Can Subliminal Messaging Be Used to Influence the Decisions and Choices of Middle and High School Students?

Ayeza Moheet

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Objective: The purpose of this project was to examine the effectiveness of subliminal messaging in influencing the choices of middle and high school students. Subliminal messages are signals below the threshold of conscious awareness, and are used in advertising to influence people's choices. It was hypothesized that exposing students to a video with subliminal messages would significantly influence their choice of color (green) or number (three).
Method: This was a single blinded, randomized control trial of 42 participants. A five minute video with lowered frequency auditory (18 hz) and subvisual subliminal messages (10 milliseconds) embedded in it was developed, with the purpose of influencing preference for the color green and the number three. The same video without subliminal messages was used as the control video. Participants were asked to watch the video for five days then complete a questionnaire on the final day to test their preferences for a certain color or number.
Results: 42 students were recruited, half were randomized to watch the experimental and half to watch the control video. Survey results showed that the experimental group did not have a higher preference for the number 3 or the color green, as compared to the control group, after using fisher's exact test to correct for multiple comparisons.
Conclusion: These results indicated that the methods of subliminal messaging used in the study did not influence the choice of the participants.
Future Research: This was a pilot study, which provided feasibility data on subliminal messaging methods and trial design and recruitment. Utilizing insights from these data it is planned to design a larger study in which the impact of subliminal messaging on behavior will be tested, to see if subliminal messaging can be used to promote healthy eating habits.

Keywords: Subliminal Messaging; middle and high school students; behavioral science; affirmations; influencing behavior; randomized control trial 2Subliminal Messaging; middle and high school students; behavioral science; affirmations; influencing behavior; randomized control trial 2

Introduction

Subliminal messages are defined as signals below the absolute threshold level (ATL) of our conscious awareness. Absolute threshold is defined as the lowest level of stimulus we can detect, be it visual, auditory, or sensory, etc. When an external stimuli falls below ATL, it cannot be detected consciously[1]. Absolute threshold levels fluctuate based on various factors such as age, fatigue, and environmental conditions, even in the same individual. It is measured most commonly using the method of limits, which involves the experimenter gradually increasing the stimuli intensity until the observer detects a change[2]. ATL has applications ranging from product testing to diagnosing sensory deficits, and is a key concept in psychophysics[3]. Subliminal perception is believed to be a result of a deliberately designed communication technique aimed at generating a response, so that people will do things they wouldn't ordinarily do. The mind consists of two interacting parts: the conscious and subconscious. The subconsciousness is more powerful than consciousness when it comes to processing information, with research indicating that while our senses take in approximately 11 million bits of information per second, the conscious mind can process only about 40 to 50 bits per second. This suggests that the vast majority of sensory data is handled unconsciously[4].

Subliminal messages appeal to the subconscious mind. They work through a process in which external sensory stimuli work to trigger reactions without us noticing the signals. As shown in figure 1, there are two types of visual subliminal messages and three types of auditory subliminal messages. The two types of visual subliminal messages are subvisual and embeds[1]. Subvisual messages are flashed quickly in a video for a fraction of a second, too fast for the human eye to see. This is also known as 'priming'. Embeds are static images that are embedded into another image, hidden plain in sight. They are subtle cues to get some message across, that one doesn't recognize immediately but their brain still stores.

The three types of auditory messages are backmasking, subaudible, and lowered frequency1. Backmasking is an audio recording that is played backwards into the original recording, subaudible messages are audio recordings that are inserted into another audio file at a lower volume than the primary audio, and lowered frequency messages are audio recordings that are lowered to a frequency below 20 hz, too low for human ears to hear[1]. This study will utilize subvisual and lowered frequency subliminal messages, as subvisual, or priming, is the most commonly studied method of subliminal messaging to influence choice and behavior. Lowered frequency messaging will be chosen due to its feasibility, as it does not require a calculation of an absolute threshold level, that being established as 20 hz.

A study conducted in 2017 examined the effectiveness of subliminal messages and their influence on people's choices. It also provided definitions for the conscious and subconscious minds, and showed their relation with the subliminal messages which are also defined. Two experiments were conducted to test the hypothesis. The results proved that the hypothesis was true- subliminal messages affect and influence the participants' choice[5]. A recent review article, conducted in 2021, reviewed studies that look at the use of subliminal messaging to change behavior. Authors concluded that subliminal messaging can modulate our choices, but is more likely to be effective in individuals who are more predisposed to the particular behavior[6]. Other studies have shown that subliminal stimulation can influence current moods, political attitudes, intentions, choices and decisions, and cognitive strategies[7].

