The Differential Impacts of Metaphor on Climate Doomism

by

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B.A., The University of Sheffield, 2020

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE
MASTER OF ARTS

in

The Faculty of Graduate and Postdoctoral Studies

(English)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

April 2023

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The Differential Impacts of Metaphor on Climate Doomism

submitted by Caitlin Johnstone in partial fulfilment of the requirements for the degree of Master of Arts in English

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Abstract

In the face of the growing threat of the climate crisis, concerns have emerged around the notion of climate doomism. Doomism refers to the belief that it is now too late to take ameliorative action to avert catastrophic climate change. The end result of this view is comparable to the result of climate scepticism; doomism produces inaction. In this thesis, I investigate the possibility that common metaphors used to describe the climate crisis could inadvertently promote climate doomism. I hypothesise that metaphors which characterise climate change as a binary switch, from a non-impacted world to an impacted world (e.g., we are heading for a climate change cliff edge) are more likely to foster doomism than metaphors that characterise the crisis as an ongoing process (e.g., we are navigating the climate change minefield). Similarly, I hypothesise that metaphors which do not feature an active human agent are more likely to promote doomism than metaphors which foreground the role of human participants.

I test these hypotheses using an empirical survey-based methodology. Participants read a brief paragraph which characterises the climate crisis as either a cliff edge or a minefield. The paragraphs are further manipulated to either foreground the role of a human agent or omit this agency. After reading the paragraphs, participants are asked three questions intended to assess feelings of urgency, agency, and feasibility in relation to the climate crisis. Doomism is defined as a high report of urgency, paired with a low report of feasibility and/or agency.

I find no significant impact of the condition manipulations on urgency and agency scores. However, the minefield metaphor is seen to significantly increase the participants’ perception of feasibility as compared to the non-metaphorical control condition. That is, participants in this condition are significantly more likely to believe that the climate crisis can be successfully addressed. Similarly, participants who see human agency foregrounded are significantly more
likely to report high feasibility scores than participants in the control condition. By increasing feasibility scores, these metaphorical presentations reduce feelings of climate doomism. I discuss the implications of these findings for climate change communicators.
Lay summary

This thesis examines the relationship between the metaphors used to describe climate change, and feelings of climate doomism. Climate doomism refers to the belief that catastrophic climate change is inevitable, and that there is now no action that can be taken to avert this. I hypothesise that common metaphors employed to describe climate change could inadvertently promote doomism. In order to test this, I used a survey-based methodology to assess participants’ feelings of urgency, agency, and feasibility in relation to the climate crisis. I presented participants with a fictional newspaper article, which described the climate crisis either as a cliff edge or as a minefield. I then asked follow-up questions intended to assess their feelings of doomism. I found that whilst the belief that the crisis required urgent action remained high across all conditions, the minefield metaphor increased the participants’ belief that the climate crisis can be successfully addressed.
Preface

This thesis is original, unpublished, and independent work by the author, Caitlin Johnstone. The survey employed in this study was approved by the University of British Columbia’s Behavioural Research Ethics Board [certificate #H22-02761].

The results of this research will form part of a larger study into the differential impact of metaphor on climate doomism in English and French, which will be co-authored by Johnstone, C., Stickles, E. and Browning, C.
Table of Contents

Abstract ............................................................................................................................................... iii

Lay summary ........................................................................................................................................ v

Preface ................................................................................................................................................ vi

Table of Contents .............................................................................................................................. vii

List of Tables ..................................................................................................................................... x

List of Figures ...................................................................................................................................... xi

Acknowledgements ............................................................................................................................ xii

1 Introduction .................................................................................................................................... 1

2 Methods ......................................................................................................................................... 16

2.1 Participants ................................................................................................................................ 16

2.2 Preliminary research and metaphor selection ....................................................................... 17

2.3 Stimuli ......................................................................................................................................... 22

2.4 Norming Studies and Ethical Approval .................................................................................... 25

2.5 Target Questions ....................................................................................................................... 25

3 Results .......................................................................................................................................... 28

3.1 Data Collection and Cleaning .................................................................................................. 28

3.1.1 Software ............................................................................................................................... 28

3.1.2 Data collection ..................................................................................................................... 29

3.1.3 Attention Check .................................................................................................................... 30
3.1.4 Data organisation ..................................................................................................... 30

3.2 General observations ...................................................................................................... 33

3.3 Significance of covariates ............................................................................................ 35

3.3.1 Urgency ................................................................................................................. 35

3.3.2 Agency ..................................................................................................................... 36

3.3.3 Feasibility ................................................................................................................ 37

3.4 Test conditions ............................................................................................................... 38

3.4.1 Urgency, agency, and feasibility as a function of metaphor and agency presentation 38

3.4.1.1 Urgency ................................................................................................................ 38

3.4.1.2 Agency .................................................................................................................. 39

3.4.1.3 Feasibility ............................................................................................................. 40

3.4.2 Urgency, agency, and feasibility as a function of condition ....................................... 42

3.5 Summary of observations ............................................................................................... 42

4 Discussion ............................................................................................................................. 44

4.1 Key findings ................................................................................................................... 44

4.2 General discussion ........................................................................................................ 46

4.2.1 Interpretation of results ............................................................................................ 46

4.3 Significance of covariates .............................................................................................. 51

4.4.1 Individual agency and doomism .............................................................................. 54

4.4.2 Attention check ......................................................................................................... 55
4.4.3 Categorical coding structure ................................................................. 56

4.2.4 Limits of Prolific demographic data ...................................................... 56

5 Conclusion ........................................................................................................ 58

Works Cited ........................................................................................................ 61

Appendices ......................................................................................................... 70

Appendix A – Informed Consent ........................................................................ 70

Appendix B – Narrative Stimuli ......................................................................... 73

Appendix C – Survey questions ......................................................................... 76

Appendix D – Code for statistical analysis ....................................................... 77
List of Tables

Table 1 Number of participants per condition, before and after attention check ......................... 29
Table 2 Treatment coding of the metaphor variable ..................................................................... 31
Table 3 Treatment coding of the agency variable ........................................................................ 31
Table 4 Summary of statistical test results. Significance levels: . = p<0.1, * = p<0.05. .............. 43
List of Figures

Fig. 1 Percentage of participants reporting 'high' attitude score .................................................................33

Fig. 2 Correlation between high feasibility and low urgency .............................................................................34
Acknowledgements

I would like to first express my sincere thanks to my supervisor, Professor Elise Stickles. Elise has been exceptionally patient, continually supportive, and her advice and guidance have led me to accomplish things that I would otherwise not even have attempted. Her passion for this subject is infectious. This project would not exist without her.

Thank you also to my reader, Professor Avi Lewis, for his thoughtful and thought-provoking comments. I am deeply grateful for his enthusiasm and for his willingness to share his expertise, especially over the last few weeks as we pushed this project over the finish line.

Thanks to Kim Grogan for her endless support, both intellectual and emotional. Kim has shared my enthusiasm for this project when I was feeling excited about it, and has offered advice, encouragement, and caffeine when I was feeling burnt out and overwhelmed. I will always be thankful for her kindness and friendship.

I am grateful for the help of Nikolas Krstic and the Applied Statistics and Data Science Group, who provided invaluable statistical advice to a true novice.

This study was funded by the Peter Wall Institute for Advanced Studies under the Catalyst Collaboration Fund. Without this funding, this project would not have been possible. Thank you in particular to Professor Sharon Stein for her insightful feedback.

I am grateful to have received scholarship funding from the UBC Faculty of Arts, and from the estate of Milton and Bess Narod.

Lastly, thank you to my family, who have consistently championed my academic endeavors from afar. I’ll be home soon!
1 Introduction

Over the last twenty years, the world has seen a dramatic increase in the frequency and intensity of extreme weather events. This trajectory has been outlined by the United Nations (Yaghmaei, 2019), who observed 3,656 climate-related events in the years 1980-1999, rising to 6,681 such events between 2000 and 2019. The number of storms recorded also grew across these periods, from 1,457 to 2,034, whilst the number of floods more than doubled in the same timeframe. Major increases were also reported in the frequency of droughts, wildfires, and extreme temperature events. The trends observed in the data have been attributed to anthropogenic climate change. This has led the scientific community to issue increasingly dire warnings. In March 2023, the Intergovernmental Panel on Climate Change (IPCC) released the final installment of the AR6 Synthesis Report, the culmination of five years of research from 2018-2023. This report paints the clearest picture yet of the unprecedented scale of the challenges we are facing and issues a stark warning: “There is a rapidly closing window of opportunity to secure a liveable and sustainable future for all”. The AR6 demonstrates indisputably that the pace and scale of the mitigative actions we are currently taking are insufficient to guarantee this future. It warns that some impacts of global warming are likely already irreversible.

In the face of the increased visibility of climate change and the corresponding amplification of warnings from the scientists, it is perhaps unsurprising that a discussion is emerging around the notion of climate doomism, a concept which has been gaining traction in recent years. Due to its novelty, this term is operationalised in a variety of ways across the existing literature, often appearing interchangeably with closely related terms such as eco-anxiety, climate grief, and solastalgia (see Coffey et al., 2021). An overview of the concept is offered by Mann (2021):
Exaggeration of the climate threat by purveyors of doom – we’ll call them “doomists” – is unhelpful at best. Indeed, doomism today arguably poses a greater threat to climate action than outright denial. For if catastrophic warming of the planet were truly inevitable and there were no agency on our part on averting it, why should we do anything? Doomism potentially leads us down the same path of inaction as outright denial of the threat.

Building from this discussion, I define doomism as the belief that catastrophic warming of the planet is now inevitable, and that there is no ameliorative action that can be taken to avert this. As Mann observes, the result of this view is essentially identical to the result of climate scepticism; doomism produces inaction, at a time when we can least afford it. Crucially, this conceptualisation of the climate crisis is not scientifically accurate. Whilst the situation is critical, research indicates that it is not yet too late to avoid the worst consequences of climate change (Shaftel, 2023). The scientific community is not naive to the scale of the challenge, and commentators have acknowledged that global temperature increases are now likely to exceed 1.5°C in the 21st century (IPCC, 2023). However, this is taken as an indication that rapid and sustained greenhouse gas emission reductions are now more essential than ever. Activists have reached a similar conclusion, arguing that every fraction of a degree of warming that can be avoided corresponds to lives saved and crises averted (Clark, 2022; Skea, 2022; Tan, 2021).

Across communities who are working to address the climate crisis, therefore, consensus indicates that now is not the moment at which to abandon our mitigation efforts.

However, research indicates a growing disconnect between this understanding and the public’s conceptualisation of the climate crisis. In the early days of climate change activism, communicators prioritised the vital issues of engaging sceptics and raising the profile of climate
change as a global threat. It appears that their efforts have been successful; in recent years there has been a significant drop in the number individuals who describe themselves as ‘dismissive’ or ‘doubtful’ regarding the existence of global warming (Gustafson et al., 2019). However, this fall in scepticism has been accompanied by a corresponding rise in the number of individuals reporting doomist attitudes. This has been demonstrated by de Pinto et al. (2019), who conducted a survey which examined the reasoning of those opposed to climate change mitigation efforts. They found that more people opposed action because of doomist beliefs than opposed it due to scepticism. This finding is supported by Leiserowitz et al. (2018), who demonstrated that more respondents believed that humans cannot address global warming even if it is happening than denied its existence. This trend in the data demonstrates a shift in the root cause of opposition to mitigation efforts. Whilst addressing scepticism remains of vital importance, the research above indicates that doomism is now the greater source of reluctance to engage with mitigation efforts. As such, it requires attention as a potential barrier to action. In this paper I question whether the language used by policymakers, activists, and journalists to describe the climate crisis could inadvertently promote climate doomism. I hypothesise that common metaphors that are employed by these communicators with the intention of addressing scepticism and promoting urgent action may be unintentionally contributing to feelings of hopelessness and despair.

I use conceptual metaphor theory (CMT) as a framework through which to examine this hypothesis. The parameters of CMT were defined by Lakoff and Johnson in their ground-breaking work, *Metaphors We Live By* (1980). They argue that metaphor, rather than being only a poetic technique or linguistic flourish, is in fact central to conceptualisation. They illustrate this
using the metaphor ARGUMENT IS WAR\(^1\), citing examples such as “Your claims are indefensible” and “I’ve never won an argument with him”. These examples, they suggest, indicate that the role of metaphor goes further than simply being a linguistic reframing of one idea in terms of another. Instead, these uses of metaphorical language reflect our conceptualisation. In this example, our understanding of argument as a concept is, in part, structured by our understanding of war. This has a direct influence on the actions that we perform when arguing. Within this example, war is acting as a source domain, and argument is the target domain. Elements of the source domain are selected for mapping onto the target domain, allowing us to reason about argument using the concept of war as a framework.

Since the publication of *Metaphors We Live By*, a wealth of studies has empirically demonstrated a link between the metaphors used to present an issue, and the interlocutor’s conceptualisation of that issue. A survey-based experimental approach to assessing this relationship was first demonstrated by Thibodeau and Boroditsky (2011). They examined the relationship between the metaphor used to describe a rise in crime in a fictional city, and the reader’s view on the measures that should be taken to address this problem. They tested this by asking participants to read a short passage describing the city, in which crime was either characterised (1) as a virus or (2) as a beast:

(1) Crime is a *virus* ravaging the city of Addison

(2) Crime is a *beast* ravaging the city of Addison

\(^1\) In CMT, metaphors are written in small caps in order to clarify that they are conceptual, distinct from words or expressions. This convention was adopted from semanticists, who similarly employ small caps to distinguish concepts from lexical items.
Their results indicated that the metaphor used had a statistically significant effect on how readers proposed solving the city’s crime problem. The steps that would be taken in order to address a literal virus or beast were seemingly mapped by the readers onto the problem of crime, and the intervention measures that they favoured varied accordingly. Individuals in the CRIME IS A VIRUS condition recommended identifying the root causes of the issue and treating it through social reforms such as addressing poverty and improving education. This is consistent with how a virus or disease epidemic would be addressed, i.e., by preventing the spread of the disease by stopping it at its source and by treating the symptoms of the disease, with the patient’s wellbeing taking a priority. By contrast, those who saw crime described as a beast favoured harsher enforcement laws, recommending catching and jailing criminals as the best approach. The metaphor used to describe crime had structured the way in which they reasoned about the issue. The measures recommended to address the crime problem in this condition were consistent with the capture of a beast, where criminals are treated as wild animals to be contained and tamed, as opposed to patients to be identified and treated.

The power of metaphor to structure reasoning has been further demonstrated in relation to climate change by Flusberg et al. (2017), who compared the metaphors CLIMATE CHANGE IS A WAR (3) and CLIMATE CHANGE IS A RACE (4). These metaphors are both seen prevalently in the media, for example:

(3) Energy-saving smart windows could help combat climate change (Tracy, 2023)

(4) Are We Losing The Race Against Climate Change? (Mann et al., 2013)

Replicating the methodology of Thibodeau and Boroditsky, they were able to demonstrate that describing climate change as a war produces a greater sense of urgency, and a greater willingness to engage in individual behaviour changes. Such behaviour changes included paying
a premium for products that offset carbon emissions and reducing the use of air conditioning and heating.

The research above has established a causal link between metaphor and conceptualisation with regards to climate change, providing evidence of the salience of addressing the role of metaphor in the discussion of the climate crisis. The central importance of metaphor in climate change communication has been widely acknowledged by scholars from a range of fields (e.g., Romaine, 1996; Shaw & Nerlich, 2015; van der Hel et al., 2018). Much of this work has focussed on the metaphors that structure our understanding of the science itself. The WORLD IS A GREENHOUSE metaphor is particularly prevalent here, as this has become central to our conceptualisation of the mechanism by which the world is warming (Augé, 2022). The appropriateness of this metaphor has been questioned by Koteyko and Atanasova (2016), who raise concerns regarding the prevailing view of greenhouses as a place of safety.

Similarly, scholars have questioned the appropriateness of the TIPPING POINT source domain in structuring our understanding of the scientific processes that drive global warming (Russill & Nyssa, 2009; van der Hel et al., 2018). This source domain is often used to describe points of irreversible ecological change:

(5) World on brink of five ‘disastrous’ climate tipping points, study finds
(Carrington, 2022)

This source domain was originally adopted in an attempt to convey the urgency of the climate crisis by aiding in the identification of discrete thresholds for danger, which were believed to be more conducive to human understanding than a nebulous ongoing threat. However, critics have suggested that the overextension of this analogy can result in alarmist attitudes. Specifically,
Russill & Nyssa (2009) note that the tipping point metaphor has been extended beyond a scientific context and into a social one. That is, the metaphor is used to apply discrete danger points regarding humans’ capacity to respond to climate change, as opposed to being used to discuss thresholds at which rapid changes occur within ecosystems. This overextension is problematic; whilst there is science to support the idea of sudden and rapid environmental changes, social tipping points inherently assume limits on what kind of event humans have the capacity to respond to. This is considerably less clearly defined than the scientific tipping point, and is much more inherently alarmist, as it assumes a scenario in which humans become powerless to address the climate crisis. Furthermore, as the climate crisis develops, we are increasingly encountering examples of tipping points that we are now almost inevitable to pass, for example the collapse of the Greenland and West Antarctic ice sheets (McKay et al., 2022). It is true that the tipping point metaphor may encourage mitigation efforts when it is employed to characterise an avoidable threshold. However, when the tipping point is suggested to be inescapable, it is likely instead to promote a policy of adaptation, and a move away from further mitigation efforts.

Shaw and Nerlich (2015) identify the TIPPING POINT source domain as characteristic of a wider pattern in the discourse, in which metaphors are used to present climate change as a dichotomous choice between an impacted and a non-impacted world. Other source domains that follow this pattern include CRASH BARRIER (6), GUARD RAIL (7) and THRESHOLD (8):

(6) The IPCC Fifth Assessment Report outlined the inconsistencies of the previously stated tourism emissions rising trend with the prerequisites to stay within the +2 °C crash barrier. (Anbar, 2022)
(7) …the scenarios described are stringent and likely to keep average temperatures either below the 1.5°C guard rail or overshoot it and then return below it by the end of the century. (Rajan & Byravan, 2019)

(8) Earth likely to cross critical climate thresholds even if emissions decline, Stanford study finds (Garthwaite, 2023)

Within this framing, climate change mitigation efforts are understood as an attempt to prevent the world from crossing the line into an ‘impacted’ state. This line is often expressed numerically in the form of a particular degree of warming, often the limit of 1.5 °C of warming above pre-industrial levels discussed in the IPCC’s special report (2018). Several issues are raised with this binary conceptualisation of the climate crisis. Firstly, this understanding of climate change is not scientifically accurate. Rather than being a discrete danger point at which the world shifts into an impacted state, climate change is best understood as an ongoing process, with each fraction of a degree of warming associated with increased risks (Mann, 2021). Secondly, a clear issue with this dichotomous view is that for millions of people around the world, dangerous climate change has already arrived. We have already crossed the line and entered into the ‘impacted’ state in which human interaction with the climate has become dangerous. As is discussed above, dichotomous metaphors are not well-equipped to deal with this scenario, steering us towards policies of adaptation rather than mitigation. Thirdly, Shaw and Nerlich criticize the choices offered to us by dichotomous metaphors (2015). By their nature, these source domains place limits on our ability to conceptualise alternative futures, instead offering us a direct choice between the status quo, or something much worse. This choice is particularly restrictive when considering the perspective of Indigenous peoples, given that today’s status quo already represents a catastrophic loss of Indigenous ecologies. This is observed by Whyte (2018):
[It] is important to consider some of the differences in the narrative that Indigenous peoples might have. It is not a given that today’s social-ecological systems are ones that are important to conserve. For the state of these systems today is already, for some, an Indigenous dystopia.

When the climate crisis is represented as a binary choice between an impacted and non-impacted world, we are inherently assuming that our current climate represents a just and desirable scenario. This acts to obscure the experience of those for whom the status quo is already representative of the catastrophic ‘impacted’ state which we are purportedly seeking to avoid. Whilst Whyte highlights this in relation to Indigenous ecologies specifically, this speaks to a wider pattern, in which existing power structures that have historically oppressed and excluded marginalised groups are upheld and reinforced, under the guise of maintaining a purportedly desirable status quo (Kaijser & Kronsell, 2014). For these reasons, a binary conceptualisation of the climate crisis, which offers a choice between ‘business as usual’ or catastrophe, is inherently restrictive.

Other scholars have focussed more specifically on the use of metaphor to represent climate change as a social, rather than scientific, issue. Atanasova and Koteyko (2017a) provide a scoping review of climate change metaphors appearing in online media sources, highlighting the prevalence of ILLNESS, WAR, and JOURNEY as source domains. Once again, multiple concerns have been raised regarding the appropriateness of these source domains in relation to the climate crisis. For example, these source domains are often complicated by the unintended mappings that they produce. Atanasova and Koteyko discuss this in relation to the WAR source domain, which exemplifies this issue (2017b). The war metaphor is frequently evoked in climate change discourses, and for good reason. There are many apt comparisons between the mobilisation
efforts of war, and the efforts that will be required in order to successfully address the climate crisis. The crisis demands an emergency ‘wartime’ mindset: the galvanisation of public support for a shared purpose; the redressing of systemic inequalities; the willingness to expend economic resources; the rejection of neoliberal economics; and the transformation of political structures to address the scale of the problems we are facing (Klein, 2020). Typically, therefore, war metaphors are employed within the discourse to promote the urgency of the issue, and to justify the drastic changes that will be required in order to address the crisis. However, multiple other mappings are also available here, which are likely less desirable in the context of the climate crisis. For instance, the war frame is also populated by the notions of opposing sides, the idea of ‘winning’ the war, and most prevalently the inherent violence that war entails. All of these notions are considerably less useful in relation to the climate crisis. Similar concerns have been raised by Larson (2011), who discusses the use of the war metaphor to describe invasive species. He argues that the long-term use of the war metaphor can result in it becoming vapid and ineffective, a concern echoed by Flusberg et al. (2017).

The discussion of war metaphors forms part of a wider critique of fear appeals in climate change discourse. Whilst foregrounding the threat of global warming is likely to produce an increased sense of urgency, research has suggested that any effects of fear-based messaging are likely to be short lived (Lowe et al., 2006). Furthermore, fear appeals are only effective at producing behaviour changes if they are accompanied by a clear opportunity for individual agency (O’Neill & Nicholson-Cole, 2009). That is, fear appeals must appear in conjunction with a method of directing this urgency towards remedial actions and the capacity for a response (Moser & Dilling, 2004). Fear is a natural and appropriate reaction to the scale of the problem we are facing, and people may indeed need to be frightened in order to engage productively with the
climate crisis. However, this does not mean that it is accurate to present the climate crisis as unsolvable, or to promote fear without hope. Doing so could likely produce doomist attitudes (Mann, 2021).

The concerns outlined above demonstrate a clear need to search for alternative framings, which evoke a more productive view of the climate crisis. In order to be constructive, these framings must avoid a binary conceptualisation of the climate crisis. Further, they must pair fear appeals with opportunities for individual response. Suggestions which appear in the literature include

CLIMATE CHANGE IS A MINEFIELD (9) and CLIMATE CHANGE IS AN UNBALANCED ACCOUNT (10):

(9) A far better analogy is that we’re walking out onto a minefield, and the farther we go, the greater the risk. (Mann, 2021)  
(10) Without the facility for a nation, organisation or individual to balance the debit from their carbon budget with a credit earned from offsetting those emissions wealthy actors would find their freedom to enjoy a high carbon lifestyle increasingly difficult to justify (Nerlich & Hellsten, 2014)  

Metaphors such as these have the potential to address some of the issues with existing metaphors outlined above. Most pertinently these metaphors avoid the problematic dichotomisation of the climate crisis, suggesting global warming to be an ongoing process rather than a discrete event. However, suggestions regarding the effectiveness of these metaphor have generally been speculative, and they have not yet been tested using empirical methodology. Indeed, this is the case for much of the discussion of the impact of metaphorical framing on the public’s conceptualisation of the climate crisis. This represents a clear gap in the existing research. Whilst efforts have been made to empirically demonstrate the relationship between metaphor and the perception of urgency in relation to the climate crisis (Flusberg et al., 2017), no existing research
has examined the possibility of a relationship between metaphoric framing and climate doomism. In this thesis, therefore, I use empirical methodology to demonstrate a statistically significant relationship between the metaphorical representation of climate change, and feelings of climate doomism.

In order to test this hypothesis, I employ the survey methodology devised by Thibodeau and Boroditsky (2011). Whilst this methodology has been demonstrated to be robust across multiple studies (e.g. Flusberg et al., 2017; Panzeri et al., 2021), critiques have been raised that it is worthwhile to address. Firstly, it is worth acknowledging that scholars have questioned the utility of the framing paradigm in relation to climate change communication (Ytterstad, 2015). It has been argued that an overreliance on this paradigm can result in a view of global warming which is too focused on human experience, at the expense of paying attention to the concrete, real-world realities of the situation. By foregrounding the importance of framing, it is possible for the absoluteness of global warming to become lost, with the crisis seen instead as a malleable issue that can be affected through reframing alone. In other words, the ice caps will continue to melt, no matter which metaphor we use to discuss them melting. Relatedly, it has been argued that this approach assigns too passive a role to human conceptualisers, implying that climate change communication is simply a framing contest in which the goal is to ‘win over’ cognition. This strategy once again runs the risk of rendering the truth relative. More broadly, empirical research has demonstrated that simply reframing the climate crisis in terms of another issue (e.g., loss of jobs, damage to the economy) is unlikely to increase public support for mitigation efforts (Bernauer & McGrath, 2016).

Given these concerns, it is salient to question the productivity of studying the metaphorical framing of the climate crisis. This choice is justifiable on two levels. Firstly, it is necessary to
stress the distinction between framing and CMT. In the criticism above, framing is generally understood as a linguistic process, rather than a conceptual one. This contrast is essential; as opposed to being a purely linguistic phenomenon, CMT suggests that the source domain used to describe an issue structures our understanding of the issue itself. That is, rather than simply talking about one concept in terms of another, we are instead reasoning about that concept. In this way, CMT assumes that the interlocutor plays an active role in the negotiation of meaning between the source and target domains. Humans are therefore not understood as passive receivers of knowledge who must be conceptually ‘won over’. Instead, they are engaged in the construction of meaning. In this way, conceptual metaphor plays a considerably more powerful role than linguistic reframing, as it has the potential to scaffold the interlocutor’s understanding of the climate crisis.

Secondly, whilst it is evidently true that the concrete reality of global warming must not be understated, this is not to say that the issue of communication is not central to the climate crisis. As the surveys discussed above have indicated, scepticism is no longer the primary barrier to engagement with climate change mitigation efforts. This indicates that a lack of attention being paid to the physical reality of global warming itself is no longer of primary concern. By contrast, doomism indicates a lack of attention on the ways in which climate change can be successfully addressed. Whilst addressing the climate crisis is indisputably an issue that is grounded in physical reality, achieving this goal will require mass-mobilisation and widespread activism. As such, it is appropriate to understand doomism as a crisis of communication, as opposed to a physical crisis (Verdier, 2021).

Furthermore, it is necessary to critique the concept of doomism itself. This is a notion that is inseparable from our understanding of success and failure in the context of the climate crisis. In
the working definition stated above, I have relied upon a conceptualisation of success as the
aversion of catastrophic warming of the planet. Doomism is, in turn, defined by the belief that
this success is no longer possible. This is a belief that I have argued to be inaccurate. However, it
must be acknowledged that this argument is contingent upon a particular representation of the
climate crisis, constructed predominantly from a western, settler-colonial perspective. Scholars
have argued that whilst it may not yet be too late to avert disastrous climate change from this
perspective, it may be too late to achieve environmental justice for some Indigenous peoples.
This is discussed by Whyte (2020), who argues that the climate crisis now demands action at a
pace that does not allow time for governments and corporations to meaningfully engage in the
construction of consent, trust and accountability with Indigenous peoples. Such relationships
take time to build, and the urgency of the crisis may leave insufficient time for this process.
From this perspective, therefore, it could be argued that it is no longer possible to successfully
address the climate crisis.

In response to this, it is necessary to acknowledge the limits of what this study is able to achieve.
Addressing doomism may be able to empower individuals to action in relation to the climate
crisis. However, empowerment to action must be seen as distinct from the notion of climate
justice, which is not inherently addressed when doomism is addressed. Whilst this study is able
to comment on doomism as a barrier to action, it is not able to guarantee that the action taken is
just. However, by targeting doomism specifically as a barrier to action, this study may go some
way towards addressing what Caney (2014) calls the principles of burden-sharing justice:

- Three, in particular, have been suggested—the principle that those who have caused
  the problem should bear the burden; the principle that those who have the ability to
pay should bear the burden; and the principle that those who have benefited from
the activities that cause climate change should bear the burden.

With these principles in mind, it follows that western settler-colonial communities should bear
the greatest responsibility for climate change mitigation. In this study, therefore, I focus on the
American context, with the intention of removing doomism as a barrier to action for those who
bear the greatest responsibility for enacting change. This is in line with the principles outlined
above. With regards to the cause of the problem, the US has cumulatively emitted more
greenhouse gasses than any other nation, and the country is responsible for almost a third of the
excess carbon dioxide that is now in the atmosphere (Gillis & Popovich, 2017). With regards to
the ability to pay, the US remains the single largest economy in the world (World Bank Group,
2023). These two facts are inextricably linked; the US’s economic power is built on its present
and historical use of fossil fuels. The decision to focus on the American context is therefore in
concordance with the principles of climate justice.
2 Methods

2.1 Participants

Participants in this study were enlisted using Prolific, a UK based online recruitment platform commonly used for behavioural research and other studies of this kind. The site is specifically designed for recruitment and participant management (Prolific Team, 2023). A total of 1540 participants took part in the study. As compensation, participants were offered £1.03 ($1.66 CAD at current exchange rate). The study was anticipated to take 5 minutes to complete, meaning that this rate was equivalent to £12.36/hour ($19.96 CAD). This pay rate was chosen in order to exceed minimum wage requirements in BC and the US. The study was generally completed faster than anticipated, with a mean participation time of 3 minutes and 16 seconds. As a result, participants were on average paid £18.92/hour ($30.56 CAD). To participate, respondents were required to be US nationals, English speakers, and to report that they believed in the existence of climate change. Prolific offers pre-screening criteria, so the study was only visible to participants who had already identified themselves as having these characteristics. The former two factors were selected as the majority of extant research in this area focusses on American English. I chose to continue this trend so that any discrepancy between the results of this and earlier studies can be discussed as potentially significant, given that linguistic, dialectal, or regional variation can be ruled out. Participants who do not believe in the existence of climate change were not eligible for this study, as the research questions are focussed specifically on climate doomism. It is not logically possible to be both a sceptic and a doomist, as belief in the potential for catastrophic climate change is inherent in climate doomism. For this reason, climate change sceptics were excluded from participation.
Prior to starting the survey, participants were asked to provide informed consent (see Appendix A). They were then asked to confirm the answers that they had provided to Prolific during pre-screening. Three questions were asked at this stage:

1. What is your nationality?
2. What is your first language?
3. Do you believe in climate change?

41 respondents provided answers that were inconsistent with their Prolific profiles (4 non-US nationals, 8 non-English speakers, 30 climate change sceptics). This resulted in the total sample size of 1540 participants. A slight majority of the participants were men, with 54% self-identifying as male and 45% identifying as female. The remaining 1% declined to disclose their gender. The mean age of the participants was 37.8, with a median age of 35. The youngest participant was 18, and the oldest was 85. The participants were predominantly white (76%).

This demographic data was recorded, as previous research has indicated that these demographic variables can impact climate change awareness and risk perception (Funk, 2021; Lee et al., 2015; Pearson et al., 2017). Identifying these variables therefore makes it possible to isolate the impact of metaphorical framing on feelings of urgency, agency, and feasibility in relation to the climate crisis.

2.2 Preliminary research and metaphor selection
As an initial step prior to constructing the experimental survey, I identified common metaphors for climate change that appeared in the academic literature. A wealth of metaphors has been employed and discussed as potentially significant in the communication of climate change science:
CLIMATE CHANGE IS A WAR (Mangat & Dalby, 2018)

CLIMATE CHANGE IS A CLIFF EDGE (M. E. Mann, 2021)

CLIMATE CHANGE IS A BOMB (Mann, 2021)

CLIMATE CHANGE IS A TIPPING POINT (Russill & Nyssa, 2009; van der Hel et al., 2018)

CLIMATE CHANGE IS A MINEFIELD (Mann, 2021)

CLIMATE CHANGE IS AN OVERFLOWING BATH (Revkin, 2009)

CLIMATE CHANGE IS AN UNBALANCED LEDGER (O’Grady, 2017)

The merits of some of the metaphors above have been discussed by front line climate change activists, who are personally engaged in the communication of climate change science to the public. However, others are discussed predominantly within academic literature. Discussion of their efficacy or otherwise is therefore largely hypothetical. As an initial step in this project, it was therefore first necessary to confirm that these metaphors were in use by climate change communicators, as opposed to appearing exclusively in the academic literature. This step was taken in order to avoid a paternalistic, top-down approach, in which communicators were informed of the metaphors they ought to be using by academics such as myself, who are working only tangentially to the field. Instead, this study aims to examine metaphors that are already in use, in order to determine which of these is likely to be most effective. The intention here is to guide the existing work of activists and communicators to be more efficient, as opposed to issuing further restrictive instructions to those already engaged in a difficult and complex task.

All of the metaphors listed above were determined to be in use by climate change communicators. This was verified using NexisUni (LexisNexis), an online corpus containing
over 17,000 news sources. Of these, CLIMATE CHANGE IS A MINEFIELD (11, 12) and CLIMATE CHANGE IS A CLIFF EDGE (13, 14) were selected for use in the study:

(11) We are continuing to *head for a precipice* — we say our eyes are open to the risks, but when you look at global emissions, if anything, we are accelerating towards the *cliff edge*. (NexusUni, Associated Press)

(12) Driving Headlong Toward The Climate Change *Cliff* (NexusUni, Honolulu Civil Beat, 2019)

(13) It's a *minefield*. And we're walking farther and farther out onto that *minefield*. And the farther we walk out onto that *minefield*, the more danger that we are going to encounter. (NexusUni, Economic Principals, 2022)

(14) The disappearance of summer sea ice in the Arctic is one of the first *landmines* in this *minefield* (NexusUni, Watts Up With That?, 2021)

This choice was motivated by two factors. Firstly, this study is intended to identify metaphors that do not compromise on communicating the urgent threat of the climate crisis. For this reason, the TIPPING POINT, the OVERFLOWING BATH and the UNBALANCED LEDGER were discounted from consideration, as they do not clearly express the immediate danger of the climate emergency.

Secondly, of the remaining source domains the CLIFF EDGE and the MINEFIELD were selected as they can be manipulated to exemplify the distinction between metaphors that evoke discrete danger points in the climate crisis, and those that do not. This manipulation is possible due to the partial nature of metaphorical mappings (Lakoff and Johnson, 1980). When, for instance, the metaphor CLIMATE CHANGE IS A CLIFF EDGE is realised, it is not the case that every element of a cliff is directly mapped onto every element of climate change. Instead, specific elements of the
CLIFF EDGE source domain are used to make inferences about the CLIMATE CHANGE target domain. When these mappings occur, the structure of the source domain is preserved in a way that is consistent with the target domain. This is defined by Lakoff as the invariance principle (1993). Sullivan (2013) extends this principle to the frames that structure the domains, such that the structure of the source domain frames is preserved in the target domain frames. In examples (11) and (12), the cliff is framed as a discrete point, a moment of danger, and an undesirable location. Our understanding of CLIMATE CHANGE is therefore structured around these elements, with these characteristics of a cliff edge being mapped onto elements of climate change that are consistent with these characteristics. This results in an understand of global warming as containing discrete points of sudden and extreme danger, which must be avoided. However, this necessarily obscures other elements of the climate crisis. It is possible to conceive of an alternative realisation of the metaphor CLIMATE CHANGE IS A CLIFF EDGE. If different frames are used to structure this source domain, the structure of the target domain is correspondingly altered. This subsequently leads to different inferences. For example:

(15) Taking in the view from the climate change cliff edge

In this manufactured example, the height of the cliff is emphasised as a useful vantage point for taking in a view. When these elements of the CLIFF EDGE source domain are mapped onto CLIMATE CHANGE, our conceptualisation of the climate crisis is correspondingly altered, as different inferences are made available. The height of the cliff corresponds to the idea of climate change as offering perspective. However, the idea of discrete danger points highlighted by examples (11) and (12) is obscured here, as in example (15) this element of the source domain is not projected into the target domain. This demonstrates that our conceptualisation of the climate crisis is dependent on the inferences that are made available when particular elements of the
CLIFF EDGE source domain are mapped onto the CLIMATE CHANGE target domain. Altering the realisation of the source domain results in different elements of the target domain being highlighted or obscured.

However, whilst this demonstrates that it is possible to manipulate to a degree the inferences that are made available by a particular realisation of the metaphor, it is crucial to observe that some inferences are impossible. This is due to the restricting nature of the target domain (Lakoff, 1993). It is of particular significance to this study that it is very difficult to conceive of an element of the CLIFF EDGE source domain that can map onto the idea of climate change as an ongoing process. This is due to the fact that there is not an element of the CLIFF EDGE that can be highlighted in order to foreground this idea; a discrete point of change is inherent to the concept. This point of change is absolute and irreversible. Either you are at the top of the cliff, aware of the nearby danger but unharmed and unaffected by it, or you are falling over the cliff, with disastrous and irreparable consequences. The CLIFF EDGE source domain does not offer a scenario in which there is a gradual worsening of circumstances over time; either you are at the top of the cliff, or the bottom. It is therefore not possible to represent climate change as an ongoing process using this metaphor, as there is no corresponding element of the CLIFF EDGE source domain that can be highlighted to evoke this inference. In other words, the CLIFF EDGE source domain inherently implies a binary impacted/non-impacted view of the climate crisis.

