

What are the most effective methods to get uninvolved people to take initial action on climate change in the United States?

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Abstract

Climate change is one of the most prominent issues in our world today. As climate change impacts have become more clear, and have been shown to be getting worse, there needs to be more of an incentive to take action towards decreasing carbon emissions. In this paper, I explore the most effective methods to get uninvolved people to take action on climate change in the United States. This research draws on the psychology behind climate change and factors that go into changing someone's behavior. Research shows that social norms and the way in which individuals frame climate change has a huge impact on whether or not someone takes action. This indicates that individuals need to change social norms and modify the way people frame climate change in order to motivate individuals to take action. However, further research on how specific framing effects different individuals and how to effectively manipulate the more concrete norms is recommended.

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Part I: Introduction

Climate change is one of the most prominent issues the U.S. faces today, yet we watch as the effects are slowly intensifying due to the minuscule action being taken by individuals. The concentration of carbon dioxide in the atmosphere is the highest it has been in 650,000 years; currently, it is 411 parts per million and continues to increase. Before the Industrial Revolution in the 1800s, the global average carbon dioxide levels were about 280 parts per million. Eighteen out of the nineteen warmest years ever recorded have occurred since 2001, and the global temperature has risen 1.9 degrees Fahrenheit since 1880. The amount of Arctic sea ice is declining at a rate of 12.8 percent per decade, and Earth's polar ice sheets are losing mass by a rate of 413 gigatonnes per year. Since the Arctic sea ice and polar ice sheets are melting, the global sea level increases 3.2 millimeters per year. Over the past 100 years, this has caused the global sea level to rise nearly 7 inches. Due to these effects, we are seeing more intense and frequent storms, droughts, floods, heat waves, and wildfires. To make matters worse, shifting weather patterns and increased temperature are causing local environments to change faster than species can evolve or relocate, leading to the extinction of a multitude of animal and plant species (“Climate Change: Vital”).

Despite the science behind climate change, there are multiple viewpoints on the issue. A peer-reviewed national survey conducted by the Yale Program on Climate Change Communication entitled *Climate Change in the American Mind* examined trends in Americans' concerns about climate change tracked between 2008 and 2017. It was found that of the 1,304 adults interviewed, 71% think climate change is happening while only about 13% think climate change is not happening. The study went on to show that 54% of Americans think global

warming is mostly human-caused, and 33% say climate change is due mostly to natural changes in the environment. 67% of Americans feel “interested” in global warming, 55% feel “disgusted”, 52% feel “helpless”, and 44% feel “hopeful” about climate change being combated (Leiserowitz et al.).

People already experience the impacts that climate change is having on the Earth, and they are only going to intensify. The global target through the Paris Climate Agreement is to keep the global temperature increase below 2 degrees Celsius. In 2015, in the United States carbon emissions per capita was 15.56 metric tons. Therefore, to meet the global target, it is imperative that individuals in the United States start taking initial action on climate change since the United States has one of the highest emissions per capita in the world. Once initial action is taken, it will lead to future more meaningful action. The most effective method to get individuals to take action on climate change is to modify the presence of social norms and the current framing of climate change.

Part II: Historical Context/Background Knowledge

In the 1820s, Joseph Fourier, a French mathematician and physicist, proposed that the energy reaching the planet as sunlight must be balanced by the energy returning to space, due to heated surfaces emitting radiation. However, he reasoned some of that energy must be held within the atmosphere and not return to space, keeping Earth warm. Fourier proposed the Earth’s atmosphere acted the way a glass greenhouse would, incoming ultraviolet radiation easily enters through the glass walls, while weaker infrared radiation slowly passes through the glass walls. The radiation that passes through the glass is then absorbed by the plants. Eventually, as the

plants heat up, they release heat in the form of thermal infrared radiation. Some of the thermal infrared radiation returns back to space, while some is trapped inside warming the greenhouse. This greenhouse analogy stuck, and about 40 years later, an Irish scientist John Tyndall would start to explore what kinds of gases were most likely playing roles.