Changing behavior can be challenging in young adults, as they can be resistant to direct advice. Subliminal messaging can be an effective method to change behavior. Since subliminal messages are not perceived by the conscious mind, the person will not be resistant to this method of counseling, as they are not aware that they are being influenced. Prior research done in adolescents, specifically in their choices of a brand, indicated that exposure to subliminal messages does not affect the respondents' beliefs and attitudes regarding decision making, however the results of the study were inconclusive[8]. The purpose of this experiment is to examine the effectiveness of subliminal messaging in influencing the decisions and choices of middle and high school students. It is predicted that exposing middle and high school students to a video embedded with visual and auditory subliminal messages will influence their choice of a certain color or number as compared to students who are exposed to the control video. As mentioned earlier, previous studies have shown the effectiveness in using subliminal messages to influence a person's choice of a specific brand or product in advertising[9]. In this study, color and number will be chosen as similar variables due to their testing feasibility, as well as their ability to determine whether a specific subliminal message can influence a participant's choice for a certain thing.

To test this, a five minute video with lowered frequency auditory (18 hz) and subvisual subliminal messages (10 milliseconds) embedded in it will be developed, with the purpose of influencing preference for the color green and the number three. A visual message will be flashed every ten seconds, for a total of sixty messages, and auditory messages will be played one after each other on loop, with each message two seconds long. There will be four different visual messages: simply the number '3' or the word 'green', and the two phrases 'green is the best color,' and 'three is the best number.' All these messages will be displayed in a green font. There will be two auditory messages: recordings of the two phrases 'green is the best color,' and 'three is the best number,' repeated in a neutral tone. The video will comprise of landscape images of all colors, and there will be no audible background noise. It will be ten minutes in length, and will not include any specific content that could skew participants preferences for a certain number or color. The same video without subliminal messages will be used as the control video, with both being identical in content except for the subvisual and lowered frequency subliminal messages in the experiment video. Participants will be asked to watch the video for five days then complete a questionnaire on the final day to test their preferences for a certain color or number. To test for color and number preference after watching the video, the survey will consist of two multiple choice questions, each with four answer choices. The first question will ask the participants to pick a number, with the four options: red, yellow, green, and blue. The second question will ask the participants to choose a number, with the four options: 6, 3, 9, and 2. No other questions will be asked, and participants will only be allowed to complete the survey once.

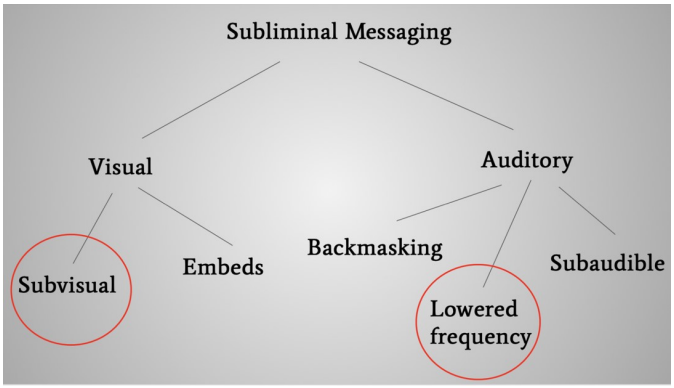

Fig. 1 Schematic showing the types of subliminal messaging

Methods

First, a video of scenery of about 5 minutes was selected. Next, lowered frequency auditory and subvisual subliminal messages

were embedded in the previously selected video using Camtasia video editing software. The visual messages were flashed during the video for a period of ten milliseconds multiple times during the video (figure 2). The auditory messages were played six times at a frequency of 18 hz (figure 3). The subliminal messages were affirmations to influence preference for the color green and the number three (figure 4). The video selected initially without any subliminal messages embedded was used as the control.

Then, a survey was developed to test the participants' preferences for a certain color or number. This was a single blinded, randomized control study. 42 participants were recruited and randomized 1:1 to the experimental or control video (figure 5). Participants and their adult guardian or parent were asked to sign the informed consent form before participating in the experiment. Participants were blinded to their video assignments. Participants were both boys and girls between the ages of 12-16. The participants were asked to watch the video every day for five consecutive days. On the final day of the study the survey questionnaire was administered (figure 5). After collecting the results, the data was depicted using 2 bar graphs, one for the survey results for color preference, and the other for number preference. To compare the preferences for the color green and the number 3 between the experimental and control groups, the bar graphs were compared, Fisher's exact test was used for comparing outcomes, and Bonferroni correction for multiple comparisons was applied. After analyzing the results, a conclusion was formed.

