

Effects of Levels of Processing and Gender Differences on Recognition of Oral Prose

Philip C. Mefoh

Department of Psychology
University of Nigeria, Nsukka

The study used a two-randomized group design to examine the effects of levels of processing (LOP) and gender on recognition of oral prose. Eighty (80) third-year undergraduate students (40 males and 40 females) randomly selected from the Department of Sociology/Anthropology of University of Nigeria, Nsukka (UNN), participated in the study. They were aged between 20 and 28 years, with a mean age of 22.89 years. Levels of processing were varied into deep and shallow processing treatment conditions, and participants in both conditions were later given a recognition test (OPAT 11). ANOVA results showed significant effect of LOP on recognition of oral prose, $F(1, 72) = 4.82, p < .05$. Female participants' performance on the recognition of oral prose was slightly higher than that of male participants, although their mean scores were not significantly different. The interaction effect between LOP and gender on the response measure was also not statistically significant. It was concluded that LOP can be a powerful tool for increasing the recognition of information that students need to acquire.

The levels of processing framework (Craik & Lockhart, 1972) have real implications for everyday cognitive experience. According to Craik and Lockhart, memory depends on the depth to which a stimulus is processed. They posit that forgetting is simply a function of depth of processing: people forget things they have not processed semantically. According to Craik (1979), levels of processing have two central themes. The first is that semantic analysis results in a deeper, more meaningful code than does a non-semantic analysis; and secondly, that the deeper the code, the more durable the memory.

Craik and Tulving (1975) demonstrated this prediction. They presented their participants with 60 words, and had them answer questions about each word. The questions were designed to control the levels of processing of the words. For each word, participants were to judge how it was printed (visual), how it sounded (acoustic), or what it meant (semantic). The researchers predicted, in line with the levels of processing theory, that words processed to deeper levels should be better remembered than those processed to shallower levels. Craik and Tulving's results confirmed those predictions - participants who processed words at deep level recognized more words than participants who processed at shallow levels

Bloom and Mudd (1991) obtained similar results. The researchers showed undergraduate participants a series of photographs (faces) and asked them to make judgments that were superficial ("is the face male or female?") or more complex ("is the face honest or dishonest?"). Participants whose question was more tasking spent more time looking at the pictures and also made more eye movements - all are indices of deep processing.

Results of a recognition test that followed showed that the participants whose question was more tasking recognized more faces later than participants who processed the pictures shallowly.

Earlier, Kearins (1986) had reported similar result. In the study, Kearins gave Australian aboriginal and white adolescents 30 seconds to memorize the location of objects arranged on a rectangular grid. The experimenter then mixed up the objects, and each adolescent was asked to replace them in their original positions. Kearins found that the adolescents used different strategies to approach the task. Adolescent who sat very still and silent appeared to concentrate deeply. They were more slow and methodical in replacing the objects than their mates who tended to fidget and mutter and replace the first few objects hurriedly. Several other studies on the levels of processing framework (e.g., Arlin, 1986; Gordon & Debus, 2002) have repeatedly confirmed that stimuli that are processed in a way that highlights structural characteristics would be remembered poorly compared to stimuli that are processed in a manner that emphasizes meaning.

Gender research is not particularly an important topic in experimental psychology. This stand is however gradually waning. The field is becoming much more gender conscious than it was some twenty years ago (Smith & Davis, 2005). It needs to be determined whether there are gender differences in basic intellectual skills, such as memory. Some psychologists (e.g., Moir & Jessel, 1989) believe that human biological circumstances have a powerful impact on many fundamental aspects of intelligence. Findings that men and women differ in their attitudes and preferences, and in their conversational styles (Weiss, 1991; Tannen, 1990), tend to support the argument that females and males are different psychologically. But many other psychologists (e.g., Tavris, 1992) claimed that no essential differences exist between the genders. For example, boys and girls crawl, walk, smile at about the same age and both become curious about sex in adolescence (Kassin, 1995). Currently, the gender debate is a hot issue in contemporary psychology (Halpern, 2000).

