
"Understanding the reasons for vaccine hesitancy"



Tom Stafford
12th Feb 2026

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Tom Stafford is a Professor of Cognitive Science at the University of Sheffield who studies learning and decision making. He'll be talking about three projects he's led which relate to the understanding of vaccine skepticism and hesitancy, including whether interactive explainers can help change the mind of those refusing vaccines, and whether conspiracy theories drive vaccine refusal or if it's the other way around. Tom is also the author of popular psychology book *Mind Hacks* and *For argument's sake: evidence that reason can change minds*.

Brand, C. O., Brady, D., & Stafford, T. (2023). [The Ideological Turing Test: a behavioural measure of open-mindedness and perspective-taking](#). <https://doi.org/10.31234/osf.io/2e9wn>

Understanding the position of ideological opponents is challenging, yet crucial if our goals are to avoid escalation and reduce conflict. We operationalise the idea of an ‘Ideological Turing Test’ to measure the accuracy with which people represent the arguments of their ideological opponents. Crucially, this offers a behavioural measure of open-mindedness which goes beyond mere self-report. We recruited 200 participants from opposite sides of three topics with potential for polarisation in the UK of the early 2020s (1200 participants total). Participants were asked to provide reasons both for and against their position. Their reasons were then rated by participants from the opposite side. Our criteria for “passing” the test was if an argument was agreed with by opponents to the same extent or higher than arguments made by proponents. We found evidence of high levels of mutual understanding across all three topics. We also found that those who passed were more open-minded towards their opponents, in that they were less likely to rate them as ignorant, immoral or irrational.



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Lost to the virus

• This article is more than 4 years old

The life and tragic death of John Eyers - a fitness fanatic who refused the vaccine

He did triathlons, bodybuilding and mountain climbing and became sceptical of the Covid jab. Then, at 42, he contracted the virus

By Sirin Kale

'He was an old romantic' ... John Eyers. Illustration: Paul Ryding/The Guardian

<https://www.theguardian.com/society/2021/nov/30/life-tragic-death-john-eyers-fitness-fanatic-who-refused-covid-vaccine>

Foolproof

Why We Fall for Misinformation
and How to Build Immunity



Sander van der Linden

'An insightful and forensic examination'
Marianna Spring, BBC's Disinformation and
Social Media Correspondent

But see ... Dan Williams 'Misinformation is not a virus, and you cannot be vaccinated against it'

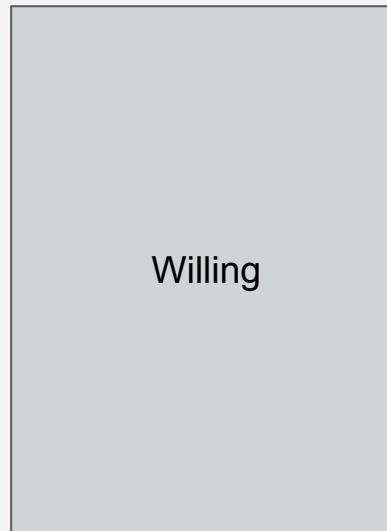
<https://danwilliamsphilosophy.com/2023/12/04/misinformation-is-not-a-virus-and-you-can-not-be-vaccinated-against-it/>

The motivation - volition model

Desire/Intention



Execution





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Opening Up Minds

2021-2023



Jacopo Amidei. Paul Piwek (PI)



Youmna Farag Andreas Vlachos (PI)



Lotty Brand Tom Stafford (PI)



Svetlana
Stoyanchev

Lead research
organisation



AI & NLP, School of
Computing and
Communications



Natural Language and Information
Processing, Department of Computer
Science and Technology



The
University
Of
Sheffield.

Department of
Psychology

TOSHIBA
Industry
partner

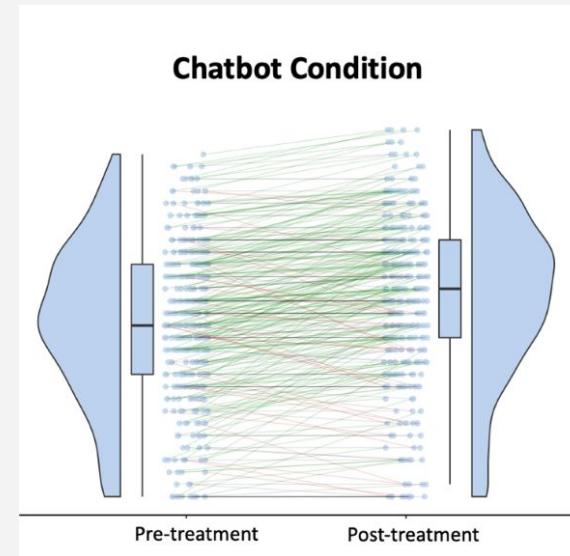
Cambridge
Research
Laboratory

Chatbots for vaccine hesitancy

ABSTRACT

The COVID-19 vaccines will not end the pandemic if they stay in freezers. In many countries, such as France, COVID-19 vaccines hesitancy is high. It is crucial that governments make it as easy as possible for people who want to be vaccinated to do so, but also that they devise communication strategies to address the concerns of vaccine hesitant individuals. We introduce and test on 701 French participants a novel messaging strategy: a chatbot that answers people's questions about COVID-19 vaccines. We find that interacting with this chatbot for a few minutes significantly increases people's intentions to get vaccinated ($\beta = 0.12$) and has a positive impact on their attitudes towards COVID-19 vaccination ($\beta = 0.23$). Our results suggest that a properly scripted and regularly updated chatbot could offer a powerful resource to help fight hesitancy towards COVID-19 vaccines.

Altay, S., Hacquin, A.-S., Chevallier, C., & Mercier, H. (2023). Information delivered by a chatbot has a positive impact on COVID-19 vaccines attitudes and intentions. *Journal of Experimental Psychology: Applied*, 29(1), 52–62.
<https://doi.org/10.1037/xap0000400>



<https://doi.org/10.1098/rsos.220366>

Brand, C. O. and Stafford, T. (2021). Review 1: "Information Delivered by a Chatbot Has a Positive Impact on COVID-19 Vaccines Attitudes and Intentions." *Rapid Reviews COVID-19*. <https://doi.org/10.1162/2e3983f5.237d4808>

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Section

Abstract

1. Introduction

2. Method

3. Results

4. Discussion

Ethics

... ...

