

The Impact of Pictures Bright or Dark Degree to Human's Memory

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ABSTRACT

Short-term memory is useful in our daily life, whether for remembering something common, for instance, telephone number or anything else, short-term memory helps us a lot. In order to learn it more clearly, my group decided to do some research about that. After discussion, we made sure the area of our research, which was the relationship between short-term recognition memory and the bright or dark degree of pictures. Through the research, we can get the result was that people who age is from 16-17 had a high rate of forgetting those pictures which were bright colour. However, what made us surprised was that the teenagers at the same age, for the color which was in dark, like black or brown, they had a high rate of remembering those pictures. In this experiment, we completed something that the old generation haven't done before, but also, it had some limitation. For instance, it did not have the basis of previous studies, the operation also brought some small deviations in the result. In addition, the experiment did not have enough participants for it to have a nice and complete analysis, which also could be improved in the future research. What's more, those pictures that were used in experiment were limited. Before our study, there were some prior researches that investigated the memory capacity and supported that there is enormous memory capacity for storing pictures of objects and scenes.

Keywords: Memory, Colour, Cognitive approach, Short-term recognition memory.

1. INTRODUCTION

In order to understanding memory easily, a small task was created because of it. Or the participants to look for only 3 seconds, and ask those participants what do they see. Some of them will tell me that they can see the main part of the office, which means that they can only remember the dark colour part of this picture while other bright colour part they just have a vague memory, or some of classmates even cannot remember those bright colour part. And here's a surprise is that most people can only remember the dark parts of the picture, for example, those black chairs or dark green plants. But other section of this office they could not have a clear memory.

As we all know, memory is one of the most important things to us, but there is no experiment that can tell us what impact of picture bright or dark degree on memory. Short-term memory are useful in our daily life, whether for remembering something common, for instance, telephone number or anything else, short-term memory help us a lot. To improve the blank and limit of this area

of memory, our group take this experiment. Short-term memory is useful in our daily life, especially teenagers. Why? Because if we have a bad memory, we cannot get a good mark, and we will always forget things in our lives. Predecessors didn't make much research on our topic, but they did other relevant research.

Short-term memory can be used at anytime, also it just needs a few seconds to remember some small things such as a telephone number or some smell, it is an active memory. It is considered that the time of duration uses second to record. What's more, short-term memory can hold the memory just recorded, but it cannot operate it. In contrast to the long-term memory, it cannot save the memory for long time even permanently. But long-term memory can. In addition, "Miller's Law" was created to test the short-term memory which also is famous research, which also called "Magical number 7". This task is used to test human memory that how many numbers can they remember once, and the result is 7, sometimes will plus or mine two.

We all now know that sometimes our memory will trick us and memory is classified into short-term memory, long-term memory and semantic memory. We learned how does the brain process information and how does the sensory memory (information) become short-term memory, and how the short-term memory becomes long-term memory. We study difference memory, for instance, episodic and semantic memory. Episodic memory means a memory about a specific place, events or time, but semantic memory is a fact.

Furthermore, in the extra research, Short-term memory is the capacity for holding, but not manipulating, a small amount of information in mind in an active, readily available state for a short period of time [1]. For example, short-term memory can be used to remember a phone number that has just been recited. the duration of short-term memory (when rehearsal or active maintenance is prevented) is believed to be in the order of seconds.

Colour is one of the most significant factors of human perception [2]. In terms of the relationship between colour and memory [3], colour also serves as an important function that signals and facilitates perceptual and cognitive organization [4]. Individuals who looked at a black and white newspaper ad had a 6% unaided recall rate whereas those who looked at the same as in had a 21% unaided recall rate. According to this result, we wanted to find that whether people can memorize darker or brighter by using PSYCHOPY, which was our directional hypothesis.

To explore our aim, we operationalized our variables. The independent variable was the image from a website, which measured as four main differences, including red, white, black and green respectively. The colours of red and black are defined as relatively dark, while the white and green are bright ones. There were two dependent variables. One is the “remember” or “not remember”, another one is the extent of memory, which were operationalized in the response in PSYCHOPY [5].

2. METHODS

2.1. Participants

Participants were 35 students consisting of both females (18) and males (17). These participants were in same grade (senior 2) and selected by opportunity

sampling in an international high school (RDFZ Chaoyang Branch School, Beijing No. 80 High School International Department). All the participants were not colorblind or color deficient or vision problems. Besides, we had already informed participants they would involve in an experiment, which would not hurt them physically or mentally. In addition, participants knew that they have the right to pause or quit the experiment.

