


Fall 2018

An Overview of Psychological Barriers to Climate Change Response and Their Implications for Improved Climate Change Communication

Ari Katz

SIT Study Abroad

Follow this and additional works at: https://digitalcollections.sit.edu/isp_collection

 Part of the [Environmental Studies Commons](#), [International and Area Studies Commons](#), and the [Other Psychology Commons](#)

Recommended Citation

Katz, Ari, "An Overview of Psychological Barriers to Climate Change Response and Their Implications for Improved Climate Change Communication" (2018). *Independent Study Project (ISP) Collection*. 2954.
https://digitalcollections.sit.edu/isp_collection/2954

This Unpublished Paper is brought to you for free and open access by the SIT Study Abroad at SIT Digital Collections. It has been accepted for inclusion in Independent Study Project (ISP) Collection by an authorized administrator of SIT Digital Collections. For more information, please contact digitalcollections@sit.edu.

An Overview of Psychological Barriers to Climate Change Response and Their Implications for Improved Climate Change Communication

Ari Katz (askatz@haverford.edu)

Academic Director: Daniel Govoni

Advisor: Jennifer Smith

SIT Study Abroad Iceland and Greenland: Climate Change and the Arctic

Table of Contents

I. Acknowledgements	2
II. Abstract	2
III. Introduction	Error! Bookmark not defined.
Background	Error! Bookmark not defined.
Research Question and Objectives	Error! Bookmark not defined.
Justification	4
IV. Psychological Barriers to Response	4
Introduction	4
Evolutionary Psychology	5
Cognitive Psychology	7
Social Psychology	8
Cultural Identity Psychology	10
Summary of Barriers - The Five D's	11
V. How Barriers Inform Communication	1Error! Bookmark not defined.
Introduction	1Error! Bookmark not defined.
Challenges and Opportunities	1Error! Bookmark not defined.
Communication Strategies - The Five S's	15
Additional Strategies	19
Future Directions for Communication	19
VI. Methods	20
Survey Sections	20
Question Discussion	2Error! Bookmark not defined.
VII. Ethics	25
VIII. Selected Survey Results	26
IX. Analysis and Discussion	33
X. Conclusion	37
XI. References	39
XII. Appendix	41
Question Section 1	41
Question Section 2	42
Question Section 3	46
Question Section 4	59

I. Acknowledgements

I extend thanks to so many people for this project. Thank you, Dr. Guðni Elísson for a life-changing lecture and for inspiring this research project. Thank you, Dan Govoni and Alex Tyas for being wonderful people and for checking in every week. Thank you, Jennifer Smith for seeing this project through from beginning to end and for being so encouraging. Thank you to my Giraffe Haus pals for holding each other accountable, for our delicious dinners, for hours of communal knitting, and for movie night every night. Thank you to the cafes of Akureyri for work space and for providing me with more mochas than I should have ever put in my body. I am swearing off caffeine for good.

II. Abstract

As climate change becomes an increasingly devastating issue it seems as if concern dwindles just as severely. Climate change lends itself so readily to apathy, but why? The overarching goal of this paper is to figure out the answer to a seemingly simple question: why do people have such a difficult time understanding and acting on climate change? The process of answering this question is a bit more complicated, and for the scope of this paper, the process is twofold. First, I aim to uncover the psychological barriers that prevent climate change response. Discussion of these psychological barriers includes insights from multiple schools of psychology, as well as a summation of these barriers into “The Five D’s,” which are Distance, Doom, Denial, Dissonance, and iDentity. Second, I explore how these barriers inform climate change communication. By strategically bypassing these barriers with different communication strategies – Social, Supportive, Simple, Story-based, and Signals – better climate change communication can be achieved. Additionally, this paper features a small-scale survey assessing potential trends in psychological barriers to response. Results from both literature review and the survey overwhelmingly indicate the need to move away from communicating climate change as an abstract, looming, global issue, and to communicate it at a personal level and in a way that encourages action.

III. Introduction

Background

Although the worst effects of climate change can be seen in coastal communities, regions with warm climates, and developing countries, people in these locations, who are often people of color and come from low socioeconomic backgrounds, generally contribute the least to climate change (Busch, 2015). Those who are experiencing the most severe impacts of climate change are often without the resources needed to mitigate those impacts, and often have much more urgent issues to deal with, such as food security and clean water. Climate change is an inherently privileged issue to be able to do something about. Yet, those with enough comfort in their daily lives to act on climate change are some of the hardest people to convince of the severity and urgency of the issue – those who are already affected live with the direct impacts daily. With that being said, most of the research in this paper pertains to the United States and the European Union, who just so happen to be two of the top carbon emitters (Busch, 2015). So, while it is a privilege to be able to do something about climate change, it is also a moral and ethical duty.

Research Question and Objectives

In the first week of my study abroad program, my class was given lecture titled “Time, Hope, and Climate Change” by Dr. Guðni Elísson. While the title holds true to the topic of discussion, the lecture also contained so much more. Dr. Elísson encouraged climate change to be a conversation. He stressed that technology – especially renewables – is not the only answer. He warned us that, although there is enough time to make a better future for our planet, we are far too optimistic, and we need to take off our rose-colored glasses in order to see any beneficial change. We walked away from Dr. Elísson’s lecture feeling helpless and discouraged, yet also empowered enough to save the world. Among the many messages Dr. Elísson shared with us that day, the most pervasive was that people do not care about climate change because climate change is almost impossible to care about. This swam around in my subconscious until it came time to draft our ISP proposals and I still had no idea why climate change lends itself so well to apathy. So, a research question was born: why do people have such a difficult time

understanding and acting on climate change? With time, this question grew into a project with three main goals: determine what psychological barriers exist to climate change response, learn how understanding those barriers can inform better climate change communication, and conduct a small-scale survey assessing barriers to response and potential trends.

For this paper, climate change response encompasses a large range of both thoughts and actions. Response includes anything “from planning by federal and state officials, to social movement activity, to individual behavioral change, or even acknowledging the information by letting it cross our minds or talking about it with friends and family” (World Bank, 2009). Better climate change communication includes any sort of communication techniques that more effectively communicate climate change than what is already being done.

Justification

For there to be any chance at truly mitigating climate change, there absolutely needs heightened global concern. It is a matter of ethics and morality, and of fostering a livable environment for all living beings and for generations to come. Scientific consensus states crystal clear that climate change is the most important environmental issue of our time, and that inaction will almost certainly transform Earth into something fundamentally unlivable. Yet, we are still marching along the business-as-usual path as if our shoes were not wet with rising tides, as if our lungs were not filled with ash. So, why do people not care? And how do you get them to care? Without the answers to those questions, progress seems futile and hope for the future seems foolish.

IV. Psychological Barriers to Response

Introduction

This section provides an overview of psychological barriers to climate change response from the lenses of four different disciplines of psychology: evolutionary psychology, cognitive psychology, social psychology, and cultural identity psychology. While these four disciplines do not provide an exhaustive understanding of climate change response from a psychological perspective, they do lay the groundwork for a sturdy base of knowledge.

Climate change psychology is an emerging field – most of the literature hails from the last decade and a half. The bulk of my research stems from psychologist and climate activist Per Espen Stoknes' book *What We Think About When We Try Not To Think About Global Warming*. The format of his book worked incredibly well for the goals of my research. Additionally, since the field of climate psychology is so small and new, his book highlights a great deal of the most noteworthy and influential research in the field.

Evolutionary Psychology

Evolutionary psychology tells us that humans are primarily worried about “self-interest, status, and imitation of others,” (Stoknes, 2015). From these categories, there are five key issues that help explain people's lack of response to climate change. These issues are: the desire to pass on our genes, flock status, imitation, short-termism, and risk perception.

Humans are very self-interested animals. From an evolutionary standpoint, one of our main goals is survival. This includes our own survival, as well as passing on our genes to ensure the continued survival of our species. When faced with a challenge, whether it be hunting for food or deciding whether to drive or bike to work, people are most likely to make “short-term selfish choices” (Stoknes, 2015). The easiest decision or the one with the most immediate reward will often be the decision made, even if that decision harms other people or the environment. Additionally, mankind's selfish tendencies may also help explain the general lack of interest in climate change issues. If an issue does not directly affect a person, their family, their friends, their town, or anything else in their immediate social vicinity, then it does not make sense to prioritize that issue when there are more proximate, pressing issues (Stoknes, 2015). Consequently, if an issue does not directly affect a person, then it does not directly affect our “moral intuitions” (Gilbert, 2006). While humans are likely to act on issues that challenges our personal morals and ethical beliefs, “chemicals in the atmosphere do not make us angry or repulsed” (Gilbert, 2006).

Continuing with the idea that humans are mostly concerned about themselves and their immediate surroundings is the concept of flock status. This term describes an animal's instinct to flaunt their bodies to impress other animals in their flock and thus gain higher status as a member of that flock. According to Stoknes, “Humans aren't that different. But rather than simply dancing proudly with what we've got, we moderns buy feathers and colors and dresses and cars

and boats and large houses and countless other things to display how big our own playground is” (Stoknes, 2015). This becomes a climate change issue when gaining relative, short-term status in one’s community overrides efforts to combat climate change. An example of this would be buying a fancy sports car to impress neighbors instead of driving a more eco-friendly car, taking public transportation, or another mode of lower-carbon transportation.

Imitation is another important player in the field of evolutionary psychology. Humans are fantastic at learning from imitation, but that is contingent upon what the majority is doing. If there is not a “majority already behaving responsibly that I can imitate,” then people will assume that those “responsible” efforts are not worth doing (Stoknes, 2015). If nobody else is composting, then why should I? The reverse mentality is just as, if not more harmful. If there a majority already behaving irresponsibly, then people will be more inclined to imitate those behaviors. If everyone else buys plastic water bottles, then I should too.

As I have already discussed, humans are wired to think in the short-term, and climate change is the opposite of a short-term issue. The effects of climate change are on the order of decades and centuries, yet “Behavioral psychology says that the optimal time interval for learning between a stimulus and response is on the order of one to two seconds” (Stoknes, 2015). Humans are “masters at responding to immediate threats, but are novices at acting to resolve worries of the distant future” (Gilbert, 2006). This puts climate far outside the scope of what humans are likely to care about because it is slow and distant. If climate change is seen as an issue at all, it is a very, very low priority.

The final issue from evolutionary psychology is risk perception. Again, this topic brings up matters of immediacy. If a threat is not easily detected by any of our senses, it probably will not register as a threat. Humans are incredibly skilled at ducking immediate threats, which means immediate threats tend to be emphasized in our brains and thus registered as more severe than distant threats (Gilbert, 2006; Stoknes, 2015). Additionally, people see intentional, man-made risks as bigger threats than natural, unchosen risks. This is why issues such as “anthrax and terrorism” seem much more severe than climate change, since “climate change lacks agency, and is instead an emergent property of more nebulous interactions,” even though the predicted risks of climate change far outweigh those of anthrax, terrorism, and the like (Gilbert, 2006). New risks are also seen as bigger threats than those people have lived with for a while. Since climate

change is something people have lived with for quite some time, people have grown used to it, and therefore, less afraid of it (Stoknes, 2015).

Cognitive Psychology

Cognitive psychology describes how people think and process information. Understanding climate change from this viewpoint is imperative for improving climate change communication because so much of communication is about getting people to think and process information. Distance is the main topic of discussion here. For most people, climate change does not hit any buttons in terms of distance. For most people, climate change is distant in both time and space, it is distant from our sense of control and from our senses, and it is socially distant as well.

Climate change is not only far away in time, but it is happening very slowly as well. As evolutionary psychology tells us, humans are fantastic at perceiving events that occur quickly, but are very unskilled at detecting smaller, more incremental changes (Gilbert, 2006). While some of the effects of climate change occur incredibly quickly, such as natural disasters, most of the effects will happen slowly over a long period of time. Humans also like to take mental shortcuts to minimize long-term thinking in order to capitalize on short-term thinking. This theory of fast and slow thinking can be attributed to psychologist and economist Daniel Kahneman, whose work Stoknes summarizes in his book. Stoknes explains that our fast thinking is “a kind of quick-and-dirty thinking based on rules of thumb, habit, gut reactions, and biases,” while our slow thinking “is more rational, linear, logical, and cumbersome” (Stoknes, 2015). Climate change requires a large emphasis on slow thinking, which makes it such a difficult problem to solve because humans love fast thinking. This system of thinking can also be described as heuristics, or mental shortcuts. A study done at Columbia University shows the use of heuristics with climate change very well. Researchers found people tend to correlate current weather patterns with how severe global warming is; this is called the local warming effect. In periods of intense warmth, people were more likely to rate climate change as a more severe issue (Zaval, Keenan, Johnson, and Weber, 2014). Weather is much more short-term, and much easier to identify as opposed to climate, which is why using weather to classify global warming severity is an example of heuristics.

For the majority of the human population, climate change is distant in space. The most extreme effects of climate change seem to only visible in places that already have extremely cold or extremely warm climates, or in small coastal communities and remote islands. While these locations are inhabited by humans, the majority of our population resides elsewhere, making the current effects of climate change seem incredibly far away. And while it is true that some of the most severe impacts of climate change are often occurring far away in distance from most people, we have pushed away almost all opportunity to notice the changes happening right around us due to our urban way of life. We move through the world in cars, trains, and planes; we live, learn, and work in temperature-controlled buildings; we barely spend time in the natural, unaltered world (Moser, 2010). This makes it almost impossible to notice any of the smaller changes that would be easily detectable in a less urbanized lifestyle.

Scientists estimate that, even if we stop all global emissions today, the effects of previous emissions would still last decades. Knowing that decades of future effects are still imminent even in most the extreme case of carbon mitigation does not bode well for optimism. Climate change issues often create a sense of helplessness because both the problems and solutions seem largely out of our control (Stoknes, 2015).

Additionally, climate change is distant from our senses. While the effects of climate change are visible, the causes are often abstract and invisible (Stoknes, 2015). Carbon does not have a color or a scent, and its measurement, parts per million (ppm) is impossible to visualize. Similarly, radiative forcing, measured in watts per square meter (W/m^2) is equally as abstract.

Lastly, climate change is socially distant from most people. Politicians are generally the ones in charge of writing laws and policies that would lead to large-scale climate change mitigation. The average person likely does not know these politicians, and likely does not know how to easily access these politicians, either. So, climate change is also socially inaccessible.

Social Psychology

Social psychology helps us understand how people interact with and influence each other, specifically looking at thoughts, feelings, and behaviors (Stoknes, 2015). Subjects discussed in this section are performance and social attention, social roles, attitudes, cognitive dissonance, and single action bias.

Social attention is one of the most powerful behavioral motivators. The presence of others has the potential to highly impact and motivate an individual's actions (Stoknes, 2015). This explains why people worry so much about what others think or why it is so much easier to stick to an exercise routine when others do it, too. In the climate change realm, this translates to not sharing an article about carbon emissions because you are worried other people will not like it, or to working as a community to lower electricity usage because it is easier as a group.

The social roles people play in their lives also contribute to how they interact with climate change issues. The biggest juxtaposition exists between scientists and ordinary people. It is difficult for people to break these roles in order to understand how people in other roles receive information to therefore communicate information properly. The way scientists tend to communicate data is very cut-and-dry, which is not conducive to social interaction or to forming personal meaning (Stoknes, 2015). When scientists are in their scientist roles, they often assume others look at data logically and rationally just as they do. Scientists often assume the ordinary person is able to extrapolate meaning from graphs just as they do. This leads to the ordinary person struggling to interact with climate data, thus disregarding climate issues entirely (Stoknes, 2015). Perhaps the most obvious examples of this communication failure due to social roles are the IPCC reports, which are written almost entirely as a series of facts, devoid of social discourse (Stoknes, 2015).

Social psychology also describes how attitudes are linked to lack of climate change response. Attitudes are comprised of three components, illustrated by the ABC-model. The A stands for the affective/emotion component, the B for the behavioral component, and the C for the cognitive component. Attitudes may be implicit or explicit, and both influence our behaviors and opinions (Stoknes, 2015). When our knowledge clashes with our attitudes is when cognitive dissonance sets in. Cognitive dissonance occurs when what we do does not align with what we know or believe, and vice versa. Stoknes explains that many people want to be able to change their behaviors to better the planet, but oftentimes are not motivated enough or do not have the resources to do so. People fix this dissonance by creatively changing their thinking around the topic to make themselves feel better. There are four main strategies people use to cope with cognitive dissonance, which include adjusting their perception of reality (my neighbor drives more than I do, my impact does not matter in comparison!), reducing the severity of the issue (evidence that driving is bad for the environment is weak anyway!), adding in more excuses (I

recycle and compost so it evens out!), and denying all evidence outright (climate change is not real, it is all just propaganda!) (Stoknes, 2015).

A final instance of how people use excuses to make themselves feel better about their environmental impact is called the single-action bias. The single-action bias is when people do one thing, such as buying a hybrid car, then feel as if they have done their part in combating climate change (Climate One, 2013). A study done by researchers at the University of Toronto found that people who were exposed to green products acted more altruistically than those who were only exposed to regular products, but that people who bought green products acted less altruistically and were more likely to steal or cheat than those who were just exposed to those products (Mazar and Zhong, 2010). This is a prime example of how a single environmentally friendly action makes people think that they have done enough.

Cultural Identity Psychology

Cultural identity psychology deals with beliefs, decisions, and behaviors that are shared between a group of people. These groups may be formed around identities people are born with, such as race, ethnicity, or generation, or around less permanent identities such as profession, hobbies, or interests. In terms of climate change issues, cultural identity psychology provides a discussion on confirmation bias, worldviews, and denial.

Confirmation bias is a way of thinking in which people seek out, or more readily accept information that aligns with their existing beliefs (Stoknes, 2015). This is deeply affected by our worldviews, which are strongly connected to our cultural identities (Stoknes, 2015). One of the most prominent examples of this bias is the way in which climate change has become a partisan issue in the United States. A study was done in 2011 to determine if political ideology played a role in whether or not people believed expert scientists agreed about the causes and existence of climate change. Researchers found that the 68% of liberals believed there was consensus among expert scientists, and only 20% believed scientists were still divided. On the other hand, 55% of conservatives believed that expert scientists were divided on climate change issues, and another 32% of conservatives believed that most expert scientists disagreed with climate change in its totality (Kahan, Jenkins-Smith, and Braman, 2011). Sometimes a person's willingness to believe in an issue has less to do with the actual science itself and more to do with the identities that person holds. And sometimes these biases become even more pervasive and become associated

not just with independent ideas, but with opposing social groups. This is called the cultural cognition thesis and can make communicating climate messages even more challenging (Kahan, 2015). Oftentimes, scientific consensus does not even have enough power to override worldviews and selective assessment of data, as evidenced by US politics (Lewandowsky, Gignac, and Vaughan, 2012).

Both confirmation biases and worldviews feed into climate denial. Denial is a defense mechanism used to avoid confronting a troublesome truth, and there are a myriad of reasons why a person might deny climate change, either actively or passively. In most cases, however, denial stems from worldviews. As Stoknes writes, “Many conservatives don’t oppose climate science because they are ignorant. Rather, it is a way of expressing who they are” (Stoknes, 2015). In fact, “The strongest predictor of expressing climate change denial is having a libertarian, free-market worldview” (Stoknes, 2015). It does not help that denial is often corporately funded, driven by policy groups and the like (Stoknes, 2015). Additionally, the more you push against denial, the worse it gets – being accused of denial only works to build up stronger defenses, rather than break them down (Stoknes, 2015).

Summary of Barriers - The Five D’s

The first section Stoknes’ book, which looks at climate change from four different schools of psychology, concludes with a summary of what exactly holds people back from taking action. Here, Stoknes proposes five psychological barriers to climate change response, which he calls “The Five D’s” (Stoknes, 2015). They are Distance, Doom, Dissonance, Denial, and iDentity. The Five D’s can be visualized as concentric circles around an individual acting as different levels of defense against climate change information.

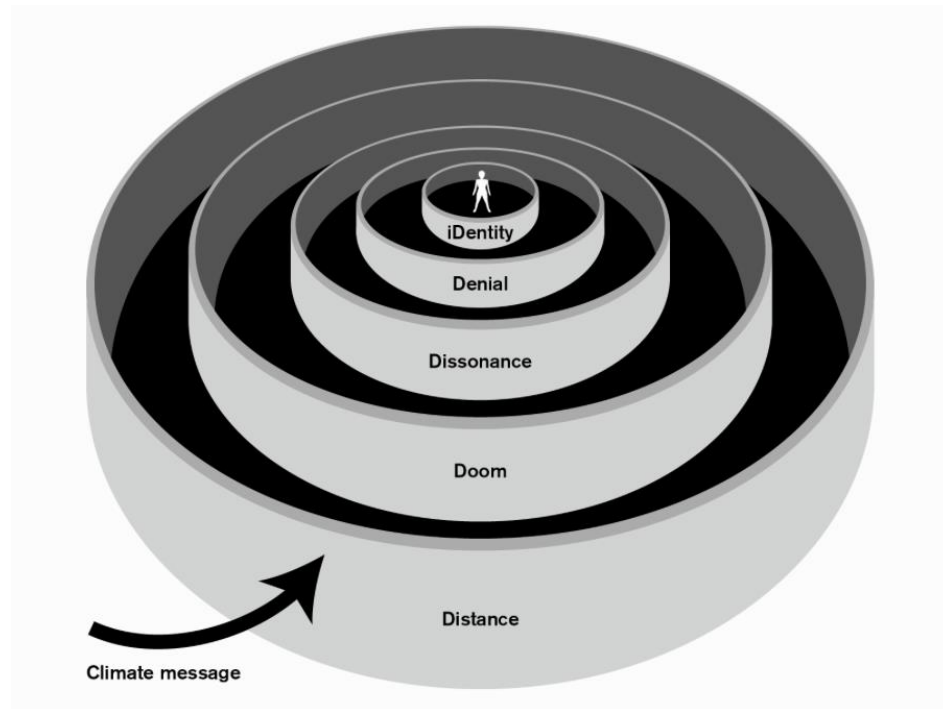


Figure 1. The Five D's visualized as concentric circles around the individual (Stoknes, 2015).

Distance is the most multifaceted barrier, as it includes distance in time, distance in space, distance from our sense of control, distance from our senses, and social distance. Doom is a bit simpler and focuses mainly on whether people are optimistic or pessimistic about the future of our planet. Dissonance is when our actions do not align with our beliefs, such as buying single-use plastic water bottles even though you know reusable bottles are better for the environment. Denial is a very straightforward barrier – this happens when people refuse to acknowledge or believe the severity of the problem. Lastly, there is iDentity, which includes all aspects of how our identities influence the way we interact with climate change issues. These barriers have their roots in the four schools of psychology previously addressed and together provide a comprehensive view on climate change attitudes.

V. How Barriers Inform Communication

Introduction

Climate change communication saw its start in the 1980s. Like today, most of these communications were based in scientific facts and figures and had little to do with social discourse. These communications quickly garnered backlash from pro-carbon players, which led to climate change becoming a partisan issue, as well as additional misunderstanding, misinformation, sensationalist media, and cultural denial. The backlash garnered attention as well, and climate activism spread. Both despite of and because of this back-and-forth cycle, climate change communications today do not look all that different (Moser, 2010). If the average person is informed at all about climate change, their level of knowledge generally remains superficial and highly influenced by the confusing dichotomy of messages, and as time goes on, this confusion only grows worse (Kahan, 2015; Moser, 2010). The science communication paradox explains “the simultaneous increase in knowledge and conflict over what’s known” (Kahan, 2015). Today, more than ever, accurate and successful climate change communication is vital to climate change mitigation.

The goal of this section is to synthesize ideas from psychology and communications to gain an understanding of how to better communicate climate change, and therefore how to better elicit and encourage response. Just as the previous section did not discuss every piece of knowledge psychology tells us about climate change, this section, too, is simply a starting point for further discussion.

Challenges and Opportunities

Susanne Moser, a social scientist focused on climate change adaptation, provides a list of essential questions to ask throughout the communication process. Since research on climate change communication is so new, many of these questions pull from strategies from other communication fields such as risk communication, science communication, and health communication (Moser, 2010). The first question asks the communicator to consider the goals, both scope and purpose, of the communication. The second asks who the audience is, which is

deeply important because communications need to be tailored to specific audiences.

Additionally, it takes much more effort to reach into groups with distinctly different views than those of the communicator, which must be considered. The third question asks how the issue is framed. Are there images? Metaphors? All of these questions are important, but perhaps framing is the most important part of the actual communication. The fourth question asks what messages and information are being communicated, and how that content can be made most useful and accessible to the group of people receiving the communication. According to Moser, messages must be “internally consistent,” must “tap into or help create mental models for people to make sense of the problem and direct them toward a behavioral response,” must “be more than the words or the information conveyed,” and must “keep the audience’s attention” (Moser, 2010). The fifth question asks the communicator to think about who the messengers are. The person doing the communicating has the potential to strongly affect how people respond to the message. The relationship between the communicator and the people receiving the communications might influence the next question, which asks through which modes the communication occurs. The internet, for example, is fantastic for increasing communication, but is also fantastic at amplifying divisions among groups which makes it easier for misinformation to spread. The last question Moser asks is if the communication was successful in doing what it was intended to do (2010).

Additionally, both Moser and a team of British researchers list three main purposes for climate change communication. These purposes are raising public knowledge and awareness of climate change issues, promoting social engagement and community participation, and encouraging changes in social norms, cultural values, and behaviors (Moser, 2010; Nerlich, Koteyko, and Brown, 2010).

Nerlich, Koteyko, and Brown also highlight special challenges and opportunities for local organizations, for governments, and for scientists. The researchers point out that local organizations have the power to engage people at emotion, personal, and community levels, and to promote bottom-up initiatives. Governments have the vast responsibility of communicating with an entire nation, and therefore must know how to address many different groups of people, need to select key facts and concepts to communicate, and should encourage citizens that there are viable solutions. Policymakers also must be consistent and factual in their messaging. For scientists, emphasis is placed on the role of language in reports and other scientific

communications. For instance, “positive trend” means “upward trend” to a scientist but may mean “good trend” to a layperson, which, as we know from climate science, is not always the case (Nerlich, Koteyko, and Brown, 2010).

Communication Strategies - The Five S's

Just as Stoknes summarizes the barriers to climate change response in a five-point list, he does the same with strategies for climate change communication. These five strategies are Social, Supportive, Simple, Story-Based, and Signals, and correspond to the Five D's (Stoknes, 2015). These strategies all revolve around the same goal of positivity, and all approach the Five D's from a proactive, preventative stance, rather than a reactionary, adaptive one.

The Social strategy is all about the power of social networks. Instead of viewing social influence as a driver for judgement and inaction, it should be utilized for its capacity to drive positive change. One exemplary study put up signs in hotel bathrooms to see how simply asking someone to reuse towels for conservation's sake would fare against signs that mentioned how almost 75% of other guests reuse their towels. As predicted, the signs depicting social norms yielded significantly higher towel reuse rates. Researchers took it a step further and tried out five different signs: one about conservation, and the other four with the 75% message but with different social identities tacked on (guest identity, same room identity, citizen identity, and gender identity). The data showed that the same room identity prevailed, yielding significantly higher towel reuse rates than all of the other sign methods (Goldstein, Cialdini, and Griskevicius, 2008). This application of social norms shows that not only do social norms encourage participation, but that they have the potential to work best “when the setting in which those norms are formed is comparable to the setting those individuals are currently occupying” (Goldstein, Cialdini, and Griskevicius, 2008).