Research articles

Using dialogues to increase positive attitudes towards COVID-19 vaccines in a vaccine-hesitant UK population

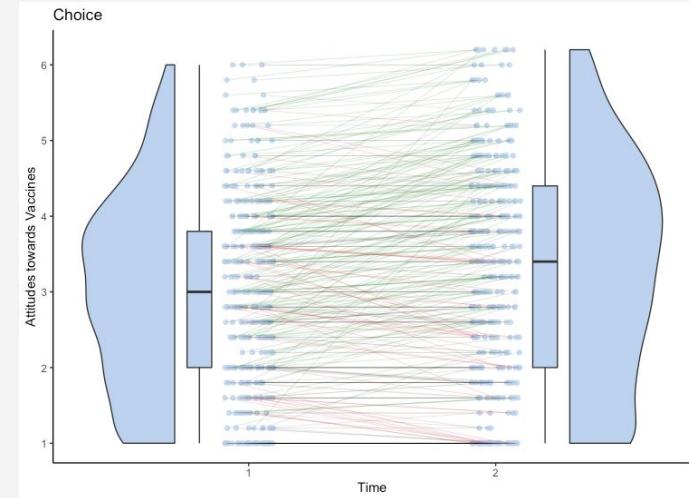
Charlotte O. Brand  and Tom Stafford

Published: 12 October 2022 | <https://doi.org/10.1098/rsos.220366>

 [Review history](#)

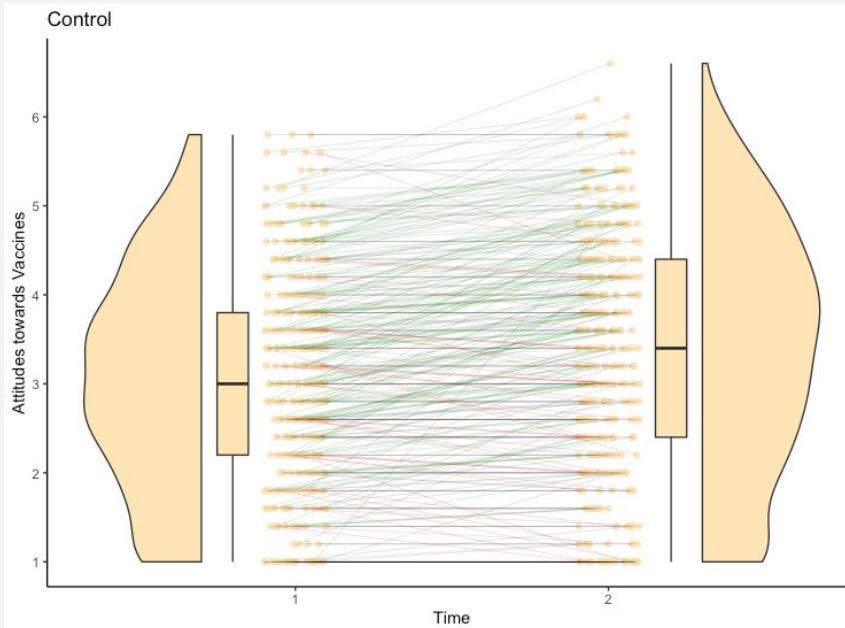
Abstract

Recently, Altay *et al.* (Altay *et al.* 2021. *J. Exp. Psychol.: Appl.* ([doi:10.1037/xap0000400](https://doi.org/10.1037/xap0000400))) showed that 5 min of interaction with a chatbot led to increases in positive COVID-19 vaccination attitudes and intentions in a French population. Here we replicate this effect in a vaccine-hesitant, UK-based population. We attempt to isolate what made the chatbot condition effective by controlling the amount of information provided, the trustworthiness of the information and the level of interactivity. Like Altay *et al.*, our