For the metaphor CLIMATE CHANGE IS A MINEFIELD, mappings are possible that evoke climate change as either a binary switch, or as an ongoing process. Examples (13) and (14) project different elements of the MINEFIELD source domain into the CLIMATE CHANGE target domain. Our conceptualisation of the target domain is altered accordingly. In example (13), the act of walking into the minefield is the highlighted element of the source domain. This leads to the inference
that climate change as a continuous and ongoing threat, intensifying with time, with the danger of stepping on a landmine increasing the further out into the minefield you go, and the further from safety you get. By contrast, example (14) highlights the landmines buried in the minefield. Different elements of the climate change target domain correspond to the landmines. Rather than being understood as a continuous process associated with gradually increasing risks, climate change is instead represented as a series of discrete danger points that can either be triggered or located and avoided.

In the present study, the metaphors CLIMATE CHANGE IS A MINEFIELD and CLIMATE CHANGE IS A CLIFF EDGE are used to exemplify the distinction between metaphors that inhere an end point, and those that do not. As the above analysis demonstrates, the CLIFF EDGE metaphor represents the climate crisis using a binary impacted/non-impacted structure. By contrast, it is possible employ the metaphor CLIMATE CHANGE IS A MINEFIELD to represent the climate crisis as an ongoing threat. This distinction is represented in the narrative stimuli in order to test the differential impact of these different metaphorical presentations on feelings of climate doomism.

2.3 Stimuli

The narrative stimuli used in this study were directly adapted from Flusberg et al. (2017). Stimuli took the form of a short paragraph, written in the style of a newspaper article (see Appendix B). Two different conditions were manipulated within the articles. In keeping with Flusberg et al.’s approach, the paragraphs differed in the metaphor employed to characterise the climate crisis. In conditions 1 and 2, participants were presented with paragraphs which employed the target metaphor CLIMATE CHANGE IS A CLIFF EDGE. By contrast, conditions 3 and 4 used the metaphor CLIMATE CHANGE IS A MINEFIELD, with condition 5 acting as a control condition, offering no metaphorical presentation, and instead discussing the ‘issue’ of climate change. In each of the
test conditions, the target metaphor was presented three times: firstly, in the heading of the paragraph; secondly, in the opening sentence; and finally, in the closing sentence. For example, Condition 1 read as follows:

Climate change is a cliff edge – and we are driving the earth towards it

When will Americans realize that we are driving the earth towards a climate change cliff edge? We must solve this problem before we push the earth over the cliff. In the United States we are working to avoid disaster by reducing our carbon footprint in the next few decades. The US has approved dozens of projects as part of an effort to reach net zero greenhouse gas emissions by 2050. We will leverage scientific expertise and take individual action to improve the energy efficiency of cars and buildings, reduce personal energy use, and increase the use of renewable energies such as wind and solar. Experts say that if we do not lower emissions soon, we will experience an increase in extreme weather conditions, more public health problems like a rise in cancer and other diseases, as well as severe economic challenges. We must act fast to avoid falling over this cliff!

In addition to metaphorical framing, the presentation of human agency was manipulated across the narrative stimuli. In conditions 1 and 3, human agents were included as actors in the target paragraph. The role of human agents was consistently displayed throughout these paragraphs, including appearances alongside all three of the instances of metaphor usage. By contrast, conditions 2 and 4 omitted this agency. For example, Condition 2 read as follows:
Climate change is a cliff edge

When will Americans realise that the earth is hurtling towards a climate change cliff edge? This problem must be addressed before the earth falls over the cliff. To avoid disaster, the United States’ carbon footprint must be reduced in the next few decades. There are dozens of projects intended to enable the US to reach net zero greenhouse gas emissions by 2050. The projects will leverage scientific expertise and individual engagement to improve the energy efficiency of cars and buildings, reduce personal energy use, and increase the use of renewable energies such as wind and solar. Experts say that if emissions are not lowered soon, there will be an increase in extreme weather conditions, more public health problems like a rise in cancer and other diseases, as well as severe economic challenges. The earth must not fall over this cliff!

The control condition was designed to be neutral in its presentation of agency, with some sentences featuring human actors and other omitting these actors. These manipulations resulted in five conditions:

- Condition 1: Cliff edge + Agency
- Condition 2: Cliff edge + No agency
- Condition 3: Minefield + Agency
- Condition 4: Minefield + No agency
- Condition 5: Control

Participants were randomly assigned to one of the four test conditions, or the control condition.
2.4 Norming Studies and Ethical Approval

Prior to testing, the narrative stimuli were confirmed to be equally clear and easy to read. For each passage, the Flesch reading ease score and the Flesch-Kincaid grade level was calculated (Flesch, 1979). Reading ease scores all appeared between 47 and 51. Flesch reading ease scores are ranked on a scale of 0-100, with 0 representing a text that is practically unreadable and 100 indicating that a text is extremely easy to read. A score of 60 is considered plain English. Therefore, all of these texts are considered moderately difficult. This does not pose a problem for interpretation of the results, as the level of difficulty was consistent across all 5 conditions.

Similarly, all of the paragraphs were reported at a grade 11 reading level, indicating that these passages are judged to be easy to read for most individuals over the age of 17. The similarity of these scores was taken as sufficient evidence that difficulty of interpretation was unlikely to significantly impact the results of this study.

An informal pilot study was conducted to confirm that the test paragraphs were similarly easy to read. Six participants were asked to read the paragraphs, and rate their readability on a scale of 1-6, with 1 indicating that the paragraph was very complex, and 6 indicating that the paragraph was very easy. The reported scores were very similar, ranging from 4.5 for conditions 1 and 3 to 5.3 for conditions 2 and 5.

This study was approved UBC’s Behavioural Research Ethics Board (BREB) [certificate #H22-02761]. It is worth noting that on the advice of the BREB, participants were paid the full amount for the study even if they failed the attention check question.

2.5 Target Questions

Following the presentation of the narrative stimuli, participants were asked a series of follow up questions (see Appendix C). Firstly, they were required to answer an attention check question, in
order to confirm that they had carefully read the passage:

What is the US’s 2050 climate change target mentioned in the paragraph?

a) Net zero greenhouse gas emissions
b) Cut greenhouse gas emissions in half

This was a multiple-choice question pertaining to the climate change target mentioned in the text. Just over 20% of participants failed to answer this question correctly. Participants who answered correctly were then asked three target questions:

1. How urgent is it for the US to implement energy reduction programs right away?
2. How likely is it that the US will be able to avoid the worst-case scenario of catastrophic climate change?
3. To what extent do you believe that your individual actions can help efforts to address the problem of climate change?

The first of these was intended to assess feelings of *urgency* in relation to the climate crisis. This refers to participants’ feelings regarding the need for speed and intensity in climate change mitigation efforts. The second question tests for feelings of *feasibility*. This is intended to assess the participants’ beliefs regarding the likelihood of the climate crisis being successfully addressed, with the very worse consequences of global warming being averted. Finally, the third question tests for *agency*. This investigates whether or not participants believe that there are actions that they can take on an individual level which will have an impact in addressing the climate crisis.

Responses were recorded on a Likert scale, scored from 1-6, with 1 indicating a low report of the relevant attitude (e.g., for question 1, it is not at all urgent to implement energy reduction
programs), and 6 indicating a high report (e.g., it is extremely urgent to implement these plans). These questions were selected based on extant research, which has suggested climate doomism to be the product of intense feelings of urgency, coupled with a low belief in the feasibility of addressing climate change, and a lack of opportunity for individual agency (Flusberg et al., 2017; Mann, 2021; Moser & Dilling, 2004; O’Neill & Nicholson-Cole, 2009; van der Hel et al., 2018). It is likely to be ineffective to ask people to report directly on their own doomist attitudes, given that this term is not sufficiently widely used in order for this to be an unambiguous question. Therefore, in this study doomism is assessed as a high report of urgency, coupled with a low report of feasibility and/or agency.

Following the presentation of the target questions, participants were also asked two follow up questions regarding their existing beliefs relating to climate change. They were asked to report their perception of temperature changes in their local area in the last 5 years, and to indicate what they believed was the cause of climate change. Previous research has demonstrated that beliefs regarding these issues have a significant impact on climate change awareness and risk perception (Lee et al., 2015). Specifically, individuals who perceive their local area to be getting warmer believe climate change to be a greater threat. Conversely, individuals who believe climate change to be a natural process are much more likely to view climate change as a low-level or non-existent threat. These questions were therefore asked in order to isolate the impact of metaphorical framing on responses to the target questions.
3 Results

3.1 Data Collection and Cleaning

3.1.1 Software

The questionnaire was designed using Qualtrics, a cloud-based platform provided free of charge to UBC students. Qualtrics was an appropriate tool here given that it is built in order to facilitate survey-based research, and as such offers a streamlined interface for constructing online questionnaires. Qualtrics is hosted in Canada, meaning that it is compliant with British Columbia’s Freedom of Information and Protection of Privacy Act (FIPPA). After construction, the survey was linked to Prolific for distribution. Prolific provided basic statistics, including the average time taken to complete the survey, the number of participants and the number of attention check failures. Prolific also provided basic demographic information for each of the participants, including age, gender, ethnicity, student status, and employment status. This was provided by the participants upon their registration with the site, and it can be accessed by researchers in an anonymized form. Participants are identified only by their Prolific user ID, which is not associated with any unique identifiers. The results of the survey itself were reported via Qualtrics.

Following data collection, RStudio was used to conduct statistical analysis (R Core Team, 2022; Robinson et al., 2023; Venables & Ripley, 2002; Wickham, 2007, 2016; Wickham et al., 2019). R is a free statistical analysis application that consists of a language, plus a run-time environment with graphics, a debugger, access to certain system functions, and the ability to run programs stored in script files (Hornik, 2022). It is commonly used for statistical computation of large datasets, such as that collected in this study. RStudio provides a streamlined interface for using
the R programming language. The code used to conduct the analysis of the survey results is shown in Appendix D, along with the full statistical results.

3.1.2 Data collection

In the data collection process, a total of 1583 participants were exposed to the questionnaire. Of these, 41 participants provided answers to the pre-screening questions that were inconsistent with their Prolific profiles. For example, 30 participants reported that they did not believe in climate change, despite their Prolific profiles indicating the opposite. These participants were removed from the survey at this stage, and as such were not assigned to a condition. In total, therefore, 1542 participants were assigned to one of five test conditions. The distribution of participants is shown in Table 1.

*Table 1 Number of participants per condition, before and after attention check*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of participants before attention check</th>
<th>Number of participants after attention check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition 1</td>
<td>330</td>
<td>234</td>
</tr>
<tr>
<td>Condition 2</td>
<td>301</td>
<td>243</td>
</tr>
<tr>
<td>Condition 3</td>
<td>302</td>
<td>244</td>
</tr>
<tr>
<td>Condition 4</td>
<td>304</td>
<td>242</td>
</tr>
<tr>
<td>Condition 5</td>
<td>305</td>
<td>238</td>
</tr>
<tr>
<td>Total</td>
<td>1542</td>
<td>1201</td>
</tr>
</tbody>
</table>

Due to an error in the survey design, 36 of the participants in Condition 1 were shown the response questions without first being exposed to the narrative stimuli. This error was identified
early in the survey distribution. To rectify this issue, the results of participants who experienced the error were discounted. Additional participants were then recruited to Condition 1 in order to ensure that the sample sizes for each condition remained relatively well balanced.

3.1.3 Attention Check

Following the presentation of the narrative stimuli, participants were required to answer a multiple-choice attention check question. If they failed to answer this question correctly, the survey ended, and the participants were not shown the test questions. This step was taken in order to identify participants who had not read the paragraph carefully. 341 participants, roughly 20% of the sample, failed to answer this question correctly. These participants were distributed relatively evenly across each of the five conditions, as is demonstrated in table 1. In total, 1201 participants provided answers to the pre-screening questions that were consistent with their prolific profiles and passed the attention check question.

3.1.4 Data organisation

As is discussed above, participants were asked to respond to the three key questions on a Likert scale from 1-6, with 1 representing a low report of the target attitude, and 6 representing a high report. These results were then converted to binary response variables, with scores 1-3 tagged as ‘Low’ and scores 3-6 tagged as ‘High’. This step was taken in order to simplify the statistical analysis of the data. Dichotomising the results made it possible to fit logistic regression models, in order to determine the probability of observing a high or low result as a function of the predictor variables. This coding mechanism also offered a clearer method of defining doomism. Doomism is defined as a ‘High’ urgency score, paired with a ‘Low’ feasibility and/or agency score.
This study aims to isolate the effect of two predictor variables: metaphor presentation, and agency presentation. These were broken down using a categorical structure, coded as two variables, each with three levels. The metaphor variable has the levels ‘Cliff’, ‘Minefield’ and ‘Control’, and the agency variable has the levels ‘Human agent’, ‘No human agent’, and ‘Control’. Treatment coding was used to assign binary numeric values to each of these levels, the structure of which is shown in tables 2 and 3.

*Table 2 Treatment coding of the metaphor variable*

<table>
<thead>
<tr>
<th></th>
<th>Cliff</th>
<th>Minefield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cliff</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Minefield</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

*Table 3 Treatment coding of the agency variable*

<table>
<thead>
<tr>
<th></th>
<th>Agency</th>
<th>No agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Agency</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>No agency</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

It is worth noting that R will automatically assign the variable that appears first in the alphabet as the reference level. For both variables this has been manually overridden, in order that the control condition is taken as the reference level. This allows for statistical tests to be conducted that assess the significance of the test conditions as a deviation from the control condition.
The majority of statistical tests were conducted using the treatment coding structure outlined above. However, it was also of interest to observe the effect of the original test conditions, which combined metaphorical framing and agency presentation. Additional testing was therefore conducted which modelled urgency, agency, and feasibility scores as a function of condition presentation. This modelling addressed secondary research questions, which concerned the impact of interactions between agency presentation and metaphorical framing.

Finally, prior to analysis the data was divided into subsets, in order that for each demographic variable there existed a separate dataset that excluded NA and ‘Prefer not to say’ responses. For example, 165 participants did not offer a current employment status, and as such their responses were recorded as NA for this variable. The responses of these participants should therefore not be included in analyses that rely on employment status as a predictor variable. In order to avoid this, a subset of the data was created that excluded participants with an NA employment status. The same process was conducted for all demographic variables, in addition to relevant combinations of variables. For example, a subset of the data was extracted that excluded all NA responses for age and gender.
3.2 General observations

The overwhelming majority of participants (96%) reported high urgency scores, with 1153 respondents recording urgency scores between 4 and 6, as opposed to just 48 reporting low urgency (see fig. 1). The prevalence of high urgency scores is not unexpected in the current climate, given the dramatic rise in extreme weather events in recent years and the consequently heightened profile of the climate crisis. This bias towards high urgency complicates the task of assigning significance to discrepancies between urgency scores across the test conditions, given that these differences are often very small. However, it is worth noting that in the control condition a slightly higher proportion of participants reporting high urgency - 97.06%, as compared to 95.60% for the cliff edge condition and 95.88% for the minefield condition.

![Chart: Percentage of participants reporting 'high' attitude score](image)

*Fig. 1 Percentage of participants reporting 'high' attitude score*

Participants were considerably less uniform when reporting on feasibility, with 58% of participants reporting low feasibility as opposed to 42% reporting high feasibility. This slight
bias towards low feasibility is perhaps also an understandable result given the severity of the ongoing climate crisis. Interestingly, agency scores were split relatively evenly; 51% of participants reported low agency, and 49% reported high agency.

A simple chi squared test reveals a statistically significant correlation between high urgency and low feasibility ($\chi^2 = 13.041, p<0.001$) (see fig. 2). When urgency scores are high, participants are significantly more likely to report low feasibility. Correspondingly, a participant who reports low urgency is significantly more likely to report high feasibility.

Interestingly, testing also revealed a somewhat unexpected correlation between urgency and agency, with high urgency scores correlating with high agency scores, and low urgency correlating with low agency ($\chi^2 = 38.585, p<0.001$). The predicted probability of observing a low
urgency score was just 0.003 when agency is high, as compared to 0.07 when agency is low (logit difference: +3.18, \( SE = 0.73, z = 4.38, p < 0.001 \)). In other words, it is exceptionally unlikely for a participant to report low urgency when they report high agency. Whilst this is an interesting and statistically significant result, it is difficult to assign weight to this observation given the very low numbers of participants reporting low urgency.

Furthermore, there was a statistically significant relationship between low agency scores, and low feasibility scores. The predicted probability of observing a low feasibility score when agency is high is 0.49. By contrast, the probability of observing a low feasibility score when agency is low is 0.66 (logit difference: +0.72, \( SE = 0.12, z = 6.09, p < 0.001 \)). Given that this study defines doomism as a high report of urgency combined with a low report of agency and/or feasibility, the correlation of high urgency with low feasibility, and low feasibility with low agency, would suggest that participants generally reported doomist attitudes.

### 3.3 Significance of covariates

#### 3.3.1 Urgency

Logistic regression models revealed a significant effect of gender on perceptions of urgency in relation to the climate crisis. The predicted probability of observing a high urgency score was 0.94 for men, and 0.98 for women (logit difference: +1.30, \( SE = 0.37, z = 3.45, p < 0.001 \)). Whilst this appears to be a relatively small difference in probability, it represents a statistically significant deviation between men and women, indicating women to be significantly more likely to report a high urgency score. The fact that a difference of just 0.04 is statistically significant can be attributed to the overall prevalence of high urgency scores. Similarly, age was also demonstrated to significantly affect feelings of urgency. The predicted probability of observing a low urgency score increased with age, with older people appearing significantly more likely to
report low urgency. There were no other significant effects of demographic variables on urgency scores.

Perceptions of local temperature changes were also a significant predictor of urgency scores. The probability of observing a low score was 0.19 for individuals who perceived their local temperature to have remained the same, compared to just 0.01 for respondents who observed an increase in local temperatures in the last five years. In other words, participants who perceived their local area to be getting warmer were extremely unlikely to report low urgency. Similarly, participants were significantly more likely to report a low urgency score if they believed climate change to be occurring naturally. The probability of observing a low score was 0.13 for participants holding this belief, compared to just 0.005 for participants who believed climate change to be anthropogenic in origin.

3.3.2 Agency

Statistical testing revealed agency scores to be significantly affected by age, gender, and ethnicity. Contrasting the results for urgency, younger people were significantly more likely to report low agency scores. As age increased, participants became more likely to report high agency. In relation to gender, the predicted probability of observing a low agency score was 0.55 for men and 0.46 for women, indicating that men were significantly more likely than women to report low agency (logit difference: -0.35, $SE = 0.17$, $z = -3.01$, $p<0.01$). With regards to ethnicity, Black participants were significantly more likely than White participants to report high agency (logit difference: -0.93, $SE = 0.25$, $z = -3.69$, $p<0.001$). Student status and employment status did not significantly affect agency scores.

Interestingly, participants who perceived any local temperature change, whether it be an increase or a decrease, were significantly more likely to report high agency than participants who were
unsure of local temperature changes. The probability of observing a low agency score was 0.58 for participants who were unsure if the average temperature had changed in their area. This fell to 0.48 for those who observed an increase in local temperatures, and 0.43 for those who perceived a temperature decrease. Both of these values represent a statistically significant decrease in the probability of participants reporting a low agency score, when participants who were unsure of local temperature changes are taken as a baseline. Additionally, participants who believed climate change to be human caused were significantly more likely to report high agency scores than participants who responded ‘Other’ to this question. This is a logical result, as participants who believe humans are causing the climate crisis are more likely to believe that humans have agency in addressing the crisis.

3.3.3 Feasibility

Feasibility scores were demonstrated to be significantly affected by age and student status. In concordance with the results for agency, the probability of reporting low feasibility fell as age increased, with older people being significantly less likely to report low feasibility. Students, by contrast, were significantly more likely to report low feasibility than non-students. The predicted probability of observing a low feasibility score was 0.56 for non-students, increasing to 0.65 for students (logit difference: 0.37, $SE = 0.18$, $z = 2.15$, $p<0.05$). Given that students are typically younger than non-students, it is worth considering whether the impact of student status on feasibility scores was in fact representative of an interaction between student status and age. However, testing revealed no significant interaction between these two variables. This suggests that the effect of student status on feasibility scores is significant independently of age.

Participants who observed local temperatures increasing were significantly more likely to report low feasibility. The probability of these participants reporting a low feasibility score was 0.62, as
compared to 0.42 for participants who perceived local temperatures to have remained constant. Furthermore, participants who believed in anthropogenic climate change were also significantly more likely to report low feasibility. The probability of observing low feasibility for participants in this group was 0.66, compared to 0.48 for participants who reported ‘Other’ in response to this question.

3.4 Test conditions

To assess the significance of metaphorical framing and agency presentation, logistic regression models were constructed in three stages. Firstly, for each of the three attitudes to be tested, two simple logistic regression models were built to show the attitude as a function of (1) metaphor presentation and (2) agency presentation. Whilst the control variables are known to be significant, as has been demonstrated above, it is worthwhile to construct simple models of the two key predictor variables, in order to assess the independent impact of metaphor and agency presentation on the test attitudes. Following this, the models were expanded to include all of the covariates observed. This revealed which covariates were significant in the context of the expanded model. Any covariates that were insignificant at the level $p<0.05$ were removed from the model. Final models were then constructed that showed the test attitude as a function of metaphor presentation and agency presentation, in addition to any statistically significant covariates.

3.4.1 Urgency, agency, and feasibility as a function of metaphor and agency presentation

3.4.1.1 Urgency

Firstly, urgency was modelled as a function of metaphor presentation, with all other covariates excluded from the model. Both the minefield condition and the cliff edge condition were seen to reduce feelings of urgency as compared to the control condition. However, this effect was not
sufficiently pronounced as to be statistically significant. When the model was expanded to include the recorded covariates, three variables were demonstrated to have statistically significant impact on urgency scores. These were gender, perception of local temperature changes, and beliefs about the cause of climate change. A new model was then constructed that excluded all statistically insignificant covariates. This confirmed that whilst metaphor presentation does increase the probability of a low urgency score being reported, this effect is not statistically significant.

Similar results were observed when urgency was modelled as a function of agency presentation. Interestingly, the simple logistic regression model suggested that both the agency condition and the no agency condition increased the probability of low urgency being reported as compared to the control condition. However, once again this result was not statistically significant. Expanded modelling demonstrated a similar result, with gender once again being the only significant demographic covariate, in addition to perception of local temperature change and beliefs about the cause of climate change. This result was confirmed by the final model, which was constructed to include only significant covariates. Whilst agency and non-agency conditions increased the probability of low urgency being reported as compared to the control, this effect was not statistically significant.

3.4.1.2 Agency

When agency was modelled as a function of metaphor presentation, both metaphorical conditions produced an increase in the probability of a participant reporting a low agency score. For the minefield condition, this was significant at the level p<0.1. Whilst this does not represent noteworthy statistical significance, it is nonetheless surprising to observe that the minefield condition increased the probability of a participant reporting low agency, given that this is in
direct opposition to the anticipated effect. Expanded testing revealed age, perception of local
temperature change and beliefs about the cause of climate change to be significant predictors of
agency scores. When the final model was constructed, the minefield condition was no longer
statistically significant. This suggests that the effect of the minefield condition on agency scores
in the simple model was a result of the significant covariates.

A similar result was observed when feelings of agency were modelled as a function of agency
presentation. It was logical here to anticipate that the presentation of human agency was likely to
decrease the chances of low agency being reported. However, as was observed in relation to
metaphor, both the agency and non-agency conditions increased the probability of a low agency
score being recorded as compared to the control condition. This effect was not statistically
significant; however, it is nonetheless noteworthy given that it was an unexpected result.
Expanded modelling revealed a significant effect of age and beliefs about the cause of climate
change. When insignificant variables were excluded, the model confirmed that agency
presentation did not significantly affect the probability of reporting low agency.

3.4.1.3 Feasibility

A simple logistic regression model revealed a statistically significant effect of metaphor
presentation on feasibility scores. Both the cliff edge and the minefield condition deviated
significantly from the control condition. Both were demonstrated to reduce the probability of
participants reporting low feasibility. The predicted probability of observing a low feasibility
score was 0.64 for the control condition, compared to 0.57 for the cliff edge condition (logit
difference: -0.32, \(SE = 0.164\), \(z = -1.97\), \(p<0.05\)) and 0.55 for the minefield condition (logit
difference: 0.38, \(SE = 0.163\), \(z = -2.34\), \(p<0.05\)). This indicates that although both metaphorical
conditions significantly reduced the likelihood of participants reporting low feasibility, this effect
was more pronounced in the minefield condition. Expanded testing indicated significant effects for metaphoric framing and beliefs about the cause of climate change. When the model was rebuilt to exclude insignificant covariates, the significance of the cliff edge condition was reduced to the level \( p<0.1 \). However, the minefield condition was still significant at the \( p<0.05 \) level. This indicates that even when significant covariates are accounted for, the minefield metaphor is seen to have a significantly reduce the probability of a participant reporting low feasibility.

This result raised the question of whether or not the observed distinction between the cliff edge and minefield conditions was statistically significant. Interestingly, when a model was built to test this, no statistical significance was observed. Whilst the result seen above indicates that the minefield condition produces a greater effect on feasibility scores than the cliff edge condition, it appears that the difference between the two conditions is insufficient to be statistically significant.

When feasibility scores were modelled as a function of agency presentation, agency was also seen to significantly impact the probability of participants reporting a low feasibility score. Specifically, participants who saw narrative stimuli which included a human agent were significantly more likely to report high feasibility scores as compared to the control condition. The predicted probability of observing a low feasibility score was 0.64 for the control condition, falling to 0.54 for conditions containing human agency (difference: -0.43, \( SE = 0.16, z = -2.62, p<0.001 \)). This indicates that presenting human agency is able to significantly decrease the probability of a participant reporting low feasibility. Interestingly, the no agency condition was also seen to decrease the probability of observing allow feasibility score. However, this result was not statistically significant. Expanded modelling revealed a significant effect of beliefs about
the cause of climate change on agency scores. When the model was rebuilt to exclude
insignificant covariates, the significance of agency presentation on feasibility scores was
confirmed.

3.4.2 Urgency, agency, and feasibility as a function of condition

Finally, logistic regression models were constructed to investigate the impact of the test
conditions on agency, urgency, and feasibility scores. For these models, the control condition
was taken as a baseline for comparison. None of the four test conditions were seen to
significantly affect urgency scores as compared to the control condition, with urgency remaining
consistently high across all results. Similarly, condition did not produce a significant effect on
agency scores.

However, condition was demonstrated to have a statistically significant effect on feasibility
scores. Specifically, the cliff edge + agency condition and the minefield + agency condition were
both demonstrated to significantly reduce the probability of a participant reporting low feasibility
scores as compared to the control condition. However, this effect was not observed for
conditions which did not feature human agents. Conditions 2 and 4 did not produce a statistically
significant effect on feasibility scores. This is an interesting observation, as the results above
indicated a statistically significant effect of metaphor presentation when this was isolated from
the effect of agency presentation. These results are somewhat contradictory, therefore, as it
appears that in the absence of a human agent, metaphorical presentation alone was insufficient to
produce feasibility scores that differed significantly from the control condition.

3.5 Summary of observations

The table below summarises the results discussed above. Results are reported as the predicted
probability of observing a low score of the test attitude based on a given predictor variable.
These probabilities are taken from the final models, including only statistically significant covariates. Significance is reported when the probability of observing a low score is significantly decreased as compared to the control condition. In other words, this indicates that participants in this condition were significantly more likely to report a high score than those in the control condition.

Table 4 Summary of statistical test results. Significance levels: . = p<0.1, * = p<0.05.

<table>
<thead>
<tr>
<th></th>
<th>Urgency</th>
<th>Agency</th>
<th>Feasibility</th>
</tr>
</thead>
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<tr>
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<td>0.80</td>
<td>0.55</td>
</tr>
<tr>
<td>Metaphor - Cliff</td>
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<td>0.82</td>
<td>0.47 (.)</td>
</tr>
<tr>
<td>Metaphor - Minefield</td>
<td>0.01</td>
<td>0.83</td>
<td>0.46*</td>
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<tr>
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<td>0.55</td>
</tr>
<tr>
<td>Agency</td>
<td>0.03</td>
<td>0.79</td>
<td>0.44*</td>
</tr>
<tr>
<td>No agency</td>
<td>0.03</td>
<td>0.79</td>
<td>0.48</td>
</tr>
<tr>
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<td>0.81</td>
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<tr>
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<tr>
<td>Condition 3</td>
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</tr>
<tr>
<td>Condition 4</td>
<td>0.02</td>
<td>0.91</td>
<td>0.48 (.)</td>
</tr>
</tbody>
</table>
4 Discussion

4.1 Key findings

In this study, I have attempted to demonstrate a statistically significant relationship between metaphor presentation and feelings of climate doomism. I anticipated that the metaphor CLIMATE CHANGE IS A MINEFIELD, which does not feature an inherent end point, would be less likely to promote doomist attitudes than the metaphor CLIMATE CHANGE IS A CLIFF EDGE, which implies a binary impacted/non-impacted view of the climate crisis. I further hypothesised that the presentation of human agency was likely to reduce feelings of climate doomism as compared to the omission of this agency. In order to test these hypotheses, I examined the effects of metaphor and agency presentation on feelings of urgency, agency, and feasibility in relation to the climate crisis. Climate doomism is here defined as a high report of urgency, paired with a low perception of agency and/or feasibility.

Several of the findings outlined above are directly relevant to these research questions. Firstly, statistical testing has indicated that the use of either the CLIFF EDGE or the MINEFIELD metaphor to discuss the climate crisis acts to significantly increase the probability of a participant reporting high feasibility as compared to the control condition. In other words, metaphorical framing makes it more likely that a participant will believe that the climate crisis can be successfully addressed, whereas a non-metaphorical framing is less likely to promote this view. This effect was observed to be greater for the MINEFIELD metaphor. This result supports the hypothesis that there is a statistically significant relationship between metaphor presentation and feelings of climate doomism. Specifically, a metaphorical presentation of climate change maintains high urgency scores and increases feasibility scores. This suggests that a metaphorical presentation of
the climate crisis is able to significantly reduce doomism as compared to a non-metaphorical presentation.

However, whilst both of the metaphorical conditions showed increased feasibility scores as compared to the control, there was no significant distinction observed between the minefield and cliff edge conditions. That is, the minefield conditions did not produce a significantly greater impact on feasibility scores than the cliff edge conditions. This undermines the hypothesis that metaphors that do not inhere an end point to climate change are less likely to produce doomist attitudes than those that suggest a dichotomous impacted/non-impacted view. Instead, this suggests that the two metaphors have a comparable impact on feasibility scores.

Secondly, the results further indicated a significant effect of agency presentation on feasibility scores. Conditions which presented human agency were more likely to produce high feasibility scores as compared to the control condition. By contrast, the non-agentive conditions did not produce feasibility scores that differed significantly from the control condition. This supports the hypothesis that foregrounding human agency is able to reduce feelings of doomism as compared to a non-agentive or neutral presentation.

Finally, statistical models which took the original test conditions as a predictor variable indicated that a metaphorical presentation only significantly increased feasibility scores when the metaphor is presented in conjunction with a human agent. This suggests that human agency is a necessary component if a metaphor is employed with the intention of addressing climate doomism.
4.2 General discussion

4.2.1 Interpretation of results

To begin by examining the broadest implications of these results, it is worthwhile to address the observed correlations between high urgency scores and low feasibility scores, and between low feasibility scores and low agency scores. Given that doomism in this study is defined as a high urgency score appearing in conjunction with a low agency and/or feasibility score, these results would suggest that doomism was generally prevalent in the test population. That is, participants who believed the climate crisis to be an urgent issue were likely to have low confidence in our ability to successfully address it. Similarly, participants who believed that we are unlikely to successfully address the climate crisis were also likely to report that their individual actions could make very little difference. The overall prevalence of doomism can be taken as evidence that I was justified in my decision to focus on this issue as a potential barrier to climate change mitigation efforts.

Furthermore, it is of vital importance that statistical testing has indicated that no manipulations of agency presentation or metaphor presentation produced an urgency score that differed significantly from the control conditions. Whilst addressing doomism as a barrier to action is crucial, successful climate change communication must also effectively convey the urgent need to act. Anxiety must not be alleviated at the expense of motivation to address the crisis. It is therefore essential that we identify metaphors that increase feelings of agency and feasibility, without compromising high feelings of urgency. This has been a point of concern for other studies which have examined the relationship between metaphor and reasoning in relation to climate change. For example, Flusberg et al. (2017) demonstrated that the metaphor CLIMATE CHANGE IS A RACE resulted in lower feelings of urgency as compared to the metaphor CLIMATE
CHANGE IS A WAR. The present study therefore makes an important contribution to the field, as it has been empirically demonstrated that the metaphors CLIMATE CHANGE IS A CLIFF EDGE and CLIMATE CHANGE IS A MINEFIELD are able to influence the perception of climate change, without reducing urgency scores.

It must be acknowledged that this conclusion is complicated by the overall prevalence of high urgency scores. Although metaphor and agency presentation did not significantly increase the probability of a participant reporting low urgency, this probability was already extremely low. The overall prevalence of high urgency scores can potentially be attributed to the fact that climate change sceptics were not eligible to participate in this study. Logically, sceptics would be considerably more likely to report low urgency scores, given that they do not believe climate change to be an issue. Removing these individuals from consideration could perhaps have contributed to the bias towards high urgency. However, a more prevalent factor is likely to be the increasing frequency and intensity of climate change related events. For those who believe in climate change, as these participants do, it perhaps inevitable that the growing visibility of the effects of climate change results in urgency scores increasing concordantly.

This study also demonstrated a statistically significant effect of agency presentation on feasibility scores. Presenting human agency in the narrative stimuli was seen to reduce the likelihood of a participant reporting low feasibility scores as compared to the control condition. In conjunction with the consistently high urgency scores discussed above, this result can be taken to support the hypothesis that presenting human agency is able to significantly reduce the chances of a participant feeling doomist as compared to the control condition. However, it is interesting to observe that the non-agentive condition also reduced the probability of a participant reporting low feasibility as compared to the control condition. Crucially, this result was insufficiently
pronounced to be assigned statistical significance. However, it was nonetheless unexpected to observe that both agentive and non-agentive conditions produced higher feasibility scores than the control condition. Potentially, this calls into question the effectiveness of the agency control condition as a baseline for comparison. Creating a neutral control was a more complex task for this variable; whilst the metaphor control condition can be defined as the absence of metaphor, the agency condition was controlled through equal presentations of agentive and non-agentive elements. The fact that both agentive and non-agentive conditions produced higher feasibility scores than this control may suggest that the control was not an effective neutral condition. If this study was to be replicated, it would be worthwhile to explore this possibility.

Furthermore, the results of this study demonstrated a link between metaphor presentation and feasibility scores. Firstly, statistical testing indicates that the use of either the CLIFF EDGE metaphor or the MINEFIELD metaphor is able to reduce the chances of a participant reporting low feasibility, with this result being significant for the MINEFIELD condition. In other words, any metaphorical presentation results in participants being less likely to feel doomist than a non-metaphorical presentation. This finding is not unexpected, given that previous research has consistently pointed to the role of metaphor in conceptualisation (Flusberg et al., 2017; Grady, 2016; Thibodeau et al., 2017; Thibodeau & Boroditsky, 2011). This is discussed by Thibodeau et al. (2017), who offer a scoping review of research into the role of metaphor in reasoning. They observe that metaphor facilitates the ability of interlocutors make inferences about the given target domain. This offers a plausible explanation for the effect of metaphor presentation on doomist attitudes. If metaphor allows the participants to make inferences about climate change and to reason through the issue, they are perhaps less likely to feel powerless to address the
situation. The results of the present study are therefore in concordance with previous research into the affect of metaphor on reasoning.

Whilst is encouraging that the present study is in concordance with these results, this finding does little to further our understanding of what constitutes effective climate change communication. This is particularly true as the non-metaphorical control condition employed in this study is perhaps the most contrived of the narrative stimuli. The vast majority of literature discussing climate change is likely to employ some kind of metaphorical presentation, given that describing the complex processes of global warming without using metaphor is an exceptionally difficult and unnatural task. It is therefore relatively unlikely that public-oriented climate change communication would try to discuss the climate crisis without employing some kind of metaphorical representation. The usefulness of this finding is therefore somewhat limited.

Crucially, this study furthers existing research by addressing the question of whether there is a significant distinction between metaphors that inhere an end point, and those that do not. Different statistical tests point to different conclusions here. On the one hand, expanded modelling revealed the minefield metaphor to significantly increase feasibility scores as compared to the control condition. Whilst the cliff edge metaphor was also seen to increase feasibility scores from the control, this was significant only at the level p<0.1, which is insufficient to be of note. This can be interpreted as evidence that the minefield metaphor has a greater ability to reduce climate doomism than the cliff edge metaphor. As an initial result, this would appear to support the hypothesis that end point metaphors are more likely to produce doomist attitudes than process metaphors. However, when the cliff edge and the minefield conditions were directly compared, testing indicated that there was no significant difference between the two. That is, whilst the minefield condition produced significantly higher feasibility
scores than the control, it did not produce significantly higher scores than the cliff edge condition. The contradictory nature of these results makes it difficult to draw firm conclusions about the effect of end point vs. process metaphors. Further testing would be required to establish whether this effect is robust, and if so whether this result is peculiar to these two metaphors in particular. Regardless of this, it is nonetheless useful to confirm that the whilst the cliff edge metaphor may not produce a significant increase in feasibility scores, it also does not produce a significant decrease. As such, it appears that this metaphor does not exacerbate the problem of climate doomism. This is critical, as this metaphor is commonly employed to characterise the climate crisis. It is therefore highly beneficial to confirm that this metaphor is not inadvertently promoting doomist attitudes.

