The Bulletin of Symbolic Logic
Volume 27, Number 1, March 2021

2021 WINTER MEETING OF THE ASSOCIATION FOR SYMBOLIC LOGIC

Virtual Gathering, Eastern APA Meeting, January 7–8, 2021

The 2019 Winter Meeting of the Association for Symbolic Logic was held online on January 7–8, 2021 in conjunction with the 2021 Eastern Division Meeting of the American Philosophical Association. The members of the Program Committee were Gil Sagi (chair) and Sean Walsh.

The program comprised six invited talks spread over two sessions. Because of the online structure of this conference, there was no contributed talk session. Below is the list of the invited talks by title, followed by the abstracts of these talks.

Andrew Bacon (University of Southern California), *Fundamentality: a logical framework*.

Eleonora Cresto (National Council for Scientific and Technical Research (CONICET)/IIF-SADAF, Argentina), *The logic of ungrounded payoffs*.

Rohan French (University of California, Davis), *Non-classical metatheory*.

Melissa Fusco (Columbia University), *A deontic logic for two-dimensional semantics*.

Hanti Lin (University of California, Davis), *Despite our death in the long run: in defense of Peirce's legacy in inductive logic and data science*.

Sanford Shieh (Wesleyan University), *Form-series, predicativity & induction in Wittgenstein's Tractatus*.

For the Program Committee
Gil Sagi

Abstracts of talks by Invited Speakers in Session I

► ELEONORA CRESTO, *The logic of ungrounded payoffs*.
National Council for Scientific and Technical Research (CONICET)/IIF-SADAF, Buenos Aires, Argentina.
E-mail: Eleonora.cresto@gmail.com

Higher order likes and desires sometimes lead agents to have ungrounded or paradoxical preferences. This situation is particularly problematic in the context of games. If payoffs are interdependent, the overall assessment of particular courses of action becomes ungrounded; in such cases the matrix of the game is radically under-determined. Paradigmatic examples of this phenomenon occur when players are 'perfect altruists' or 'perfect haters', in a sense to be explained. In this talk I rely on a dynamic doxastic logic to mimic the search for a suitable matrix. Upgrades are triggered by conjectures on other players' utilities, which can in turn be based on behavioral or verbal cues. We can prove that, under certain conditions, pairs of agents with paradoxical preferences eventually come to believe that they are not able to interact in a game. As a result I hope to provide a better understanding of game-theoretic ungroundedness, and, more generally, of the structure of higher order preferences and desires.

1079-8986/21/2701-0006
DOI:10.1017/bsl.2021.8

► MELISSA FUSCO, *A two-dimensional logic for the paradoxes of deontic modality*.
Department of Philosophy, Columbia University, New York, NY, USA.
E-mail: mf3095@columbia.edu

In this paper, I take steps toward axiomatizing the two dimensional deontic logic in Fusco [1], which validates a form of free choice permission (von Wright [4], Kamp [2]; (1) below) and witnesses the nonentailment known as Ross's Puzzle (Ross [3]; (2) below).

(1) You may have an apple or a pear ⇒ You may have an apple, and you may have a pear.
(2) You ought to post the letter ⇏ You ought to post the letter or burn it.

Since $\diamond(p \text{or} q) = (\diamond p \vee \diamond q)$ and $\Box(p) \Rightarrow \Box(p \vee q)$ are valid in any normal modal logic—including standard deontic logic—the negations of (1)–(2) are entrenched in modal proof systems. To reverse them without explosion will entail excavating the foundations of the propositional tautologies. The resulting system pursues the intuition that classical tautologies involving disjunctions are *truths of meaning* rather than *propositional necessities*. This marks a departure from the commitments the propositional fragment of a modal proof system is standardly taken to embody.

[1] M. Fusco, *Deontic modality and the semantics of choice*, ***Philosophers' Imprint***, vol. 15 (2015), no. 28, pp. 1–27.

[2] H. Kamp, *Free choice permission*, ***Proceedings of the Aristotelian Society, New Series***, vol. 74 (1973), pp. 57–74.

[3] A. Ross, *Imperatives in logic*, ***Theoria***, vol. 7 (1941), no. 1, pp. 53–71.

[4] G. H. von Wright, ***An Essay on Deontic Logic and the General Theory of Action***, North Holland, Amsterdam, 1969.