In the 1860s, Tyndall's laboratory tests showed that out of all the greenhouse gases, gases released in the combustion of coal (carbon dioxide, methane, and volatile hydrocarbons) was especially effective for absorbing energy. He went on to demonstrate how carbon dioxide acted like a sponge in terms of its ability to absorb multiple wavelengths of sunlight, similar to how a sponge absorbs water. By 1895, the Swedish chemist Svante Arrhenius became curious about how decreasing levels of carbon dioxide could cool the Earth. To explain the past ice ages, he wondered if a decrease in volcanic activity might lower global carbon dioxide levels. Through calculations, he found that if carbon dioxide levels were to be halved, global temperatures could decrease by about 9 degrees Fahrenheit. Arrhenius then wondered if the reverse was true, what would happen if the carbon dioxide levels were to double. His results suggested the global temperatures would increase by 9 degrees Fahrenheit. Decades later, modern climate modeling confirmed the accuracy of Arrhenius's numbers.

In the 1930s, scientists started to claim that carbon emissions might have already started to warm our planet. A British engineer, Guy Stewart Callendar, noted that the United States and North Atlantic region had already contributed to the warming a significant amount from the industrial revolution. Callendar's calculations suggested if carbon dioxide concentrations doubled in the Earth's atmosphere, the Earth could warm by 3.6 degrees Fahrenheit. Even though Callendar's claims were largely met with skepticism, he was able to draw attention to the idea of

global warming. This attention led to some of the first government-funded projects to closely monitor climate change and carbon dioxide levels. In the early 1980s, there was a huge increase in global temperatures, causing widespread droughts and wildfires in the United States. The summer of 1988 was the hottest on record (many have since then been hotter). Scientists started sounding the alarm on climate change and the public began to pay closer attention.

Growing concern led to the passing of extensive legislation, the Clean Air Act of 1970, National Environmental Policy Act of 1970, the Water Pollution Control Act Amendments of 1972, the Marine Protection, Research, and Sanctuaries Act of 1972, the Federal Water Pollution Control Act Amendments of 1972 (which is now known as the Clean Water Act), the Endangered Species Act of 1973, etc. These laws regulated toxic substances, pesticides, ocean dumping; and protected wildlife, wilderness, and scenic rivers. Furthermore, the new laws provided the opportunity for pollution research, monitoring, enforcement, and contaminated site cleanups. The creation of these laws led to a major shift in the environmental movement.

Top science organizations such as IPCC, NASA, and NOAA are all in agreement that by putting off addressing climate change the problem will only worsen. The longer people wait, the more carbon dioxide will be present in the atmosphere and the greater the temperature will increase, causing intensified effects. James Hansen, NASA's former top climatologist, describes climate change as "imagine a giant asteroid on a direct collision course with Earth. That is the equivalent of what we face now" (Hansen). The longer individuals wait to confront climate change, the less control we will have at reversing its devastating impacts. In order to have a better chance of avoiding the asteroid, people need to start early and incrementally act. If

individuals do not start taking more steps towards reducing climate change, everyone will start to feel the drastic effects.

Part III: Research and Analysis

Factors in Taking Climate Change Action

Personal Factors

The majority of Americans now know and believe about climate change, but that doesn't necessarily mean they will take action.

Riley O'Connell, a senior at Bowdoin College, perceived a gap in climate change psychology research and began a year-long study examining how personality traits correspond to a subject's climate change opinion and their subsequent willingness to take action. This study analyzed 3,000 responses from a diverse group of people around the country and was funded by the Grua-O'Connell Research Award, which funds faculty-mentored student research. His results found that people who possess a high propensity for guilt and shame tended to believe in climate change and were more likely to take steps to reduce their contribution to climate change.

Subjects who reported low self-esteem also had high levels of belief in climate change but tended not to take action. Additionally, O'Connell found that subjects with children are far more likely than those without children to believe in climate change but are not likely to change their lifestyles and carbon consumption. O'Connell speculated that perhaps parents care more about their family and its immediate needs than the long-term effects of climate change on society.

Educational Factors

Education was found to be an important indicator to a person's awareness and willingness to take action on climate change. Yale researchers recently found that 40% of adults worldwide have never heard of climate change, and in developing countries that figure climbs to 65% (Calderon). Education is an essential element in responding to climate change; it helps people understand and address the disastrous impacts it has on our planet. When climate literacy is increased among young people, it encourages changes in their attitudes and behavior and helps them adapt to climate change. Education and awareness play an essential role in increasing adaptation and mitigation of communities and allowing individuals to adopt sustainable lifestyles (“Climate Change Education”). Educating new generations will only contribute to a younger population that is more educated and committed to reducing their carbon footprint.