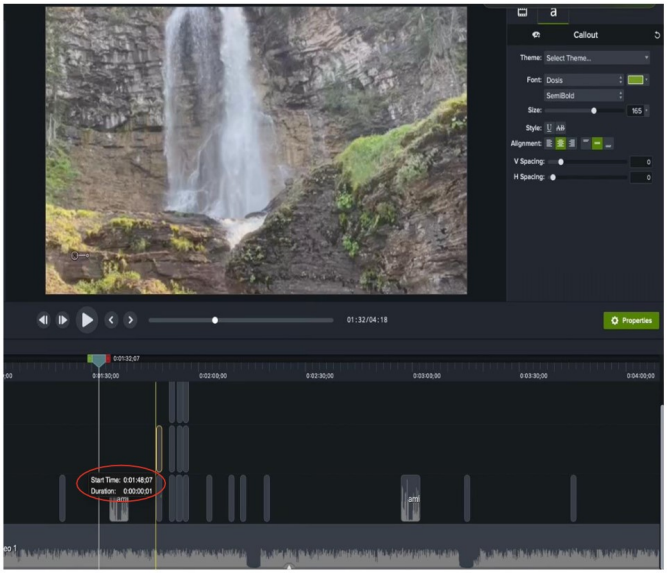

Fig. 2 Image of visual embedded subliminal messages in video

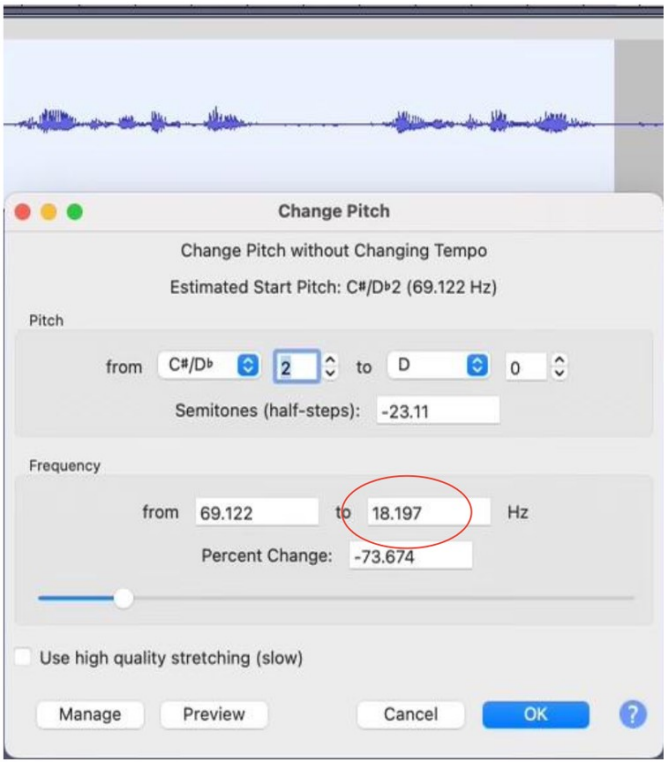

Fig. 3 Image of auditory subliminal message frequency

Fig. 4 Image of subliminal message embedded in video

Results

After receiving survey responses from all participants, the total number of responses for each color and number choice for both experiment groups were tallied and displayed on a bar graph. The results were then interpreted and analyzed in the context of the study, which aimed to determine whether subvisual and lowered frequency subliminal messages were effective in influencing participant choice for the color green or the number

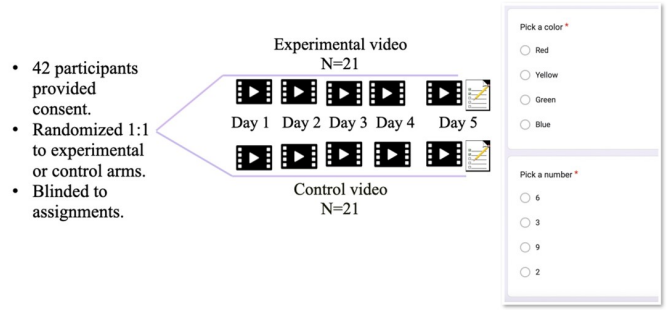

Fig. 5 Diagram of experiment methodology

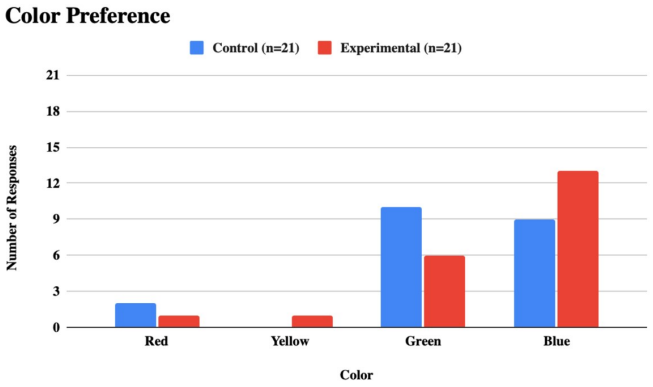

Fig. 6 Number of participant responses for each color choice on the survey in both control and experimental groups.

