

# The Effects of Conformity on Perceived Intensity of Stimuli

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## ABSTRACT

Conformity serves as the baseline for how one conducts themselves within a society. While a vital component to communal functioning, what transpires consequently is the question of how one's own perceived cognition compares to that of the world around them, creating a conflict within experienced and expressed reaction. This study examines the ways in which group conformity may influence a person's private perception of a reaction to a stimulus, aiming to determine the intrinsic effects of conformity through the examination of 122 participants and their rating of sourness when given a gumball. Throughout 41 trials, participants were placed in either the control or experimental group; those in the control group were isolated and given either a sweet or sour gumball, while those in the experimental group were placed into groups of three, wherein two participants were given sweet gumballs, and the remaining participant was given a sour gumball. Participants in both groups were then asked to privately rate their perceived level of sourness on a scale of one to ten. In experimental trials, each group was given a brief period of time to discuss their experiences prior to the rating. A 22% increase in sourness rating between the control and experimental groups was found through this process, establishing that group conformity could not only influence how one outwardly expressed themselves in a given setting but could additionally alter how a person perceives their own physiological experience to given stimuli.

## **Effects of Conformity on Perceived Responses to External Stimuli**

The concept of conformity is one that is frequently explored in the discipline of social psychology. Defined by the Oxford Dictionary as "behavior in accordance with socially accepted conventions or standards" (Oxford, n.d.), it is an unspoken phenomenon in the face of society, creating polarized constructs and distorted personal opinions. Solomon Asch's conformity theory outlined the basis of conformity in situations in which opinions following the basis of factual information were to be tested, utilizing lines of varying lengths to deduce the degree to which individuals are willing to let go of personal belief in order to fit into a group (Asch, 1956).

The effects of conformity are overtly clear in the social development of identity, often encouraging a desire for belonging. While it is this principle that establishes social harmony, it is not without the loss of individuality. Many often strive for an "optimal balance" between individuality and commonality, seeking to both appear as original and remain accepted in a given society (Brewer, 2003). This concept highlights how the degree of conformity can be strongly context-dependent while simultaneously establishing the idea that social conformity merely covers how individuals may behave in the face of social pressure and how likely they may be to change publicly expressed opinions while withholding private opinions in a hunt for the approval of a group. The result of group conformity is often compliance, a temporary change in behaviour that is entirely reliant on the presence of social pressure; compliance as a result of group conformity has been found to last no more than three days (Huang, Kendrick, & Yu, 2014). Acceptance, a change in privately held opinions as a result of conformity, is much more difficult to reach. The changes, however, are much more apparent and remain internalized. Acceptance as a consequence of conformity can be most prominently seen in the absorption of cultural norms or values, its influence reflecting not only on public expressions

of opinion but also on private ideologies. It can also be seen commonly through informational conformity, in which one's opinions conform to those that are believed to have accurate information, which are often those who hold authority (Hardin & Higgins, 1996). While there has been ample research conducted regarding fact or opinion-based conformity, little is known about whether the same principles apply to the perception of physiological responses.

Testing whether or not conformity can influence one's impression of privately perceived stimuli can be done through the utilization of distinctive flavours. While taste receptors differ amongst different individuals, the perceived physiological reaction is generally universal. Sourness is considered among the five basic tastes, categorized as the detection of acidity through Type III taste receptor cells (Frank et al., 2022). While the level of tolerance towards sourness has been found to vary dramatically from person to person and is almost 53% genetically accounted for, the flavour remains one that is universally recognized (Monell Chemical Senses Center, 2007). Applying the factor of sourness to the concept of conformity may explicate the degree to which social pressure could both influence one's outwardly expressed opinions and construct cognitive dissonance, creating a conflict of personal perception compared to the expressed opinions of a group. This study intends to assess whether group conformity can influence one's private perception of sourness, building onto Solomon Asch's study to determine the correlation between conformity and perceived physiological responses to external stimuli.

