IX PRINCIPIA INTERNATIONAL SYMPOSIUM

POSSIBLE WORLDS AND THEIR APPLICATIONS IN PHILOSOPHY AND THE SCIENCES

ABSTRACTS

NEL
Federal University of Santa Catarina
Florianópolis, 2015

IX *Principia* International Symposium

Possible Worlds and Their Application
in Philosophy and the Sciences

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IX *Principia* International Symposium

Possible Worlds and Their Applications
in Philosophy and the Sciences

Praiatur Hotel
Florianópolis, SC
August 17 - 20, 2015

promoted by:

NEL – Epistemology and Logic Research Group
Principia – An International Journal of Epistemology

supported by:

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ABSTRACTS

IX *Principia* Iinternational Symposium

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Mundos posibles, identidad de los indiscernibles y lógica inductiva

En "The Leibniz Carnap program for inductive logic", I. Hacking sostiene que la viabilidad del proyecto carnapiano de lógica inductiva depende de la aceptación de supuestos metafísicos similares a los de la concepción leibniziana. Hacking destaca que la concepción leibniziana de probabilidad es asimilable a la idea de posibilidad lógica, consistencia interna o ausencia de contradicción. Y agrega que en la doctrina metafísica leibniziana expuesta en "De rerum originatione radicali" está implicada la noción de posibilidad como disposición o propensión a la existencia, al ser actual. Según Leibniz, así como los diversos mundos posibles concebidos por Dios se actualizan según su grado de posibilidad, las disposiciones o propensiones objetivas de los sucesos de nuestro mundo actual fundamentan nuestras expectativas. Así, la probabilidad que asignamos a la ocurrencia de dichos sucesos se sustentaría en las propensiones o disposiciones objetivas de éstos.

Hacking enfatiza que Leibniz adoptó —como posteriormente lo hizo Carnap— una interpretación relacional de los juicios sobre probabilidad. De acuerdo con esta interpretación, una expresión de la forma "es probable que p", donde la posición de "p" está ocupada por algún enunciado, no es una oración completa que pueda calificarse como verdadera o falsa. Ya que el enunciado que ocupa el lugar de "p" es verdadero o falso independientemente de todo elemento de juicio disponible, pero sólo puede calificarse como más o menos probable con respecto a la evidencia que se considere en cada caso. Más aún, Hacking señala que la noción de descripción de estado -constituyente esencial de la lógica inductiva de Carnap— es una rigorización relativa a un lenguaje formalizado de la idea leibniziana de mundo posible.

En esta comunicación, cuestionamos esta tesis de Hacking destacando, en primer lugar, algunas de las dificultades que plantea la asimilación de las descripciones de estado carnapianas con los mundos posibles leibnizianos. En segundo lugar, argumentamos que la tesis de Hacking que relaciona las concepciones de Carnap y Leibniz sólo sería admisible si afirmara la existencia de un vínculo entre el concepto leibniziano de probabilidad y la interpretación carnapiana de la probabilidad estadística en términos de disposiciones. Pero Carnap sostiene que hay una diferencia radical entre la probabilidad estadística y la probabilidad inductiva o lógica, una diversidad tal que no es posible considerarlas como interpretaciones alternativas.

This proposal was the initial motivation to study the processing of information obtained from observations made by "classical" agents, but where the outcome of such a process could not have classic features, such as the rejection of the principle of excluded middle or rejection of the principle of non-contradiction, without this negation trivialize the calculus obtained (Paraconsistent Society).

In this context, we intend to define the concept of quasi-truth by da Costa through a paraconsistent logic obtained from society semantics.

In this presentation we investigate the theory of the society semantics, in particular the paraconsistent logic, a sort of three-valued logic as introduced by [4], obtained from the open societies, in order to formalize the notion of quasi-truth introduced by da Costa and collaborators [3].

Thus, this is a work in progress and we intend to provide a formal treatment for a type of societies semantics, and show that the formalization of the notion of quasi-truth through an open Society contemplates the notion of pragmatic satisfaction.

