

Preference of Students on the Format of Options in a Multiple-Choice Test

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Article Info

Article history:

Received Sep 18, 2016
Revised Nov 27, 2016
Accepted Nov 30, 2016

Keywords:

Language testing
Letter case options
Multiple-choice test
Preference
Psychology of choice

ABSTRACT

Schools in the Philippines, especially those that are offering teacher education programs, are advised to construct examinations that are Licensure Examination for Teachers (LET)-like test items. This is because “if any aspect of a test is unfamiliar to candidates, they are likely to perform less well than they would do otherwise on subsequently taking a parallel version, for example.” Using the education students of Leyte Normal University, Southern Leyte State University-Tomas Oppus Campus, and Visayas State University, this study determined the students’ preference on the arrangements/format of options in a multiple-choice test through a survey questionnaire. Moreover, it tried to find out the reasons behind the preferences. Mean, frequency and Chi-square tests were used in the analysis of data. Results revealed that the cascading arrangement is the most preferred arrangement of options and the one-line horizontal arrangement is the least preferred arrangement of options in a multiple-choice test. The reasons identified were organized and easy to read, less confusing and easier to distinguish and vertically arranged thus require less eye movement. Moreover, the reasons for the lower case preference were it is usual and commonly used in a multiple-choice test, clear and gives less eye and mental pressure and easier to read and write. And lastly, the relationship between the students’ preference of the arrangement of options in a multiple-choice test and the letter case options were tested using the Chi-square test. Hence, it is argued that in constructing a multiple-choice test, one has to consider using the cascading arrangement.

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1. INTRODUCTION

Recently, schools in the country, especially those that are offering teacher education programs, are advised to construct tests that are Licensure Examination for Teachers (LET) - like test items. This is because “if any aspect of a test is unfamiliar to candidates, they are likely to perform less well than they would do otherwise (on subsequently taking a parallel version, for example)” [1].

Multiple-choice tests are pervasive in universities or educational settings, [2] but with unknown effects on students’ knowledge. Reference [3] reported that current assessment practices need to reflect changes based on new understandings of learning theories, that new curricula are being developed, that new knowledge and skills are necessary for the 21st century, and that the accountability requirements of systems

and governments have to be there especially that assessment is an integral part of the teaching and learning process.

Structurally, multiple-choice questions or items have two parts: a stem-the question, problem, or task to be answered or solved; and a set of response options or alternatives-possible answers or solutions to the question. The options comprise of the correct answer called the key; and one or more incorrect or less appropriate answers called the distracters or distractors [4]. While the stem is an important part of a multiple-choice item, the options are no less relevant. No matter how well-written a stem is, a single flawed option can invalidate the item. As a rule, well-written options are critical for a multiple-choice test to be adjudged valid.

“People’s preferences play a significant role in a decision-making process. And the same is directly connected with satisfaction, which is one of the main dimensions of assessing the usability of *any instrument*” [5]. According to [6], there are two types of choices, the utilitarian (need) and hedonic (want) choices. When people are choosing an option, they compare it to other options within a choice set. If they compare a hedonic option to a utilitarian option, they will feel guilty choosing the hedonic option. In the case of a multiple-choice test, the correct answer could be viewed as the utilitarian option or the need.

Accordingly, sequential presentation of choices has an impact on memory. If the choices are presented sequentially, according to [7], “we develop a stronger memory and thus preference for the first and last positions. The first item will have a greater impact on long-term memory and the last item will have a greater impact on working memory. This has some implications on choice distance [7]-[9]:

- a. Choose the first position when the choice is in the future
- b. Choose the last position when the choice is immediate

Sequential presentations reduce choice satisfaction because people “hope” for a better option [9]. On the other hand, in the simultaneous presentation of choices, “*when multiple alternatives are presented together, each one is evaluated in comparison with the others*”. In a study by [10], they found out that “...choosers presented with their options simultaneously tend to remain focused on the current set of options, comparing them among each other; whereas choosers presented with their options sequentially tend to imagine a better option, hoping it will become available.” Like in the multiple-choice test where the options are presented simultaneously, test takers are prevented from “hoping” or looking for better options/answers.

In 1995, [11] found out that “*Whether people were choosing a product from a grocery shelf, deciding which bathroom stall to use, or marking a box on a questionnaire, they avoided the ends and tended to make their selection from the middle.*” With simultaneous presentations, the eyes are naturally drawn toward the center because of the central fixation bias [12] which is presented in Figure 1.