2.2. Process and materials

There were totally three conditions, and all participants would enter each condition, which was an example of repeated measures design. Firstly, participants would see an introduction to the experiment. After that, they will see the first condition, including 12 images as a stimulus with main 4 different colours and each of them in 3-seconds intervals.

Next, participants would see the introduction of the second condition. There was an important point is that the duration of this introduction was the same for each participant, 30 seconds for each, since the time for recalling was one of the control variables in this experiment.

Then, the second condition would be manipulated by PSYCHOPY with 15 images as a stimulus, 12 of them were old, 3 of them were new. Participants should type “right” (remember) or “left” (not remember) to present they remember or not. The reason for increasing 3 new images was too strong the internal validity and reduce demand characteristics.

To be more specific, students did not see the 3 new images in the first condition, if they choose “remember” during the second condition with those new images, they might have already known the aim of our experiment. Thus, it is easy for us to eliminate the confounding variables and delete the invalidity figures. In addition, when people see those images again, they might recall them all clearly due to a few images and short time, which perhaps cannot distribute the data with a difference.

The last step for participants was to type “1” or “2” to show the extent of their memory. In this case, participants will see the third time of those images in the same order as the second condition, if they remember clearly, they should type “1”, if they remember misty, they need to type “2”. All the data would be recorded.

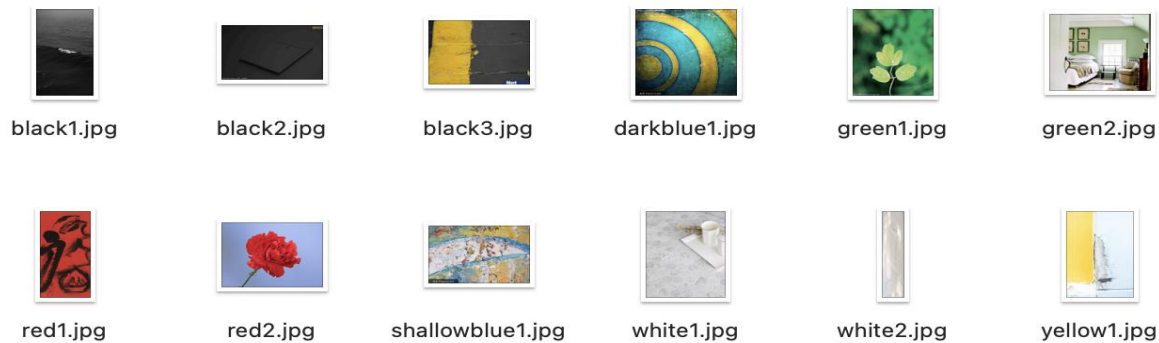


Figure 1. Pictures in the present study.

The images were selected in Bing website with different colours and brightness. The brightness was determined by eight students who studied psychology in RDFZ Chaoyang Branch School. The eight students categorize these images into the bright group and the dark group. If more than three students disagreed the categorize with the images, the images would be deleted. Each image needed to be supported over five students. For example, the white1 image was classified into the bright group by 7 students, so that this image would be identified as the bright one.

At the end of the experiment, the participants would be asked whether they had already guessed the real aim

of the experiment before we debriefed them, there were 4 people who thought this is an experiment about the relationship between the memory and the colour of the images. Therefore, four participants' data were deleted.

3. RESULTS

The recognition performance and memory clarity of the picture which in different lightness conditions are shown in Table 1. The accuracy and clarity of the subjects' memories of pictures with different lightness are shown in Table 2.

Table 1. Descriptive statistics under different lightness conditions (N = 31)

	recognition performance (M ± SD)	memory clarity (M ± SD)
Bright	0.89 ± 0.13	0.59 ± 0.14
Dark	0.96 ± 0.09	0.90 ± 0.25

Note: M, mean; SD, standard deviation. Bright colors: white, red, yellow, pink, orange. Dark colors: black, dark blue, green, shallow blue.

Table 2. The percentage of memory of the images with different lightness (N = 31)

color	not remember	not clear	member each	All (N=31)	rate of not remember	rate of not clear
white	20	30	3	90	22.20%	33.30%
red	4	31	3	90	4.40%	34.40%
yellow	2	3	1	30	6.60%	10%
black	2	1	2	60	3.30%	1.70%
DB	1	0	1	30	3.30%	0%
green	2	3	2	60	3.30%	5%
orange	2	26	1	30	6.60%	86.70%
pink	1	27	1	30	3.30%	90%
SB	2	2	1	30	6.60%	6.60%

In order to compare whether there are significant differences in the subjects' image recognition performance and memory clarity under different lightness conditions, a repeated measurement t-test was used for analysis in this study. The results showed that, on the whole, the subjects' recognition performance was significantly higher for the low-brightness pictures than for the high-brightness pictures ($t = 3.48, p = 0.002 < 0.01$, Cohen's $d = 0.63$), also the short-term memory of the

low-brightness pictures is clearer than those high-brightness pictures ($t = 7.48, p < 0.001$, Cohen's $d = 1.53$).