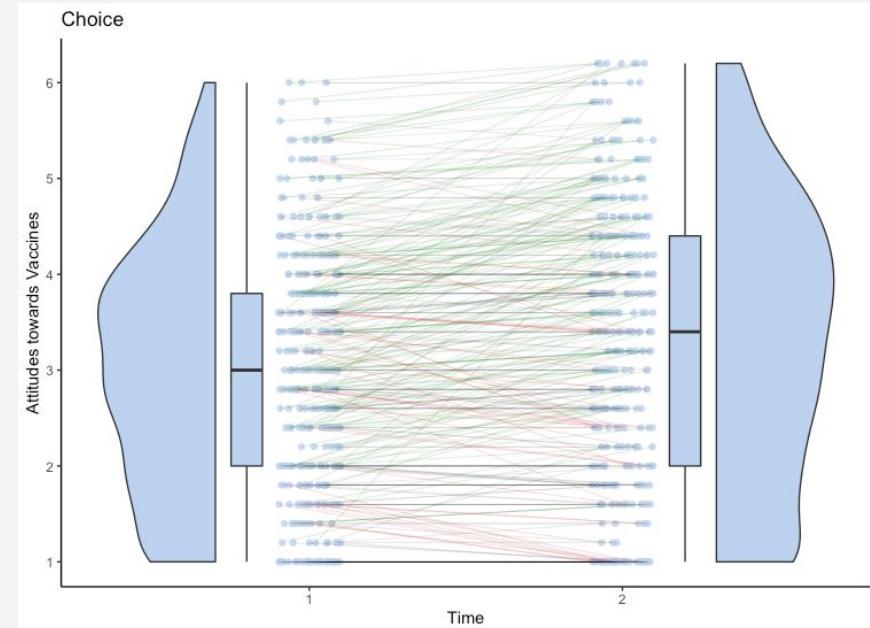


Chatbots—Engagement helped, not agency

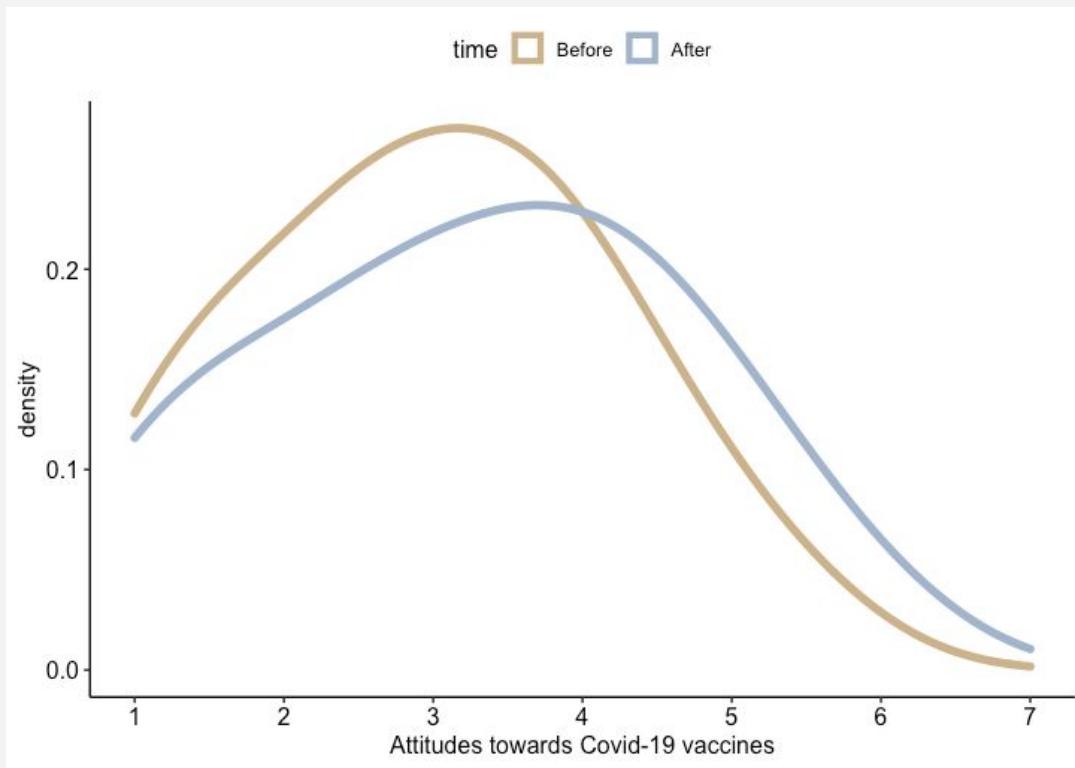
Reading



Choosing



479 refusers, 237 hesitant

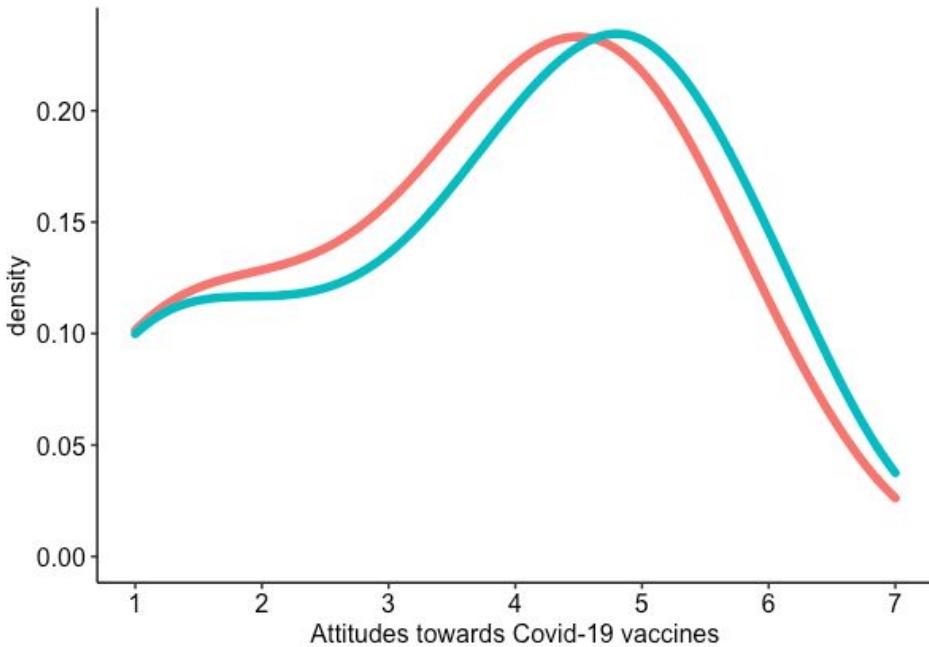


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... Covid-19 vaccines are effective

EFFECTIVE

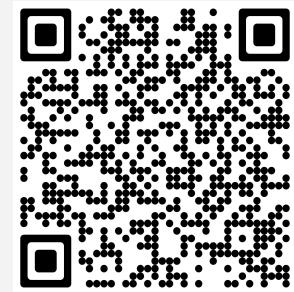
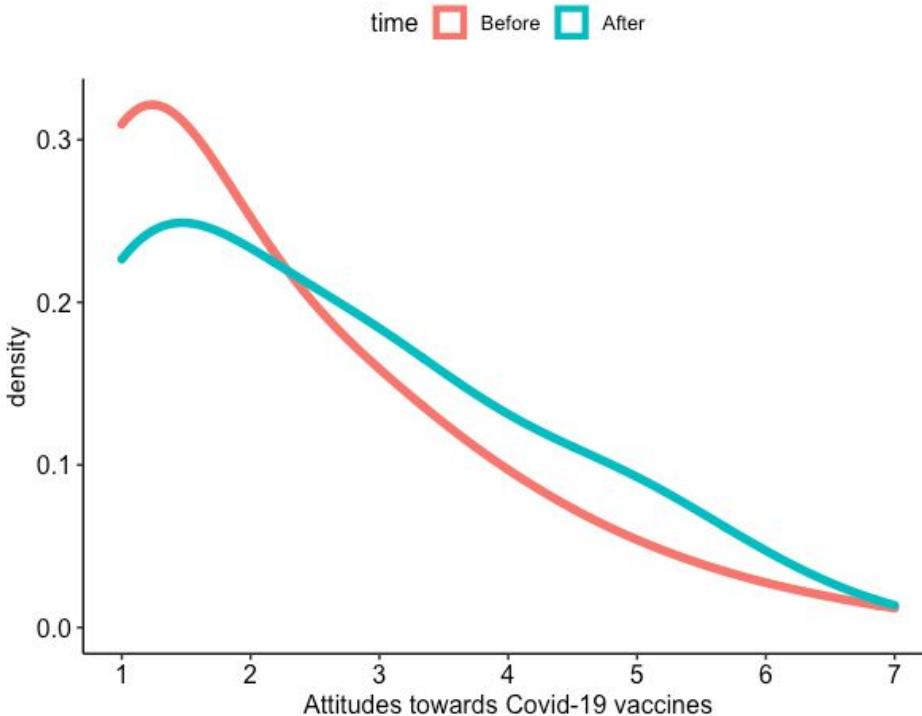
time □ Before □ After