References

[1] CARNIELLI, W. A.; LIMA-MARQUES, M. 'Society semantics for multiple-valued logics'. In W.A. Carnielli and I.M.L. D'Ottaviano, editors, Advances in Contemporary Logic and Computer Science, volume 235 of Contemporary Mathematics Series, pp. 33-52. American Mathematical Society, 1999.

[2] CONIGLIO, M. E.; SILVESTRINI, L. H. C. 'An alternative approach for quasi-truth'. Logic Journal of the IGPL, v. 22, p. 387-410, 2014.

[3] MIKENBERG, I., COSTA, N. C. A. da; CHUAQUI, R. 'Pragmatic Truth and Approximation to Truth'. The Journal of Sy3mbolic Logic, 51-1, p. 201-221. 1986.

[4] SETTE, A. M., 'On the propositional calculus P^1'. Mathematica Japonicae, 18(13), p. 173-180, 1973.

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Paraconsistent and explosive intermediate logics between the truth and degree preserving infinite-valued Łukasiewicz logic

In the last two decades, formal systems of fuzzy logic, nowadays under the discipline known as *mathematical fuzzy logic* (MFL, see Cintula *et. al.* (2011)), have been proposed and studied as suitable tools for reasoning with propositions containing vague predicates. They are characterized by allowing to interpret formulas in a linearly ordered scale of truth values, which makes them specially suited for representing the gradual aspects of vagueness.

Most of the deductive systems in MFL have been studied by considering consequence relations which, as in the classical case, postulates that a formula follows from a

set of premises if every algebraic evaluation that interprets the premises as true also interprets the conclusion as true. This the *truth-preservation paradigm* which states that, for an inference to be valid, every algebraic evaluation that interprets the premises as completely true, will also interpret the conclusion as completely true. An alternative approach that has recently received some attention is based on the *degree-preservation* paradigm (see Font *et. al.* (2006) Bou *et al* (2009)), in which a conclusion follows from a set of premises if, for all evaluations, the meet of the truth degrees of the premises is lees or equal then the truth degree of the conclusion. It has been argued that this approach is more coherent with the commitment of many-valued logics to truth-degree semantics because all values play an equally important rôle in the corresponding notion of consequence (see e.g. Font (2009)).

An interesting point is that, while the truth-preserving fuzzy logics are explosive, i.e. from any theory containing a formula φ and its negation $\neg\varphi$ everything follows, in two recent papers Ertola *et. al.* (2015, Coniglio *et. al.* (2014) some (extensions of) degree-preserving fuzzy logics have been shown to exhibit some well behaved paraconsistency properties. In particular, this is the case of the well-known infinite-valued Łukasiewicz logic Ł, whose degree preserving companion $Ł^{\leq}$ is not explosive, i.e. it is paraconsistent.

Since $Ł^{\leq}$ is included in Ł (in terms of their consequence operators), with $Ł^{\leq}$ being paraconsistent and Ł explosive, a natural question that arise in this setting is to ask about possible intermediate logics between $Ł^{\leq}$ and Ł. And if so, to study them and also to study which of them are paraconsistent and which of them are explosive.

From a syntactical point of view, since $Ł^{\leq}$ and Ł have the same theorems, intermediate logics will be necessarily defined as extensions of $Ł^{\leq}$ with inference rules admissible in $Ł^{\leq}$ and derivable in Ł.

From a semantical point of view, Ł is complete with respect to the matrix $([0,1]_{\mathrm{MV}}, \{1\})$, where $[0,1]_{\mathrm{MV}}$ is the real interval $[0,1]$ equipped with the usual structure of MV-algebra. On the other hand, $Ł^{\leq}$ is complete with respect to the set of all matrices $\{([0,1]_{\mathrm{MV}}, F)$, where F is an order filter of $[0,1]$.

