

June 01, 2022

Ref: Communicating dynamic norms with visual cues

Dear Dr. Chambers,

Thank you for offering us the opportunity to revise and resubmit our manuscript entitled 'Communicating dynamic norms with visual cues'. We have amended the manuscript to address the issues raised, and provide the clarifications requested by you and the reviewers. Please find below our responses to each point that was raised and the corresponding amendments we have made to the manuscript. Additionally, we wanted to note that we have made two changes to the manuscript:

- a) We changed the payment at time 1 from 5.60/hr to 6.00/hr in line with Prolific's new payment policies
- b) We added a sub-section titled 'Missing data' within the 'Intended Analyses' section in the manuscript, detailing our treatment of missing data at time 2. Specifically, we added the following text:

"We designed the surveys to force responses on all items, so we expect missing data to occur only in measured outcomes at the second time measurement due to participant attrition. We will use multiple imputation to generate and analyse 100 multiply imputed datasets over 10 iterations to maximise power for small effect sizes (Graham, 2009; Graham et al., 2007). Multiple imputation methods are considered superior to other methods such as listwise or pairwise deletion, or mean imputation, which can bias results and decrease statistical power and accuracy (Jakobsen et al., 2017; Peugh & Enders, 2004). Incomplete variables will be imputed within subsets reflecting the interaction between norm type and format (Tilling et al., 2016), under fully conditional specification method (Van Buuren et al., 2006), with predictive mean matching implemented in the 'mice' package in R (Buuren & Groothuis-Oudshoorn, 2011). As recommended, we will impute missing outcome values at the item-level, using the entirety of available data (Collins et al., 2001; Gottschall et al., 2012; Rioux et al., 2020). We will report the range of missing data rates across variables. The parameters of interest will be estimated in each imputed dataset, and the pooled estimates and SEs obtained using Rubin's rules will be used for the calculation of all Bayes factors (Rubin, 2004). For comparison, we will also perform complete case analysis, and results will be reported in the supplementary materials."

## Reviewer feedback

1. "In particular, my main worry regards the manipulation planned for this study. On reading the pilot study conducted, I noticed that the manipulations used (also manipulations to be used in the actual study) might be problematic. I have accessed the manipulations used in the pilot on OSF and I noticed that the dynamic norm condition told participants info about how the norm of eating meat HAS CHANGED:

However, to my understanding of the dynamic norms literature, dynamic norms should reflect HOW NORMS ARE CHANGING, not (only) how the norms have changed in the last few years. And if I understood your paper correctly, your dynamic norm manipulation was meant to reflect that the number of people engaging in the behaviour of eating less meat IS INCREASING. But this information was not necessarily conveyed in the Pilot manipulation (or in the manipulations to be used in the study), and this might explain the Pilot overall null results - and can be a line explored in the Discussion. So I think that a reference to the future trends need to be included in the instructions, otherwise this instruction will not reflect a trend in the norm changing over the years, but it will only state a stage that's been achieved so far - and participants might assume this could stop, as any previous trends (e.g., fashion, overall consumption) might indeed disappear. For example, the instructions could be something like (my suggestions are in red):

Dynamic norm condition: "In 2020, 33% of British people - a figure that's been increasing every year over the previous 5 years and that looks likely to continue increasing in the next decade -

have successfully been engaging in one or more of the following behaviours to eat less meat ...”

- Eating small portions of meat
- Opting out of eating meat several days of the week
- Adopting a vegan/vegetarian diet”
- Taking part in Veganuary-style events\*

\*perhaps another example participants might find easy to accept, given the popularity and media attention to these events?

Thank you for your careful reflection and thoughtful suggestion. We have considered it carefully and we indeed do believe that the addition of an explicit comment on future trends in the manipulation would likely lead to significant results. However, we think this would be a considerable shift from the paradigm used to manipulate dynamic norms. In previous work, researchers providing dynamic (trending) norm information do not refer usually to future trends. In one study, Sparkman and Walton (2017, Study 3) add a reference to a future norm to examine the role of the perceived future descriptive norm and directly test the causal role of pre conformity (i.e. conforming to a future predicted norm). Thus, adding an explicit reference to a future norm may be an additional layer in the design, and statements about future growth in the norm would be an additional manipulation that is superimposed on the standard dynamic norm manipulation format. Apart from this Sparkman and Walton study, most studies providing dynamic (trending) norm manipulation provide information on how norms have changed up to the present time (Cheng et al., 2020; de Groot et al., 2021; Graupensperger et al., 2021; Lee & Liu, 2021; Meleady, 2021; Mortensen et al., 2019; Sparkman et al., 2020; Sparkman & Walton, 2017, 2019)

We believe there is considerable merit in manipulating future norms alongside dynamic norms in future research, and we would like to pursue this idea further once the impact of visual cues on the standard type of dynamic norm vs static norm manipulation has been investigated. To improve on our existing manipulation, we have updated the text to include a sentence describing that norms are changing, without reference to a future norm:

“More and more people in the UK are changing. In 2020, 33% of British people - a figure increasing every year over the previous 5 years - successfully engaged in one or more of the following behaviours to eat less meat...”

We also appreciate your suggestion for another example behaviour, and we have added “taking part in Veganuary-style events” to the information provided.