► HANTI LIN, *Despite our death in the long run*: *in defense of Peirce's legacy for the epistemology of data science*.
Philosophy Department, University of California at Davis, Davis, CA, USA.
E-mail: ika@ucdavis.edu

There is a long epistemological tradition in which inductive methods are evaluated in terms of certain concepts about convergence to the truth. This convergentist tradition can be traced back to Peirce and has become influential in data science (including both statistics and machine learning). But this tradition is also controversial, still often greeted with an old worry: We are all dead in the long run, so who cares about convergence to the truth? Call this worry the Keynesian worry. In this talk, Peirce's ideas will be debugged, developed, and defended against the Keynesian worry.

► SANFORD SHIEH, *Predicativity, form-series, and bilateralism in Wittgenstein's Tractatus.*
Department of Philosophy, Wesleyan University, 350 High St., Middletown, CT 06459, USA.
E-mail: sshieh@wesleyan.edu

It is now generally accepted that some version of standard first-order logic with identity may be formulated with fairly minimal extensions of the notational resources of Wittgenstein's *Tractatus Logico-Philosophicus*, especially in remarks 5.2522 & 5.501 (see in particular [5]). It is not at all clear, however, whether the *Tractatus* provides the means for formulating other systems of logic. In this talk, I survey some recent proposals for Tractarian logic(s) different from or beyond first-order logic. First, I discuss the suggestion of [3] and [8] that impredicative second-order quantification is consistent with the *Tractatus*, and the contrary position of [9] that only predicative quantification is allowed by Wittgenstein's commitments. Second, I discuss the suggestion first advanced in [2] and developed in [4] that the device of "form-series," introduced at 4.1252, is used by Wittgenstein to provide an alternative to Frege's definition of the ancestral of a dyadic relation. Form-series provides the means of expressing certain infinitary disjunctions whose disjuncts are "constructed" according to a "formal law" (5.501). I survey conceptions of this notion of "formal law" advanced in [1, 4, 9]. I explore the complexities of logical truth on some of these conceptions. Finally, I discuss the relationship between the well-known apparently proto-semantic account in 4.26–4.462

https://doi.org/10.1017/bsl.2021.8 Published online by Cambridge University Press

of what we would call the "logical truth (and falsity)" of tautologies and contradictions and Wittgenstein's move, starting in 5.124, to a terminology of propositions "affirming" and "denying" other propositions. I explore the possibility of reconstructing this terminology using the resources of the "bilateral" logic of [6] and [7].

[1] David Fisher and Charles McCarty, *Reconstructing a logic from Tractatus: Wittgenstein's variables and formulae*, ***Early analytic philosophy: new perspectives on the tradition***, (Sorin Costreie, editor), Springer, Berlin, 2016, pp. 301–324.

[2] P. T. Geach, *Wittgenstein's operator N*, ***Analysis***, vol. 41 (1981), no. 4, pp. 168–171.

[3] Michael Potter, *The logic of the Tractatus*, ***Handbook of the History of Logic***, ***vol. 5*** (D. M. Gabbay and J. Woods, editors), Elsevier, Amsterdam, 2009, pp. 255–304.

[4] Thomas G. Ricketts, *Logical segmentation and generality in Wittgenstein's Tractatus*, ***Wittgenstein's Tractatus: History and Interpretation***, (Michael Potter and Peter Sullivan, editors), Oxford University Press, Oxford, 2012, pp. 125–142.

[5] Brian Rogers and Kai F. Wehmeier, *Tractarian first-order logic: Identity and the N-operator*, ***Review of Symbolic Logic***, vol. 5 (2012), no. 4, pp. 538–573.

[6] Ian Rumfitt, *'Yes' and 'no'*, ***Mind***, vol. 109 (2000), no. 436, pp. 781–823.

[7] Timothy Smiley, *Rejection*, ***Analysis***, vol. 56 (1996), no. 1, pp. 1–9.

[8] Scott Soames, ***The Analytic Tradition in Philosophy, vol. 2***, Princeton University Press, Princeton, NJ, 2017.

[9] Max Weiss, *Logic in the Tractatus*, ***Review of Symbolic Logic***, vol. 10 (2017), no. 1, xs pp. 1–50.

Abstracts of talks by Invited Speakers in Session II

► ANDREW BACON, *Fundamentality: A logical framework*.
Department of Philosophy, University of Southern California, USA.
E-mail: abacon@usc.edu.