## Literature Review

### Compliance and Acceptance

Within the field of social sciences, two categories of conformity have been established: public agreement (compliance) and private agreement (acceptance). Compliance refers to the overt and public change of behaviour that results from conformity. In contrast, acceptance refers to the internal and psychological changes that occur within a person as a result of conformity (Levine, 2020).

### *Solomon Asch Conformity Experiments*

The Solomon Asch conformity experiments were conducted in the 1950s, demonstrating the potency of conformity in groups. The initial experiment was conducted with 123 male participants, with each participant being placed into a group in which the remaining five to seven subjects were confederates (Asch, 1956). The participants were shown a reference card with a line on it, followed by another card holding three lines, labeled a, b, and c. The participants were then asked to publicly state the line that matched the reference line, in addition to the length of the reference line in the context of an everyday object, which lines were the same length, and other responses. The objective being to observe whether the real participants would conform to the incorrect confederate answers and respond in the same way, despite the answer being erroneous (Asch, 1956). Each line was classed as a "trial," in which the non-confederate participant answered last or next to last. In the first two trials, the confederates gave the correct responses, leaving the non-confederate at ease and without doubts. However, by the third trial, all of the confederates began to give incorrect answers. Of the 18 trials, the confederates answered incorrectly for 12 (Asch, 1956).

Although Solomon Asch's original hypothesis was that the majority of people would not conform to something that was so apparently incorrect, the results showed that a mere 24% of participants did not conform in any trials. 75% of participants conformed at least once, and 5% conformed in every trial. In spite of these rates in the experimental group, only one subject out of 35 gave a false answer in the control group, where no pressure to conform was present (Asch, 1956).

Variations of the initial model tested how many participants were necessary in order to create conformity within the trials. These variations created the notion of group size affecting rates of conformity. The subsequent experiments tested rates of conformity in groups as small as two, and as large as 15. Trials in groups of two resulted in

virtually no conformity, groups of three resulted in low levels of conformity, and groups of four or higher resulted in increased conformity. However, groups of five resulted in maximum conformity. Adding additional subjects resulted in no stronger effect (Asch, 1956).

It is important to consider that Solomon Asch's conformity experiments addressed the effects of conformity on public response and not private response. In a public response, conformity is more likely; however, private responses result in lower rates of conformity (Deutsch & Gerard, 1955).

### *Muzafer Sherif Conformity and Group Norm Experiments*

The conformity studies conducted by Muzafer Sherif in 1935 studied conformity with public response. The experimenter put subjects in a dark room and instructed them to watch a point of light and say how far it moved. This study used the autokinetic effect, first discovered by Alexander von Humboldt in 1799 (Schweitzer, 1857), in order to measure conformity. The autokinetic effect is a visual perceptual phenomenon in which a stationary, small point of light in a dark environment appears to be moving (Adams, 1912). Muzafer Sherif conducted this experiment in order to determine the effects of conformity on the autokinetic effect. Initially, Muzafer Sherif studied how people reacted to the autokinetic effect when alone, finding that individuals established a norm for the movement of the light. They typically and consistently decided that the light was moving between two to six inches. In the first experimental groups, subjects were put into the same dark room, two or three at a time, and asked to agree on a measurement of movement (Sherif, 1935). The experimenter then observed that individuals who usually made a larger judgment began to make smaller judgements. Those who made smaller judgements began to make larger judgements. Most subjects were also unaware of the social influence and did not believe that they were swayed by the judgements of others. After the initial experiment groups, subjects were tested again, one at a time. They were found to now conform to the group judgment (Sherif, 1935). Muzafer Sherif's study of conformity demonstrated both public and private conformity, resulting in both compliance and acceptance (Sherif, 1935).

### Cognitive Dissonance

Group conformity and the social group have been envisioned to be an important source and resolution of cognitive dissonance in many individuals. However, group conformity can act as both a source of cognitive dissonance and a result of cognitive dissonance (Wood, 2005).