In this talk, based on the paper Coniglio *et. al.* (2015), firstly we introduce some families of inference rules (generalizing the explosion rule) that are admissible in $Ł^{\leq}$ and derivable in Ł and we have characterized the corresponding intermediate logics.

We prove that there are at least countably many paraconsistent and countably many explosive logics between $Ł^{\leq}$ and Ł.

Finally, from a semantical perspective, we study logics defined by families of matrices of type $([0,1]_{\mathrm{MV}}, F)$ where F is an order filter, obtaining again infinitely many paraconsistent and infinitely many explosive intermediate logics. It is also proved that there are intermediate logics (like the one defined by explosion inference rule) that are not semantically defined by this type of matrices. Actually, one needs to consider families of matrices defined by lattice filters over arbitrary MV-algebras.

References

BOU, F.; ESTEVA, F.; FONT, J-M.; GIL, A.; GODO, L.; TORRENS, A; VERDÚ, V. 'Logics preserving degrees of truth from varieties of residuated lattices.' Journal of Logic and Computation, 19(6),

p. 1031-1069, 2009.
CINTULA, p.; HÁJEK, P.; NOGUERA, C. (eds.) 'Handbook of Mathematical Fuzzy Logic (in 2 volumes)', volume 37, 38 of Studies in Logic, Mathematical Logic and Foundations. College Publications, London, 2011.
CONIGLIO, M. E.; ESTEVA, F.; GODO, L. 'Logics of formal inconsistency arising from systems of fuzzy logic.' Logic Journal of the Interest Group of Pure and Applied Logic, 22(6), p. 880-904, 2014.
CONIGLIO, M. E.; ESTEVA, F.; GODO, L. 'On the set of intermediate logics between the truth and degree preserving Łukasiewicz logics.' Sumbitted to publication, 2015.
ERTOLA, R.; ESTEVA, F.; FLAMINIO, T.; GODO, L.; NOGUERA, C. 'Exploring paraconsistency in degree-preserving fuzzy logics.' Soft Computing, to appear, 2015.
FONT, J-M. 'Taking degrees of truth seriously.' Studia Logica, 91(3), p. 383-406, 2009.
FONT, J-M.; GIL, A.; TORRENS, A.; VERDÚ, V. 'On the infinite-valued Łukasiewicz logic that preserves degrees of truth. Archive for Mathematical Logic, 45(7), p.839-868, 2006.

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15 modal systems without possible words

The success of Kripke's relation semantics overshadowed some heterodox approaches, as Kearns non-deterministic semantics [4] , based on 4-valued matrices for T, $S4$ and $S5$ systems. In fact, Kearns' semantics is a particular case of non-deterministic many-valued matrices, thoroughly formalized and described in [1], denominated Nmatrices (for instance, Nmatrices are a particular case of Possible Translation Semantics introduced in [2]). In the first step of our work we obtained completeness of the systems B and $KB5$ by four-valued Nmatrices.

Trying to expand Kearns' results, we obtained 6-valued Nmatrices for D, arguing that 4-valued are not enough to characterize systems weaker than T. However, the second part of this work shows that six-valued Nmatrices are sufficient in order to characterize a variant of the four systems studied in the first part, replacing axiom (T) by axiom (D). This is how we obtain completeness for $KD4$, $KD5$, $KD45$ and KDB (see [5] and [3]).

The third part of our research analyzes even weaker modal systems, eliminating the axiom (D). In order to obtain completeness, it is necessary 8-valued Nmatrices. That is how we have a new semantics also for K, KB, $K4$, $K5$ and $K45$, resulting 15 modal systems. It is worth noting that those 15 systems are well known normal modal systems.

References

[1] AVRON, A.; ZAMANSKY, A. 'Non-deterministic semantics for logical systems'. Handbook of Philosophical Logic, 16, p. 227-304, 2011.
[2] CARNIELLI, W. 'Possible-Translations Semantics for Paraconsistent Logics'. In: D. Batens, C. Mortensen, G. Priest, and J. P. Van Bendegem, editors, Frontiers of Paraconsistent Logic: Pro-