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...we've had enough time to develop Covid-19 vaccines

Enough Time



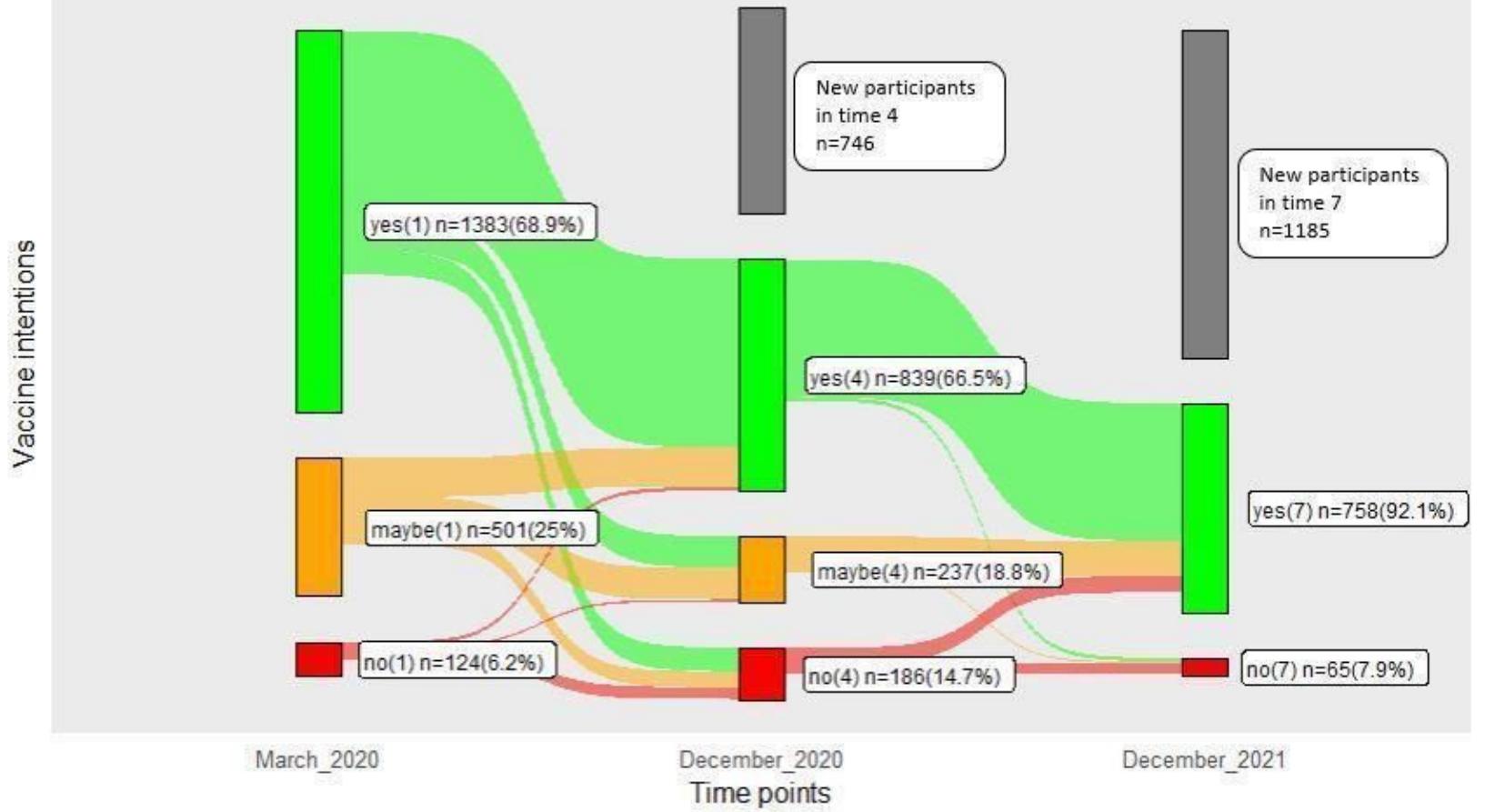
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Conclusions

1. Among the vaccine hesitant attitudes were mixed
2. ...and malleable



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The (Ideological) Turing Test

Originally, Bryan Caplan (2011),
after Alan Turing (1950).

“We should “attempt to re-express your target’s position so clearly, vividly, and fairly that your target says, ‘Thanks, I wish I’d thought of putting it that way’,”

Dennett, D. C. (2013). Intuition pumps and other tools for thinking. WW Norton & Company.

Three topics

Veganism

Vaccines

Brexit

Data collected March - May 2022



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ITT protocol

Pro-Xer asked

“Imagine you are chatting with someone who is anti-X.
What might this person say to you?

Please provide THREE reasons that they might give for
being anti-X in the boxes below.”