Using peer influence to encourage positive change regarding social norms is imperative for progress. People are not just going to go green unless they believe others will, too. Stoknes points out that “People adjust their behavior to fit the signals sent by their physical surroundings about what a neighborhood finds acceptable” (2015). If there is already litter lining the streets of a neighborhood, you can bet that people are going to be more likely to continue littering there than start littering on a clean street. In the same vein, if an individual knows that all of their neighbors are recycling, then that individual is much more likely to recycle than if their

neighbors did not all recycle. With this, it is important that the power of social norms is used in a positive way. Telling a group of people that “83% of people do not recycle” most likely will not be seen as a call to action but will invoke further complacency (Stoknes, 2015). If no one else does it, why should I? A summary of two large field experiments on energy consumption and reduction showed that, among issues of sustainability, the wellbeing of future generations, saving money, and what neighbors are doing, social norms (neighbors) prevail as the most effective driver for behavioral change and energy conservation (Ayres, Raseman, and Shih, 2009). As evidenced, social norms are extremely powerful.

Of course, it is important not to ignore other motivators such as pricing, taxes, and technology. Combining social norms and peer pressure with these other motivators could prove most effective. Stoknes notes that face-to-face interaction will always be the most powerful tool for imparting a long-lasting behavioral impact. He also notes that people are generally much more responsive to their peers than to experts. All in all, keeping it local is the best way to enact positive, lasting change. Communicators should seek out opportunities for people to become excited about making changes in their homes, their friend groups, their neighborhoods, and their cities (Stoknes, 2015).

The second strategy, Supportive, is focused on reframing the climate message. As previously discussed, most climate change communication strategies in the past revolved around hard science, data, numbers, and facts – none of which is easily conducive to emotional connection. When communicators did attempt to connect people to the issues, oftentimes extreme frames of disaster, destruction, uncertainty, costs, high price, loss and sacrifice were used (Stoknes, 2015). While these negative frames must have worked on some people (would anyone unaffected care about climate change today if they did not?), they are perhaps the worst way a communicator could frame a message.

Instead of framing climate change as a large and looming disaster that will cause mass destruction, it should be framed as an issue that will impact individual people, their family, their friends, and their hometown. Messages of disaster and destruction on a global scale, a planetary scale, an environmental scale, are all too large to be concrete and only act to strengthen people’s distance from the topic (Stoknes, 2015). Stoknes recommends stressing that “The health of our human lives depends on the vitality of the more-than-human world” (2015). Yes, floods, droughts and heat waves will happen, but how will they affect *people*? Communicators should

talk about how lives and health will be put at risk from damaged infrastructure, and how asthma, allergies, respiratory diseases, and heat-related deaths will all become more common as climate change persists (Stoknes, 2015). Of course, these are all still very scary issues to face, but bringing climate change home, framing it as an intensely personal issue will hopefully encourage people to act.

Instead of framing climate change as a cost or a loss, it should be framed as an opportunity for insurance. Humans are loss-averse: we would rather avoid a future loss than realize a future gain (Stoknes, 2015). Just as we have health insurance to make sure we are covered if we get sick, climate change should be framed as an opportunity to insure ourselves against potential risks in the future.

Instead of framing climate change as an unknown, uncertain issue, communicators should turn this frame around and direct attention toward preparedness and ethics. Scientists may not be perfectly certain of what will happen as climate change progresses, but extreme change will occur beyond reasonable doubt, so it would be “reckless, unethical, and irresponsible” to not prepare for these effects (Stoknes, 2015). Stoknes encourages communicators to make people feel morally responsible to act. Additionally, preparedness is much more active than adaptation – it is much easier for people to want to prepare for climate change in concrete ways than to try and imagine how they will have to adapt to an abstract future.

Instead of framing climate change as a sacrifice, frame it as an opportunity. For Stoknes, he would rather hear about having a cool, new electric car, and that eating fish and veggies and biking to work would give him better abs, than he would about giving up his SUV and T-bone steaks (Stoknes, 2015). For those who tend to deny climate change, climate change could be framed as an opportunity for national defense, free-market competition, property rights, and smart, green economic development. Stoknes urges communicators to get people excited about the future, not scared.

When working to reframe climate change issues, it is imperative that communicators “never accept the backfiring frames. Don’t negate them, or repeat them, or structure your arguments to counter them. That just activates those frames, thereby strengthening them in the audience’s mind” (Stoknes, 2015). Avoid backfiring frames at all costs, and only focus on positive ones.

The Simple strategy deals with making it easier to choose green options. Greener options need to be affordable, accessible, and presented well. While not related to climate change, organ donor policies are a great example of how opt-in versus opt-out policies make a huge difference. Austria's organ-donor policy is opt-out, and 99% of people are donors, whereas Germany, for example, has an opt-in policy, and its consent rate is only 12% (Stoknes, 2015). This strategy could be applied to climate change issues by making green options the default. Stoknes provides a few examples of defaults such as setting the printer to two-sided, having to pay for your share of CO₂ emissions unless you click an opt-out button at the end of the page, or reducing parking spaces and improving public transportation (Stoknes, 2015). The list of "green nudges" that can be made by stores, restaurants, and at home is extensive. Stores should advertise the most energy-efficient electrical appliances, energy programs should make the green programs the default, and recycling bins should be made larger while garbage bins should be made smaller. Meals should be served on smaller plates so people take less food at a time, therefore limiting food waste. The vegetarian option should not just be labelled the "vegetarian option," but something more appealing to larger audiences such as the "daily special." Technology companies should start selling smart home devices that can track energy use and encourage people to be more energy efficient (Stoknes, 2015). Again, all of these strategies focus on making climate change issues near and personal and promote positive changes in behavior and attitude.

The Story-Based strategy is aimed at rewriting the stories of climate hell and imminent apocalypse as narratives of human potential and a better future. Climate change stories should be positive, believable, and should depict a world people want to live in. Stoknes features four types of stories in his book: green growth, wellbeing, stewardship, and rewilding (2015). The green growth narrative presents brown growth as a thing of the past, and puts the emphasis on a future of smart, green growth and an environmentally friendly world. The wellbeing narrative depicts stories of social justice, generosity, and a happy future. It shows that happiness can be found in simplicity. It pushes us in a better direction. The stewardship story brings to light issues of religion and ethics. Many monotheistic religions feature a disconnect between humans and nature, and this story asserts the holiness of nature and attempts to reconnect humans with their non-human environment. This story says that the destruction of the planet is sinful, and frames

environmental stewardship as a religious duty. And lastly, the rewilding story, which champions nature's resilience to change (Stoknes, 2015).

The fifth and final strategy, Signals, encourages new signals of progress. Gross domestic product (GDP) is one of the main markers of progress, but, similar to climate messages of the past, does not do enough to incite emotion or to inspire social discourse. New signals need to be more meaningful than just numbers, and they need to indicate green growth. Perhaps these new signals will show the impact of change over time of economic activity and its impacts on the environment. This could be a combination of CO₂ emissions, corporation growth, and value (Stoknes, 2015). Perhaps this signal could count happiness and wellbeing, or maybe even ethics.

Additional Strategies

While Stoknes' suggestions for climate change communication are quite extensive and do cover most of what other climate change communicators are addressing, one additional strategy warrants discussion. This strategy is called "inoculation theory," and is aimed at eradicating misinformation. Inoculation theory works by "forewarning people that they may be exposed to information that challenges their existing beliefs or behaviors. Then, one or more (weakened) examples of that information are presented and directly refuted" (van der Linden, Leiserowitz, Rosenthal, and Maibach, 2017). People are inoculated against misinformation just as they are given vaccines to prevent diseases. After conducting two different studies, researchers concluded that inoculation worked, and moreover, "proved equally effective across the political spectrum," which has incredible implications for breaking past worldviews and the partisan nature of climate change (van der Linden, Leiserowitz, Rosenthal, and Maibach, 2017).

Future Directions for Communication

Above all, more research needs to be done on all facets of climate change communication. There is a lack of empirical data on all elements of the communication process, on the use of visual aids and the arts, on how to communicate mitigation and adaptation, on how to boost long-term and deeper engagement, and on how to communicate the urgency of the situation without overwhelming people (Moser, 2010). We need to move away from seeing the public as "empty vessels" to fill with knowledge and as poor decision makers, and we need to

demolish the top-down expert to non-expert model of communication (Nerlich, Koteyko, and Brown, 2010). Climate change communication needs to move past one-way streams and toward dialogic communication (Moser, 2010; Nerlich, Koteyko, and Brown, 2010; Stoknes, 2015). We also must put more value in bottom-up, community-focused initiatives and recognize that children and young people have incredible capacity to be innovators and motivators (Nerlich, Koteyko, and Brown, 2010).

VI. Methods

An online survey was distributed on November 1, 2018. It was made with Google Forms. I originally sent the survey through email, SMS, and other messaging apps, and posted it on social media sites such as Facebook and LinkedIn. The survey was further distributed by approximately fifteen other people through a variety of digital means.

The survey is comprised of seven separate sections; introduction, background information, four question sections, and demographics. The introduction includes information about me, my research, and the survey. The background information includes definitions of climate and climate change. The demographics recorded are age and city/town and country where the survey taker resides the majority of the year. The background information and survey questions are below. A discussion on the methods behind each section will follow. A discussion on the introduction can be found in the Ethics portion of this paper.

Survey Sections

Background Information

The following survey is aimed at assessing how people think about climate change. For the purposes of this survey, climate is defined as weather trends over a long period of time, generally 30 years or so. Climate change refers to modern global warming as a result of human activity.

Question Section 1

Please choose the statement you agree with the most.

- The effects of climate change have already begun.
- The effects of climate change will start within a few years.

- The effects of climate change will start within my lifetime.
- The effects of climate change will not happen in my lifetime, but will affect future generations.
- There will be no effects from climate change.

Please choose the statement you agree with the most.

- I am informed about climate change. It is happening, it is caused by humans, and we need to take action now.
- I am concerned about climate change, and I know some things about it, but it is not my top priority.
- I think climate change might be an issue, but I am not certain. I believe there are more serious issues we should be dealing with right now.
- I haven't thought much about climate change. I do not think it is something we need to worry about yet, but it might be an issue in the future.
- If climate change is happening, it is not caused by humans, and it is unlikely to affect anything for several decades.
- Climate change is not happening, it is not a threat to people or the planet, and we do not need to take any action.

Question Section 2

Please list where you think climate change will have the most severe impacts. (You may list specific locations and/or characteristics of places. Type "..." if you are unsure.)

Question Section 3

Please choose the answer that corresponds to how much control you feel you have in your daily life at taking action regarding these issues. If you do not believe the issue is important, please select the last column. You may leave any questions blank.

Answer options: Completely out of my control, Mostly out of my control, Unsure / No opinion, Mostly in my control, Completely in my control, This is not an important issue

- Sea level rise
- Ocean acidification
- Warming oceans
- Carbon emissions
- Melting sea and land ice
- Extreme weather events and natural disasters
- Air pollution
- Ocean pollution
- Dependence on fossil fuels
- Overexploitation of natural resources
- Overpopulation
- Extinction of species
- Recycling
- Composting
- The amount of trash I produce
- The amount of plant-based products in my diet
- The amount of meat in my diet
- How much I fly
- How much I drive
- Eating locally grown food
- Buying clothes second-hand
- Supporting large corporations
- Supporting small businesses
- Capitalism
- The amount of single-use plastic I use

Question Section 4

The following section will ask your level of agreement/disagreement with a series of statements.

Answer options: Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree

- Climate change currently affects where I live.
 - Climate change will affect where I live in the future.
 - Climate change will affect other places more than where I live.
 - Climate change will affect the whole planet equally.
-
- If the carbon dioxide in the atmosphere were visible, carbon emissions would be seen as a bigger problem.
 - I feel that I have access to people who make climate policies.
 - I feel that I have access to people who run large corporations.
 - There are solutions to climate change.
 - I am optimistic about climate change mitigation on a global scale.
 - I am pessimistic about the future of our planet.
 - It is likely we will implement solutions to climate change before it is too late.
-
- Climate change is an important global issue.
 - Climate change is made out to be a bigger issue than it actually is.
 - Climate change is an issue everyone should care about.
 - Climate change is a social issue.
 - Climate change is a political issue.
 - Climate change is an economic issue.
 - I engage with those who have different viewpoints on climate change than I do.
 - Every time I use coal, oil, or gas, I contribute to climate change
-
- I try to live as environmentally friendly as I can.
 - I still do things even though I know they are bad for the environment.
 - I do enough to combat climate change given the resources available to me.
 - I could do more to combat climate change given the resources available to me.
 - My social status contributes to how I engage with climate change issues.
 - My economic status contributes to how I engage with climate change issues.
 - My political beliefs contribute to how I engage with climate change issues.

- My religious/spiritual beliefs contribute to how I engage with climate change issues.

Question Discussion

The goals of this survey were largely inspired by Stoknes' book, namely the Five D's. I aimed to assess the extent to which these barriers influence people's perceptions on climate change issues, and to see if any trends exist among these perceptions.

Since the focus of my survey was aimed solely at psychological barriers, I did not include questions that assessed educational barriers or educational level. However, I did want to make sure that every participant entered the survey with the same baseline level of climate change knowledge, which is why I provided short definitions for climate and climate change in the Background Information section. I kept these definitions concise so as to minimize reading time, and to avoid making people feel as if I were trying to educate them.

The first question section had two goals: determine how distant in time people perceive climate change to be and assess people's level of concern regarding climate change. These goals do not necessarily go hand-in-hand, but the format of these questions lent itself well to their combination. The first question tackled the first goal in a fairly simple way; do people think climate change is happening now? In the next generation? Never? The second question has a bit more beef to it, and pulls from a 2009 Yale study that, after surveying American adults' attitudes toward climate change, divided these attitudes into six groups. The "Six Americas" are The Alarmed, The Concerned, The Cautious, The Disengaged, The Doubtful, and The Dismissive (Yale Program On Climate Change, 2009). Each answer option in the second question represents each of these attitudes. The Alarmed is worried about climate change, is well-informed on the subject, and understands that action must be taken now in order to secure the health of our planet. The Concerned is worried as well but is only partly informed and does not feel as strongly about taking immediate action. The Cautious believes that climate change might be an issue, but feels that there are other, more important issues to be dealt with at the moment. The Disengaged does not know much, if anything, about climate change, but is open to the possibility of it being an issue in the future. The Doubtful does not acknowledge anthropogenic global warming, believes all changes are natural, and is sure nothing will be impacted for many years, if ever. The Dismissive is an outright denier, is positive climate change is not happening, and does not think any action should be taken (Yale Program On Climate Change, 2009).

The main goals of the second question section were to assess where people believe the most severe impacts of climate change to be, and how distant in space people perceive climate change to be. As discussed in the Literature Review, most people believe climate change is happening in places far away from where they live, so I wanted to find out where exactly people think these changes are occurring. This question was open-ended as opposed to multiple-choice, and also placed toward the beginning of the survey, because I did not want to prime people into thinking about any specific location.

The third question section was aimed at assessing how distant climate change is from people's sense of control. This section included a series of climate change issues of different scales and was formatted as a five-point Likert Scale question with an additional sixth option of labeling the issue as unimportant. The purpose of including issues of different scales – such as warming oceans, which is very large-scale issue, or how much one drives, which is a small-scale issue – was to see if any trends exist between how much control one feels they have and the scale of the issue. Additionally, the issues in this section were randomly shuffled for each survey taker so as to not group the issues of similar scales together as I had inputted them.

The fourth and final question section was meant to assess the remaining barriers, as well as the barriers already touched upon. This section was formatted as a five-point Likert Scale question as well and was divided into four subsections so that the scale was visible at the top of each section (Google Forms does not allow for a scrolling scale). These subsections were unlabeled and were primarily divided arbitrarily by number of questions. However, the first subsection targets distance, the second distance and doom, the third distance, denial and identity, and the fourth dissonance and identity.

VII. Ethics

All participants were informed of my identity and institutional affiliations on the first page of the survey. The survey introduction also explained the general purpose of my research, the survey's overall format, and that participants' identities would remain unknown. My email was also provided; participants were encouraged to reach out with questions, concerns, or to ask for a copy of my final paper. Participants were required to check a box to agree to participate in the survey. Additionally, it was made clear that participants were able to exit the survey at any

point and that their answers would not be recorded if they did not press submit on the final page of the survey.

Since I was distributing the survey through social media and other social networks, my main concern in writing this survey was that soliciting too much demographic information would enable me to identify individual survey takers (or that they would think I might be able to do so). Still, I wanted to obtain enough demographic information for analysis. The solution to this concern was collecting only age and town/city of residence. Another concern I had about the introduction was providing enough detail to properly inform people of the purpose of the research without influencing their answers. Because of this concern, I chose to title the survey simply “Climate Change Survey” and used the phrasing “how people think about climate change” instead of “psychological barriers to response.”

VIII. Selected Survey Results

The following section contains a handful of selected charts and graphs to be discussed in section IX. The full set of data can be found in the Appendix at the end of the paper.

Question Section 1, Question 1

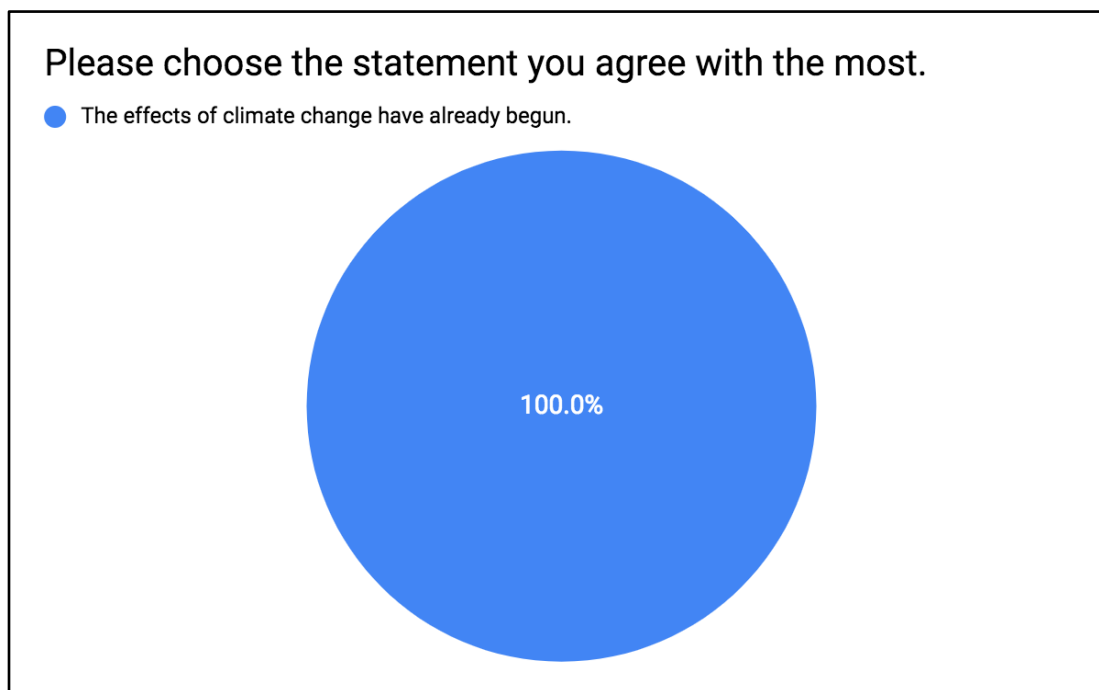


Figure 2.

Question Section 1, Question 2

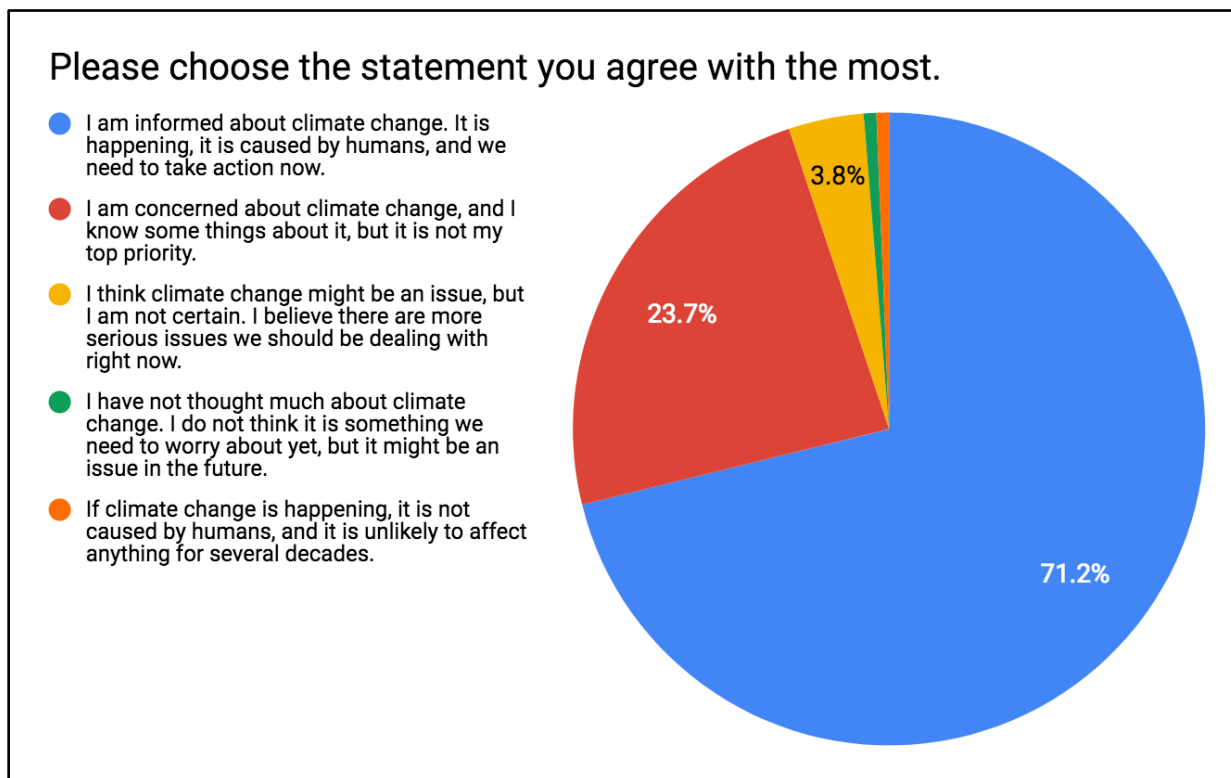


Figure 3.

Question Section 2

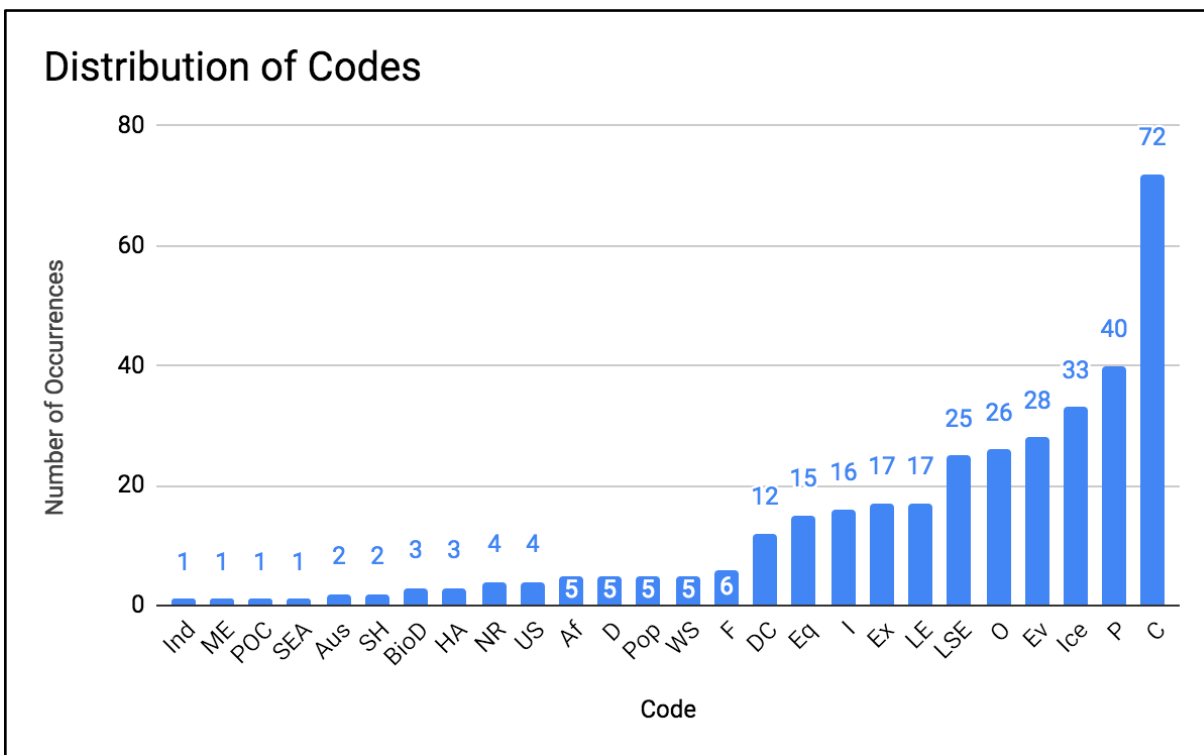


Figure 4.