However, it is interesting to observe that when feasibility is modelled as a function of condition, the metaphorical conditions only produced a significant increase in feasibility scores when a human agent was also featured. In the non-agentive conditions, there was no such increase. This is an interesting result, as it appears to suggest that metaphorical presentation is only able to affect feasibility scores when it appears alongside a human agent. This could indicate that a human agent is a necessary component to enable the metaphorical conceptualisation of the climate crisis. The key role of human agency in climate change mitigation efforts has been speculated in previous studies (e.g., Moser & Dilling, 2004; O’Neill & Nicholson-Cole, 2009). These results appear to offer an empirical grounding for this speculation. In a future study it would be worthwhile to examine the relationship between human agency and metaphorical reasoning more explicitly. It may be possible that this relationship is peculiar to the English language, and that metaphors in other language may not require a human agent to be foregrounded in order to facilitate reasoning.
Whilst the results discussed so far have demonstrated the relative malleability of feasibility scores, agency scores appeared to be much more robust, and were not significantly affected by metaphor presentation, agency presentation, or condition. This result contradicts the hypothesis that there is a relationship between the metaphorical presentation of climate change and feelings of climate doomism. If agency is isolated from feasibility as a measure of doomist attitudes, then these results would instead indicate that there is no significant effect of metaphorical presentation or agency presentation on doomism, as urgency scores remained high, but agency scores were unaffected. It appears that perceptions of individual agency are less likely to be influenced by metaphor than perceptions of feasibility. Potentially, this could be due to the conceptual differences between the notions of feasibility and agency. Feasibility represents a relatively abstract concept, whereas agency is connected to much more concrete individual actions. It could be the case that metaphorical presentation is therefore better equipped to aid participants in reasoning regarding feasibility, whereas perceptions of agency may be better addressed through specific calls to take particular actions. However, it is also arguable that this result calls into question the effectiveness of assessing levels individual agency as a measure of doomism. This is discussed in greater detail blow.

4.3 Significance of covariates

Gender was demonstrated to have a statistically significant effect on urgency and agency scores. This is consistent with previous research which has indicated gender to be a predictor of climate change risk perception (Pearson et al., 2017). However, interpreting these scores as an indicator of climate doomism is somewhat more complex. Whilst women reported significantly higher urgency scores than men, they were also more likely to report higher agency. This suggests that whilst women may feel more imminent concern regarding the climate crisis, they are also more
likely to perceive their individual actions as having a meaningful impact. This does not directly suggest increased climate doomism. It is worth noting that whilst men are significantly more likely to report low urgency than women, the vast majority nonetheless reported high urgency. These results combined are therefore indicative of men being more likely to feel doomism than women. This is a somewhat unexpected result, as previous research has indicated that women are more likely than men to report climate related anxiety (Coffey et al., 2021). It is possible to take this at face value and accept that this study has produced opposing results to those observed by Coffey et al. (2021). This is entirely possible; studying the effects of gender on doomism was not the primary goal of this research project, and therefore it is possible that other studies with a more explicit focus on ecoanxiety and gender may produce different results. However, it is worth noting that Coffey et al.’s research focussed on eco-anxiety specifically. This is closely related to, but distinct from, climate doomism, which has the additional dimension of a more explicit focus on our ability (or lack thereof) to successfully address the climate crisis. Potentially this result suggests that whilst women may be more likely to report eco-anxiety, they may also feel a greater optimism regarding our ability to resolve the crisis, resulting in lower doomism scores. The results of the current study, therefore, do not necessarily contradict Coffey et al.

Age was demonstrated to be a statistically significant predictor for urgency, agency, and feasibility scores. As age increased, the probability of reporting low urgency increased. Correspondingly, as age increased the probability of reporting low feasibility decreased. Similarly, as age increased the probability of reporting low agency decreased. In other words, older people were more likely to believe that climate change is not urgent and will be addressed successfully, whereas younger people are more likely to believe that climate change is highly urgent and is unlikely to be successfully addressed. Older people were also more likely than
younger people to feel that their individual actions had an effect in relation to the climate crisis. As was anticipated, therefore, younger people were more likely to report high urgency, paired with low feasibility and agency, indicating younger people to be more likely to present doomist attitudes in relation to the climate crisis. Previous research has indicated younger people are more likely than older people to take personal action to address the climate crisis, and they are also more likely to favour mitigation policies (Funk, 2021). The effect of age on urgency, agency and feasibility scores therefore paints a picture that is consistent with these findings.

Perception of local temperature changes and beliefs regarding the cause of climate change were both demonstrated to be statistically significant predictors of agency, urgency, and feasibility scores. These results were consistent with prior research (Lee et al., 2015), and generally followed a logical pattern. For example, it is not unexpected that individuals who believe climate change to be anthropogenic in origin are more likely to report high urgency scores than those who believe climate change to be occurring naturally. Interestingly, participants who reported a belief in anthropogenic climate change were also significantly more likely to report low feasibility scores. That is, individuals with a more accurate understanding of the causes of climate change were more likely to feel doomist and were less likely to believe that climate change can be successfully addressed. This result is noteworthy, as this directly rebukes the idea that engendering a more accurate understanding of the crisis is the most effective way to promote climate change mitigation efforts. By contrast, it appears that a more accurate understanding of the climate crisis does not necessarily correlate with a greater belief that climate change will be successfully addressed. These results would in fact suggest the opposite; a more accurate understanding of global warming is associated with pessimism regarding humans’ ability to address the crisis successfully. Potentially, this finding could be attributed to a kind of naïve
optimism, with participants who are unaware of the anthropogenic causes of climate change feeling generally more confident that the crisis will be addressed. However, although avoiding such unfounded complacency is evidently vital, the vast majority of participants (86%) understood climate change to be anthropogenic in origin. This suggests that an inaccurate understanding of the causes of climate change is not a major concern.

4.4 Methodological concerns

4.4.1 Individual agency and doomism

To return to the point raised above, it is worthwhile to discuss the fact that metaphorical framing appears to have no significant effect on agency scores. Given that urgency scores remained high across all conditions, it is possible to conclude from this result that metaphorical framing is unable to significantly affect feelings of climate doomism. However, this can alternatively be understood as calling into question the efficacy of using the report of individual agency as a measure of doomist attitudes. The follow up question that was intended to assess this specifically required participants to report the extent to which they perceived their individual actions as being able to help efforts to address the climate crisis. There are two potential methodological issues which may explain the insignificant agency scores observed. Firstly, it must be acknowledged that this question falls into the trap of placing the burden of mitigation efforts on the individual, as opposed to framing this as a collective effort. This is problematic; the scale and scope of the climate crisis and the nature of the underlying power structures that sustain it mean that it is impossible for the actions of any one individual to have a meaningful effect (Stoddard et al., 2021). Questioning perceptions of individual agency may therefore not be an effective measure.

2 Points 4.4.2 and 4.4.3 discuss concerns raised by the Applied Statistics and Data Science Group during consultation
of doomism. Respondents may indeed report low agency in response to this question, but they may nonetheless feel optimistic regarding our collective capacity to address the crisis.

Secondly and relatedly, it is worth noting that whilst the agency follow-up question specifically assessed individual agency, the human agency presented in the narrative stimuli was collective (i.e., “We must act fast”, as opposed to “You must act fast”). Therefore, it may be the case that this follow-up question did not provide an accurate assessment of the kind of agency conveyed in the narrative stimuli. Arguably, the kind of collective agency evoked in the stimuli is captured more effectively by the follow-up question intended to assess feasibility scores. Given that the feasibility question assessed the likelihood of the US, which metonymically evokes the collective efforts of individuals in the US, avoiding catastrophic climate change, this question may have inadvertently provided a more accurate assessment of feelings of collective agency. Given that there was a significant relationship between metaphorical framing and feasibility scores, I would argue that the results above can be taken as evidence of a relationship between metaphorical presentation and feelings of climate doomism, despite the lack of a significant affect on agency scores.

4.4.2 Attention check

The attention check question was intended to exclude participants who had not read the narrative stimuli carefully. This step was taken in order to prevent the results from being impacted by participants who were not responding to the test condition and were instead reporting exclusively on their pre-existing views of the climate crisis. However, the high failure rate means that it is pertinent to consider the possibility of a non-response bias effect, in which some participants were more likely to fail the attention check question than others. The question itself was framed in an attempt to avoid this kind of bias, given that it focussed on factual information reported in
the stimuli as opposed to an opinion or claim. However, the possibility that a non-response bias effect was seen is difficult to rule out entirely. This is particularly true as participants who failed the attention check question were not asked to respond to any further questions. This represents a methodological shortcoming of the study. Had the responses of these participants been recorded, it would have been possible to assess the likelihood of a non-response bias on the basis of their answers. Without these responses, it is not possible to examine whether participants holding particular beliefs were more or less likely to fail the attention check question.

4.4.3 Categorical coding structure
I chose to employ a categorical structure in the coding of metaphor and agency presentation. This allowed for the isolation of the effects of agency and metaphor, an approach which enabled the research questions to be more directly addressed. For example, a categorical coding structure allows the effects of the minefield metaphor to be isolated from the effects of agency presentation. However, this approach is complicated by the fact that the control conditions for minefield and agency were combined into one test condition. As a result, not all possible variable pairs were realised in the test conditions. For example, when observing the effects of the minefield metaphor, the models can account for the minefield + agency and the minefield + no agency conditions, but not for minefield + agency control, as this was not one of the five test conditions. This is a methodological drawback, as the failure to test for this condition may have affected the fit of the model.

4.2.4 Limits of Prolific demographic data
Previous research has indicated that political leanings are likely to be a significant predictor of climate change awareness and risk perception (Lee et al., 2015). This is an issue that is likely to have been exacerbated by recent election cycles in the US, in which climate change policy has
been heavily dichotomised along party lines. However, in this study I did not record political leanings, as this is not part of the basic demographic information provided by Prolific. This represents a potential flaw in this study, as the effect of political leanings on agency, urgency and feasibility scores cannot be observed. In a future study, it would be worthwhile to investigate political leanings using a follow-up question, in order that this covariate can be accounted for in the logistic regression models produced.

Similarly, previous research has indicated that Indigenous peoples are among those who are most acutely experiencing anxiety in relation to the climate crisis (Coffey et al., 2021). However, Prolific does not invite participants to self-identify as Indigenous upon recruitment. This study is therefore unable to specifically assess whether Indigenous peoples are more likely to experience climate doomism. This issue is complicated by the fact that the present study intends to address climate doomism as a potential barrier to climate change mitigation efforts. With this in mind, it is necessary to avoid placing the responsibility for addressing climate change on Indigenous peoples, given that they are amongst those who contributed the least to causing the climate crisis. However, the need to avoid placing an additional burden on this community must be balanced against the need to acknowledge the negative impact of climate doomism on Indigenous peoples specifically. In order to rectify this in future studies, it may be worthwhile to invite Indigenous participants to self-identify if they wish to do.
5 Conclusion

This thesis aimed to demonstrate a statistically significant relationship between metaphor presentation and climate doomism. I hypothesised that metaphors which presented climate change as having an inherent end point would be more likely to promote doomism than those that presented it as an ongoing process. I further hypothesised that metaphors would be more likely to produce doomist attitudes if human agents were omitted. My analysis of urgency, agency and feasibility scores has indicated that there is a statistically significant relationship between metaphor and climate doomism. Specifically, it has been shown that employing metaphor when discussing the climate crisis produces a significant increase in feasibility scores, in conjunction with high urgency scores. In other words, participants who encountered a metaphorical presentation of the climate crisis were significantly less likely to report doomist attitudes than those in the control condition. This result is in concordance with the many studies that have preceded this one which have demonstrated a relationship between metaphor and reasoning. However, the results of this study have also suggested that there may be a significant difference between metaphors that inhere and end point and those that suggest climate change to be a continuous process. Similarly, the foregrounding of a human agent was demonstrated to significantly increase the probability of a participant reporting high feasibility as compared to the control condition. This suggests that climate doomism may be reduced when humans are presented as having agency in addressing the climate crisis.

I took an empirical approach to metaphor in this study, focussing on producing quantifiable results that were nonetheless grounded in real-world metaphor usage. This allowed me to assess statistical significance, whilst ensuring that my results remained applicable and relevant to climate change communicators. Whilst many previous studies of this kind have successfully
demonstrated a link between metaphor and attitudes towards climate change, this study has made an important contribution to the field by demonstrating a significant relationship between metaphor and feelings of climate doomism. Given that the idea of doomism has only recently emerged, our understanding of the concept is still in its infancy. It is therefore an important initial step to establish that metaphorical presentation has the capacity to reduce doomism. However, whilst using metaphor is seen here to reduce doomism as compared to non-metaphorical presentations, statistical analysis provided contradictory results regarding the relative benefits of employing the metaphor CLIMATE CHANGE IS A MINEFIELD as opposed to CLIMATE CHANGE IS A CLIFF EDGE. Further research is needed to provide clarification on the effect of metaphors that inhere an end point as opposed to those that suggest climate change to be an ongoing process.

Whilst the differential impact of the cliff edge and minefield metaphors requires further investigation, it is clear that neither of these metaphors acts to exacerbate the problem of climate doomism. Whilst the minefield metaphor appears to produce a greater impact in reducing doomism, the cliff edge metaphor is also effective, although to a lesser degree. Based on the findings of this study, climate change communicators should consider the use of the metaphors CLIMATE CHANGE IS A MINEFIELD and CLIMATE CHANGE IS A CLIFF EDGE when they are discussing the climate crisis. Either metaphor has the potential to reduce feelings of climate doomism whilst maintaining a high sense of urgency, which is essential for promoting climate change mitigation efforts. The fact that this study demonstrates there to be no significant difference between these two metaphors means that there are no additional restrictions placed on climate change communicators. This is an important point, as these individuals are already working on a complex and daunting task. As both of these metaphors have been demonstrated to be in use, the
results of this study can be taken as evidence that the language currently used by climate change communicators is not inadvertently promoting climate doomism. This is an important contribution to the field, as there is very little existing work that examines the causes of doomist attitudes.

No singular study is ever able to offer a clear-cut solution to the vast and complex problems that must be navigated when discussing the climate crisis. However, the results of this study offer empirical support to the language currently used by front-line communicators, and it provides evidence that it is possible to use language to prompt a reconceptualization of the climate crisis. These results therefore offer cause for optimism, demonstrating that climate doomism is not an inevitable response to our present reality, and showing that it is possible to use language to construct a more hopeful vision of the future.
Works Cited


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Appendices

Appendix A – Informed Consent

Study Title - Diffusing the Time Bomb: Differential impacts of metaphor on climate doomism

Introduction and Procedures

In this study, you will read a short paragraph and then answer a series of questions about your attitudes towards climate change. You will also be asked a series of basic demographic questions. The goal of this is to find more effective ways to communicate about climate change. Completion of this survey should take no longer than 5 minutes. Please complete the survey in a single sitting.

By participating in this survey, you are agreeing to carefully read and execute all instructions to the best of your ability, and to provide accurate demographic information. Participation in research is completely voluntary. If you wish to exit the survey at any point, you may exit the window. Your responses will not be recorded. By selecting “I agree” and completing the survey, you are consenting to participate in this research.

Benefits and Risks

This study has no direct benefits to you. The results of the study may improve our understanding of the way in which we form views on climate change. Risks and/or discomforts may include the risk of breach of confidentiality. However, all data collection is anonymized at the point of analysis, at which point no data can be traced back to you as an individual.

Data Confidentiality

Your study data will be handled as confidentially as possible. We will not collect any personal identifying information as part of the study. We will assign you a unique identifying ID number
which will not be associated with, or traceable to, your Prolific Worker ID. To further minimize risks to confidentiality, we will store all data on encrypted and password protected UBC servers. Only study personnel will have access to the data. Data will be stored on UBC servers for 5 years after the study is completed for use in future research. When we publish our research, we may need to also publish the data we have collected. However, if this study data will be published, it will be fully anonymized and cannot be connected to any individual.

Compensation

To thank you for completing this study, you will be paid $15.00 USD/hour via Prolific.

An attention check question will be used in this survey. Payment is not dependent on you answering this question correctly.

We are grateful to have received funding for this study from the Peter Wall Institute for Advanced studies, UBC, through the Catalyst Collaboration fund.

Questions and Contact Information

This study is being conducted by Professor Elise Stickles at the University of British Columbia. If you have any questions about this study, Prof. Stickles can be contacted at elise.stickles@ubc.ca. This study is being conducted in part to fulfill the requirements of a Master’s degree. The degree is being undertaken by Caitlin Johnstone, a co-investigator on the study, who can be contacted at cjohns99@student.ubc.ca.

If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the UBC Research Participant Complaint
Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598.
Appendix B – Narrative Stimuli

Climate change narrative stimuli (adapted from Flusberg et al., 2017)

Condition 1 – End point + agency

Climate change is a cliff edge – and we are driving the earth towards it
When will Americans realise that we are driving the earth towards a climate change cliff edge? We must solve this problem before we push the earth over the cliff. In the United States we are working to avoid disaster by reducing our carbon footprint in the next few decades. The US has approved dozens of projects as part of an effort to reach net zero greenhouse gas emissions by 2050. We will leverage scientific expertise and take individual action to improve the energy efficiency of cars and buildings, reduce personal energy use, and increase the use of renewable energies such as wind and solar. Experts say that if we do not lower emissions soon, we will experience an increase in extreme weather conditions, more public health problems like a rise in cancer and other diseases, as well as severe economic challenges. We must act fast to avoid falling over this cliff!

Condition 2 – End point + no agency

Climate change is a cliff edge
When will Americans realise that the earth is hurtling towards a climate change cliff edge? This problem must be addressed before the earth falls over the cliff. To avoid disaster, the United States’ carbon footprint must be reduced in the next few decades. There are dozens of projects intended to enable the US to reach net zero greenhouse gas emissions by 2050. The projects will leverage scientific expertise and individual engagement to improve the energy efficiency of cars and buildings, reduce personal energy use, and increase the use of
renewable energies such as wind and solar. Experts say that if emissions are not lowered soon, there will be an increase in extreme weather conditions, more public health problems like a rise in cancer and other diseases, as well as severe economic challenges. The earth must not fall over this cliff!

Condition 3 – Continuous process + agency

Climate change is a minefield – and we are walking into it

When will Americans realise that we are walking ever-further into the climate change minefield? We must turn around and walk back to safety. In the United States we are working to avoid disaster by reducing our carbon footprint in the next few decades. The US has approved dozens of projects as part of an effort to reach net zero greenhouse gas emissions by 2050. We will leverage scientific expertise and take individual action to improve the energy efficiency of cars and buildings, reduce personal energy use, and increase the use of renewable energies such as wind and solar. Experts say that if we do not lower emissions soon, we will experience an increase in extreme weather conditions, more public health problems like a rise in cancer and other diseases, as well as severe economic challenges. We must turn back and walk out of this minefield!

Condition 4 – Continuous process + no agency

Climate change is a minefield

When will Americans realise that the earth is moving ever-further into the climate change minefield? The earth must be turned around and brought back to safety. To do this, the United States’ carbon footprint must be reduced in the next few decades. There are dozens of projects
intended to enable the US to reach net zero greenhouse gas emissions by 2050. The projects will leverage scientific expertise and individual engagement to improve the energy efficiency of cars and buildings, reduce personal energy use, and increase the use of renewable energies such as wind and solar. Experts say that if emissions are not lowered soon, there will be an increase in extreme weather conditions, more public health problems like a rise in cancer and other diseases, as well as severe economic challenges. The earth must be brought back out of this minefield!

Condition 5 – Control

The issue of climate change

When will Americans start to address the problem of climate change? The entire country needs to direct their efforts to address this important issue. The United States is joining the effort to reduce its carbon footprint in the next few decades. The US has approved dozens of projects as part of an effort to reach net zero greenhouse gas emissions by 2050. The projects will leverage scientific expertise and individual engagement to improve the energy efficiency of cars and buildings, reduce personal energy use, and increase the use of renewable energies such as wind and solar. Experts say that if we do not lower emissions soon, we will experience an increase in extreme weather conditions, more public health problems like a rise in cancer and other diseases, as well as severe economic challenges. The earth must not reach this state!
Appendix C – Survey questions

Attention check question
What is the US’s 2050 climate change target mentioned in the paragraph?

a. Net zero greenhouse gas emissions
b. Cut greenhouse gas emissions in half

Survey questions
How urgent is it for the US to implement energy reduction programs right away?

Not Urgent 1 2 3 4 5 6 Extremely urgent

How likely is it that the US will be able to avoid the worst-case scenario of catastrophic climate change?

Highly unlikely to avoid 1 2 3 4 5 6 Highly likely to avoid

To what extent do you believe that your individual actions can help efforts to address the problem of climate change?

My individual actions cannot help at all 1 2 3 4 5 6 My individual actions can help greatly

Follow up questions
In the last 5 years, have the average temperatures in your local area changed?

In the last 5 years it has become cooler
In the last 5 years it has become warmer
In the last 5 years the average temperature has stayed roughly the same
I’m not sure

What do you believe causes climate change?

Climate change is caused by human activity
Climate change is occurring naturally
Other
# Load relevant packages
library(tidyverse)

## -- Attaching packages ----------------------------------------
tidyverse 1.3.2 —
## ✔ ggplot2 3.4.1
## ✔ tibble 3.1.8
## ✔ tidyr 1.3.0
## ✔ stringr 1.5.0
## ✔ readr 2.1.4
## ✔ forcats 1.0.0
## -- Conflicts -----------------------------------------------
tidyverse_conflicts() —
## ✗ dplyr::filter() masks stats::filter()
## ✗ dplyr::lag()    masks stats::lag()

library(broom)
library(ggplot2)
require(foreign)

## Loading required package: foreign
require(nnet)

## Loading required package: nnet
require(reshape2)

## Loading required package: reshape2
## -- Attaching package: 'reshape2'
## The following object is masked from 'package:tidyr':
## smiths

# Load in data
doomism_data <- read.csv("Full statistical analysis data.csv")

# Convert relevant variables to factor variables
doomism_data$Condition <- as.factor(doomism_data$Condition)
doomism_data$Urgency_binary <- as.factor(doomism_data$Urgency_binary)
doomism_data$Feasibility_binary <- as.factor(doomism_data$Feasibility_binary)
doomism_data$Agency_binary <- as.factor(doomism_data$Agency_binary)
doomism_data$Temp_change <- as.factor(doomism_data$Temp_change)
doomism_data$Climate_cause <- as.factor(doomism_data$Climate_cause)
doomism_data$Condition <- as.factor(doomism_data$Condition)
doomism_data$Sex <- as.factor(doomism_data$Sex)
doomism_data$Ethnicity <- as.factor(doomism_data$Ethnicity)
doomism_data$Student_status <- as.factor(doomism_data$Student_status)
doomism_data$Employment_status <- as.factor(doomism_data$Employment_status)

#Assign Control variable as reference level
doomism_data$Metaphor <- factor(as.character(doomism_data$Metaphor),
levels=c("Control", "Cliff", "Minefield"))
doomism_data$Agency_presentation <- factor(as.character(doomism_data$Agency_presentation),
levels=c("Control", "Agency", "No agency"))
doomism_data$Condition <- factor(as.character(doomism_data$Condition),
levels=c("Condition 5: control",
"Condition 1: Cliff edge agency",
"Condition 2: Cliff edge no agency",
"Condition 3: minefield agency",
"Condition 4: minefield no agency"))

#Confirm application of treatment coding
contrasts(doomism_data$Metaphor)

##           Cliff Minefield
## Control     0         0
## Cliff       1         0
## Minefield   0         1

contrasts(doomism_data$Agency_presentation)

##           Agency No agency
## Control    0         0
## Agency     1         0
## No agency  0         1

contrasts(doomism_data$Urgency_binary)

##          Low
## High     0
## Low      1

contrasts(doomism_data$Agency_binary)
## Low
## High  0
## Low  1

contrasts(doomism_data$Feasibility_binary)

## Low
## High  0
## Low  1

contrasts(doomism_data$Condition)

##                                   Condition 1: Cliff edge agency
## Condition 5: control                                          0
## Condition 1: Cliff edge agency                                 1
## Condition 2: Cliff edge no agency                              0
## Condition 3: minefield agency                                  0
## Condition 4: minefield no agency                               0
##                                   Condition 2: Cliff edge no agency
## Condition 5: control                                              0
## Condition 1: Cliff edge agency                                    0
## Condition 2: Cliff edge no agency                             1
## Condition 3: minefield agency                                     0
## Condition 4: minefield no agency                                 0
##                                   Condition 3: minefield agency
## Condition 5: control                                           0
## Condition 1: Cliff edge agency                                0
## Condition 2: Cliff edge no agency                             0
## Condition 3: minefield agency                                 1
## Condition 4: minefield no agency                              0
##                                   Condition 4: minefield no agency
## Condition 5: control                                             0
## Condition 1: Cliff edge agency                                  0
## Condition 2: Cliff edge no agency                                0
## Condition 3: minefield agency                                    0
## Condition 4: minefield no agency                             1

#Extracting subsets of data
eth_NA <- is.na(doomism_data$Ethnicity)
eth_no_NA <- subset(doomism_data, subset = !eth_NA)
eth_no_NA$Metaphor <- factor(as.character(eth_no_NA$Metaphor),
                          levels=c("Control", "Cliff", "Minefield"))
eth_no_NA$Agency_presentation <-
factor(as.character(eth_no_NA$Agency_presentation),
                          levels=c("Control", "Agency", "No agency"))
eth_no_NA$Ethnicity <- factor(as.character(eth_no_NA$Ethnicity),
                          levels=c("White", "Asian", "Black", "Mixed", "Other"))
sex_no_NA <- subset(doomism_data, Sex == "Male" | Sex == "Female")
sex_no_NA$Metaphor <- factor(as.character(sex_no_NA$Metaphor),
levels=c("Control", "Cliff", "Minefield"))
sex_no_NA$Agency_presentation <-
factor(as.character(sex_no_NA$Agency_presentation),
levels=c("Control", "Agency", "No agency"))
sex_no_NA$Sex <- factor(as.character(sex_no_NA$Sex), levels=c("Male", "Female"))

emp_NA <- is.na(doomism_data$Employment_status)
emp_no_NA <- subset(doomism_data, subset = !emp_NA)
emp_no_NA$Metaphor <- factor(as.character(emp_no_NA$Metaphor),
levels=c("Control", "Cliff", "Minefield"))
emp_no_NA$Agency_presentation <-
factor(as.character(emp_no_NA$Agency_presentation),
levels=c("Control", "Agency", "No agency"))

student_NA <- is.na(doomism_data$Student_status)
student_no_NA <- subset(doomism_data, subset = !student_NA)
student_no_NA$Metaphor <- factor(as.character(student_no_NA$Metaphor),
levels=c("Control", "Cliff", "Minefield"))
student_no_NA$Agency_presentation <-
factor(as.character(student_no_NA$Agency_presentation),
levels=c("Control", "Agency", "No agency"))

age_NA <- is.na(doomism_data$Age)
age_no_NA <- subset(doomism_data, subset = !age_NA)
age_no_NA$Metaphor <- factor(as.character(age_no_NA$Metaphor),
levels=c("Control", "Cliff", "Minefield"))
age_no_NA$Agency_presentation <-
factor(as.character(age_no_NA$Agency_presentation),
levels=c("Control", "Agency", "No agency"))

full_NA <- is.na(doomism_data$Age)|
is.na(doomism_data$Sex)|
is.na(doomism_data$Student)|
is.na(doomism_data$Ethnicity)
full_no_NA <- subset(doomism_data, subset = !full_NA)
full_no_NA$Metaphor <- factor(as.character(full_no_NA$Metaphor),
levels=c("Control", "Cliff", "Minefield"))
full_no_NA$Agency_presentation <-
factor(as.character(full_no_NA$Agency_presentation),
levels=c("Control", "Agency", "No agency"))

age_sex_NA <- is.na(doomism_data$Age)|is.na(doomism_data$Sex)
age_sex_no_NA <- subset(doomism_data, subset = !age_sex_NA)
age_sex_no_NA$Metaphor <- factor(as.character(age_sex_no_NA$Metaphor), levels=c("Control", "Cliff", "Minefield"))
age_sex_no_NA$Agency_presentation <- factor(as.character(age_sex_no_NA$Agency_presentation), levels=c("Control", "Agency", "No agency"))

age_stu_no_NA <- is.na(doomism_data$Age) | is.na(doomism_data$Student_status)
age_stu_no_NA <- subset(doomism_data, subset = !age_stu_no_NA)
age_stu_no_NA$Student_status <- factor(as.character(age_stu_no_NA$Student_status), levels=c("No", "Yes"))

condition_1 <- subset(doomism_data, Condition == "Condition 1: Cliff edge agency" | Condition == "Condition 5: control")
condition_1$Metaphor <- factor(as.character(condition_1$Metaphor), levels=c("Control", "Cliff", "Minefield"))
condition_1$Agency_presentation <- factor(as.character(condition_1$Agency_presentation), levels=c("Control", "Agency", "No agency"))
condition_1$Condition <- factor(as.character(condition_1$Condition), levels=c("Condition 5: control", "Condition 1: Cliff edge agency"))

condition_2 <- subset(doomism_data, Condition == "Condition 2: Cliff edge no agency" | Condition == "Condition 5: control")
condition_2$Metaphor <- factor(as.character(condition_2$Metaphor), levels=c("Control", "Cliff", "Minefield"))
condition_2$Agency_presentation <- factor(as.character(condition_2$Agency_presentation), levels=c("Control", "Agency", "No agency"))
condition_2$Condition <- factor(as.character(condition_2$Condition), levels=c("Condition 5: control", "Condition 2: Cliff edge no agency"))

condition_3 <- subset(doomism_data, Condition == "Condition 3: minefield agency" | Condition == "Condition 5: control")
condition_3$Metaphor <- factor(as.character(condition_3$Metaphor), levels=c("Control", "Cliff", "Minefield"))
condition_3$Agency_presentation <- factor(as.character(condition_3$Agency_presentation), levels=c("Control", "Agency", "No agency"))
condition_3$Condition <- factor(as.character(condition_3$Condition), levels=c("Condition 5: control", "Condition 3: minefield agency"))

condition_4 <- subset(doomism_data, Condition == "Condition 4: minefield no agency" | Condition == "Condition 5: control")
condition_4$Metaphor <- factor(as.character(condition_4$Metaphor),
levels=c("Control", "Cliff", "Minefield"))
condition_4$Agency_presentation <-
factor(as.character(condition_4$Agency_presentation),
levels=c("Control", "Agency", "No agency"))
condition_4$Condition <- factor(as.character(condition_4$Condition),
levels=c("Condition 5: control", "Condition 4: minefield no agency"))
cliff_minefield <- subset(doomism_data, Metaphor == "Minefield" |
Metaphor == "Cliff")
criff_minefield$Metaphor <-
factor(as.character(cliff_minefield$Metaphor), levels=c("Cliff",
"Minefield"))
criff_minefield$Agency_presentation <-
factor(as.character(cliff_minefield$Agency_presentation),
levels=c("Agency", "No agency"))
criff_minefield$Feasibility_binary <-
as.factor(cliff_minefield$Feasibility_binary)
age_noage <- subset (doomism_data, Agency_presentation == "Agency" |
Agency_presentation == "No agency")
age_noage$Agency_presentation <-
as.character(age_noage$Agency_presentation)
age_noage$Feasibility_binary <-
as.factor(age_noage$Feasibility_binary)

#Assessing the significance of control variables
#Gender effects
feasibility_sex <- glm(Feasibility_binary ~ Sex, data = sex_no_NA,
family = "binomial")
summary(feasibility_sex)

## Call:
## glm(formula = Feasibility_binary ~ Sex, family = "binomial",
data = sex_no_NA)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.332  -1.288   1.030   1.071   1.071
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  0.35631    0.07921   4.498 6.85e-06 ***
## SexFemale -0.10023    0.11785  -0.851 0.395
## ---


tidy(feasibility_sex)

# A tibble: 2 × 5
#  term        estimate std.error statistic    p.value
#  <chr>          <dbl>     <dbl>     <dbl>      <dbl>
#1 (Intercept)    0.356    0.0792     4.50  0.00000685
#2 SexFemale    -0.100    0.118    -0.851 0.395

i_feasibility_sex <- tidy(feasibility_sex)$estimate[1]
s_feasibility_sex <- tidy(feasibility_sex)$estimate[2]

plogis(i_feasibility_sex + s_feasibility_sex *0)

## [1] 0.5881459

plogis(i_feasibility_sex + s_feasibility_sex *1)

## [1] 0.5636704

urgency_sex <- glm(Urgency_binary ~ Sex, data = sex_no_NA, family = "binomial")
summary(urgency_sex)

# Call:
# glm(formula = Urgency_binary ~ Sex, family = "binomial", data = sex_no_NA)
# Deviance Residuals:
#     Min       1Q   Median       3Q      Max
# -2.8577   -0.3496   -0.3496   -0.1844    2.8577
# Coefficients:
# Estimate Std. Error  z value Pr(>|z|)
# (Intercept) -2.7645     0.1651  -16.745  < 2e-16 ***
# SexFemale   -1.3016     0.3745   -3.476  0.000509 ***
# ---
# Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Dispersion parameter for binomial family taken to be 1)

## Null deviance: 402.41 on 1191 degrees of freedom  
## Residual deviance: 387.39 on 1190 degrees of freedom  
## AIC: 391.39

## Number of Fisher Scoring iterations: 6

tidy(urgency_sex)

## # A tibble: 2 × 5
## #  
## #  term estimate std.error statistic  p.value
## #  (Intercept)  -2.76 0.165 -16.7  6.15e-63
## #  SexFemale    -1.30 0.374  -3.48 5.09e- 4

d_urgency_sex <- tidy(urgency_sex)$estimate[1]
s_urgency_sex <- tidy(urgency_sex)$estimate[2]
plogis(i_urgency_sex + s_urgency_sex * 0)

## [1] 0.05927052

plogis(i_urgency_sex + s_urgency_sex* 1)

## [1] 0.01685393

agency_sex <- glm(Agency_binary ~ Sex, data = sex_no_NA, family = "binomial")
summary(agency_sex)

## Call:
glm(formula = Agency_binary ~ Sex, family = "binomial", data = sex_no_NA)

## Deviance Residuals:
##          Min       1Q   Median       3Q      Max
## -1.26400 -1.11414  1.09300  1.09300  1.24200

## Coefficients:
##                Estimate Std. Error z value Pr(>|z|)
## (Intercept) 0.20128    0.07836   2.569  0.01021 *
## SexFemale -0.35138    0.11693  -3.005  0.00266 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## (Dispersion parameter for binomial family taken to be 1)
# Null deviance: 1651.9 on 1191 degrees of freedom
# Residual deviance: 1642.8 on 1190 degrees of freedom
# AIC: 1646.8

## Number of Fisher Scoring iterations: 3

```r
tidy(agency_sex)
```

## A tibble: 2 × 5

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<th>std.error</th>
<th>statistic</th>
<th>p.value</th>
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<td>0.0784</td>
<td>2.57</td>
<td>0.0102</td>
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<tr>
<td>SexFemale</td>
<td>-0.351</td>
<td>0.117</td>
<td>-3.00</td>
<td>0.00266</td>
</tr>
</tbody>
</table>

```r
i_agency_sex <- tidy(agency_sex)$estimate[1]
s_agency_sex <- tidy(agency_sex)$estimate[2]
plogis(i_agency_sex + s_agency_sex* 0)
```

## [1] 0.550152

```r
plogis(i_agency_sex + s_agency_sex* 1)
```

## [1] 0.4625468

# Employment effects

```r
urgency_emp <- glm(Urgency_binary ~ Employment_status, data = emp_no_NA, family = "binomial")
summary(urgency_emp)
```

## Call:
```r
glm(formula = Urgency_binary ~ Employment_status, family = "binomial", data = emp_no_NA)
```

## Deviance Residuals:
```r
  Min       1Q   Median       3Q      Max
-0.3441 -0.3072 -0.3072 -0.2561 2.7511
```

## Coefficients:
```r
Estimated
(Intercept) -16.57
Employment_statusFull-Time 13.54
Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) 12.96
```
## Employment_statusOther
12.80
## Employment_statusPart-Time
13.77
## Employment_statusUnemployed (and job seeking)
13.16
##
### Std. Error
### (Intercept)
799.85
## Employment_statusFull-Time
799.85
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
799.85
## Employment_statusOther
799.85
## Employment_statusPart-Time
799.85
## Employment_statusUnemployed (and job seeking)
799.85
##
### z value
### (Intercept)
-0.021
## Employment_statusFull-Time
0.017
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.016
## Employment_statusOther
0.016
## Employment_statusPart-Time
0.017
## Employment_statusUnemployed (and job seeking)
0.016
##
### Pr(>|z|)
### (Intercept)
0.983
## Employment_statusFull-Time
0.986
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.987
## Employment_statusOther
0.987
## Employment_statusPart-Time
0.986
## Employment_status
Unemployed (and job seeking) 0.987

## (Dispersion parameter for binomial family taken to be 1)

## Null deviance: 372.92  on 1065  degrees of freedom
## Residual deviance: 369.16  on 1060  degrees of freedom
## AIC: 381.16
## Number of Fisher Scoring iterations: 15

agency_emp <- glm(Agency_binary ~ Employment_status, data = emp_no_NA, family = "binomial")
summary(agency_emp)

## Call:
## glm(formula = Agency_binary ~ Employment_status, family = "binomial",
##     data = emp_no_NA)
## ## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.296 -1.168   1.063   1.186   1.274
## ## Coefficients:
## ## (Intercept) Employment_statusFull-Time Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) Employment_statusOther Employment_statusPart-Time Employment_statusUnemployed (and job seeking)
## Estimate
## -0.22314 0.20187 0.07719 0.49758 0.43078 0.41730
## Std. Error
## 0.67082 0.67608 0.67082 0.67608 0.67082 0.67608
## Employment_status
- Not in paid work (e.g. homemaker, retired or disabled): 0.69038
- Other: 0.73663
- Part-Time: 0.68792
- Unemployed (and job seeking): 0.69466