### *Leon Festinger Cognitive Dissonance Experiment*

The Leon Festinger cognitive dissonance experiment was a participant observation study of a doomsday cult that believed that the earth was to be destroyed by a flood. Leon Festinger observed the member reactions when the flood did not happen and how their levels of commitment affected their behaviours. More committed cult members were more often likely to re-interpret evidence in order to fit their beliefs, concluding that the earth was not destroyed due to the faithfulness of the cult's members. Although this was the first recorded study on cognitive dissonance, the results were greatly influenced by social groups and group conformity. The cult members, especially those that were highly committed to the doomsday ideology, were more likely to be influenced by both group conformity and cognitive dissonance since both of these factors would lead to the same conclusion. The committed members re-interpreted the evidence in order to match their existing ideology, both relieving themselves of the discomfort that stemmed from cognitive dissonance and fitting them back into the group. A similar phenomenon occurred with the fringe members of the cult. They were likely influenced by the other fringe members that no longer believed in the cult ideology and changed their thoughts in order to align with the presented evidence.

## Female vs. Male Sensory Perception

There are innate differences between sensory perception in the male versus female sexes. These anatomical differences dictate a person's sensitivity to sensory inputs, specifically taste and smell. Those that are born female have almost 50% more nerve cells in their olfactory bulb than those born male (Ana et al., 2014). Additionally, those born female are more likely to be supertasters, with 34% of women being supertasters, compared to only 22% of men being supertasters (Bartoshuk, 1990).

## Methods

### Hypothesis

Participants given sour gumballs in the experimental group will rate the degree of sourness as lower when compared to participants given sour gumballs in the control group.

### Sample Group

122 subjects (female = 55% and male = 45%; age range: 11-60 years; mean female age: 28 and mean male age: 21) from within Holy Trinity School in Richmond Hill, Ontario (students and faculty). Participants were of different ages, genders, ethnicities, and cultures. 41 trials were conducted as part of the data collection process.

### Instruments

A single-blind experiment was designed as part of the study, utilizing sour gumballs, sweet gumballs, and a sourness rating system from 1-10. This experiment was conducted at Holy Trinity School in December of 2022, placing recruited participants in randomized groups of three. Consent forms were administered prior to each trial for reasons of ethicality, ensuring the anonymity of participants and providing a general outline of the trial procedure, addressing any questions or concerns. Participants were split amongst two groups: a control group with the purpose of measuring the base rating of sourness for the given sour gumballs, where each isolated participant was given either a sour or sweet gumball, and an experimental group with the purpose of measuring whether or not the factor of group conformity would alter the perceived sourness of the gumball, where two of three participants were given a sweet gumball, the remaining given a sour gumball. A Google Spreadsheet was then utilized to record all collected data throughout each trial, visualized through different graphs for ease in the analysis process.

### Procedure

#### *Procedure of Control Trials*

1. Bring one participant into a private room, ensuring that distractions and the presence of others is minimal.
2. Ask the participant to read and sign consent forms.
3. Explain to participants their right to withdraw, right to confidentiality, and expectations of nondisclosure.
4. Give the participant either a sour or a sweet gumball.
5. Ask the participant to chew the gumball.
6. Give the participant a rating form and ask them to fill it out privately.
7. Collect rating forms and insert data into a spreadsheet.