Anti-Xer rates these arguments

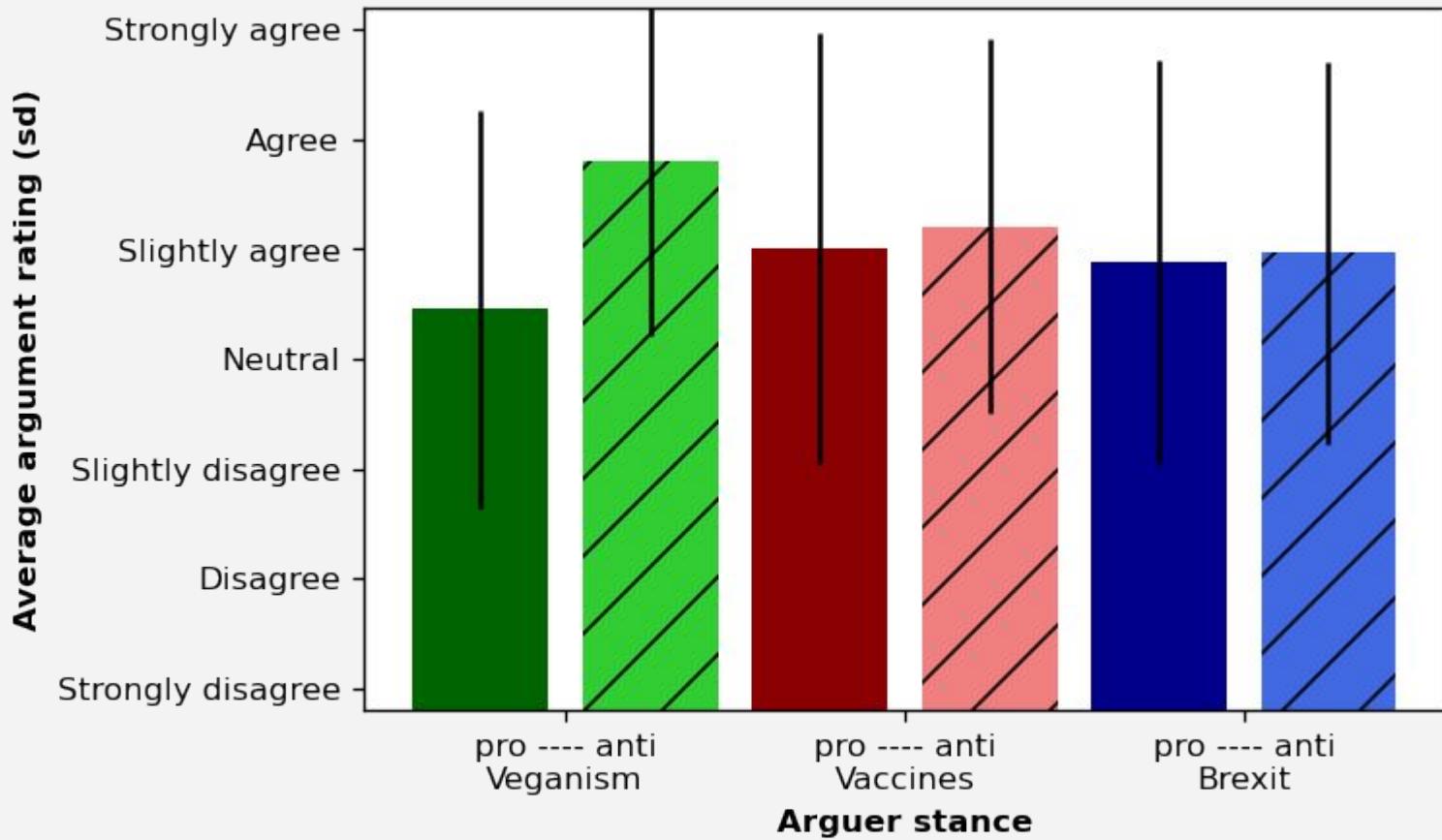
Strongly agree - strongly disagree

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This next graph shows that everyone (pro and anti) can articulate arguments that their opponents endorse somewhat (ABSOLUTE CRITERIA)

Interesting: higher score for anti-vegans, who seem able to produce pro-vegan arguments which are strongly endorsed by vegans

ABSOLUTE SUCCESS STANDARD



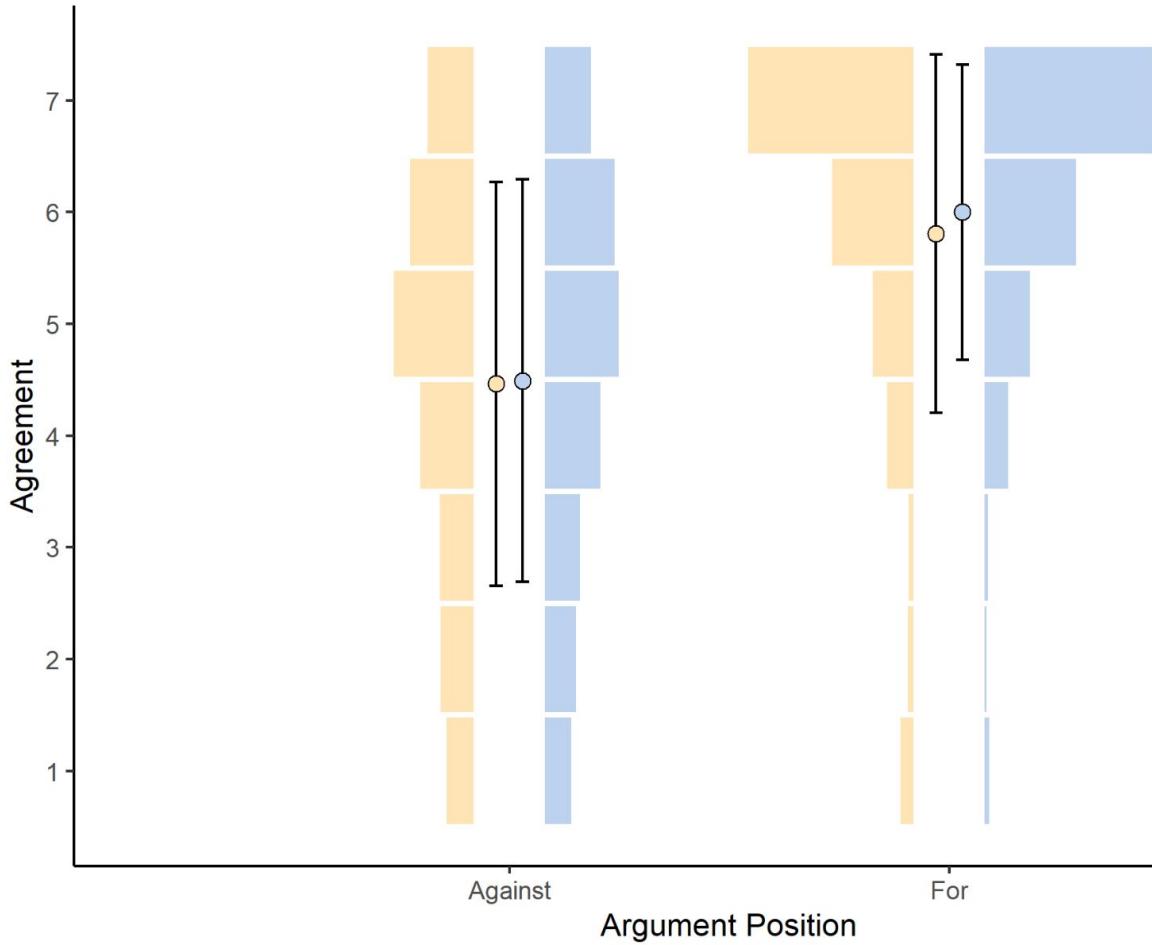
These next graphs show distributional information: (“baseline” is believers’ arguments rated by co-believers)