## z value
- (Intercept): -0.333
- Full-Time: 0.299
- Not in paid work (e.g. homemaker, retired or disabled): 0.112
- Other: 0.675
- Part-Time: 0.626
- Unemployed (and job seeking): 0.601

## Pr(>|z|)
- (Intercept): 0.739
- Full-Time: 0.765
- Not in paid work (e.g. homemaker, retired or disabled): 0.911
- Other: 0.499
- Part-Time: 0.531
- Unemployed (and job seeking): 0.548

## Dispersion parameter for binomial family taken to be 1

## Null deviance: 1477.5 on 1065 degrees of freedom
## Residual deviance: 1473.0 on 1060 degrees of freedom
## AIC: 1485

## Number of Fisher Scoring iterations: 3
feasibilty_emp <- glm(Feasibility_binary ~ Employment_status, data = emp_no_NA, family = "binomial")
summary(feasibilty_emp)

## Call:
## glm(formula = Feasibility_binary ~ Employment_status, family = "binomial",
##     data = emp_no_NA)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -1.5043 -1.2788   0.8826   1.0793   1.0940
##
## Coefficients:
## Estimate Std. Error   z value
## (Intercept) 0.22314  0.67082
## Employment_statusFull-Time 0.01198  0.67616
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) -0.02381  0.69047
## Employment_statusOther 0.33647  0.74041
## Employment_statusPart-Time -0.01550  0.68792
## Employment_statusUnemployed (and job seeking) 0.51879  0.69779
##
## Std. Error
## (Intercept) 0.67082
## Employment_statusFull-Time 0.67616
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) 0.69047
## Employment_statusOther 0.74041
## Employment_statusPart-Time 0.68792
## Employment_statusUnemployed (and job seeking) 0.69779
##
## z value
## (Intercept)
## Employment_status

- Full-Time 0.333
- Not in paid work (e.g. homemaker', 'retired or disabled) -0.034
- Other 0.454
- Part-Time -0.023
- Unemployed (and job seeking) 0.743

## Employment_status

Pr(>|z|)

- (Intercept) 0.739
- Full-Time 0.985
- Not in paid work (e.g. homemaker', 'retired or disabled) 0.972
- Other 0.650
- Part-Time 0.982
- Unemployed (and job seeking) 0.457

## Dispersion parameter for binomial family taken to be 1

Null deviance: 1454.9 on 1065 degrees of freedom
Residual deviance: 1447.3 on 1060 degrees of freedom
AIC: 1459.3

Number of Fisher Scoring iterations: 4

## Ethnicity effects

```r
urgency_eth <- glm(Urgency_binary ~ Ethnicity, data = eth_no_NA, family = "binomial")
summary(urgency_eth)
```

## Call:

```
glm(formula = Urgency_binary ~ Ethnicity, family = "binomial",
data = eth_no_NA)
```

## Deviance Residuals:

```
Min 1Q Median 3Q Max
```
```r
## -0.2983 -0.2983 -0.2983 -0.2747 2.9604
##
## Coefficients:
##                Estimate Std. Error z value Pr(>|z|)
## (Intercept)     -3.0899    0.1617  -19.112   <2e-16 ***
## EthnicityAsian -0.1935    0.6099   -0.317     0.751
## EthnicityBlack -1.2795    1.0192  -1.255     0.209
## EthnicityMixed -0.2423    0.6094  -0.398     0.691
## EthnicityOther -0.1682    1.0318  -0.163     0.871
##
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 402.74  on 1195  degrees of freedom
## Residual deviance: 400.20  on 1191  degrees of freedom
## AIC: 410.2
##
## Number of Fisher Scoring iterations: 7
```

```r
agency_eth <- glm(Agency_binary ~ Ethnicity, data = eth_no_NA, family = "binomial")
summary(agency_eth)
```

```r
## Call:
## glm(formula = Agency_binary ~ Ethnicity, family = "binomial",
##     data = eth_no_NA)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -1.328   -1.214    1.034    1.142    1.552
##
## Coefficients:
##                Estimate Std. Error z value Pr(>|z|)
## (Intercept)     0.08493    0.06603   1.286 0.198407
## EthnicityAsian -0.10902    0.22926  -0.476 0.634399
## EthnicityBlack -0.93222    0.25275  -3.688 0.000226 ***
## EthnicityMixed  0.26338    0.22748   1.158 0.246933
## EthnicityOther -0.01082    0.39078  -0.028 0.977915
##
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 1657.6  on 1195  degrees of freedom
```
## Residual deviance: 1640.5 on 1191 degrees of freedom
## AIC: 1650.5
##
## Number of Fisher Scoring iterations: 4

tidy(agency_eth)

## A tibble: 5 x 5
##
## # A tibble: 5 × 5
## term           estimate std.error statistic  p.value
## <chr>             <dbl>     <dbl>     <dbl>    <dbl>
## 1 (Intercept)      0.0849    0.0660    1.29   0.198
## 2 EthnicityAsian  -0.109     0.229    -0.476  0.634
## 3 EthnicityBlack   -0.932     0.253    -3.69   0.000226
## 4 EthnicityMixed   0.263     0.227     1.16   0.247
## 5 EthnicityOther   -0.0108    0.391    -0.0277 0.978

i_agency_eth <- tidy(agency_eth)$estimate[1]
s_agency_eth_B <- tidy(agency_sex)$estimate[2]
plogis(i_agency_eth + s_agency_eth_B* 0)

## [1] 0.5212187

plogis(i_agency_eth + s_agency_eth_B* 1)

## [1] 0.4337781

feas_eth <- glm(Feasibility_binary ~ Ethnicity, data = eth_no_NA, family = "binomial")
summary(feas_eth)

## Call:
## glm(formula = Feasibility_binary ~ Ethnicity, family = "binomial",
## data = eth_no_NA)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.4266 -1.2840  0.9577  1.0744  1.0842
##
## Coefficients:
##                Estimate Std. Error z value Pr(>|z|)
## (Intercept)     0.24717    0.06648   3.718 0.000201 ***
## EthnicityAsian  0.32192    0.23795   1.353 0.176087
## EthnicityBlack  -0.932     0.253    -3.69  0.000226
## EthnicityMixed   0.263     0.227     1.16   0.247
## EthnicityOther  -0.0108    0.391    -0.0277 0.978
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Dispersion parameter for binomial family taken to be 1)

## Null deviance: 1630.8 on 1195 degrees of freedom
## Residual deviance: 1627.0 on 1191 degrees of freedom
## AIC: 1637

## Number of Fisher Scoring iterations: 4

```
# Student effects
urgency_stu <- glm(Urgency_binary ~ Student_status, data = student_no_NA, family = "binomial")
summary(urgency_stu)
```

```
## Call:
## glm(formula = Urgency_binary ~ Student_status, family = "binomial", 
##     data = student_no_NA)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.3009  -0.3009  -0.3009  -0.3009  2.8201
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) -3.0720     0.1598  -19.230   <2e-16 ***
## Student_statusYes -0.8856     0.6043  -1.466    0.143
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 368.33 on 1085 degrees of freedom
## Residual deviance: 365.58 on 1084 degrees of freedom
## AIC: 369.58

## Number of Fisher Scoring iterations: 6

agency_stu <- glm(Agency_binary ~ Student_status, data = student_no_NA, family = "binomial")
summary(agency_stu)
```

```
## Call:
## glm(formula = Agency_binary ~ Student_status, family = "binomial", 
##     data = student_no_NA)
##
```
```
## Deviance Residuals:
##    Min  1Q Median  3Q  Max
## -1.242 -1.176  1.114  1.179  1.179
##
## Coefficients:
##                Estimate Std. Error z value Pr(>|z|)
## (Intercept)    -0.00432    0.06572  -0.066   0.948
## Student_statusYes  0.15460    0.17164   0.901    0.368
##
## (Dispersion parameter for binomial family taken to be 1)
##
##    Null deviance: 1505.4  on 1085  degrees of freedom
## Residual deviance: 1504.6  on 1084  degrees of freedom
## AIC: 1508.6
##
## Number of Fisher Scoring iterations: 3

feas_stu <- glm(Feasibility_binary ~ Student_status, data = student_no_NA, family = "binomial")
summary(feas_stu)
```

```
## Call:
## glm(formula = Feasibility_binary ~ Student_status, family = "binomial",
##     data = student_no_NA)
##
## Deviance Residuals:
##    Min       1Q   Median       3Q      Max
## -1.4614  -1.2899   0.9178   1.0689   1.0689
##
## Coefficients:
##                Estimate Std. Error z value Pr(>|z|)
## (Intercept)    0.26064    0.06628   3.932 8.41e-05 ***
## Student_statusYes  0.38598    0.17916   2.154   0.0312 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##    Null deviance: 1478.8  on 1085  degrees of freedom
## Residual deviance: 1474.0  on 1084  degrees of freedom
## AIC: 1478
##
## Number of Fisher Scoring iterations: 4
```
tidy(feas_stu)

## # A tibble: 2 × 5
## #  term estimate std.error statistic  p.value
## 1 (Intercept) 0.261 0.0663     3.93 0.0000841
## 2 Student_statusYes 0.386 0.179     2.15 0.0312

i_feas_stu <- tidy(feas_stu)$estimate[1]
s_feas_stu <- tidy(feas_stu)$estimate[2]
plogis(i_feas_stu + s_feas_stu * 0)

## [1] 0.5647948

plogis(i_feas_stu + s_feas_stu * 1)

## [1] 0.65625

# Age effects

urgency_age <- glm(Urgency_binary ~ Age, data = age_no_NA, family = "binomial")
summary(urgency_age)

## Call:
## glm(formula = Urgency_binary ~ Age, family = "binomial", data = age_no_NA)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.4657 -0.3001 -0.2655 -0.2454  2.7184
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) -4.10230   0.45952  -8.927  <2e-16 ***
## Age          0.02277   0.01033   2.204   0.0275 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 395.8  on 1188 degrees of freedom
## Residual deviance: 391.2  on 1187 degrees of freedom
## AIC: 395.2
##
## Number of Fisher Scoring iterations: 6
```r
#Student * Age interaction
age_stu <- glm(Feasibility_binary ~ Student_status * Age, data = age_stu_no_NA, family = "binomial")
tidy(age_stu) %>% select(term, estimate)

## # A tibble: 4 × 2
## #  term                  estimate
##   <chr>                    <dbl>
## 1  (Intercept)            0.804
## 2 Student_statusYes      0.422
## 3 Age                   -0.0130
## 4 Student_statusYes:Age -0.00828

summary(age_stu)

## Call:
## glm(formula = Feasibility_binary ~ Student_status * Age, family = "binomial",
##     data = age_stu_no_NA)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.540   -1.294   0.957   1.039   1.309
##
## Coefficients:
##                      Estimate Std. Error z value Pr(>|z|)
## (Intercept)            0.804188   0.218861   3.674 0.000238 ***
## Student_statusYes      0.422009   0.638288   0.661 0.508511
## Age                   -0.013049   0.005133 -2.542 0.011008 *
## Student_statusYes:Age -0.008277   0.021681 -0.382 0.702628
##
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 1468.4  on 1079  degrees of freedom
## Residual deviance: 1456.5  on 1076  degrees of freedom
## AIC: 1464.5
##
## Number of Fisher Scoring iterations: 4

agency_age <- glm(Agency_binary ~ Age, data = age_no_NA, family = "binomial")
summary(agency_age)
```
Call:
glm(formula = Agency_binary ~ Age, family = "binomial", data = age_no_NA)

Deviance Residuals:
Min 1Q Median 3Q Max
-1.486 -1.183 0.910 1.090 1.738

Coefficients:
Estimate Std. Error z value Pr(>|z|)
(Intercept) 1.288864 0.187454 6.876 6.17e-12 ***
Age -0.032696 0.004705 -6.950 3.66e-12 ***
---
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 1647.7 on 1188 degrees of freedom
Residual deviance: 1596.2 on 1187 degrees of freedom
AIC: 1600.2

Number of Fisher Scoring iterations: 4

feas_age <- glm(Feasibility_binary ~ Age, data = age_no_NA, family = "binomial")
summary(feas_age)

Call:
glm(formula = Feasibility_binary ~ Age, family = "binomial", data = age_no_NA)

Deviance Residuals:
Min 1Q Median 3Q Max
-1.4296 -1.2952 0.9764 1.0362 1.3217

Coefficients:
Estimate Std. Error z value Pr(>|z|)
(Intercept) 0.837332 0.181705 4.608 4.06e-06 ***
Age -0.013769 0.004476 -3.076 0.0021 **
---
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)
## Null deviance: 1620.0 on 1188 degrees of freedom
## Residual deviance: 1610.5 on 1187 degrees of freedom
## AIC: 1614.5

## Number of Fisher Scoring iterations: 4

# Local temperature change effects
urgency_temp <- glm(Urgency_binary ~ Temp_change, data = doomism_data, family = "binomial")
summary(urgency_temp)

## Call:
glm(formula = Urgency_binary ~ Temp_change, family = "binomial",
data = doomism_data)

## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.6536 -0.2884 -0.1257 -0.1257  3.1130

## Coefficients:
## Estimate
## (Intercept) -3.1594
## Temp_changeIn the last 5 years it has become cooler 0.1975
## Temp_changeIn the last 5 years it has become warmer -1.6782
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 1.7243

## Std. Error
## (Intercept) 0.3403
## Temp_changeIn the last 5 years it has become cooler 0.6829
## Temp_changeIn the last 5 years it has become warmer 0.5327
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.3964

## z value
## (Intercept) -9.283
## Temp_changeIn the last 5 years it has become cooler
0.289

## Temp_changeIn the last 5 years it has become warmer -3.150
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 4.350
##
## Pr(>|z|)
## (Intercept) < 2e-16
## Temp_changeIn the last 5 years it has become cooler 0.77240
## Temp_changeIn the last 5 years it has become warmer 0.00163
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 1.36e-05
##
## (Intercept) ***
## Temp_changeIn the last 5 years it has become cooler **
## Temp_changeIn the last 5 years it has become warmer
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same ***
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 403.15 on 1200 degrees of freedom
## Residual deviance: 322.01 on 1197 degrees of freedom
## AIC: 330.01
##
## Number of Fisher Scoring iterations: 7

tidy(urgency_temp)

## # A tibble: 4 × 5
## term                          estim¹ std.e² stati³ p.value
## <chr>                        <dbl>   <dbl> <chr>     <dbl>
## 1 (Intercept)                -3.16    0.340 - 9.28 1.65e-20
## 2 Temp_changeIn the last 5 years it has become warmer 0.198 0.683 0.289 7.72e-1
## 3 Temp_changeIn the last 5 years it has become warmer -1.68 0.533 -
```r
## 4 Temp_change
In the last 5 years the average temperature has become cooler
 ## 4.35 1.36e-5
## # with abbreviated variable names `estimate`, `std.error`, `statistic`

i_urgency_temp <- tidy(urgency_temp)$estimate[1]
s_urgency_temp_warmer <- tidy(urgency_temp)$estimate[3]
s_urgency_temp_same <- tidy(urgency_temp)$estimate[4]
plogis(i_urgency_temp + s_urgency_temp_warmer * 0)

## [1] 0.04072398
plogis(i_urgency_temp + s_urgency_temp_warmer * 1)

## [1] 0.007863696
plogis(i_urgency_temp + s_urgency_temp_same * 1)

## [1] 0.1923077

agency_temp <- glm(Agency_binary ~ Temp_change, data = doomism_data, family = "binomial")
summary(agency_temp)

## Call:
## glm(formula = Agency_binary ~ Temp_change, family = "binomial",
## data = doomism_data)
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.335  -1.139   1.028   1.217   1.306
## Coefficients:
## Estimate     Std. Error
## (Intercept) 0.33802
## Temp_changeIn the last 5 years it has become cooler -0.63528
## Temp_changeIn the last 5 years it has become warmer -0.42983
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.02488
```
0.13646
## Temp_changeIn the last 5 years it has become cooler
0.29267
## Temp_changeIn the last 5 years it has become warmer
0.15452
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.21241
##
z value
## (Intercept)
2.477
## Temp_changeIn the last 5 years it has become cooler
-2.171
## Temp_changeIn the last 5 years it has become warmer
-2.782
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.117
##
Pr(>|z|)
## (Intercept)
0.01325
## Temp_changeIn the last 5 years it has become cooler
0.02996
## Temp_changeIn the last 5 years it has become warmer
0.00541
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.90675
##
## (Intercept)
*
## Temp_changeIn the last 5 years it has become cooler
*
## Temp_changeIn the last 5 years it has become warmer
**
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomomial family taken to be 1)
##
## Null deviance: 1664.6  on 1200  degrees of freedom
## Residual deviance: 1650.7  on 1197  degrees of freedom
## AIC: 1658.7
##
## Number of Fisher Scoring iterations: 4
```r
tidy(agency_temp)

## # A tibble: 4 × 5
## #  term                                           estim...¹ std.e...²        stati...³ p.value
## <chr>                                            <dbl>   <dbl>   <dbl>   <dbl>
## 1 (Intercept)                                     0.338    0.136    2.48    0.0132
## 2 Temp_changeIn the last 5 years it has become ... -0.635    0.293    2.17    0.0300
## 3 Temp_changeIn the last 5 years it has become ... -0.430    0.155    2.78    0.00541
## 4 Temp_changeIn the last 5 years the average te...  0.0249   0.212    0.117   0.907
## # ... with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_agency_temp <- tidy(agency_temp)$estimate[1]
s_agency_temp_cooler <- tidy(agency_temp)$estimate[2]
s_agency_temp_warmer <- tidy(agency_temp)$estimate[3]
plogis(i_agency_temp + s_agency_temp_cooler * 0)

## [1] 0.5837104

plogis(i_agency_temp + s_agency_temp_cooler * 1)

## [1] 0.4262295

plogis(i_agency_temp + s_agency_temp_warmer * 1)

## [1] 0.4770642

feasibility_temp <- glm(Feasibility_binary ~ Temp_change, data = doomism_data, family = "binomial")
summary(feasibility_temp)

## Call:
## glm(formula = Feasibility_binary ~ Temp_change, family = "binomial",
##     data = doomism_data)
## Deviance Residuals:
##    Min         1Q     Median         3Q        Max
## -1.3909 -1.2479  0.9779  0.9779  1.3116
## Coefficients:
```
| Estimate | Std. Error | z value | Pr(>|z|) |
|----------|------------|----------|----------|
| (Intercept) | 0.13493 | 1.142 | 0.2533 |
| Temp_changeIn the last 5 years it has become cooler | 0.29021 | 0.035 | 0.9721 |
| Temp_changeIn the last 5 years it has become warmer | 0.15417 | 2.173 | 0.0298 |
| Temp_changeIn the last 5 years the average temperature has stayed roughly the same | 0.21088 | -2.202 | 0.0277 |

* Indicates significance at the 0.05 level.
roughly the same *

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 1637.6 on 1200 degrees of freedom
Residual deviance: 1615.2 on 1197 degrees of freedom
AIC: 1623.2

Number of Fisher Scoring iterations: 4

tidy(feasibility_temp)

A tibble: 4 × 5

<table>
<thead>
<tr>
<th>term</th>
<th>estimate</th>
<th>std.error</th>
<th>statistic</th>
<th>p.value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>0.154</td>
<td>0.135</td>
<td>1.14</td>
<td>0.253</td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become...</td>
<td>0.0102</td>
<td>0.290</td>
<td>0.0350</td>
<td>0.972</td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become...</td>
<td>0.335</td>
<td>0.154</td>
<td>2.17</td>
<td>0.0298</td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years the average te...</td>
<td>-0.464</td>
<td>0.211</td>
<td>-2.20</td>
<td>0.0277</td>
</tr>
</tbody>
</table>

... with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_feas_temp <- tidy(feasibility_temp)$estimate[1]
s_feas_temp_warmer <- tidy(feasibility_temp)$estimate[3]
s_feas_temp_same <- tidy(feasibility_temp)$estimate[4]
plogis(i_feas_temp + s_feas_temp_warmer * 0)
[1] 0.5384615

plogis(i_feas_temp + s_feas_temp_warmer * 1)
[1] 0.6199214

plogis(i_feas_temp + s_feas_temp_same * 1)
[1] 0.4230769

Beliefs on cause of climate change effects
Assign 'other' as reference level
doomism_data$Climate_cause <-
factor(as.character(doomism_data$Climate_cause), levels=c("Other", "Climate change is caused by human activity", "Climate change is occurring naturally"))

urgency_cause <- glm(Urgency_binary ~ Climate_cause, data = doomism_data, family = "binomial")
summary(urgency_cause)

## Call:
## glm(formula = Urgency_binary ~ Climate_cause, family = "binomial", data = doomism_data)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.8446 -0.1705 -0.1705 -0.1705  2.9113
##
## Coefficients:
##                                Estimate Std. Error     z value
## (Intercept)                     -2.0932     0.3533 -5.925 ***
## Climate_causeClimate change is caused by human activity -2.1302     0.4387 -4.856 ***
## Climate_causeClimate change is occurring naturally     1.2459     0.4293  2.902 **
##
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 403.15  on 1200  degrees of freedom
## Residual deviance: 311.40  on 1198  degrees of freedom
## AIC: 317.4
##
## Number of Fisher Scoring iterations: 7

tidy(urgency_cause)
## A tibble: 3 × 5
##  term                                           estim¹ std.e² statistic p.value
##  <chr>                                            <dbl>   <dbl>      <dbl>    <dbl>
## 1 (Intercept)                                   -2.09   0.353     -5.93 3.12e-9
## 2 Climate_causeClimate change is caused by huma... -2.13   0.439     -4.86 1.20e-6
## 3 Climate_causeClimate change is occurring natu...  1.25   0.429      2.90 3.71e-3

i_urgency_cause <- tidy(urgency_cause)$estimate[1]
s_urgency_cause_human <- tidy(urgency_cause)$estimate[2]
s_urgency_cause_natural <- tidy(urgency_cause)$estimate[3]
plogis (i_urgency_cause + s_urgency_cause_human * 0)

## [1] 0.1097561

plogis(i_urgency_temp + s_urgency_cause_human * 1)

## [1] 0.005018723

plogis(i_urgency_temp + s_urgency_cause_natural * 1)

## [1] 0.1285966

agency_cause <- glm(Agency_binary ~ Climate_cause, data = doomism_data, family = "binomial")
summary(agency_cause)

## Call:
## glm(formula = Agency_binary ~ Climate_cause, family = "binomial",
##     data = doomism_data)
##
## Deviance Residuals:
##    Min       1Q   Median       3Q      Max
## -1.5789  -1.1522   0.8234   1.2029   1.2029
##
## Coefficients:
##                Estimate Std. Error   (Intercept) 0.4463
## Climate_causeClimate change is caused by human activity -0.5060
0.2347
### Climate_cause
Climate change is occurring naturally 0.4613
0.3351
### z value
Pr(>|z|)
### (Intercept) 1.971
0.0487 *
### Climate_cause
Climate change is caused by human activity -2.155
0.0311 *
### Climate_cause
Climate change is occurring naturally 1.377
0.1686
### ---
### Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '. ' 0.1 ' ' 1
### (Dispersion parameter for binomial family taken to be 1)
###
### Null deviance: 1664.6 on 1200 degrees of freedom
### Residual deviance: 1645.1 on 1198 degrees of freedom
### AIC: 1651.1
###
### Number of Fisher Scoring iterations: 4
tidy(agency_cause)
### # A tibble: 3 × 5
### term estim...¹ std.e...² stati...³ p.value
### <chr> <dbl> <dbl>
### 1 (Intercept) 0.446 0.226
1.97 0.0487
### 2 Climate_cause
Climate change is caused by human... -0.506 0.235
-2.16 0.0311
### 3 Climate_cause
Climate change is occurring naturally 0.461 0.335
1.38 0.169
### # ... with abbreviated variable names ¹estimate, ²std.error, ³statistic
i_agency_cause <- tidy(agency_cause)$estimate[1]
s_agency_cause_human <- tidy(agency_temp)$estimate[2]
plogis(i_agency_cause + s_agency_cause_human * 0)
### [1] 0.6097561
plogis(i_agency_cause + s_agency_cause_human * 1)
### [1] 0.4528931
```r
text <- "feasibility_cause <- glm(Feasibility_binary ~ Climate_cause, data = doomism_data, family = "binomial")
summary(feasibility_cause)
##
## Call:
## glm(formula = Feasibility_binary ~ Climate_cause, family = "binomial", 
## data = doomism_data)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.351 -1.351   1.013   1.013   1.401
##
## Coefficients:
##                         Estimate Std. Error         z value Pr(>|z|)
## (Intercept)              -0.09764    0.22113       -0.442    0.6588
## Climate_causeClimate change is caused by human activity 0.49749    0.23001       2.163    0.0305 *
## Climate_causeClimate change is occurring naturally -0.41319    0.31973      -1.292    0.1963
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 1637.6  on 1200  degrees of freedom
## Residual deviance: 1619.0  on 1198  degrees of freedom
## AIC: 1625
##
## Number of Fisher Scoring iterations: 4

tidy(feasibility_cause)
##
## # A tibble: 3 × 5
##   term                                           estim...¹ std.e...²
##   <chr>                                           <dbl>     <dbl>
## 1 (Intercept)                                   -0.0976    0.221
## 2 Climate_causeClimate change is caused by human activity 0.4975    0.230
## 3 Climate_causeClimate change is occurring naturally -0.4132    0.319
##
## # A tibble: 3 × 5
##   term                                           estim...¹ std.e...²
##   <chr>                                           <dbl>     <dbl>
## 1 (Intercept)                                   -0.0976    0.221
## 2 Climate_causeClimate change is caused by human activity 0.4975    0.230
## 3 Climate_causeClimate change is occurring naturally -0.4132    0.319
##
```
```
##   <chr>                                            <dbl>   <dbl>
<dbl>   <dbl>
## 1 (Intercept)                           -0.0976  0.221   4.42   0.659
## 2 Climate_causeClimate change is caused by human...  0.497    0.230 2.16   0.0305
## 3 Climate_causeClimate change is occurring naturally... -0.413    0.320 1.29   0.196
## # … with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_feas_cause <- tidy(feasibility_cause)$estimate[1]
s_feas_cause_human <- tidy(feasibility_cause)$estimate[2]
plogis(i_feas_cause + s_feas_cause_human * 0)

## [1] 0.4756098

plogis(i_feas_temp + s_feas_cause_human * 1)

## [1] 0.6573806

# General doomism
# Is urgency correlated with feasibility?
plot_urg_feas <- ggplot(doomism_data) +
  aes(x = Urgency_binary, fill = Feasibility_binary) +
  geom_bar(position = "fill")
plot_urg_feas +
  ggtitle("Relationship between urgency and feasibility") +
  xlab("Urgency Score") +
  ylab("Count") +
  labs(fill = "Feasibility score")
```
#Is urgency correlated with agency?

```r
ggplot(doomism_data) + aes(x = Urgency_binary, fill = Agency_binary) + geom_bar(position = "fill")
```
#Logistic regression model of relationship between urgency and feasibility scores

```r
urgency_feasibility <- glm(Feasibility_binary ~ Urgency_binary, data = doomism_data, family = "binomial")
summary(urgency_feasibility)
```

## Call:
```r
glm(formula = Feasibility_binary ~ Urgency_binary, family = "binomial",
data = doomism_data)
```

## Deviance Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-1.329</td>
<td>-1.329</td>
<td>1.033</td>
<td>1.033</td>
<td>1.525</td>
</tr>
</tbody>
</table>

## Coefficients:

|                      | Estimate | Std. Error | z value | Pr(>|z|) |
|----------------------|----------|------------|---------|----------|
| (Intercept)          | 0.3487   | 0.0598     | 5.831   | 5.51e-09 *** |
| Urgency_binaryLow    | -1.1371  | 0.3171     | -3.586  | 0.000336 *** |

---

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## (Dispersion parameter for binomial family taken to be 1)

## Null deviance: 1637.6 on 1200 degrees of freedom

## Residual deviance: 1623.5 on 1199 degrees of freedom

## AIC: 1627.5

## Number of Fisher Scoring iterations: 4

#Logistic regression model of relationship between agency and feasibility scores

```r
feas_agency_interatcion <- glm(Feasibility_binary ~ Agency_binary, data = doomism_data, family = "binomial")
summary(feas_agency_interatcion)
```

## Call:
```r
glm(formula = Feasibility_binary ~ Agency_binary, family = "binomial",
data = doomism_data)
```

## Deviance Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-1.4713</td>
<td>-1.1545</td>
<td>0.9096</td>
<td>0.9096</td>
<td>1.2005</td>
</tr>
</tbody>
</table>
## Coefficients:

| Term           | Estimate | Std. Error | z value | Pr(>|z|) |
|----------------|----------|------------|---------|----------|
| (Intercept)    | -0.05425 | 0.08237    | -0.659  | 0.51     |
| Agency_binaryLow | 0.72295  | 0.11870    | 6.090   | 1.13e-09 *** |

---

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 1637.6  on 1200  degrees of freedom
Residual deviance: 1599.8  on 1199  degrees of freedom
AIC: 1603.8

Number of Fisher Scoring iterations: 4

```r
tidy(feas_agency_interacion)
```

# A tibble: 2 × 5

<table>
<thead>
<tr>
<th>term</th>
<th>estimate</th>
<th>std.error</th>
<th>statistic</th>
<th>p.value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>-0.0543</td>
<td>0.0824</td>
<td>-0.659</td>
<td>0.51</td>
</tr>
<tr>
<td>Agency_binaryLow</td>
<td>0.723</td>
<td>0.119</td>
<td>6.090</td>
<td>0.00000000113</td>
</tr>
</tbody>
</table>

```r
i_feas_agency_int <- tidy(feas_agency_interacion)$estimate[1]
s_feas_agency_int <- tidy(feas_agency_interacion)$estimate[2]
plogis(i_feas_agency_int + s_feas_agency_int * 0)
```

[1] 0.4864407

```r
plogis(i_feas_agency_int + s_feas_agency_int * 1)
```

[1] 0.6612111

---

Logistic regression model of relationship between urgency and agency scores

```r
urg_age_interaction <- glm(Urgency_binary ~ Agency_binary, data = doomism_data, family = "binomial")
summary(urg_age_interaction)
```

# Call:

```r
glm(formula = Urgency_binary ~ Agency_binary, family = "binomial", data = doomism_data)
```

# Deviance Residuals:

<table>
<thead>
<tr>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.3957</td>
<td>-0.3957</td>
<td>-0.0824</td>
<td>-0.0824</td>
<td>3.3725</td>
</tr>
</tbody>
</table>
## Coefficients:

|                | Estimate | Std. Error | z value | Pr(>|z|) |
|----------------|----------|------------|---------|----------|
| (Intercept)    | -5.6836  | 0.7083     | -8.024  | 1.02e-15 *** |
| Agency_binaryLow | 3.1754   | 0.7247     | 4.382   | 1.18e-05 *** |

---

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 403.15  on 1200  degrees of freedom
Residual deviance: 353.14  on 1199  degrees of freedom
AIC: 357.14

Number of Fisher Scoring iterations: 8

tidy(urg_age_interaction)

# A tibble: 2 × 5

<table>
<thead>
<tr>
<th>term</th>
<th>estimate</th>
<th>std.error</th>
<th>statistic</th>
<th>p.value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>-5.68</td>
<td>0.708</td>
<td>-8.02</td>
<td>1.02e-15 ***</td>
</tr>
<tr>
<td>Agency_binaryLow</td>
<td>3.18</td>
<td>0.726</td>
<td>4.38</td>
<td>1.18e-05 ***</td>
</tr>
</tbody>
</table>

i_urg_age_int <- tidy(urg_age_interaction)$estimate[1]
s_urg_age_int <- tidy(urg_age_interaction)$estimate[2]
plogis(i_urg_age_int + s_urg_age_int * 0)

[1] 0.003389831

plogis(i_urg_age_int + s_urg_age_int * 1)

[1] 0.07528642

# Simple chi square tests
chi_table <- table(doomism_data$Urgency_binary, doomism_data$Feasibility_binary)
chi_table_2 <- table(doomism_data$Urgency_binary, doomism_data$Agency_binary)
chi_table_3 <- table(doomism_data$Agency_binary, doomism_data$Feasibility_binary)
chisq.test(chi_table)

# Pearson's Chi-squared test with Yates' continuity correction

# data:  chi_table
# X-squared = 13.041, df = 1, p-value = 0.0003048
chisq.test(chi_table_2)

## Pearson's Chi-squared test with Yates' continuity correction
## data: chi_table_2
## X-squared = 38.585, df = 1, p-value = 5.241e-10

# Logistic regression models- simple
# Urgency as a function of metaphor presentation (simple)
metaphor_urgency <- glm(Urgency_binary ~ Metaphor, data = doomism_data, family = "binomial")
summary(metaphor_urgency)

## Call:
## glm(formula = Urgency_binary ~ Metaphor, family = "binomial",
##     data = doomism_data)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.3001   -0.3001  -0.2899   -0.2899   2.6557
##
## Coefficients:
##                   Estimate Std. Error z value Pr(>|z|)
## (Intercept)     -3.4965     0.3836  -9.114   <2e-16 ***
## MetaphorCliff    0.4185     0.4438   0.943    0.346
## MetaphorMinefield 0.3481     0.4465   0.780    0.436
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 403.15  on 1200  degrees of freedom
## Residual deviance: 402.17  on 1198  degrees of freedom
## AIC: 408.17

## Number of Fisher Scoring iterations: 6
levels(doomism_data$Urgency_binary)

## [1] "High" "Low"
tidy(metaphor_urgency)

## # A tibble: 3 × 5
##   term            estimate std.error statistic  p.value
##   <chr>            <dbl>     <dbl>    <dbl>    <dbl>
## 1 (Intercept)  -3.4965      0.3836    -9.114   <2e-16
## 2 MetaphorCliff  0.4185      0.4438     0.943    0.346
## 3 MetaphorMinefield 0.3481    0.4465     0.780    0.436
```r
## 1 (Intercept) -3.50 0.384 -9.11 7.95e-20
## 2 MetaphorCliff  0.419 0.444  0.943 3.46e-1
## 3 MetaphorMinefield  0.348 0.446  0.780 4.36e-1

#Agency as a function of metaphor presentation (simple)
metaphor_agency <- glm(Agency_binary ~ Metaphor, data = doomism_data, family = "binomial")
summary(metaphor_agency)

## Call:
## glm(formula = Agency_binary ~ Metaphor, family = "binomial",
##     data = doomism_data)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.230 -1.193  1.125  1.161  1.242
##
## Coefficients:
##                    Estimate Std. Error z value Pr(>|z|)
## (Intercept) -0.1515     0.1300 -1.166   0.2438
## MetaphorCliff 0.1893     0.1590  1.190   0.2340
## MetaphorMinefield  0.2752     0.1586  1.735   0.0828 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 1664.6  on 1200  degrees of freedom
## Residual deviance: 1661.6  on 1198  degrees of freedom
## AIC: 1667.6
##
## Number of Fisher Scoring iterations: 3

tidy(metaphor_agency)

## # A tibble: 3 × 5
## term estimate std.error statistic p.value
## <chr>     <dbl>     <dbl>     <dbl>   <dbl>
## 1 (Intercept)  0.152     0.130    -1.17    0.244
## 2 MetaphorCliff 0.189     0.159    1.19    0.234
## 3 MetaphorMinefield  0.275     0.159    1.73  0.0828

i_met_ag <- tidy(metaphor_agency)$estimate[1]
s_cliff_met_ag <- tidy(metaphor_agency)$estimate[2]
s_mine_met_ag <- tidy(metaphor_agency)$estimate[3]
plogis(i_met_ag + s_cliff_met_ag * 0)
```
plogis(i_met_ag + s_cliff_met_ag * 1)

plogis(i_met_ag + s_mine_met_ag * 1)

# Feasibility as a function of metaphor presentation (simple)
metaphor_feasibility <- glm(Feasibility_binary ~ Metaphor, data = doomism_data, family = "binomial")
summary(metaphor_feasibility)

tidy(metaphor_feasibility)
i_feas_metaphor <- tidy(metaphor_feasibility)$estimate[1]

s_cliff_feas_metaphor <- tidy(metaphor_feasibility)$estimate[2]
s_mine_feas_metaphor <- tidy(metaphor_feasibility)$estimate[3]

plogis(i_feas_metaphor + s_cliff_feas_metaphor * 0)
## [1] 0.6428571

plogis(i_feas_metaphor + s_cliff_feas_metaphor * 1)
## [1] 0.5660377

plogis(i_feas_metaphor + s_mine_feas_metaphor * 1)
## [1] 0.5514403

#Urgency as a function of agency presentation (simple)
agency_urgency <- glm(Urgency_binary ~ Agency_presentation, data =
doomism_data, family = "binomial")
summary(agency_urgency)
## Call:
glm(formula = Urgency_binary ~ Agency_presentation, family =
"binomial",
data = doomism_data)
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.3070  -0.3070  -0.2827  -0.2827   2.6557
## Coefficients:
##                              Estimate Std. Error z value Pr(>|z|)
## (Intercept)                   -3.4965     0.3836  -9.114  <2e-16 ***
## Agency_presentationAgency     0.4651     0.4414   1.054    0.292
## Agency_presentationNo agency  0.2968     0.4494   0.660    0.509
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Dispersion parameter for binomial family taken to be 1)
##     Null deviance: 403.15  on 1200  degrees of freedom
## Residual deviance: 401.94  on 1198  degrees of freedom
## AIC: 407.94
## Number of Fisher Scoring iterations: 6
# Agency as a function of agency presentation (simple)

```r
agency_agency <- glm(Agency_binary ~ Agency_presentation, data = doomism_data, family = "binomial")
summary(agency_agency)
```

