I. Introduction

The Epistemic Containment Principle (ECP): epistemic modalss must take wider scope than strong quantifiers. [2]

- Every student might be the murderer.

MIGHT > EVERY, MIGHT > EVERY

A few systemic classes of counterexamples to the ECP:

- Objective vs. subjective (doxastic) [1], [5]
- Each, every, all, etc.

Questions & Hypotheses

1. How robust is the ECP as an empirical phenomenon? Can it be captured experimentally and quantitatively?
2. Are there any systematic contextual factors that determine the ECP, that have not yet received attention?
   - QUDs (Question Under Discussions; [4]), which create biases towards different scopal orderings
   - The nature of the evidential source, which are in turn biased towards addressing different QUDs
3. What is the relationship between these and other factors that have been known to influence the ECP?
   - Many of them can be reduced to the core effect of QUDs and pragmatic reasonings

II. Probing the intuitions

QUD effects (Experiment 2):

- Which of them has the possibility of being a murderer? (As far as I know, everyone might be the murderer.

EFFECTS OF EVIDENTIAL SOURCE (EXPERIMENT 1):

- How many bushes might have a tiger?

Effects of evidential source (Experiment 1):

- How many bushes might have a tiger?

Based on what the zookeeper said, every bush might have a tiger. MIGHT > EVERY, MIGHT > EVERY

- Which bush is more likely to have a tiger?

Based on what I see, every bush might have a tiger. MIGHT > EVERY, MIGHT > EVERY

III. Experimental Paradigms and Stimuli

In the two experiments, participants read through 4–5 situations in which the epistemic base of the speaker was explicitly given via two types of visual stimuli (e.g., Fig. 1 and 2). They were then asked to judge whether a sentence uttered by that speaker was true or false. In target trials, the speaker’s epistemic base rendered the sentence true only under the ECP-violating scopal ordering, but false under the ECP-observing one. 600 native English speakers were recruited for each experiment.

IV. Experiment 1: evidential source and indirect QUDs

Sample prompt: Ron learns from the zookeeper that two tigers and one panther, which look as in Fig. 1, live in the silver cage. One day a guest arrives and they peer through the cage, which looks as in Fig. 2. At this moment, Ron says: (Sentence stimulus).

V. Experiment 2: direct QUDs

Sample prompt: Ron is a zookeeper. He keeps two tigers and one panther, which look as in Fig. 1, in the silver cage. One day a guest arrives and they peer through the cage, which looks as in Fig. 2. (The guest asks: QUD.) Ron says: (Sentence stimulus).

VIII. QUD manipulations

Caveats to incorporating QUD manipulations: not all participants seem to pay close enough attention to them.

Filler trials involving QUDs: Two tigers and one fox in Fig. 1–2. Fox in the leftmost bush.

“Which of the left two bushes have tigers?” / “Both.” (F) \rightarrow 25% incorrect responses

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Discussion & Conclusion

1. The ECP is best analyzed as a gradient epiphenomenon that is derived from a confluence of biases in other more fundamental factors. One important factor is the QUD.
   - Many implicit, default QUDs likely anticipate answers with ECP-observing scopal interpretations.
   - However, if a particular QUD anticipates ECP-violating scopal interpretation as a (more) relevant answer, the latter is more likely to be accepted, obviating the ECP.

2. It remains to be seen if other factors, e.g., subjective vs. objective epistemic modal distinction, can ultimately be reduced to a QUD-based explanation.
Additional free responses

(1) From those who chose ECP violating responses (i.e., True responses; primarily in response to ECP, ADV(V), and WHICH conditions)

a. The leaves on both kinds of plants have the same appearance. So it’s possible that any of the pots could have a lotus shoot. Though saying ‘every’ isn’t as clear as saying ‘any’.
b. It depends (on) whether she meant each one might have a cherry or every single one might have a cherry.
c. This one is interesting because while it’s false that each ice cream sundae will have a maraschino cherry you could still reason that every one of them MIGHT have one.
d. It depends on if she emphasizes the word ‘every’ or ‘might’.
e. It is tricky to know if George means there are 3/3 moss butterflies or (if he means) each beaker (could) possibly contain one.
f. I think I just adjusted my definition of ‘every’ to mean ‘possibly’ and not ‘all’.
g. I think she means each statue has the potential to have a blue sapphire not that all of them will.
h. I suppose the vagueness in meaning comes from whether he means that it is possible for every bush to have a tiger cub or that it is possible that a tiger cub could be in every bush but not all.
i. ‘might’ is an ambiguous word.

(2) From those who chose ECP observing responses (i.e., False responses; primarily in response to ADV(O), and HOW conditions), but also voiced some reserve due to the ambiguity

a. Interesting. This depends on how you interpret ‘every pot might...’ I would lean towards (this meaning) that all 3 pots would have a desert lotus shoot and not just that each pot might potentially have a desert lotus root.
b. The more I think about it I guess every bush MIGHT have a tiger cub but it just is not the correct way to say this.

(3) From those who chose ECP observing responses (i.e., False) and were more sure about their judgements

a. The correct phrase should be ‘each pot might have a desert lotus shoot’. The word ‘every’ implies that all pots inclusively together have desert lotus shoots.
b. ‘Any of the bushes might have a tiger club’ would be true. ‘Every bush’ cannot have a tiger cub cause there are only two tiger cubs.
c. Any of the three could have the tiger cubs but only two at a time.
d. ‘Any of the bushes might have a tiger cub’ would be true. Every bush cannot have a tiger cub cause there are only two tiger cubs.

References


For questions and comments, please email me at: sunwooj@stanford.edu. Experiments, data, mixed effects models, and a copy of the poster can be found at: https://github.com/sunwooj/ecp/.