

Reasoning with Quantifiers, Lewisian Imaging and the Confirmation Paradox

From a normative point of view, the conclusions we can draw from a sentence of the form *No A is B* are the same as the ones we can draw from *No B is A*, because *No* is a symmetric determiner, and therefore these two sentence types are logically equivalent. I will present experimental evidence (building on joint work with Vincent Mouly) showing that people do not in fact reason in the same way with *No A is B* and with *No B is A*. In particular, people's estimate of the number of As after processing *No A is B* is higher than after processing *No B is A* (and vice-versa for *B*). I will argue that this instantiates a more general property of *restrictors*: we tend not to revise our beliefs about the size of the restrictor set even when receiving information that would in fact warrant such a revision. I will argue that this effect can be explained if we make the following hypotheses:

- Belief update does not (always) correspond to probabilistic conditionalization, but can also proceed by *Imaging*, as defined by David Lewis (1976). In a nutshell, when revising our beliefs with a proposition S, our posterior degree of confidence in a certain proposition T corresponds to our prior degree of confidence in the conditional 'If S, T' (using Stalnaker's semantics for conditionals), rather than to the conditional probability $P(T|S)$.
- Restrictors tend to serve as *anchors* when we engage in conditional reasoning: when considering the different ways in which a quantified sentence could be true, we mentally keep constant the restrictor set. I will relate this both to the possibility of *de re* readings for restrictors and to recent experimental results about verification strategies for quantified statements (Knowlton, Pietroski, Williams et al. 2023).

I will show how these findings and the proposed theory can shed light on the *confirmation paradox* (see also Rinard 2014): given a statement S of the form '*All As are Bs*', people are more prone to think that an observation of an object that has both properties A and B 'confirms' S than they are to think that observing an object that is both not-B and not-A confirms S, and I will discuss, time permitting, further experimental results (based on joint work with Nicolas Poisson) pertaining to the confirmation paradox.

Selected References:

- Knowlton, T., Pietroski, P, Williams, A., Halberda, J & Lidz, J. (2023), Psycholinguistic evidence for restricted quantification. *Nat Lang Semantics* 31, 219–251. <https://doi.org/10.1007/s11050-023-09209-w>
- Lewis, D., (1976), Probabilities of Conditionals and Conditional Probabilities, *Philosophical Review*, 85(3): 297–315. doi:10.2307/2184045
- Rinard, S. (2014), A New Bayesian Solution to the Paradox of the Ravens, *Philosophy of Science* 81 (1):81-100 (2014)