### *Procedure of Experimental Trials*

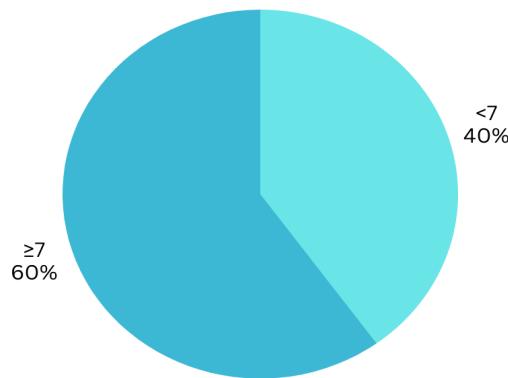
1. Split participants into groups of three.
2. Bring participants into a private room, ensuring that distractions and the presence of others is minimal.
3. Ask participants to read and sign consent forms.
4. Explain to participants their right to withdraw, right to confidentiality, and expectations of nondisclosure.
5. Inform participants of discussion time and rating system.
6. Ask participants to close their eyes, handing two of the participants sweet gumballs and the other a sour gumball.
7. Ask participants to chew the gumball and open their eyes after they have placed it in their mouths.
8. Give participants 1 minute to discuss their experiences with each other.
9. Give participants rating forms and ask them to fill them out privately.
10. Collect rating forms and insert data into a spreadsheet.

## **Results**

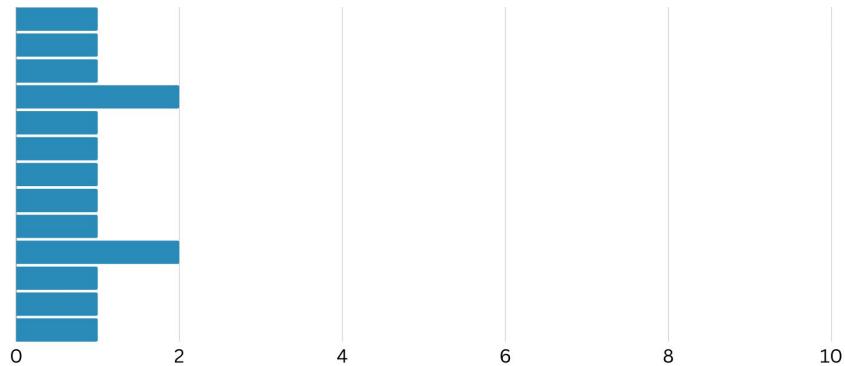
After conducting 41 separated trials, the following results were obtained, aiming to answer the following questions:

1. Can private perception of stimuli be affected by group conformity?
2. How might the opinions of others influence a person to accept a generalized opinion?
3. Does the influence of conformity on private perception differ by gender?
4. Does the influence of conformity on private perception differ by age group?

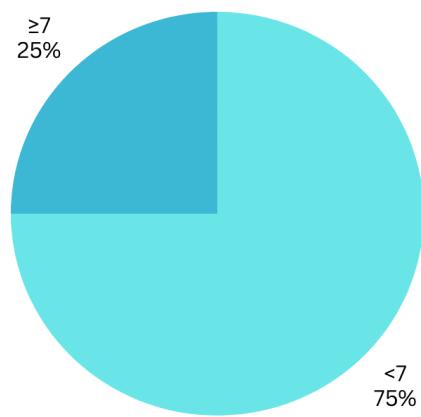
Figures 1-4 summarize and compare the raw results from both the control and experimental groups.