2. Page 8, first para: I think there’s something missing here: you not only investigated the influence of dynamic (compared to static) norms, you investigated how dynamic norms COUPLED WITH visual cues fare compared to static norms coupled with visual cues. So I don’t see why this shouldn’t be specified more clearly. If you had only tested the influence of dynamic norms, the visual cue would not have been necessary. - but as it was included, it needs to be justified, or at least acknowledged.

We have updated the text to reflect the comparison we made.

3. Page 9, Table 1: The commentary I have made originally has been answered by the authors (thank you!), but I had another thought:  
Thanks for providing this explanation! But I still don’t understand the justification: did the other measures (interest in reducing meat consumption and attitudes) not correlate with intentions and expectations? (there’s no info on which measures correlated with which) If they did not, that’s rather strange, as they typically do. And if they did, why not combining all of them? To me, it’s unclear why one would combine measures of such distinct concepts - what’s the necessity?

In line with the theory of planned behaviour, we believe attitudes, intentions, and expectations to be conceptually distinct (‘interest’, also, for that matter). In applications of the TPB, the ways in which

intentions and expectations are operationalised often blur their conceptual distinction. For example, intention has been measured using the statement “I intend to eat less meat within the next year” on a likelihood scale (Fishbein & Ajzen, 2010). This is akin to asking participants rate their expectation of an intention. For this reason, we think it is reasonable to combine expectation and intention measures. Additionally, Fishbein and Ajzen (2010) note that “there is little to be gained by the proposed distinctions” in their discussion of intentions, expectations, and willingness (p. 40). On the other hand, the conceptual distinctions between interest, attitudes and intentions are widely accepted.

4. Page 10: I think it would be worth running a comprehension or fluency of processing test on the following formulations: ‘**more British people are eating less meat**’ (used in your manipulations) vs. ‘**less British people are eating meat**’.

The latter looks easier/more fluent to process, and ease of processing affects unrelated judgments, so harder to process statements will detrimentally impact the DVs due to their processing, not their actual content. If you chose to use the latter, of course the visual cues would need to be adapted, but I think it could be worth the effort if it ensures that people are more responsive to this kind of framing.

Our study is designed to look at outcomes related to reducing meat consumption, rather than reducing the number of people eating meat. In changing the wording for ease of processing, the meaning of the information changes, and this also alters what is being measured.

5. I hope that these notes are useful, and I wish the authors all the best with their research plans! I completed this review with the assistance of my collaborator Dr. Jenny Cole, Postdoctoral Scholar in Social Psychology at Vanderbilt University, Owen Graduate School of Management.

We would like to sincerely thank both reviewers for their comments and suggestions for improvement.

6. Page 3: Differently how? a short precision would work here

We have added a short description elaborating on the difference.

7. Page 3: There might be a typo before the citation.

Thank you for spotting this. We have now made the necessary correction.

8. Page 3: is it necessary to use both terms here? I think you referred more to injunctive than subjective

We have decided to use only the term ‘injunctive’ as it may be clearer to the reader.

9. Page 4: Were both the dynamic and static norm info equally more effective?

In one study, the perceived dynamic and static norms were not compared against one another in any reported models. In the two other studies, each norm was tested separately in each study, but the research design does not allow for comparison between groups. We have amended the text to clarify this.

10. Page 4: A bit unclear, needs re-writing

We have clarified the wording and we added information that could allow for a more nuanced understanding of the manipulation.

11. Page 6: This sentence is unclear

We have added more detail to clarify the intended meaning.

12. Page 7: Is any of your hypotheses testing the interaction between visual cue (present v. absent) and type of norm (static v. dynamic)? So far, I don’t think I have seen any such hypothesis. I

mean, this might not be on your list of priorities, but since you started by comparing static and dynamic norms, I am wondering if the next logical step for that comparison is to see if it's exacerbated by the inclusion of visual cues? I feel it's a type of information that's unnecessary to miss, since you'll have all the tools to test the data for it.

We would like to thank the reviewer for pointing out this oversight on our part. We have now amended our list of hypotheses to include a hypothesis specifically testing the interaction between visual cue and type of norm (hypotheses 2 and 5), and another hypothesis testing the simple main effect of visual cue within dynamic norm conditions (hypotheses 3 and 6).

13. Page 8: I think there's something missing here: you not only investigated the influence of dynamic (compared to static) norms, you investigated how dynamic norms COUPLED WITH visual cues fare compared to static norms coupled with visual cues. So I don't see why this shouldn't be specified more clearly. If you had only tested the influence of dynamic norms, the visual cue would not have been necessary. - but as it was included, it needs to be justified, or at least acknowledged.

We have now updated the text to reflect the comparison we are making.

14. Page 9: How about the results on these 2 measures taken separately? It would be good to include them - as well as including a table with all inter-item correlations (it would give the reader a better picture of what happened 1) among all these measures and 2) between the two conditions.

We have updated the table to show the statistical results of condition predicting intentions and expectations separately, for added clarity. We have also added a table showing intercorrelations between all measured study variables.

15. Page 12: 3 seconds or rather 13 seconds?

We originally intended to exclude participants who spent 3 seconds or less reading the normative information. While the average reading speed is around 250 words per minute, we have decreased the minimum time limit to account for faster readers and those who are skimming text. We have increased the minimum limit for exclusion to 5 seconds. The manuscript text now reads:

“Based on an average reading speed of about 240-260 words per minute, the text prompts should take roughly 13 seconds to read (Brysbaert, 2019). Accordingly, we assume that 5 s is a conservative estimate of minimum reading time, and we will exclude the data of participants who spend less than 5 s on the reading task.”