Here we see

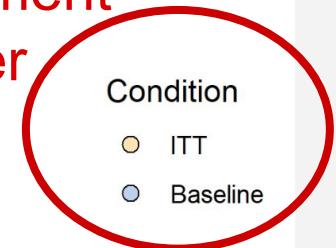
- true believers better (but not much better)
- discrepancy size

vaccines > brexit > veganism

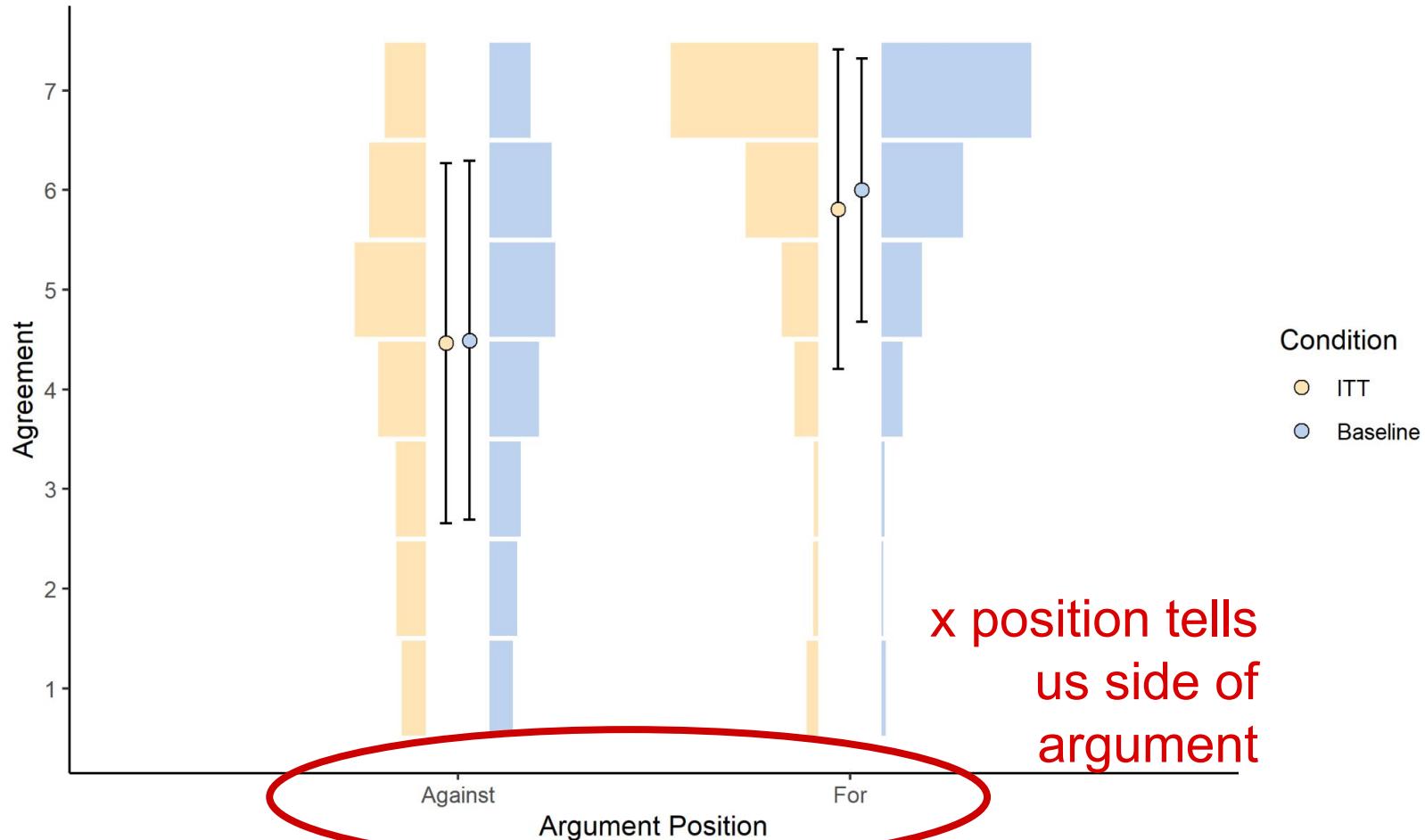
Veganism Arguments



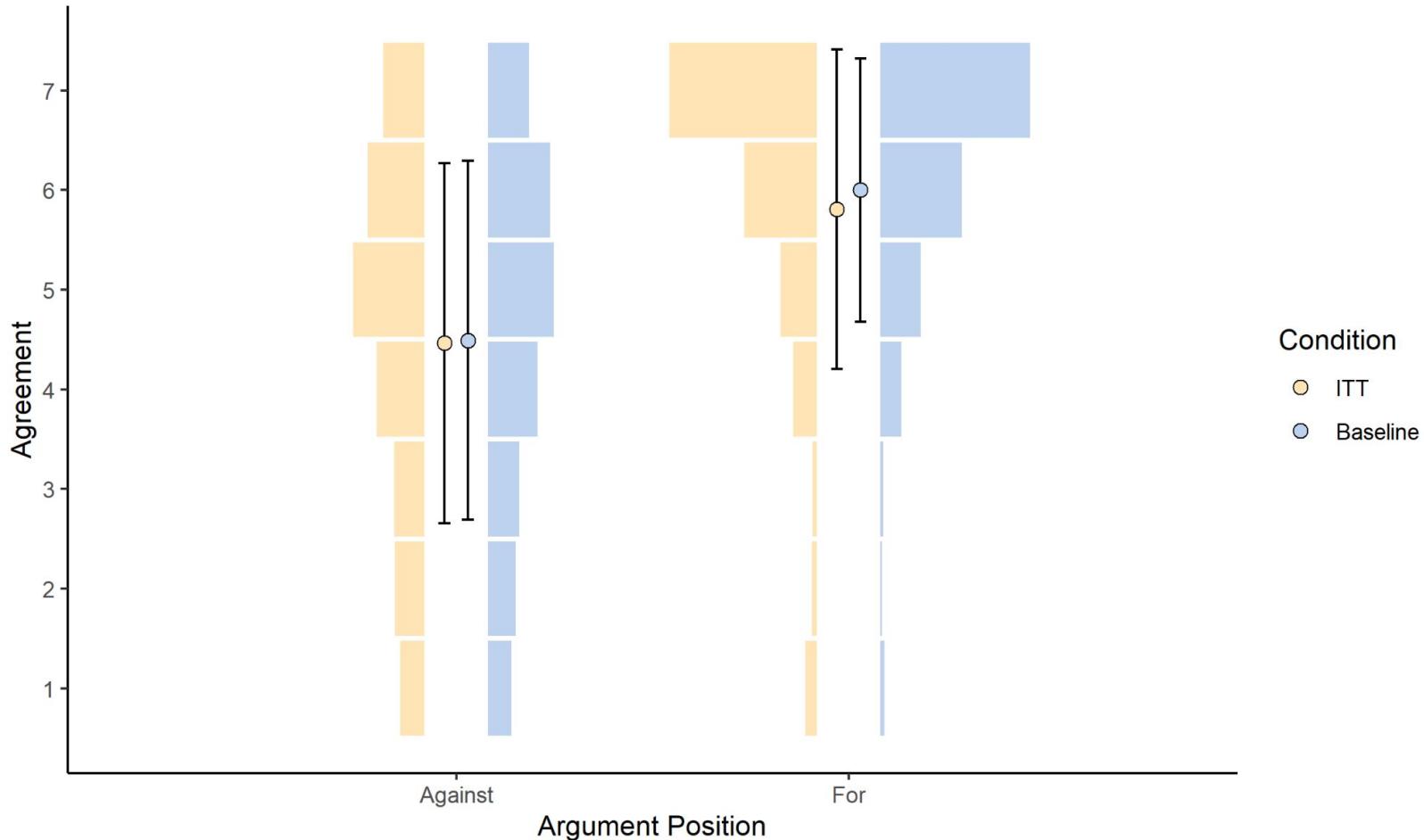
Colour tells us
position of
argument
maker