##
## Call:
## glm(formula = Agency_binary ~ Agency_presentation, family = "binomial",
##     data = doomism_data)
##
## Deviance Residuals:
##     Min      1Q  Median      3Q     Max
##-1.217  -1.207   1.139   1.148   1.242
##
## Coefficients:
##                           Estimate Std. Error  z value Pr(>|z|)
## (Intercept)               -0.1515     0.1300   -1.166   0.244
## Agency_presentationAgency  0.2437     0.1590    1.532   0.125
## Agency_presentationNo agency 0.2217     0.1586    1.398   0.162
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 1664.6 on 1200 degrees of freedom
## Residual deviance: 1662.0 on 1198 degrees of freedom
## AIC: 1668
##
## Number of Fisher Scoring iterations: 3

# Feasibility as a function of agency presentation (simple)

```r
agency_feasibility <- glm(Feasibility_binary ~ Agency_presentation, data = doomism_data, family = "binomial")
summary(agency_feasibility)
```

##
## Call:
## glm(formula = Feasibility_binary ~ Agency_presentation, family = "binomial",
##     data = doomism_data)
##
## Deviance Residuals:
##     Min      1Q  Median      3Q     Max
##-1.435  -1.246   0.940   1.048   1.111
##
## Coefficients:
##                           Estimate Std. Error  z value Pr(>|z|)
## (Intercept)               -0.1515     0.1300   -1.166   0.244
## Agency_presentationAgency  0.2437     0.1590    1.532   0.125
## Agency_presentationNo agency 0.2217     0.1586    1.398   0.162
##```
## (Intercept)                    0.5878     0.1353   4.345 1.39e-05 ***
## Agency_presentationAgency -0.4285     0.1635  -2.621  0.00877 **
## Agency_presentationNo agency -0.2760     0.1636  -1.688  0.09150 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 1637.6  on 1200  degrees of freedom
## Residual deviance: 1630.6  on 1198  degrees of freedom
## AIC: 1636.6
##
## Number of Fisher Scoring iterations: 4

tidy(agency_feasibility)

## # A tibble: 3 × 5
##   term                         estimate std.error statistic  p.value
##   <chr>                           <dbl>     <dbl>     <dbl>    <dbl>
## 1 (Intercept)                    0.588     0.135      4.34    0.0000139
## 2 Agency_presentationAgency -0.428     0.163      -2.62   0.00877
## 3 Agency_presentationNo agency -0.276     0.164      -1.69   0.0915

i_feas_agency <- tidy(agency_feasibility)$estimate[1]
s_agency_feas_agency <- tidy(agency_feasibility)$estimate[2]
s_noagency_feas_agency <- tidy(agency_feasibility)$estimate[3]
plogis(i_feas_agency + s_agency_feas_agency * 0)

## [1] 0.6428571

plogis(i_feas_agency + s_agency_feas_agency * 1)

## [1] 0.539749

plogis(i_feas_agency + s_noagency_feas_agency * 1)

## [1] 0.5773196

# Urgency as a function of condition (simple)
urgency_condition1 <- glm(Urgency_binary ~ Condition, data = condition_1, family = "binomial")
summary(urgency_condition1)
## Call:
\[
\text{glm(formula = Urgency\_binary ~ Condition, family = "binomial", data = condition\_1)}
\]
## Deviance Residuals:
\[
\begin{array}{cccccc}
\text{Min} & \text{1Q} & \text{Median} & 3Q & \text{Max} \\
\text{-0.2801} & \text{-0.2801} & \text{-0.2444} & \text{-0.2444} & \text{2.6557} \\
\end{array}
\]
## Coefficients:
\[
\begin{array}{cccc}
\text{Estimate} & \text{Std. Error} & \text{z value} & \text{Pr(>|z|)} \\
\text{(Intercept)} & \text{-3.4965} & \text{0.3836} & \text{-9.114 <2e-16} \\
\text{Condition 1: Cliff edge agency} & \text{0.2776} & \text{0.5126} & \text{0.542 0.588} \\
\end{array}
\]
## (Dispersion parameter for binomial family taken to be 1)
## (Signif. codes:  \(0  \text{'***'}  0.001  \text{'**'}  0.01  \text{'*'}  0.05  .  0.1  \ '  1\)
## (Dispersion parameter for binomial family taken to be 1)
## Null deviance: 139.75 on 471 degrees of freedom
## Residual deviance: 139.46 on 470 degrees of freedom
## AIC: 143.46
## Number of Fisher Scoring iterations: 6

\[
\text{urgency\_condition2} \leftarrow \text{glm(Urgency\_binary ~ Condition, data = condition\_2, family = "binomial")}
\]
\[
\text{summary(urgency\_condition2)}
\]
## Call:
\[
\text{glm(formula = Urgency\_binary ~ Condition, family = "binomial", data = condition\_2)}
\]
## Deviance Residuals:
\[
\begin{array}{cccccc}
\text{Min} & \text{1Q} & \text{Median} & 3Q & \text{Max} \\
\text{-0.3183} & \text{-0.3183} & \text{-0.2444} & \text{-0.2444} & \text{2.6557} \\
\end{array}
\]
## Coefficients:
\[
\begin{array}{cccc}
\text{Estimate} & \text{Std. Error} & \text{z value} & \text{Pr(>|z|)} \\
\text{(Intercept)} & \text{-3.4965} & \text{0.3836} & \text{-9.114 <2e-16} \\
\text{Condition 1: Cliff edge agency} & \text{0.2776} & \text{0.5126} & \text{0.542 0.588} \\
\end{array}
\]
urgency_condition3 <- glm(Urgency_binary ~ Condition, data = condition_3, family = "binomial")
summary(urgency_condition3)

## Call:
## glm(formula = Urgency_binary ~ Condition, family = "binomial",
##     data = condition_3)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -0.3309  -0.3309  -0.2444  -0.2444   2.6557
##
## Coefficients:
## Estimate Std. Error z value Pr(>|z|)
## (Intercept)     -3.4965     0.3836  -9.114   <2e-16 ***
## ConditionCondition 3: minefield agency 0.6190     0.4780   1.295     0.195
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 166.45  on 481  degrees of freedom
## Residual deviance: 164.69  on 480  degrees of freedom
## AIC: 168.69
Number of Fisher Scoring iterations: 6

```r
urgency_condition4 <- glm(Urgency_binary ~ Condition, data = condition_4, family= "binomial")
summary(urgency_condition4)
```

---

**Call:**
```
glm(formula = Urgency_binary ~ Condition, family = "binomial",
     data = condition_4)
```

**Deviance Residuals:**
```
     Min       1Q   Median       3Q      Max
-0.2444   -0.2444   -0.2423   -0.2423    2.6620
```

**Coefficients:**
```
(Intercept)                        -3.49651    0.38365  9.114   <2e-16
## ConditionCondition 4: minefield no agency -0.01717    0.54249  -0.032    0.975
##
## (Intercept)                               ***
## ConditionCondition 4: minefield no agency
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

**Residual deviance: 126.56 on 479 degrees of freedom**

**Number of Fisher Scoring iterations: 6**

---

**Agency as a function of condition (simple)**
```
age_condition1 <- glm(Agency_binary ~ Condition, data = condition_1, family= "binomial")
summary(age_condition1)
```

---

**Call:**
```
glm(formula = Agency_binary ~ Condition, family = "binomial",
     data = condition_1)
```
## Deviance Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-1.24354</td>
<td>-1.11377</td>
<td>-0.00054</td>
<td>1.11269</td>
<td>1.24241</td>
</tr>
</tbody>
</table>

## Coefficients:

|                          | Estimate | Std. Error | z value | Pr(>|z|) |
|--------------------------|----------|------------|---------|----------|
| (Intercept)              | -0.15155 | 0.13001    | -1.166  | 0.2438   |
| ConditionCondition 1: Cliff edge agency | 0.3057 | 0.1847 | 1.655 | 0.0978 . |

---

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 654.33 on 471 degrees of freedom
Residual deviance: 651.58 on 470 degrees of freedom
AIC: 655.58

Number of Fisher Scoring iterations: 3

age_condition2 <- glm(Agency_binary ~ Condition, data = condition_2, family= "binomial")
summary(age_condition2)

## Call:

glm(formula = Agency_binary ~ Condition, family = "binomial", data = condition_2)

## Deviance Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-1.146</td>
<td>-1.146</td>
<td>-1.114</td>
<td>1.209</td>
<td>1.242</td>
</tr>
</tbody>
</table>

## Coefficients:

|                          | Estimate | Std. Error | z value | Pr(>|z|) |
|--------------------------|----------|------------|---------|----------|
| (Intercept)              | -0.15155 | 0.13001    | -1.166  | 0.244    |
| ConditionCondition 2: Cliff edge no agency | 0.07744 | 0.18272 | 0.424 | 0.672   |

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 665.29 on 480 degrees of freedom
## Residual deviance: 665.11  on 479  degrees of freedom
## AIC: 669.11
## Number of Fisher Scoring iterations: 3

age_condition3 <- glm(Agency_binary ~ Condition, data = condition_3, family= "binomial")
summary(age_condition3)

## Call:
## glm(formula = Agency_binary ~ Condition, family = "binomial",
##     data = condition_3)
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.191 -1.114 -1.114   1.164   1.242
## Coefficients:
##                                        Estimate Std. Error z value
## (Intercept)                              -0.1515     0.1300  -1.166
## 0.244
## ConditionCondition 3: minefield agency   0.1843     0.1825   1.010
## 0.312
## (Dispersion parameter for binomial family taken to be 1)
## Null deviance: 667.79  on 481  degrees of freedom
## Residual deviance: 666.77  on 480  degrees of freedom
## AIC: 670.77
## Number of Fisher Scoring iterations: 3

age_condition4 <- glm(Agency_binary ~ Condition, data = condition_4, family= "binomial")
summary(age_condition4)

## Call:
## glm(formula = Agency_binary ~ Condition, family = "binomial",
##     data = condition_4)
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.270 -1.114  1.087  1.087   1.242
##
## Coefficients:

| Estimate | Std. Error | z value | Pr(>|z|) |
|----------|------------|---------|----------|
| -0.1515  | 0.1300     | -1.166  | 0.2438   |
| 0.3673   | 0.1834     | 2.003   | 0.0452   |

## Signif. codes:

- '***' p < 0.001
- '**' p < 0.01
- '*' p < 0.05
- '.' p < 0.1
- ' ' p > 0.1

## (Dispersion parameter for binomial family taken to be 1)

**Null deviance:** 665.29 on 479 degrees of freedom

**Residual deviance:** 661.26 on 478 degrees of freedom

**AIC:** 665.26

**Number of Fisher Scoring iterations:** 3

```r
tidy(age_condition4)

# A tibble: 2 × 5
#   term                     estimate std.error statistic p.value
# 1 (Intercept)             -0.152     0.130     -1.17   0.244
# 2 ConditionCondition 4: minefield no agency    0.367     0.183     2.00   0.0452
```

```r
d <- tidy(age_condition4)
```

```
[1] 0.4621849
```

```r
```

```
[1] 0.553719
```

```r
i_feas_metaphor <- tidy(metaphor_feasibility)$estimate[1]
s_cliff_feas_metaphor <- tidy(metaphor_feasibility)$estimate[2]
s_mine_feas_metaphor <- tidy(metaphor_feasibility)$estimate[3]
plogis(i_feas_metaphor + s_cliff_feas_metaphor * 0)
```

```
[1] 0.4621849
```

```r
plogis(i_feas_metaphor + s_mine_feas_metaphor * 0)
```

```
[1] 0.4621849
```
## 0.6428571
plogis(i_feas_metaphor + s_cliff_feas_metaphor * 1)
## 0.5660377
plogis(i_feas_metaphor + s_mine_feas_metaphor * 1)
## 0.5514403

#Expanded logistic regression models
#Metaphor urgency expanded
metaphor_urgency_ex <- glm(Urgency_binary ~ Metaphor + Temp_change +
Climate_cause + Age + Sex + Ethnicity + Student_status +
Employment_status, data = full_no_NA, family="binomial")
summary(metaphor_urgency_ex)

## Call:
## glm(formula = Urgency_binary ~ Metaphor + Temp_change +
## Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status,
## family = "binomial", data = full_no_NA)
## Deviance Residuals:
## Min 1Q Median 3Q Max
## -1.6475 -0.2057 -0.1308 -0.0753 3.0682
## Coefficients:
## Estimate
## (Intercept) -17.47733
## MetaphorCliff -0.08520
## MetaphorMinefield 0.12726
## Temp_changeIn the last 5 years it has become cooler 0.28017
## Temp_changeIn the last 5 years it has become warmer -1.22689
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.90856
## Climate_causeClimate change is occurring naturally 2.50639
## Climate_causeOther 1.40019
## Age
0.01745
## Sex Male
1.37676
## Ethnicity Black
-0.90604
## Ethnicity Mixed
-0.17037
## Ethnicity Other
1.10646
## Ethnicity White
0.11499
## Student_status Yes
-0.65887
## Employment_status Full-Time
12.03605
## Employment_status Not in paid work (e.g. homemaker', 'retired or disabled)
11.33292
## Employment_status Other
11.51566
## Employment_status Part-Time
12.61575
## Employment_status Unemployed (and job seeking)
11.75497
## Temp_change In the last 5 years it has become cooler
0.87886
## Temp_change In the last 5 years it has become warmer
0.58298
## Temp_change In the last 5 years the average temperature has stayed roughly the same
0.47269
## Climate_cause Climate change is occurring naturally
0.43906
## Climate_cause Other
0.53893
## Age
0.01570
## Sex Male
0.52162
## Ethnicity
- Black: 1.39782
- Mixed: 1.19799
- Other: 1.41297
- White: 0.89531

## Student_status
- Yes: 0.83499

## Employment_status
- Full-Time: 860.02257
- Not in paid work (e.g. homemaker', 'retired or disabled): 860.02277
- Other: 860.02322
- Part-Time: 860.02263
- Unemployed (and job seeking): 860.02278

## z value
- (Intercept): -0.020
- Metaphor_Cliff: -0.149
- Metaphor_Minefield: 0.225
- Temp_change_In the last 5 years it has become cooler: 0.319
- Temp_change_In the last 5 years it has become warmer: -2.105
- Temp_change_In the last 5 years the average temperature has stayed roughly the same: 1.922
- Climate_cause_Climate change is occurring naturally: 5.708
- Climate_cause_Other: 2.598

## Age
- 1.112

## Sex
- Male: 2.639
- Female: -0.648

## Ethnicity
- Black: -0.648
- Mixed: -0.142
# EthnicityOther
0.783

# EthnicityWhite
0.128

# Student_statusYes
-0.789

# Employment_statusFull-Time
0.014

# Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.013

# Employment_statusOther
0.013

# Employment_statusPart-Time
0.015

# Employment_statusUnemployed (and job seeking)
0.014

# Pr(>|z|)

# (Intercept)
0.98379

# MetaphorCliff
0.88195

# MetaphorMinefield
0.82169

# Temp_changeIn the last 5 years it has become cooler
0.74989

# Temp_changeIn the last 5 years it has become warmer
0.03533

# Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.05459

# Climate_causeClimate change is occurring naturally
1.14e-08

# Climate_causeOther
0.00937

# Age
0.26627

# SexMale
0.00831

# EthnicityBlack
0.51687

# EthnicityMixed
0.88691

# EthnicityOther
0.43358

# EthnicityWhite
0.89781
## Student_status
Yes

## Employment_status
- Full-Time
  
- Not in paid work (e.g. homemaker', 'retired or disabled)
- Other
- Part-Time
- Unemployed (and job seeking)

## (Intercept)

## Metaphor
- Cliff
- Minefield

## Temp_change
- In the last 5 years it has become cooler
- In the last 5 years it has become warmer

## Climate_cause
- Climate change is occurring naturally

## Age

## Sex
- Male

## Ethnicity
- Black
- Mixed
- Other
- White

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## (Dispersion parameter for binomial family taken to be 1)

## Null deviance: 343.38  on 1013  degrees of freedom
## Residual deviance: 227.40  on  994  degrees of freedom
(55 observations deleted due to missingness)
AIC: 267.4

Number of Fisher Scoring iterations: 15

# Remove insignificant variables
metaphor_urgency_red <- glm(Urgency_binary ~ Metaphor + Temp_change + Climate_cause + Age, data = age_no_NA, family = "binomial")
summary(metaphor_urgency_red)

# Call:
# glm(formula = Urgency_binary ~ Metaphor + Temp_change + Climate_cause + Age, family = "binomial", data = age_no_NA)

# Deviance Residuals:
#          Min       1Q   Median       3Q      Max
# -1.2511   -0.2083   -0.1111   -0.0980  3.2451

# Coefficients:

Estimate
(Intercept) -4.70004
MetaphorCliff 0.25009
MetaphorMinefield 0.32881
Temp_changeIn the last 5 years it has become cooler 0.35215
Temp_changeIn the last 5 years it has become warmer -1.36364
Temp_changeIn the last 5 years the average temperature has stayed roughly the same 1.20128
Climate_causeClimate change is occurring naturally 2.45566
Climate_causeOther 1.55630
Age 0.01531

Std. Error
(Intercept) 0.76951
MetaphorCliff
## MetaphorMinefield

## Temp_changeIn the last 5 years it has become cooler

## Temp_changeIn the last 5 years it has become warmer

## Temp_changeIn the last 5 years the average temperature has stayed roughly the same

## Climate_causeClimate change is occurring naturally

## Climate_causeOther

## Age

### z value

### (Intercept)

-6.108

## MetaphorCliff

0.496

## MetaphorMinefield

0.649

## Temp_changeIn the last 5 years it has become cooler

0.497

## Temp_changeIn the last 5 years it has become warmer

-2.478

## Temp_changeIn the last 5 years the average temperature has stayed roughly the same

2.809

## Climate_causeClimate change is occurring naturally

6.211

## Climate_causeOther

3.377

## Age

1.259

### Pr(>|z|)

### (Intercept)

1.01e-09

## MetaphorCliff

0.619911

## MetaphorMinefield

0.516324

## Temp_changeIn the last 5 years it has become cooler

0.619185

## Temp_changeIn the last 5 years it has become warmer

0.516324
## Temp_change
In the last 5 years the average temperature has stayed roughly the same 0.004969

## Climate_cause
Climate change is occurring naturally 5.25e-10

## Climate_causeOther
0.000732

## Age
0.208160

### (Intercept)  
***

### MetaphorCliff

### MetaphorMinefield

## Temp_change
In the last 5 years it has become cooler

## Temp_change
In the last 5 years it has become warmer *

## Temp_change
In the last 5 years the average temperature has stayed roughly the same **

## Climate_cause
Climate change is occurring naturally ***

## Climate_causeOther
***

## Age

### ---

### Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

### (Dispersion parameter for binomial family taken to be 1)

### Null deviance: 395.80  on 1188  degrees of freedom

### Residual deviance: 271.86  on 1180  degrees of freedom

### AIC: 289.86

### Number of Fisher Scoring iterations: 7

tidy(metaphor_urgency_red)

### # A tibble: 9 × 5

<table>
<thead>
<tr>
<th>term</th>
<th>estim.¹</th>
<th>std.e.²</th>
<th>stati.³</th>
<th>p.value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>-4.70</td>
<td>0.770</td>
<td>-6.11</td>
<td>1.01e-9</td>
</tr>
<tr>
<td>MetaphorCliff</td>
<td>0.250</td>
<td>0.504</td>
<td>0.496</td>
<td>6.20e-1</td>
</tr>
</tbody>
</table>
## 3 Metaphor Minefield
0.329 0.507
0.649 5.16e-1

## 4 Temp_change In the last 5 years it has become...
0.352 0.709
0.497 6.19e-1

## 5 Temp_change In the last 5 years it has become...
-1.36 0.550
2.48 1.32e-2

## 6 Temp_change In the last 5 years the average t...
1.20 0.428
2.81 4.97e-3

## 7 Climate_cause Climate change is occurring nat...
2.46 0.395
6.21 5.25e-10

## 8 Climate_cause Other
1.56 0.461
3.38 7.32e-4

## 9 Age
0.0153 0.0122
1.26 2.08e-1

# ... with abbreviated variable names estimate, std.error, statistic

i_urg_metaphor <- tidy(metaphor_urgency_red)$estimate[1]
s_cliff_urg_metaphor <- tidy(metaphor_urgency_red)$estimate[2]
s_mine_urg_metaphor <- tidy(metaphor_urgency_red)$estimate[3]
plogis(i_urg_metaphor + s_cliff_urg_metaphor * 0)
## [1] 0.00901295

plogis(i_urg_metaphor + s_cliff_urg_metaphor * 1)
## [1] 0.01154438

plogis(i_urg_metaphor + s_mine_urg_metaphor * 1)
## [1] 0.01247799

Metaphor agency expanded

metaphor_agency_ex <- glm(Agency_binary ~ Metaphor + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status,
data = full_no_NA, family = "binomial")
supply(metaphor_agency_ex)

## Call:
## glm(formula = Agency_binary ~ Metaphor + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status, family = "binomial", data = full_no_NA)

## Deviance Residuals:
##    Min     1Q Median     3Q    Max
## -2.1681 -1.1176  0.5899  1.0671  2.0343
### Coefficients:

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>0.38540</td>
</tr>
<tr>
<td>MetaphorCliff</td>
<td>0.17991</td>
</tr>
<tr>
<td>MetaphorMinefield</td>
<td>0.17888</td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become cooler</td>
<td>0.32665</td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become warmer</td>
<td>0.17570</td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years the average temperature has stayed roughly the same</td>
<td>0.15249</td>
</tr>
<tr>
<td>Climate_causeClimate change is occurring naturally</td>
<td>1.19781</td>
</tr>
<tr>
<td>Climate_causeOther</td>
<td>0.49341</td>
</tr>
<tr>
<td>Age</td>
<td>-0.04214</td>
</tr>
<tr>
<td>SexMale</td>
<td>0.21887</td>
</tr>
<tr>
<td>EthnicityBlack</td>
<td>-0.55825</td>
</tr>
<tr>
<td>EthnicityMixed</td>
<td>0.50208</td>
</tr>
<tr>
<td>EthnicityOther</td>
<td>0.14791</td>
</tr>
<tr>
<td>EthnicityWhite</td>
<td>0.44618</td>
</tr>
<tr>
<td>Student_statusYes</td>
<td>-0.21645</td>
</tr>
</tbody>
</table>
## Temp_change
In the last 5 years the average temperature has stayed roughly the same 0.24449
## Climate_cause
Climate change is occurring naturally 0.29702
## Climate_cause
Other 0.26776
## Age
0.00574
## Sex
Male 0.13365
## Ethnicity
Black 0.36240
## Ethnicity
Mixed 0.34460
## Ethnicity
Other 0.47495
## Ethnicity
White 0.25881
## Student_status
Yes 0.19737
## z value
## (Intercept) 3.160
## Metaphor
Cliff 0.771
## Metaphor
Minefield 1.354
## Temp_change
In the last 5 years it has become cooler -1.985
## Temp_change
In the last 5 years it has become warmer -1.952
## Temp_change
In the last 5 years the average temperature has stayed roughly the same -0.624
## Climate_cause
Climate change is occurring naturally 4.033
## Climate_cause
Other 1.843
## Age
-7.341
## Sex
Male 1.638
## Ethnicity
Black -1.540
## Ethnicity
Mixed 1.457
## EthnicityOther
0.311
## EthnicityWhite
1.724
## Student_statusYes
-1.097
##
Pr(>|z|)
## (Intercept)
0.00158
## MetaphorCliff
0.44086
## MetaphorMinefield
0.17561
## Temp_changeIn the last 5 years it has become cooler
0.04711
## Temp_changeIn the last 5 years it has become warmer
0.05089
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.53282
## Climate_causeClimate change is occurring naturally
5.51e-05
## Climate_causeOther
0.06537
## Age
2.12e-13
## SexMale
0.10149
## EthnicityBlack
0.12345
## EthnicityMixed
0.14512
## EthnicityOther
0.75548
## EthnicityWhite
0.08472
## Student_statusYes
0.27278
##
## (Intercept)
**
## MetaphorCliff
## MetaphorMinefield
## Temp_changeIn the last 5 years it has become cooler
*
## Temp_changeIn the last 5 years it has become warmer
## Temp_change
In the last 5 years the average temperature has stayed roughly the same.

## Climate_cause
Climate change is occurring naturally.

***

## Climate_cause
Other.

## Age

***

## Sex
Male

## Ethnicity
Black

## Ethnicity
Mixed

## Ethnicity
Other

## Ethnicity
White

## Student_status
Yes

---

## Signif. codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## (Dispersion parameter for binomial family taken to be 1)

## Null deviance: 1481.6 on 1068 degrees of freedom
## Residual deviance: 1368.9 on 1054 degrees of freedom
## AIC: 1398.9

## Number of Fisher Scoring iterations: 4

# Remove insignificant variables

```r
metaphor_agency_red <- glm(Agency_binary ~ Metaphor + Temp_change + Climate_cause + Age, data = age_no_NA, family = "binomial")
summary(metaphor_agency_red)
```

## Call:
```
glm(formula = Agency_binary ~ Metaphor + Temp_change + Climate_cause + Age, family = "binomial", data = age_no_NA)
```

## Deviance Residuals:
```
Min     1Q Median     3Q    Max
-1.9539 -1.1458  0.7076  1.0965  1.9644
```

## Coefficients:
```
Estimate
(Intercept)
```
## Me

### MetaphorCliff
0.114561

### MetaphorMinefield
0.226907

### Temp_change
- In the last 5 years it has become cooler
  -0.684226
- In the last 5 years it has become warmer
  -0.303475
- In the last 5 years the average temperature has stayed roughly the same
  -0.072941

### Climate_cause
- Climate change is occurring naturally
  1.059954
- Other
  0.534365

### Age
-0.035360

### Std. Error
- (Intercept)
  0.257336
- MetaphorCliff
  0.165724
- MetaphorMinefield
  0.165228
- Temp_change
  - In the last 5 years it has become cooler
    0.306141
  - In the last 5 years it has become warmer
    0.160731
  - In the last 5 years the average temperature has stayed roughly the same
    0.225909
- Climate_cause
  - Climate change is occurring naturally
    0.276037
  - Other
    0.249165

### z value
- (Intercept)
  5.390
- MetaphorCliff
  0.691
- MetaphorMinefield
  1.373
- Temp_change
  - In the last 5 years it has become cooler
## Temp_change
In the last 5 years it has become warmer -1.888
## Temp_change
In the last 5 years the average temperature has stayed roughly the same -0.323
## Climate_cause
Climate change is occurring naturally 3.840
## Climate_cause
Other 2.145
## Age
-7.270
## Pr(>|z|)
## (Intercept) 7.04e-08
## Metaphor
Cliff 0.489392
## Metaphor
Minefield 0.169660
## Temp_change
In the last 5 years it has become cooler 0.025417
## Temp_change
In the last 5 years it has become warmer 0.059014
## Temp_change
In the last 5 years the average temperature has stayed roughly the same 0.746788
## Climate_cause
Climate change is occurring naturally 0.000123
## Climate_cause
Other 0.031983
## Age
3.59e-13
##
## (Intercept) ***
## Metaphor
Cliff
## Metaphor
Minefield
## Temp_change
In the last 5 years it has become cooler *
## Temp_change
In the last 5 years it has become warmer .
## Temp_change
In the last 5 years the average temperature has stayed roughly the same
## Climate_cause
Climate change is occurring naturally ***
## Climate_cause
Other *
## Age

---

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 1647.7  on 1188  degrees of freedom
Residual deviance: 1561.2  on 1180  degrees of freedom
AIC: 1579.2

Number of Fisher Scoring iterations: 4

tidy(metaphor_agency_red)

# A tibble: 9 × 5

## term                          estim¹ std.e² statistic  p.value

1 (Intercept)                   1.39  0.257  5.39  7.04e-8
2 MetaphorCliff                 0.115 0.166  0.691 4.89e-1
3 MetaphorMinefield             0.227 0.165  1.37  1.70e-1
4 Temp_change                  -0.684 0.306 -2.24  2.54e-2
5 Temp_change                  -0.303 0.161 -1.89  5.90e-2
6 Temp_change                  -0.0729 0.226 -0.323 7.47e-1
7 Climate_cause                1.06  0.276  3.84  1.23e-4
8 Climate_cause                0.534 0.249  2.14  3.20e-2
9 Age                          -0.0354 0.00486 -7.27  3.59e-13

# ... with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_age_met <- tidy(metaphor_agency_red)$estimate[1]
s_cliff_age_met <- tidy(metaphor_agency_red)$estimate[2]
s_mine_age_met <- tidy(metaphor_agency_red)$estimate[3]
plogis(i_age_met + s_cliff_age_met * 0)

# [1] 0.8001224
plogis(i_age_met + s_cliff_age_met * 1)
## [1] 0.8178161

plogis(i_age_met + s_mine_age_met * 1)
## [1] 0.8339614

# Metaphor feasibility expanded
metaphor_feas_ex <- glm(Feasibility_binary ~ Metaphor + Temp_change +
Climate_cause + Age + Sex + Ethnicity + Student_status +
Employment_status, data = full_no_NA, family = "binomial")
summary(metaphor_feas_ex)

## Call:
## glm(formula = Feasibility_binary ~ Metaphor + Temp_change +
## Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status,
data = full_no_NA, family = "binomial")
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.9667 -1.2516   0.8491  1.0290  1.6836
##
## Coefficients:
##              Estimate
## (Intercept)  -0.052027
## MetaphorCliff -0.289593
## MetaphorMinefield -0.399027
## Temp_changeIn the last 5 years it has become cooler -0.068746
## Temp_changeIn the last 5 years it has become warmer 0.284690
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same -0.416974
## Climate_causeClimate change is occurring naturally -0.618450
## Climate_causeOther -0.248194
## Age -0.010199
## SexMale
<table>
<thead>
<tr>
<th></th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>EthnicityBlack</td>
<td>0.165215</td>
</tr>
<tr>
<td>EthnicityMixed</td>
<td>0.258720</td>
</tr>
<tr>
<td>EthnicityOther</td>
<td>0.072184</td>
</tr>
<tr>
<td>EthnicityWhite</td>
<td>-0.335051</td>
</tr>
<tr>
<td>Student_statusYes</td>
<td>0.111662</td>
</tr>
<tr>
<td>Employment_statusFull-Time</td>
<td>0.771380</td>
</tr>
<tr>
<td>Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)</td>
<td>0.892998</td>
</tr>
<tr>
<td>Employment_statusOther</td>
<td>1.078893</td>
</tr>
<tr>
<td>Employment_statusPart-Time</td>
<td>0.879083</td>
</tr>
<tr>
<td>Employment_statusUnemployed (and job seeking)</td>
<td>1.223614</td>
</tr>
<tr>
<td>Std. Error (Intercept)</td>
<td>0.865860</td>
</tr>
<tr>
<td>MetaphorCliff</td>
<td>0.185633</td>
</tr>
<tr>
<td>MetaphorMinefield</td>
<td>0.183976</td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become cooler</td>
<td>0.320015</td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become warmer</td>
<td>0.178129</td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years the average temperature has stayed roughly the same</td>
<td>0.240213</td>
</tr>
<tr>
<td>Climate_causeClimate change is occurring naturally</td>
<td>0.274941</td>
</tr>
<tr>
<td>Climate_causeOther</td>
<td>0.260348</td>
</tr>
<tr>
<td>Age</td>
<td>0.005636</td>
</tr>
<tr>
<td>SexMale</td>
<td>0.138168</td>
</tr>
<tr>
<td>EthnicityBlack</td>
<td>0.372829</td>
</tr>
<tr>
<td>EthnicityMixed</td>
<td></td>
</tr>
</tbody>
</table>
0.363370
## EthnicityOther
0.493779
## EthnicityWhite
0.274375
## Student_statusYes
0.209547
## Employment_statusFull-Time
0.778062
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.794973
## Employment_statusOther
0.841782
## Employment_statusPart-Time
0.791532
## Employment_statusUnemployed (and job seeking)
0.799358
## z value
## (Intercept)
-0.060
## MetaphorCliff
-1.560
## MetaphorMinefield
-2.169
## Temp_changeIn the last 5 years it has become cooler
-0.215
## Temp_changeIn the last 5 years it has become warmer
1.598
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
-1.736
## Climate_causeClimate change is occurring naturally
-2.249
## Climate_causeOther
-0.953
## Age
-1.810
## SexMale
1.196
## EthnicityBlack
0.694
## EthnicityMixed
0.199
## EthnicityOther
-0.679
## EthnicityWhite
-0.031
## Student_statusYes
0.533
## Employment_statusFull-Time
0.991
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
1.123
## Employment_statusOther
1.282
## Employment_statusPart-Time
1.111
## Employment_statusUnemployed (and job seeking)
1.531
##
Pr(>|z|)
## (Intercept)
0.9521
## MetaphorCliff
0.1188
## MetaphorMinefield
0.0301
## Temp_changeIn the last 5 years it has become cooler
0.8299
## Temp_changeIn the last 5 years it has become warmer
0.1100
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.0826
## Climate_causeClimate change is occurring naturally
0.0245
## Climate_causeOther
0.3404
## Age
0.0703
## SexMale
0.2318
## EthnicityBlack
0.4877
## EthnicityMixed
0.8425
## EthnicityOther
0.4974
## EthnicityWhite
0.9755
## Student_statusYes
0.5941
## Employment_statusFull-Time
0.3215
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)  0.2613
## Employment_statusOther  0.2000
## Employment_statusPart-Time  0.2667
## Employment_statusUnemployed (and job seeking)  0.1258
## (Intercept)
## MetaphorCliff
## MetaphorMinefield *
## Temp_changeIn the last 5 years it has become cooler
## Temp_changeIn the last 5 years it has become warmer
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same.
## Climate_causeClimate change is occurring naturally *
## Climate_causeOther
## Age .
## SexMale
## EthnicityBlack
## EthnicityMixed
## EthnicityOther
## EthnicityWhite
## Student_statusYes
## Employment_statusFull-Time
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
## Employment_statusOther
## Employment_statusPart-Time
## Employment_statusUnemployed (and job seeking)
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Dispersion parameter for binomial family taken to be 1)
## 
## Null deviance: 1381.6 on 1013 degrees of freedom
## Residual deviance: 1335.2 on 994 degrees of freedom
## (55 observations deleted due to missingness)
## AIC: 1375.2
## 
## Number of Fisher Scoring iterations: 4
# Remove insignificant variables

```r
metaphor_feasibility_red <- glm(Feasibility_binary ~ Metaphor + Climate_cause, data = doomism_data, family = "binomial")
summary(metaphor_feasibility_red)
```

```r
## Call:
## glm(formula = Feasibility_binary ~ Metaphor + Climate_cause, 
##     family = "binomial", data = doomism_data)

## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.4690 -1.3084   0.9115   1.0518   1.4392

## Coefficients:
##               Estimate Std. Error      z value Pr(>|z|)
## (Intercept)   0.1861    0.2573 0.7230    0.4695
## MetaphorCliff -0.2976    0.1651 -1.8020    0.0715 .
## MetaphorMinefield -0.3607    0.1644 -2.1952    0.0282 *
## Climate_causeClimate change is caused by human activity 0.4775    0.2306 2.0710    0.0384 *
## Climate_causeClimate change is occurring naturally -0.4226    0.3204 -1.3190    0.1871

