



The Use of Confederates and an Ambiguous Stimulus as Informational Influence to Elicit Conformed Responses from Primed Participants.

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Abstract. Many studies in the past have looked at how a social influence, such as confederates, can affect a decision a participant makes in the presence of a group. However, not many studies have used this process with ambiguous colors and primed participants. This study looked at the effect between participants who were primed for color-word associations and the influence of confederates. It was hypothesized that when labeling an ambiguous color, participants who were primed with color-word associations would still be persuaded by confederates. Participants were given a group of words that conveyed the colors blue or green. Participants then looked at an ambiguous blue-green stimulus and were asked to label it blue or green after the confederates had given incorrect responses for which participants were primed. Analysis of the results did not find a significant difference. Further research could be conducted to see how new results could create new group therapy procedures.

Every day, people encounter different forms of influence, from a commercial advertisement wanting someone to buy an expensive sports car, to a coworker trying to persuade another employee to cover for them. Some of these influences are obvious, but others are more subtle. In psychology, the effects of social influence are a standard research interest. A classic example of social influence is the use of confederates in a study. A confederate is a person who is acting on behalf of the researcher and is not a true participant; their actions are not being recorded. Having confederates act as social influencers in an experiment can easily persuade a participant's decision about a presented situation or stimulus (Asch, 1956). To help establish this idea, many theories and experiments have shown the effects of using a social influence, such as with confederates.

One of the first studies about social influence was conducted by Asch (1956). In

Asch's experiment participants sat with a group of confederates; the participant did not know that the other group members were confederates. Each member of the group had to decide which line on a sheet of paper was similar to an example line. The confederates said that it was not similar, and in an effort not to be a minority in the group the participant conformed to the confederates' incorrect answer. This is how Asch came up with his Theory of Conformity. Conformity is the process of a group member going along with the majority when they have identified a certain stimulus differently from the minority group member's original response.

Confederates are not the only way to elicit a response from a participant using social influence. In general, there are certain characteristics that can make a person more of an influencer to another person (Festinger, 1954), for example body image, biological sex, and occupation. From these





characteristics, and other implications of social influence, Festinger (1954) provided a theory for social comparison. Group dynamics can also play into how personal characteristics influence other people. It has been found that when people work well with each other and have similar backgrounds, it is easier to go along with the rest of the group (Festinger, Gerard, Hymovitch, Kelley, & Raven, 1952).

There are different ways in which social influence can occur, but it can also be divided into two categories. These categories are normative and informational influence (Deutsch & Gerard, 1954). Normative influence is the persuasion a person receives from other members of a group to conform to the group as a whole on ideas the group is confronted by. This means that if a minority group member does not want to be left out of an outlier, even if they have a better answer, that member will conform to the rest of the group. Informational influence is what occurs when a person is not sure how to respond to a situation or stimulus, so he or she looks at other members of the group for cues on how to behave. Informational influence can be implemented with ambiguous colors, such as a blue-green color that is ambiguous.

Social influence can have an impact on a person's perception of a certain stimuli. When looking at an object, a social influence can be used to persuade the participant's perception of the object. An object or situation can be a known, concrete one, which makes it easier for a participant to decipher what it is. This was prevalent in Asch's (1956) conformity study. The stimuli used in his experiment, lines on different cards, were concrete and the participants knew right away what they were. Known colors, such as bright hues of red and dark hues of green can also easily be deciphered. This was studied in an experiment that found that participants who knew a certain color stimulus looked at it longer than a color stimulus the participants were unsure of (Thomas & DeCapito, 1966). It has been acknowledged that when a known

stimulus is used, participants who encounter a group who have different responses to a stimulus are more likely to go along with the group consensus rather than their own correct response (Sherif, 1935). This is due to social influence and the impact it has on people, even though they know how an object looks and have been exposed to it hundreds of times in their daily activities.

On the other side of the spectrum are stimuli that are not so easy to decipher. An experimenter can use stimuli that are ambiguous and are not easily labeled by a participant. A form of ambiguous stimuli can be images. Ambiguous pictures of objects have been used in studies where participants have to respond to what they are, such as with the Luchins face-bottle series (Luchins & Luchins, 1955). With the Luchins series, participants have to distinguish an image as being either a face or a bottle. They are formed in black silhouettes that can actually make it hard to tell what they are. Ambiguous stimuli can also be used in a series of steps that from the beginning present small pieces of the stimulus, but at the end present a full picture of the combined stimuli (Moscovici & Personnaz, 1991). Using colors as ambiguous stimuli can be a good way to make it difficult for participants to identify the correct name of a presented color as well. Having ambiguous stimuli in a study makes participants think more before they react. The stimulus might not be something with which the participant is familiar.

