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The effect of incongruent audio and visual stimuli on memory of written words.

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ABSTRACT

This study investigated the effect of incongruent audiovisual stimuli on people's memory of written words. Twenty adults participating in the experiment were asked to memorize written words while discriminating the audio stimuli. In one condition, the video showed had congruent audiovisual stimuli while in the other condition, the video had incongruent audiovisual stimuli. The hypothesis was that people with video that had the same audio and visual would remember more words than the people with video that had conflicted stimuli. The results paired with the t-test indicated that the number of words recalled by the participants with matched audiovisual video is significantly higher than the number of words recalled by the participant with video that had different audio and visual. This supported the hypothesis showing that the auditory has an effect on word recalling. This finding can lead to future researches on improving memory by combining the audio and visual stimuli.

1. Introduction

People have selective attention, which allow them to focus only on certain stimulus, and what we fail to notice, we fail to encode it into memory (Myers & DeWall, 2015). The two-track mind help us process many information simultaneously on different levels of consciousness. However, since both visual and auditory stimuli are encoded through effortful processing, selective attention keeps them from happening at the same time. Moreover, echoic memory also lasts longer than iconic memory. As the results, many would find concentrating and memorizing while distracted by irrelevant sounds difficult.

Many studies have assessed the effect of incongruent audiovisual stimuli on perception. People would show both auditory input discrimination impairment and slowed visual process while performing discrimination tasks regardless of being instructed to only pay attention to the visual stimuli or not (Dunifon, Rivera, & Robinson, 2016). Participants were to determine if the paired stimuli were the same after presented with either the unimodal condition or one of the cross-modal condition of which either stimuli could be different. The ANOVA test showed that visual discrimination was slower in the cross-modal condition and that the participants' responses were slowed down without the conflict between changes of the two stimuli. Experiment 3 presenting an eye tracker indicated similar results. Eye movement pattern and EGG were also used

for in dept researches indicating that people memorize better with matching sound (Marandi & Sabzpoushan, 2014) and respond with high accuracy faster in discrmination tasks with congruent audiovisual stimuli than with incongruent audiovisual stimuli (Harrison, Witheridge, Makin, Wueger, Pegna, & Meyer, 2015).

The current experiment investigated the effect of mismatched audiovisual stimuli on written word memorization. Participants were asked to recall a list of words after seeing a video with either incongruent auditory or congruent one. Building around previous researches as well as the selective attention theory, it was hypothesized that participants would able to recall more words when showed the video with same audio and written words than the video with different audio and visual.

2. Methods

2.1 Participants

Twenty volunteers, recruited around View Royal neighborhood, participated in the experiment. These included 12 females and 8 males ranging from 18 to 39 years of ages with the average of 23.9. They were later randomly assigned into two groups of ten: Congruent Audiovisual Stimuli Group and Incongruent Audiovisual Stimuli Group.

2.2 Materials

Two videos were used in this experiment. Each video contained 20 words, each word was showed for 2 seconds. All words were written in 180-point black and white Time New Roman font. There were two sets of words. One set had the audio that fit with the visual and the other one was mismatched (see Appendix A for the lists of words used in this experiment). Other material included a laptop, a set of headphones, a stopwatch and a consent form. The one-page consent form providing a brief information about the study as well as the participants' right was printed on a 8.5 x 11 inches white paper in 12-point Time New Roman font (see Appendix B).

2.3 Procedure

Participants were approached and asked if they would like to take part in an experiment. After being briefly informed about the study purpose and agreeing to participate, the participants were asked to read and sign the consent form. Participants were then seated near window with suitable brightness to have a good look at the screen. The researcher then randomly gave the participants either the video with matched audio or the video that had the audio that are different from the written words and asked the participants to put on their headphone. The instructions were to watch the video and verbally recall the 20 words that were written on the screen in 90 seconds while ignoring the audio. The participants were also told that if more than 20 words were spoken, only the first 20 would be recorded unless the participant explicitly fixed during the time limit. The number of correctly recalled words was recorded by the researcher. Finally, the researcher debriefed the experiment and thank the participants for volunteering in the study.

3. Results

The level of significance set in this experiment was .05. The mean of the number of written words recalled for the Congruent Audiovisual Stimuli Group was 12.1 (SD = 4.18). The mean of the number of written words recalled for the Incongruent Audiovisual Stimuli Group was 7.9 (SD =

Table 1

Means (and Standard Deviations) of number of words recalled by the Congruent Audiovisual Stimuli and Incongruent Audiovisual Stimuli Groups.

	Auditory Condition	
	Congruent Audiovisual Stimuli	Incongruent Audiovisual Stimuli
Words Recalled	12.1 (4.18)	7.9 (3.7)