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

## (Dispersion parameter for binomial family taken to be 1)

## Null deviance: 1637.6 on 1200 degrees of freedom
## Residual deviance: 1613.9 on 1196 degrees of freedom
```
## AIC: 1623.9

## Number of Fisher Scoring iterations: 4

tidy(metaphor_feasibility_red)

## # A tibble: 5 × 5
## term                                           estim...¹ std.e...² stati...³ p.value
## <chr>                                            <dbl>   <dbl>   <dbl>   <dbl>
## 1 (Intercept)                                      0.186   0.257   0.723  0.470
## 2 MetaphorCliff                                  -0.298   0.165   1.80   0.0715
## 3 MetaphorMinefield                              -0.361   0.164   2.19   0.0282
## 4 Climate_causeClimate change is caused by huma... 0.477   0.231   2.07   0.0384
## 5 Climate_causeClimate change is occurring natu... -0.423   0.320   1.32   0.187
## # ... with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_feas_met <- tidy(metaphor_feasibility_red)$estimate[1]
s_cliff_feas_met <- tidy(metaphor_feasibility_red)$estimate[2]
s_mine_feas_met <- tidy(metaphor_feasibility_red)$estimate[3]
plogis(i_feas_met + s_cliff_feas_met * 0)

## [1] 0.5463934

plogis(i_feas_met+ s_cliff_feas_met * 1)

## [1] 0.4721654

plogis(i_feas_met + s_mine_feas_met * 1)

## [1] 0.4564574

#Does minefield differ significantly from cliff?
feas_cliff_mine <- glm(Feasibility_binary ~ Metaphor, data = cliff_minefield, family = "binomial")
summary(feas_cliff_mine)

## Call:
## glm(formula = Feasibility_binary ~ Metaphor, family = "binomial",
##     data = cliff_minefield)
# Deviance Residuals:
##    Min     1Q Median     3Q    Max
## -1.292 -1.266   1.067  1.091  1.091

## Coefficients:
##                       Estimate Std. Error  z value Pr(>|z|)
## (Intercept)           0.26570    0.09238   2.876  0.00403 **
## MetaphorMinefield    -0.05921    0.12982  -0.456  0.64831

---

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 1321.7  on 962  degrees of freedom
Residual deviance: 1321.5  on 961  degrees of freedom
AIC: 1325.5

Number of Fisher Scoring iterations: 3

# Agency urgency expanded

agency_urgency_ex <- glm(Urgency_binary ~ Agency_presentation + Temp_change + Climate_cause + Age + Sex + Ethnicity + Employment_status + Student_status, data = full_no_NA, family = "binomial")
summary(agency_urgency_ex)

Call:
glm(formula = Urgency_binary ~ Agency_presentation + Temp_change + Climate_cause + Age + Sex + Ethnicity + Employment_status + Student_status, family = "binomial", data = full_no_NA)

Deviance Residuals:
##    Min     1Q Median     3Q    Max
## -1.68124 -0.20739 -0.13115 -0.07692  3.06252

Coefficients:

Estimate
(Intercept) -17.527623
Agency_presentationAgency 0.049736
Agency_presentationNo agency -0.002152
Temp_change In the last 5 years it has become cooler
Temp_changeIn the last 5 years it has become warmer
-1.211698
Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.904651
Climate_changeClimate change is occurring naturally
2.490437
Climate_changeOther
1.378973
Age
0.017984
Sex_Male
1.364345
Ethnicity_Black
-0.853707
Ethnicity_Mixed
-0.166916
Ethnicity_Other
1.106437
Ethnicity_White
0.167385
Employment_status_Full-Time
12.032520
Employment_status_Not in paid work (e.g. homemaker', 'retired or disabled)
11.315181
Employment_status_Other
11.513018
Employment_status_Part-Time
12.604410
Employment_status_Unemployed (and job seeking)
11.776328
Student_status_Yes
-0.613674
Std. Error
(Intercept)
856.044056
Agency_presentation_Agency
0.565633
Agency_presentation_No agency
0.568684
Temp_changeIn the last 5 years it has become cooler
0.880409
Temp_changeIn the last 5 years it has become warmer
0.582366
Temp_changeIn the last 5 years the average temperature has stayed

roughly the same   0.477556
## Climate_causeClimate change is occurring naturally
  0.439250
## Climate_causeOther
  0.538524
## Age
  0.015648
## SexMale
  0.519634
## EthnicityBlack
  1.396783
## EthnicityMixed
  1.208409
## EthnicityOther
  1.415405
## EthnicityWhite
  0.897113
## Employment_statusFull-Time
  856.042968
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
  856.043170
## Employment_statusOther
  856.043618
## Employment_statusPart-Time
  856.043031
## Employment_statusUnemployed (and job seeking)
  856.043174
## Student_statusYes
  0.827404
## (Intercept)
  -0.020
## Agency_presentationAgency
  0.088
## Agency_presentationNo agency
  -0.004
## Temp_changeIn the last 5 years it has become cooler
  0.301
## Temp_changeIn the last 5 years it has become warmer
  -2.081
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
  1.894
## Climate_causeClimate change is occurring naturally
  5.670
## Climate_causeOther
## Age
1.149
## SexMale
2.626
## EthnicityBlack
-0.611
## EthnicityMixed
-0.138
## EthnicityOther
0.782
## EthnicityWhite
0.187
## Employment_statusFull-Time
0.014
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.013
## Employment_statusOther
0.013
## Employment_statusPart-Time
0.015
## Employment_statusUnemployed (and job seeking)
0.014
## Student_statusYes
-0.742
## Pr(>|z|)
## (Intercept)
0.98366
## Agency_presentationAgency
0.92993
## Agency_presentationNo agency
0.99698
## Temp_changeIn the last 5 years it has become cooler
0.76321
## Temp_changeIn the last 5 years it has become warmer
0.03747
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.05818
## Climate_causeClimate change is occurring naturally
1.43e-08
## Climate_causeOther
0.01045
## Age
0.25044
## SexMale
## Employment_status
Unemployed (and job seeking)

## Student_status
Yes

---

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 343.38  on 1013  degrees of freedom
Residual deviance: 227.65  on  994  degrees of freedom
(55 observations deleted due to missingness)
AIC: 267.65

Number of Fisher Scoring iterations: 15

agency_urgency_red <- glm(Urgency_binary ~ Agency_presentation + Temp_change + Climate_cause + Sex, data = sex_no_NA, family = "binomial")
summary(agency_urgency_red)

## Call:
glm(formula = Urgency_binary ~ Agency_presentation + Temp_change + Climate_cause + Sex, family = "binomial", data = sex_no_NA)

## Deviance Residuals:

##     Min      1Q  Median      3Q     Max
## -1.24098 -0.22959 -0.12395 -0.07605  3.13549

## Coefficients:

## Estimate
## (Intercept) -3.56076
## Agency_presentationAgency -0.06211
## Agency_presentationNo agency -0.01881
## Temp_changeIn the last 5 years it has become cooler 0.38648
## Temp_changeIn the last 5 years it has become warmer -1.28541
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 1.18911
## Climate_causeClimate change is occurring naturally 2.51990
## Climate_causeOther
<table>
<thead>
<tr>
<th>Factor</th>
<th>Coefficient</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>0.60038</td>
<td></td>
</tr>
<tr>
<td>SexFemale</td>
<td>-0.97957</td>
<td></td>
</tr>
<tr>
<td>Std. Error</td>
<td>0.51276</td>
<td></td>
</tr>
<tr>
<td>Agency_presentationAgency</td>
<td>0.51636</td>
<td></td>
</tr>
<tr>
<td>Agency_presentationNo agency</td>
<td>0.72294</td>
<td></td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become cooler</td>
<td>0.55222</td>
<td></td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become warmer</td>
<td>-2.328</td>
<td></td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years the average temperature has stayed roughly the same</td>
<td>2.761</td>
<td></td>
</tr>
<tr>
<td>Climate_causeClimate change is occurring naturally</td>
<td>0.38864</td>
<td></td>
</tr>
<tr>
<td>Climate_causeOther</td>
<td>0.46616</td>
<td></td>
</tr>
<tr>
<td>SexFemale</td>
<td>0.42182</td>
<td></td>
</tr>
<tr>
<td>z value</td>
<td>-5.931</td>
<td></td>
</tr>
<tr>
<td>(Intercept)</td>
<td>-0.121</td>
<td></td>
</tr>
<tr>
<td>Agency_presentationAgency</td>
<td>-0.036</td>
<td></td>
</tr>
<tr>
<td>Agency_presentationNo agency</td>
<td>0.535</td>
<td></td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become cooler</td>
<td>-2.328</td>
<td></td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become warmer</td>
<td>2.761</td>
<td></td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years the average temperature has stayed roughly the same</td>
<td>6.484</td>
<td></td>
</tr>
<tr>
<td>Climate_causeClimate change is occurring naturally</td>
<td>3.457</td>
<td></td>
</tr>
<tr>
<td>Climate_causeOther</td>
<td>-2.322</td>
<td></td>
</tr>
<tr>
<td>Pr(&gt;</td>
<td>z</td>
<td>)</td>
</tr>
<tr>
<td>(Intercept)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.01e-09
## Agency_presentationAgency
0.903593
## Agency_presentationNo agency
0.970943
## Temp_changeIn the last 5 years it has become cooler
0.592928
## Temp_changeIn the last 5 years it has become warmer
0.019927
## Temp_changeIn the last 5 years the average temperature has stayed
roughly the same 0.005762
## Climate_causeClimate change is occurring naturally
8.94e-11
## Climate_causeOther
0.000546
## SexFemale
0.020220
## (Intercept)
***
## Agency_presentationAgency
## Agency_presentationNo agency
## Temp_changeIn the last 5 years it has become cooler
## Temp_changeIn the last 5 years it has become warmer
*
## Temp_changeIn the last 5 years the average temperature has stayed
roughly the same **
## Climate_causeClimate change is occurring naturally
***
## Climate_causeOther
***
## SexFemale
*
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Dispersion parameter for binomial family taken to be 1)
## Null deviance: 402.41  on 1191  degrees of freedom
## Residual deviance: 268.87  on 1183  degrees of freedom
## AIC: 286.87
## Number of Fisher Scoring iterations: 7

tidy(agency_urgency_red)
## # A tibble: 9 × 5
## term                      estim¹  std.e² statistic  p.value
## <chr>                      <dbl>   <dbl>
## 1 (Intercept)              -3.56    0.600
## 2 Agency_presentationAgency -0.0621  0.513
## 3 Agency_presentationNo agency -0.0188  0.516
## 4 Temp_changeIn the last 5 years it has become... 0.386    0.723
## 5 Temp_changeIn the last 5 years it has become... -1.29    0.552
## 6 Temp_changeIn the last 5 years the average t... 1.19     0.431
## 7 Climate_causeClimate change is occurring nat... 2.52     0.389
## 8 Climate_causeOther        1.61     0.466
## 9 SexFemale                -0.980    0.422

... with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_urg_age <- tidy(agency_urgency_red)$estimate[1]
s_urg_age <- tidy(agency_urgency_red)$estimate[2]
s_urg_noage <- tidy(agency_urgency_red)$estimate[3]
plogis(i_urg_age + s_urg_age * 0)

## [1] 0.02763193

plogis(i_urg_age + s_urg_age * 1)

## [1] 0.02601128

plogis(i_urg_age + s_urg_noage * 1)

## [1] 0.02713103

 Agency agency expanded
agency_agency_ex <- glm(Agency_binary ~ Agency_presentation + Temp_change + Climate_cause + Age + Sex + Ethnicity + Employment_status + Student_status, data = full_no_NA, family = "binomial")
summary(agency_agency_ex)
## Call:
```r
glm(formula = Agency_binary ~ Agency_presentation + Temp_change + Climate_cause + Age + Sex + Ethnicity + Employment_status + Student_status, family = "binomial", data = full_no_NA)
```

## Deviance Residuals:
```
          Min       1Q   Median       3Q      Max
-2.1458 -1.1154   0.5836   1.0788   1.9861
```

## Coefficients:
```
Estimate
(Intercept) 0.781699
Agency_presentationAgency 0.115443
Agency_presentationNo agency 0.114991
Temp_changeIn the last 5 years it has become cooler -0.644632
Temp_changeIn the last 5 years it has become warmer -0.342703
Temp_changeIn the last 5 years the average temperature has stayed roughly the same -0.157224
Climate_causeClimate change is occurring naturally 1.175945
Climate_causeOther 0.451677
Age -0.042749
SexMale 0.267246
EthnicityBlack -0.559261
EthnicityMixed 0.530318
EthnicityOther -0.091886
EthnicityWhite 0.386096
Employment_statusFull-Time 0.454135
Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) 0.646747
Employment_statusOther
```
0.844759
## Employment_statusPart-Time
0.769660
## Employment_statusUnemployed (and job seeking)
0.469990
## Student_statusYes
-0.274522
##
Std. Error
## (Intercept)
0.885087
## Agency_presentationAgency
0.185497
## Agency_presentationNo agency
0.184994
## Temp_changeIn the last 5 years it has become cooler
0.334462
## Temp_changeIn the last 5 years it has become warmer
0.182958
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.252060
## Climate_causeClimate change is occurring naturally
0.303822
## Climate_causeOther
0.275164
## Age
0.006089
## SexMale
0.140192
## EthnicityBlack
0.374357
## EthnicityMixed
0.358931
## EthnicityOther
0.498994
## EthnicityWhite
0.267561
## Employment_statusFull-Time
0.796595
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.814919
## Employment_statusOther
0.860934
## Employment_statusPart-Time
0.810485
## Employment_statusUnemployed (and job seeking)
0.814417
## Student_statusYes
0.209218
## z value
## (Intercept)
0.883
## Agency_presentationAgency
0.622
## Agency_presentationNo agency
0.622
## Temp_changeIn the last 5 years it has become cooler
-1.927
## Temp_changeIn the last 5 years it has become warmer
-1.873
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
-0.624
## Climate_causeClimate change is occurring naturally
3.871
## Climate_causeOther
1.641
## Age
-7.020
## SexMale
1.906
## EthnicityBlack
-1.494
## EthnicityMixed
1.477
## EthnicityOther
-0.184
## EthnicityWhite
1.443
## Employment_statusFull-Time
0.570
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.794
## Employment_statusOther
0.981
## Employment_statusPart-Time
0.950
## Employment_statusUnemployed (and job seeking)
0.577
## Student_statusYes
-1.312
##
```
Pr(>|z|)
## (Intercept)
0.377134
## Agency_presentationAgency
0.533717
## Agency_presentationNo agency
0.534210
## Temp_changeIn the last 5 years it has become cooler
0.053934
## Temp_changeIn the last 5 years it has become warmer
0.061051
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.532787
## Climate_causeClimate change is occurring naturally
0.000109
## Climate_causeOther
0.100698
## Age
2.21e-12
## SexMale
0.056613
## EthnicityBlack
0.135196
## EthnicityMixed
0.139543
## EthnicityOther
0.853901
## EthnicityWhite
0.149151
## Employment_statusFull-Time
0.568613
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.427409
## Employment_statusOther
0.326488
## Employment_statusPart-Time
0.342301
## Employment_statusUnemployed (and job seeking)
0.563880
## Student_statusYes
0.189474
## (Intercept)
## Agency_presentationAgency
## Agency_presentationNo agency
## Temp_changeIn the last 5 years it has become cooler
```
## Temp_change
In the last 5 years it has become warmer.

## Temp_change
In the last 5 years the average temperature has stayed roughly the same.

## Climate_cause
Climate change is occurring naturally.

### Agency_agency_red <- glm(Agency_binary ~ Agency_presentation + Climate_cause + Age, data = age_no_NA, family = "binomial"")

### summary(agency_agency_red)

### Call:

### glm(formula = Agency_binary ~ Agency_presentation + Climate_cause + Age, family = "binomial", data = age_no_NA)

### Deviance Residuals:

### Min 1Q Median 3Q Max
```r
tidy(agency_agency_red)
```

```
# A tibble: 6 × 5

  term                              estim¹ std.e² stati³ p.value
  <chr>                <dbl>  <dbl> <dbl>    <dbl>
1 (Intercept)          1.14   0.23   5.05  4.42e-07 ***
2 Agency_presentationAgency 0.18   0.17   1.09 2.78e- 1
3 Agency_presentationNo agency 0.17   0.16   1.03 3.06e- 0
4 Climate_causeClimate change is occurring naturally 1.16   0.27   4.36 1.29e-05 ***
5 Climate_causeOther      0.59   0.24   2.40 9.16e-02 *
6 Age                    0.00   0.00  -7.34 2.07e-13 ***
```
## 3 Agency_presentation
No agency                   0.168  0.165 1.02 3.06e- 1
## 4 Climate_cause
Climate change is occurring nat...  1.16  0.266 4.36 1.29e- 5
## 5 Climate_cause
Other                             0.586  0.244 2.40 1.64e- 2
## 6 Age
-0.0355 0.00483 -7.34 2.07e-13
## # ... with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_age_age <- tidy(agency_agency_red)$estimate[1]
s_age_age <- tidy(agency_agency_red)$estimate[2]
s_age_noage <- tidy(agency_agency_red)$estimate[3]
plogis(i_age_age + s_age_age * 0)

## [1] 0.7583325

plogis(i_age_age + s_age_age * 1)

## [1] 0.7896275

plogis(i_age_age + s_age_noage * 1)

## [1] 0.7878211

#Agency feasibility expanded
agency_feasibility_ex <- glm(Feasibility_binary ~ Agency_presentation + Temp_change + Climate_cause + Age + Sex + Ethnicity + Employment_status + Student_status, data = full_no_NA, family = "binomial")
summary(agency_feasibility_ex)

## Call:
glm(formula = Feasibility_binary ~ Agency_presentation + Temp_change + Climate_cause + Age + Sex + Ethnicity + Employment_status + Student_status, family = "binomial", data = full_no_NA)

## Deviance Residuals:
Min      1Q  Median      3Q     Max
-1.972   -1.251  0.845  1.027  1.693

## Coefficients:

Estimate
(Intercept)
-0.062301
## Agency_presentationAgency
-0.417238
## Agency_presentationNo agency
-0.275236
## Temp_changeIn the last 5 years it has become cooler
-0.072780
## Temp_changeIn the last 5 years it has become warmer
0.283846
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same -0.411867
## Climate_causeClimate change is occurring naturally
-0.626293
## Climate_causeOther
-0.249342
## Age
-0.010138
## SexMale
0.164930
## EthnicityBlack
0.258803
## EthnicityMixed
0.054279
## EthnicityOther
-0.317350
## EthnicityWhite
-0.009288
## Employment_statusFull-Time
0.778651
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.896822
## Employment_statusOther
1.087457
## Employment_statusPart-Time
0.895354
## Employment_statusUnemployed (and job seeking)
1.243310
## Student_statusYes
0.114695
##
## Std. Error
## (Intercept)
0.867062
## Agency_presentationAgency
0.184930
## Agency_presentationNo agency
0.184714
## Temp_changeIn the last 5 years it has become cooler
0.320089
## Temp_changeIn the last 5 years it has become warmer
0.178090
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.240251
## Climate_causeClimate change is occurring naturally
0.275322
## Climate_causeOther
0.260689
## Age
0.005639
## SexMale
0.138190
## EthnicityBlack
0.373024
## EthnicityMixed
0.363912
## EthnicityOther
0.493667
## EthnicityWhite
0.274524
## Employment_statusFull-Time
0.779164
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) 0.796151
## Employment_statusOther
0.843176
## Employment_statusPart-Time
0.792491
## Employment_statusUnemployed (and job seeking)
0.800225
## Student_statusYes
0.209544
## (Intercept)
-0.072
## Agency_presentationAgency
-2.257
## Agency_presentationNo agency
-1.490
## Temp_changeIn the last 5 years it has become cooler
-0.227
## Temp_changeIn the last 5 years it has become warmer
## Temp_change

In the last 5 years the average temperature has stayed roughly the same -1.714

## Climate_cause

Climate change is occurring naturally -2.275

## Climate_cause

Other -0.956

## Age

-1.798

## Sex

Male 1.193

## Ethnicity

Black 0.694

## Ethnicity

Mixed 0.149

## Ethnicity

Other -0.643

## Ethnicity

White -0.034

## Employment_status

Full-Time 0.999

## Employment_status

Not in paid work (e.g. homemaker', 'retired or disabled) 1.126

## Employment_status

Other 1.290

## Employment_status

Part-Time 1.130

## Employment_status

Unemployed (and job seeking) 1.554

## Student_status

Yes 0.547

## Pr(>|z|)

(Intercept) 0.9427

## Agency_presentation

Agency 0.0240

## Agency_presentation

No agency 0.1362

## Temp_change

In the last 5 years it has become cooler 0.8201

## Temp_change

In the last 5 years it has become warmer 0.1110

## Temp_change

In the last 5 years the average temperature has stayed roughly the same 0.0865

## Climate_cause

Climate change is occurring naturally
0.0229
## Climate_causeOther
0.3388
## Age
0.0722
## SexMale
0.2327
## EthnicityBlack
0.4878
## EthnicityMixed
0.8814
## EthnicityOther
0.5203
## EthnicityWhite
0.9730
## Employment_statusFull-Time
0.3176
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.2600
## Employment_statusOther
0.1971
## Employment_statusPart-Time
0.2586
## Employment_statusUnemployed (and job seeking)
0.1203
## Student_statusYes
0.5841
## (Intercept)
## Agency_presentationAgency
## Agency_presentationNo agency
## Temp_changeIn the last 5 years it has become cooler
## Temp_changeIn the last 5 years it has become warmer
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same .
## Climate_causeClimate change is occurring naturally
## Climate_causeOther
## Age
## SexMale
## EthnicityBlack
## EthnicityMixed
## EthnicityOther
## EthnicityWhite
## Employment_status

- Full-Time
- Not in paid work (e.g. homemaker', 'retired or disabled)
- Other
- Part-Time
- Unemployed (and job seeking)
- Student_status

---

### Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

### (Dispersion parameter for binomial family taken to be 1)

### Null deviance: 1381.6  on 1013  degrees of freedom
### Residual deviance: 1334.8  on  994  degrees of freedom
### (55 observations deleted due to missingness)
### AIC: 1374.8

### Number of Fisher Scoring iterations: 4

```r
agency_feasibility_red <- glm(Feasibility_binary ~ Agency_presentation + Climate_cause, data = doomism_data, family = "binomial")
summary(agency_feasibility_red)
```

### Call:
```
glm(formula = Feasibility_binary ~ Agency_presentation + Climate_cause, 
    family = "binomial", data = doomism_data)
```

### Deviance Residuals:
```
    Min       1Q   Median       3Q      Max
-1.4692 -1.2871  0.9114  1.0716  1.4620
```

### Coefficients:

<table>
<thead>
<tr>
<th>Term</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>0.1826</td>
</tr>
<tr>
<td>Agency_presentationAgency</td>
<td>-0.4098</td>
</tr>
<tr>
<td>Agency_presentationNo agency</td>
<td>-0.2494</td>
</tr>
<tr>
<td>Climate_causeClimate change is caused by human activity</td>
<td>0.4813</td>
</tr>
<tr>
<td>Climate_causeClimate change is occurring naturally</td>
<td>-0.4207</td>
</tr>
<tr>
<td></td>
<td>0.3205</td>
</tr>
</tbody>
</table>
## z value
Pr(>|z|)
## (Intercept) 0.709 0.4782
## Agency_presentationAgency -2.489 0.0128 *
## Agency_presentationNo agency -1.513 0.1304
## Climate_causeClimate change is caused by human activity 2.086 0.0370 *
## Climate_causeClimate change is occurring naturally -1.313 0.1893
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Dispersion parameter for binomial family taken to be 1)
## Null deviance: 1637.6 on 1200 degrees of freedom
## Residual deviance: 1612.6 on 1196 degrees of freedom
## AIC: 1622.6
## Number of Fisher Scoring iterations: 4

tidy(agency_feasibility_red)

## # A tibble: 5 × 5
##   term                                           estim...¹ std.e...²
##   <chr>                                            <dbl>   <dbl>
## 1 (Intercept)                                      0.183   0.257
## 0.709  0.478
## 2 Agency_presentationAgency                      -0.410   0.165 -
## 2.49   0.0128
## 3 Agency_presentationNo agency                   -0.249   0.165 -
## 1.51   0.130
## 4 Climate_causeClimate change is caused by huma...
## 2.09   0.0370
## 5 Climate_causeClimate change is occurring natu...
## -0.421   0.321 -
## 1.31   0.189
## # … with abbreviated variable names ¹estimate, ²std.error, statistic

i_feas_age <- tidy(agency_feasibility_red)$estimate[1]
s_age_feas_age <- tidy(agency_feasibility_red)$estimate[2]
s_noage_feas_age <- tidy(agency_feasibility_red)$estimate[3]
plogis(i_feas_age + s_age_feas_age * 0)
## [1] 0.5455216
plogis(i_feas_age + s_age_feas_age * 1)
## [1] 0.4434391
plogis(i_feas_age + s_noage_feas_age * 1)
## [1] 0.4833098

#Does agency differ significantly from no agency?
feas_age_noage <- glm(Feasibility_binary ~ Agency_presentation, data = age_noage, family = "binomial")
summary(feas_age_noage)

## Call:
## glm(formula = Feasibility_binary ~ Agency_presentation, family = "binomial",
##     data = age_noage)
##
## Deviance Residuals:
##     Min      1Q  Median      3Q     Max
## -1.312  -1.246   1.048   1.111   1.111
##
## Coefficients:
##                              Estimate Std. Error z value Pr(>|z|)
## (Intercept)                   0.15933    0.09177   1.736   0.0825 .
## Agency_presentationNo agency  0.15245    0.12989   1.174   0.2405
## ---
## Signif. codes:  * * * 0.001 ** 0.01 * 0.05 . 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 1321.7 on 962 degrees of freedom
## Residual deviance: 1320.3 on 961 degrees of freedom
## AIC: 1324.3
##
## Number of Fisher Scoring iterations: 4

#Urgency conditions expanded
urgency_condition1_ex <- glm(Urgency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, data = condition_1, family= "binomial")
summary(urgency_condition1_ex)
## Call:
## glm(formula = Urgency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, family = "binomial", data = condition_1)

## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.0001 -0.2408 -0.1356 -0.0811   2.9688

## Coefficients:

Estimate
(Intercept) -16.16695
ConditionCondition 1: Cliff edge agency -0.12834
Temp_changeIn the last 5 years it has become cooler 0.93440
Temp_changeIn the last 5 years it has become warmer -1.59540
Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.46831
Climate_causeClimate change is occurring naturally 1.55320
Climate_causeOther 1.30350
Age 0.02246
Sex Male 1.14951
Ethnicity Black 0.07584
Ethnicity Mixed 0.58294
Ethnicity Other 1.52073
Ethnicity White 0.05963
Student_status Yes -0.80757
Employment_status Full-Time 10.90426
Employment_status Not in paid work (e.g. homemaker', 'retired or disabled) 10.30848
## Employment_status

- Other: 12.32019
- Part-Time: 11.84976
- Unemployed (and job seeking): 11.53684

### Std. Error

- (Intercept): 1690.98806
- Condition: 0.64421
- Temp_change: 0.99497
- Climate_cause: 0.87849
- Age: 0.03108
- Sex: 0.77145
- Ethnicity: 1.74483
- Student_status: 1.31805
- Employment_status: 1690.98714
- Not in paid work (e.g. homemaker', 'retired or disabled): 1690.98749
- Other: 1690.98759
- Part-Time: 1690.98719
- Unemployed (and job seeking): 1690.98730
## z value

### (Intercept)
-0.010

### Condition
- Condition 1: Cliff edge agency
  -0.199

### Temp_change
- In the last 5 years it has become cooler
  0.939
- In the last 5 years it has become warmer
  -1.646

### Temp_change
- In the last 5 years the average temperature has stayed roughly the same
  0.550

### Climate_cause
- Climate change is occurring naturally
  1.768
- Other
  1.409

### Age
  0.723

### Sex
- Male
  1.490
- Female

### Ethnicity
- Black
  0.043
- Mixed
  0.336
- Other
  0.867
- White
  0.046

### Student_status
- Yes
  -0.613
- No

### Employment_status
- Full-Time
  0.006
- Not in paid work (e.g. homemaker', 'retired or disabled)
  0.006
- Other
  0.007
- Part-Time
  0.007
- Unemployed (and job seeking)
  0.007

### Pr(>|z|)

### (Intercept)
  0.9924

### Condition
- Condition 1: Cliff edge agency
  0.8421
urgency_condition1_red <- glm(Urgency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex, data = condition_1, family = "binomial")
summary(urgency_condition1_red)

# Call:
glm(formula = Urgency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex, family = "binomial", data = condition_1)

# Deviance Residuals:
Min 1Q Median 3Q Max
-1.06847 -0.24604 -0.13443 -0.08021 3.14772

# Coefficients:

Estimate
(Intercept) -4.2680813
Condition 1: Cliff edge agency -0.2787634
Temp_change In the last 5 years it has become cooler
1.4688167
## Temp_changeIn the last 5 years it has become warmer
-1.4971309
## Temp_changeIn the last 5 years the average temperature has stayed
roughly the same 0.7360744
## Climate_causeClimate change is occurring naturally
1.7459067
## Climate_causeOther
1.7146110
## Age
0.0008061
## SexMale
1.0429704
## Std. Error
## (Intercept)
1.1968127
## ConditionCondition 1: Cliff edge agency
0.6028358
## Temp_changeIn the last 5 years it has become cooler
0.8858470
## Temp_changeIn the last 5 years it has become warmer
0.9410731
## Temp_changeIn the last 5 years the average temperature has stayed
roughly the same 0.7721498
## Climate_causeClimate change is occurring naturally
0.7486344
## Climate_causeOther
0.7426073
## Age
0.0229674
## SexMale
0.6572929
## z value
## (Intercept)
-3.566
## ConditionCondition 1: Cliff edge agency
-0.462
## Temp_changeIn the last 5 years it has become cooler
1.658
## Temp_changeIn the last 5 years it has become warmer
-1.591
## Temp_changeIn the last 5 years the average temperature has stayed
roughly the same 0.953
## Climate_causeClimate change is occurring naturally
## Climate_causeOther

2.332

## Age

0.035

## SexMale

1.587

Pr(>|z|)

(Intercept) 0.000362

Condition

Condition 1: Cliff edge agency

0.643780

Temp_change

In the last 5 years it has become cooler

0.097299

In the last 5 years it has become warmer

0.111637

In the last 5 years the average temperature has stayed roughly the same

0.340449

Climate_cause

Climate change is occurring naturally

0.019694

Climate_causeOther

0.020949

Age

0.972003

SexMale

0.112566

(Intercept)

***

Condition

Condition 1: Cliff edge agency

Temp_change

In the last 5 years it has become cooler

Temp_change

In the last 5 years it has become warmer

Temp_change

In the last 5 years the average temperature has stayed roughly the same

Climate_cause

Climate change is occurring naturally

* *

Climate_causeOther

* *

Age

SexMale

---

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)
Null deviance: 139.41 on 466 degrees of freedom
Residual deviance: 104.93 on 458 degrees of freedom
(5 observations deleted due to missingness)
AIC: 122.93

Number of Fisher Scoring iterations: 7

tidy(urgency_condition1_red)

# A tibble: 9 × 5
#  term                                          estimate std.error statistic p.value
#  <chr>                                         <dbl>     <dbl>      <dbl>   <dbl>
# 1 (Intercept)                                   -4.27e+0   1.20        -3.57     3.62e-3
# 2 ConditionCondition 1: Cliff edge agency      -2.79e-1   0.60       -0.462    6.44e-1
# 3 Temp_changeIn the last 5 years it has become... 1.47e+0   0.886       1.66      9.73e-2
# 4 Temp_changeIn the last 5 years it has become... -1.50e+0   0.941      -1.59     1.12e-1
# 5 Temp_changeIn the last 5 years the average t... 7.36e-1   0.772       0.953    3.40e-1
# 6 Climate_causeClimate change is occurring nat... 1.75e+0   0.749       2.33      1.97e-2
# 7 Climate_causeOther                            1.71e+0   0.743       2.31      2.09e-2
# 8 Age                                          8.06e-4   0.023       0.0351   9.72e-1
# 9 SexMale                                       1.04e+0   0.657       1.59      1.13e-1

# ... with abbreviated variable names ¹std.error, ²statistic

i_urg_con1 <- tidy(urgency_condition1_red)$estimate[1]
s_urg_con1 <- tidy(urgency_condition1_red)$estimate[2]
plogis(i_urg_con1 + s_urg_con1 * 0)

[1] 0.01381511

plogis(i_urg_con1 + s_urg_con1 * 1)

[1] 0.01048941

urgency_condition2_ex <- glm(Urgency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, data = condition_2, family = "binomial")
## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred

summary(urgency_condition2_ex)

## Call:
## glm(formula = Urgency_binary ~ Condition + Temp_change +
## Climate_cause +
##     Age + Sex + Ethnicity + Student_status + Employment_status,
##     family = "binomial", data = condition_2)

## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.9187  -0.1229  -0.0562  -0.0122   3.4359

## Coefficients:
##              Estimate
## (Intercept)  -1.995e+01
## ConditionCondition 2: Cliff edge no agency  -6.290e-01
## Temp_changeIn the last 5 years it has become cooler  -2.213e-01
## Temp_changeIn the last 5 years it has become warmer  -2.622e+00
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same   4.854e-01
## Climate_causeClimate change is occurring naturally   3.333e+00
## Climate_causeOther  1.608e+00
## Age              2.507e-02
## SexMale          2.755e+00
## EthnicityBlack   -1.810e+01
## EthnicityMixed   -2.296e+00
## EthnicityOther   -2.596e-01
## EthnicityWhite   -1.893e+00
## Student_statusYes -1.610e+01
## Employment_status

- **Full-Time**: 1.504e+01
- **Not in paid work (e.g. homemaker', 'retired or disabled)**: 1.403e+01
- **Other**: -2.899e-01
- **Part-Time**: 1.598e+01
- **Unemployed (and job seeking)**: 1.650e+01

## Std. Error

- **(Intercept)**: 1.159e+04
- **Condition**: Condition 2: Cliff edge no agency
  - 7.919e-01
- **Temp_change**: In the last 5 years it has become cooler
  - 1.449e+00
  - In the last 5 years it has become warmer
  - 1.230e+00
  - In the last 5 years the average temperature has stayed roughly the same
  - 8.191e-01
- **Climate_cause**: Climate change is occurring naturally
  - 9.022e-01
- **Climate_cause**: Other
  - 1.099e+00
- **Age**: 3.101e-02
- **Sex**: Male
  - 1.253e+00
- **Ethnicity**: Black
  - 2.924e+03
- **Ethnicity**: Mixed
  - 1.666e+00
- **Ethnicity**: Other
  - 1.895e+00
- **Ethnicity**: White
  - 1.315e+00
- **Student_status**: Yes
  - 1.923e+03
- **Employment_status**: Full-Time
  - 1.159e+04
- **Employment_status**: Not in paid work (e.g. homemaker', 'retired or disabled)
  - 1.159e+04
- **Employment_status**: Other
  - 1.236e+04
## Employment_status

### Part-Time

1.159e+04

### Unemployed (and job seeking)

1.159e+04

### z value

#### (Intercept)

-0.002

#### Condition

Condition 2: Cliff edge no agency

-0.794

#### Temp_change

In the last 5 years it has become cooler

-0.153

In the last 5 years it has become warmer

-2.132

In the last 5 years the average temperature has stayed roughly the same

0.593

#### Climate_cause

Climate change is occurring naturally

3.694

#### Climate_cause

Other

1.463

#### Age

0.809

#### Sex

Male

2.199

#### Ethnicity

Black

-0.006

Mixed

-1.377

Other

-0.137

White

-1.440

#### Student_status

Yes

-0.008

#### Employment_status

Full-Time

0.001

Not in paid work (e.g. homemaker', 'retired or disabled)

0.001

Other

0.000

Part-Time

0.001

Unemployed (and job seeking)

0.001

Pr(>|z|)
## (Intercept)
0.998627
## Condition
## Condition 2: Cliff edge no agency
0.427064
## Temp_change
## In the last 5 years it has become cooler
0.878675
## Temp_change
## In the last 5 years it has become warmer
0.033046
## Temp_change
## In the last 5 years the average temperature has stayed roughly the same
0.553403
## Climate_cause
## Climate change is occurring naturally
0.000221
## Climate_cause
## Other
0.143531
## Age
0.418800
## Sex
## Male
0.027902
## Ethnicity
## Black
0.995060
## Ethnicity
## Mixed
0.168367
## Ethnicity
## Other
0.891058
## Ethnicity
## White
0.149835
## Student_status
## Yes
0.993320
## Employment_status
## Full-Time
0.998965
## Employment_status
## Not in paid work (e.g. homemaker', 'retired or disabled)
0.999034
## Employment_status
## Other
0.999981
## Employment_status
## Part-Time
0.998900
## Employment_status
## Unemployed (and job seeking)
0.998864
##
## (Intercept)
## Condition
## Condition 2: Cliff edge no agency
## Temp_change
## In the last 5 years it has become cooler
## Temp_change
## In the last 5 years it has become warmer
*  
## Temp_change
## In the last 5 years the average temperature has stayed roughly the same
## Climate_cause

Climate change is occurring naturally

***

## Climate_cause

Other

## Age

## Sex

Male

* 

## Ethnicity

Black

## Ethnicity

Mixed

## Ethnicity

Other

## Ethnicity

White

## Student_status

Yes

## Employment_status

Full-Time

## Employment_status

Not in paid work (e.g. homemaker, 'retired or disabled)

## Employment_status

Other

## Employment_status

Part-Time

## Employment_status

Unemployed (and job seeking)

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 134.518 on 401 degrees of freedom
Residual deviance:  66.247 on 383 degrees of freedom
(79 observations deleted due to missingness)
AIC: 104.25

Number of Fisher Scoring iterations: 19

urgency_condition2_red <- glm(Urgency_binary ~ Condition + Temp_change + Climate_cause + Sex, data = condition_2, family = "binomial")
summary(urgency_condition2_red)

Call:
glm(formula = Urgency_binary ~ Condition + Temp_change + Climate_cause + Sex, family = "binomial", data = condition_2)

Deviance Residuals:
Min    1Q Median    3Q    Max
-1.5386 -0.1331 -0.0834 -0.0247 3.1854

Coefficients:

  Estimate
<table>
<thead>
<tr>
<th>Term</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>z value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>-5.0670</td>
<td>0.9718</td>
<td>-5.214</td>
</tr>
<tr>
<td>Condition 2: Cliff edge no agency</td>
<td>-0.5917</td>
<td>0.6520</td>
<td>-0.908</td>
</tr>
<tr>
<td>Temp_change: In the last 5 years it has become cooler</td>
<td>0.6957</td>
<td>0.9382</td>
<td>0.742</td>
</tr>
<tr>
<td>Temp_change: In the last 5 years it has become warmer</td>
<td>-3.0274</td>
<td>1.1369</td>
<td>-2.663</td>
</tr>
<tr>
<td>Temp_change: In the last 5 years the average temperature has stayed roughly the same</td>
<td>0.3444</td>
<td>0.6534</td>
<td>0.527</td>
</tr>
<tr>
<td>Climate_cause: Climate change is occurring naturally</td>
<td>2.9844</td>
<td>0.7112</td>
<td></td>
</tr>
<tr>
<td>Climate_cause: Other</td>
<td>2.0246</td>
<td>0.8465</td>
<td></td>
</tr>
<tr>
<td>Sex: Male</td>
<td>2.5563</td>
<td>0.8808</td>
<td></td>
</tr>
</tbody>
</table>
## Climate_cause
Climate change is occurring naturally
4.196
## Climate_cause
Other
2.392
## Sex
Male
2.902

Pr(>|z|)
(Intercept)
1.85e-07
Condition
Condition 2: Cliff edge no agency
0.36409
Temp_changeIn the last 5 years it has become cooler
0.45836
Temp_changeIn the last 5 years it has become warmer
0.00775
Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.59815
Climate_cause
Climate change is occurring naturally
2.71e-05
Climate_cause
Other
0.01676
Sex
Male
0.00371

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 159.710 on 476 degrees of freedom
Residual deviance: 92.154 on 469 degrees of freedom
```r
### (4 observations deleted due to missingness)
### AIC: 108.15
###
### Number of Fisher Scoring iterations: 8

tidy(urgency_condition2_red)