Colors can be difficult concepts to label, especially when there are so many of them. This notion can be used in an experimental setting. In the study of color perception there are two different perspectives on how humans identify colors. The first one is the Universalist view that holds that seeing and naming colors is a natural phenomenon that humans are born with as a survival tool. The other perspective is the Cultural Relativist Theory that views color perception as something that is not the same in different



cultures. Humans learn different colors specific to their culture (Jameson, 2005). As an overarching perspective, these two views can be combined, because colors are easily defined by humans using both methods, and they can be placed in certain groups of hues, like green.

A study created by Keasey, Walsh, and Moran (1969) challenged participants' color perceptions with a blue-green ambiguous stimulus color that was not easily defined. The study also used social influencers to help make identifying the stimulus easier or more difficult by having the influencers state what they believed the color to be. As in Asch's study, the experimenters had the influencers persuade the participants that the ambiguous color was something it was not. The major conclusion of the study was that it was possible to easily persuade participants that the color stimulus was something it was not likely to be, like labeling a color blue even though it was green. Social influences in studies like the one described above can include the sex and occupation of confederates, along with cues given by the experimenter, for example, "You're really good at this."

Labeling an ambiguous color may be difficult for a participant in a study, therefore using a priming technique may make it more likely that a participant is less easily persuaded by a confederate with a different response to an ambiguous color stimulus. Priming is a psychological technique used to try to create different responses in participants due to previous stimuli that invoke a linkage to a current stimulus (Brown, Jones, & Mitchell, 1996). This can easily be done by having someone think of an object, such as a bike, and then relate it to something new that is presented. This occurs because the image of the bicycle will be freshly implanted into the person's mind, which can affect concurrent thoughts the person has to focus on after thinking about the bicycle. This technique is used to try to create different responses in

participants due to previous objects and ideas that invoke an association to the current stimuli (Meyer, Ouellet, & Häcker, 2008).

One way in which this can be done is by using the Stroop test. The test can be used to prime participants with word-color associations. The Stroop effect uses different color names and places different physical colors with them. An example of this is the physical word red, but then the word would be typed in blue. When a participant reads a list of these different color names with different typed colors, the participant has to slow down to cognitively think about what color to read (Stroop, 1935). The more familiar these patterns become to a participant, the faster the participant can be primed for the words and recognize similar words to them (Burt, 2002). Referring to the Stroop test, priming participants with visually black words can also contract implicit memory of colors that link to given words. This has been portrayed in a study where participants read a narrative that related to images of certain colors (Cacciari, Massironi, & Corradini, 2004). Instead of having the words physically represent a color, the word could implicitly represent an object or idea. An example of this would be associating the word "ocean" with the color "blue."

In a study conducted by Pendry and Carrick (2001), the use of priming was used on participants to illicit a response that conformed to the confederates' responses that were employed. The participants were given a picture and a narrative of a man who looked like an "accountant" or a "punk." This was the prime of the study. The participants then had to decipher how many "beeps" a certain machine made, in which there were 100 in all. The confederates gave their responses first, which were inaccurate, giving a response saying the machine made 125 beeps. The participants then gave their response. The study found that participants in the "accountant" prime gave a more conformed response with the confederates than the

participants who were in the “punk” prime. The study was looking at the linkage between primed sources that may be more trustworthy than another one, with that of conformity in a group.

The current study combined all of the above concepts of social influence, color perception, and priming to persuade a participant about a certain ambiguous color stimulus. Participants read words that were associated with colors, such as “green” with the word “grass.” These types of word associations served as a prime and an anchor for color recognition. An ambiguous green-blue color was presented to the participants and they had to decipher what the color was. The current study employed confederates to try to persuade participants to give an incorrect label to the ambiguous color stimuli. It was predicted that participants who were primed for blue or green color-word associations would be more persuaded by confederates and not use the prime when labeling a blue-green ambiguous color stimulus than participants who did not encounter the confederates. It was also predicted that participants primed for the color blue would label the ambiguous blue-green color blue more frequently than green, and participants primed for the color green would label the ambiguous color green more frequently than blue.