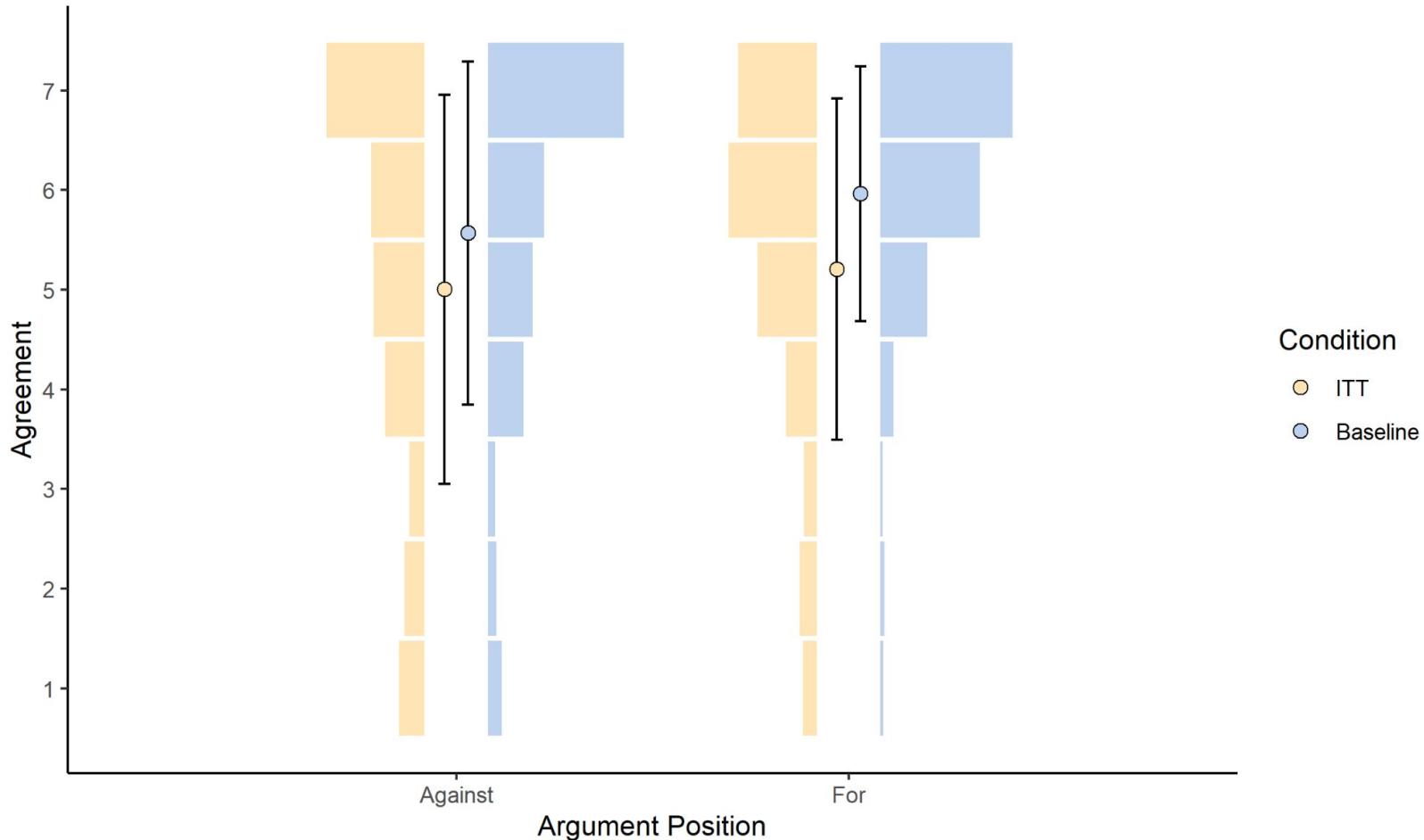
Veganism Arguments



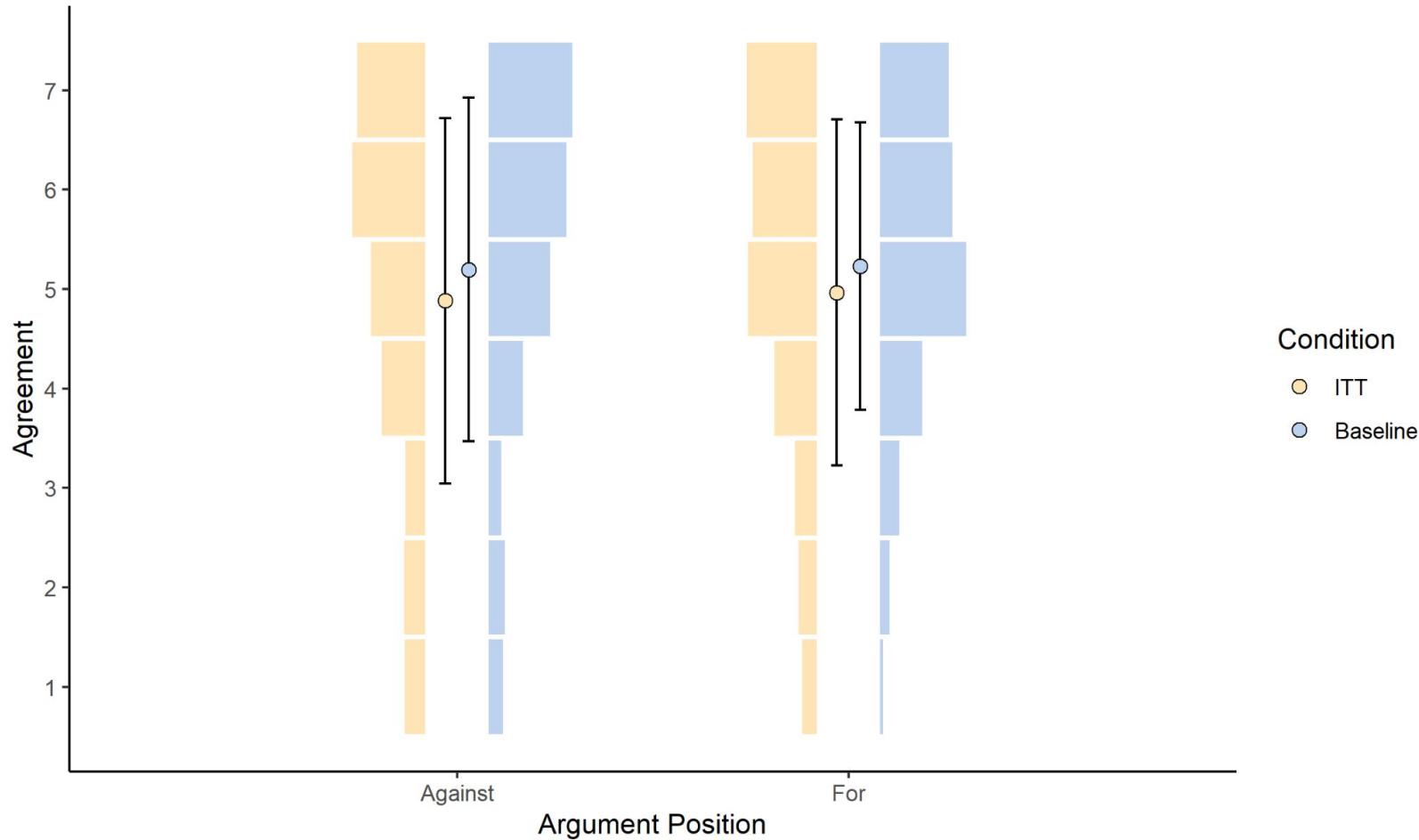
Veganism Arguments



Vaccine Arguments



Brexit Arguments



Explore the arguments

<https://sheffield-university.shinyapps.io/OuMshiny/>



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The ITT and open mindedness

Passing the ITT

 associated with believing opponents “have good reasons”, and **reduced likelihood** of believing they are “immoral”, “ignorant” or “irrational”.

 not associated with (self-report) **research** on the topic, or **discussing** it

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Opening Up Minds

Brand, C. O., Brady, D., & Stafford, T. (2023)

The Ideological Turing Test: a behavioural measure of open-mindedness and perspective-taking.

<https://doi.org/10.31234/osf.io/2e9wn>

Farag, Y., Brand, C. O., Amidei, J., Piwek, P., Stafford, T., Stoyanchev, S., & Vlachos, A. (2023).

Opening up minds with argumentative dialogues. arXiv preprint arXiv:2301.06400.

Opening Up Minds:
engaging dialogue
