'Uncertainty attunement' has explanatory value in understanding autistic anxiety

Eloise Stark[1,2*], James Stacey[2], Will Mandy[3], Morten L. Kringelbach[1,4,] and Francesca Happé[5]

[1] Department of Psychiatry, University of Oxford, Oxford, UK
[2] Oxford Health NHS Foundation Trust, Warneford Hospital, Oxford, UK
[3] Research Department of Clinical, Educational and Health Psychology, University College London, 1-19 Torrington Place, London, UK
[4] Center for Music in the Brain, Department of Clinical Medicine, Aarhus University, Denmark
[5] Social, Genetic and Developmental Psychiatry Centre, Institute of Psychiatry, Psychology and Neuroscience, King's College London, London, UK

* Correspondence: eloise.stark@psych.ox.ac.uk (E. Stark).

Keywords: autism, cognition, predictive processing, uncertainty, anxiety

We wholeheartedly thank Bervoets, Milton and Van de Cruys [1] for their helpful and important addition to the debate surrounding autism and anxiety. Bervoets et al. aim to clarify the concept of 'intolerance of uncertainty' and argue that it does not fit well within a predictive processing framework and is ultimately unhelpful in understanding anxiety in autism.

The stance of Bervoets et al. on intolerance of uncertainty, in our opinion, does not adequately capture the complexity of the construct. As described within our original paper [2], intolerance of uncertainty is a multifaceted construct comprising components at different levels of explanation – (i) a desire for predictability and an active engagement in seeking certainty, and (ii) uncertainty paralysis or a feeling of being cognitively or behaviourally 'stuck' in situations of uncertainty [3, 4].

We agree that specific elements of the construct do render intolerance of uncertainty superfluous in the face of precision-based predictive processing accounts of autism. As Bervoets and colleagues argue, predictive processing as a biological mechanism situates the mind inherently as a minimiser of uncertainty. Uncertainty intolerance is therefore indistinguishable from predictive processes by this account.

However, our original Opinion piece situates the *consequences* of salient mismatches between predictions and outcomes (prediction errors) as more integrally linked to the subjective and physiological experience of anxiety. Specifically, we proposed that uncertainty paralysis – the feeling of being cognitively or behaviourally 'stuck' in situations of uncertainty – may be physiologically linked to anxiety. For example, the 'freeze' response is often a hallmark of anxiety and is a common response to perceived threat. In non-autistic individuals, freezing responses have been related to higher state anxiety [5]. In this regard, a careful analysis of the constituents of intolerance of (or 'attunement to') uncertainty, and extraction of the temporal dynamics of predictive processing and subsequent anxiety will help us to extrapolate how these constituent parts may lead to an anxious state in autistic (and non-autistic) individuals.

Similarly, we agree with Bevroets and colleagues that partitioning predictive processes relating to uncertainty estimation is an important endeavour to fully comprehend the construct of ‘intolerance of uncertainty’ that scientists and psychologists have been measuring and discussing since the 1990s [4]. Yet importantly, uncertainty estimation is likely to involve both conscious, metacognitive mechanisms where the individual is actively and subjectively monitoring their mental processes, and ‘subpersonal mechanisms’ or mental processes that operate below the level of subjective awareness [6].

While existing measures may not tap into the ‘subpersonal mechanisms’ or underlying uncertainty estimation on a biological level, we do believe that studying attitudes towards uncertainty and parent reports of uncertainty distress in their children bears value in understanding the metacognitive and behavioural elements of managing perceived uncertainty. Although uncertainty (and intolerance thereof) may be a universal construct that has neurobiological underpinnings in predictive processing mechanisms, it has helpful explanatory value in conceptualising individual distress (such as during the COVID-19 pandemic [7]) and has personal relevance to many, including autistic people.

Throwing the baby (intolerance of uncertainty) out with the bath water (the misconceptions inherent in the term, such as implications of inappropriate emotionality) may not be maximally helpful for moving the field forward. Rather, a reappropriation of the term ‘intolerance of uncertainty’ or a renaming of the concept in an attempt to remove the assumption that the individual is oversensitive, rather than reacting appropriately to their internal working models, may be more constructive for all; perhaps we should refer transdiagnostically to ‘uncertainty attunement’?

Lastly, we do concur that predictive processing and uncertainty are intrinsically linked, and that the weighting of perceptual inference (or “precision”) is key to this scientific exploration. However, measuring predictive processing, specifically encompassing precision weighting, is an incredibly complex venture; as Yon and Frith argue [6], “we must get more precise about how precision works”.

Bervoets and colleagues suggest that current measurements of intolerance of uncertainty are flawed, with reference to the ‘double empathy problem’ and limitations of attitudinal or parent-report questionnaires. They suggest that lab experiments using controlled inductions of uncertainty and computational modelling to track uncertainty estimation may be the correct way forward. We applaud this notion, and hope to see experimental studies in future that are able to track such computations to see whether autistic and non-autistic individuals show differences. However, while we await such endeavours, we believe that the large body of extant literature linking the concept of intolerance of uncertainty to anxiety in autistic individuals has value. For instance, the Coping with Uncertainty in Everyday Situations (CUES) trial, which aims to help autistic children to learn strategies to increase tolerance to uncertainty, appears promising in terms of reducing anxiety in autistic young people [8].

To conclude, there are likely to be many routes from cognition to anxiety within individuals, including autistic individuals. This should not, of course, detract from careful examinations of systemic factors, such as adversity, trauma and environmental stressors. Autism represents a vast spectrum, full of heterogeneity, which is both a wonderful marker of human diversity and a challenge for conceptual accounts that attempt to explain common experiences through simple models. We are not wedded to any element, construct or proposed relationship within our original model. Rather, we hope it will generate further lively debate, experimental work, and – through these – theoretical and practical progress. As the Physician Lewis Thomas wrote, “Science is founded on uncertainty” [9]; we await novel empirical tests of our and other models, and constructs related to individual differences in attunement to uncertainty.

References

1. Bervoets, J. et al. (2021) Autism and intolerance of uncertainty: An ill-fitting pair. Trends in Cognitive Science.

2. Stark, E. et al. (2021) Autistic Cognition: Charting Routes to Anxiety. Trends in Cognitive Sciences 25 (7), 571-581.

3. Berenbaum, H. et al. (2008) Intolerance of uncertainty: Exploring its dimensionality and associations with need for cognitive closure, psychopathology, and personality. Journal of Anxiety Disorders 22 (1), 117-125.

4. Birrell, J. et al. (2011) Toward a definition of intolerance of uncertainty: A review of factor analytical studies of the Intolerance of Uncertainty Scale. Clinical psychology review 31 (7), 1198-1208.

5. Sagliano, L. et al. (2014) Approaching threats elicit a freeze-like response in humans. Neuroscience letters 561, 35-40.

6. Yon, D. and Frith, C.D. (2021) Precision and the Bayesian brain. Current Biology 31 (17), R1026-R1032.

7. Freeston, M. et al. (2020) Towards a model of uncertainty distress in the context of Coronavirus (COVID-19). The Cognitive Behaviour Therapist 13.

8. Rodgers, J. et al. (2017) Towards a treatment for intolerance of uncertainty in young people with autism spectrum disorder: Development of the coping with uncertainty in everyday situations (CUES©) programme. Journal of autism and developmental disorders 47 (12), 3959-3966.

9. Thomas, L. (1980) On science and uncertainty. Discover 1, 59.