Method

Design

This study used a 2(confederates) x 2(prime) between-subjects factorial design with a control, where the participants were randomly assigned to one of five different conditions. One of the independent variables was whether or not the participant was exposed to a confederate. There were two levels of this independent variable, which were being exposed to confederates or not. The second independent variable was the primed condition in which the participant was randomly placed. The levels of this

independent variable were primed for green or for blue. The control condition also had randomly assigned participants, who were not exposed to the confederates or the color primes. The dependent variable was the name which the participant gave to the ambiguous color stimulus.

Participants

Participants were 89 undergraduate students from Minnesota State University Moorhead. They volunteered through a sign-up sheet located on the psychology department bulletin board. The participants had the opportunity to receive extra credit for their psychology courses in accordance with their professors’ grading policy. The average age was 21.18 years ($SD = 3.40$). The sample was representative more for females (67.4%) than for males (32.6%). Seventy three percent of participants in the sample indicated that English was the first language they learned.

Materials

The eight words that were used for the color-word association for the color blue were “frost,” “indigo,” “turquoise,” “denim,” “aqua,” “navy,” “sky,” and “ocean.” The eight words that were used for the color-word association for the color green were “lettuce,” “moss,” “mint,” “asparagus,” “pea,” “emerald,” “lime,” and “grass.” These words were chosen in a pilot study where 15 participants rated ten “blue” words and ten “green” words on a seven-point Likert scale. The eight highest-rated words for each color were used in the current study. These word groups were given on a sheet of paper that contained a chart, where the first column showed the words, the second column was a space to place a check mark if the participant associated the word with the color blue, and the third column was a space to place a check mark if the participant associated the word with the color green. One condition had the eight blue associated words in the chart and another condition had the eight green associated words in the chart.



The stimulus used in this study was an ambiguous blue-green color that was displayed on a projection screen. A ceiling-mounted Hitachi projector was used for this. The ambiguous color was created in Microsoft Paint by modifying the regular colors of blue and green into a combination of the two. In the “edit color” section of the program, the hue was set at 118, the saturation was at 127, the luminescence was set at 86, red was set at 43, green at 139, and blue at 135. The stimulus color was displayed full screen on the projection screen without a white background.

The study randomly used a pair of two male confederates and a pair of one female and one male confederate between the ages of 18 and 22 years old, all of whom were Caucasian. The confederates were undergraduate students from Minnesota State University Moorhead.

A demographics survey was used to keep track of the differences in participants. The survey asked participants their age, sex, and whether or not English was their first language. This came in the form of a half sheet of paper where participants circled the items that applied to them.

Procedure

Participants first read and signed the informed consent form after they had entered the lab. The study was described as a word association and color perception study where participants had to label certain colors. The confederates were already seated at a table in front of the projection screen when a participant walked into the lab. The participant then filled out the demographic survey, and was randomly placed in a condition where they were primed for the color blue, green, or no color. The color associated words on the sheet of paper were presented first, where the words in the column depended on what condition the participant was placed. The experimenter told the participant and confederates to place a check mark in the horizontal column where the word best corresponded to the color “blue” or “green.”

The experimenter gave two minutes for the participant and confederates to complete this task. After the participant and confederates had completed the task, the experimenter examined the charts for a few moments in the presence of the participant and confederates. The experimenter then said to the group, “you guys are very good at this.” The participant and confederates were also told to keep the color they thought the chart of words reminded them the most of in their mind for the rest of the study.

The participant and confederates were then exposed to the ambiguous color stimulus on the projection screen for five seconds. After five seconds, the experimenter put a black slide on the screen to cover up any color. The experimenter then asked the participant and confederates if they thought the color was green or blue. The two confederates gave their responses first, each providing their responses. The responses they gave were the opposite color to what the participant was primed for with the color-word associations. If the participant was primed for blue, then the confederates said the stimulus color was green. If the participant was primed for green, then the confederates said the stimulus color was blue. The researcher then marked on a small notepad the color name that the participant gave to the ambiguous color stimulus. After labeling the color stimulus the participant was fully debriefed and told that the other participants in the study were confederates. The participant was asked not to discuss the study with anyone not involved in the study. The participant was given a contact number and location to where they could receive help if they had any side effects from the study. They were also thanked for their participation.

The above procedure was used for both the blue and green prime conditions. Participants who were placed in the control condition did not have to look at the chart in the beginning of the study and proceeded straight to the ambiguous color stimulus.

These participants also did not have contact with confederates. They were told to identify the ambiguous color stimulus only.