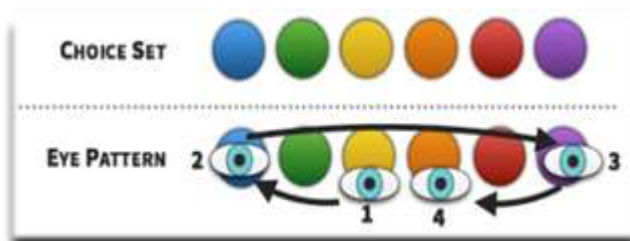


Figure 1. The eye pattern in Central fixation bias (Tatler, 2007) & Central gaze cascade effect (Atalay, Bodur, & Rasolofoarison, 2012) (with permissions from Kolenda, 2016)

According to [9], “The more you look at an option, the more you like it. The more you like an option, the more you look at it. Because we devote more attention to the central options, we become more likely to choose them.” People want their choice to be easy [9]. In the context of test taking, easy choice could mean that the arrangement of choices and texts do not contribute to confusion and much effort from the test takers.

This study explored the preferences of students on the arrangements of options in a multiple-choice test. By arrangement, we refer to the format or lay-out of options in a multiple-choice test. Specifically, the researchers sought answers to the following questions: (1) What is the preference of students on the arrangements of options and preference on letter cases of options in a multiple-choice test ? (2) What are the reasons behind their preferences ? (3) Is there a significant relationship between the students’ preference of the arrangement of options in a multiple-choice test and the letter case ?

This study was strongly anchored on two theories: the Central Fixation Bias by [12] and the Central Gaze Cascade Effect by [13]. Reference [10] believed that a person is more likely to choose from the center.

Reference [12] espoused that with simultaneous presentations, his/her eyes are naturally drawn toward the center because of the central fixation bias. And this triggers a feedback loop which is known as the central gaze cascade effect. Reference [9], moreover, said that after viewing the central options, the person still needs to view the peripheral options. So, he/she moves his/her eyes toward the left. Then, he/she moves his/her eyes toward the right-while crossing over the central options again. Afterward, he/she moves his/her eyes back to the center for balance.

With the aforementioned theories, the researchers delved into investigating the preferences of students on the various arrangements of options in a multiple-choice test. Then, the preferred arrangement of option was correlated to the preference on letter cases of options in a multiple-choice test. Then, the reasons behind their preferences on both the arrangement of options and the letter cases options were also elicited from the respondents. The schematic diagram for the theoretical and conceptual framework of this study is presented in Figure 2.

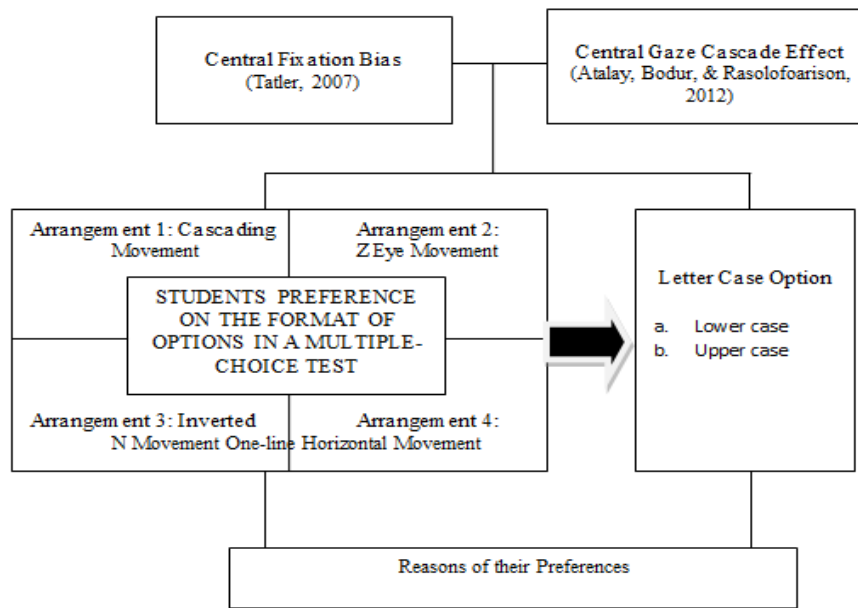


Figure 2. Theoretical and Concetual Framework of The Study

2. RESEARCH METHOD

This study employed the quantitative method of research, specifically the descriptive survey method. The qualitative method was, likewise, used to determine non-numeric responses. A total of 261 BEED students from Leyte Normal University, Southern Leyte University-Tomas Oppus, and Visayas State University were used as respondents of the study.

