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# Capturing the complexity of uncertainty language to maximise its use.

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Uncertainty is often communicated verbally, using uncertainty phrases such as 'there is a small risk of earthquake', 'flooding is possible' or 'it is very likely the sea level will rise'. Prior research has only examined a limited number of properties of uncertainty phrases: mainly the probability conveyed (e.g., 'a small chance' convey a small probability whereas 'it is likely' convey a high probability). We propose a new analytical framework that captures more of the complexity of uncertainty phrases by studying their semantic, pragmatic and syntactic properties. Further, we argue that the complexity of uncertainty phrases is functional and can be leveraged to best describe uncertain outcomes and achieve the goals of speakers.

We will present findings from a corpus study and an experiment where we assessed the following properties of uncertainty phrases: probability conveyed, subjectivity, valence, nature of the subject, grammatical category of the uncertainty quantifier and whether the quantifier elicits a positive or a negative framing. Natural language processing techniques applied to corpus data showed that people use a very large variety of uncertainty phrases representing different configurations of the properties of uncertainty phrases (e.g., phrases that convey different levels of subjectivity, phrases with different grammatical construction). In addition, the corpus analysis uncovered that uncertainty phrases commonly studied in psychology are not the most commonly used in real life. In the experiment we manipulated the amount of evidence indicating that a fact was true and whether the participant was required to prove the fact was true or that it was false. Participants produced a phrase to communicate the likelihood that the fact was true (e.g., 'it is not sure…', 'I am convinced that…'). The analyses of the uncertainty phrases produced showed that participants leveraged the properties of uncertainty phrases to reflect the strength of evidence but also to achieve their personal goals. For example, participants aiming to prove that the fact was true chose words that conveyed a more positive polarity and a higher probability than participants aiming to prove that the fact was false. We discuss the utility of the framework for harnessing the properties of uncertainty phrases in geosciences.