Results

Preliminary analysis was first performed on the number of responses of “Yes” or “No” on the color-word association charts for each condition to see if there was a difference between the two primes. The number of “Yes” responses out of eight were counted and used for the analysis. This was performed with the blue and green color-word association charts. A two-way independent measures ANOVA was conducted to see if the two association charts had differences. According to the preliminary analysis, there was not a significant difference between the prime charts with participants in the no confederate, blue prime condition ($M= 6.29$, $SE= .35$) and the prime charts with participants in the no confederate, green prime condition ($M= 6.67$, $SE= .38$), $F(1, 47)= .13$, $p >.05$. There was also not a significant difference between the prime charts with participants in the confederate, blue prime condition ($M= 6.33$, $SE= .44$) and the prime charts with participants in the confederate green prime condition ($M= 7.0$, $SE= .38$). These results can be seen in Figure 1. This analysis was conducted to see how much the two primes differed from one another.

After preliminary analysis was conducted, main analysis was performed to see if there was a difference between the confederate conditions, color of prime and the control with the response of color given by the participants. Analysis was done for all five conditions in the experiment using logistical regression. This was conducted because the main dependent variable was a categorical “blue” or “green” response and there were multiple factors to test. According to the regression analysis, the frequencies from the model between prime and confederate conditions were not found to be statistically significant, $\chi^2(4, N=89) = 5.96$, $p > .05$.

Frequencies of the responses across conditions can be found in Figure 2. Frequencies for a “green” response are highest in Condition One where confederates label the ambiguous color green and frequencies for a “blue” response are highest in Condition Two where confederates label the ambiguous color blue. Frequencies for the no confederate conditions and the control condition are about the same for blue and green responses. The differences of the confederate and the non-confederate groups of the five conditions may look similar, but all five conditions were not found to be statistically significant.

Discussion

The purpose of this study was to see if there would be a conformity effect between participants who were in the presence of confederates and those who were not. This study also utilized a prime by implementing color-word association charts that contained words that were supposed to remind the participant of the color “blue” or “green.” To combine these two concepts, an ambiguous color was used to try to enhance informational influence upon the participants. The hypothesis, participants who are primed for blue or green color-word associations are going to be more persuaded by confederates and not use the prime when labeling a blue-green ambiguous color stimulus than participants who do not encounter the confederates was not supported. The hypothesis that participants primed for the color blue will label the ambiguous blue-green color blue more frequently than green and participants primed for the color green will label the ambiguous color green more frequently than blue also was not supported.

The first hypothesis that included the conformity of participants with confederates was not supported like it was in Asch’s (1956) experiment. Asch did use seven confederates and this experiment used only two, but the number of participants does not always impact conformity to group norms. This study used



informational influence because of the ambiguous color. That means that participants who were unsure of the color would use the confederates to help make their decision of how to label it (Deutsch & Gerard, 1954). The participants in this experiment definitely did notice the confederates and were always curious as to what the confederates were doing and how they responded. An example of this was that the confederates usually took more time to fill out the color-word association charts than participants did. Participants who were keeping watch on the confederates would see this and go back and look at their chart to see if they had everything “right.” Frequencies do show that the response that the confederates give, such as “green” are more likely to be said by participants. This can be seen in conditions one and two when the confederates were present. This suggests that there is some type of social comparison and conformity happening that relates to Festinger’s (1954) social comparison theory, but the differences between responses were not enough to support the theory.

The second hypothesis of participants labeling the ambiguous color the way they were primed was also not found to be statistically significant. This was very interesting because again, the study used an ambiguous color. Many participants gave responses of “teal,” “aqua,” and “sky blue.” These participants were directed to respond with the labels blue or green. The preliminary analysis of the two color-word association chart primes was not found to be statistically significant. That is a positive finding, because it means that the two primes had the same level of consistency. A prime is used to act as an anchor in a person’s mind (Brown, Jones, & Mitchell, 1996). The primes used in this experiment had a small effect on participants labeling the ambiguous color, but the primes were not strong enough to make a significant impact on more participants. The priming part of the study was an extra effect added to help expand the results found in Keasey, Walsh,

and Moran’s (1969) study. The two studies are very different, but the same psychological measures of conformity and ambiguity are employed. Even adding a prime for participants, this study did not find significant results.

This experiment did have multiple limitations that may have led to unwanted results. Two of the larger limitations of this study were sample size and the use of convenience sampling. The expected sample size was 100 participants, but only 89 were available to participate. This created smaller condition sizes than expected. Convenience sampling was also a limitation, because the conditions were not truly selected randomly. Having a sign-up sheet with one participant slot per session also led to participants knowing that the other people in the room were part of the study. This happened multiple times. Confederate behavior was also a limitation. When participants were not in the room confederates used their cell phones and conversed with each other. This became debilitating when an unexpected participant showed up and the confederates were still interacting with one another.