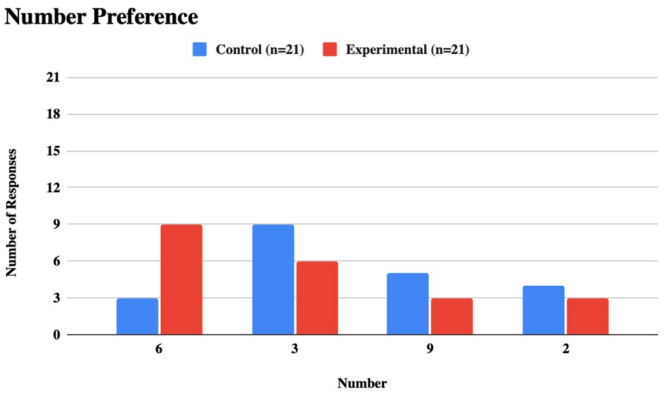

Fig. 7 Number of participant responses for each number choice on the survey in both control and experimental groups.

three, after having watched a video embedded with subliminal messages daily for five days. There were four color choices provided in the survey. Graph 1 displays the number of participants who chose each color on the survey after watching the video in both the control and experimental group. Each bar represents the overall number of responses for each color choice, with the blue bars representing the control participants, and the red, experimental. Taller bars indicate a color choice that a greater number of participants selected on the survey. As shown in graph 1, from the control group 2 participants chose red, 0 chose yellow, 10 chose green, and 9 chose blue. From the experimental group, 1 participant chose red, 1 chose yellow, 6 chose green, and 13 chose blue. Additionally, there were four number choices provided in the survey. As shown in graph 2, which was structured identically to graph 1, the only change being this time the bars depicting the overall number of responses for each number choice on the survey, from the control group three participants chose the number 6, nine chose 3, five chose 9, and four chose 2. From the experimental group nine participants chose 6, six chose 3, three chose 9, and three chose 2. There were no major trends in the data, nor was the predicted outcome supported, as approximately only 29% of students exposed to the video embedded with subliminal messages chose the color green in the following survey, and only 21% chose the number 3, and baseline preference was not measured. There was no statistically significant difference between the experimental and control groups (color green P-value 0.11 and number 3 P-value 0.19). This means the subliminal messages did not significantly influence the participants' preferences for the color green or number 3. Overall, taking into account all the survey color and number options, the colors blue and green were selected by a higher percentage of people as compared to red yellow, however this cannot be accredited to the subliminal messages as the data was similar for the control group.

Discussion

The purpose of this study was to examine the effectiveness of subliminal messaging in influencing the choices of middle and high school students. In this experiment 42 students were recruited and half were randomized to watch the experimental video and the other half were randomized to watch the control video. The experimental video contained visual and auditory subliminal messages to influence the participants' preference for the color green and the number three.

Previous literature has shown mixed results about the effectiveness of subliminal messaging to influence behavior, though there is a lack of data in school children. It had been predicted that the group exposed to the experimental video would have an increased preference for the color green and the number three. However, the survey results show that the experimental group did not have a higher preference for the number 3 or the color green as compared to the control group.

These results indicate that the methods of subliminal mes-

saging used in the study which were subvisual and lowered frequency did not influence the choice of the participants. The hypothesis was not supported by these data and the subliminal messaging methods used in the study did not influence the choice of a certain color or number of the middle and high school participants. Subvisual and lowered frequency methods of subliminal messaging may have failed to produce significant effects due to the specific design of the experiment, as well as the age group studied and the amount of time the participants were exposed to the messages. The messages may also have been less effective due to the specific variables of color and number used to test participant response. Testing messages containing different content, such as names or images, may produce different results in further research. Previous research has also shown that subliminal messages are more effective when a participant is already inclined towards a specific choice or behavior, and this should be taken into account when designing future experiments, as the current study did not test for this.

This was a pilot study, which provided feasibility data on subliminal messaging methods and trial design and recruitment. The study was limited in terms of sample size, as well timing constraints, as the participants only watched the video once a day for five days. Prolonged exposure to the video, or increasing the length of the video may impact results in future experimentation. This study was also limited due to its use of only two types of subliminal messaging techniques, due to the complexity of creating videos with successful embed or backmasking subliminal messages. Utilizing insights from these pilot data it is planned to design a larger study in which the impact of subliminal messaging on behavior will be tested, to see if subliminal messaging can be used to promote healthy eating habits. In the future the decision to test other subliminal messaging methods such as embeds or backmasking may also be made.

Subliminal messaging is being utilized in political messaging and advertising. However, the data of this study shows that subliminal messages, specifically subvisual and lowered frequency, were not effective in influencing the choices of middle and high school students. This provides evidence that targeted messages aimed at influencing consumers or voters to choose particular products and candidates may be ineffective and alternate forms of campaigning should be utilized. Therefore the data does not support the ongoing use of these methods, and advertisements and political campaigns should reconsider the use of subliminal methods in their messaging.

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