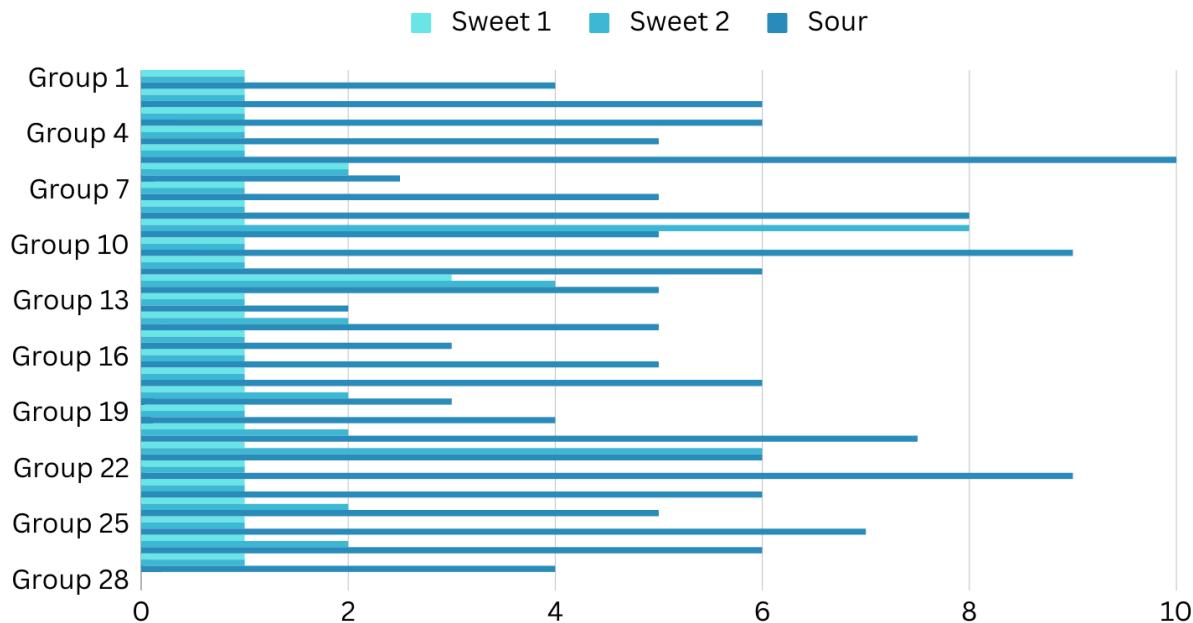
**Figure 1.** Ratio of sourness ratings of sour gumballs from participants in the control group.



**Figure 2.** Ratings of sourness of sweet gumballs from participants in the control group.



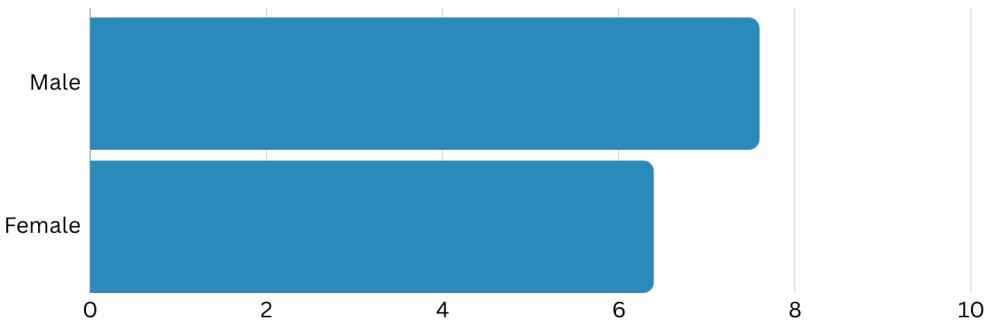
**Figure 3.** Ratings of sourness according to participants given the sour gumball in the experimental group.



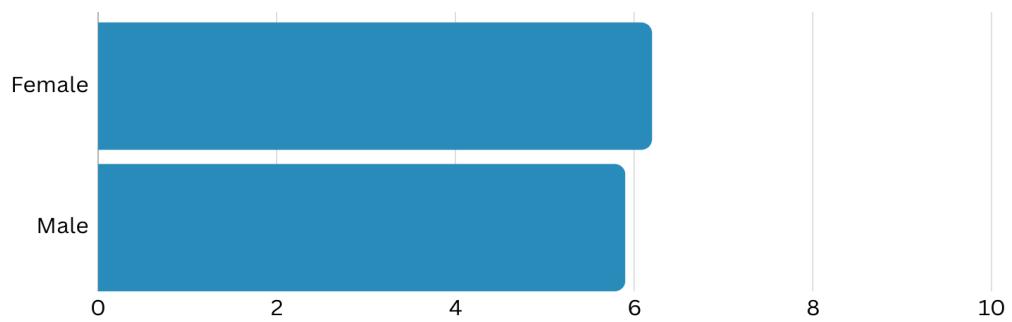
**Figure 4.** Ratings of sourness by all participants in the experimental group.