Thirty percent of the total population of BEED enrollees of Leyte Normal University and Visayas State University were utilized, but total enumeration in Southern Leyte State University-Tomas Oppus (SLSU-TO) capus was employed because its population was smaller compared to the two universities. In a long bond paper, the questions were written in a form equivalent to the usual printing or type script utilized in major examinations (Times New Romans, 12 font).

Here are the options of arrangement of choices:

Arrangement 1: Cascading Movement

- a. I prefer letter Q
- b. I prefer letter Q
- c. I prefer letter Q
- d. I prefer letter Q

Arrangement 2: Z Eye Movement

- | | |
|----------------------|----------------------|
| a. I prefer letter Q | b. I prefer letter Q |
| c. I prefer letter Q | d. I prefer letter Q |

Arrangement 3: Inverted N Eye Movement

- | | |
|----------------------|----------------------|
| a. I prefer letter Q | c. I prefer letter Q |
| b. I prefer letter Q | d. I prefer letter Q |

Arrangement 4 : One line Horizontal Movement

- | | | | |
|----------------------|----------------------|----------------------|----------------------|
| a. I prefer letter Q | b. I prefer letter Q | c. I prefer letter Q | d. I prefer letter Q |
|----------------------|----------------------|----------------------|----------------------|

The respondents were asked to rank from the highest to the lowest (4 being the highest preference and 1 being the lowest preference) their preferred arrangement of options in a multiple-choice test. This method was used because “the most popular ways of collecting preferences include direct ranking and pairwise comparisons” [5].

Data collected were tabulated and analysed using means, frequencies, and chi-square test. Means were used to generate interpretation of ranked data to answer the question on respondents’ preferences on the arrangement of options for a multiple-choice test. Frequency was used in determining the answers on the preferences on the letter case of options. Chi-square test was employed using the statistical software, Stata 13.0, to determine the correlation between the respondents’ preferences on the arrangement of options and their preferences on the option for the letter case. The data concerning their responses on their reasons for their choice of options were treated qualitatively in which similar ideas were grouped together.

2.1. Limitations

This study included the BEED students only; thus, the findings may not be sufficient to make generalizations and may not be applicable to all test takers.

3. RESULTS AND ANALYSIS

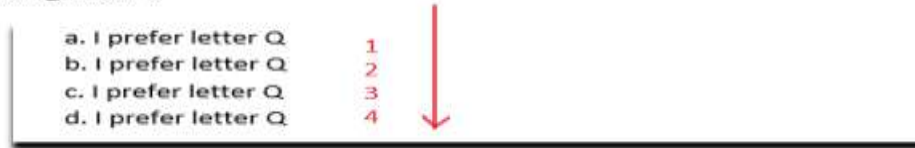
Table 1 below shows that the respondents preferred arrangement 1, with a mean of 3.50; arrangement 3 was the second preferred arrangement with a mean of 2.74. Arrangement 2 was the third most preferred with a mean of 2.07, while arrangement 4 was (is) the least preferred with a mean of 1.91.

Table 1. Mean of Arrangement of Option

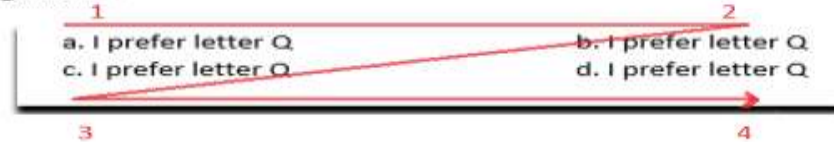
	Arrangements of choices			
	Arrangement 1	Arrangement 2	Arrangement 3	Arrangement 4
Mean	3.50	2.07	2.74	1.91

3.1. Preference on Arrangement of Options

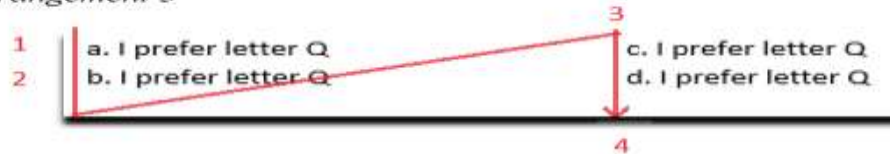
Consistent with the principles of Central fixation bias of [13] and Central gaze cascade effect of [14], Arrangement 1, (mean= 3.50) demands less strain in the extraocular muscles of the eyes, specifically the fovea, an eye muscle responsible for sharp central vision, which is necessary in humans for activities where visual detail, such as reading, is of primary importance [14]. So, the test taker can focus more on the questions, which is a requirement in a cognitively demanding task such as taking a multiple-choice test because the eyes moving up and down is less distracting than the letter Z movement of the eyes. As what [9] argued, “*People want their choice to be easy.*” In the context of test taking, easy choice could mean that the arrangement of options and texts does not contribute to confusion and much effort from the test takers. Eye movement in Arrangement 1 :

