Workshop:

Rationality frameworks for conditionals

Munich Center for Mathematical Philosophy
Room Number 225, 2nd Floor, Ludwigstraße 31, Munich
Friday, August 17, 2012

`http://www.pfeifer-research.de/rffc.htm`

Aims & Scope

This workshop brings together philosophers and psychologists and focuses on investigating conditionals from formal and empirical points of views. The topics (listed in alphabetical order) include but are not restricted to:

- causality and conditionals
- conditional structures
- experimental paradigms for conditionals
- learning conditionals (i.e., conditionalizing on conditionals)
- probabilistic approaches to conditionals
- quantitative and qualitative approaches to conditionals
- ranking theory and conditionals
- simulation studies on conditionals

Funding

This workshop is generously supported by the *Munich Center for Mathematical Philosophy* (70% of the travelling and hotel costs as well as lunch and dinner on the workshop day; Alexander von Humboldt Foundation). The coordination project of the SPP1516 (German Research Foundation) contributes 30% of the travelling and hotel costs.

Organizer

Dr. Niki Pfeifer

Program

Slots consist of 40 minutes talk and 20 minutes discussion.

9:00–9:10 Niki Pfeifer:
Introduction to rationality frameworks for conditionals

9:10–10:10 *Tutorial* by Gabriele Kern-Isberner:
Understanding conditionals through conditional structures

Most of the rules humans use for rational reasoning are conditionals, i.e., semantically meaningful rules that establish a plausible connection between premise and conclusion. Such conditionals are substantially different from logical implications since they cannot be interpreted in classical logic in a truthfunctional way but need richer epistemic structures to be fully understood and used. However, abandoning classical logic completely for reasoning with such rules is counterintuitive and does not seem to serve the general requirements for rational reasoning. Indeed, classical logic is in general an important means to support rational reasoning, in particular, when several pieces of information must be combined, or to detect contradictions that should be avoided. The tutorial will present the theory of conditional structures that builds on classical logic but provides significant extensions to provide guidelines for the handling of conditionals, respecting their characteristics. Instead of logical truth or falseness, the notions verification and falsification play major roles. We will also show how the non-applicability of conditionals is important in order to make a difference to material implications. Beyond such logical basics, conditional structures provide a powerful theory to make complex interactions between various conditionals transparent and manageable. This is necessary when different pieces of conditional information have to be combined for rational reasoning, e.g., when chaining rules, or when evaluating which of several conditionals with contradictory conclusions should be applied. Furthermore, we will also show how conditional structures can be linked to different semantical frameworks like probability theory, or Wolfgang Spohn's ordinal conditional function. As a special feature, the approach provides a constructive schema to find adequate models for inductive reasoning. Indeed, in the probabilistic environment, observing conditional structures leads to reasoning via the well-known principle of maximum entropy. The usefulness of conditional structures for practical reasoning tasks will be illustrated by several examples.

10:10–10:20 *Coffee break*

10:20–11:20 Björn Meder, Michael Waldmann, and York Hagmayer:
Causal reasoning with the "do-operator"

Causal reasoning involves various types of probabilistic conditional inferences, such as prediction from causes to effects and diagnostic inferences from effects to causes. A cornerstone of true causal reasoning is the capacity to derive predictions about interventions on causal systems. This requires distinguishing between inferences based on passively observed states of a causal system, and the very same states generated by means of external intervention. For example, observing (ßeeing") the status of a barometer enables us to predict the approaching weather, but this does not license the inference that manipulating ("doing") the barometer will affect the weather. Pearl's (2000, see also Spirtes, Glymour & Scheines, 1993) "do-operator"formalizes this intuition and specifies how such inferences can be modeled within a causal Bayes nets framework. We will present evidence from a series of empirical studies showing that people are sensitive to the normative distinction between observational and interventional inferences, emphasizing the role of causal knowledge in conditional reasoning.

11:20–11:30 *Coffee break*

11:30–12:30 Paul Thorn and Gerhard Schurz:
Reward versus risk in uncertain inference

Systems of logico-probabilistic (LP) reasoning characterize inference from conditional assertions that (are taken to) express high conditional probabilities. LP systems differ in the number of inferences they license. While LP systems that license a greater number of inferences offer the reward of deriving more true informative conclusions, such systems also introduce the risk of drawing more false conclusions. In this talk, we briefly describe four LP systems (O, P, Z, and QC), and our investigation of the systems by means of computer simulations.

12:30–14:00 *Lunch*

14:00–15:00 Henrik Singmann, Sieghard Beller, and Christoph Klauer:
Disentangling suppression effects with the dual-source model of probabilistic conditional reasoning

According to the dual-source model of probabilistic conditional inference (Klauer, Beller, & Hütter, 2010), inferences are based on the integration of two types of information, logical form and prior knowledge, leading to a model with parameters for these two sources of information and a weighting parameter. In an experiment using Byrne's (1989) suppression paradigm, we assessed and modeled the influence of additional disablers and alternatives on people's probabilistic conditional inferences. In the baseline condition, participants worked on simple conditional problems. In two other conditions, we explicitly mentioned either disablers or alternatives for each problem. Results revealed, as expected, that disablers reduced endorsement rates for MP and MT, whereas alternatives reduced endorsement for AC and DA. Interestingly, in the model, the presence of disablers and alternatives had a differential impact on the three types of parameters: logical form, prior knowledge, and the weighting parameter. Both disablers and alternatives decreased the perceived strength with which the relevant inferences (i.e., MP and MT for disablers and AC and DA for alternatives) seem warranted based on the logical form. Additionally, disablers specifically decreased the weight given to the logical form compared to the prior knowledge and alternatives decreased the influence of the prior knowledge for the given conditional rules.

15:00–15:10 *Coffee break*

15:10–16:10 Wolfgang Spohn:
Ten ways for conditionals to express conditional belief

The talk does not ask when are our various conditional sentences true. Rather it asks: What might we express with conditional sentences? In any case, conditional belief. Thereby ranking theory comes into play, as the best account of conditional belief. However, the Ramsey test is not the only option. The talk will go far beyond the Ramsey test, by presenting ten different features of conditional belief that conditionals may express and thus offering rich means for interpreting our various conditional constructions. Finally, the talk will specify which of these features are truth-evaluable, thereby providing what we want: namely a merely partial explanation of truth-conditions of conditionals.

16:10–16:30 *Coffee break*

16:30–17:30 Stephan Hartmann and Soroush Rafiee Rad:
Updating on conditionals = Kullback-Leibler + causal structure

Modeling how to learn an indicative conditional has been a major challenge for Formal Epistemologists. One proposal to meet this challenge is to request that the posterior probability distribution minimizes the Kullback-Leibler divergence to the prior probability distribution, taking the learned information as a constraint (expressed as a conditional probability statement) into account. This proposal has been criticized in the literature based on several clever examples. In this paper, we revisit four of these examples and show that one obtains intuitively correct results for the posterior probability distribution if the underlying probabilistic models reflect the causal structure of the scenarios in question.

17:30–18:30 David Over, Igor Douven and Sara Verbrugge:
Scope ambiguities and conditionals

Scope ambiguities in natural language have been much discussed by linguists and philosophers. There has been some psychological work on the scope ambiguities of negation, but we present the first experiments on modal scope ambiguities in conditionals, with special attention paid to the scope ambiguities of the probability operator. We also discuss the implications of our results for the assessment of the conditional probability hypothesis, sometimes called the Equation, according to which the probability of a conditional is the probability of its consequent given its antecedent.

19:15 *Workshop dinner at the* Alter Simpl