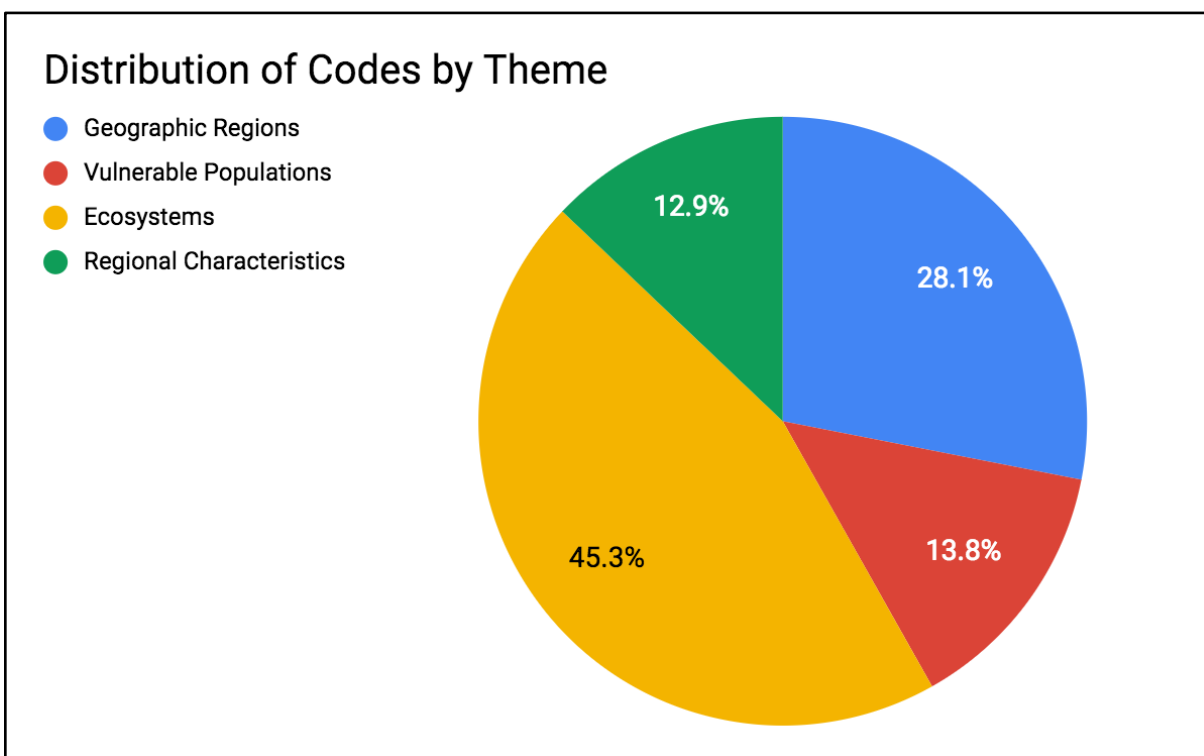
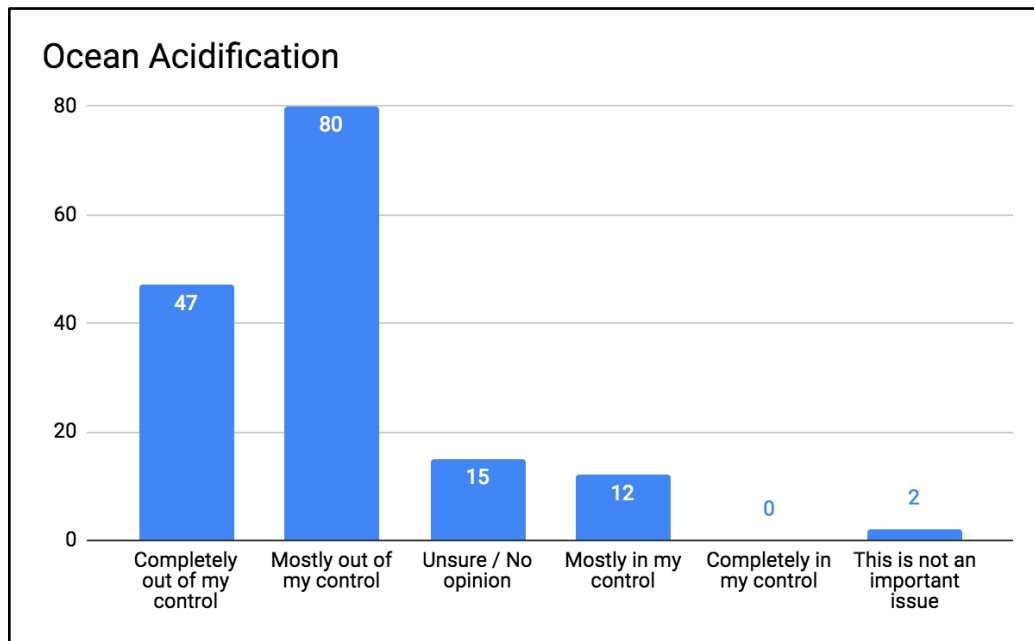
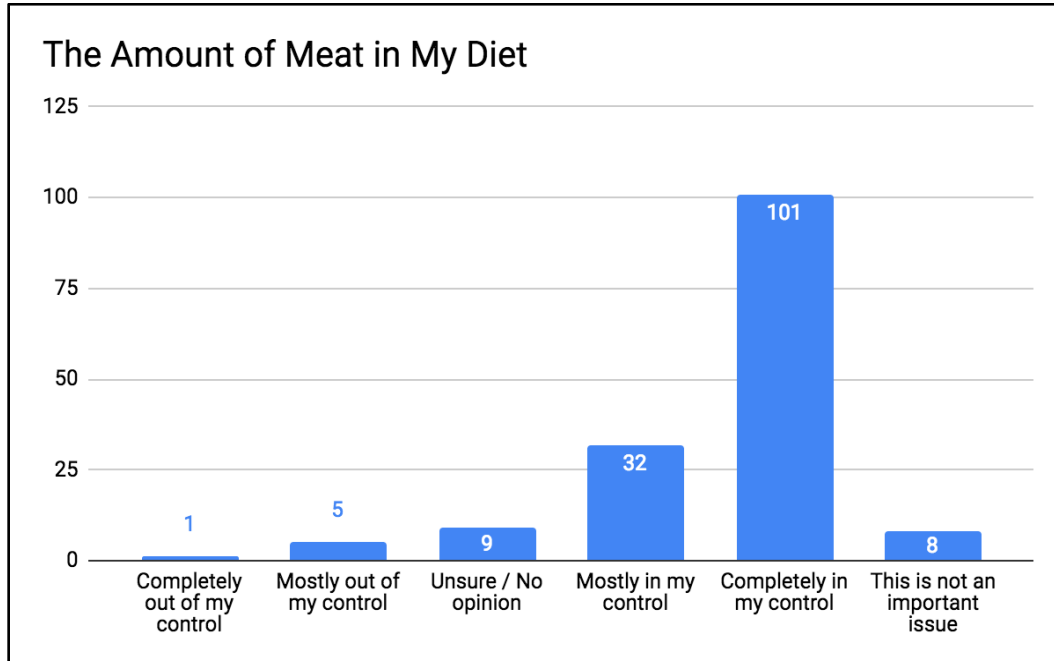
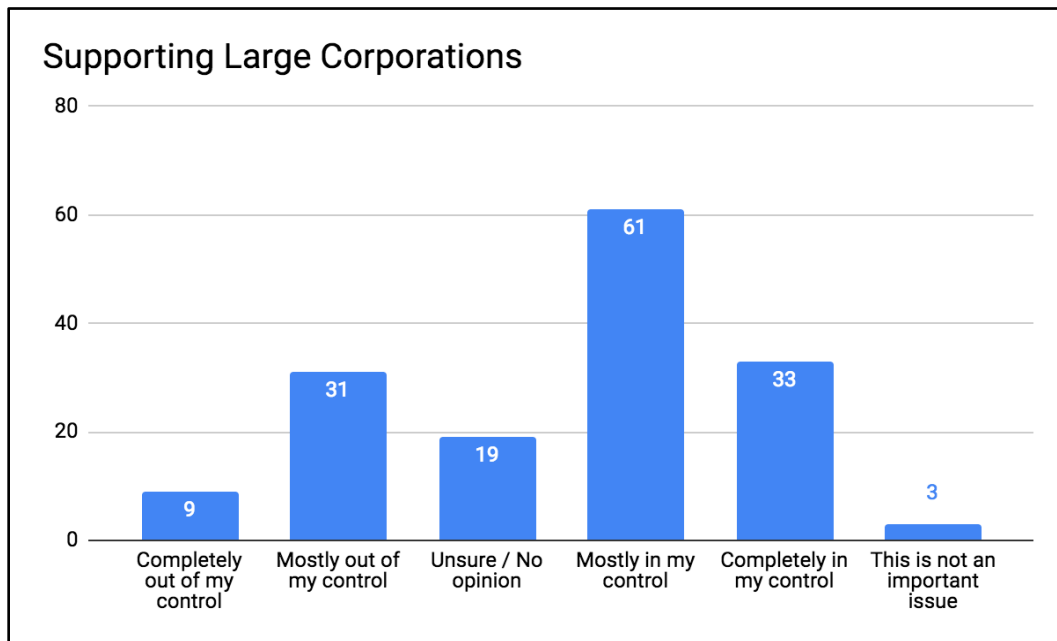
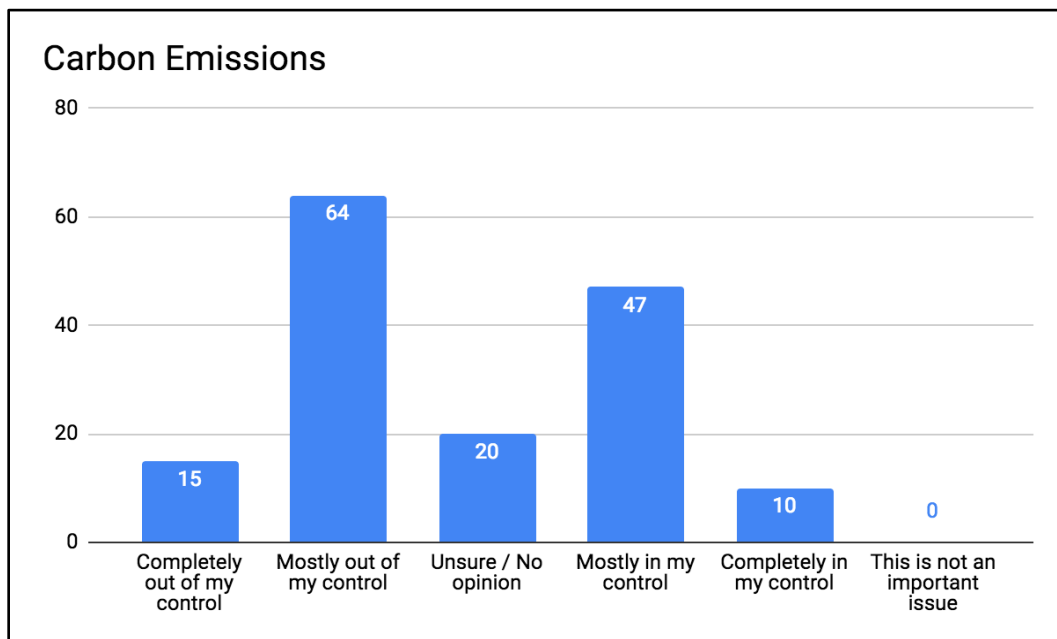
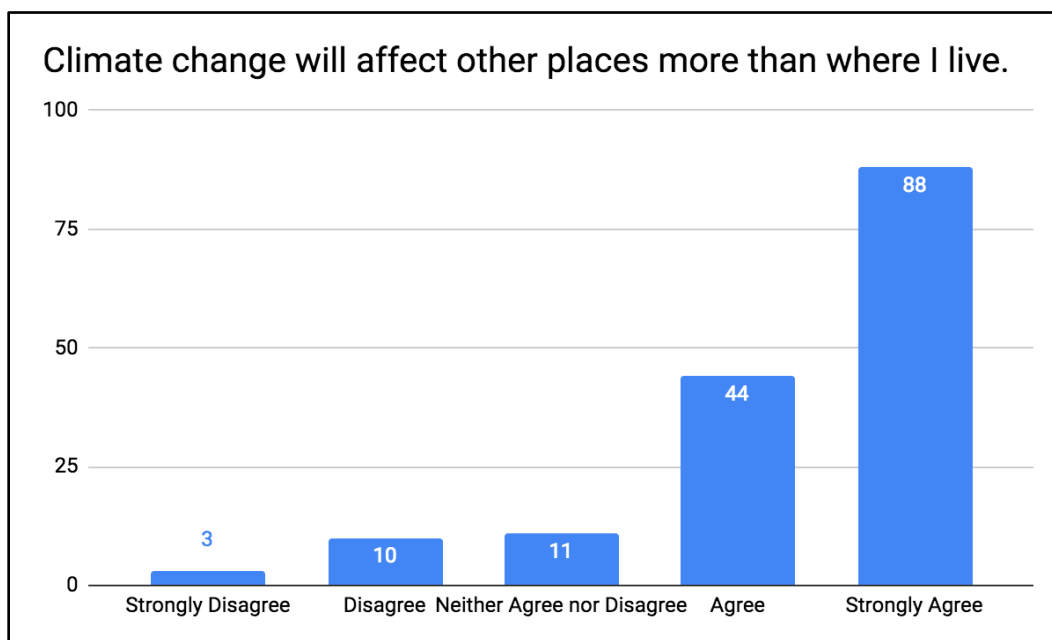
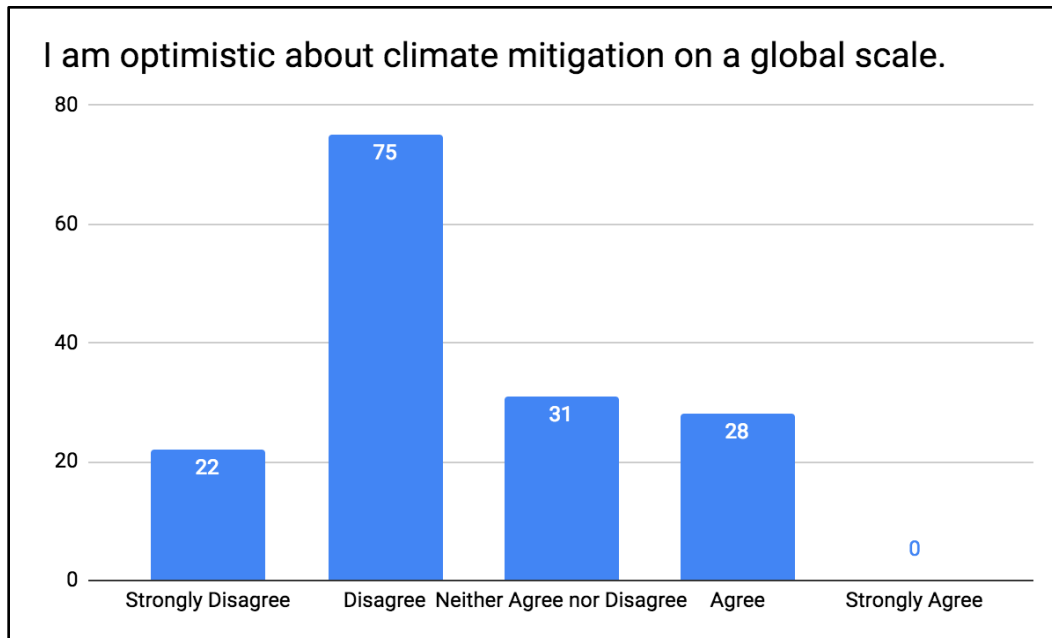
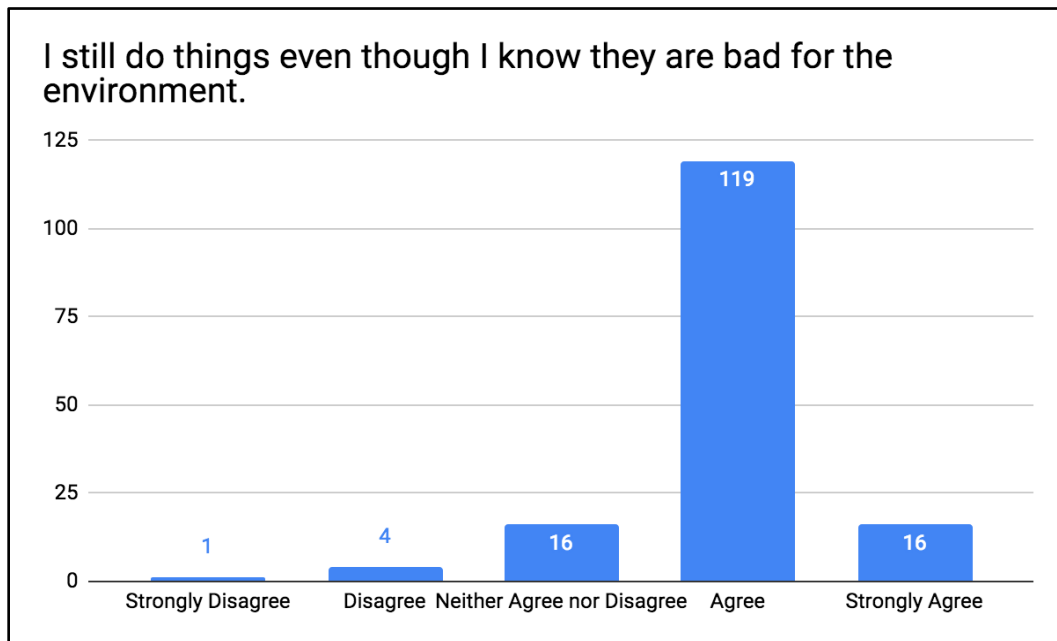
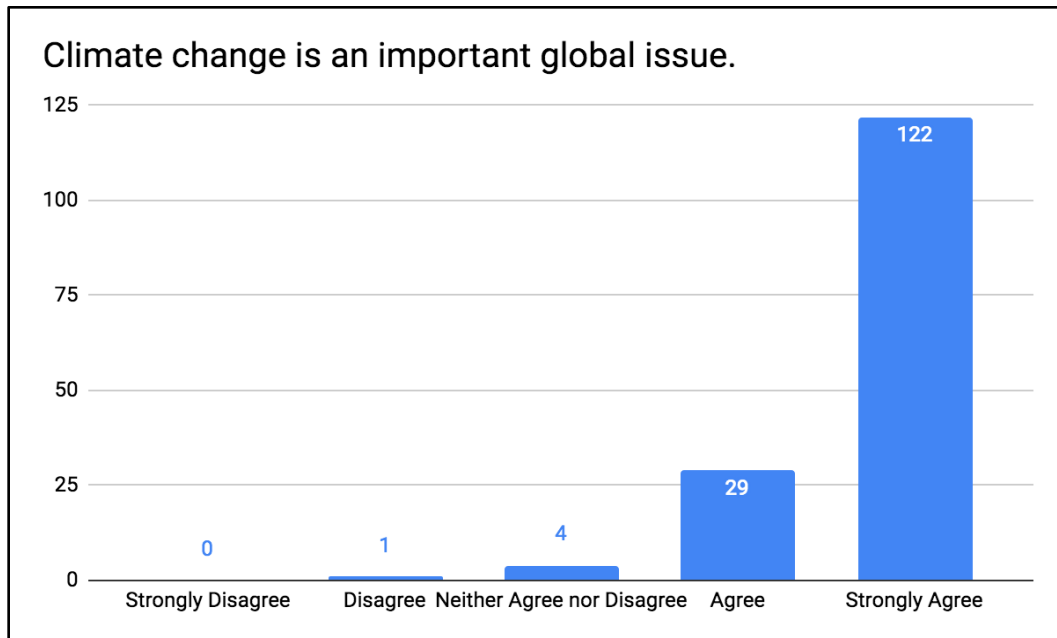


Figure 5.

Question Section 3, Large-Scale Issue**Figure 6.****Question Section 3, Small-Scale Issue****Figure 7.**

Question Section 3, Unevenly Distributed Issues**Figure 8.****Figure 9.**

Question Section 4, Distance**Figure 10.****Question Section 4, Doom****Figure 11.**

Question Section 4, Dissonance**Figure 12.****Question Section 4, Denial****Figure 13.**

Question Section 4, iDentity

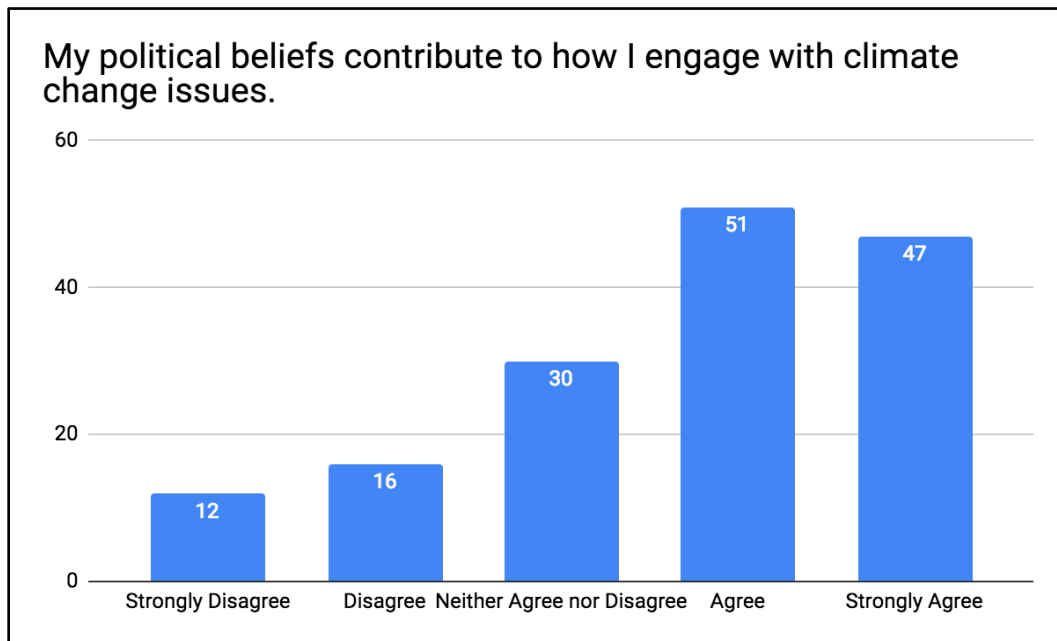


Figure 14.

IX. Analysis and Discussion

The intention of collecting demographic information was to analyze potential trends between those demographics and responses. However, there is not enough variation in these data to provide meaningful analysis. The majority of participants are located in and around my hometown and college town, and the majority of participants are between 15 and 23 years old, with almost a quarter of total responses coming from 20-year-olds. These results are not surprising, as the modes of survey distribution reached largely into my own social circle, and into social circles of similar demographics to mine. Because of this, all survey data presented is trends within individual questions.

The first question section set out to assess how distant in time people perceive climate change to be, and what people's attitudes on climate change are. Results from the first question, seen in Figure 2, are unanimous: all survey takers agree that the effects of climate change have already begun. Results from the second question in this section, seen in Figure 3, show that the vast majority of participants either fall into The Alarmed or The Concerned attitude groups outlined by the Yale Program On Climate Change, which is consistent with responses from the

first question (2009). However, one participant chose the answer corresponding to The Disengaged attitude group, and one participant chose the answer corresponding to The Doubtful attitude group. These responses clash with the unanimity from the first question, as people who fall under these categories do not believe that climate change is a current issue, rather something that, for The Disengaged, might be an issue in the future, and for The Doubtful, will likely never be an issue (Yale Program On Climate Change, 2009). One potential explanation for this discrepancy is that the first question did not specify whether I meant natural climate change or anthropogenic climate change. Perhaps these two participants are unsure whether or not climate change is naturally occurring or manmade. However, I provided a definition of climate change at the beginning of the survey, before participants began answering questions, which explained that any references to climate change in the survey are references to anthropogenic climate change. It is also likely that participants did not agree with this definition or skimmed past it.

The goal of the second question section was to assess where people believe the most severe effects of climate change will occur, and if this had anything to do with the spatial distance barrier. Since I did not perform any analysis on these data other than displaying trends, there will be no spatial distance analysis. Figure 4 shows the distribution of coding occurrences. Nine participants either left this question blank or did not understand the question correctly, so these data were discarded. This means that the data shown from this section are from 148 responses, whereas all other sections include data from 156 responses. For a full list of codes and meanings, please reference the Appendix. Codes that occur between 1 and 10 times were Ind, ME, POC, SEA, Aus, SH, BioD, HA, NR, US, Af, D, Pop, WS, and F. Codes that occur between 11 and 20 times are DC, Eq, I, Ex, and LE. Codes that occur between 21 and 30 times are LSE, O, and Ev. Codes that occur between 31 and 40 times are Ice and P. The only code that occurs more than 41 times is C with 72 occurrences. These data show that coastal locations, polar regions, and ice systems are the most commonly referenced locations regarding climate change impacts. The whole planet, ocean systems, and places of low socioeconomic status were the three next most common. I additionally sorted the codes by four themes: geographic regions, vulnerable populations, ecosystems, and regional characteristics. Distribution of codes within themes can be found in the Appendix. As shown in Figure 5, almost half of the codes are related to ecosystems, and over a quarter are related to geographic regions. This suggests that when thinking of climate change and its effects, people might be more likely to think of specific

geographic locations or ecosystems, rather than about specific groups or people or broader types of locations.

The third question section aimed to assess how much control people feel that they have in their daily lives regarding climate change issues of different scales. For the majority of this section, responses were as predicted: large-scale issues skew toward feelings of lack of control, and small-scale issues skew toward more control. The example shown in Figure 6 is ocean acidification, one of the large-scale issues. The majority of participants feel that ocean acidification is mostly out of their control, and the next largest group of participants feel that the issue is completely out of their control. Most of the other large-scale issues included in this section follow a similar skew trend, including sea level rise, warming oceans, melting land and sea ice, extreme weather events and natural disasters, air pollution, ocean pollution, dependence on fossil fuels, overexploitation of natural resources, overpopulation, extinction of species, and capitalism. It is interesting to point out that the question on capitalism generated eight responses of “This is not an important issue,” which is the largest amount of responses any question generated.

Most of the small-scale issues had a similar skew toward feelings of control. The example shown in Figure 7 is the amount of meat in participants’ diets, which is a small-scale issue. As seen in this figure, the majority of participants feel that this issue is completely in their control, and many others feel that this issue is mostly in their control. Most of the other small-scale issues follow a similar skew trend, including recycling, composting, the amount of trash participants produce, how often participants drive, eating locally grown food, buying clothes second-hand, supporting small businesses, the amount of plant-based products in participants’ diets, and the amount of single use plastic participants use. It is interesting to point out that the questions on the amount of meat and the amount of plant-based products in participants’ diets were the only other two questions that generated eight responses of “This is not an important issue.”

Two issues do not have obvious skew trends, which are supporting large corporations and carbon emissions, and can be seen in Figures 8 and 9. While Figure 8 shows a small majority of participants leaning toward feelings of control, a large portion of participants still felt that supporting large corporations is out of their control. While Figure 9 shows a small majority of participants leaning toward lack of control, a large portion of participants still feel that carbon

emissions are in their control. I expected the data for supporting large corporations to follow a similar skew trend to the rest of the small-scale issues, and the data for carbon emissions to follow a similar skew trend to the rest of the large-scale issues. However, I see how these two issues may not have been interpreted as intended. While individuals are often able to choose which brands they support and which companies they purchase from, it can also be very difficult to escape the monopolies of large corporations, thus rendering this issue both small-scale and large-scale. Carbon emissions can easily be seen as both small-scale and large-scale, as well, especially because I failed to specify if this question was asking about carbon emissions on a national or global scale or at a personal scale.

For the fourth question section, I chose to highlight one graph for each of the Five D's. For Distance, I chose data for the statement "Climate change will affect other places more than where I live." As seen in Figure 10, 85% of participants either agreed or strongly agreed with this statement, which shows that, among the people who took my survey, most see climate change as spatially distant. This is not surprising, as the majority of participants are from suburban and urban Chicago and Philadelphia, regions which have yet to see any severe impacts from climate change. For Doom, I chose data for the statement "I am optimistic about climate mitigation on a global scale." As seen in Figure 11, 62% of participants either disagree or strongly disagree, and another 20% are neutral. Only 18% agree with this statement, while none felt strong agreement. For Dissonance, I chose data for the statement "I still do things even though I know they are bad for the environment." As seen in Figure 12, an overwhelming majority of participants, 86% either agree or strongly agree with this statement. For Denial, I chose data for the statement "Climate change is an important global issue." This statement garnered the most consistent responses out of any other question in the survey, with 90% of participants either agreeing or strongly agreeing, shown in Figure 13. For iDentity, I chose data for the statement, "My political beliefs contribute to how I engage with climate change issues." While the majority (63%) of participants agreed with this statement, 19% also felt neutral about the issue, which can be seen in Figure 14.

While these five examples do not perfectly embody trends for other questions in the five categories, they, along with data from the first three question sections, do a good job showing general trends. Overall, four out of the five psychological barriers to climate change response exist (to varying degrees) for the people who took my survey. The majority of participants see

climate change as being distant in many respects. Large-scale issues are distant from people's control, as evidenced by Figure 6 and the rest of the discussion on the third question section. Both Figure 6 and Figure 10 show that climate change is spatially distant. Appendix data shows that climate change is also socially distant and distant from participants' senses as well. However, Figure 2 shows that climate change is not distant in time, as all participants believe the effects of climate change are already occurring.

While many participants believe that there are solutions to climate change, as seen in Appendix data, many do not believe that these solutions will be implemented in time to save the planet; many participants are not optimistic about climate mitigation, as seen in Figure 11. This supports the existence of Doom as a psychological barrier.

Dissonance can also be seen strongly; Figure 12 and Appendix data show that many people still harm the environment and contribute to climate change despite knowing the weight of their actions.

The fourth barrier represented in my data is iDentity, although different identities contribute to different degrees. Political beliefs, as shown in Figure 14, contribute to how the majority of participants interact with climate change issues. Social status and economic status contribute as well, as seen in Appendix data. However, religious and spiritual beliefs do not contribute as much as other identities do, also seen in Appendix data.