According to Nagae (1985), handedness is a better predictor of cognitive abilities than gender. Nagae studied the effects of handedness and gender differences in processing manner of verbal and spatial information. Left handed and right-handed females and males were given the task of viewing sets of six or eight letters in a 5 x 5 matrix. The result of the study showed that there were no differential recognition of letters and positions according to gender, instead much of the differences observed were due to handedness. Nagae concluded that handedness in general appears to be a stronger correlate of cognitive skills than gender.

Similarly, Cox and Waters (1986) stated that perhaps the reason why many studies show male advantage on cognitive and spatial abilities is that such studies fail to use a general developmental framework, which is necessary to interpret results correctly. Thus, using a developmental analysis, Cox and Waters examined the use of organization strategies with related and unrelated categorizable word list among 1st, 3rd, and 5th grades children. The results of the study indicated that in the related condition, both females and males showed significant levels of organization in the 3rd and 5th grades, but only females demonstrated significant levels of organization in the 1st grade. In the unrelated

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condition in which only the 3rd and 5th grades were used, result showed no use of organization for females and males in the 3rd grade. However, a significant level of organization was observed for only females in the 5th grade. The study concluded that generally, gender differences were pronounced across the ages studied, with males showing a developmental lag in the use of organization strategies.

Amponsah and Krekling (1997) examined the pattern of gender differences in four visual spatial ability tests - water level, surface development, PMA space, and Vanderberg-kuse in two cultures. Except for the surface development test on which no gender differences appeared in either sample, the researchers observed that males performed significantly better than females in both samples. The finding supports earlier studies (e.g., Burnett, 1986; Linn & Petersen, 1985) that indicated that males often perform better than females in tasks that involve mentally rotating objects in space to determine what they look like in another position.

The present study has two specific goals. The first goal is to affirm or refute Lockhart and Craik's (1990) claim that the levels of processing result are consistently obtained in both recall and recognition tasks. It is hypothesized that there would be statistically significant effect of levels of processing on recognition of oral prose. This is predicted on the encoding-specificity principle (Tulving & Thompson, 1973) and the transfer-appropriate processing principle (Morris, Bransford, & Franks, 1977). Both principle maintain that memory performance is determined by the extent to which the cues that were present during encoding are also present at the time of retrieval.

The second goal seeks to examine the debate that differences or similarities exist between the genders. It is predicted that females will significantly perform better than males on the recognition of oral prose. The prediction is based on the hypothesis that testosterone has an effect on cognitive skills: Geschwind and Behan (1982) proposed that prenatal testosterone washes over the foetal brain thereby slowing the development of the left hemisphere, where language skills are housed. The effect of testosterone on the left hemisphere, maintained Geschwind and Behan, explains why females excel more than males in various language tests.

Method

Participants

Eighty (80) undergraduates of University of Nigeria, Nsukka (UNN), participated in the study. They were 40 women and 40 men, selected randomly from a population of 152 third-year students of Department of Sociology/ Anthropology, UNN. Their ages ranged between 20 and 28 years, with a mean age of 22.89 years. All the participants were randomly assigned to either of two treatment conditions, deep versus shallow processing. In varying the levels of processing into the two treatment groups, a restriction was imposed to the extent that there were equal number of men and women in each treatment group. Gender was used as a basis for sample selection.

Instruments

A prose passage of 576 words (Amadi, 1973) (Appendix) was the stimulus material used in the study. Oral Prose Assessment Test (OPAT 11), developed by the present researcher, was the instrument used to measure recognition. In developing the OP AT test, the researcher raised 15 questions from the stimulus material and gave the items to 10 students (other than those that participated in the study) to answer and generate three (3) possible distracter items for each question. In the end, only 10 questions were selected based on the congruency observed from the respondents' responses to the initial 15 questions. The test was then subjected to validity and reliability analyses. The mean response of five (5) judges that examined the appropriateness of the test (OPAT 11) to measure recognition was 87.65; similarly, a mock experiment with 24 undergraduate volunteers yielded a Cronbach alpha of .60. These outcomes were interpreted to mean that OPAT 11 would adequately measure recognition.