Individuals with more education tend not only to be more concerned about the environment but also engage in actions that promote decisions that protect the environment. In urban India, the probability of water purification through energy efficient methods increased 9% when the most educated adults completed primary education and by 22% when the most educated adults had completed secondary education (“Education Increases Awareness”). An analysis of the Global Warming Citizen Survey in the United States showed the higher a respondent's education level, the greater his/her actions are in terms of policy support, environmental political participation and pro-environment behavior. By educating individuals, they will have a better understanding of the issue and will more likely take action on climate change. Education is able to change an individual's behavior, thus changing the social norm.

Social Norms

A social norm is the existence and expectation of a behavioral regularity in a population; every individual in that population is aware of this expectation or behavioral regularity. Most norms seem fixed and people see them as a 'given', a pre-existing, eternal social reality. Individuals see norms as the regular and desirable, their sense of right versus wrong is driven by certain norms. Norms begin to develop from the moment of birth, a child soaks up every notion of what is natural from the behaviors and words around them (Green). Norms can be categorized based on their presence and strength within a group. Social norms contribute most to an individual's tendency to take action against climate change.

Types of Social Norms

Social norms can be categorized as belonging to one of two groups, descriptive norms and prescriptive norms. A descriptive norm is defined as what people do, feel, and think: "any pattern of consistent behavior within a group or population can be considered a descriptive norm, from brushing one's teeth to staring up at the sky" (Dannals). A norm can only be descriptive when an individual conforms to the norm due to the expectation that a large group of others are also conforming to the norm. Descriptive norms are the average behavior of a group and in what state individuals perform an act. Descriptive norms that form quickly are often seen as fads, whereas the long-term descriptive norms are unlikely to change and are referred to as conventions. The descriptive norm is a means of determining the most efficient course of action. If an individual observes the majority behaving in a similar manner and infer that they are doing so as a rational response, then the individual will behave in that manner (Dannals). Individuals can infer that the majority action is the most efficient action.

In contrast, a prescriptive norm is what people believe should be done. This type of norm refers to what most people in a group approve of: “Some treat prescriptive norms as an attitudinal version of a descriptive norm” (Dannals). Prescriptive norms describe the average attitude towards a behavior. Prescriptive norms can be used to designate certain actions, such as taking petrified wood from a national park is wrong or unfavorable. The descriptive norm describes a common behavior, “many past visitors removed the petrified wood from the park”. While the prescriptive norm describes the attitude towards that behavior, “don’t remove the petrified wood from the park”. In this case, the attitude reflected through the prescriptive norm contrasts with the behavior reflected in the descriptive norm; most people take petrified wood, but most people don’t agree that people should remove petrified wood. The more intense prescriptive norms can be referred to as moral norms or taboos. These different types of social norms play key role in our lives.

Social norms have a huge influence over people’s beliefs and behaviors. Individuals usually conform to a social norm due to a combination of an individual's’ desires. The individual’s desires could be that they don’t want to receive social punishment due to breaking a norm or not following a norm: “Threats of social exclusion or social judgment can be strong enough to motivate individuals even to deny obvious truths”(Dannals). In society, there is a want to fit in without feeling judgement, so people change who they are or what they believe. Another reason an individual might conform to a social norm is to advance himself/herself in an organization. There is a desire to gather positive social status that accompanies some act of conformity. Individuals are able to learn new social norms via observing others and enacting the behavior that others approve or endorse, while avoiding behavior that they see results in neglect.

Individuals are motivated to learn and adapt to social norms in order to avoid social punishment. Social norms are a very powerful driver to behavior, so it is important to understand how social norms can be changed to become more pro-environmental.

Changing Social Norms

Social norms are like clay. They are flexible and can be remolded or changed. However, sometimes norms need a little nudge by an outside force to influence the norm to change. Leadership has a prominent impact on shaping social norms and people's personal behavior. Public figures and celebrities can act as role models and shift the social norms, thus, changing the behaviors of many individuals. If an individual in a powerful position acts a certain way or expresses a certain behavior, their followers assume those actions and views help a person rise in the social realm, and so they emulate them (Konnikova). Once the public follows a celebrity's new behavior, norms are reexamined and altered accordingly.