One barrier, Denial, is not supported in my data. As shown by the overwhelming evidence in Figure 2 and Figure 13, participants do not deny that climate change is happening, and in fact strongly believe it is happening now.

It is hard to say if these data are representative of just my social circle, or if they stretch beyond it. Regardless, these data strongly point toward the existence of psychological barriers to climate change, which means that communicators do need to continue to use strategies that bypass and fight against these barriers.

X. Conclusion

The future of our planet lies in research, action, and policy. The foundation of psychological knowledge had been lain for, in many cases, over a decade. We know what we need to do to better communicate climate change, so why are we still using scare tactics, fear

mongering, and alarmist strategies, or hard facts, unemotional data, and faceless graphs? From the research presented and from my survey results, it is clear that psychological barriers to climate change response exist. But we need to move the focus beyond the fact that people have a difficult time responding to climate change and instead focus on communication strategies that emphasize hope, positivity, conversation, and a better future; ones that elicit response.

Researchers should continue to study the climate change communication process as a whole but must also run studies that address specific communication methods and their effectiveness.

Additionally, since climate change cannot be everyone's top priority, as not everyone has the resources available to help mitigate it, I am calling upon those with the power to act to help build a better future. To effectively communicate climate change is to compel people to act. And people need to act now. These actions should begin on a personal, small-scale level. However, they must be accompanied by policy changes that support, encourage, and further individual and local action, and policy that removes infrastructural constraints that prevent people from acting (Moser, 2010; Nerlich, Koteyko, and Brown, 2010).

XI. References

- Ayres, I., Raseman, S., and Shih, A. (2009). Evidence from two large field experiments that peer comparison feedback can reduce residential energy usage. *NBER Working Paper Series*. <http://www.nber.org/papers/w15386>
- Busch, J. (2015). [Pie charts showing which countries caused climate change and which countries are hurt by climate change, drawing from World Bank Development data]. *Climate Change and Development in Three Charts*. Retrieved from <https://www.cgdev.org/blog/climate-change-and-development-three-charts>
- Climate One. (2013, Feb 20). *Single action bias and foot in the door* [Video file]. Retrieved from <https://www.youtube.com/watch?v=tg6M11kWcoU>
- Gilbert, D. (2006, July 2). If only gay sex caused global warming. Los Angeles Times. Retrieved from <http://articles.latimes.com/2006/jul/02/opinion/op-gilbert2>
- Goldstein, N. J., Cialdini, R. B., Griskevicius, V. (2008). A room with a viewpoint: using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research*, 35, 472-482. doi:10.1086/586910
- Kahan, D. (2015). What is the “science of science communication”? *Journal of Science Communication*, 14(3), 1-12. <http://dx.doi.org/10.2139/ssrn.2562025>
- Kahan, D., Jenkins-Smith, H., and Braman, D. (2011). Cultural cognition of scientific consensus. *Journal of Risk Research*, 14(2), 147-174. doi:10.1080/13669877.2010.511246
- van der Linden, S., Leiserowitz, A., Rosenthal, S., and Maibach, E. (2017). Inoculating the public against misinformation about climate change. *Global Challenges* 1(2). <https://doi.org/10.1002/gch2.201600008>
- Lewandowsky, S., Gignac, G. E., and Vaughan, S. (2012). The pivotal role of perceived scientific consensus in acceptance of science. *Nature Climate Change*, 3(4), 399–404. doi:10.1038/nclimate1720
- Mazar, N., and Zhong, C.-B. (2010). Do green products make us better people? *Psychological Science*, 21(4), 494-498. doi:10.1177/0956797610363538
- Moser, S. C. (2010). Communicating climate change: history, challenges, process and future directions. *WIREs Climate Change*, 1, 31-53. doi:10.1002/wcc.11

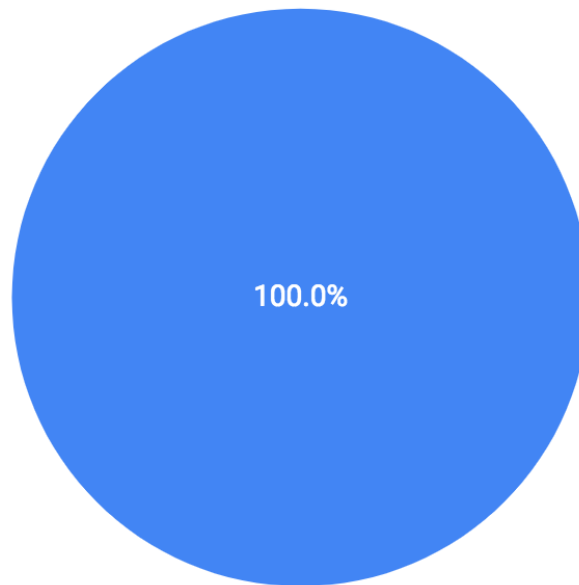
- Nerlich, B., Koteyko, N., and Brown, B. (2010). Theory and language of climate change communication. *WIREs Climate Change*, 1, 97-110. doi:10.1002/wcc.2
- Stoknes, P. E. (2015). *What we think about when we try not to think about global warming*. Vermont: Chelsea Green.
- World Bank. (2009). *Cognitive and behavioral challenges in responding to climate change*. Kari Marie Norgaard.
- Yale Program On Climate Change Communication. (2009). *Global warming's six Americas 2009: an audience segmentation analysis*. Leiserowitz, A., Maibach, E., and Roser-Renouf, C.
- Zaval, L., Keenan, E. A., Johnson, E. J., and Weber, E. U. (2014). How warm days increase belief in global warming. *Nature Climate Change*, 4, 143-147. doi:10.1038/NCLIMATE2093

XII. Appendix

Question Section 1

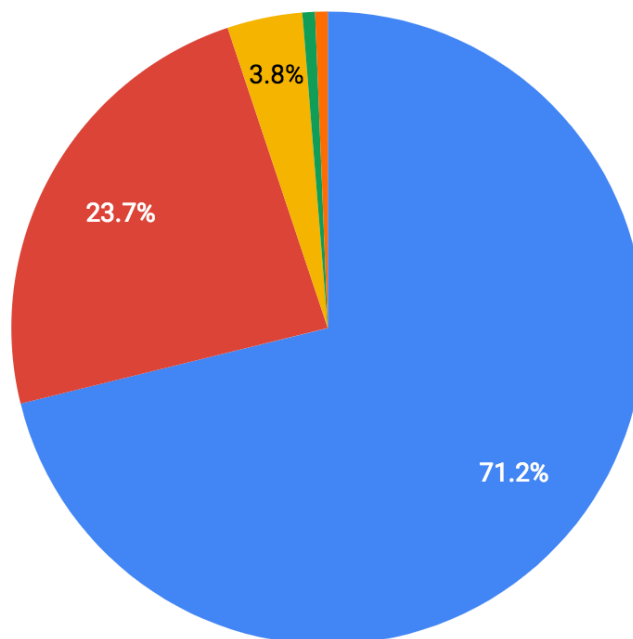
Please choose the statement you agree with the most.

- ☒ The effects of climate change have already begun.



Please choose the statement you agree with the most.

- I am informed about climate change. It is happening, it is caused by humans, and we need to take action now.
- I am concerned about climate change, and I know some things about it, but it is not my top priority.
- I think climate change might be an issue, but I am not certain. I believe there are more serious issues we should be dealing with right now.
- I have not thought much about climate change. I do not think it is something we need to worry about yet, but it might be an issue in the future.
- If climate change is happening, it is not caused by humans, and it is unlikely to affect anything for several decades.

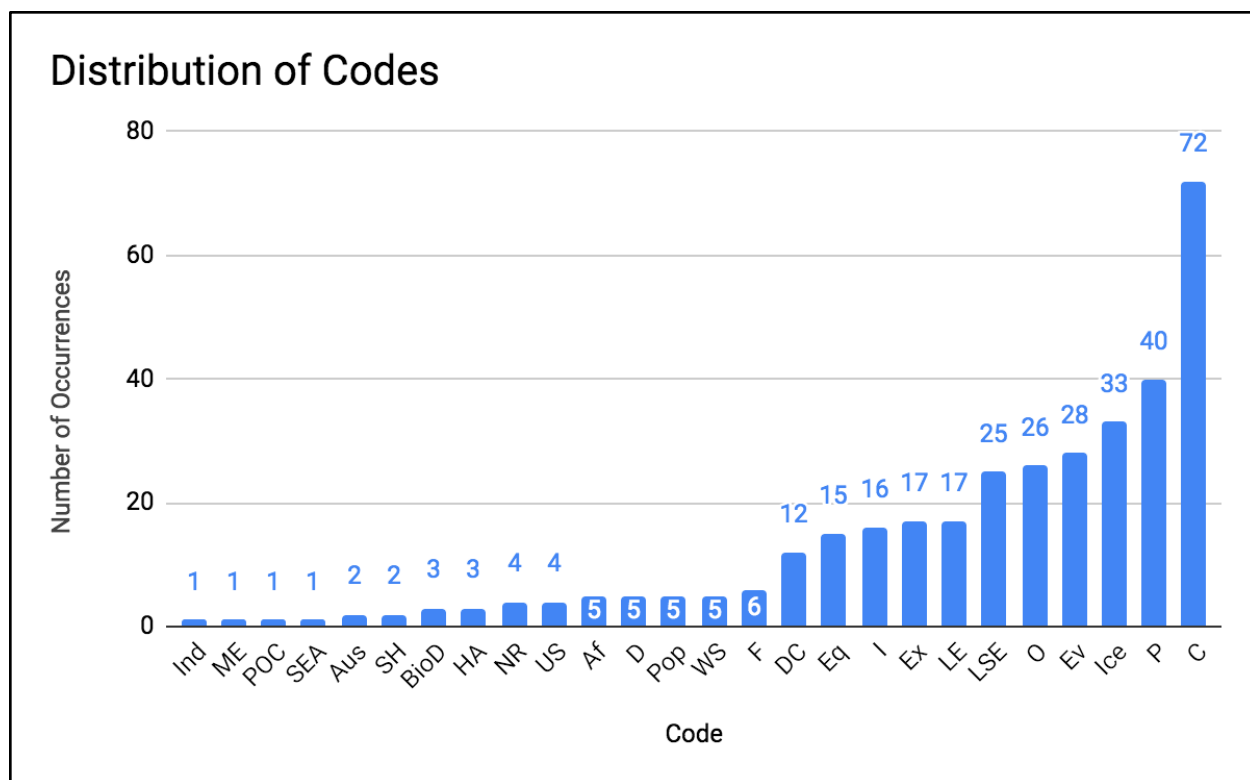


Question Section 2

Full list of codes

Code	Meaning of Code	Number of Responses
Af	Africa	5
Aus	Australia	2
BioD	Places with high biodiversity	3
C	Coastlines, coastal cities, and other coastal communities	72
D	Deserts	5
DC	Developing countries	12
Eq	Equatorial regions	15
Ev	Everywhere; the whole planet	28

Ex	Regions with extreme environmental conditions; this includes regions with extreme temperatures and extreme weather events	17
F	Forests, including rainforests and jungles	6
HA	Regions of high elevation	3
I	Islands	16
Ice	Ice systems, including ice caps, land ice, sea ice, and glaciers	33
Ind	Indigenous populations	1
LE	Places with low elevation; this includes regions below sea-level	17
LSE	Regions of low socioeconomic status	25
ME	The Middle East	1
NR	Regions/communities reliant on natural resources, including agricultural regions	4
O	Ocean systems	26
P	Polar regions and other high latitude regions	40
POC	People of color	1
Pop	Highly/densely populated regions (both human and non-human)	5
SEA	Southeast Asia	1
SH	The southern hemisphere	2
US	Regions in the United States	4
WS	Water-stressed communities (this includes communities with limited access to clean water as well as drought-ridden regions and regions prone to floods)	5

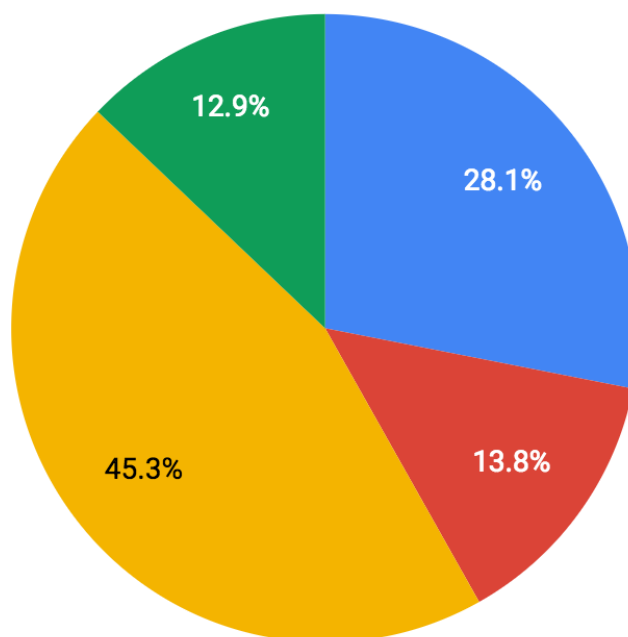


Codes by theme

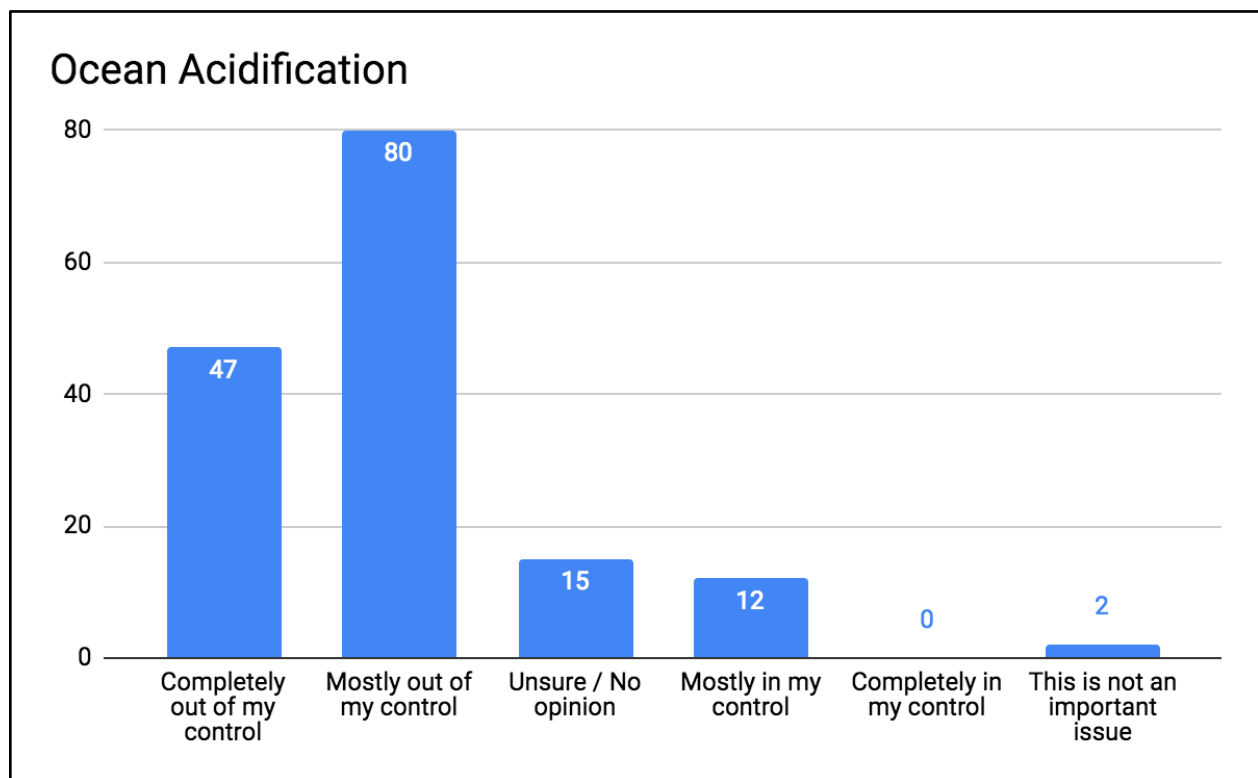
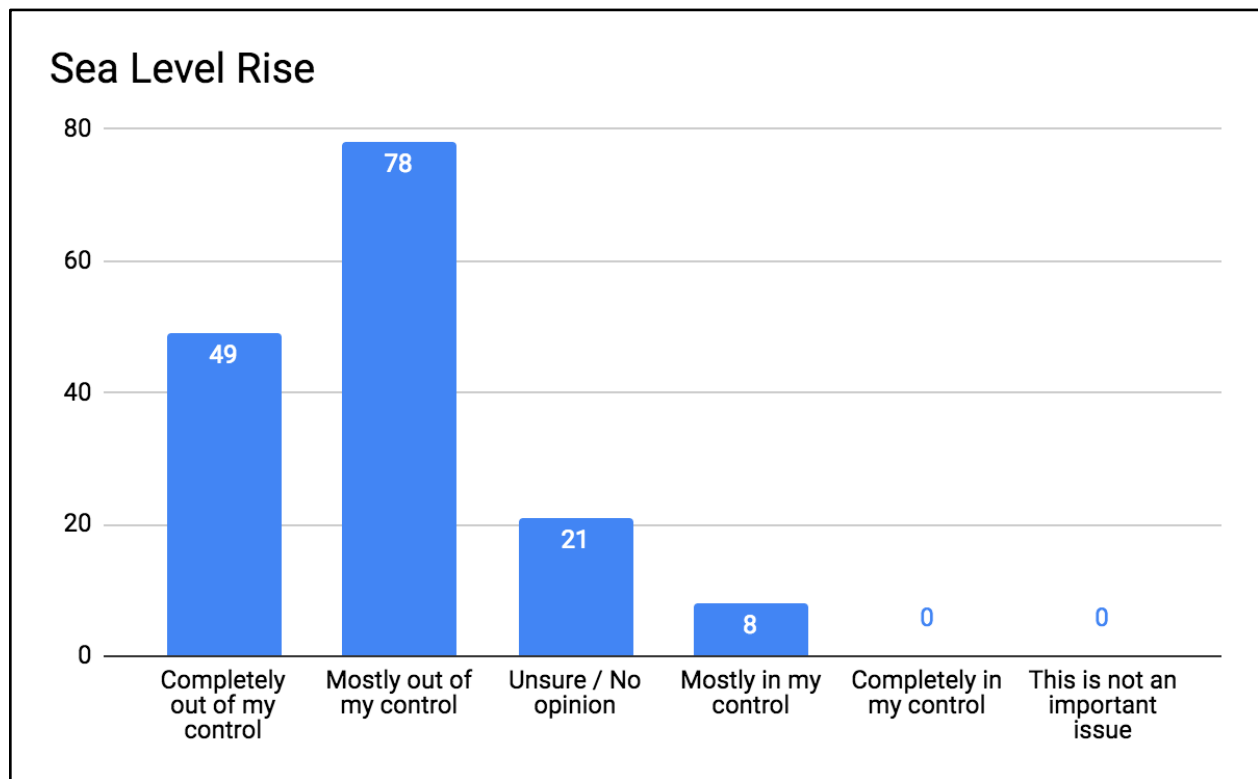
Theme	Codes	Number of Occurrences
Geographic Regions	Af, Aus, Eq, Ev, ME, P, SEA, SH, US	98
Vulnerable Populations	DC, Ind, LSE, NR, POC, WS	48
Ecosystems	C, D, F, Ice, I, O	158
Regional Characteristics	BioD, Ex, HA, LE, Pop	45

Distribution of Codes by Theme

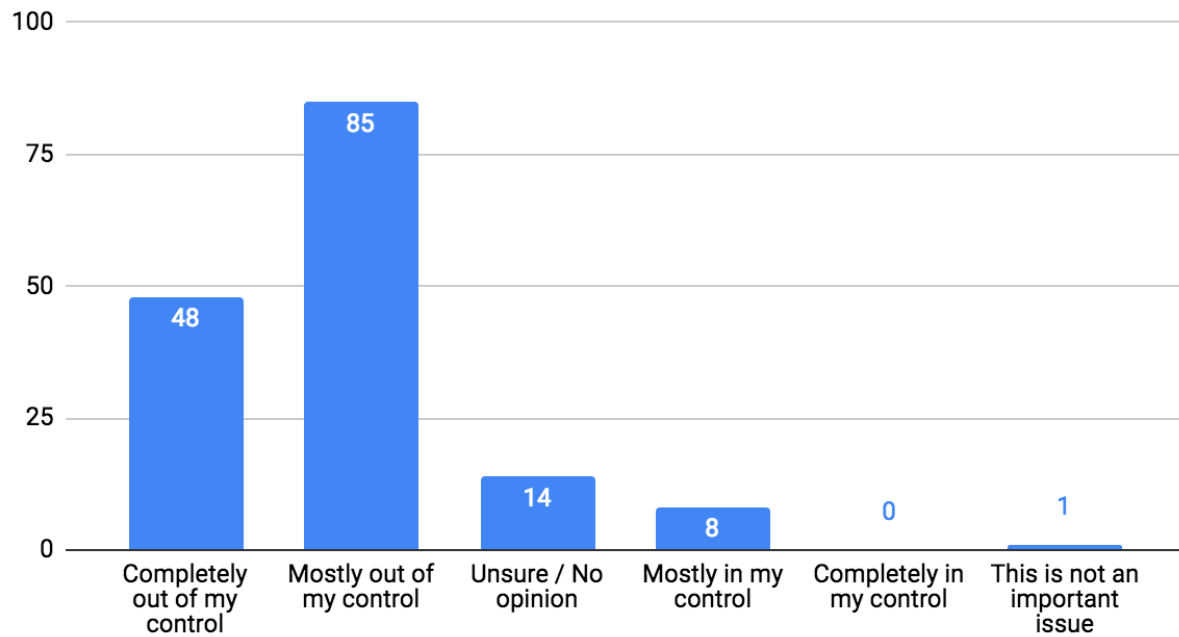
- Geographic Regions
- Vulnerable Populations
- Ecosystems
- Regional Characteristics



