experiences are available for students and pupils in most public secondary and primary schools in Nigeria where universities in Nigeria have long recognized the importance of perceptual training in technological development and have consequently introduced industrial attachment in their curriculum. There is no such opportunity for children in primary and secondary schools and that is the more reason why it is best started at the kindergarten level through primary and secondary levels.

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