generated from
argument maps



PI: Paul Piwek

http://mcs.open.ac.uk/pp2464/Opening_U_Minds



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Conclusions

1. Among the vaccine hesitant attitudes were mixed
2. ...and malleable
3. On divisive topics there is a surprisingly strong degree of mutual understanding (although vaccines lower than veganism and brexit)



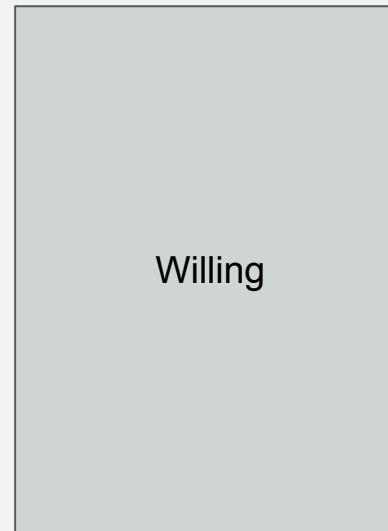
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The motivation - volition model

Desire/Intention



Execution

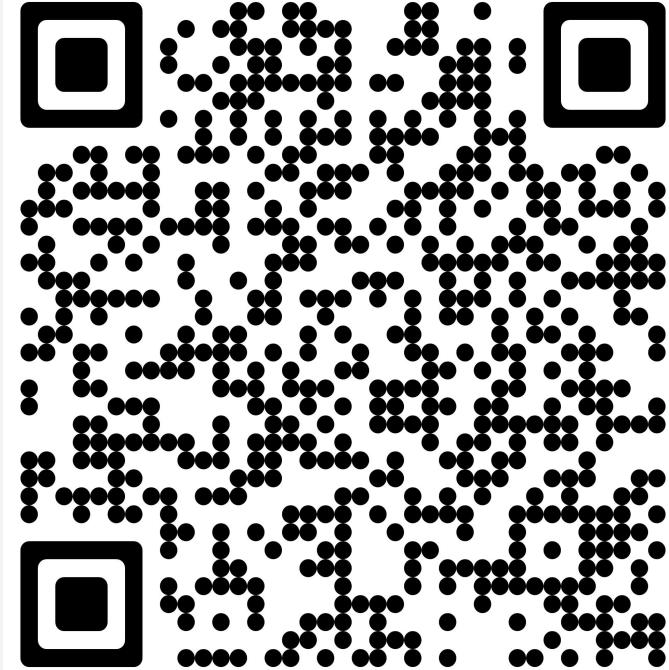


Conclusions

1. Among the vaccine hesitant attitudes were mixed
2. ...and malleable
3. On divisive topics there is a surprisingly strong degree of mutual understanding (including on vaccines)
4. We should assume poor motivation when we see inaction
5. Actions affects beliefs as well as vice versa



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Updates at
<https://tomstafford.substack.com/>



END

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