### *Demographic differences in obtained data*

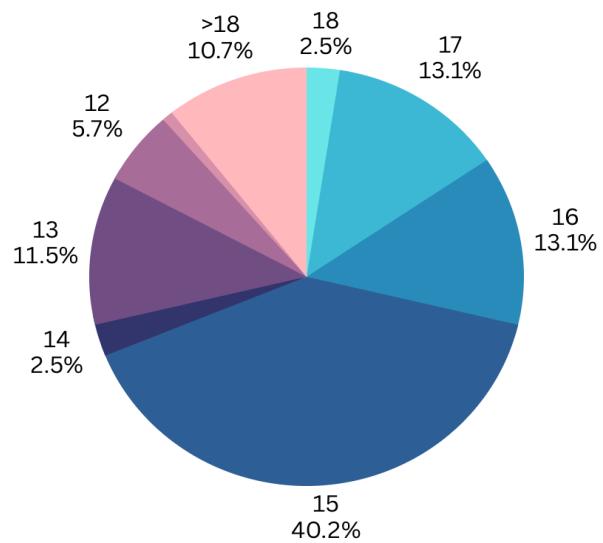
Several noticeable findings were revealed through viewing results from different demographic perspectives. Figures 5-7 summarize obtained results based on age and gender demographics.



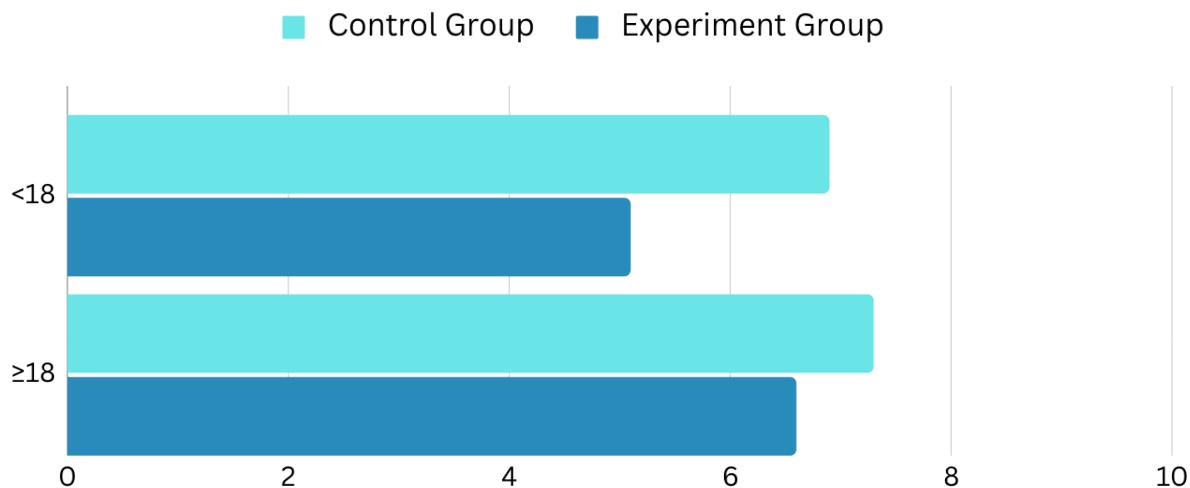
**Figure 5.** Sourness ratings of sour gumballs from male and female participants in the control group.