In October of 1993, "Got Milk?", an American advertising campaign to encourage the consumption of milk took place in California. In this campaign over 100 celebrities participated in got milk ads featuring them with a white mustache along with a print copy of explaining the benefits of drinking milk. One year after the campaign had started, the total milk consumption in California rose to 755 million total gallons, a 2% increase. By having celebrities featured in the got milk campaign and represent their message, others changed their behavior to consume more milk (Vecchio).

Laws, regulations, and public messaging also wield influence over individuals and society through the ways in which they incentivize or disincentivize actions and behaviors. When

the government establishes laws and regulations, individual's behaviors change and eventually those behaviors become normal, making new norms.

Additional government regulation could include carbon pricing, which would help drive technological advances towards the act of using less carbon (Green). The United States is one of the few nations that does not implement a carbon tax, however, certain states have chosen to enforce their own. In November 2006, residents in Boulder, Colorado passed a carbon tax. A carbon tax is a tax on electricity consumption with deductions for using electricity from renewable sources. As of 2015, the Boulder carbon tax was estimated to reduce carbon emission by over 100,000 tons per year. The city's Office of Environmental affairs has infused \$1.8 million of tax revenue back into the community through bike lanes, energy efficient improvements, and further investments in green energy. In May 2008, nine counties in the San Francisco Bay Area, passed a carbon tax on businesses of 4.4 cents per ton of carbon dioxide emissions. A report by the New York State Energy Research and Development Agency attributes the region's decrease in carbon dioxide to fuel-switch from petroleum and coal to less carbon-intensive natural gas, lower electricity demand, and increased nuclear and renewable capacity (Ye). From this data it is clear that the carbon tax changed behavior and lowered carbon emissions.

Sometimes just the availability of solutions and norms is enough for an individual to take action. Earlier this year, the United States Environmental Protection Agency started the H2Otel Challenge program to reduce hotel water consumption. They installed new equipment such as water efficient toilets, faucets, and shower heads. Also, hotels were encouraged to give guests the option of reusing their towels and sheets through using little signs that are ubiquitous across the

United States. Knowing the basic power of social norms, behavioral scientists Noah Goldstein, Robert Cialdini, and Vidas Griskevicius created two versions of the towel reuse signs for guests. One sign gave the standard industry message playing on the environmental concerns, “HELP SAVE THE ENVIRONMENT. You can show your respect for nature and help save the environment by reusing your towels during your stay.” The other sign focused on descriptive social norms, “JOIN YOUR FELLOW GUESTS IN HELPING TO SAVE THE ENVIRONMENT. Almost 75% of guests who are asked to participate in our new resource saving program do help by using their towels more than once. You can join your fellow guests in this program to help save the environment by reusing your towels during your stay.” Over a span of 80 days, the researchers collected data on whether or not guests reused at least one of their towels in response to either the environmentally focused sign or the social-conforming sign. Their results showed that guests with the social-conforming sign reuse their towels at a significantly higher rate than those with a standard, environmental sign. The social-conforming sign focused on descriptive norms through expressing the average behavior of the guests was re-using your towel, and therefore re-using your towel was seen as the most effective method of action. In a second experiment that spanned over 53 days, the researchers found that signs referring to guests in that specific room number (opposed to just other hotel guests in general) served as even stronger motivators for towel reuse (Jaffe).

Placing laws, regulations, and public messages will encourage people to change their behavior to be more pro-environmental. Eventually, these behaviors will turn into the norm. If the United States create laws, regulations, public messaging, and have role models speak up about the different aspects of climate change this will create collective action on becoming more

pro-environmental. Once individuals see that others are paying attention and changing their behavior to climate change, then they will want to change their behavior to fit what others are doing. They will want to change to fit the new norm.

Using these methods to change behavior and social norms may not work for everyone. It may be more difficult to modify certain social norms than others. Religious norms may be in particular harder to change. A lot of religions have norms that have been around for years that surround climate change and environmental behavior. Religion can be one of the most powerful forces in shaping an individual's norms if it is present in his/her life, "Religion can encourage or discourage activism, promote conformity or challenge it, forment love or hatred" (Green). Religion can be used to create action but also inaction.

