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Recall Ability Affected by Modality of Presentation

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Abstract

The relationship between the modality of presentation of paired associates and recall ability in both visual and auditory learners was investigated. Participants for this study were college students (N=41). They read definitions that characterized visual learners and auditory learners and then self-reported their preference. Participants then received one auditory and one visual list of paired-associates. After each list, participants wrote down the word pairs they could recall. Analysis showed no significant main effect of self-reported learning style or of list-type. Analysis did show a significant interaction between list-type and self-reported learning style. Results indicated that auditory learners had better recall ability when the information was presented auditorally and that visual learners had better recall when the information was presented visually. These findings suggest that schools should use learning styles as a tool in teaching students and that students should understand their own learning style in order to help themselves learn information more easily.

Recall Ability Affected by Modality of Presentation

Learning styles have been investigated for years. Numerous inventories to determine one's preferred learning styles now exist. Learning styles are important to students and teachers. They offer an understanding of why students learn differently and help teachers to modify their teaching styles to be more inclusive of all learning styles. Certain Learning Style Inventories are found to be better than others. Fleming and Mills (1992) concluded that Learning Style Inventories that use a modal approach are good resources for students as they help one to recognize his/her preferences for study. Modal approaches offer scores in multiple categories of learning styles so that one realizes that learning can occur even when the most preferred learning style is not offered. These approaches offer a complete picture of one's learning style. Fleming and Mills (1992) recommend that teachers use different forms of presentation to reach students of all learning preferences and that students use their learning style knowledge to adjust study methods.

Not all studies have resulted in findings of students with multiple significant learning style preferences. Ladd and Ruby (1999) found a concrete preference when they studied international students' learning preferences. Using the Canfield Learning Styles Inventory they found that international students preferred experience to lectures even though most had formerly learned with lectures in their home countries.

More in depth studies on learning styles have been conducted to find which is best. Jensen (1971) determined that auditory information was better in immediate recall than visual information and that visual was better for delayed recall. DeBoth and Dominowski (1978) conducted a study to better understand how learning styles might affect learning within a classroom. They used larger amounts of material than Jensen and lengthened the time between learning and recall. They

concluded that there are many differences in learning between subjects, but that learning in an individual is stable. McCall and Rae (1974) also studied learning preferences in learning word pairs. They found that performance was always better when the words in the pair had “high meaningfulness.” They also concluded that visual presentation is better than auditory presentation of paired associates and that combined audio-visual presentations did not result in more or better learning. Instead, results showed more recall when information was presented in only one mode of presentation.

Zicha (1997) took this information one step further when she conducted a study on disabled students’ modality preferences as related to instruction. She concluded that there were differences between auditory learners receiving the auditory instructions and auditory learners receiving visual instructions, but they were non-significant. However the differences between auditory learners receiving visual instructions and visual learners receiving auditory instructions were. Significant differences also occurred between visual learners receiving visual instructions and visual learners receiving auditory instructions. It seems that the modality of presentation, in this case, did make a difference in the response of disabled students.

The literature review shows that learning styles play an important role in students’ lives and that learning style inventories are important tools for students and teachers alike (Fleming & Mills, 1992). One’s preferred learning style affects the ability of students to learn information presented in various modes (DeBoth & Dominowski, 1978; Jensen, 1971; Ladd & Ruby, 1999; McCall & Rae, 1974; Zicha, 1997). The purpose of the present study was to understand the relationship between the modality of presentation of paired associates and recall ability in both visual and auditory learners. Based on the aforementioned research, it is hypothesized that the

modality of presentation will affect recall ability so that those who categorize themselves as auditory learners will have better recall when word pairs are presented auditorally and those who categorize themselves as visual learners will have better recall when word pairs are presented visually.

Method

Participants

Forty-one college students participated in this study. Volunteers were students of the University of Central Arkansas. Participants were recruited from various psychology courses.

Materials

Two lists of word pairs were used in this study. The word pair lists were developed by the researchers so that they would relate to all participants equally. For example the words were screened to make sure they were not more appropriate for one gender. Also each word in the pairs did not relate to the word it was paired with or to the other words in the list. A Superlab program (Cedrus Corp.) on PC computers was used to instruct participants, present the information, and for debriefing purposes. Headphones were used to present the auditory lists. A writing utensil and a piece of paper with boxes to check one's preferred learning style and two sections to be used for listing recalled words from each mode of presentation were provided for data collection.

Procedure

Participants gave their permission by signing their name to a participant list before any testing was conducted. Participants entered the lab and began the Superlab program that first presented an introductory screen with instructions followed by a screen presenting definitions of

both visual and auditory learners. Auditory learners are those who learn better by listening to information and prefer to repeat information out loud when trying to learn or memorize. In contrast, visual learners prefer to see charts and graphs of information and use flash cards or repetitive writing to learn or memorize information. The participant chose which learning type applied and marked it on the piece of paper provided. Then the Superlab program provided instructions to the participant and presented each word pair in the appropriate list for five seconds. The order of lists and the mode in which it was presented was assigned randomly. After the first list was presented, participants were given two minutes to write down all the word pairs they recalled from the list. After the two minutes of recall, instructions were again given for the next list. This list was presented in the mode opposite the previous list so that if the first list was visual then the second was auditory. Each word pair of this list was presented for five seconds followed by another two minutes for recall. When these two minutes expired, a debriefing screen appeared on the computer and the participants were allowed to leave.