Through the data of this experiment, it shows that participants have a short-term memory of most of the pictures. A small amount of the pictures that had not remembered, the color of the most focus on the main part is a bright color. In this, the main part is white color have not remembered is accounted 22.22% while other bright color photos cannot be remembered also have a great percentage, for instance, orange, yellow. They have 6.66%

as well. Therefore, we can infer that people will have a high forgotten rate of bright color pictures for comparison with those dark colors pictures.

But the data analysis of the next set of data, for most of the participants, they were having vague memory. Comparing with those dark color pictures, some bright colors will more easily have a vague memory for people, for example, white, red, orange and pink. They have a high degree of having vague picture memory. About this, pink makes up for 90% percent of the whole experiment which is the largest data. What's more, the proportion of orange is 86.7% percent. Moreover, there are 33.3% for white and 34.4% for red. But for those dark colors such as black and dark blue, those responses have a low forgotten rate, only 1.7% or even all of them were remembered.

According to those data, the point is that people always have a good memory of dark color pictures. The recognition memory depends on the color of learning knowledge about the color of nature the surface property color is part of the memory representation. For those bright color pictures, they will have a vague memory, or even have a high forgotten rate of them.

4. DISCUSSION

In this study, what we have found was well aligned with the prior study [6]. From our perspective, our result can be summarized into one paragraph, which is that we have a good and clear memory about those dark sections of those pictures and have a high forgotten rate of those bright color parts. We can infer that, if we integrate this result into our daily life is that if we want to have a good and deep impression on others, we can wear dark color clothes such as dark suit, especially when someone goes to a company interview. What's more, our research also has limitations. For instance, our research is lack of participants because we don't have much time to find more participants, in the future, we will find more people to attend our test, and this is also good for us to find more correct theories.

People always have a good memory of dark color pictures, but for those bright color pictures, they will have a more vague memory, or even have a high forgotten rate of them. It's not as same as our Traditional cognitive that people always easier to remember the bright color or the color they like. According to our research, people always have a better memory on remember a dark color, and easier to forget bright colors.

Although we finish our research well, there is still exist some limitation in our research. Firstly, there were plenty of confounding variables, such as the noise. It is difficult to control other students in the classroom. However, it can be solved by the standard environment. For instance, we can allow all participants to do the PSYCHOPY in the same and quiet room.

Secondly, this is a repeated measures design, which means participants can see all conditions. Hence, it is possible some participants can guess the aim of our experiment. This might lead the demand characteristic to occur. For instance, there were 10% of participants chose to remember in the pink image and around 14% of participants chose remember the orange image in the second section. However, these two pictures haven't been put in the first section. There might be demand characteristics.

On the other hand, we haven't tested students' initial memory ability, which can be one of the participant variables. Because we cannot guarantee all students have the same ability of memory, the students who have better memory performance are more likely to recall more images. This can be solved by testing their memory before they do the PSYCHOPY and we separate them into the corresponding group.

The last problem is generalizability. This experiment only had 35 senior students participating in the experiment, the result cannot be applied to the elderly or the young. Because of these drawbacks, our result of the experiment might be inaccurate and invalidity, according to Herrera-Morales et al. [7], colour is more likely to manipulate long-term memory than short-term memory. Thus, different designs have produced varying results; this study did not find coloured vision stimuli to have an influence on long-term memory or compare with short-term memory as well. In summary, the result validated our hypothesis. However, there are some limitations and weaknesses of our experiment.

5. CONCLUSION

The results did significantly validate the hypothesis. Regardless of the dark or bright degree of pictures, it has an influence on people's short-term recognition memory. To be more specific, people have better short-term recognition memory on dark colors, such as black, than the bright colors, such as white. Through the experiment, we only used the PSYCHOPY to test the relationship between short-term memory recognition and the color of pictures, however, there are some other methods could be conducted. Besides, compare short-term memory recognition and long-term memory recognition on color of images also can be investigated. Thus, there are lots of different aspects which are able to be explored in favor of varying needs in psychology and society.

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