Research has found that there is a correlation between someone's religion, their belief on climate change, and their desire to take action. There are more self-identified Agnostics or Atheists in the "alarmed" or "concerned" categories (up to 21%) than in the "doubtful" or "dismissive" categories (up to 6%). Similarly, Western Christians and Baptists were underrepresented in the "alarmed" category (up to 15%) and over presented in the "dismissive" category (up to 36%) (Sachdeva).

Evangelical Christians, who make up roughly 30% of the American population, have a complex relationship with climate change and usually deny its existence. Evangelicals are less likely to believe climate change is occurring, that human activity is the cause, and that there is scientific evidence that supports climate change (Morrison). For many conservative Christians, the issue of climate change triggers their deeper mistrust of science. Pushback falls into a few categories: "God is in control", "God gave us dominion over the Earth", "Jesus is returning, and

so humans don't need to worry about keeping the planet sustainable" (Bailey). Interviews with Evangelical Christian participants revealed that a sub-group of pastors and church members believe that "environmental degradation is a seemingly inevitable consequence of humans great aptitude of sinning" (Sachdeva). These individuals believe that climate change is going to happen no matter what because of human sin, so what's the point of taking action if it's inevitable.

As in other sub-groups within society, leaders with high social status could play an influential role in changing social norms within religion. For example, certain evangelical leaders need to speak up and change the norm by modifying the way they view climate change. While some Evangelical Christians may be opposed to changing their views and norms, hopefully the majority of religious followers will be open-minded and take action against climate change.

Framing Climate Change

Here are a few recent article headlines about climate change: "No Way to Defend Ourselves Against the Onslaught of Climate Change", "Concrete is tipping us into climate catastrophe. It's payback time", "How Much Hotter Is Your Hometown Than When You Were Born", "Antarctic ice melting six times faster than 1980s". This linguistic framing of climate change as an "onslaught" or "catastrophe" focuses our attention on the unsolvable global tragedy and may be "contributing to a sense of uncertainty and lack of self-efficacy that together disempower local action" (Hoff et al.). Research has shown how certain people act to different forms of framing when paired with climate change. The way in which people frame an issue evokes specific emotions and responses, so it is vital to understand different types of framing.

Research shows that when climate change is framed negatively, it affects an individual's reaction and doesn't implement long lasting pro-environmental behavior. When you frame something in a negative manner, fear arises because the individual might feel like they're faced with imminent physical harm (Nabi et al. 444). This fear can then lead to a variety of other emotions like stress and anxiety. If a person is stressed or gets anxious from hearing about the issue, they will most likely avoid that issue. When human life or any aspect of your life is threatened causing fear and anxiety, subconscious roadblocks come into play (Dickinson et al. 147). Consequently, when climate change is framed in a way that causes fear, people will avoid the issue and will not focus on addressing it.

People may only have a finite amount of worry available to handle problems, "Too much doom and gloom may lower an individual's sense of self-efficacy and reduce the motivation to act" (Hoff et al.). During the global financial crisis, Americans who viewed climate change as a very serious problem dropped from a steady 47% to 35%. Due to people being stressed with the global financial crisis they couldn't take on the stress of climate change.

Negative framing can also lead to minimal action. The ambiguous aspects surrounding climate change make people unsure of the magnitude of the risks that they will face. Due to this, people tend to avoid making decisions that have long-term effects. In Argentina, farmers who were worried about climate change were more likely to change some aspects of their production practices but hardly ever undertook more than one change. It was as if the farmers were eager to dismiss the climate change worries in their own minds, believing that with that one action they had addressed all their problems (Hoff et al.). Targeting negative emotions may also lead to a single action, whereas when framing uses positive emotions it is more likely to produce a

virtuous cycle of pro-environmental behavior.

Positive framing creates a sense of hope and optimism. It allows people to see there are solutions to help solve this problem, and their life isn't being threatened. People are able to see that by contributing and changing their behavior, they will actually have an impact. A study conducted by Cornell University examined different methods of framing climate change and how it would impact humans and other species. In the study, there were fear based framing, hope based framing, human based framing, and species based framing. The fear based frames were used to express the ideas that climate change is dangerous to humans or a specific species. The positive framing statements ignored the negative impacts of climate change and focused on the potential for people to mitigate carbon emission and have a positive impact on climate change. They then tested six different framing statements on 3,456 participants. By including fear based, negative framing with positive framing, they were able to conclude that hope based framing was superior at creating interest and intentions to take reasonable action to reduce climate change (Dickinson et al.). So articles need to have more headlines like: "The Epic Story Of Solving Climate Change", "The Climate Challenge Unites Us", "Climate Action from the Ground Up", "On the Path of Climate Progress", and "Don't Panic, Do Act: A Climate Resource With Real Solutions".