Besides all of the limitations of this experiment, there were strengths to it. A strength of this study was that it kept multiple extraneous factors constant. Examples of this would be keeping the confederates in the room at all times, keeping the lighting the same, and having the participant sitting in the same exact spot every time, no matter if there was a confederate present or not. Another strength to this experiment was the use of different psychological procedures. The procedures included the use of confederates, priming, and informational influence. Combining these concepts into one study has been rarely attempted by other researchers. It also gives a glimpse at how these variables interact with one another, especially since these concepts do occur with one another outside of a laboratory setting. The color was ambiguous enough to make it difficult for all participants



to give one color label to it; this can be seen with the control frequencies. These frequencies are not all blue or all green. This was a strength because it may have led the participants to use the confederates, and primes to make their decision of what the color was if they were unsure how to label it. If it was not absolutely ambiguous, the results of the study may have differed in a negative standpoint.

There are many ways that this experiment could be expanded upon. Since there was a small sample size, this experiment could be conducted again with a stronger prime and more confederates. A stronger prime could include having more words on the color-word association chart or participants could read a passage that elicits thoughts of the colors blue or green. Having more confederates would increase a possible conformity effect and could create an interaction with a new prime. New ambiguous colors could be used, such as a red-orange color, to see if there is a difference between perception of “cool” and “warm” colors. A rating scale of how much the ambiguous color looks like a certain color could also be implemented to gather means and to use a different technique of analysis. Overall, future research on conformity and primes could help to explain why people act the way they do in group settings. The prime component of this study could help to further knowledge of how primes work and how this could relate new group therapy procedures.

References

- Asch, S. E. (1956). Studies of independence and conformity: I. A minority of one against a unanimous majority. *Psychological Monographs: General and Applied*, 70(9), 1-70.
- Brown, A. S., Jones, T. C., & Mitchell, D. B. (1996). Single and multiple test repetition priming in implicit memory. *Memory*, 4(2), 159-173.
- Burt, J. S. (2002). Why do non-color words interfere with color naming?. *Journal of Experimental Psychology: Human Perception and Performance*, 28(5), 1019-1038.
- Cacciari, C., Massironi, M., & Corradini, P. (2004). When color names are used metaphorically: The role of linguistic and chromatic information. *Metaphor & Symbol*, 19(3), 169-190.
- Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *The Journal of Abnormal and Social Psychology*, 51(3), 629-636.
- Festinger, L. (1954). A theory of social comparison processes. *Human Relations*, 7, 117-140.
- Festinger, L., Gerard, H. B., Hymovitch, B., Kelley, H. H., & Raven, B. (1952). The influence process in the presence of extreme deviates. *Human Relations*, 5, 327-346.
- Jameson, K. A. (2005). Culture and cognition: What is universal about the representation of color experience?. *Journal of Cognition & Culture*, 5(3/4), 293-347.
- Keasey, C. B., Walsh, J. A., & Moran, G. P. (1969). The effect of labeling as an informational social influence upon color perception. *The Journal of Social Psychology*, 79(2), 195-202.
- Luchins, A. S., & Luchins, E. H. (1955). Previous experience with ambiguous and non-ambiguous perceptual stimuli under various social influences. *The Journal of Social Psychology*, 42, 249-270.
- Meyer, A. S., Ouellet, M., & Häcker, C. (2008). Parallel processing of objects in a naming task. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 34(4), 982-987.
- Moscovici, S., & Personnaz, B. (1991). Studies in social influence VI: Is Lenin orange or red? Imagery and social influence. *European Journal of Social Psychology*, 21(2), 101-118.
- Pendry, L., & Carrick, R. (2001). Doing what the mob do: Priming effects on conformity. *European Journal of Social Psychology*, 31(1), 83-92.
- Sherif, M. (1935). A study of some social factors in perception. *Archives of Psychology*, 187, 60.
- Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, 18(6), 643-662.
- Thomas, D. R., & DeCapito, A. (1966). Role of stimulus labeling in stimulus generalization. *Journal of Experimental Psychology*, 71(6), 913-915.