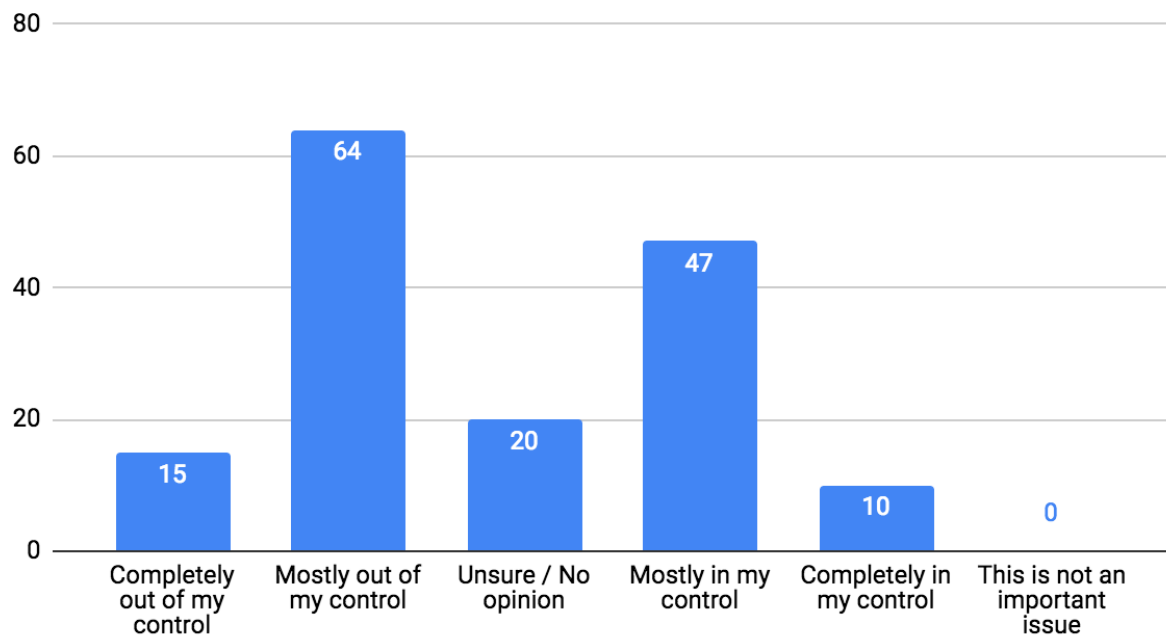
Question Section 3



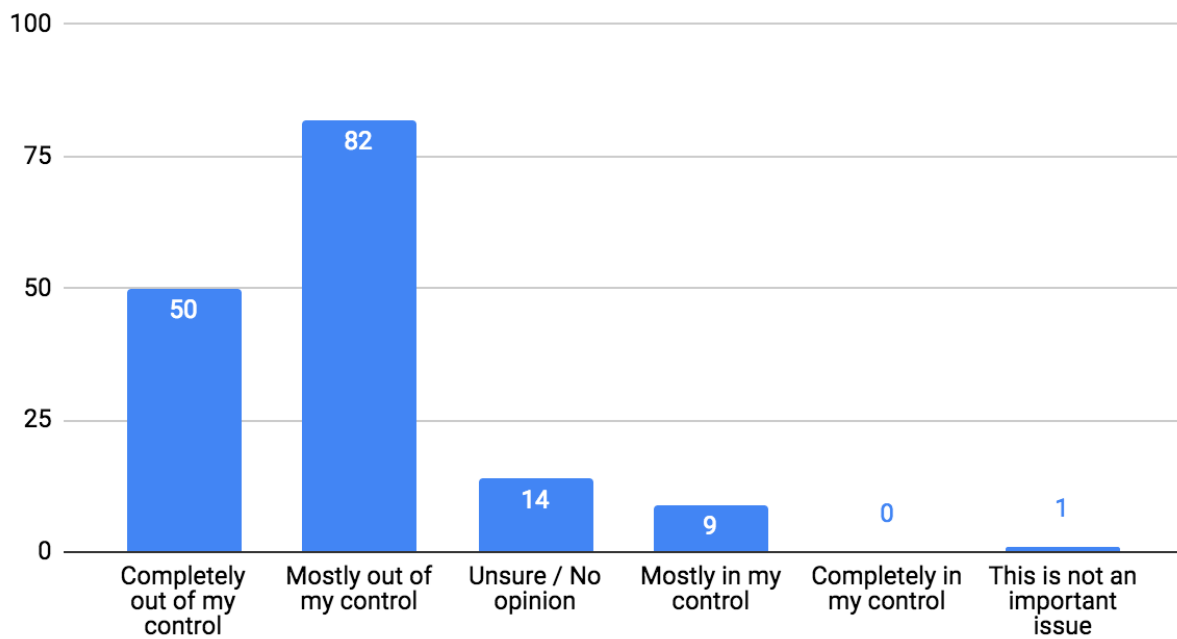
Warming Oceans



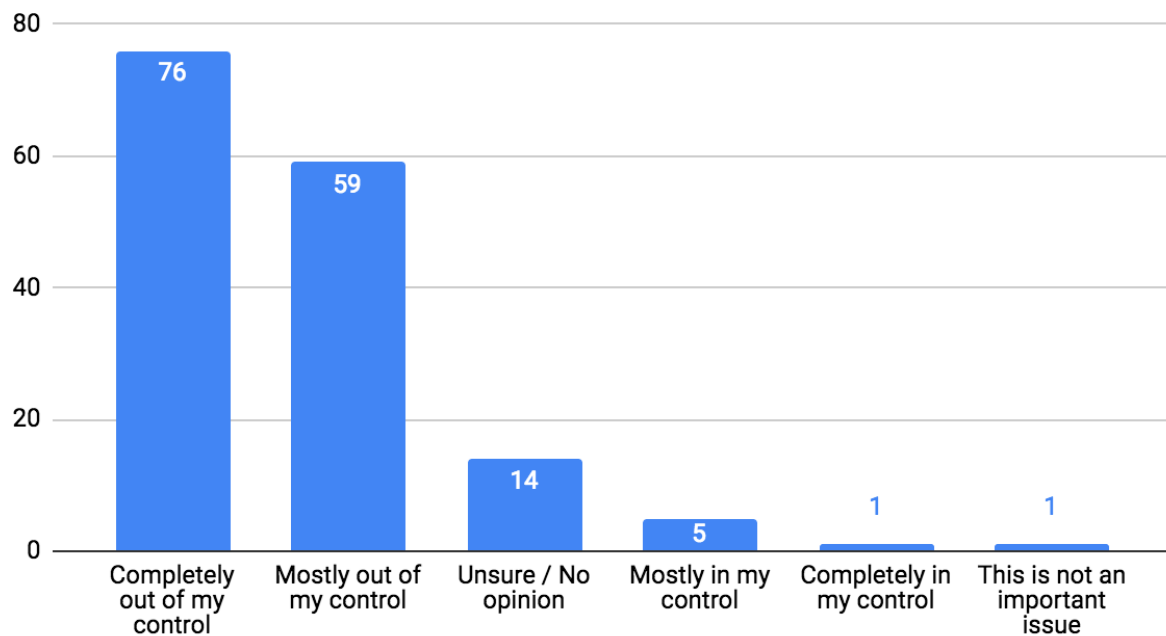
Carbon Emissions



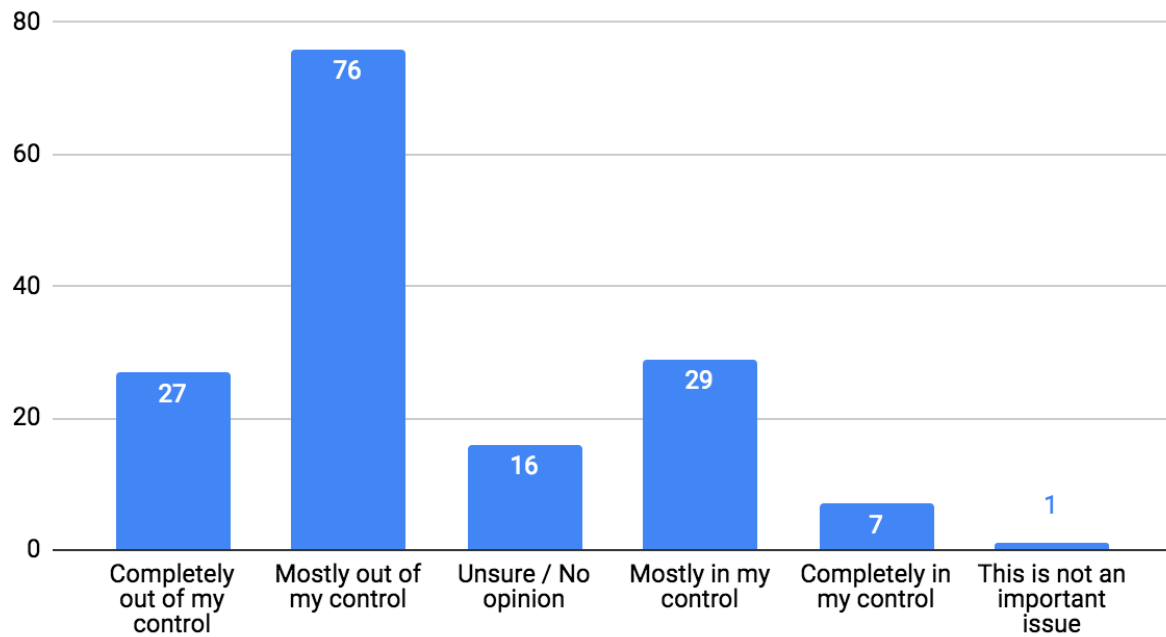
Melting Land and Sea Ice



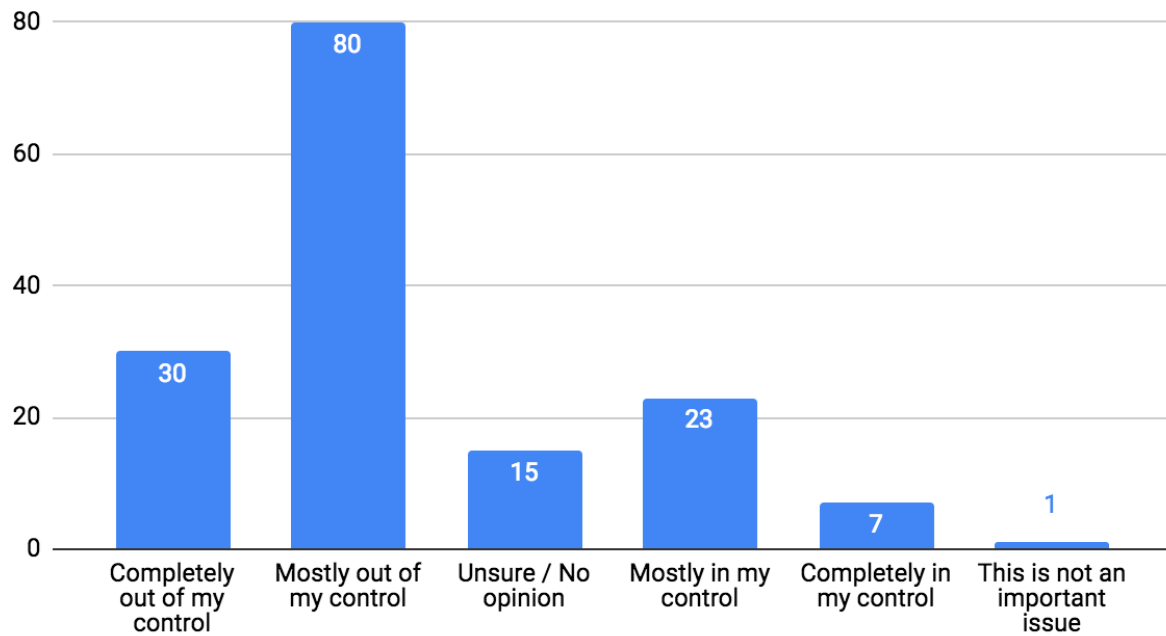
Extreme Weather Events and Natural Disasters