In testing a participant for the recognition of oral prose, the participant was first given the stimulus material to read. Then after a 10- minute retention interval, the participant was given the OPA T 11 test. The participant's task was to pick a target (correct response) from a list of distracters (options a to d). Participants were required to write their answers on the spaces provided beside each question. Each correct answer was awarded a score of 2, while an incorrect one was scored zero (0). Two examples of the items on OP AT 11 test were:

Item 2. Who did the writer describe as, Ha dirty, emaciated and utterly miserable woman, mourning for her only child"?

- (a) his aunt (b) his wife (c) his sister (d) his mother

Item 3. Mention the date the writer and some of his soldiers travelled to Ata.

- (a) 11th January (b) 12th January (c) 14th January (d) 20,h January

Procedure

Levels of processing were manipulated by varying the instructions that were given to the deep and shallow processing conditions. Participants assigned to the deep processing condition received the following instructions: "You are welcome to this experiment. When you settle down, you would be given a passage to read. Your task is to identify in the passage why the author wept". Those who were assigned to the shallow processing condition were instructed as thus: "You are welcome to this experiment. When you settle down, you would be given a passage to read. Your task is to identify the number of times the word 'refugees' appeared in the passage".

Participants in each treatment condition were naive of the instructions given to the other group. Test administration procedure used the incidental learning approach, in which participants were not aware that their memories would be tested. The stimulus material was studied for 5 minutes. This was expected to have discouraged rehearsal. It was

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followed by a 10-minute retention interval, which preceded the memory test. Test time was 10 minutes. Participants wrote their answers on the spaces provided beside each question. Each correct answer was scored two (2), while an incorrect one was scored zero (0). As a subject variable, gender was not manipulated; rather it was adopted as a basis for categorizing the sample.

Design/ statistic

The study adopted a two-randomized group design, with two factors: levels of processing (deep versus shallow processing) and gender (males versus females). Statistic for data analysis was the between-groups parametric ANOVA (F-statistic).

Results

On the first factor, levels of processing, participants in the deep processing condition obtained higher mean score on the recognition task than others in the shallow processing condition. The descriptive analysis also showed that the recognition mean score for female participants was higher than that of the male participants. See Table 1 below.

Table 1

Means (M) and Standard Deviation (SD) of Groups Scores

Factors	<i>M</i>	<i>SD</i>
Levels of processing (A)		
Deep processing	14.70	2.54
Shallow processing	13.35	2.84
Gender (B)		
Females	14.20	2.75
Males	13.20	2.81

The F-statistic was employed to test the means obtained to determine whether there were significant differences on the two variables. Analysis of means of the deep and shallow processing conditions indicated that the differences were statistically significant. Participants in the deep processing condition and participants in the shallow processing condition differed significantly on the recognition of oral prose, $F(1, 72) = 4.82, p < .05$. In contrast. Although female participants performed better than the male participants as shown in Table 1, analysis of variance (ANOVA) indicates that the differences in performance were statistically insignificant, $F(1, 72) = 0.33$. Similarly, the interaction effect between levels of processing and gender was not statistically significant, $F(1, 72) = 0.16$.

Discussion

The first hypothesis that there would be statistically significant effect of levels of processing on the recognition of oral prose was confirmed. The difference observed between the mean score of participants in the deep processing condition and that of participants in the shallow processing condition was statistically significant. The finding is consistent with those of previous studies (e.g., Craik & Tulving, 1975; Bloom & Mudd, 1991); but more importantly, it replicates the original experiment. In the original explanation of levels of processing, Craik and Lockhart (1972) had argued that later memory for experiences was directly tied to their depth of processing during initial perception: the deeper the level of processing during initial perception, the better should be memory for that experience. This finding confirms Craik and Lockhart's hypothesis.

The results of this study indicate that deep processing increased following instruction to read the prose passage carefully than one instructing participants to only scan the material perceptually. Thus, it seems that levels of processing have practical implications for education. Practicing deep processing strategies promotes meaningful learning. The levels of processing framework emphasize importance of what students do while encoding information. To the extent that students are required to deal with meaning of content, their memories improve. Tasks focusing on superficial or shallow aspects of the to-be-learned materials result in poor memory for content. This researcher therefore suggests a variety of ways students could encode materials to improve their depth of processing information. These include: asking themselves critical questions about the material they study; thinking about the material in ways that would relate it to their own experience; paying close attention to details; and organizing the material in terms that can be understood. These strategies have been identified to help students remember materials they study very clearly (Gordon & Debus, 2002).