**Figure 6.** Sourness ratings of sour gumballs from male and female participants in the experimental group.



**Figure 7.** Age demographics of all participants.



**Figure 8.** Sourness ratings of participants over and under the age of 18.

## Discussion

The results of this study demonstrate beyond doubt that group conformity can play a significant role in influencing one's perceived response to external stimuli, directly proving our hypothesis; as seen in Figure 1, 60% of participants given a sour gumball in the control group rated its sourness as a seven or above, while in Figure 2, merely 25% of participants in the experimental group rated the sourness of the same gumball as a seven or above. A 35% decrease suggests that in the presence of a group with contradicting opinions, one is likely to question their own perception, even in the absence of social pressure. As seen in Figure 6, the average rating of sourness within the control group was seven, while the average rating of sourness within the experimental group was 5.5, further confirming a decrease in perceived sourness between both groups. Seeing as all participants were asked to rate their perceived level of sourness in confidentiality, there was no clear factor of compliance, rather the difference in rating can be accounted for by cognitive dissonance, creating a contradiction in perceived and expressed degree of sourness. However, the results further implied a dramatic difference in rates of conformity between male and female participants: this is visualized in Figure 4 and Figure 5, where the difference in the average rating of sourness between participants in the control and experimental groups greatly differs by sex. In female participants, the experimental group rated the sourness of the gumball at an average of 5.7, a 12% difference from the average rating of same-sexed participants in the control group, 6.4. In male participants, the difference between the two groups is even more prominent: male participants who received the sour gumball in the experimental group rated its sourness at an average of 5.9, a 23.4% difference from the rating of male participants in the control group: 7.6. This suggests that men were more likely to conform in the circumstances of this study, which directly contradicts many previous studies conducted regarding similar topics. In fact, it is widely believed that women in Western cultures conform more than men (Eagly 1986). This finding, however, can generally be accounted for by an increased level of distorted masculinity in modern-day society; men are generally more likely to resist conformity as a way to assert dominance, the desire to achieve higher status a prominent factor in a world of established hierarchies (Ruden, 2011). Seeing as the nature of our study revolves around one's perception of sourness, conforming to the group would essentially demonstrate superiority: conformity occurs as the participant attempts to personally disregard the sourness of the gumball, outwardly matching the neutral reactions of the group, who unbeknownst to them, received a sweet gumball. In doing so, this creates an internal conflict which ultimately alters their private perception of the gumball altogether. At the same time, while the same correlation was spotted within female participants, the degree to which private conformity occurred was dramatically lower, their private perception of the gumball remaining much more consistent with the fundamental absence of the innate desire

for superiority (Johnson, 1974). Furthermore, the results of our study found a dramatic difference in rates of private conformity between different age groups. This could be the effect of puberty and its implications amongst the participants, as depicted in Figure 6, 80.4% of all participants were between the ages of 13-17, during their teenage years. Multiple studies have found that conformity most prominently affects those within the ages of puberty, for it is during this period that an adolescent's personal perception will become conflicted with external influence (Grayson, 2018). The fourth stage in the theory of moral development as proposed by Lawrence Kohlberg is characterized by the internalization of social roles and order (Kohlberg, 1958). This stage falls within the level of conventional morality and occurs between the ages of 10 to 15, where the maturing prefrontal cortex allows for an increase in abstract thinking and empathy (Arain et al, 2013). While this does correlate with heightened self-awareness during adolescence, it also allows for increased personal vulnerabilities. This stage is best described as a period in which one's judgment expands to include social conventions, adopting the norms of the surrounding society. The desire to fit in is exemplified: people begin to view social belonging as a necessity alongside biological satisfaction, for increased conformity. This can be explained by the 16% decrease in rating differences between participants over and under the age of 18, as seen in Figure 8. Participants under the age of 18 in the experimental group rated the sourness of the gumball 26% lower than participants of the same age range in the control group, while participants ages 18 and above in the experimental group rated the sourness of the gumball only 10% lower than the participants of the same age range in the control group. The rates of social conformity have been found to decrease significantly as one ages, and as one becomes more solidified in terms of personal identity, external factors no longer influence private perception in the same way it does for those without a strong sense of individuality, namely those undergoing puberty (Pasupathi, 1999). Overall, the general findings of this study prove that there is, in fact, a strong correlation between social conformity and one's perceived sourness of a gumball.