Arrangement 1

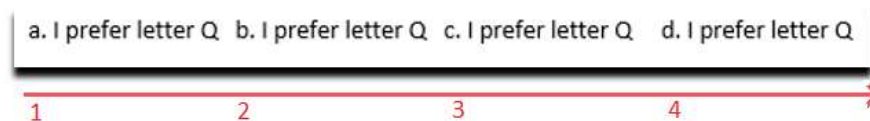
Arrangement 2 (mean= 2.07), therefore, is a classic example that goes against the principles of Central fixation bias and Central gaze cascade effect. This could explain why Arrangement 2 is ranked third by the respondents. Eye movement in Arrangement 2 :

Arrangement 2

For Arrangement 3 (mean=2.74), although it involves movement of the eyes sideways, it is less distracting because it somehow involves a little of central fixation bias and central gaze cascade effect, as observed in the vertical eye movement for the first two options which then shifts to another vertical eye movement for the third and fourth options, described as the inverted N eye movement. Eye movement in Arrangement 3 :

Arrangement 3

Lastly, Arrangement 4 involves many eye movements, thus contradicting the principles of central fixation bias and central gaze cascade effect or the one-line horizontal eye movement causes difficulty on test takers' part, because as asserted by Starr and Rayner (2001) that if parafoveal information is denied, reading rates decrease rapidly and information processing rate in reading likewise is decreases. This information obviously contradicts the principle of central fixation bias and central gaze cascade effect. Eye movement in Arrangement 4 :

Arrangement 4

3.2. Reasons for the preference on the arrangement of options

The qualitative measure of the respondents' reasons of their preferred arrangement of options include recording of these responses, classifying and grouping according to their similarity of thought and idea, and using frequencies to rank these from most to least mentioned reasons. Generally, the respondents' reasons for choosing Arrangement 1 are as follows:

1. It is organized and easy to read.
2. It is less confusing and easier to distinguish; and
3. The choices are vertically arranged and require less eye movement.

3.3. Preference and Reasons on the Letter Case Option

The lower case is the more preferred letter case option than the upper case. The reasons for this preference are: (1) It is usual and is the most commonly used in a multiple-choice test; (2) It is clear and gives less eye and mental pressure; and (3) It is easier to read and write.

3.4. Relationship between Preference in the Arrangement of Choices and Letter Case

Table 2 presented the crosstabulation of the arrangement of choices and the letter case options. It is shown in the table that since the chi-square test ($p=0.482$) is greater than the 0.05 level of significance, the null hypothesis (H_0) is accepted. Thus, there is no significant relationship between the students' preference of the arrangement of options in a multiple-choice test and the letter cases of option. The solution is shown the Table 2.

Table 2. Cross-tabulation of the arrangement of choices and letter case

Lettercase	arrangement				Total
	1	2	3	4	
lower	105 102.3	17 14.9	24 28.2	4 4.6	150 150.0
upper	78 75.7	9 11.1	25 20.8	4 3.4	111 111.0
Total	178 178.0	26 26.0	49 49.0	8 8.0	261 261.0

Pearson chi2 (3) = 2.4621 Pr = 0.482

Solution:

Hypothesis:

H_0 : There is no significant relationship between the students' preference of the arrangement of options in a multiple-choice test and the letter cases of option.

H_a : There is a significant relationship between the students' preference of the arrangement of options in a multiple-choice test and the letter cases of option.

Test stat value: 2.4621; p-value: 0.482

Decision on H_0 : Do not reject H_0 .

Conclusion: Since the chi-square test ($p=0.482$) is greater than the 0.05 level of significance, the null hypothesis (H_0) is accepted. Thus, there is no significant relationship between the students' preference of the arrangement of options in a multiple-choice test and the letter cases of option.

4. CONCLUSION

With the findings abovementioned, it is concluded that when one constructs a multiple-choice test, one should consider using the cascading arrangement. There is a need to further investigate the correlation of the preference of the arrangement of options in a multiple-choice test and the letter cases of option with the language test results of the students in a teacher education program.

ACKNOWLEDGEMENTS

We would like to thank Dr. Norberto E. Milla, Prof. Lorena Ripalda, Prof. Jocelyn Bayrante, Prof. Lyziel Bongcaras, and all the BEED respondents.

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