## # A tibble: 8 × 5
## term                          estim...¹ std.e...² statistic p.value
## <chr>                       <dbl>   <dbl>   <dbl>   <dbl>
## 1 (Intercept)                -5.07    0.972  1.85e-7  5.21
## 2 ConditionCondition 2: Cliff edge no agency -0.592   0.652  3.64e-1  0.908
## 3 Temp_changeIn the last 5 years it has become ... 0.696   0.938  4.58e-1  0.742
## 4 Temp_changeIn the last 5 years it has become ... -3.03    1.14  7.75e-3  2.66
## 5 Temp_changeIn the last 5 years the average te... 0.344   0.653  5.98e-1  0.527
## 6 Climate_causeClimate change is occurring natu... 2.98    0.711  4.20  2.71e-5
## 7 Climate_causeOther          2.02    0.846  2.39  1.68e-2
## 8 SexMale                     2.56    0.881  2.90  3.71e-3
## # ... with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_urg_con2 <- tidy(urgency_condition2_red)$estimate[1]
s_urg_con2 <- tidy(urgency_condition2_red)$estimate[2]
plogis(i_urg_con2 + s_urg_con2 * 0)

## [1] 0.006261843

plogis(i_urg_con2 + s_urg_con2 * 1)

## [1] 0.003474774

urgency_condition3_ex <- glm(Urgency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, data = condition_3, family = "binomial")

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred

summary(urgency_condition3_ex)
```
## Call:
## glm(formula = Urgency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, family = "binomial", data = condition_3)

## Deviance Residuals:
##       Min        1Q    Median        3Q       Max
## -1.46085 -0.16354 -0.08881 -0.00003  3.05379

## Coefficients:
## Estimate
## (Intercept) -1.874e+01
## ConditionCondition 3: minefield agency 6.957e-01
## Temp_changeIn the last 5 years it has become cooler 4.400e-01
## Temp_changeIn the last 5 years it has become warmer -2.730e+00
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same -4.883e-01
## Climate_causeClimate change is occurring naturally 2.907e+00
## Climate_causeOther 6.093e-01
## Age 8.811e-03
## SexMale 1.609e+00
## EthnicityBlack -2.057e+01
## EthnicityMixed -1.954e+01
## EthnicityOther 6.569e-01
## EthnicityWhite -1.441e+00
## Student_statusYes -1.901e+01
## Employment_statusFull-Time 1.560e+01
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) 1.526e+01
## Employment_statusOther
-3.968e+00
## Employment_statusPart-Time
1.663e+01
## Employment_statusUnemployed (and job seeking)
1.582e+01
## Std. Error
## (Intercept)
1.527e+04
## ConditionCondition 3: minefield agency
6.865e-01
## Temp_changeIn the last 5 years it has become cooler
1.331e+00
## Temp_changeIn the last 5 years it has become warmer
1.043e+00
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 8.164e-01
## Climate_causeClimate change is occurring naturally
8.383e-01
## Climate_causeOther
1.224e+00
## Age
2.769e-02
## SexMale
8.109e-01
## EthnicityBlack
3.967e+03
## EthnicityMixed
5.159e+03
## EthnicityOther
2.034e+00
## EthnicityWhite
1.437e+00
## Student_statusYes
2.739e+03
## Employment_statusFull-Time
1.527e+04
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) 1.527e+04
## Employment_statusOther
1.607e+04
## Employment_statusPart-Time
1.527e+04
## Employment_statusUnemployed (and job seeking)
1.527e+04
## z value

### (Intercept)  
-0.001

### Condition
- Condition 3: minefield agency  
  1.013

### Temp_change
- In the last 5 years it has become cooler  
  0.331
- In the last 5 years it has become warmer  
  -2.618
- In the last 5 years the average temperature has stayed roughly the same  
  -0.598

### Climate_cause
- Climate change is occurring naturally  
  3.468
- Other  
  0.498

### Age  
0.318

### Sex
- Male  
  1.984

### Ethnicity
- Black  
  -0.005
- Mixed  
  -0.004
- Other  
  0.323
- White  
  -1.003

### Student_status
- Yes  
  -0.007

### Employment_status
- Full-Time  
  0.001
- Not in paid work (e.g. homemaker', 'retired or disabled)  
  0.001
- Other  
  0.000
- Part-Time  
  0.001
- Unemployed (and job seeking)  
  0.001

### Pr(>|z|)

### (Intercept)  
0.999021

### Condition
- Condition 3: minefield agency  
  0.310893
## Temp_change
In the last 5 years it has become cooler
0.740917
In the last 5 years it has become warmer
0.008846
In the last 5 years the average temperature has stayed roughly the same 0.549811
## Climate_cause
Climate change is occurring naturally
0.000524
## Climate_cause
Other
0.618499
## Age
0.750337
## Sex
Male
0.047228
## Ethnicity
Black
0.995863
## Ethnicity
Mixed
0.996977
## Ethnicity
Other
0.746737
## Ethnicity
White
0.315976
## Student_status
Yes
0.994463
## Employment_status
Full-Time
0.999185
## Employment_status
Not in paid work (e.g. homemaker', 'retired or disabled)
0.999203
## Employment_status
Other
0.999803
## Employment_status
Part-Time
0.999131
## Employment_status
Unemployed (and job seeking)
0.999173
## (Intercept)
## Condition
Condition 3: minefield agency
## Temp_change
In the last 5 years it has become cooler
## Temp_change
In the last 5 years it has become warmer
**
## Temp_change
In the last 5 years the average temperature has stayed roughly the same
## Climate_cause
Climate change is occurring naturally
***
## Climate_cause
Other
## Age
urgency_condition3_red <- glm(Urgency_binary ~ Condition + Sex + Climate_cause + Temp_change, data = condition_3, family = "binomial")
summary(urgency_condition3_red)

# Call:
# glm(formula = Urgency_binary ~ Condition + Sex + Climate_cause + Temp_change, family = "binomial", data = condition_3)
#
# Deviance Residuals:
#                    Min          1Q       Median          3Q          Max
# -1.1941     -0.2533     -0.1206     -0.0858      3.1393
#
# Coefficients:
# Estimate  Std. Error  z value
# (Intercept)    -3.9149      0.2832     -13.83
# SexMale          0.2832      0.0858      3.32
## Climate_cause

Climate change is occurring naturally

## Climate_causeOther

## Temp_change

In the last 5 years it has become cooler

In the last 5 years it has become warmer

In the last 5 years the average temperature has stayed roughly the same

## Std. Error

(Intercept)

ConditionCondition 3: minefield agency

SexMale

## Climate_cause

Climate change is occurring naturally

Climate_causeOther

## Temp_change

In the last 5 years it has become cooler

In the last 5 years it has become warmer

In the last 5 years the average temperature has stayed roughly the same

## z value

(Intercept)

ConditionCondition 3: minefield agency

SexMale

## Climate_cause

Climate change is occurring naturally

Climate_causeOther

## Temp_change

In the last 5 years it has become cooler

In the last 5 years it has become warmer

In the last 5 years the average temperature has stayed roughly the same
roughly the same  1.142
## Pr(>|z|)
## (Intercept)  
6.63e-08
## Condition
 Condition 3: minefield agency  
0.611130
## Sex
 Male  
0.241065
## Climate_cause
 Climate change is occurring naturally  
0.000282
## Climate_cause
 Other  
0.059548
## Temp_change
 In the last 5 years it has become cooler  
0.614684
## Temp_change
 In the last 5 years it has become warmer  
0.027692
## Temp_change
 In the last 5 years the average temperature has stayed roughly the same  
0.253275
## (Intercept)  
***
## Condition
 Condition 3: minefield agency
## Sex
 Male
## Climate_cause
 Climate change is occurring naturally
***
## Climate_cause
 Other.
## Temp_change
 In the last 5 years it has become cooler
## Temp_change
 In the last 5 years it has become warmer
*
## Temp_change
 In the last 5 years the average temperature has stayed roughly the same
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Dispersion parameter for binomial family taken to be 1)
##   Null deviance: 166.11  on 477  degrees of freedom
## Residual deviance: 115.53  on 470  degrees of freedom
## (4 observations deleted due to missingness)
## AIC: 131.53
##
## Number of Fisher Scoring iterations: 7
tidy(urgency_condition3_red)
```
## # A tibble: 8 × 5
##   term                                           estim…¹ std.e…² statistic p.value
##   <chr>                                            <dbl>   <dbl>   <dbl>   <dbl>
## 1 (Intercept)                                    -3.91    0.725   5.40   6.63e-8
## 2 ConditionCondition 3: minefield agency         0.283   0.557   0.508  6.11e-1
## 3 SexMale                                         0.683   0.582   1.17   2.41e-1
## 4 Climate_causeClimate change is occurring natu…   2.22    0.611   3.63   2.82e-4
## 5 Climate_causeOther                              1.42    0.756   1.88   5.95e-2
## 6 Temp_changeIn the last 5 years it has become …   0.491   0.976   0.503  6.15e-1
## 7 Temp_changeIn the last 5 years it has become …  -1.97    0.895   2.20   2.77e-2
## 8 Temp_changeIn the last 5 years the average te…   0.769   0.673   1.14   2.53e-1
## # … with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_urg_con3 <- tidy(urgency_condition3_red)$estimate[1]
s_urg_con3 <- tidy(urgency_condition3_red)$estimate[2]
plogis(i_urg_con3 + s_urg_con3 * 0)
## [1] 0.01955204
plogis(i_urg_con3 + s_urg_con3 * 1)
## [1] 0.02578654

urgency_condition4_ex <- glm(Urgency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, data = condition_4, family = "binomial")

## Warning: glm.fit: fitted probabilities numerically 0 or 1 occurred
summary(urgency_condition4_ex)
```

```
## Deviance Residuals:

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>1Q</th>
<th>Median</th>
<th>3Q</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-1.0947</td>
<td>-0.1664</td>
<td>-0.0780</td>
<td>0.0000</td>
<td>3.2631</td>
</tr>
</tbody>
</table>

## Coefficients:

- **Estimate**
  - (Intercept) \(-1.875e+01\)
  - Condition Condition 4: minefield no agency \(2.540e-02\)
  - Temp_change In the last 5 years it has become cooler \(5.310e-02\)
  - Temp_change In the last 5 years it has become warmer \(-2.986e+00\)
  - Temp_change In the last 5 years the average temperature has stayed roughly the same \(3.173e+01\)
  - Climate_cause Climate change is occurring naturally \(1.100e+00\)
  - Climate_cause Other \(1.545e-01\)
  - Age \(3.451e-02\)
  - Sex Male \(1.736e+00\)
  - Ethnicity Black \(-1.755e+01\)
  - Ethnicity Mixed \(-1.671e+01\)
  - Ethnicity Other \(7.763e-01\)
  - Ethnicity White \(-9.020e-01\)
  - Student_status Yes \(-3.062e-01\)
  - Employment_status Full-Time \(1.449e+01\)
  - Employment_status Not in paid work (e.g. homemaker', 'retired or disabled) \(-2.673e+00\)
  - Employment_status Other \(-1.389e+00\)
  - Employment_status Part-Time \(1.480e+01\)
  - Employment_status Unemployed (and job seeking) \(1.490e+01\)
## (Intercept) 9.541e+03

## Condition Condition 4: minefield no agency 6.660e-01

## Temp_change In the last 5 years it has become cooler 1.218e+00
## Temp_change In the last 5 years it has become warmer 1.137e+00

## Temp_change In the last 5 years the average temperature has stayed roughly the same 7.449e-01

## Climate_cause Climate change is occurring naturally 8.899e-01

## Climate_cause Other 1.162e+00

## Age 3.333e-02

## Sex Male 8.664e-01

## Ethnicity Black 2.849e+03

## Ethnicity Mixed 2.947e+03

## Ethnicity Other 1.830e+00

## Ethnicity White 1.286e+00

## Student_status Yes 1.181e+00

## Employment_status Full-Time 9.541e+03

## Employment_status Not in paid work (e.g. homemaker', 'retired or disabled) 9.731e+03

## Employment_status Other 1.022e+04

## Employment_status Part-Time 9.541e+03

## Employment_status Unemployed (and job seeking) 9.541e+03

## z value

## (Intercept) -0.002

## Condition Condition 4: minefield no agency 0.038
## Temp_change
In the last 5 years it has become cooler 0.044
## Temp_change
In the last 5 years it has become warmer -2.627
## Temp_change
In the last 5 years the average temperature has stayed roughly the same 0.426
## Climate_cause
Climate change is occurring naturally 1.236
## Climate_cause
Other 0.133
## Age
1.035
## Sex Male
2.003
## Ethnicity Black
-0.006
## Ethnicity Mixed
-0.006
## Ethnicity Other
0.424
## Ethnicity White
-0.701
## Student_status Yes
-0.259
## Employment_status Full-Time
0.002
## Employment_status Not in paid work (e.g. homemaker', 'retired or disabled)
0.000
## Employment_status Other
0.000
## Employment_status Part-Time
0.002
## Employment_status Unemployed (and job seeking)
0.002
## Pr(>|z|)
(Intercept) 0.99843
## Condition Condition 4: minefield no agency
0.96958
## Temp_change
In the last 5 years it has become cooler 0.96522
## Temp_change
In the last 5 years it has become warmer 0.00862
## Temp_change
In the last 5 years the average temperature has stayed roughly the same 0.67017
## Climate_cause
Climate change is occurring naturally 0.21644
## Climate_cause
Other 0.89419
## Age
0.30045
## Sex
Male 0.04516
## Ethnicity
Black 0.99508
## Ethnicity
Mixed 0.99548
## Ethnicity
Other 0.67148
## Ethnicity
White 0.48299
## Student_status
Yes 0.79544
## Employment_status
Full-Time 0.99879
## Employment_status
Not in paid work (e.g. homemaker', 'retired or disabled) 0.99978
## Employment_status
Other 0.99989
## Employment_status
Part-Time 0.99876
## Employment_status
Unemployed (and job seeking) 0.99875
## (Intercept)
## Condition
Condition 4: minefield no agency
## Temp_change
In the last 5 years it has become cooler
## Temp_change
In the last 5 years it has become warmer **
## Temp_change
In the last 5 years the average temperature has stayed roughly the same
## Climate_cause
Climate change is occurring naturally
## Climate_cause
Other
## Age
## Sex
Male *
## Ethnicity
Black
## Ethnicity
Mixed
## Ethnicity
Other
## Ethnicity
White
## Student_status
Yes
## Employment_status

- Full-Time
- Not in paid work (e.g. homemaker', 'retired or disabled)
- Other
- Part-Time
- Unemployed (and job seeking)

---

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 115.056  on 405  degrees of freedom
Residual deviance:  76.471  on 387  degrees of freedom
(74 observations deleted due to missingness)
AIC: 114.47

Number of Fisher Scoring iterations: 19

urgency_condition4_red <- glm(Urgency_binary ~ Condition + Sex + Temp_change, data = condition_4, family = "binomial")
summary(urgency_condition4_red)

## Call:
glm(formula = Urgency_binary ~ Condition + Sex + Temp_change, family = "binomial", data = condition_4)

## Deviance Residuals:
Min       1Q   Median       3Q      Max
-0.6237  -0.2260  -0.0973  -0.0515   3.2728

## Coefficients:

Estimate
(Intercept)        -3.6544
ConditionCondition 4: minefield no agency    -0.1696
SexMale            1.4430
Temp_changeIn the last 5 years it has become cooler    0.5141
Temp_changeIn the last 5 years it has become warmer     -2.9697
Temp_changeIn the last 5 years the average temperature has stayed roughly the same    0.6731
## Std. Error

### (Intercept)
0.7456

### Condition: Condition 4: minefield no agency
0.5701

### Sex: Male
0.6811

### Temp_change

- In the last 5 years it has become cooler: 0.8894
- In the last 5 years it has become warmer: 1.1060
- In the last 5 years the average temperature has stayed roughly the same: 0.6417

## z value

### (Intercept)
-4.901

### Condition: Condition 4: minefield no agency
-0.298

### Sex: Male
2.119

### Temp_change

- In the last 5 years it has become cooler: 0.578
- In the last 5 years it has become warmer: -2.685
- In the last 5 years the average temperature has stayed roughly the same: 1.049

## Pr(>|z|)

### (Intercept)
9.51e-07

### Condition: Condition 4: minefield no agency
0.76604

### Sex: Male
0.03411

### Temp_change

- In the last 5 years it has become cooler: 0.56323
- In the last 5 years it has become warmer: 0.00725
- In the last 5 years the average temperature has stayed roughly the same: 0.29421

### (Intercept)
***

### Condition: Condition 4: minefield no agency
--

## SexMale

* 

## Temp_changeIn the last 5 years it has become cooler 

## Temp_changeIn the last 5 years it has become warmer 

** 

## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 

--- 

## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1 

## (Dispersion parameter for binomial family taken to be 1) 

##  Null deviance: 126.262 on 474 degrees of freedom 

## Residual deviance: 98.371 on 469 degrees of freedom 

## (5 observations deleted due to missingness) 

## AIC: 110.37

## Number of Fisher Scoring iterations: 8

tidy(urgency_condition4_red)

## # A tibble: 6 × 5 

## term                                           estim...¹ std.e...² status...³ p.value

## <chr>                                            <dbl>   <dbl>   <dbl>      

## 1 (Intercept)                                      -3.65    0.746 9.51e-7

## 2 ConditionCondition 4: minefield no agency       -0.170   0.570 7.66e-1

## 3 SexMale                                          1.44    0.681 3.41e-2

## 4 Temp_changeIn the last 5 years it has become ...   0.514   0.889 5.63e-1

## 5 Temp_changeIn the last 5 years it has become ...   -2.97    1.11 7.25e-3

## 6 Temp_changeIn the last 5 years the average te...   0.673   0.642 2.94e-1

## # … with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_urg_con4 <- tidy(urgency_condition4_red)$estimate[1]
s_urg_con4 <- tidy(urgency_condition4_red)$estimate[2]
plogis(i_urg_con4 + s_urg_con4 * 0)

## [1] 0.02522379
plogis(i_urg_con4 + s_urg_con4 * 1)

## [1] 0.021372

#Agency conditions expanded
agency_condition1_ex <- glm(Agency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, data = condition_1, family = "binomial")
summary(agency_condition1_ex)

##
## Call:
## glm(formula = Agency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, 
##     family = "binomial", data = condition_1)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.9519 -1.1052  -0.3804   1.0632   2.1671
##
## Coefficients:
## Estimate
## (Intercept)  1.59512
## ConditionCondition 1: Cliff edge agency 0.16726
## Temp_changeIn the last 5 years it has become cooler -0.83817
## Temp_changeIn the last 5 years it has become warmer -0.31901
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same -0.25901
## Climate_causeClimate change is occurring naturally 1.07232
## Climate_causeOther 1.31460
## Age -0.04174
## SexMale 0.20868
## EthnicityBlack -0.69192
## EthnicityMixed 0.34339
## Ethnicity

- Other: 0.49043
- White: 0.44350

## Student_status

- Yes: -0.17606

## Employment_status

- Full-Time: -0.40536
- Not in paid work (e.g. homemaker, retired or disabled): -0.52623
- Other: 0.26248
- Part-Time: -0.46512
- Unemployed (and job seeking): -0.10325

## Climate_cause

- Climate change is occurring naturally: 0.49577
- Other: 0.54317

## Age

- 0.01055

## Sex

- Male: 0.23012

## Ethnicity

- Black: 0.61235
- Mixed: 0.62061
- Other: 0.77731
- White: 0.42339

## Student_status

- Yes: 0.33965
## Employment_status

- **Full-Time**: 1.49736
- **Not in paid work (e.g. homemaker', 'retired or disabled)**: 1.52304
- **Other**: 1.61629
- **Part-Time**: 1.51932
- **Unemployed (and job seeking)**: 1.52899

## Employment_status

- **Full-Time**: 0.271
- **Not in paid work (e.g. homemaker', 'retired or disabled)**: -0.346
- **Other**: 0.162

## z value

- **(Intercept)**: 0.987
- **Condition 1: Cliff edge agency**: 0.766
- **Temp_changeIn the last 5 years it has become cooler**: -1.519
- **Temp_changeIn the last 5 years it has become warmer**: -1.078
- **Temp_changeIn the last 5 years the average temperature has stayed roughly the same**: -0.606
- **Climate_causeClimate change is occurring naturally**: 2.163
- **Climate_causeOther**: 2.420
- **Age**: -3.958
- **SexMale**: 0.907
- **EthnicityBlack**: -1.130
- **EthnicityMixed**: 0.553
- **EthnicityOther**: 0.631
- **EthnicityWhite**: 1.047
- **Student_statusYes**: -0.518
- **Employment_statusFull-Time**: -0.271
- **Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)**: -0.346
- **Employment_statusOther**: 0.162
## Employment_status

- **Part-Time**
  - 0.306
- **Unemployed (and job seeking)**
  - 0.068

**Pr(>|z|)**

- **(Intercept)**
  - 0.3239

- **Condition**: Condition 1: Cliff edge agency
  - 0.4435

- **Temp_change**: In the last 5 years it has become cooler
  - 0.1288
- **Temp_change**: In the last 5 years it has become warmer
  - 0.2811
- **Temp_change**: In the last 5 years the average temperature has stayed roughly the same
  - 0.5442

- **Climate_cause**: Climate change is occurring naturally
  - 0.0305

- **Climate_cause**: Other
  - 0.0155

- **Age**: 7.54e-05

- **Sex**: Male
  - 0.3645

- **Ethnicity**: Black
  - 0.2585
- **Ethnicity**: Mixed
  - 0.5800
- **Ethnicity**: Other
  - 0.5281
- **Ethnicity**: White
  - 0.2949

- **Student_status**: Yes
  - 0.6042

- **Employment_status**: Full-Time
  - 0.7866

- **Employment_status**: Not in paid work (e.g. homemaker', 'retired or disabled)
  - 0.7297

- **Employment_status**: Other
  - 0.8710

- **Employment_status**: Part-Time
  - 0.7595

- **Employment_status**: Unemployed (and job seeking)
  - 0.9462

- **(Intercept)**
## Condition

### Condition 1: Cliff edge agency
- Temp_changeIn the last 5 years it has become cooler
- Temp_changeIn the last 5 years it has become warmer
- Temp_changeIn the last 5 years the average temperature has stayed roughly the same
### Climate_cause
- Climate change is occurring naturally
  * 
- Climate_causeOther
  * 
### Age
  ***
### Sex
- Male
### Ethnicity
- Black
- Mixed
- Other
- White
### Student_status
- Yes
### Employment_status
- Full-Time
- Not in paid work (e.g. homemaker', 'retired or disabled)
- Other
- Part-Time
- Unemployed (and job seeking)
### Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
### (Dispersion parameter for binomial family taken to be 1)
### Null deviance: 543.42 on 391 degrees of freedom
### Residual deviance: 490.38 on 373 degrees of freedom
### (80 observations deleted due to missingness)
### AIC: 528.38
### Number of Fisher Scoring iterations: 4

```r
agency_condition1_red <- glm(Agency_binary ~ Condition + Climate_cause + Age, data = condition_1, family = "binomial")
summary(agency_condition1_red)
```

### Call:
```r
glm(formula = Agency_binary ~ Condition + Climate_cause + Age, 
   family = "binomial", data = condition_1)
```
### Deviance Residuals:
```r
   Min     1Q Median     3Q    Max
```
## Coefficients:

| Term                                | Estimate | Std. Error | z value | Pr(>|z|) |
|-------------------------------------|----------|------------|---------|----------|
| (Intercept)                         | 1.225    | 0.325      | 3.77    | 0.000*** |
| ConditionCondition 1: Cliff edge agency | 0.206    | 0.194      | 1.06    | 0.289    |
| Climate_causeClimate change is occurring naturally | 0.923    | 0.425      | 2.17    | 0.029*   |
| Climate_causeOther                  | 1.609    | 0.510      | 3.15    | 0.002**  |
| Age                                 | -0.038   | 0.008      | -4.89   | <3.20e-7*** |

---

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 648.75 on 467 degrees of freedom
Residual deviance: 603.28 on 463 degrees of freedom
(4 observations deleted due to missingness)

AIC: 613.28

Number of Fisher Scoring iterations: 4

tidy(agency_condition1_red)

# A tibble: 5 × 5
table
  term                                estim...¹ std.e...² stati...³ p.value
    <chr>                              <dbl>  <dbl> <chr>     <dbl>
1 (Intercept)                        1.23   0.325 3.77  1.62e-4
2 ConditionCondition 1: Cliff edge agency | 0.206 | 0.194 1.06 2.89e-1
3 Climate_causeClimate change is occurring naturally | 0.923 | 0.425 2.17 2.96e-2


```r
## 4 Climate_causeOther                              1.61   0.510
3.15 1.61e-3
## 5 Age
-0.0384 0.00784
-4.90 9.75e-7
## # ... with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_age_con1 <- tidy(agency_condition1_red)$estimate[1]
s_age_con1 <- tidy(agency_condition1_red)$estimate[2]
plogis(i_age_con1 + s_age_con1 * 0)
## [1] 0.7729607
plogis(i_age_con1 + s_age_con1 * 1)
## [1] 0.8070662

agency_condition2_ex <- glm(Agency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, data = condition_2, family = "binomial")
summary(agency_condition2_ex)
```

```r
## Call:
## glm(formula = Agency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, data = condition_2, family = "binomial")
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.3855 -1.0229 -0.5804  1.1160  2.1663
## Coefficients:
##             Estimate
## (Intercept) -12.810546
## ConditionCondition 2: Cliff edge no agency 0.031417
## Temp_changeIn the last 5 years it has become cooler -1.615462
## Temp_changeIn the last 5 years it has become warmer -0.820050
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same -0.550837
## Climate_causeClimate change is occurring naturally
```
1.498639
## Climate_causeOther
0.511730
## Age
-0.032724
## SexMale
0.387105
## EthnicityBlack
-1.321759
## EthnicityMixed
-0.498218
## EthnicityOther
-0.361100
## EthnicityWhite
0.035982
## Student_statusYes
0.232759
## Employment_statusFull-Time
14.395607
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
14.434783
## Employment_statusOther
14.714909
## Employment_statusPart-Time
14.385086
## Employment_statusUnemployed (and job seeking)
14.121235
## ConditionCondition 2: Cliff edge no agency
0.219362
## Temp_changeIn the last 5 years it has become cooler
0.554568
## Temp_changeIn the last 5 years it has become warmer
0.302273
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.416488
## Climate_causeClimate change is occurring naturally
0.532205
## Climate_causeOther
0.446832
## Age
0.009662
## SexMale
0.231923
## EthnicityBlack
0.670967
## EthnicityMixed
0.581609
## EthnicityOther
0.748727
## EthnicityWhite
0.441486
## Student_statusYes
0.367377
## Employment_statusFull-Time
579.502476
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
579.502532
## Employment_statusOther
579.502813
## Employment_statusPart-Time
579.502526
## Employment_statusUnemployed (and job seeking)
579.502551
## z value
## (Intercept)
-0.022
## ConditionCondition 2: Cliff edge no agency
0.143
## Temp_changeIn the last 5 years it has become cooler
-2.913
## Temp_changeIn the last 5 years it has become warmer
-2.713
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
-1.323
## Climate_causeClimate change is occurring naturally
2.816
## Climate_causeOther
1.145
## Age
-3.387
## SexMale
1.669
## EthnicityBlack
-1.970
## EthnicityMixed
-0.857
## EthnicityOther
-0.482
## EthnicityWhite
0.082
## Student_statusYes
0.634
## Employment_statusFull-Time
0.025
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.025
## Employment_statusOther
0.025
## Employment_statusPart-Time
0.025
## Employment_statusUnemployed (and job seeking)
0.024
##
Pr(>|z|)
## (Intercept)
0.982363
## ConditionCondition 2: Cliff edge no agency
0.886117
## Temp_changeIn the last 5 years it has become cooler
0.003580
## Temp_changeIn the last 5 years it has become warmer
0.006669
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.185976
## Climate_causeClimate change is occurring naturally
0.004864
## Climate_causeOther
0.252110
## Age
0.000707
## SexMale
0.095096
## EthnicityBlack
0.048846
## EthnicityMixed
0.391656
## EthnicityOther
0.629603
## EthnicityWhite
0.935043
## Student_statusYes
0.526362
## Employment_statusFull-Time
0.980182
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) 0.980128
## Employment_statusOther
0.979742
## Employment_statusPart-Time
0.980196
## Employment_statusUnemployed (and job seeking) 0.980559
##
## (Intercept)
## ConditionCondition 2: Cliff edge no agency
## Temp_changeIn the last 5 years it has become cooler  **
## Temp_changeIn the last 5 years it has become warmer  **
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
## Climate_causeClimate change is occurring naturally  **
## Climate_causeOther
## Age
### Sex Male
## EthnicityBlack *
## EthnicityMixed
## EthnicityOther
## EthnicityWhite
## Student_statusYes
## Employment_statusFull-Time
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
## Employment_statusOther
## Employment_statusPart-Time
## Employment_statusUnemployed (and job seeking)
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 556.09  on 401  degrees of freedom
## Residual deviance: 496.74  on 383  degrees of freedom
## (79 observations deleted due to missingness)
## AIC: 534.74
## Number of Fisher Scoring iterations: 13

```r
agency_condition2_red <- glm(Agency_binary ~ Condition + Climate_cause + Age + Ethnicity + Temp_change, data = condition_2, family = "binomial")
summary(agency_condition2_red)
```

```
## Call:
## glm(formula = Agency_binary ~ Condition + Climate_cause + Age + Ethnicity + Temp_change, family = "binomial", data = condition_2)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.3276  -1.0522  -0.5838  1.1191  2.1826
##
## Coefficients:
##
## (Intercept)          1.622884
## ConditionCondition 2: Cliff edge no agency          0.065424
## Climate_causeClimate change is occurring naturally  1.640109
## Climate_causeOther                                           0.466323
## Age                                                           -0.033818
## EthnicityBlack                                                -1.428124
## EthnicityMixed                                                -0.520262
## EthnicityOther                                                0.038108
## EthnicityWhite                                                0.089419
## Temp_changeIn the last 5 years it has become cooler           -1.361564
## Temp_changeIn the last 5 years it has become warmer           -0.626628
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same -0.599408
```
Std. Error
## (Intercept)
0.479643
## Condition
Condition 2: Cliff edge no agency
0.196577
## Climate_cause
Climate change is occurring naturally
0.497239
## Climate_cause
Other
0.412488
## Age
0.008063
## Ethnicity
Black
0.618620
## Ethnicity
Mixed
0.513390
## Ethnicity
Other
0.657492
## Ethnicity
White
0.377587
## Temp_change
In the last 5 years it has become cooler
0.516632
## Temp_change
In the last 5 years it has become warmer
0.262588
## Temp_change
In the last 5 years the average temperature has stayed roughly the same
0.375727
## z value
## (Intercept)
3.384
## Condition
Condition 2: Cliff edge no agency
0.333
## Climate_cause
Climate change is occurring naturally
3.298
## Climate_cause
Other
1.131
## Age
-4.194
## Ethnicity
Black
-2.309
## Ethnicity
Mixed
-1.013
## Ethnicity
Other
0.058
## Ethnicity
White
0.237
## Temp_change
In the last 5 years it has become cooler
-2.635
## Temp_changeIn the last 5 years it has become warmer
-2.386
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same -1.595
## Pr(>|z|)
## (Intercept) 0.000716
## ConditionCondition 2: Cliff edge no agency 0.739272
## Climate_causeClimate change is occurring naturally 0.000972
## Climate_causeOther 0.258261
## Age 2.74e-05
## EthnicityBlack 0.020968
## EthnicityMixed 0.310876
## EthnicityOther 0.953780
## EthnicityWhite 0.812799
## Temp_changeIn the last 5 years it has become cooler 0.008402
## Temp_changeIn the last 5 years it has become warmer 0.017016
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.110639
## (Intercept) ***
## ConditionCondition 2: Cliff edge no agency ***
## Climate_causeClimate change is occurring naturally ***
## Climate_causeOther
## Age ***
## EthnicityBlack *
## EthnicityMixed
## EthnicityOther
## EthnicityWhite
## Temp_changeIn the last 5 years it has become cooler
**

## Temp_change

### In the last 5 years it has become warmer

### In the last 5 years the average temperature has stayed roughly the same

---

### Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

### (Dispersion parameter for binomial family taken to be 1)

### Null deviance: 654.40  on 472 degrees of freedom

### Residual deviance: 599.15  on 461 degrees of freedom

### (8 observations deleted due to missingness)

### AIC: 623.15

### Number of Fisher Scoring iterations: 4

tidy(agency_condition2_red)

### # A tibble: 12 × 5

<table>
<thead>
<tr>
<th>term</th>
<th>estim.¹</th>
<th>std.e.²</th>
<th>stati.³</th>
<th>p.value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>1.62</td>
<td>0.480</td>
<td>3.38</td>
<td>7.16e-4</td>
</tr>
<tr>
<td>Condition</td>
<td>Condition 2: Cliff edge no agency</td>
<td>0.0654</td>
<td>0.197</td>
<td>0.333</td>
</tr>
<tr>
<td>Climate_cause</td>
<td>Climate change is occurring nat...</td>
<td>1.64</td>
<td>0.497</td>
<td>3.30</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0338</td>
<td>0.00806</td>
<td>-4.19</td>
<td>2.74e-5</td>
</tr>
<tr>
<td>EthnicityBlack</td>
<td>-1.43</td>
<td>0.619</td>
<td>-2.31</td>
<td>2.10e-2</td>
</tr>
<tr>
<td>EthnicityMixed</td>
<td>-0.520</td>
<td>0.513</td>
<td>-1.01</td>
<td>3.11e-1</td>
</tr>
<tr>
<td>EthnicityOther</td>
<td>0.0381</td>
<td>0.657</td>
<td>0.0580</td>
<td>9.54e-1</td>
</tr>
<tr>
<td>EthnicityWhite</td>
<td>0.0894</td>
<td>0.378</td>
<td>0.237</td>
<td>8.13e-1</td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become warmer</td>
<td>-1.36</td>
<td>0.517</td>
<td>-2.64</td>
<td>8.40e-3</td>
</tr>
<tr>
<td>Temp_changeIn the last 5 years it has become warmer</td>
<td>-0.627</td>
<td>0.263</td>
<td>-2.39</td>
<td>1.70e-2</td>
</tr>
</tbody>
</table>
## 12 Temp_change
In the last 5 years the average temperature has become cooler -0.732148
-1.60 1.11e-1

## # … with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_age_con2 <- tidy(agency_condition2_red)$estimate[1]
s_age_con2 <- tidy(agency_condition2_red)$estimate[2]
plogis(i_age_con2 + s_age_con2 * 0)

## [1] 0.8351925

plogis(i_age_con2 + s_age_con2 * 1)

## [1] 0.8440015

agency_condition3_ex <- glm(Agency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, data = condition_3, family = "binomial")
summary(agency_condition3_ex)

##
## Call:
## glm(formula = Agency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, data = condition_3, family = "binomial")
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -2.1438  -1.0352  -0.5343  1.0671  2.0756
##
## Coefficients:
##
## Estimate
## (Intercept) 0.698905
## ConditionCondition 3: minefield agency 0.060736
## Temp_changeIn the last 5 years it has become cooler -0.732148
## Temp_changeIn the last 5 years it has become warmer -0.458253
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same -0.179157
## Climate_causeClimate change is occurring naturally 1.587975
## Climate_causeOther
0.836959
## Age
-0.041644
## SexMale
0.325347
## EthnicityBlack
-1.126517
## EthnicityMixed
-0.376474
## EthnicityOther
0.233937
## EthnicityWhite
0.414899
## Student_statusYes
-0.361721
## Employment_statusFull-Time
0.528746
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.736193
## Employment_statusOther
1.104577
## Employment_statusPart-Time
1.039991
## Employment_statusUnemployed (and job seeking)
0.578903
##
Std. Error
## (Intercept)
1.458434
## ConditionCondition 3: minefield agency
0.218480
## Temp_changeIn the last 5 years it has become cooler
0.593814
## Temp_changeIn the last 5 years it has become warmer
0.307824
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.421219
## Climate_causeClimate change is occurring naturally
0.525406
## Climate_causeOther
0.520613
## Age
0.009707
## SexMale
0.227379
## EthnicityBlack
0.630709
## EthnicityMixed
0.632091
## EthnicityOther
0.887552
## EthnicityWhite
0.451628
## Student_statusYes
0.343653
## Employment_statusFull-Time
1.312946
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
1.348725
## Employment_statusOther
1.405176
## Employment_statusPart-Time
1.338062
## Employment_statusUnemployed (and job seeking)
1.342084
##
## z value
## (Intercept)
0.479
## ConditionCondition 3: minefield agency
0.278
## Temp_changeIn the last 5 years it has become cooler
-1.233
## Temp_changeIn the last 5 years it has become warmer
-1.489
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same -0.425
## Climate_causeClimate change is occurring naturally
3.022
## Climate_causeOther
1.608
## Age
-4.290
## SexMale
1.431
## EthnicityBlack
-1.786
## EthnicityMixed
-0.596
## EthnicityOther
0.264
## EthnicityWhite
| Variable                          | Coefficient | Pr(>|z|) |
|----------------------------------|-------------|---------|
| Student_statusYes                | -1.053      | 0.919   |
| Employment_statusFull-Time       | 0.403       | 0.777   |
| Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) | 0.546      |
| Employment_statusOther           | 0.786       |         |
| Employment_statusPart-Time       | 0.777       |         |
| Employment_statusUnemployed (and job seeking) | 0.431   |
| (Intercept)                      | 0.63178     |         |
| ConditionCondition 3: minefield agency | 0.78102   |
| Temp_changeIn the last 5 years it has become cooler | 0.21759 |
| Temp_changeIn the last 5 years it has become warmer | 0.13657 |
| Temp_changeIn the last 5 years the average temperature has stayed roughly the same | 0.67060 |
| Climate_causeClimate change is occurring naturally | 0.00251 |
| Climate_causeOther               | 0.10791     |         |
| Age                              | 1.78e-05    |         |
| SexMale                          | 0.15247     |         |
| EthnicityBlack                   | 0.07408     |         |
| EthnicityMixed                   | 0.55144     |         |
| EthnicityOther                   | 0.79211     |         |
| EthnicityWhite                   | 0.35827     |         |
| Student_statusYes                | 0.29254     |         |
| Employment_statusFull-Time       | 0.68716     |         |
| Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) | 0.546      |
disabled) 0.58517
## Employment_statusOther
0.43182
## Employment_statusPart-Time
0.43702
## Employment_statusUnemployed (and job seeking)
0.66622
## (Intercept)
## ConditionCondition 3: minefield agency
## Temp_changeIn the last 5 years it has become cooler
## Temp_changeIn the last 5 years it has become warmer
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
## Climate_causeClimate change is occurring naturally
**
## Climate_causeOther
## Age
***
## SexMale
## EthnicityBlack
.
## EthnicityMixed
## EthnicityOther
## EthnicityWhite
## Student_statusYes
## Employment_statusFull-Time
## Employment_statusNot in paid work (e.g. homemaker’, ‘retired or disabled)
## Employment_statusOther
## Employment_statusPart-Time
## Employment_statusUnemployed (and job seeking)
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Dispersion parameter for binomial family taken to be 1)
## Null deviance: 556.29 on 401 degrees of freedom
## Residual deviance: 496.58 on 383 degrees of freedom
## (80 observations deleted due to missingness)
## AIC: 534.58
## Number of Fisher Scoring iterations: 4
agency_condition3_red <- glm(Agency_binary ~ Condition + Climate_cause + Age, data = condition_3, family = "binomial")
summary(agency_condition3_red)