## Conclusion

Using the perceived sourness of a gumball in different group circumstances, the results of this study clearly showed that group conformity is a significant factor in influencing one's private perception of stimuli, proving our hypothesis. Not only did the results depict a clear difference in the rating of sourness between the control and experimental groups, there was also a distinct increase in rates of private conformity among male participants as compared to their female counterparts, in addition to an increase in rates of private conformity in participants under 18 as compared to participants 18 and over. The true nature of conformity is still a conceptual topic with many threads left to explore. However, the findings of this study prove without a doubt that group conformity has a significant impact on a person's private perceptions. This indicates that factors of conformity have a considerable effect on not only a person complying with group norms but also on a person accepting this group norm as their own belief. Although rates of conformity often decrease when assessing acceptance as opposed to compliance, a significant deviation from the control group to the experiment group could still be observed. This deviation indicates high levels of conformity, therefore proving our hypothesis that participants given sour gumballs in the experimental group would rate the degree of sourness as lower when compared to participants given sour gumballs in the control group.

## Limitations

Although the present study was conducted ethically and effectively, there were certain intervening variables that had the potential to influence the results of this experiment.

### *Sample Diversity*

Although the experiment gathered subjects of all different backgrounds, ages, and genders, the study was conducted only on the students and faculty of Holy Trinity School. In order to have a more diverse sample, especially in age,



culture, and class demographics, the study could have been conducted outside of a single educational institution. It is possible that age, culture, and social class could have had effects on the rates of conformity in the present study (Bond and Smith, 1996; Pasupathi, 1999; Welter 1990). Using the same study model with participants of higher or lower income would have likely yielded slightly different results. Similarly, conducting a similar study model in a different country would have likely yielded different rates of conformity. For example, if the same study model was to be used in different countries, the researcher would find that rates of conformity would increase in cultures that are more collectivist than individualistic (Bond and Smith, 1996).

#### ***Gumball Type***

When supplying the required materials for the project, we encountered an issue with the size of our gumballs. In order to lead participants to believe that the gumballs were the same, they needed to be of the same general shape and size. However, when purchasing the gumballs from the supplier, we could not find any that were of the same size. The sour gumballs ended up being a lot larger than the sweet gumballs. In the control group, this was not a problem. But in the experiment group, this posed a minor problem, since there was a chance of the participants noticing that the gumballs were different. In order to combat this, the participants were told a version of the true story: the supplier ran out of the same type of gumball, so the size may differ. They, however, were not told that the acidity would differ.

#### ***Genetic Predisposition***

Many individuals are genetically predisposed to be more sensitive or less sensitive to citric acid. Although group conformity and cognitive dissonance may have an observable effect on a person's rating of sourness, the genetic predisposition of a person and their sensitivity to sourness may pose an intervening variable that may affect the results of the study. In order to prevent this affecting the results of the study, we ensured that the control sample was large and diverse, mitigating the possibility of genetics determining the results.

## **Further Research**

Due to the plethora of potentially confounding variables in our conducted study, as well as our limitation in both resources and participants, the findings of our study could not be generalized. Further research could be conducted by recreating this study after adjusting the variables to remain consistent throughout the entire experiment. One could potentially introduce new examples of stimuli apart from sourness. For example, the factor of spice could be used to induce a stronger physiological reaction from participants. Though spice tolerance differs greatly amongst individuals with differing amounts of capsaicin receptors, it remains a flavor that can be distinctly identified. By utilizing a vast variety of stimuli to test our hypothesis, a conclusion of greater validity could be reached. Furthermore, the factor of authority could be added in order to potentially deduce whether or not private acceptance as a result of conformity could be altered with the addition of authority figures, seeing as it has already been theorized through the gender-based results of our study that the increased rates of conformity among men could be accounted for by an increased desire for power in a group setting (Kimmel, 1993). By furthering this study through the additional observations of gender and power dynamics in the context of conformity, researchers will be able to better understand the power that gender may give or take away from a person in modern society. Although past conformity studies have shown that conformity is less likely to occur in males than females (Eagly, 1978), our results differed from the norm. By further examining gender-based conformity research, many will be able to better understand gender dynamics in modern day societies.

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