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Discussions

Interactive comment on "The Met Office Weather Game: investigating how different methods for presenting probabilistic weather forecasts influence decision-making" *by* Elisabeth M. Stephens et al.

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Many thanks for your insightful comments which will improve the clarity and relevance of our manuscript. We respond to your numbered comments below.

1. Ensemble visualisation

Our choice for the visualisations and designs was based largely on what visualisations were already in use by operational weather agencies at the time so that we were testing what was 'operational'. We already mention the 'Invent' format as

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coming from the Met Office website. The Line format was based on a format in use by the Norwegian weather service for their long term probability forecast (e.g. https://www.yr.no/place/Norway/Troms/Troms%C3%B8/Troms%C3%B8/long.html). The precipitation probability bar comes from the Australian Bureau of Meteorology website (e.g. http://www.bom.gov.au/nsw/forecasts/sydney.shtml).

We will update the text from Lines 164 onwards to read:

"The presentation formats used within this game were based on visualisations in use at the time by operational weather forecasting agencies. Seven different temperature forecast presentation formats were tested (Fig. 1), representing 3 levels of information content (deterministic, mean with 5th / 95th percentile range, mean with 5th / 95th and 25th / 75th. These included table and line presentation formats (in use by the Norwegian Weather Service, www.yr.no, for their long term probability forecast) as well as the 'Invent' style as it appeared on the web, and a more simplified version based on some user feedback. Nine different rainfall forecast presentation formats were tested (Fig. 2), with 3 different levels of information content including one deterministic format used as a control from which to draw comparisons. The 'bar format' is derived from the Australian Bureau of Meteorology website, www.bom.gov.au, and the 'umbrella' format was intended as a pictorial representation similar to a pie chart style found on the University of Washington's Probcast website (now defunct)"

2. A game as a proxy

The reviewer makes a good point here, we do understand that the game design cannot replicate the real world, and players may take more risks than in real life. We were trying to make a similar point towards the end of 4.4 but hopefully this updated text will make that clearer:

"The game format is useful for achieving large numbers of participants, but the game cannot replicate the real life costs of decision-making and therefore players might take more risks than they would in real life. While the aim was to compare different presen-

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tation formats it is possible that some formats encourage or discourage this risk taking more than others, especially if they need more time to interpret. A thorough understanding how weather scenarios influence forecast interpretation should be achieved by complementing game-based analysis such as this with qualitative methodologies such as that adopted by Sivle (2014), which was also able to find that weather symbols were being interpreted differently to how the Norwegian national weather service intended."

With respect to the bias, that could well reflect risk-taking but for 4c in particular it is perhaps more related to the construct of the question, with it only being possible to make an error in one direction when the probability is 0% (you can see the opposite for Q4 Stonemouth for example).

3. On statistics

This first paragraph was cut off but we suspect the reviewer meant to finish this paragraph with a suggestion to change the plots in Figure 3 so that the y axis is a percentage rather than total. We are happy to do this.

The mentioning of the removal of those who have been taught about uncertainty within the text was a relic of an earlier version that was not caught on proof reading. We've changed the text and double checked all our figures / updated them where necessary. We will present the results shown in Figure 6 within the supplementary material for both responses to this 'taught about uncertainty' question.

The authors did not work directly on the coding itself, this was consulted out to an external company by the Met Office. We will include them in the acknowledgements.

4. Extending the analysis

The ANOVA analysis is presented in the Supplementary Material, where we have referenced this we have now included a direct reference to Figure 1 and the P Value of <2.2e-16.

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We have only collected location data by Postcode District; there is a median population of over 20000 in each postcode district so identifying the individual would be difficult (see https://www.doogal.co.uk/PostcodeDistricts.php).

5. On presentation

There were some issues with how these plots could be presented within the Discussion format provided by the journal, we will make sure that they are readable in the final proofs and if not adjust them accordingly.

6. Use of games in geoscience

We agree that more reference to games in geoscience is needed, within section 2 we will append a sentence to the paragraph that begins on Line 207:

"Our solution was to make the game as competitive as possible, while being able to identify and eliminate results from participants who played repeatedly to maximise their score. We also provided the incentive of the potential of a small prize to those that played all the way to the end of the game. Games have been used across the geosciences, for example to support drought decision-making (Hill et al., 2014), to promote understanding of climate change uncertainty (Pelt et al. 2015), and to test understanding of different visualisations of volcanic ash forecasts (Kelsey et al. 2017)."

Hill, H., Hadarits, M., Rieger, R., Strickert, G., Davies, E.G. and Strobbe, K.M., 2014. The Invitational Drought Tournament: What is it and why is it a useful tool for drought preparedness and adaptation?. Weather and Climate Extremes, 3, pp.107-116.

Mulder, K.J., Lickiss, M., Harvey, N., Black, A., Charlton-Perez, A., Dacre, H. and McCloy, R., 2017. Visualizing volcanic ash forecasts: scientist and stakeholder decisions using different graphical representations and conflicting forecasts. Weather, Climate, and Society, 9(3), pp.333-348.

Van Pelt, S.C., Haasnoot, M., Arts, B., Ludwig, F., Swart, R. and Biesbroek, R., 2015. Communicating climate (change) uncertainties: simulation games as boundary ob-

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