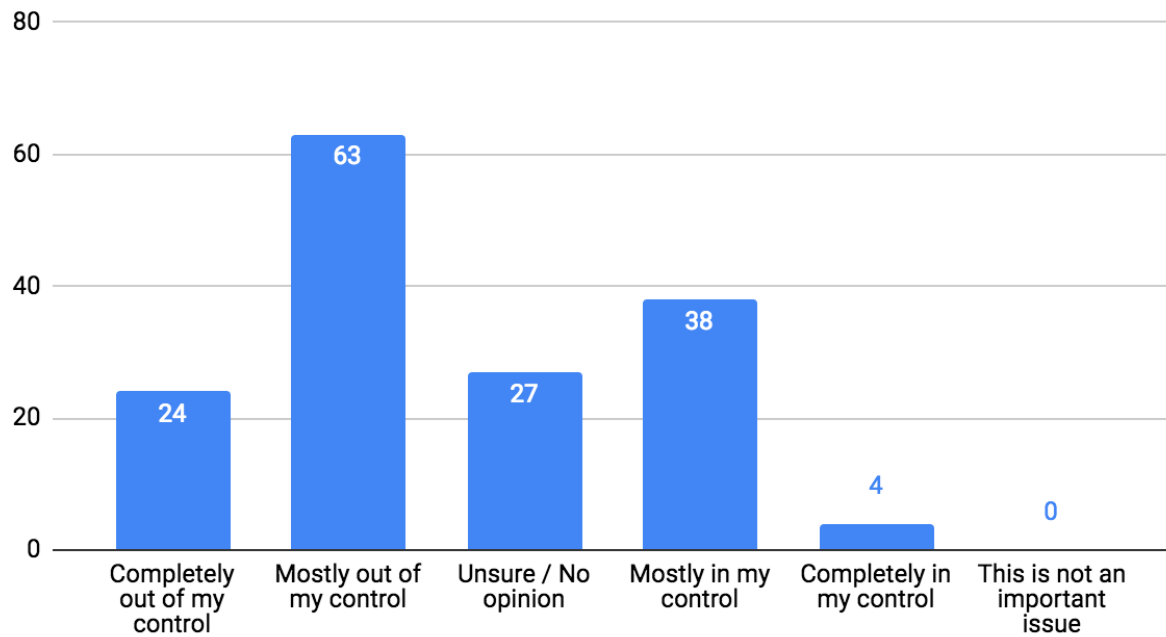
Air Pollution



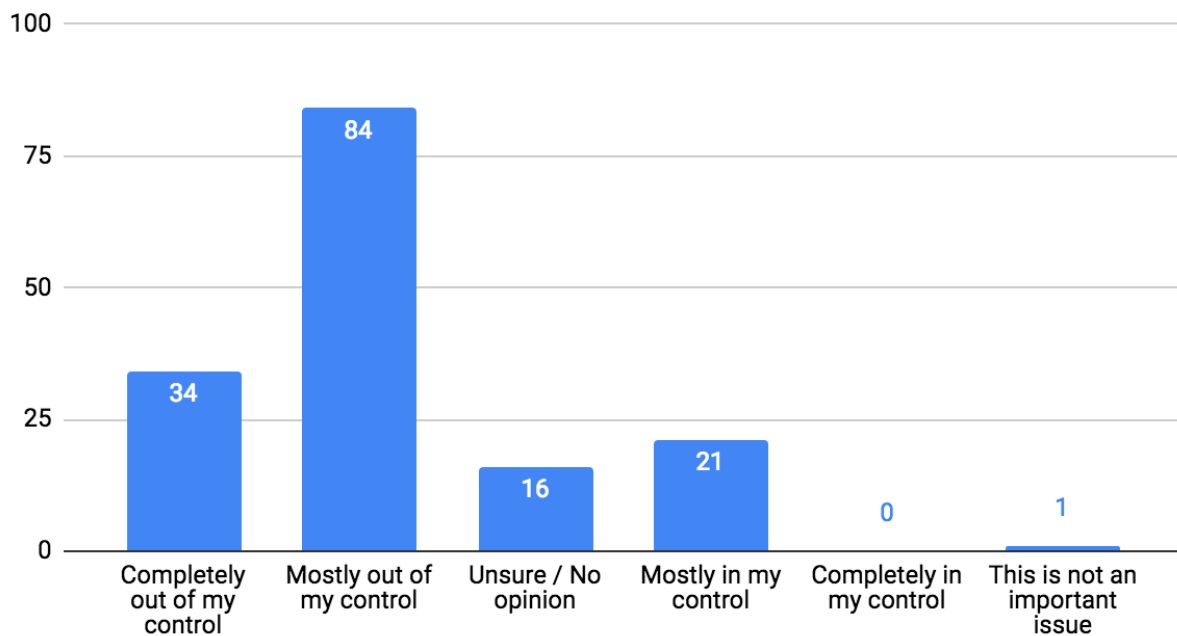
Ocean Pollution



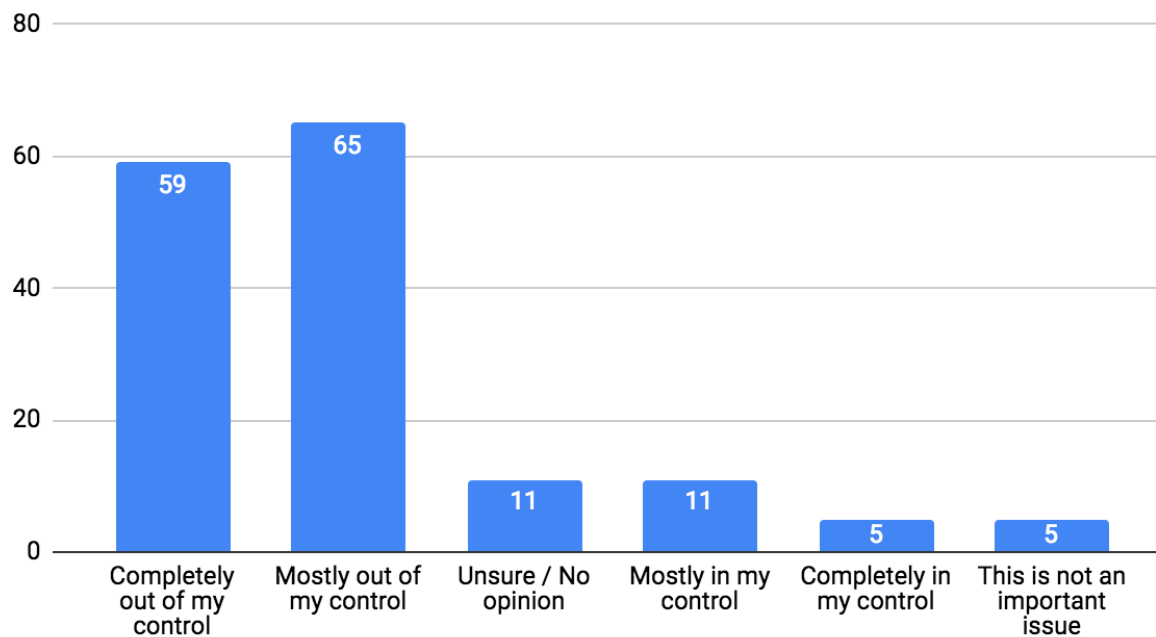
Dependence on Fossil Fuels



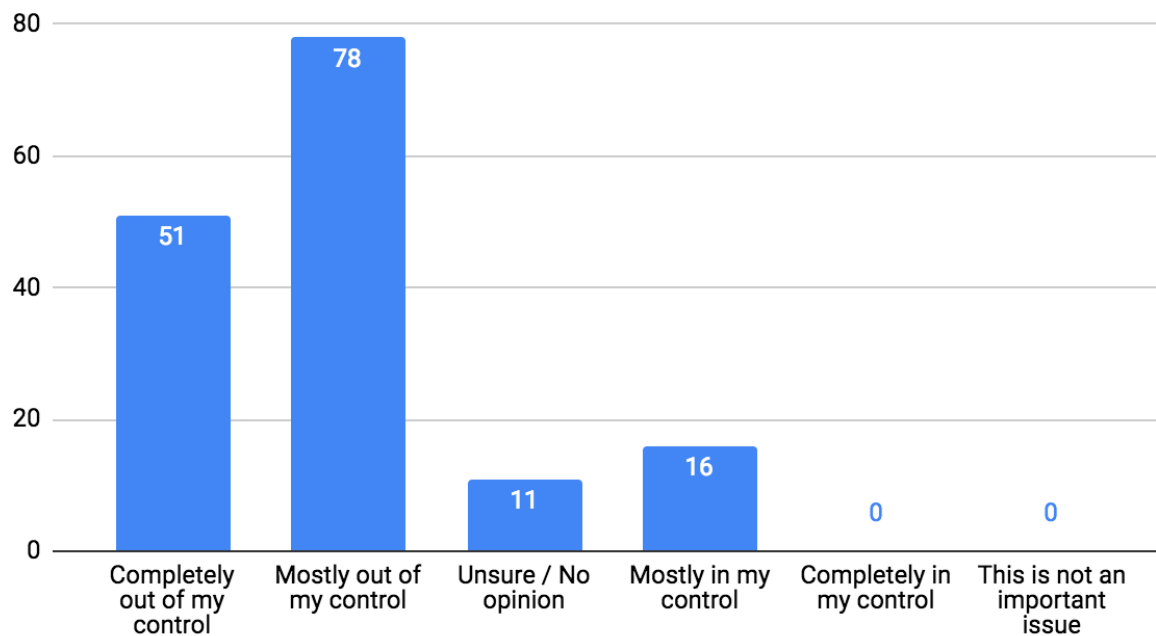
Overexploitation of Natural Resources



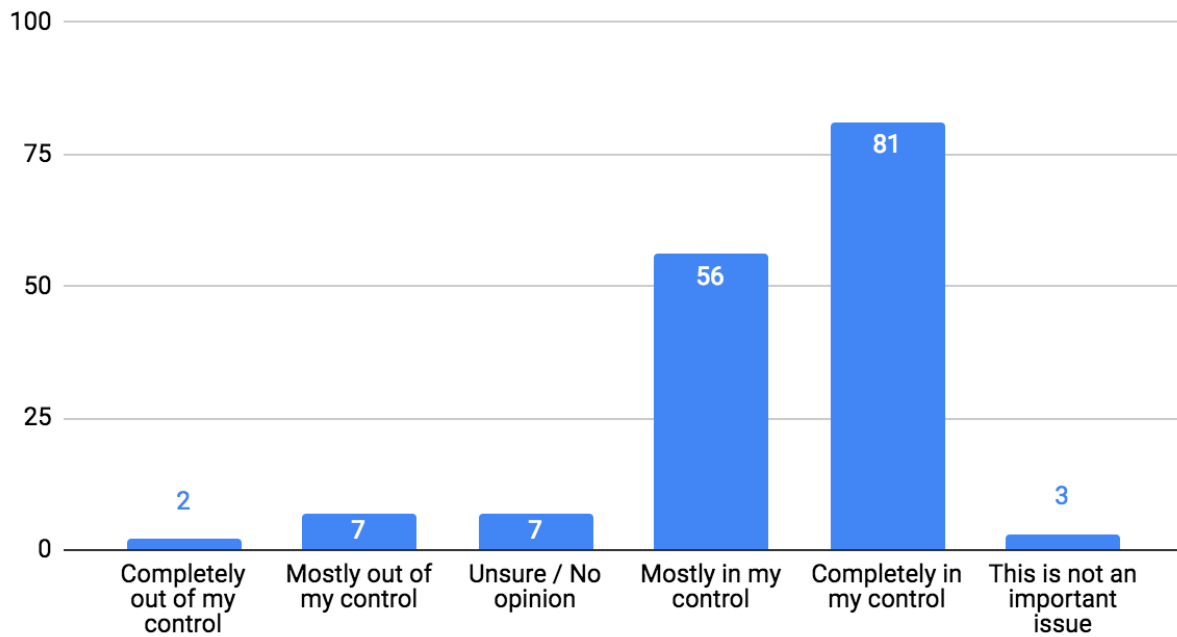
Overpopulation



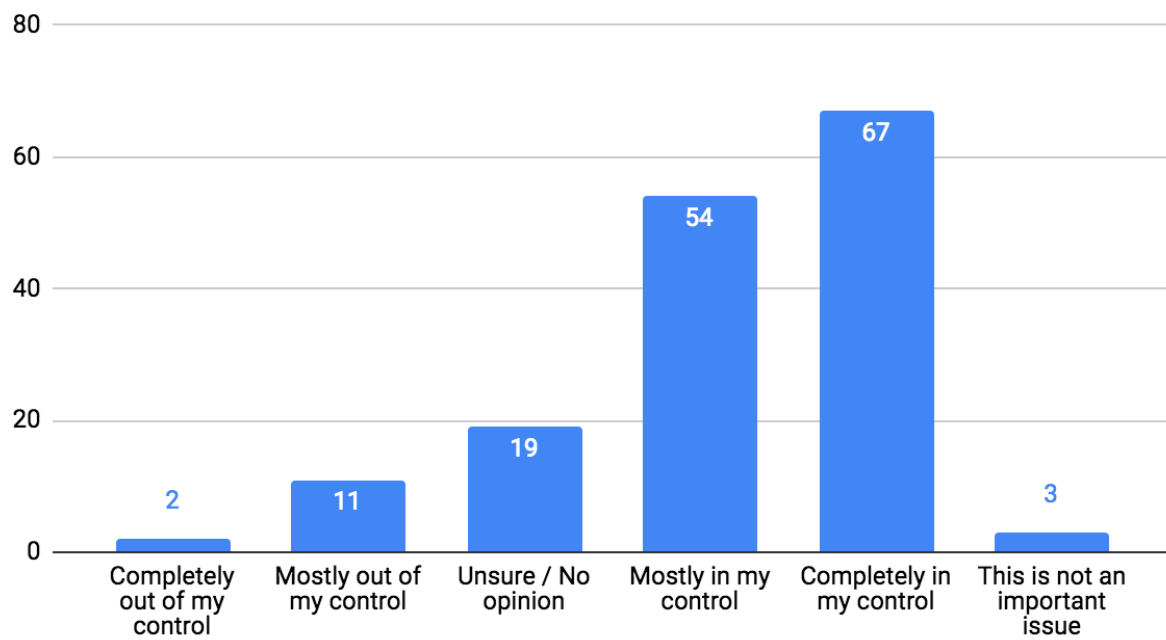
Extinction of Species



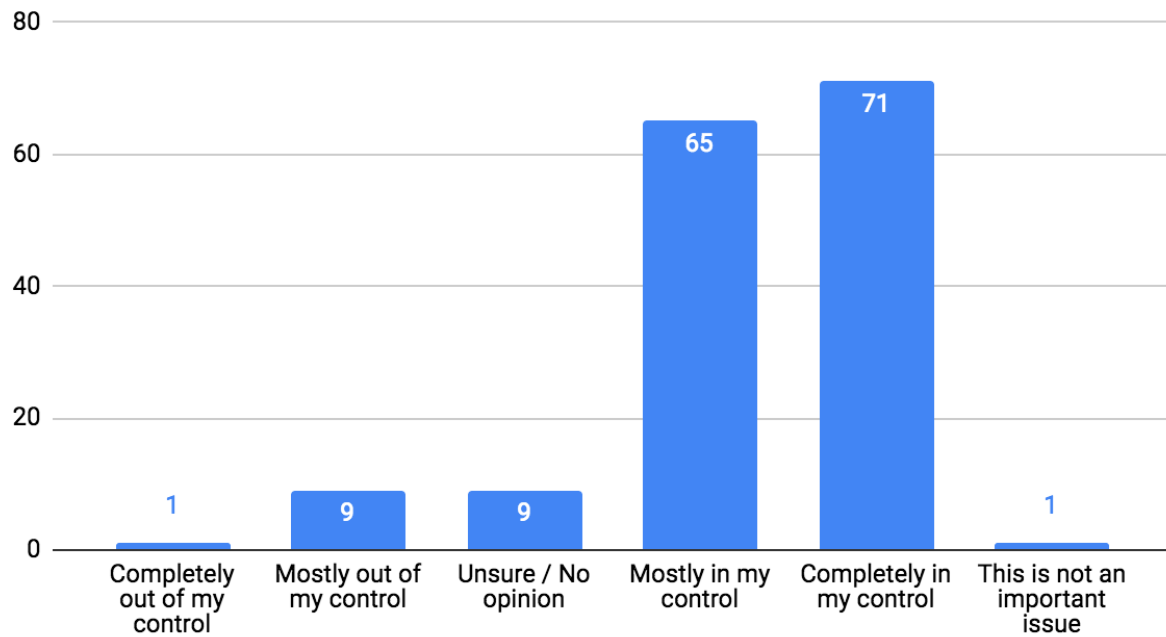
Recycling



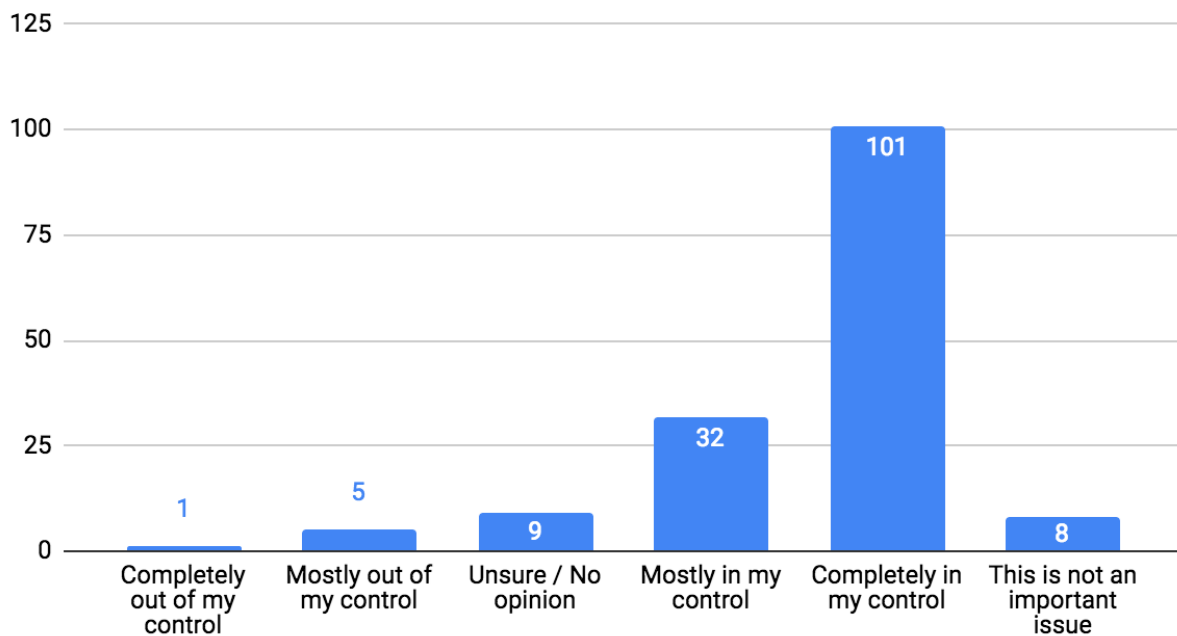
Composting



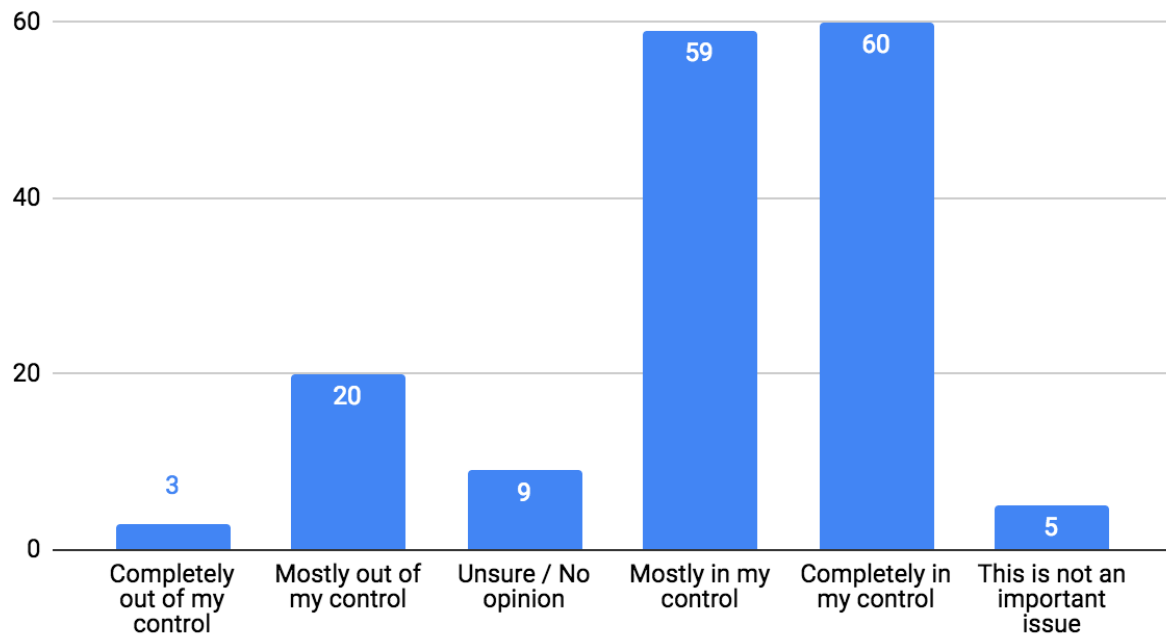
The Amount of Trash I Produce



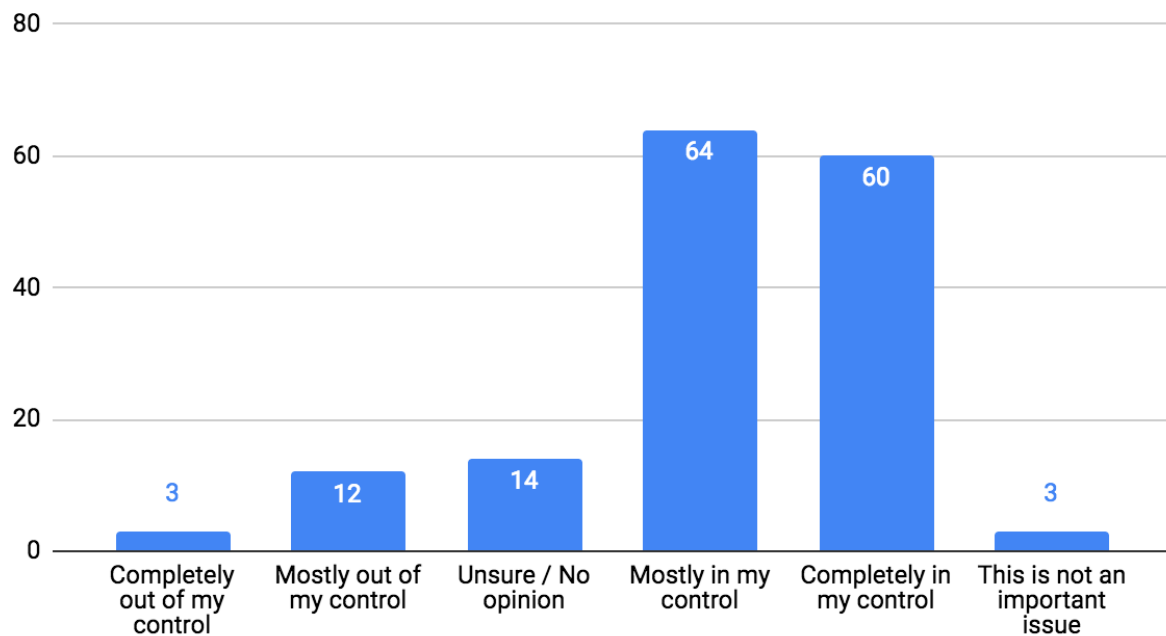
The Amount of Meat in My Diet



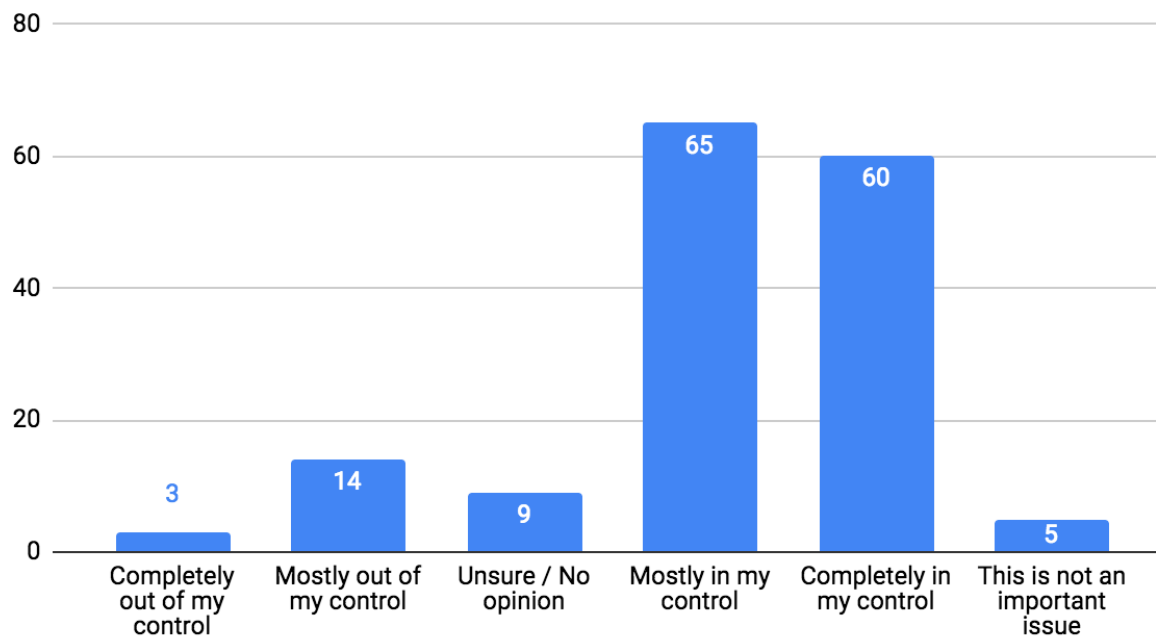
How Often I Fly



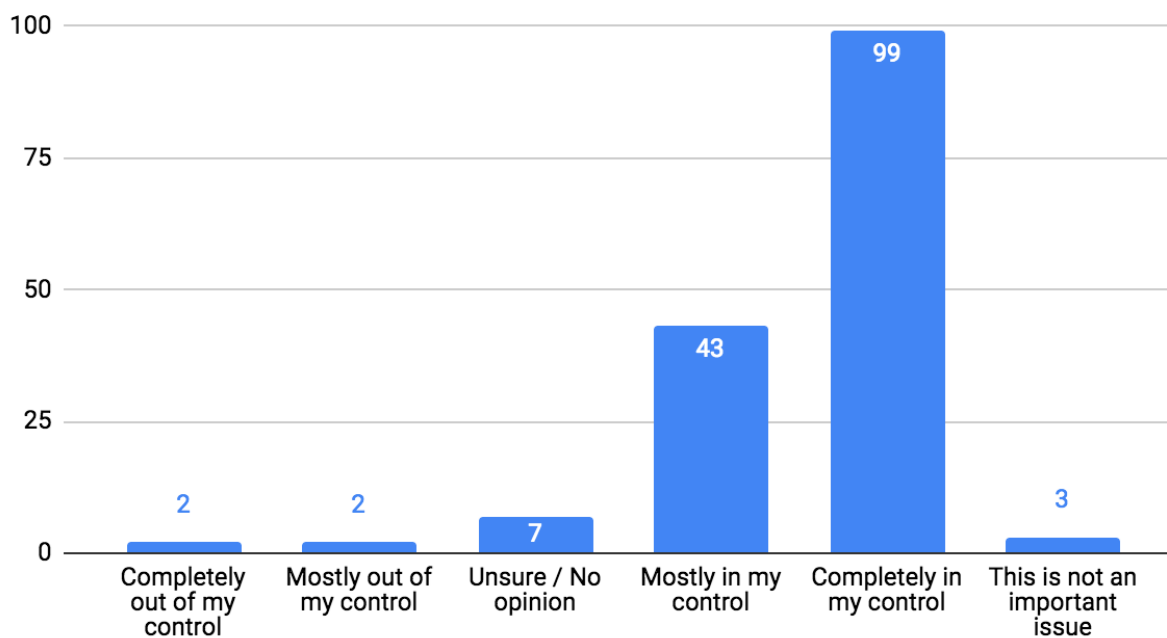
How Often I Drive



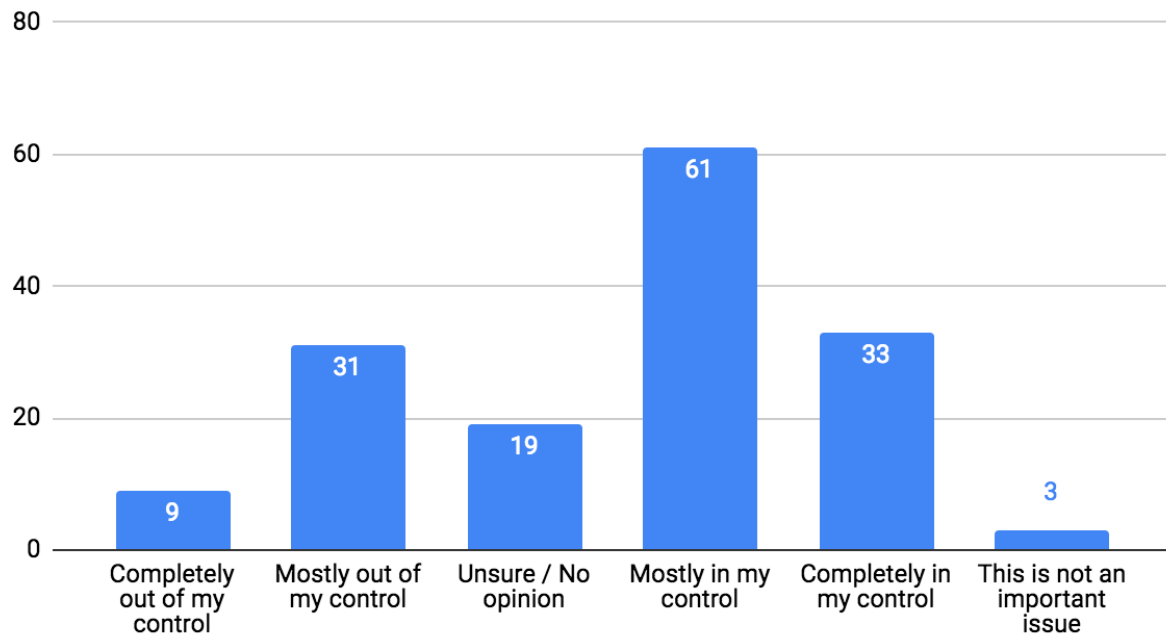
Eating Locally Grown Food



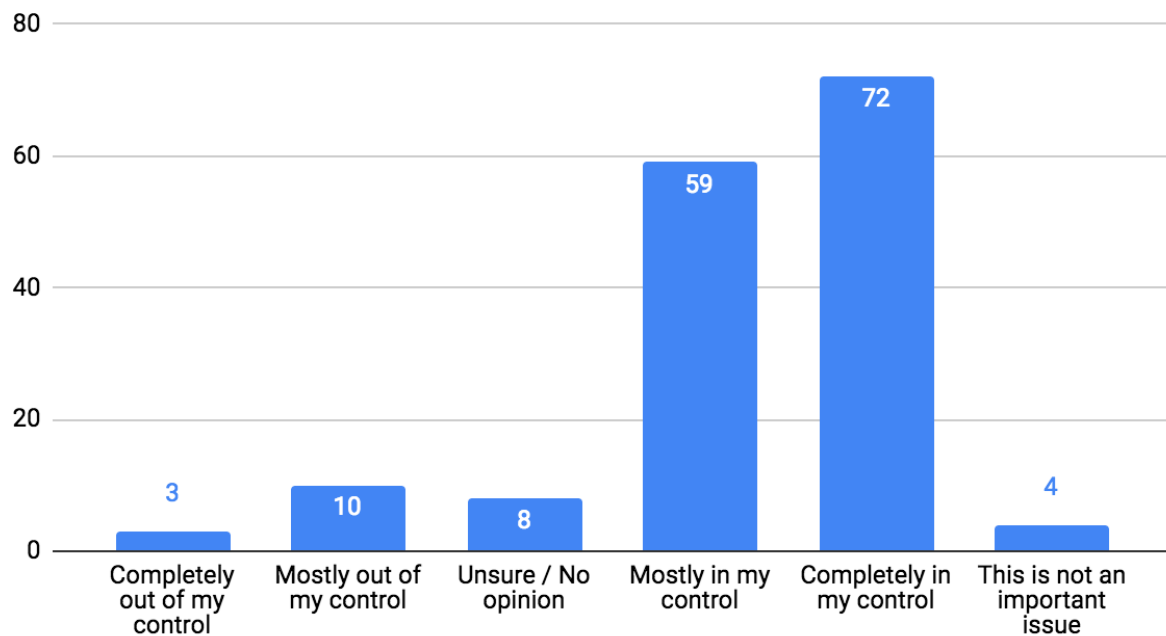
Buying Clothes Second-Hand



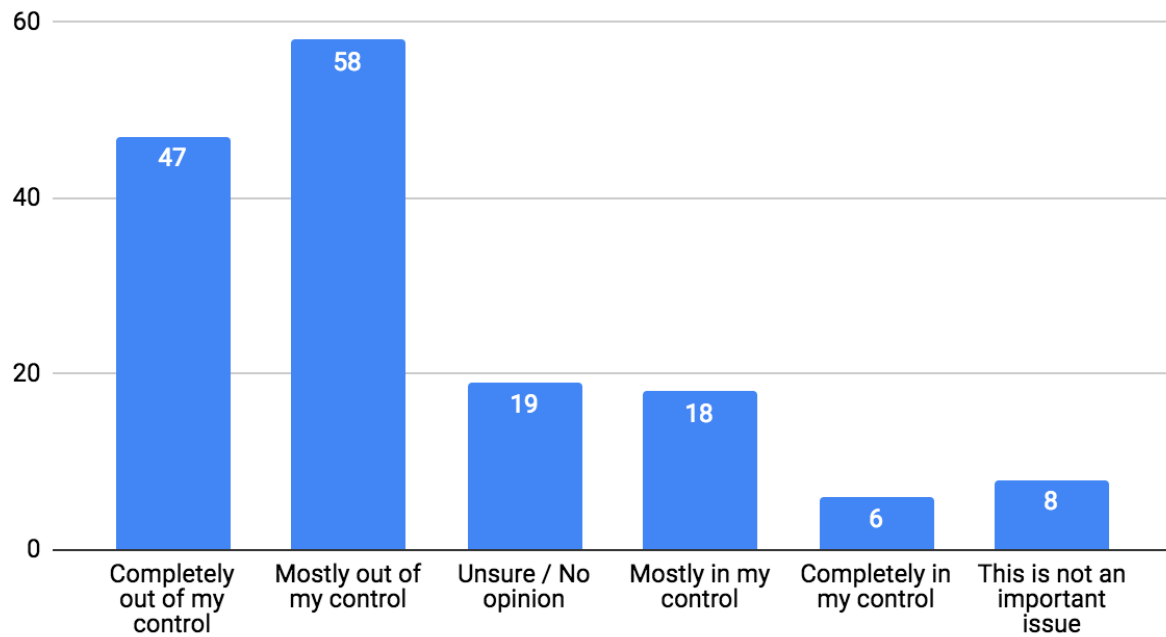
Supporting Large Corporations



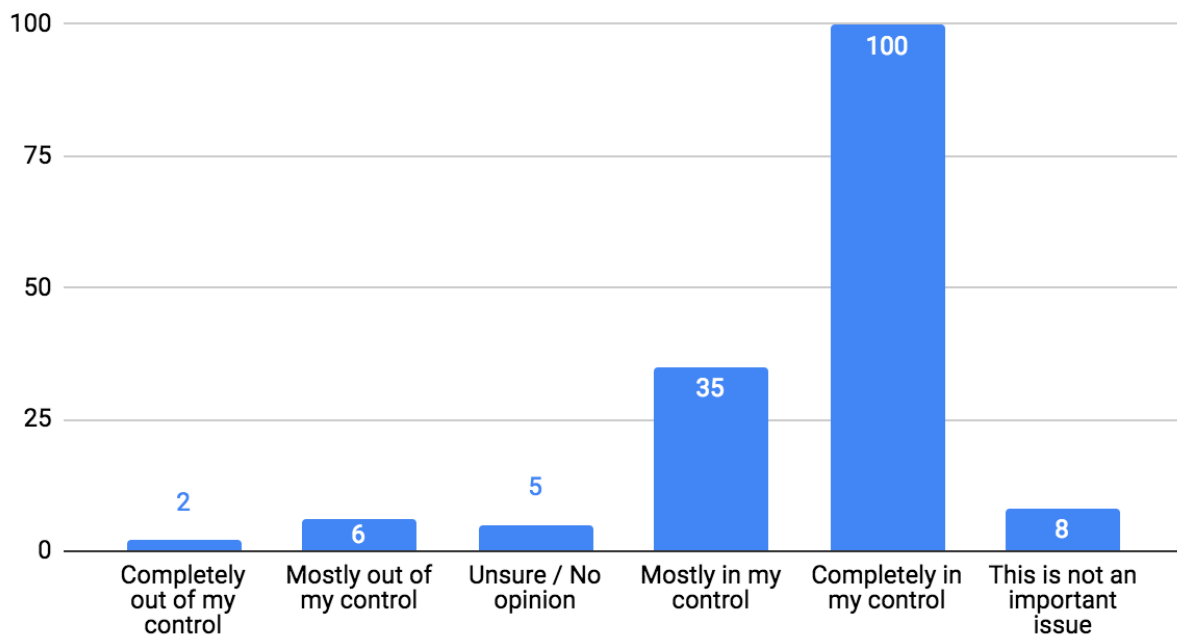
Supporting Small Businesses

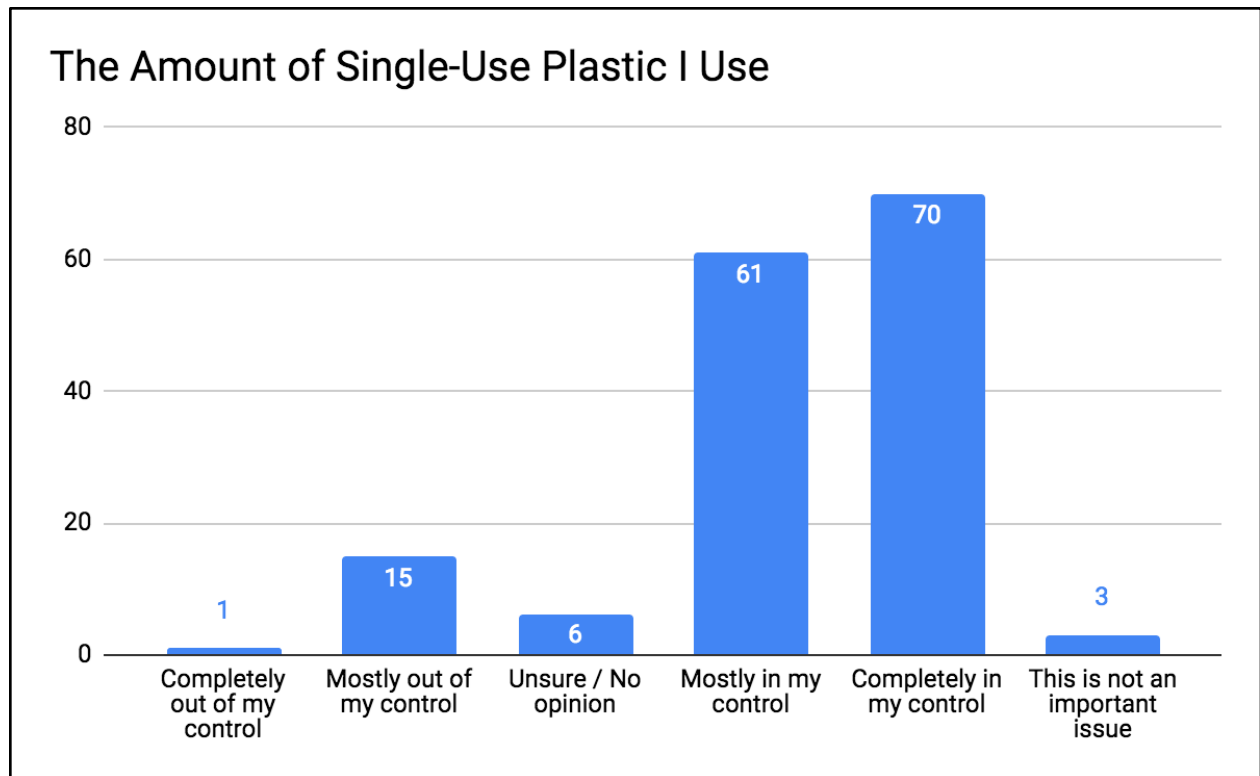


Capitalism

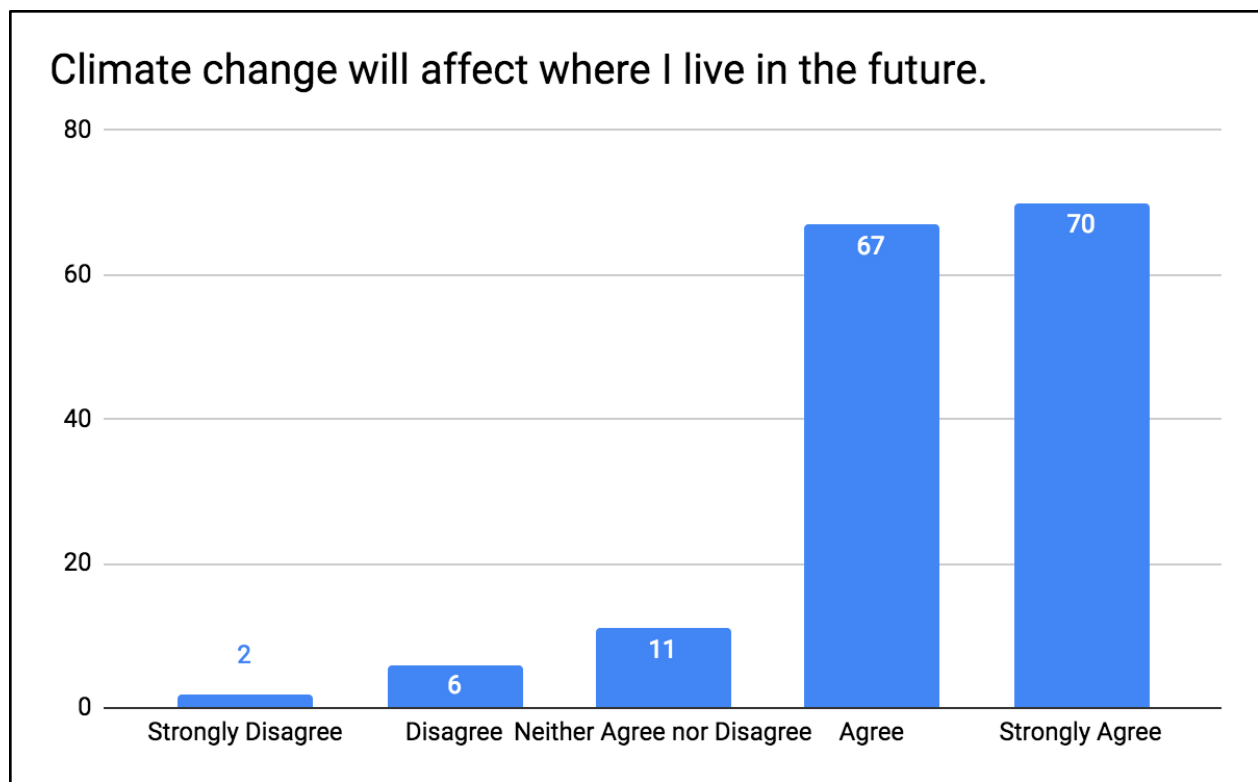
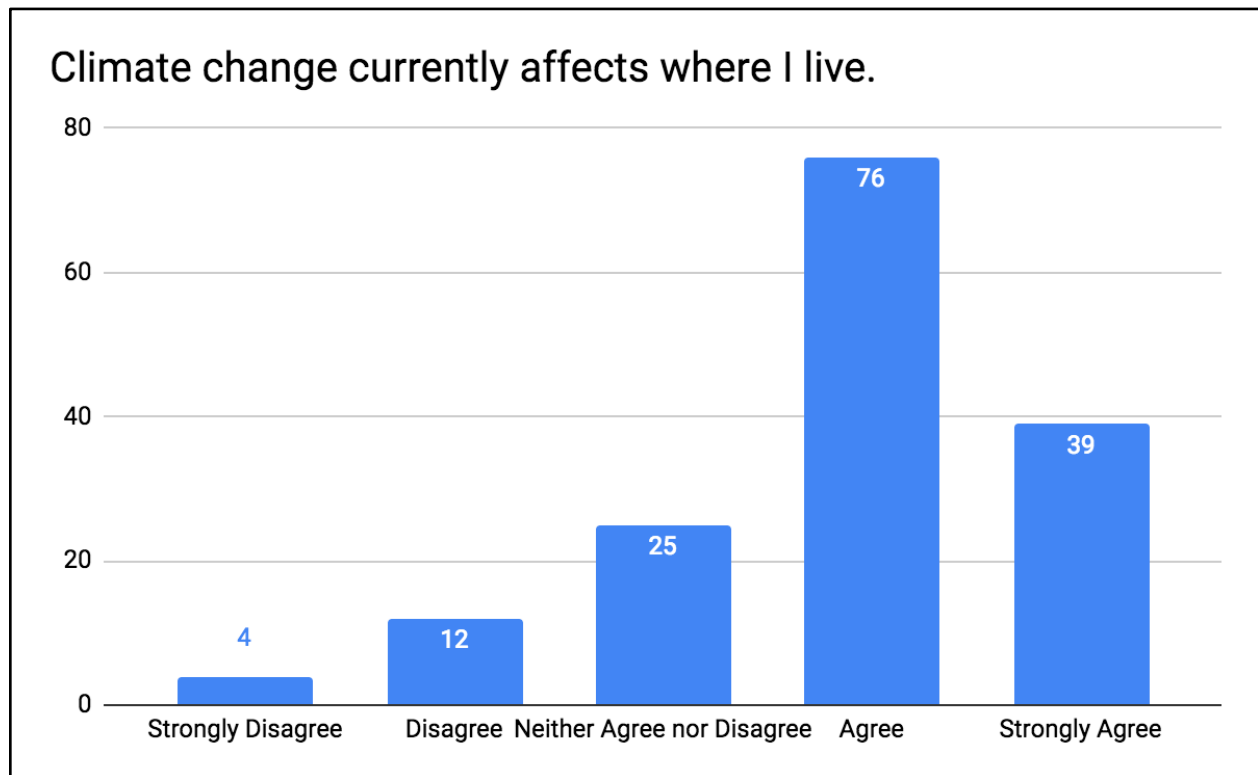


