

Non-Categorical Thought (Abstracts)

Peter Hawke (St Andrews / Amsterdam)

Assertibility Semantics for Conditionals, Quantification and Modality

(Joint work with Shane Steinert-Threlkeld)

We exhibit a novel semantic framework in the state-based tradition, aimed at capturing subtle interactions in natural language between indicative conditionals, basic quantifiers and epistemic modals. We show that our framework accounts for linguistic data that more orthodox frameworks cannot accommodate: including a standard dynamic semantic framework and standard domain semantics. In particular, it uniformly addresses challenging data recently emphasized by Gillies (on conditionals), Willer (on conditionals) and Yalcin (on epistemic modality *de re*). This yields foundational morals. First, the framework is a static alternative to recent attempts to accommodate some of the data with a dynamic semantics. Second, our framework is naturally interpreted as governing assertibility rather than truth *per se*, and seems a promising basis for an expressivist semantics.

Ruth Byrne (TCD)

Keeping track of what is real and what is imagined: How people update the epistemic status of models of counterfactuals

(Joint work with Orlando Espino, University of La Laguna, Tenerife, Spain)

When people understand a factual conditional, such as, ‘if it was a good year there were roses in the national park’ they tend to think initially about a single possibility, ‘it was a good year and there were roses’; if needed, they can flesh out their models to consider other possibilities, such as, ‘it was not a good year and there were no roses’. In contrast, when they understand a counterfactual conditional, such as, ‘if it had been a good year there would have been roses’, they think about two possibilities from the outset: they construct a model of the conjecture, ‘it was a good year and there were roses’, and a model of the presupposed facts, ‘it was not a good year and there were no roses’, and they keep track of the epistemic status of these models, as corresponding to the conjecture or the facts. In this talk I review the main experimental evidence that people envisage multiple possibilities for a counterfactual from the outset whereas they initially envisage a single possibility for a factual conditional, which comes from many different sources including studies of comprehension reading times, eye-tracking, and inferences. Less is known about how people track the epistemic status of models and in this talk I focus on a recent series of experiments designed to examine how people keep track of what is real and what is imagined when they understand a counterfactual. The results indicate that when people expect a story that contains a counterfactual to continue to be about the conjecture, they keep in mind both possibilities; whereas when they expect the story to continue to be about the presupposed facts, they focus on the possibility corresponding to the facts. The discovery supports the proposal that comprehension of a counterfactual requires the comparison of the imagined conjecture to the presupposed reality.

Max Jones (Leeds / Bristol)

What are the origins of counterfactual thought? Why do they matter?

Recent attempts to ground modal knowledge in our capacity for counterfactual thought have appealed to evolutionary explanations of the origins of this capacity. I will present alternative explanations of the origins of counterfactual thought, either as an exaptation or an invention. These alternative explanations undermine the idea that counterfactual thought can support domain-general modal knowledge. This need not be seen as fatal for counterfactual-based

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accounts of modal knowledge, since the appeal to evolutionary origins was arguably misguided in the first place. However, looking to the origins of counterfactual thought may place constraints on the kind of knowledge that we can expect to derive through engaging in counterfactual thought.

John Divers / Shyane Siriwardena (Leeds / Cambridge)

Metaphysical Modality and Objective Probability.

Divers (2018)¹: (a) argues that a neo-Quinean pragmatic scepticism about metaphysical modality is a perfectly reasonable position to maintain and (b) predicts some difficulties and limitations associated with various strategies for overcoming such scepticism. In this paper we develop an account of the difficulties and limitations associated with one such strategy – that is: the strategy of attempting to establish an appropriate (scepticism-defeating) association between metaphysical modality and objective probability. We argue that observation of the crucial distinction between *probability functions* and *probability spaces* is the key to understanding why the only defensible theses about connections between objective probability and metaphysical possibility are ineffective for the purpose of meeting the challenge posed by neo-Quinean pragmatic scepticism about metaphysical modality.

Vincenzo Crupi (Turin)

Three ways of being non-material (joint work with Andrea Iacona)

Abstract. We investigate three formal accounts of conditionals which articulate three distinct non-material interpretations of "if then": the suppositional interpretation, the evidential interpretation, and the strict interpretation. The interesting thing about these three accounts is that, although they are all defined in terms of one and the same notion, the standard notion of probability, each of them exhibits specific logical features that deserve separate consideration. In particular, the evidential interpretation significantly differs both from the suppositional interpretation and from the strict interpretation.

Salvador Mascarenhas (ENS, Paris)

Reasoning with disjunctions as a form of hypothesis testing

(based on joint work with Mathias Sablé-Meyer, Neurospin)

The idea that human reasoning is best modeled by rational (Bayesian) update procedures resting on a representational system with probability measures has gained great currency in the psychology of reasoning over the past twenty years (e.g. Oaksford and Chater, 2007). Conversely, the popularity of research paradigms that approach human reasoning within the mold of a model-theoretic formal system without probability measures has decreased. I argue that elements from both approaches are necessary to understand a large class of fallacious inference patterns involving disjunction and disjunction-like elements. For example, from "Mary met every king or every queen of Europe" and "Mary met the king of Spain," subjects overwhelmingly assent to the fallacious conclusion that "Mary met every king of Europe." I argue that this is because the disjunctive premise puts forth two alternatives and invites the reasoner to pick one, while the second premise provides evidence in favor of one alternative rather than the other. I extend the account Crupi et al. (2008) give of the conjunction fallacy in terms of hypothesis testing: the hypothesis "Mary met every king of

¹ Divers, J. (2018) "W(h)ither Metaphysical Necessity?" (The Presidential Address) in *Proceedings of the Aristotelian Society Supplementary Volume*, 92.1, pp.1-25.

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Europe” is a better theory of the evidence “Mary met the king of Spain” than its competing hypothesis “Mary met every queen of Europe.” Additionally, I show that the conjunction fallacy is in a concrete way a special case of these inferences with disjunction. The view of human reasoners as hypothesis testers rather than posterior-probability maximizers generalizes to a very broad class of compelling fallacies.

More concretely, I give a reconceptualization of the Erotetic Theory of Reasoning of Koralus and Mascarenhas (2013), a kind of Mental Models Theory (Johnson-Laird, 1983), in terms of Bayesian confirmation theory, where the hypotheses under consideration are determined by disjunctive premises interpreted as questions, along the lines of Inquisitive Semantics (Groenendijk, 2008; Mascarenhas, 2009). The resulting picture of human reasoning is by construction aligned with well-supported theories of linguistic interpretation, and it illustrates the need for both probabilistic tools (confirmation theory) and model-theoretic tools (non-classical semantics for disjunction) in an account of mental representations.