In explaining the notion of a fundamental property or relation, metaphysicians will often draw an analogy with languages. According to this analogy, the fundamental properties and relations stand to reality as the primitive predicates and relations stand to a language: the smallest set of vocabulary God would need in order to write the 'book of the world'. However this metaphor, if taken too literally, is fraught with paradoxes. In this talk I shall outline a general model theoretic framework for generating theories of fundamentality that draws on the abstract properties of languages as left adjoints of forgetful functors in categories of typed structures. I will then summarize some results on the consistency of higher-order theories of fundamentality that capture some of the abstract analogies between language and reality.

► ROHAN FRENCH, *Non-classical metatheory*.
University of California, Davis, Davis, CA, USA.
E-mail: rfrench@ucdavis.edu

According to a common line of thought non-classical logicians who claim that their preferred non-classical logic L gives the correct account of deductive validity, while at the same time proving crucial metatheoretic results *about* L in classical logic, are in some sense being insincere in their claim about the correctness of L. This suggests an important necessary condition on the acceptability of a non-classical logic as providing the correct account of deductive validity: that it be able to provide internally acceptable proofs of its main metatheorems.

As it turns out, the content of this condition is not entirely clear for reasons largely familiar to non-classical logicians, namely that non-classical logics are able to draw distinctions which are collapsed by classical logic. Focusing on soundness and completeness theorems in this talk we will investigate how this condition can be made more precise. In particular we will examine three different soundness and completeness results for Intuitionistic propositional logic, assessing the extent to which they both count as internally acceptable and whether they show that Intuitionistic logic satisfies the acceptability condition.

https://doi.org/10.1017/bsl.2021.8 Published online by Cambridge University Press

Abstract of talk presented by title

► JOACHIM MUELLER-THEYS, *"A are B"*.
Kurpfalzstr. 53, 69 226 Heidelberg, Germany.
E-mail: mueller-theys@gmx.de

Statements of the form "A are B" may seem incomplete by the lack of quantifiers. However, "A are B" must not be identified with the stronger universal propositions "all A are B" (though the former may technically serve as shortcut for the latter) or the weaker particular propositions "some A are B," as instantiations like $A :=$ Russians, $B :=$ Europeans verify. Interpretations by "many" or "most" come closer to the original meaning. An "democratic" and even quantitative interpretation takes place by "at least half of."

Consider again "Russians are Europeans." Say that the number of all European Russians is 113 million, while the number of all Russians is 147×10^6. Thus the quotient $0.77 = 77\%$ may be assigned to "Russians are Europeans." In general,

$$V^*[A\mathrm{r}B] := \frac{\mid B \cap A \mid}{\mid A \mid}$$

provided that $A \neq \varnothing$ and $B \cap A$ are finite. Thus it is possible to assign *truth values* (in a literal sense), which are rational numbers $0 \leq V^*[A\mathrm{r}B] \leq 1$, in somehow adequate manner to "A *are* B" *without using quantifiers*. Note that, for the sake of simplicity, $A, B, \ldots$ serve as variables as well for term expressions as for corresponding term extensions. The approach traces back to Łukasiewicz: *Die logischen Grundlagen der Wahrscheinlichkeitsrechnung* (Krakow 1913), mentioned by Walter A. Carnielli.

Given V^*, even binary truth values may be assigned, whence $A\mathrm{r}B$ may be integrated into binary classical logic:

$$V_\lambda[A\mathrm{r}B] := \begin{cases} 1 & \text{if } V^*[A\mathrm{r}B] \geq \lambda, \\ 0 & \text{else} \end{cases}$$

for some fixed *limit* λ with $0.5 \leq \lambda < 1$. $\lambda := .5$ appears kind of standard:

$$V[A\mathrm{r}B] := V_{\frac{1}{2}}[A\mathrm{r}B],$$

corresponding to " at least half of A are B."

Utterance as "Germans like sauerkraut," "gypsies are thievish," "orientals are no-goods" is often regarded as expression of prejudice. However, by means of specification, statistical data, stochastic methods, functional values $V^* \ldots$ might be assigned even to them. Imagine an examination, where 907 of 919 plebs liked row. By extrapolation (*Hochrechnung*), "mean people like row" may receive adequate values. This paragraph resulted from discussions with social pedagogue "hp." Nota bene that we deal with denotation, not with connotation.

https://doi.org/10.1017/bsl.2021.8 Published online by Cambridge University Press