The Amount of Plant-Based Products in My Diet

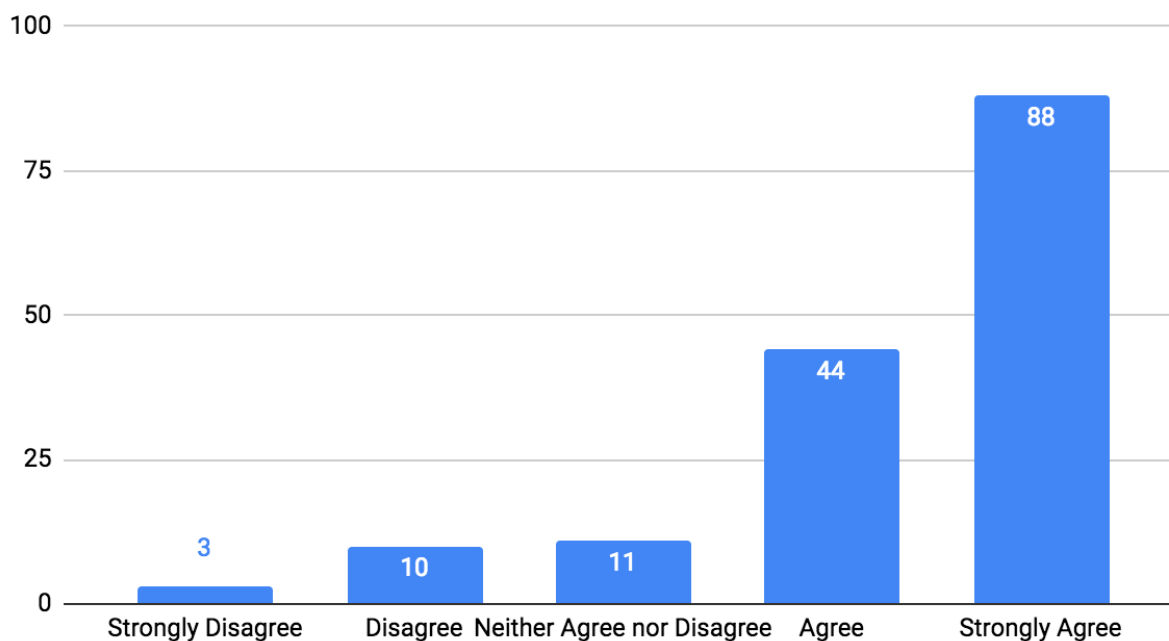




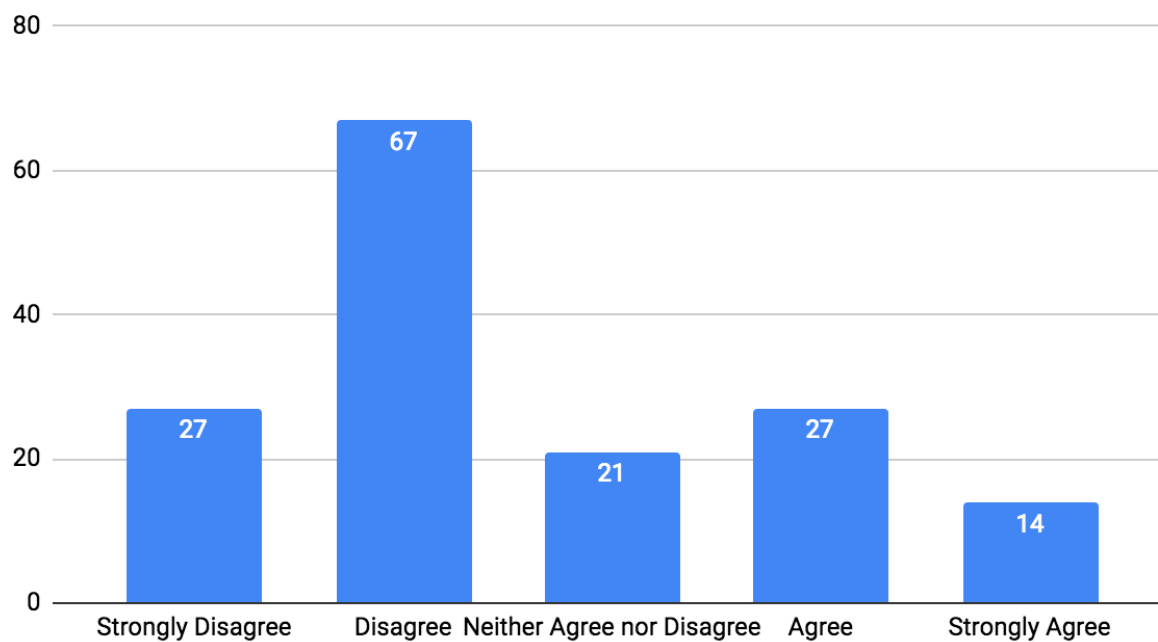
Question Section 4



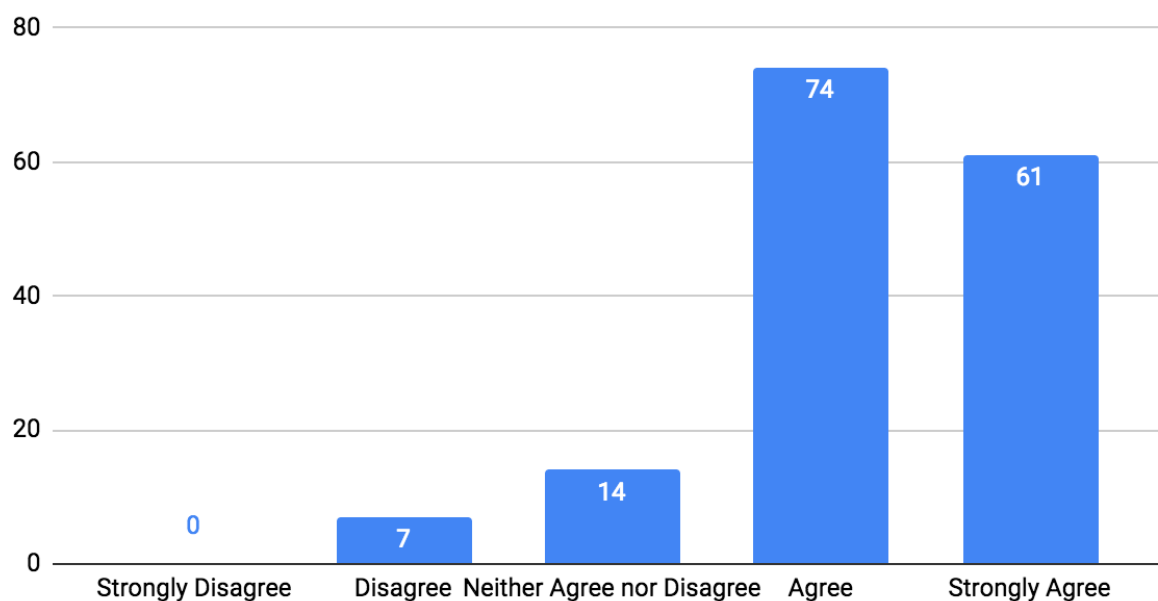
Climate change will affect other places more than where I live.



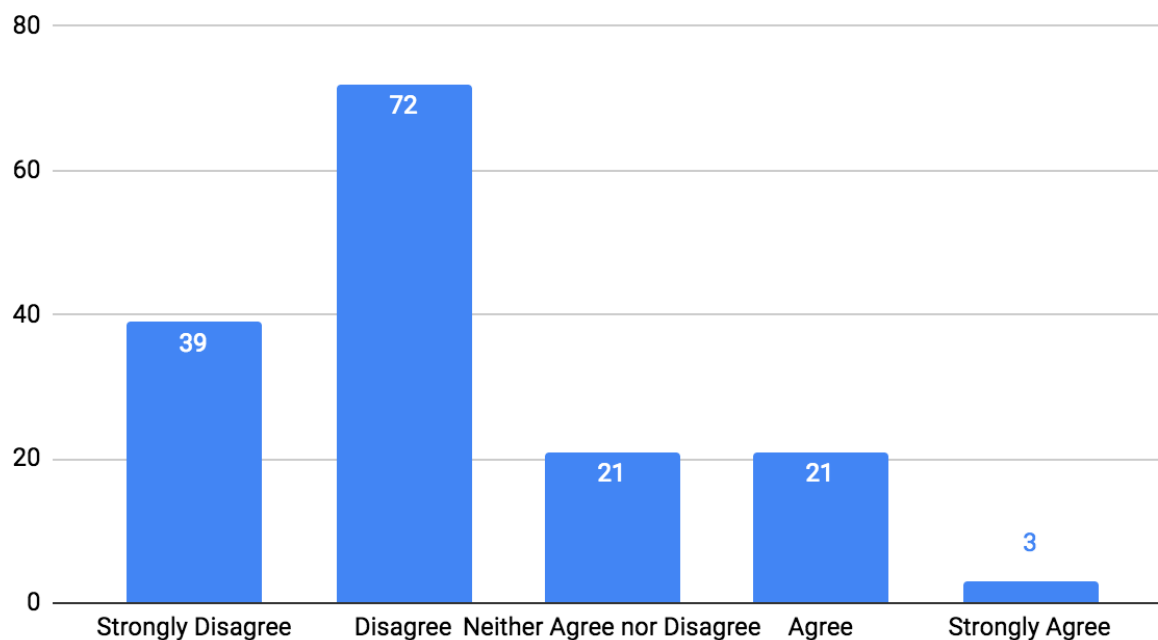
Climate change will affect the whole planet equally.



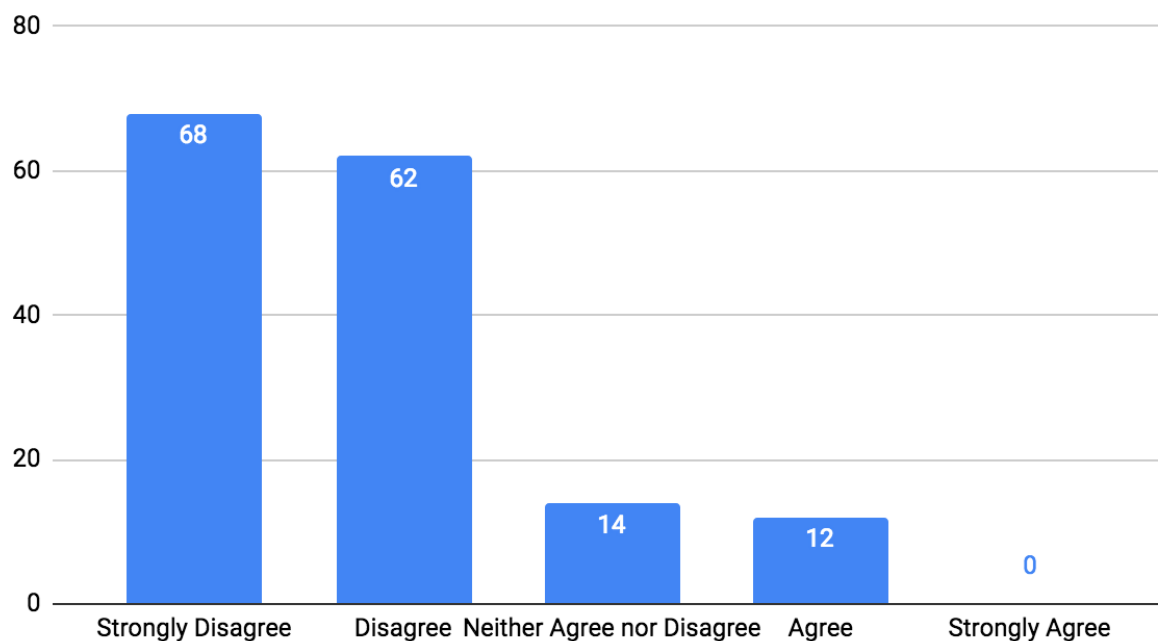
If the carbon dioxide in the atmosphere were visible, carbon emissions would be seen as a bigger problem.



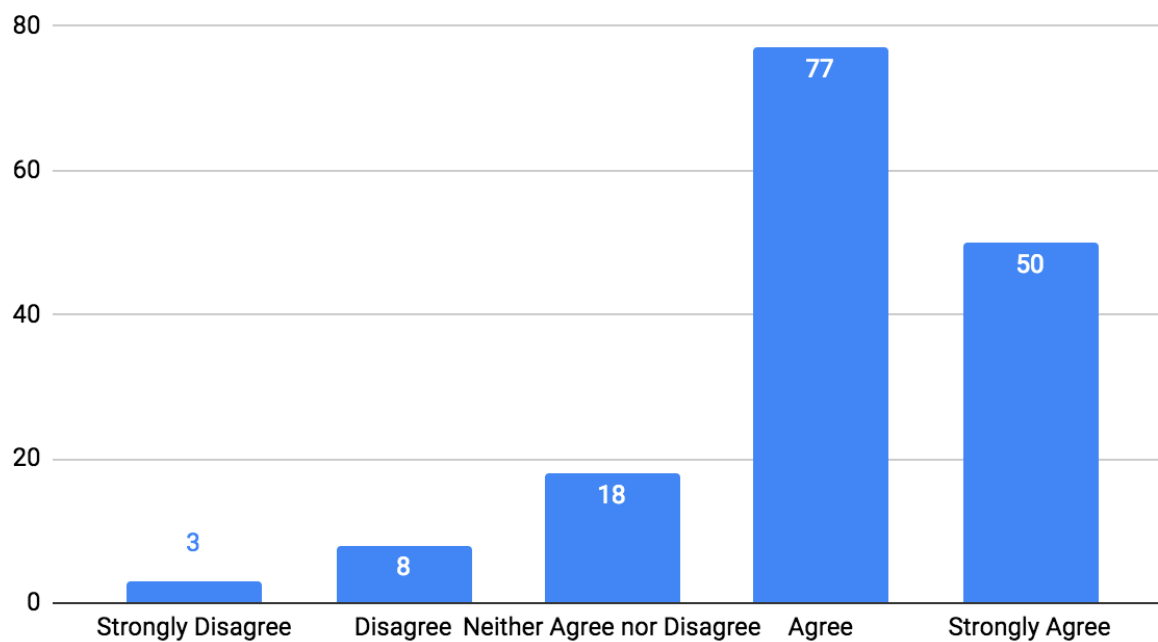
I feel that I have access to people who make climate policies.



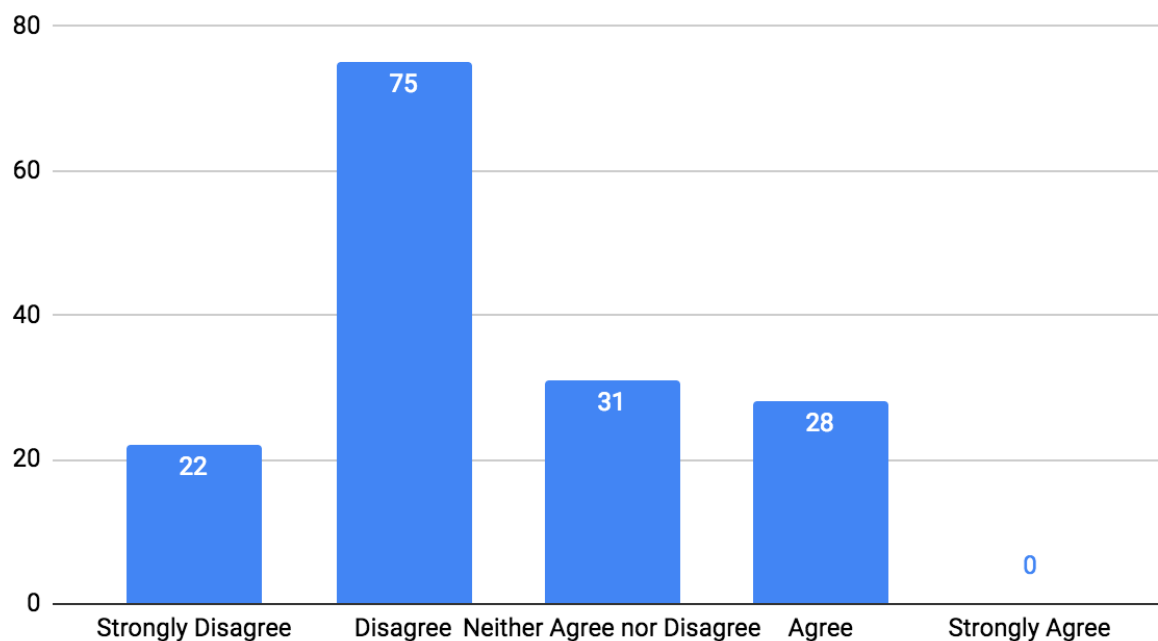
I feel that I have access to people who run large corporations.



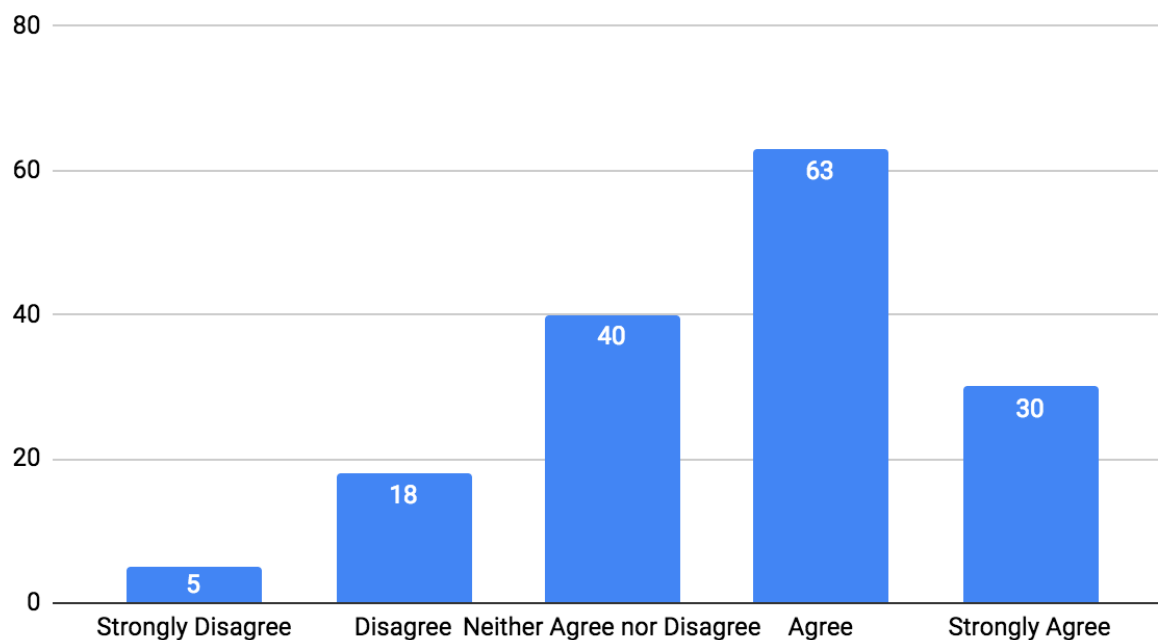
There are solutions to climate change.



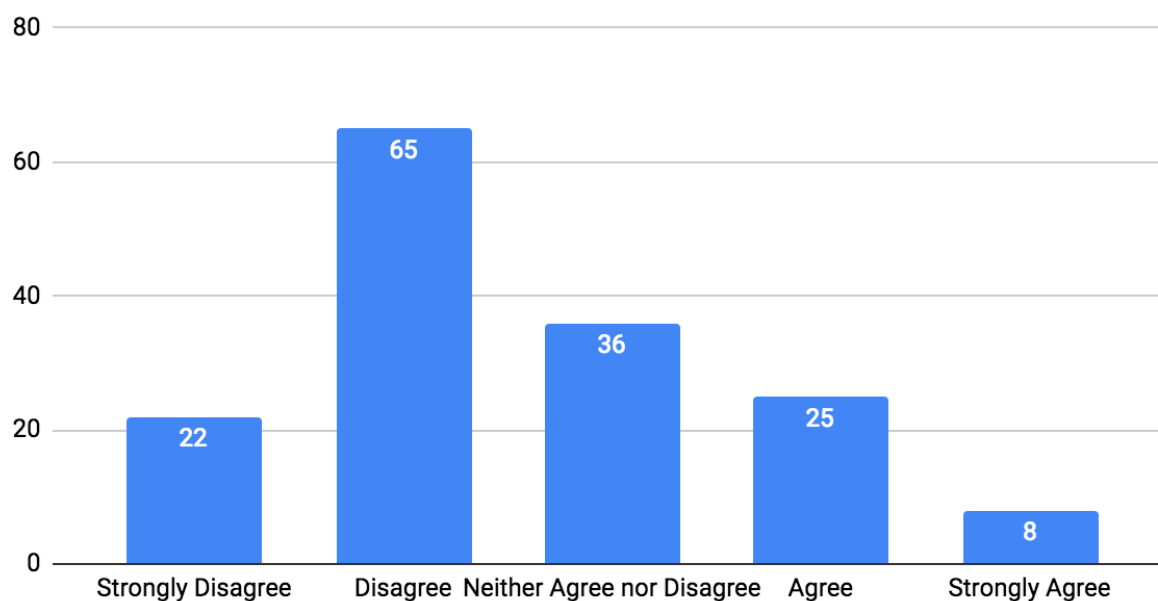
I am optimistic about climate mitigation on a global scale.



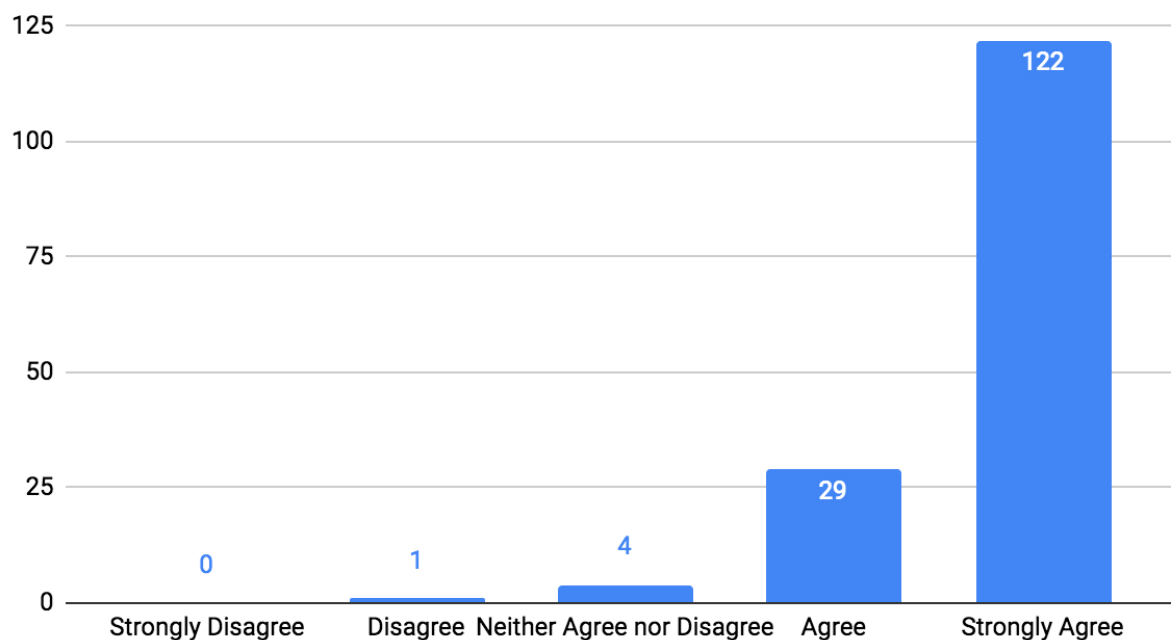
I am pessimistic about the future of our planet.



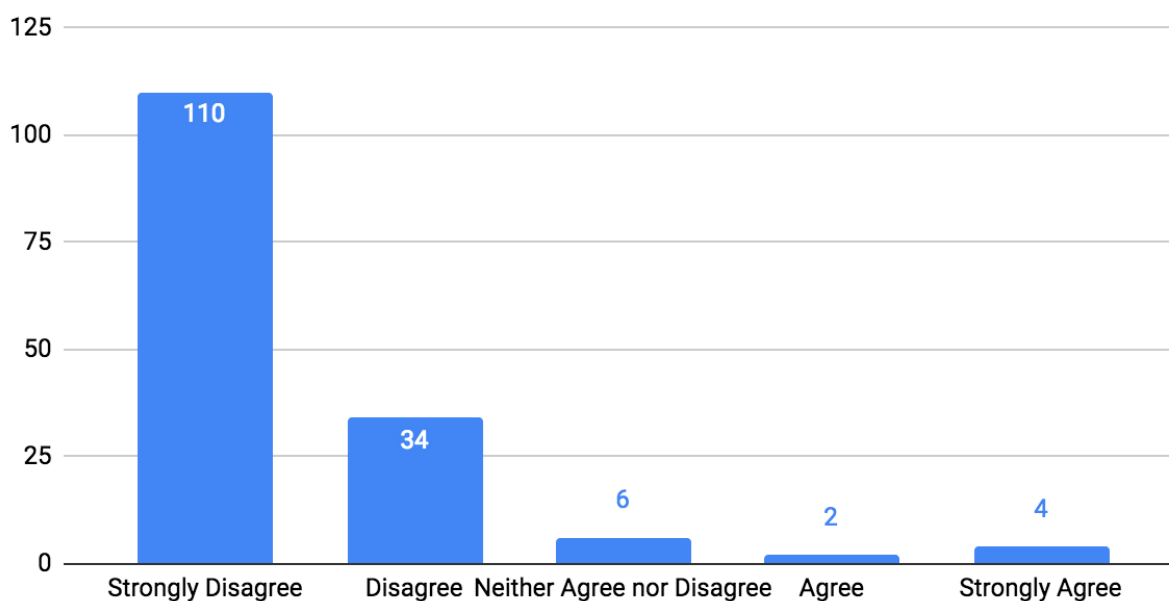
It is likely we will implement solutions to climate change before it is too late.



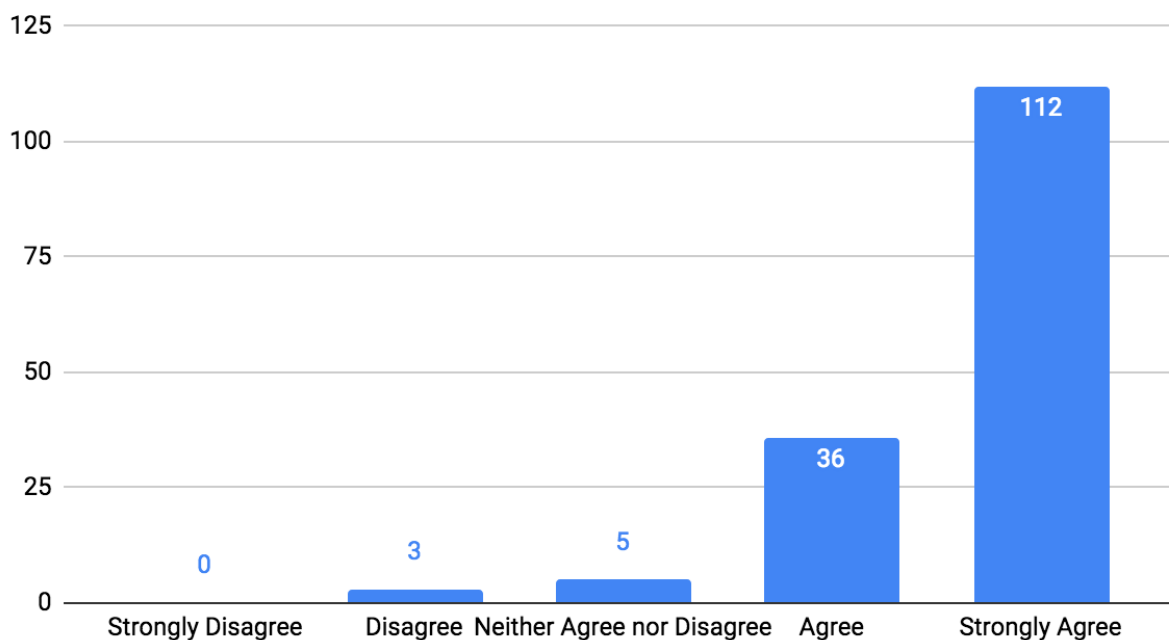
Climate change is an important global issue.