Part IV: Discussion and Conclusions

The results of this research show there are two effective methods to get individuals to start taking initial action towards reducing their carbon emissions, changing social norms and positively framing climate change. The combination of these two methods would take steps towards people realizing how important it is to act on climate change. This research shows that if

individuals work on the framing of climate change and change norms, eventually people will be more likely to change their behavior and become more pro-environmental.

Therefore, people need to start framing climate change in a positive and optimistic way. When people can see there is a tangible way to make a contribution to reduce carbon emissions, they may be more likely to participate. We need to show individuals it is not all doom and gloom by fading away from framing climate change in a negative form. Through positive framing there is a chance for people to change their behavior and have steady action on climate change.

Framing will not be sufficient enough on its own; individuals need to change the social norms around certain behavior, specifically behavior that affects climate change. Role models and individuals who have a high presence in our country need to speak up about the issue of climate change and what can be done to reduce our impact. Public personalities from sports stars to intellectuals should stand up and ‘take a pledge’ to act a certain way, promoting pro-environmental behavior. These individuals need to discuss and take a true stand on the matter of climate change, they should show their followers what they are doing about it, educate their followers about it, and show possible solutions. This will cause their followers to want to change their behavior into more pro-environmental approach because they look up to this individual.

In order to send a message to the public about the urgency of climate change and its dangers, the government needs to push for more pro-environmental laws, regulations, and public messaging. For example, creating carbon tax to reduce our carbon emissions, making recycling cost-free in communities, reducing parking and creating car sharing programs, putting in bike lanes throughout communities, making public transportation more convenient for individuals,

and forming building codes that require more sustainable buildings. With these different laws and regulations, there needs to be public messaging that tells a certain story around climate change that influences people to use public transportation, ride their bike, carpool, recycle, turn their thermostat down, and have meatless Mondays. These laws, regulations, public messages, and role models will change individuals behavior slowly and then it will become the new norm. Then the domino effect would come into play. Once people see others behavior is more pro-environmental, they will change their behavior to fit the norm. Therefore, individuals need to start changing social norms through propaganda and economic linguistics.

However, these methods may not motivate every individual to focus on reducing their carbon emissions. This is a critical area demanding further research on how specific framing effects certain groups of individuals based on their age, economic status, and interests, as well as, how to effectively influence the more concrete norms.

Implementing new framing of climate change and social norms are key to reducing climate change because if individuals do not act, climate change impacts will progress and the effects will increase and amplify. Temperature increases will rise from 2.5 to 10 degrees Fahrenheit over the next century. Droughts in the Southwest and heat waves everywhere are projected to become more intense. Hurricane associated storm intensity and rainfall rates are projected to increase. Sea levels will rise 1 to 4 feet by 2100 (“Global Climate Change”). With enough loss of diversity the entire ecosystem will continue to collapse. Human health will be more vulnerable to an increase in waterborne diseases, poor air quality, and diseases transmitted by insects and rodents (“Climate Change Impacts”).

To prevent these impacts individuals have already started a movement towards reducing carbon emissions. People are moving in the direction of more renewable energy and sources, such as solar, wind, and hydroelectric dams. In 2017, 18% of all electricity in the United States was produced by renewable sources, compared to a 15% in 2016. Car companies, such as Tesla are more driven to create technological advancements that reduce carbon emissions. Businesses and construction companies are moving towards more sustainable and green buildings. In 2018, 69.8% of Chicago's office buildings were certified as green, 64% of San Francisco's office buildings were certified as green, and 58.4% of Atlanta office buildings were certified as green (“Green building”).

These actions alone will not be enough if the United States want to stay on target of keeping the global temperature increase below 3.6 degrees Fahrenheit and prevent amplifying impacts of climate change. Individuals need to stop watching as the effects of climate change intensify and start joining the initiative to reducing carbon emissions. Individuals need to start changing social norms and framing climate change in a positive manner, so other individuals will join the movement. How does the current perspectives on climate change influence your motivation to act?

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