The mean score for the female participants was higher than that of the male participants. However, the difference in means was not significant. Consequently, the second hypothesis, which posited that females would significantly perform better than males on the recognition task, was rejected. The finding supports Nagae's (1985) study that no differential recognition performance exists between the genders. The result does not contradict the biologically oriented researchers (e.g., Geschwind & Behan, 1982), who cautioned that the differences often seen between males and females are too small; in fact, too small to make predictions about an individual male and female. As the gender debate rages on, the result of this study favours the opinion that men and women are more alike than they are different. However, the hard line position that no difference exists between the genders in cognitive processes, such as recognition, needs to be interpreted with caution.

The human male or female may love, work, play and have families together, but to some extent, they live in different worlds. To put it a bit more precisely, although the gender gap is narrowing down, some levels of differences still exist between males and females. For example, Nolen-Hoeksema (1999) showed that females and males respond to stress in different ways. While men are more likely to turn to alcohol when they are down and

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depressed, women tend to ruminate about the problem. The present study concludes that for future research, efforts need to be invested on evaluating the roles of the three gender variables of sex, gender roles, and sexuality, to observe which accounts for more of the variation in cognitive abilities rather than just treating the gender variable as a unit factor.

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Appendix

The Last Search

People were busy fishing out their relations from various refugees' camps. I rushed to Igwuruta, from where the bulk of refugees seemed to be streaming in. A fantastic sight greeted me. Sprawled in the school compound and all around were over ten thousand refugees. And the number was increasing every minute. The soldiers would not let them go straight to their villages. They wanted them screened and cleared first. But who could screen so many people? How long would it take? Meanwhile, hunger and exposure were taking their toll. After much persuasion the soldiers agreed to let them go after the usual search for weapons. I moved through the seething sea of humanity, trying to trace my family. It was not easy. At every step someone hugged me, weeping with joy.

"They said you were dead. We had given up all hope"

"Well, I am alive. Please, where is my family?"

"Your mother is on the way, a few miles back, maybe. I saw her."

"And my wife?"

I didn't see her. They said she is at Ata. I doubt if she has started moving".

"And my father?"

"At Mbaise."

I rushed away in search of my mother. I picked her up at Umuechen-a dirty, emaciated and utterly miserable woman, mourning for her only child. She could not hug me at first because my uncle and other relations carried me shoulder high, weeping like children. I could not stop my tears either.

Back in Port-Harcourt I joined the GOC's team to Uli. They drove so fast that I could hardly keep up. I stopped at Orlu to make inquiries. I drew blank. I rushed back to Port-Harcourt and picked up four of my soldiers. I stocked the car with food and drink and warned my

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soldiers we would not come back until I had found my family. We set out on 14 January for Ata. Our search led us to Owerri. There was a large refugee camp there, covering the entire police barracks. Many of my relations were there. And hell broke loose when they saw me. They hugged me fiercely. I could hardly breathe. I tried to peer around to look for my wife and children. I could not, so great was the crush on me. In the end I actually cried out:

"Where is my wife?"

"She has just left for Port-Harcourt."

"My children?"

"They are clinging to you."

I looked down. Two of my children were clinging to my feet. After much struggling I bent down and picked them up. I was afraid to ask for the rest, but one by one I fished them out. I took them to the car along with other relations, and stuffed them with food. I arrived at Port-Harcourt late in the evening. I rushed into the house, and my mother heaved a sigh of relief.

"Your wife arrived a short while ago. I have had considerable difficulty stopping her from doubling back to Owerri to look for you. "

Then Dora came rushing at me. We wept.

I picked up my father the next day just four miles from home. Clad in a tattered ancient black overcoat, and with a white beard, he was pushing his bicycle along with steps made remarkably steady by his proximity to his ancestral home. He did not weep as he hugged me, but I knew he felt more than everybody else.