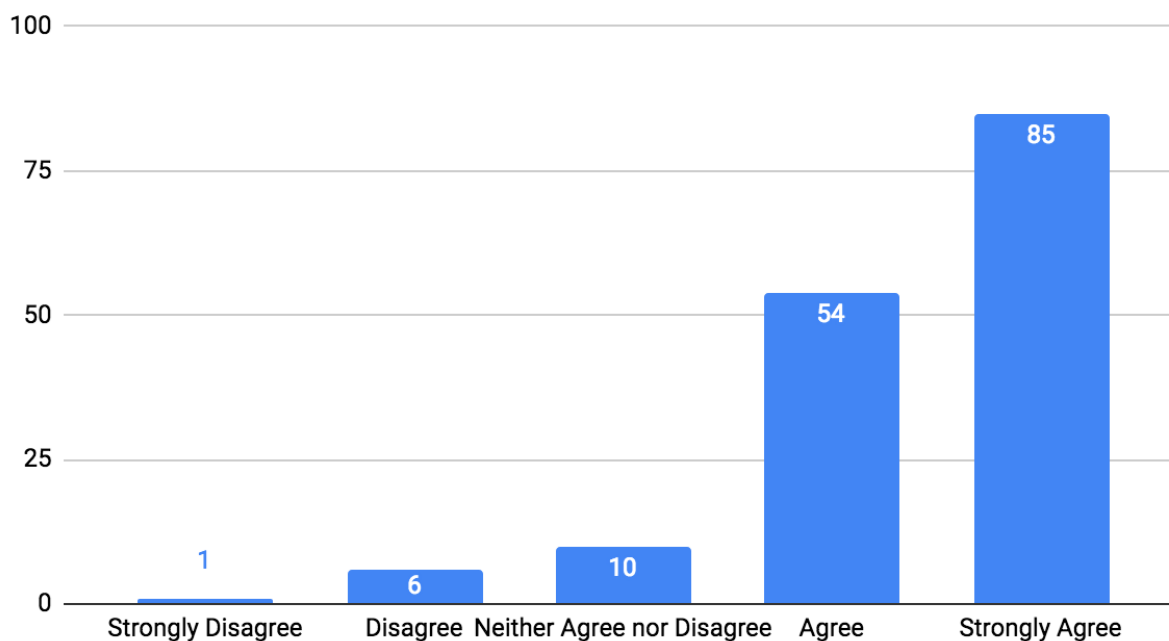
Climate change is made out to be a bigger issue than it actually is.



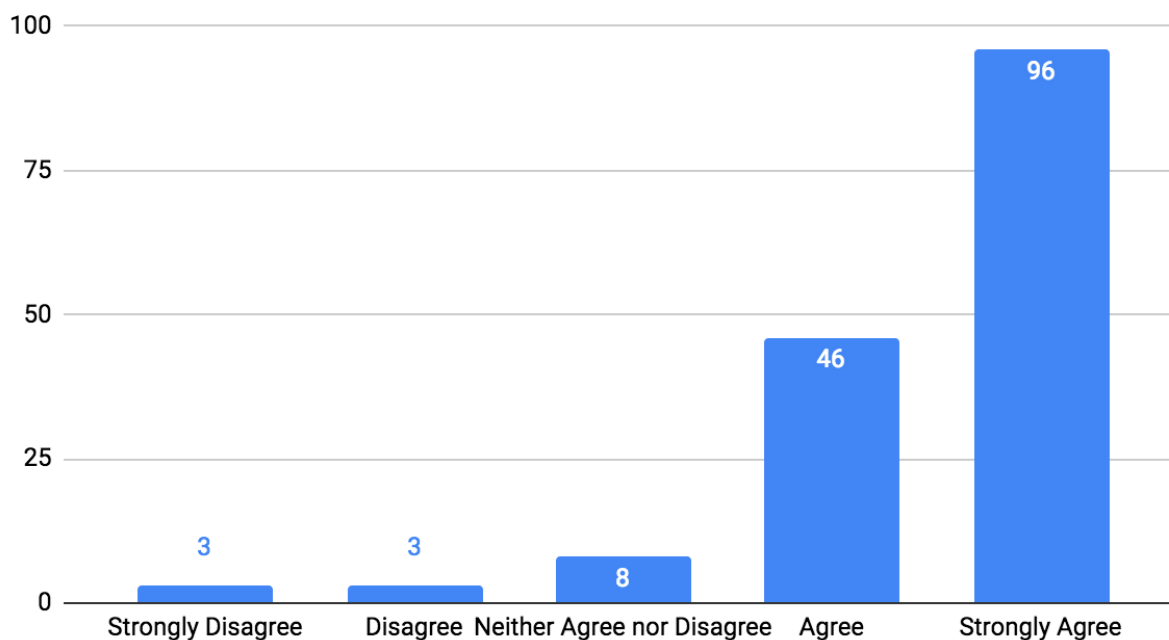
Climate change is an issue everyone should care about.



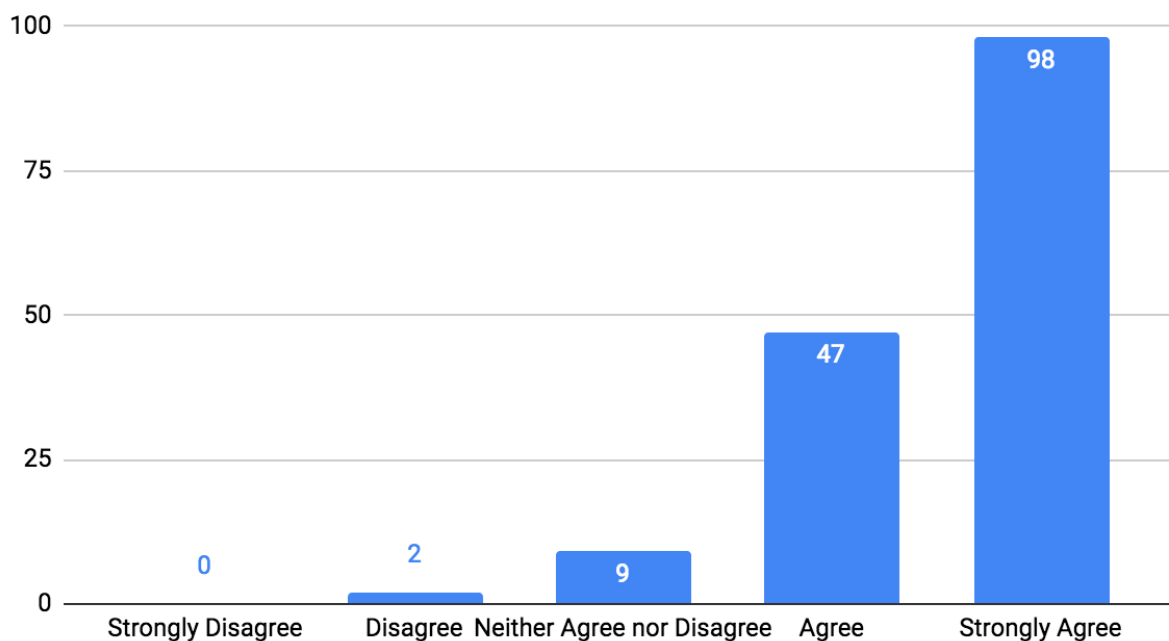
Climate change is a social issue.



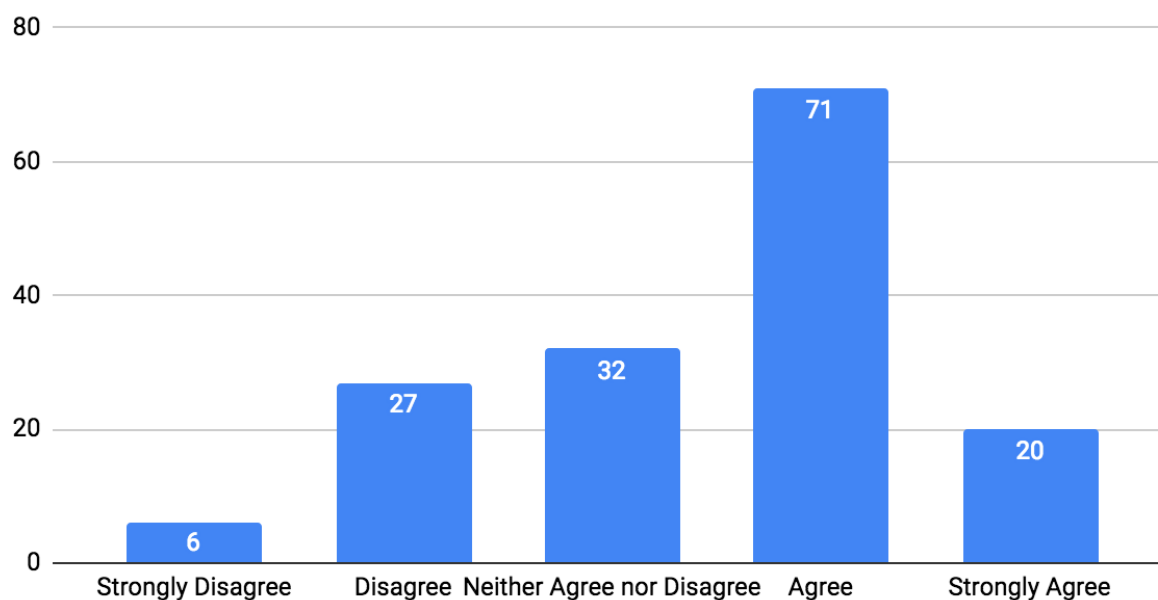
Climate change is a political issue.



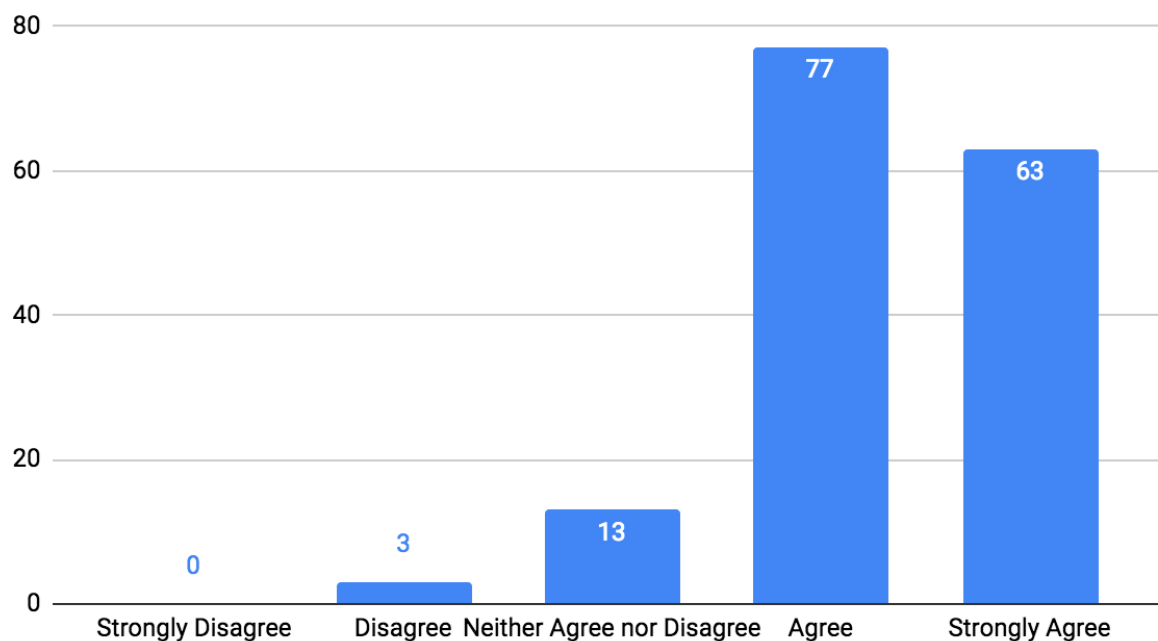
Climate change is an economic issue.



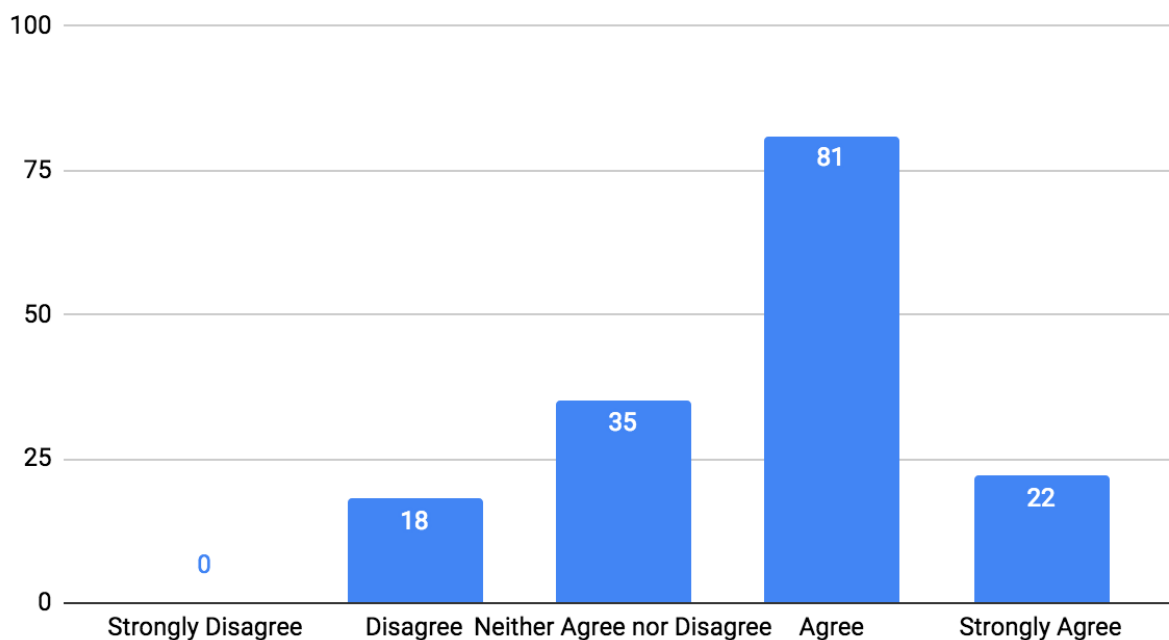
I engage with those who have different viewpoints on climate change than I do.



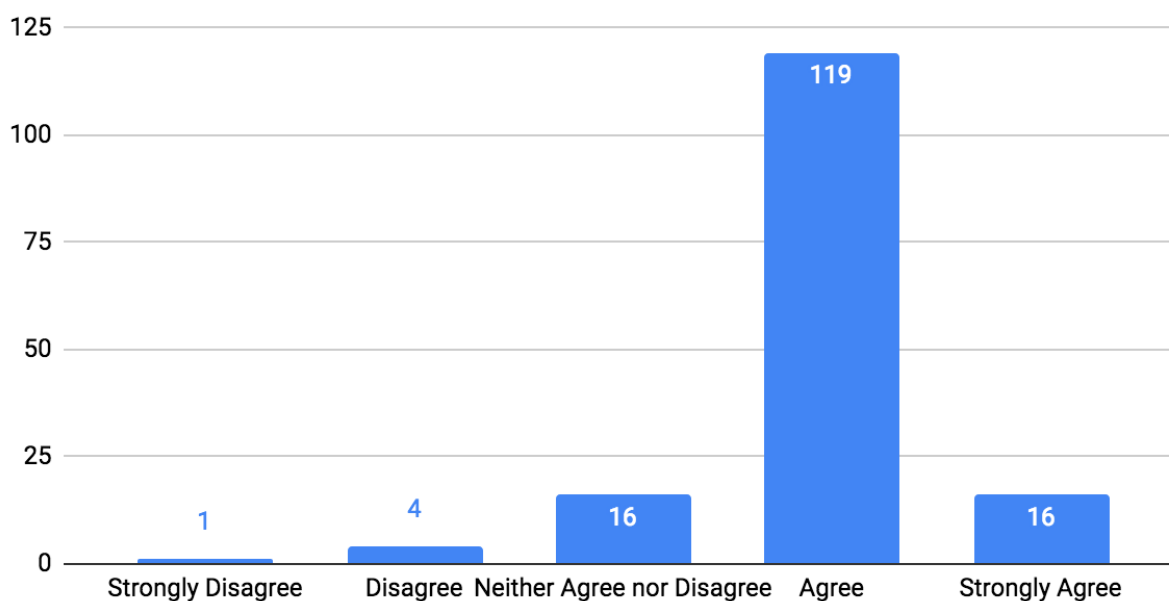
Every time I use coal, oil, or gas, I contribute to climate change.



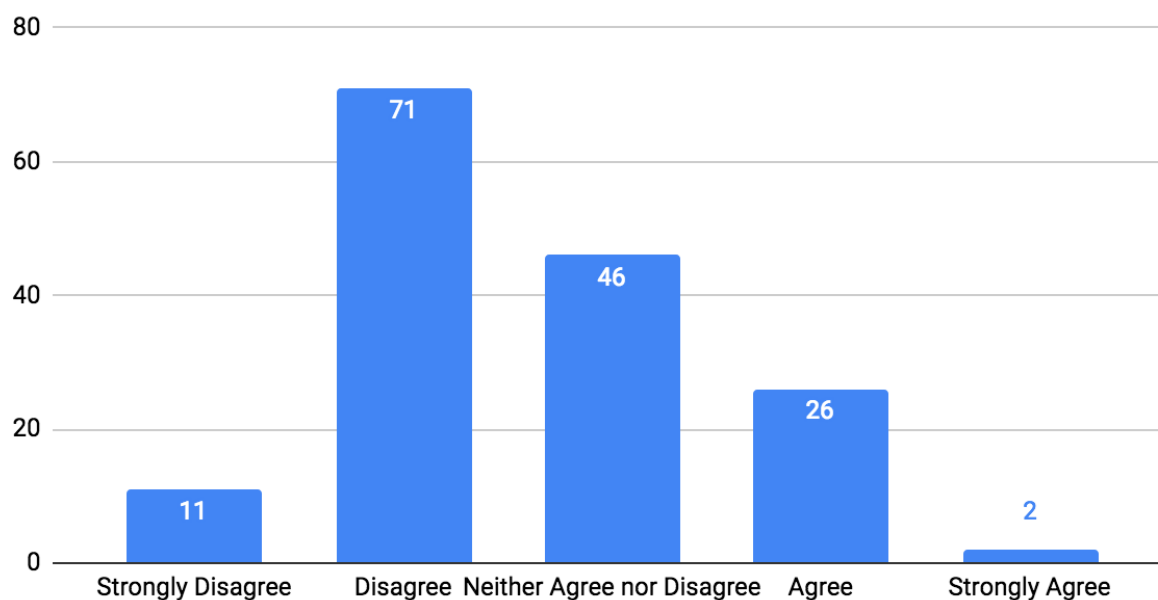
I try to live as environmentally friendly as I can.



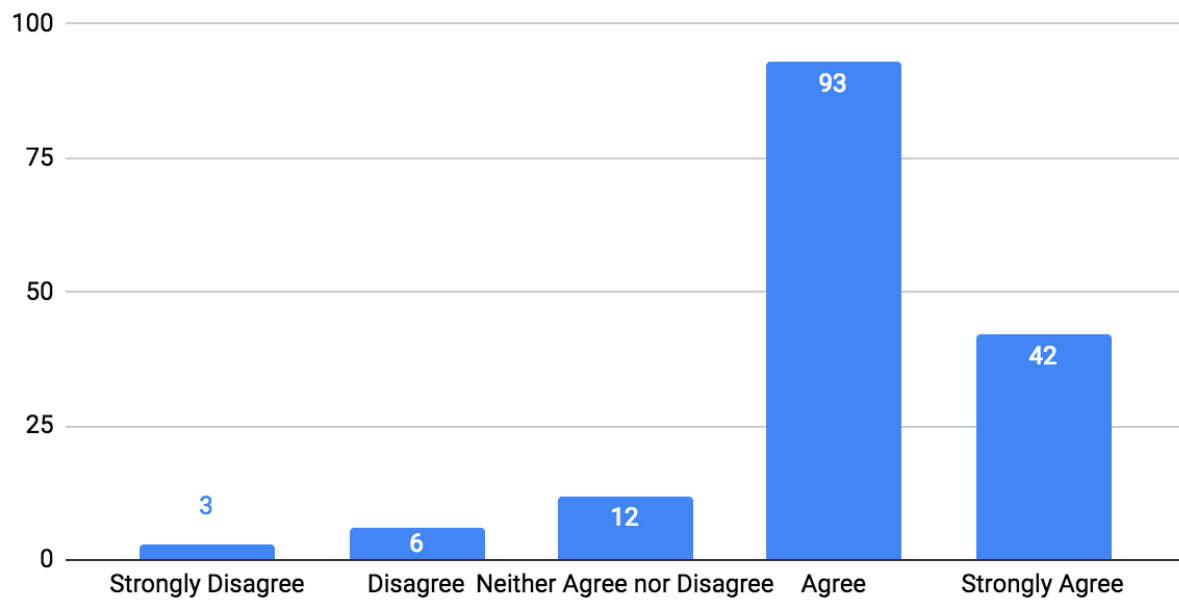
I still do things even though I know they are bad for the environment.



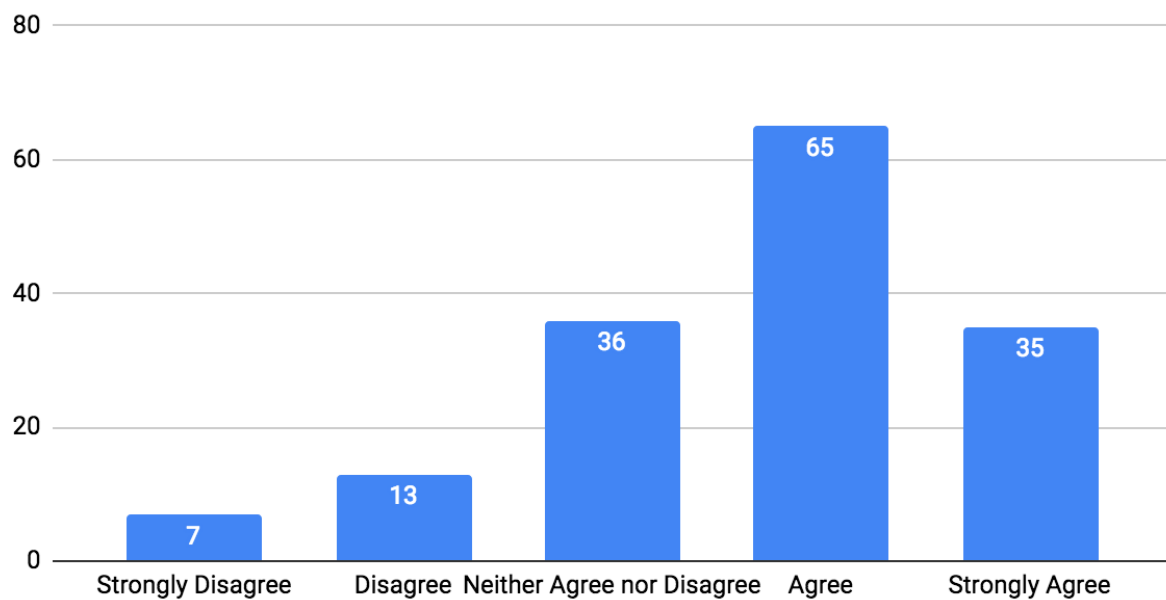
I do enough to combat climate change given the resources available to me.



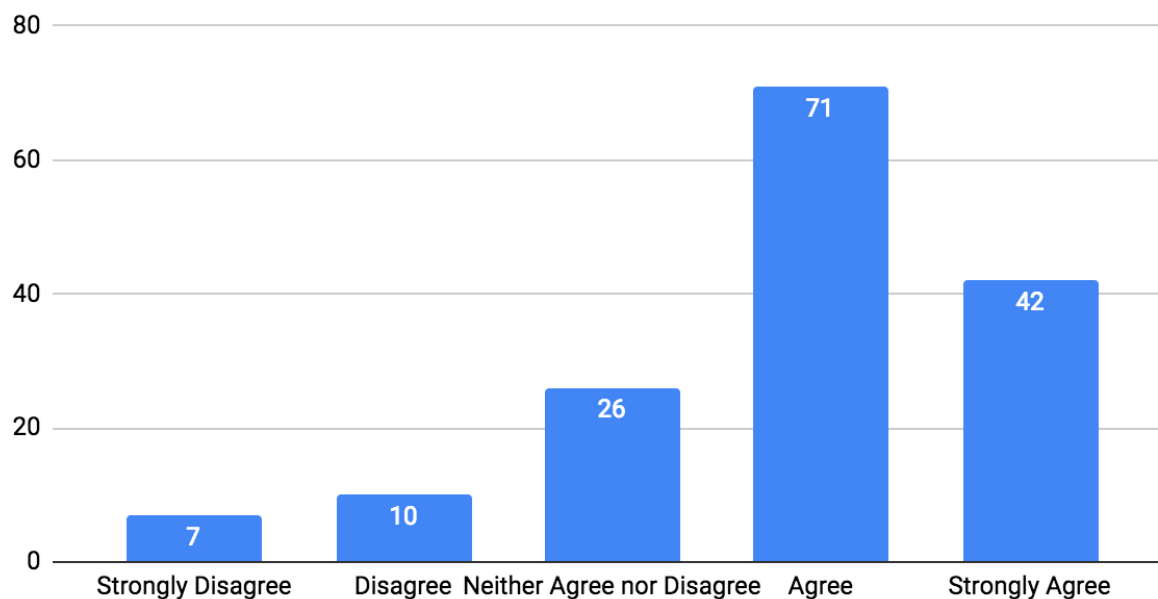
I could do more to combat climate change given the resources available to me.



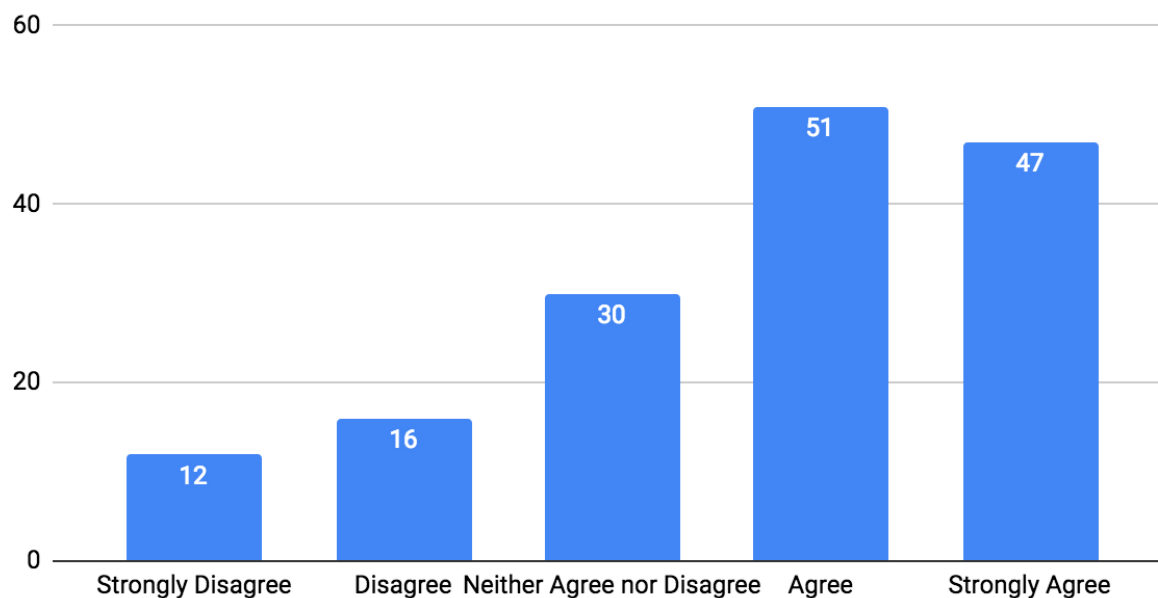
My social status contributes to how I engage with climate change issues.



My economic status contributes to how I engage with climate change issues.



My political beliefs contribute to how I engage with climate change issues.



My religious/spiritual beliefs contribute to how I engage with climate change issues.