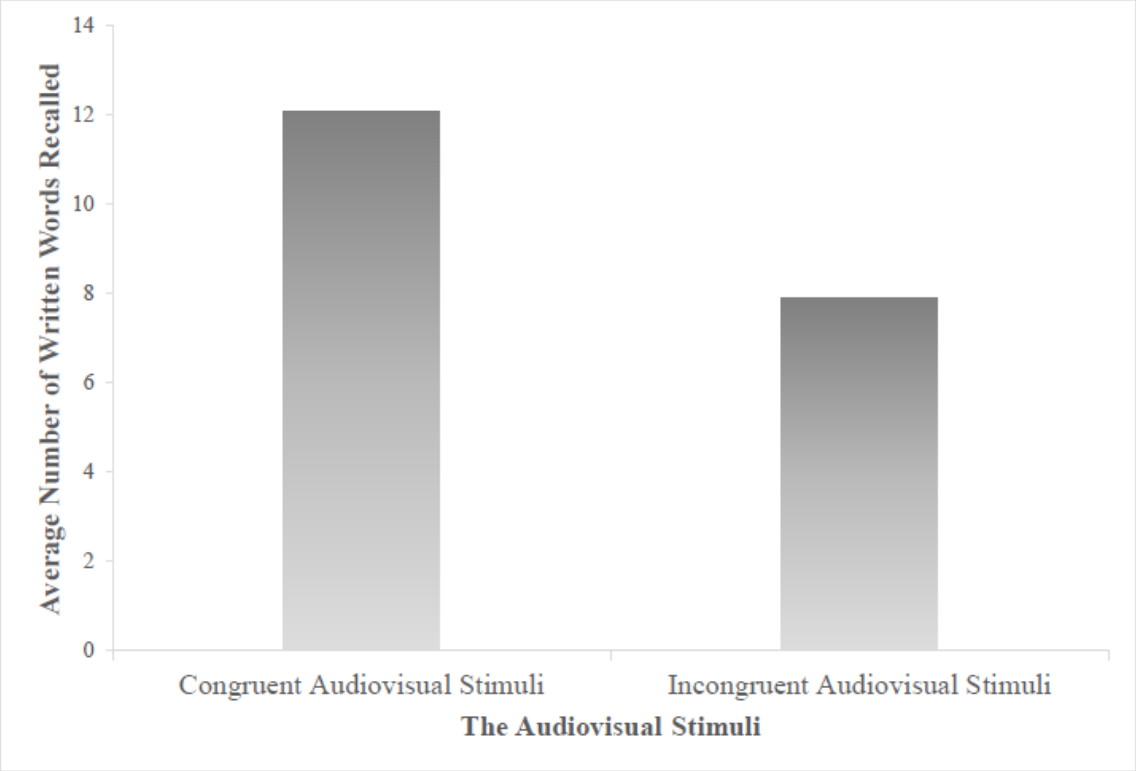

Figure 1. The average number of written words recalled by the Congruent Audiovisual Stimuli and Incongruent Audiovisual Stimuli Groups.

3.7). These data were analyzed using an independent sample t-test and the results were significant, $t(18) = +2.38$, $p = .029$, suggesting that people remember more written words when the audio and the words showed on the screen are the same than when the audio and visual are different.

Discussion

The hypothesis that incongruent auditory would impair people's memory of written words was supported by this experiment.

These findings are in line with the research conducted by Dunifon, Rivera, and Robinson (2016) showing that people have

difficulty in discriminating visual stimuli when the audio stimuli are different. The results are also consistent with those of Marandi and Sabzpoushan's study (2014) which revealed that people's memory will benefit from matching sound and visual.

These findings have important application in educational setting. Students could benefit greatly if immerge themselves in environments with matching sound to what they study rather than those with distracting sound. Teachers may want to combine lectures with writing lessons on boards or slides to increase efficiency. Discussions could create an audiovisual stimulating environment which help students focus as well as memorize lesson faster. These findings also imply that people can't fully focus while doing multitasks that require both visual and audio perception.

In the current study, participants were asked to verbally recall the written words. It is to be further investigated if incongruent audio has the same effect on recalling by writing words down. The role of decision criterion also needs to be examined, that is if the way the questions is shaped will affect the number of words recalled. Other future researches could also take another approach with related audio stimuli and their influence on memory.

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Appendix A

Lists of words used in the experiment

List 1: Pronunciation of the words	List 2: Pronunciation of the words in List 1
Words	Black
Cheese	Iron
Orange	Heart
Pain	Moral
Brother	Home
Donut	Sun
Technology	Snake
Rejection	Vision
Dagger	Mischief
Music	Winter
Anger	Surprise
Doctor	Ice
Chaos	Self
Perception	Tea
Chocolate	Wine
Panther	Thunder
Hammer	Mission
Always	Spider
Line	Mind
Captain	Magic

Appendix B

Consent form used in the experiment

A Study on the Psychology of Audiovisual Memory

This study is investigating the influences that effect people's memory. Before taking part in this study, please read the consent form below. If you understand the statements and freely consent to participate, please provide a signature and date at the bottom of the page.

Consent From

This study is designed to understand which factors might contribute to an individual's memory capacity. The study is conducted by An Ton, a student of psychology at Camosun College for the partial fulfillment of the requirement for Psychology 110, Experimental Psychology. The study has been approved by the instructor of the course, Grace Chan.

Participation in the study typically takes approximately 5 minutes and is strictly anonymous. All responses will be kept completely confidential, and in no case will responses from individual participants be identified. Rather, all data will be pooled and then analyzed.

Participation in this study is voluntary. Participants may withdraw from the study at any time. Participants begin by watching a video showing a list of words and will be asked to recall them.

If participants have further questions about this study or their rights, they may contact the principal investigator, An Ton (glawcc.nit@gmail.com) or the course instructor, Grace Chan at 250-370-3271 (ChanG@camosun.ca).

If you are 18 years of age or older, understand the statements above, and freely consent to participate in the study, please sign below:

Signature: _____ Date:_____