## Call:
## glm(formula = Agency_binary ~ Condition + Climate_cause + Age, family = "binomial", data = condition_3)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.9783 -1.1111  -0.7195   1.1516   1.7194

## Coefficients:
##                           Estimate Std. Error z value
## (Intercept)                           0.88614   0.30518   2.904
## ConditionCondition 3: minefield agency 0.12375   0.18988   0.652
## Climate_causeClimate change is occurring naturally 1.53597   0.45357   3.386
## Climate_causeOther                    0.97269   0.44052   2.208
## Age                                    -0.02965   0.00721 -4.113
##
## Pr(>|z|)                 
## (Intercept)                           0.003689 **
## ConditionCondition 3: minefield agency 0.514563
## Climate_causeClimate change is occurring naturally 0.000708 ***
## Climate_causeOther                    0.027240 *
## Age                                    3.91e-05 ***

## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 662.24  on 477  degrees of freedom
## Residual deviance: 627.44  on 473  degrees of freedom
## (4 observations deleted due to missingness)
## AIC: 637.44
##
## Number of Fisher Scoring iterations: 4

tidy(agency_condition3_red)
## # A tibble: 5 × 5
## #   term                                           estim...¹ std.e...²  stati...³ p.value
## #   <chr>                                            <dbl>   <dbl>   <dbl>  <dbl>
## 1 (Intercept)                                     0.886  0.305   2.90  3.69e-3
## 2 ConditionCondition 3: minefield agency          0.124  0.190  0.652 5.15e-1
## 3 Climate_causeClimate change is occurring natu... 1.54   0.454  3.39  7.08e-4
## 4 Climate_causeOther                              0.973  0.441  2.21  2.72e-2
## 5 Age                                             -0.0297 0.00721 4.11  3.91e-5
## # ... with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_age_con3 <- tidy(agency_condition3_red)$estimate[1]
s_age_con3 <- tidy(agency_condition3_red)$estimate[2]
plogis(i_age_con3 + s_age_con3 * 0)

## [1] 0.7080933

plogis(i_age_con3 + s_age_con3 * 1)

## [1] 0.7329998

agency_condition4_ex <- glm(Agency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, data = condition_4, family = "binomial")
supply(agency_condition4_ex)

## Call:
## glm(formula = Agency_binary ~ Condition + Temp_change + Climate_cause + Age + Sex + Ethnicity + Student_status + Employment_status, family = "binomial", data = condition_4)

## Deviance Residuals:
##    Min      1Q  Median     3Q      Max
## -1.9967 -1.0377  0.4425  0.9942  2.0819

## Coefficients:
##
## Estimate
## (Intercept)  0.86627
## ConditionCondition 4: minefield no agency  0.21344
## Temp_changeIn the last 5 years it has become cooler  0.02423
## Temp_changeIn the last 5 years it has become warmer -0.15014
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same -0.23588
## Climate_causeClimate change is occurring naturally  1.69762
## Climate_causeOther  0.51455
## Age -0.06467
## SexMale  0.53430
## EthnicityBlack -0.36540
## EthnicityMixed  0.66986
## EthnicityOther  0.94514
## EthnicityWhite  0.76911
## Student_statusYes -0.72198
## Employment_statusFull-Time  0.59958
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)  0.87212
## Employment_statusOther  1.38036
## Employment_statusPart-Time  1.15923
## Employment_statusUnemployed (and job seeking)  0.34961

## Std. Error
## (Intercept)  1.45188
## ConditionCondition 4: minefield no agency  0.22212
## Temp_changeIn the last 5 years it has become cooler  0.54213
## Temp_change
In the last 5 years it has become warmer
0.29819

## Temp_change
In the last 5 years the average temperature has stayed roughly the same
0.42698

## Climate_cause
Climate change is occurring naturally
0.50471

## Climate_cause
Other
0.46879

## Age
0.01094

## Sex
Male
0.23030

## Ethnicity
Black
0.61794

## Ethnicity
Mixed
0.56934

## Ethnicity
Other
0.98155

## Ethnicity
White
0.43485

## Student_status
Yes
0.34496

## Employment_status
Full-Time
1.33462

## Employment_status
Not in paid work (e.g. homemaker', 'retired or disabled)
1.36710

## Employment_status
Other
1.42538

## Employment_status
Part-Time
1.36315

## Employment_status
Unemployed (and job seeking)
1.37284

## z value
(Intercept)
0.597

## Condition
Condition 4: minefield no agency
0.961

## Temp_change
In the last 5 years it has become cooler
0.045

## Temp_change
In the last 5 years it has become warmer
-0.504

## Temp_change
In the last 5 years the average temperature has stayed roughly the same
-0.552

## Climate_cause
Climate change is occurring naturally
3.364
## Climate_causeOther
1.098
## Age
-5.914
## SexMale
2.320
## EthnicityBlack
-0.591
## EthnicityMixed
1.177
## EthnicityOther
0.963
## EthnicityWhite
1.769
## Student_statusYes
-2.093
## Employment_statusFull-Time
0.449
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.638
## Employment_statusOther
0.968
## Employment_statusPart-Time
0.850
## Employment_statusUnemployed (and job seeking)
0.255
## Pr(>|z|)
## (Intercept)
0.550737
## ConditionCondition 4: minefield no agency
0.336598
## Temp_changeIn the last 5 years it has become cooler
0.964348
## Temp_changeIn the last 5 years it has become warmer
0.614611
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.580657
## Climate_causeClimate change is occurring naturally
0.000769
## Climate_causeOther
0.272367
## Age
3.34e-09
## SexMale
0.020340
## EthnicityBlack
0.554312
## EthnicityMixed
0.239373
## EthnicityOther
0.335595
## EthnicityWhite
0.076951
## Student_statusYes
0.036357
## Employment_statusFull-Time
0.653248
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.523517
## Employment_statusOther
0.332836
## Employment_statusPart-Time
0.395103
## Employment_statusUnemployed (and job seeking)
0.798982
## (Intercept)
## ConditionCondition 4: minefield no agency
## Temp_changeIn the last 5 years it has become cooler
## Temp_changeIn the last 5 years it has become warmer
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
## Climate_causeClimate change is occurring naturally
***
## Climate_causeOther
## Age
***
## SexMale
*
## EthnicityBlack
## EthnicityMixed
## EthnicityOther
## EthnicityWhite
.
## Student_statusYes
*
## Employment_statusFull-Time
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
## Employment_statusOther
## Employment_statusPart-Time
## Employment_status

Unemployed (and job seeking)

---

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 562.68  on 405  degrees of freedom
Residual deviance: 488.15  on 387  degrees of freedom
(74 observations deleted due to missingness)
AIC: 526.15

Number of Fisher Scoring iterations: 4

agency_condition4_red <- glm(Agency_binary ~ Condition + Climate_cause + Age + Sex + Student_status, data = condition_4, family = "binomial")
summary(agency_condition4_red)

Call:
glm(formula = Agency_binary ~ Condition + Climate_cause + Age + Sex + Student_status, family = "binomial", data = condition_4)

Deviance Residuals:

Min      1Q  Median      3Q     Max
-2.2300  -1.0470   0.4514   1.0349   2.1690

Coefficients:

                      Estimate  Std. Error z value  Pr(>|z|)    
(Intercept)           1.993388   0.435507    4.577  4.71e-06 ***
ConditionCondition 4: minefield no agency  0.276691   0.208791    1.325   0.185103
Climate_causeClimate change is occurring naturally  1.751375   0.490445    3.571  1.70e-04 ***
Climate_causeOther  0.605008   0.439522    1.377  0.167145
Age                 -0.060654   0.009778   -6.203  4.71e-10 ***
SexMale             0.379603   0.209168    1.815  0.071637 .
Student_statusYes -0.741180   0.301146   -2.461  0.013866 *

Pr(>|z|)
## Climate_cause

Climate change is occurring naturally 0.000356 ***  
Climate_cause Other 0.168662  
Age 5.53e-10 ***  
Sex Male 0.069551 .  
Student_status Yes 0.013847 *  
---  
**Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1**  
(Dispersion parameter for binomial family taken to be 1)  
  
Null deviance: 601.50 on 433 degrees of freedom  
Residual deviance: 535.57 on 427 degrees of freedom  
(46 observations deleted due to missingness)  
AIC: 549.57  

Number of Fisher Scoring iterations: 4  

tidy(agency_condition4_red)  

## # A tibble: 7 × 5  
## term estimate¹ std.error² statistic³ p.value  
## <chr>     <dbl>    <dbl>     <dbl>    <dbl>  
## 1 (Intercept) 1.99  0.436  4.58 4.71e-6  
## 2 ConditionCondition 4: minefield no agency 0.277  0.209  1.33 1.85e-1  
## 3 Climate_causeClimate change is occurring nat... 1.75  0.490  3.57 3.56e-4  
## 4 Climate_causeOther 0.605  0.440  1.38 1.69e-1  
## 5 Age -0.0607  0.00978 -6.20 5.53e-10  
## 6 Sex Male 0.380  0.209  1.81 6.96e-2  
## 7 Student_status Yes -0.741  0.301 -2.46 1.38e-2  
## # … with abbreviated variable names ¹estimate, ²std.error, ³statistic  

i_age_con4 <- tidy(agency_condition4_red)$estimate[1]  
s_age_con4 <- tidy(agency_condition4_red)$estimate[2]  
plogis(i_age_con4 + s_age_con4 * 0)  

## [1] 0.8801011
plogis(i_age_con4 + s_age_con4 * 1)

## [1] 0.9063685

# Feasibility condition expanded
feas_condition1_ex <- glm(Feasibility_binary ~ Condition + Temp_change + Climate_cause + Ethnicity + Sex + Employment_status + Student_status, data = condition_1, family = "binomial")
summary(feas_condition1_ex)

# Call:
# glm(formula = Feasibility_binary ~ Condition + Temp_change + Climate_cause + Ethnicity + Sex + Employment_status + Student_status,
#     family = "binomial", data = condition_1)
#
# Deviance Residuals:
#    Min      1Q  Median      3Q     Max
# -2.251 -1.198   0.746   1.009   1.690
#
# Coefficients:
# Estimate
# (Intercept) -13.92066
# ConditionCondition 1: Cliff edge agency
# -0.39179
# Temp_changeIn the last 5 years it has become cooler
# -0.11128
# Temp_changeIn the last 5 years it has become warmer
# 0.27163
# Temp_changeIn the last 5 years the average temperature has stayed roughly the same
# -0.55207
# Climate_causeClimate change is occurring naturally
# -0.69296
# Climate_causeOther
# -0.26775
# EthnicityBlack
# 0.27701
# EthnicityMixed
# -0.94360
# EthnicityOther
# -0.48873
# EthnicityWhite
# -0.54582
## Sex
Male

## Employment_status
Full-Time
14.89770

Not in paid work (e.g. homemaker', 'retired or disabled)
14.55756

Other
15.33316

Part-Time
14.56037

Unemployed (and job seeking)
15.40124

## Student_status
Yes
0.32212

## Std. Error
(Intercept)
608.04775

Condition
Cliff edge agency
0.21864

Temp_change
In the last 5 years it has become cooler
0.51814

In the last 5 years it has become warmer
0.29006

In the last 5 years the average temperature has stayed roughly the same
0.40447

Climate_cause
Climate change is occurring naturally
0.48180

Other
0.45789

Ethnicity
Black
0.66085

Mixed
0.64717

Other
0.80276

White
0.45845

## Sex
Male
0.22822

## Employment_status
Full-Time
608.04753

Not in paid work (e.g. homemaker', 'retired or disabled)
608.04757

Other
608.04786
## Employment_status

- **Part-Time**: 608.04758
- **Unemployed (and job seeking)**: 608.04762
- **Student**: Yes, 0.33133

### z value

- **(Intercept)**: -0.023
- **Condition 1: Cliff edge agency**: -1.792
- **Temp_change**: In the last 5 years it has become cooler, -0.215
- **Temp_change**: In the last 5 years it has become warmer, 0.936
- **Temp_change**: In the last 5 years the average temperature has stayed roughly the same, -1.365
- **Climate_cause**: Climate change is occurring naturally, -1.438
- **Climate_cause**: Other, -0.585
- **Ethnicity**: Black, 0.419
- **Ethnicity**: Mixed, -1.458
- **Ethnicity**: Other, -0.609
- **Ethnicity**: White, -1.191
- **Sex**: Male, 0.437
- **Employment_status**: Full-Time, 0.025
- **Employment_status**: Not in paid work (e.g. homemaker', 'retired or disabled), 0.024
- **Employment_status**: Other, 0.025
- **Employment_status**: Part-Time, 0.024
- **Employment_status**: Unemployed (and job seeking), 0.025
- **Student**: Yes, 0.972

### Pr(>|z|)
## (Intercept)
0.9817
## ConditionCondition 1: Cliff edge agency
0.0731
## Temp_changeIn the last 5 years it has become cooler
0.8300
## Temp_changeIn the last 5 years it has become warmer
0.3490
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.1723
## Climate_causeClimate change is occurring naturally
0.1504
## Climate_causeOther
0.5587
## EthnicityBlack
0.6751
## EthnicityMixed
0.1448
## EthnicityOther
0.5426
## EthnicityWhite
0.2338
## SexMale
0.6621
## Employment_statusFull-Time
0.9805
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.9809
## Employment_statusOther
0.9799
## Employment_statusPart-Time
0.9809
## Employment_statusUnemployed (and job seeking)
0.9798
## Student_statusYes
0.3309
##
## (Intercept)
## ConditionCondition 1: Cliff edge agency
## Temp_changeIn the last 5 years it has become cooler
## Temp_changeIn the last 5 years it has become warmer
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
## Climate_causeClimate change is occurring naturally
## Climate_causeOther
## Ethnicity
### Black
### Mixed
### Other
### White
## Sex
### Male
### Employment_status
#### Full-Time
#### Not in paid work (e.g. homemaker', 'retired or disabled)
#### Other
#### Part-Time
#### Unemployed (and job seeking)
## Student_status
### Yes
---
### Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
### (Dispersion parameter for binomial family taken to be 1)
### Null deviance: 529.37 on 391 degrees of freedom
### Residual deviance: 493.26 on 374 degrees of freedom
### (80 observations deleted due to missingness)
### AIC: 529.26
### Number of Fisher Scoring iterations: 13

feas_condition1_red <- glm(Feasibility_binary ~ Condition, data = condition_1, family = "binomial")
summary(feas_condition1_red)

### Call:
### glm(formula = Feasibility_binary ~ Condition, family = "binomial",
### data = condition_1)
### Deviance Residuals:
###     Min      1Q  Median      3Q     Max
### -1.435  -1.251   0.940   1.106   1.106
### Coefficients:
### Estimate Std. Error z value
### Pr(>|z|)
### (Intercept) 0.5878 0.1353 4.345 1.39e-05
### Condition: Cliff edge agency -0.4164 0.1885 -2.210 0.0271
### (Intercept) ***
## Condition

### Condition 1: Cliff edge agency

---

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 637.83  on 471  degrees of freedom
Residual deviance: 632.92  on 470  degrees of freedom
AIC: 636.92

Number of Fisher Scoring iterations: 4

tidy(feas_condition1_red)

# A tibble: 2 × 5
  term                                    estimate std.error statistic p.value
  <chr>                                      <dbl>     <dbl>  <dbl>     <dbl>
1 (Intercept)                                0.588     0.135  4.34 0.0000139
2 ConditionCondition 1: Cliff edge agency  -0.416     0.188 -2.21 0.0271

i_feas_con1 <- tidy(feas_condition1_red)$estimate[1]
s_feas_con1 <- tidy(feas_condition1_red)$estimate[2]
plogis(i_feas_con1 + s_feas_con1 * 0)

# [1] 0.6428571

plogis(i_feas_con1 + s_feas_con1 * 1)

# [1] 0.542735

feas_condition2_ex <- glm(Feasibility_binary ~ Condition + Temp_change + Climate_cause + Ethnicity + Sex + Employment_status + Student_status, data = condition_2, family = "binomial")
summary(feas_condition2_ex)

# Call:
# glm(formula = Feasibility_binary ~ Condition + Temp_change +
# Climate_cause + Ethnicity + Sex + Employment_status +
# Student_status,
# family = "binomial", data = condition_2)
#
# Deviance Residuals:
#        Min          1Q      Median          3Q         Max
## -2.1503 -1.2669  0.7752  0.9385  1.4771
##
## Coefficients:
##
## Estimate
## (Intercept)  -0.8155
## ConditionCondition 2: Cliff edge no agency  -0.1383
## Temp_changeIn the last 5 years it has become cooler  0.4002
## Temp_changeIn the last 5 years it has become warmer  0.2521
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same  -0.6177
## Climate_causeClimate change is occurring naturally  -0.2659
## Climate_causeOther  -0.4642
## EthnicityBlack  0.9140
## EthnicityMixed  0.4490
## EthnicityOther  0.5669
## EthnicityWhite  0.8021
## SexMale  0.1251
## Employment_statusFull-Time  0.3663
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)  0.3159
## Employment_statusOther  0.1122
## Employment_statusPart-Time  0.5016
## Employment_statusUnemployed (and job seeking)  1.1501
## Student_statusYes  0.5817
##
## Std. Error
## (Intercept)  1.5483
## ConditionCondition 2: Cliff edge no agency
## Temp_change
In the last 5 years it has become cooler

## Temp_change
In the last 5 years it has become warmer

## Temp_change
In the last 5 years the average temperature has stayed roughly the same

## Climate_cause
Climate change is occurring naturally

## Climate_cause
Other

## Ethnicity
Black

## Ethnicity
Mixed

## Ethnicity
Other

## Ethnicity
White

## Sex
Male

## Employment_status
Full-Time

## Employment_status
Not in paid work (e.g. homemaker, 'retired or disabled')

## Employment_status
Other

## Employment_status
Part-Time

## Employment_status
Unemployed (and job seeking)

## Student_status
Yes

## (Intercept)
-0.527

## Condition
Condition 2: Cliff edge no agency

## Temp_change
In the last 5 years it has become cooler

## Temp_change
In the last 5 years it has become warmer

## Temp_change
In the last 5 years the average temperature has stayed roughly the same

## Climate_cause
Climate change is occurring naturally
-0.599
## Climate_causeOther
-1.103
## EthnicityBlack
1.481
## EthnicityMixed
0.784
## EthnicityOther
0.768
## EthnicityWhite
1.844
## SexMale
0.554
## Employment_statusFull-Time
0.253
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.216
## Employment_statusOther
0.071
## Employment_statusPart-Time
0.342
## Employment_statusUnemployed (and job seeking)
0.774
## Student_statusYes
1.556
## Pr(>|z|)
## (Intercept)
0.5984
## ConditionCondition 2: Cliff edge no agency
0.5223
## Temp_changeIn the last 5 years it has become cooler
0.4329
## Temp_changeIn the last 5 years it has become warmer
0.3791
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.1130
## Climate_causeClimate change is occurring naturally
0.5494
## Climate_causeOther
0.2700
## EthnicityBlack
0.1386
## EthnicityMixed
0.4329
## EthnicityOther
0.4428  
## EthnicityWhite
0.0651  
## SexMale
0.5798  
## Employment_statusFull-Time
0.8002  
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.8292  
## Employment_statusOther
0.9430  
## Employment_statusPart-Time
0.7325  
## Employment_statusUnemployed (and job seeking)
0.4387  
## Student_statusYes
0.1198  
## (Intercept)
## ConditionCondition 2: Cliff edge no agency
## Temp_changeIn the last 5 years it has become cooler
## Temp_changeIn the last 5 years it has become warmer
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
## Climate_causeClimate change is occurring naturally
## Climate_causeOther
## EthnicityBlack
## EthnicityMixed
## EthnicityOther
## EthnicityWhite
## SexMale
## Employment_statusFull-Time
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
## Employment_statusOther
## Employment_statusPart-Time
## Employment_statusUnemployed (and job seeking)
## Student_statusYes
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Dispersion parameter for binomial family taken to be 1)
## Null deviance: 537.02  on 402  degrees of freedom
## Residual deviance: 511.17  on 385  degrees of freedom
## (78 observations deleted due to missingness)
## AIC: 547.17
##
## Number of Fisher Scoring iterations: 4

feas_condition2_red <- glm(Feasibility_binary ~ Condition, data = condition_2, family = "binomial")
summary(feas_condition2_red)

## Call:
glm(formula = Feasibility_binary ~ Condition, family = "binomial", data = condition_2)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max
## -1.435 -1.333   0.940   1.030   1.030
##
## Coefficients:
##                                             Estimate Std. Error  z value Pr(>|z|)
## (Intercept)                                  0.5878     0.1353  4.345  1.39e-05     
## Condition 2: Cliff edge no agency -0.2301     0.1879 -1.225    0.221
##
## (Intercept)                                ***
## Condition 2: Cliff edge no agency
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 640.96  on 480  degrees of freedom
## Residual deviance: 639.46  on 479  degrees of freedom
## AIC: 643.46
##
## Number of Fisher Scoring iterations: 4

tidy(feas_condition2_red)

## # A tibble: 2 × 5
##   term                                        estimate std.error   statis...¹ p.value
##   <chr>                                         <dbl>     <dbl>       <dbl>   <dbl>
## 1 <chr>                                         <dbl>     <dbl>       <dbl>   <dbl>
## 2 <dbl>                                         <dbl>     <dbl>       <dbl>   <dbl>
## 3 1 (Intercept)                                  0.588     0.135
## Condition 2: Cliff edge no agency

| Estimate | Std. Error |      t value | Pr(>|t|) |
|----------|------------|--------------|----------|
| -0.230   | 0.188      | -1.22        | 2.21e-01 |

---

```r
i_feas_con2 <- tidy(feas_condition2_red)$estimate[1]
s_feas_con2 <- tidy(feas_condition2_red)$estimate[2]
plogis(i_feas_con2 + s_feas_con2 * 0)
## [1] 0.6428571

plogis(i_feas_con2 + s_feas_con2 * 1)
## [1] 0.5884774
```

```r
feas_condition3_ex <- glm(Feasibility_binary ~ Condition + Temp_change + Climate_cause + Ethnicity + Sex + Employment_status + Student_status, data = condition_3, family = "binomial")
summary(feas_condition3_ex)
```

### Model Call:
```
Call:
  glm(formula = Feasibility_binary ~ Condition + Temp_change + Climate_cause + Ethnicity + Sex + Employment_status + Student_status, family = "binomial", data = condition_3)
```

### Deviance Residuals:
```
  Min 1Q Median 3Q Max
-1.8903 -1.2576 0.8271 1.0335 1.5941
```

### Coefficients:
```
Estimate (Intercept) 0.73248
ConditionCondition 3: minefield agency -0.43753
Temp_changeIn the last 5 years it has become cooler 0.23680
Temp_changeIn the last 5 years it has become warmer 0.23892
Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.30136
Climate_causeClimate change is occurring naturally -0.80151
Climate_causeOther
```
-0.55217
## EthnicityBlack
0.12494
## EthnicityMixed
-0.27011
## EthnicityOther
0.04293
## EthnicityWhite
0.17725
## SexMale
0.09330
## Employment_statusFull-Time
-0.61185
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
-0.78421
## Employment_statusOther
0.23529
## Employment_statusPart-Time
-0.44986
## Employment_statusUnemployed (and job seeking)
-0.25494
## Student_statusYes
0.54227
##
## Std. Error
## (Intercept)
1.40570
## ConditionCondition 3: minefield agency
0.21116
## Temp_changeIn the last 5 years it has become cooler
0.54007
## Temp_changeIn the last 5 years it has become warmer
0.29472
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.39668
## Climate_causeClimate change is occurring naturally
0.43391
## Climate_causeOther
0.47151
## EthnicityBlack
0.58223
## EthnicityMixed
0.62085
## EthnicityOther
0.87792
## EthnicityWhite
0.44960
## SexMale
0.21725
## Employment_statusFull-Time
1.27581
## Employment_statusNot in paid work (e.g. homemaker, 'retired or disabled)
1.29884
## Employment_statusOther
1.37797
## Employment_statusPart-Time
1.29636
## Employment_statusUnemployed (and job seeking)
1.30876
## Student_statusYes
0.32148
##
## z value
## (Intercept)
0.521
## ConditionCondition 3: minefield agency
-2.072
## Temp_changeIn the last 5 years it has become cooler
0.438
## Temp_changeIn the last 5 years it has become warmer
0.811
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.760
## Climate_causeClimate change is occurring naturally
-1.847
## Climate_causeOther
-1.171
## EthnicityBlack
0.215
## EthnicityMixed
-0.435
## EthnicityOther
0.049
## EthnicityWhite
0.394
## SexMale
0.429
## Employment_statusFull-Time
-0.480
## Employment_statusNot in paid work (e.g. homemaker, 'retired or disabled)
-0.604
## Employment_statusOther
0.171
## Employment_statusPart-Time
-0.347
## Employment_statusUnemployed (and job seeking)
-0.195
## Student_statusYes
1.687
##
Pr(>|z|)
## (Intercept)
0.6023
## ConditionCondition 3: minefield agency
0.0383
## Temp_changeIn the last 5 years it has become cooler
0.6611
## Temp_changeIn the last 5 years it has become warmer
0.4176
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
0.4474
## Climate_causeClimate change is occurring naturally
0.0647
## Climate_causeOther
0.2416
## EthnicityBlack
0.8301
## EthnicityMixed
0.6635
## EthnicityOther
0.9610
## EthnicityWhite
0.6934
## SexMale
0.6676
## Employment_statusFull-Time
0.6315
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.5460
## Employment_statusOther
0.8644
## Employment_statusPart-Time
0.7286
## Employment_statusUnemployed (and job seeking)
0.8456
## Student_statusYes
0.0916
##
## (Intercept)
## Condition 3: minefield agency
*  
## Temp_changeIn the last 5 years it has become cooler
## Temp_changeIn the last 5 years it has become warmer
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same
## Climate_causeClimate change is occurring naturally
.
## Climate_cause Other
## Ethnicity Black
## Ethnicity Mixed
## Ethnicity Other
## Ethnicity White
## Sex Male
## Employment_status Full-Time
## Employment_status Not in paid work (e.g. homemaker', 'retired or disabled)
## Employment_status Other
## Employment_status Part-Time
## Employment_status Unemployed (and job seeking)
## Student_status Yes
.
## ---

## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
## Null deviance: 546.10  on 402  degrees of freedom
## Residual deviance: 527.63  on 385  degrees of freedom
## (79 observations deleted due to missingness)
## AIC: 563.63
##
## Number of Fisher Scoring iterations: 4

feas_condition3_red <- glm(Feasibility_binary ~ Condition, data = condition_3, family = "binomial")
summary(feas_condition3_red)

##
## Call:
## glm(formula = Feasibility_binary ~ Condition, family = "binomial",
##     data = condition_3)
##
## Deviance Residuals:
##    Min      1Q  Median      3Q     Max

246
# Coefficients:

| Term                          | Estimate | Std. Error | z value | Pr(>|z|) |
|-------------------------------|----------|------------|---------|----------|
| (Intercept)                   | 0.5878   | 0.1353     | 4.345   | 1.39e-05 *** |
| Condition 3: minefield agency | -0.4400  | 0.1865     | -2.359  | 0.0183 *  |

---

Signif. codes: 0 *** 0.001 ** 0.01 * 0.05 . 0.1 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 652.77 on 481 degrees of freedom
Residual deviance: 647.16 on 480 degrees of freedom
AIC: 651.16

Number of Fisher Scoring iterations: 4

```r
tidy(feas_condition3_red)
```

# A tibble: 2 × 5

<table>
<thead>
<tr>
<th>term</th>
<th>estimate</th>
<th>std.error</th>
<th>statistic</th>
<th>p.value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;chr&gt;</td>
<td>&lt;dbl&gt;</td>
<td>&lt;dbl&gt;</td>
<td>&lt;dbl&gt;</td>
<td>&lt;dbl&gt;</td>
</tr>
<tr>
<td>1 (Intercept)</td>
<td>0.588</td>
<td>0.135</td>
<td>4.34</td>
<td>0.000139</td>
</tr>
<tr>
<td>2 Condition 3: minefield agency</td>
<td>-0.440</td>
<td>0.187</td>
<td>-2.36</td>
<td>0.0183</td>
</tr>
</tbody>
</table>

```r
i_feas_con3 <- tidy(feas_condition3_red)$estimate[1]

s_feas_con3 <- tidy(feas_condition3_red)$estimate[2]
plogis(i_feas_con3 + s_feas_con3 * 0)
```  

[1] 0.6428571

```r
plogis(i_feas_con3 + s_feas_con3 * 1)
```  

[1] 0.5368852

```r
feas_condition4_ex <- glm(Feasibility_binary ~ Condition + Temp_change + Climate_cause + Ethnicity + Sex + Employment_status + Student_status, data = condition_4, family = "binomial")

summary(feas_condition4_ex)
```
## Call:
## glm(formula = Feasibility_binary ~ Condition + Temp_change + 
##     Climate_cause + Ethnicity + Sex + Employment_status + 
##     Student_status, 
##     family = "binomial", data = condition_4)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.8712  -1.2396   0.8129   0.9970   1.5363
##
## Coefficients:
## Estimate
## (Intercept)  -14.98585
## ConditionCondition 4: minefield no agency  -0.41419
## Temp_changeIn the last 5 years it has become cooler 0.67159
## Temp_changeIn the last 5 years it has become warmer 0.61995
## Temp_changeIn the last 5 years the average temperature has stayed roughly the same 0.10287
## Climate_causeClimate change is occurring naturally -0.32834
## Climate_causeOther 0.28251
## EthnicityBlack 0.18239
## EthnicityMixed 0.14364
## EthnicityOther -0.03593
## EthnicityWhite -0.42278
## SexMale 0.26250
## Employment_statusFull-Time 15.38074
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled) 15.00988
## Employment_statusOther 15.85702
## Employment_statusPart-Time 15.34785
## Employment_status
- Unemployed (and job seeking) 15.45969
- Student_statusYes -0.03295

## Student_status
- Yes -0.03295

## Std. Error

## (Intercept)
507.30062

## Condition
- Condition 4: minefield no agency 0.21315

## Temp_change
- In the last 5 years it has become cooler 0.51027
- In the last 5 years it has become warmer 0.27848
- In the last 5 years the average temperature has stayed roughly the same 0.38846

## Climate_cause
- Climate change is occurring naturally 0.41568
- Other 0.43645

## Ethnicity
- Black 0.61320
- Mixed 0.61505
- Other 0.98443
- White 0.45249

## Sex
- Male 0.21865

## Employment_status
- Full-Time 507.30042
- Not in paid work (e.g. homemaker', 'retired or disabled) 507.30048
- Other 507.30070
- Part-Time 507.30049
- Unemployed (and job seeking) 507.30051

## z value

## (Intercept)
-0.030
## Condition
- Condition 4: minefield no agency
  -1.943

## Temp_change
- In the last 5 years it has become cooler
  1.316
- In the last 5 years it has become warmer
  2.226
- In the last 5 years the average temperature has stayed roughly the same
  0.265

## Climate_cause
- Climate change is occurring naturally
  -0.790
- Other
  0.647

## Ethnicity
- Black
  0.297
- Mixed
  0.234
- Other
  -0.037
- White
  -0.934

## Sex
- Male
  1.201

## Employment_status
- Full-Time
  0.030
- Not in paid work (e.g. homemaker', 'retired or disabled)
  0.030
- Other
  0.031
- Part-Time
  0.030
- Unemployed (and job seeking)
  0.030

## Student_status
- Yes
  -0.106

## Pr(>|z|)
- (Intercept)
  0.976
- Condition
  0.052
- Temp_change
  0.188
- Temp_change
  0.026
- Temp_change
  0.791
## Climate_cause
Climate change is occurring naturally
0.430
## Climate_causeOther
0.517
## EthnicityBlack
0.766
## EthnicityMixed
0.815
## EthnicityOther
0.971
## EthnicityWhite
0.350
## SexMale
0.230
## Employment_statusFull-Time
0.976
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
0.976
## Employment_statusOther
0.975
## Employment_statusPart-Time
0.976
## Employment_statusUnemployed (and job seeking)
0.976
## Student_statusYes
0.915
## (Intercept)
## Condition
Condition 4: minefield no agency
.
## Temp_change
In the last 5 years it has become cooler
## Temp_change
In the last 5 years it has become warmer
*
## Temp_change
In the last 5 years the average temperature has stayed roughly the same
## Climate_cause
Climate change is occurring naturally
## Climate_causeOther
## EthnicityBlack
## EthnicityMixed
## EthnicityOther
## EthnicityWhite
## SexMale
## Employment_statusFull-Time
## Employment_statusNot in paid work (e.g. homemaker', 'retired or disabled)
## Employment_statusOther
## Employment_status
- Part-Time
- Unemployed (and job seeking)
- Student_status: Yes

---

Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 551.37  on 407  degrees of freedom
Residual deviance: 523.56  on 390  degrees of freedom
(AIC: 559.56)

Number of Fisher Scoring iterations: 13

```r
feas_condition4_red <- glm(Feasibility_binary ~ Condition + Temp_change, data = condition_4, family = "binomial")
summary(feas_condition4_red)
```

Call:
```
glm(formula = Feasibility_binary ~ Condition + Temp_change, family = "binomial",
data = condition_4)
```

Deviance Residuals:
```
     Min      1Q  Median      3Q     Max
-1.5161 -1.2937  0.8730  0.9973  1.2506
```

Coefficients:
```
Estimate Std. Error
(Intercept)  0.23779  0.23442
ConditionCondition 4: minefield no agency  -0.32866
Temp_changeIn the last 5 years it has become cooler  0.45456
Temp_changeIn the last 5 years it has become warmer  0.53043
Temp_changeIn the last 5 years the average temperature has stayed roughly the same  -0.07957
```

Std. Error
```
(Intercept)  0.23442
```
### Condition 4: minefield no agency
0.18902
### Temp_change
In the last 5 years it has become cooler
0.45292
### Temp_change
In the last 5 years it has become warmer
0.24389
### Temp_change
In the last 5 years the average temperature has stayed roughly the same
0.34630
### z value
### (Intercept)
1.014
### Condition 4: minefield no agency
-1.739
### Temp_change
In the last 5 years it has become cooler
1.004
### Temp_change
In the last 5 years it has become warmer
2.175
### Temp_change
In the last 5 years the average temperature has stayed roughly the same
-0.230
### Pr(>|z|)
### (Intercept)
0.3104
### Condition 4: minefield no agency
0.0821
### Temp_change
In the last 5 years it has become cooler
0.3156
### Temp_change
In the last 5 years it has become warmer
0.0296
### Temp_change
In the last 5 years the average temperature has stayed roughly the same
0.8183
### (Intercept)
### Condition 4: minefield no agency
*
### Temp_change
In the last 5 years it has become cooler
### Temp_change
In the last 5 years it has become warmer
*
### Temp_change
In the last 5 years the average temperature has stayed roughly the same
### ---
### Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
### (Dispersion parameter for binomial family taken to be 1)
## Null deviance: 644.43 on 479 degrees of freedom
## Residual deviance: 633.94 on 475 degrees of freedom
## AIC: 643.94
##
## Number of Fisher Scoring iterations: 4

tidy(feas_condition4_red)

## # A tibble: 5 × 5
##   term                                                                 estim...¹ std.e...² statistic p.value
##   <chr>                                                                 <dbl>   <dbl>   <dbl>   <dbl>
## 1 (Intercept)                                                           0.238    0.234    1.01   0.310
## 2 ConditionCondition 4: minefield no agency                            -0.329    0.189   -1.74   0.0821
## 3 Temp_changeIn the last 5 years it has become warmer                   0.455    0.453    1.00   0.316
## 4 Temp_changeIn the last 5 years it has become cooler                   0.530    0.244    2.17   0.0296
## 5 Temp_changeIn the last 5 years the average temperature has increased -0.0796   0.346   -0.230  0.818
## # ... with abbreviated variable names ¹estimate, ²std.error, ³statistic

i_feas_con4 <- tidy(feas_condition4_red)$estimate[1]
s_feas_con4 <- tidy(feas_condition4_red)$estimate[2]
plogis(i_feas_con4 + s_feas_con4 * 0)

## [1] 0.5591686

plogis(i_feas_con4 + s_feas_con4 * 1)

## [1] 0.4772989