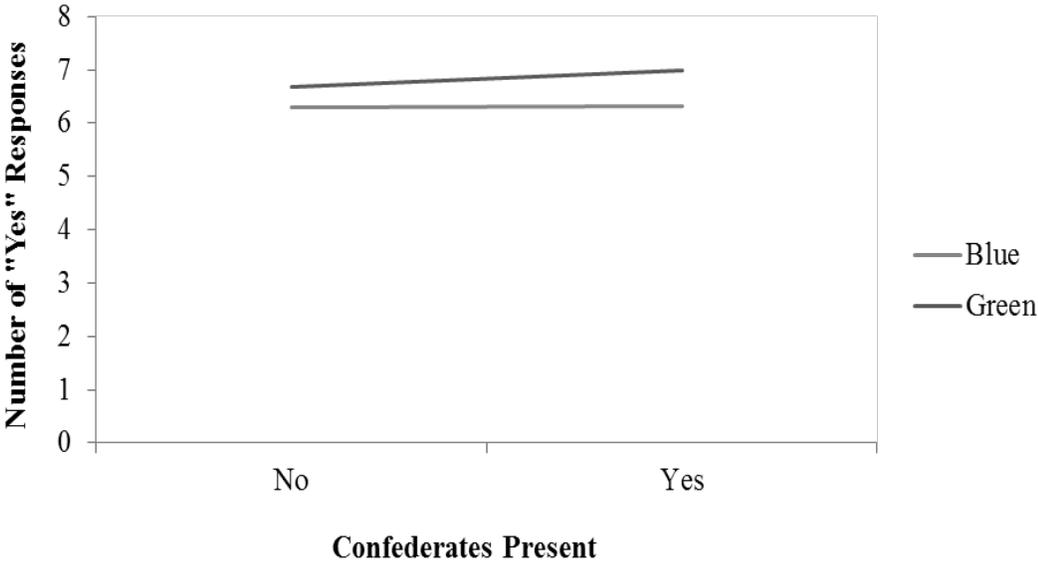


Figure 1. Number of "yes" responses on priming charts across conditions

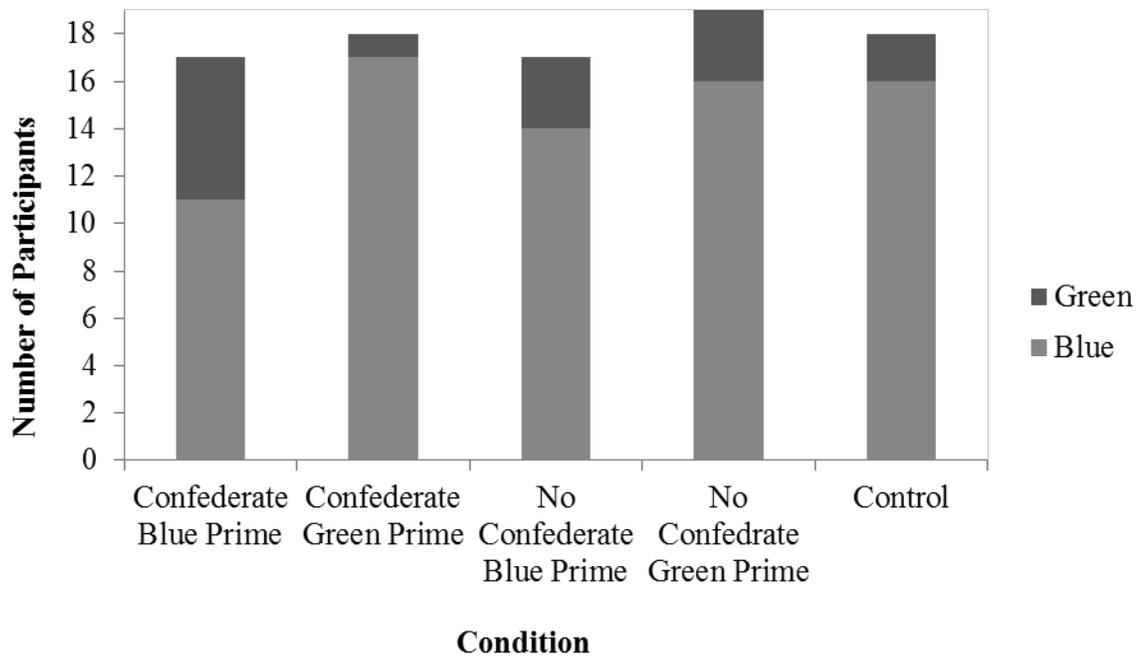


Figure 2. Number of “blue” and “green” responses per condition