Communicating Science Under Uncertainty: Claim Strength and Hedging in Animal Metacognition Research

Accurate reporting of scientific findings is crucial, as failures in this can lead to issues such as diminishing public trust and ill-informed decision-making (Intemann, 2022; Jaakkola et al., 2020). A well-known way in which science is misrepresented is through overly confident or overstated claims that go beyond what the evidence supports, such as through communicating treatment efficacy without being transparent about the interpretive uncertainties (Intemann, 2022). It is not only important to consider the strength of claims but also how consistently this strength is presented. If the inferential gap between evidence and interpretation is not maintained consistently, this would reasonably leave the audience uncertain about the level of confidence intended, thereby increasing the chance of misunderstandings around how impactful the findings are (Perra et al., 2021).

Such inconsistency seems particularly likely in fields characterised by high uncertainty, such as animal metacognition, as ambiguities can lead to unclear and inconsistent language (Bringmann et al., 2022; Roszik & Miklósi, 2025). Studying animals' ability to reflect on their own thinking relies on indirect evidence and therefore depends heavily on assumptions about what behaviour can reveal about underlying cognitive processes. As a result, the same empirical findings can often support multiple interpretations that vary in strength, ranging from lower-level associative explanations to higher-order interpretations such as self-awareness (Beran, 2019). Because there is often no clear consensus on the appropriate level of cognitive explanation, there is inherent ambiguity in how findings should be framed, which may be reflected in subtle variation in how claims are expressed within research articles.

Language plays a central role in shaping how strongly these interpretations are conveyed. One way researchers manage uncertainty is through hedging, which linguistically modifies propositions to reduce claim strength and help avoid overextending evidence. Hedging therefore seems informative for understanding how claim strength is constructed and shifts across papers. Although hedging has been compared across disciplines (Takimoto, 2015) and sections of research articles (Varttala, 2001), it has not yet been examined in animal metacognition research and in relation to claim strength consistency.

In this study, I examine both the strength and consistency of claims in animal metacognition publications by directly comparing how the same main claim is presented in the abstract section and across the general discussion section. Focusing on these two sections allows comparison between the most condensed presentation of findings (abstract) and the most interpretative synthesis (discussion), where cognitive claims are typically elaborated and evaluated (Njeri Mugwe & Runo, 2026). For each paper, instances of the same main claim are identified in both sections and coded for

strength based on the level of metacognitive capacity attributed to the animal. Claim strength is operationalised on a 5-point scale, ranging from very weak behavioural descriptions with no metacognitive attribution to very strong claims involving explicit self-awareness or human-like metacognitive abilities. This enables a systematic comparison of whether the same findings are framed with a consistent level of confidence across sections, or whether claim strength shifts depending on rhetorical context. In addition, I analyse the use of hedging language within these claims, qualitatively examining how linguistic markers of uncertainty relate to claim strength and its consistency across sections. This study aims to provide insight into how researchers navigate the gap between evidence and interpretation, and how inconsistencies in claim strength may arise in scientific communication.

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