Results

The design was a 2x2 mixed design. One independent variable was the self reported learning style which was a between subjects variable. The other independent variable was the mode of presentation, a within subjects factor. The two dependent variables were the auditory recall scores and the visual recall scores. Data were scored by counting the number of correct word pairs recalled by each participant. Homonyms were accepted as correct (i.e., pull and pool). Also, other words that might have sounded alike over headphones were accepted (i.e., hat and cat). If the word pairs in the recall lists were written vertically they were considered to be correct if the two words from the pair were written in sequential order. Any problems in scoring were

dealt with on a case by case method. The data were analyzed using an ANOVA. The hypothesis stated that the modality of presentation will affect recall ability so that those who categorized themselves as auditory learners will have better recall when word pairs are presented auditorally and those who categorize themselves as visual learners will have better recall when the word pairs are presented visually.

Table 1 provides summary data. It shows the mean, standard deviation, and number of participants by the type of learner and type of list. Analysis showed no significant main effect of self reported learning style $F(1,39)=0.414, p=0.524$. Analysis showed no significant main effect of listype $F(1,39)=0.025, p=0.875$. Analysis did shows a significant interaction between listype and self-reported learning style $F(1,39)=6.092, p=0.18$. Figure 1 shows that auditory learners had better recall when the word pairs were presented auditorally. Also, the auditory learners scored higher than the visual learners when the word pairs were presented auditorally. The same is true for the visual learners. They scored higher when the word pairs were presented visually rather than auditorally. Also, they scored higher than the auditory learners when the word pairs were presented visually. The null hypothesis for both of the main effects was retained and the null hypothesis for the interaction effect was rejected.

Discussion

The present data showed that the modality of presentation does affect recall ability based on self reported learning ability. As our hypothesis states, the modality of presentation did affect recall ability so that those who categorized themselves as auditory learners did have better recall when word pairs were presented auditorally and those who categorized themselves as visual learners had better recall when word pairs are presented visually. These finding clearly show that

one does learn better when information is presented in a way that best fits one's learning style.

The present study only offered two types of learning styles for the participant to choose from. Fleming and Mills (1992) favored a modal approach to determine the best way for one to learn. Although the Fleming and Mills (1992) study is valid, the present study showed that preferences can be found that affect one's recall ability even when using only two types of learning styles. This offers support to Ladd and Ruby's (1999) findings of a significant learning style among international students.

The study does not really compare to Jensen's (1971) study that determined which modality of presentation was better in the different types of recall (immediate or delayed) or to McCall and Rae's (1974) study that found better recall in word pairs with high meaningfulness. The recall time was not manipulated in the present study and the researchers paired the words together so that they did not have high meaningfulness. The present study also does not align itself in comparison to DeBoth and Dominowski's (1978) findings that there are many different learning preferences between subjects, but that learning is stable over time. However, the reasoning behind DeBoth and Dominowski's (1978) study does compare to the present study. Both study's were conducted because the researchers wanted to know if learning styles affect learning within the classroom and if so, how. Even though these studies did not really compare to the findings of the present study, they did offer understanding to the researchers about learning styles and the part they play in recall.

The findings of the present study were in complete agreement with the finds of the Zicha (1997) study. Both studies found differences between auditory learners receiving auditory stimulation and visual learners receiving visual stimulation. Also, differences were found between

visual learners receiving visual stimulation and visual learners receiving auditory stimulation. Zicha found differences between auditory learners receiving auditory stimulation and auditory learners receiving visual stimulation. The last results were not significant in Zicha's (1997) study, but were in the present study. Zicha (1997) used instructions as stimulation while the present study used word pairs.

The findings of the present study have the capability to change the way schools teach. Most schools do not bother discovering a child's learning style before trying to educate them. The findings of the present study suggest that each child should be tested or even give a self-reported learning style before the school attempts to teach them. After the learning preference is known, a teacher can better understand how to help that child learn.

This study also has the capability to help people understand their own learning styles. This could give them an idea about how best to try to learn some piece of information they need to be able to recall. Those who are auditory learners would need to find a way to have the information presented to them auditorally while studying and the visual learners need to use visual stimulation while studying. The results of the present study clearly show that the differences between learning preferences do affect the recall ability of a person.

The present study does have some shortcomings. Only two learning styles were available for the participants to choose from, although most researchers agree that there are at least four different learning styles. Also, only word pairs were used as recall material. The result might have been different if passages or other materials were used as information to recall. Also, all the participants were college students. The result might have turned out differently depending on the participants. The scoring had some problems as mentioned above. If an example had been used to

better explain what the researchers wanted, those that did not write the word pairs vertically would not have been counted as correct. Both the change in scoring policy and the addition of an example might have changed the scoring of some participants, changing the overall results.

In the future, this project could be expanded upon. Many different age groups could be tested to see if these results hold true at any age. Also, participants could be retested using new lists every few years making the study a long term study. Another expansion could include adding more learning styles to the presentation of information so that all learning styles could be compared. These suggestions would help in the understanding of recall ability in those of each learning style presence and of all ages. This information would help in the overall understanding of learning styles and the part they play in our lives everyday.

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Table 1*Summary Data for Visual and Auditory Learning Scores*

Score	Learner	Mean	Standard Deviation	N
Visual Score	Visual learner	5.29	3.21	28
	Auditory learner	3.46	2.11	13
	Total	4.71	3.00	41
Auditory learner	Visual learner	4.00	2.24	28
	Auditory learner	4.92	2.69	13
	Total	4.29	2.40	41

Figure Caption

Figure 1. Mean number of word pairs recalled as a function of type of learners and list type.

