Baptizing Paraconsistent Logic: the unique touch of Miró Quesada

Itala M. Loffredo D'Ottaviano
Centre for Logic, Epistemology and the History of Science
University of Campinas, Brazil
itala@unicamp.br

Evandro Luís Gomes
Department of Philosophy
State University of Maringá, Brazil
elgomes@uem.br

The Heterodox in Logic and Reason

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dedicated to the memory of Francisco Miró Quesada Cantuarias

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the history of paraconsistency

the present state of paraconsistent logic attests to significant enhancement and its maturity permits a critical historical analysis of its development, having in view the appreciation of its historical roots and stages of formation.

the aim of our general research project, to which this paper belongs, consists in studying how a truly paraconsistent perspective was constituted in Western thought, as well as how logical principles, rules and axiomatic logical systems have expressed the contemporary various aspects of paraconsistency.

the history of paraconsistency

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our goal

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in this talk we present and analyse the main known historical events concerning the creation of the word 'paraconsistent', as well as its introduction as the name for 'inconsistent but non-trivial formal systems'.

Para além das Colunas de Hércules...

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part of this talk has previously appeared in Section 4.3.3 of

book

Gomes, Evandro L., D'Ottaviano, Itala M. L., **Para além das Colunas de Hércules, uma história da paraconsistência: de Heráclito a Newton da Costa** (*Beyond the Columns of Hercules, a history of paraconsistency: from Heraclitus to Newton da Costa*, in Portuguese), Campinas: Editora Unicamp - CLE, 2017.

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authors

- Evandro Luís Gomes
- Itala M. Loffredo D'Ottaviano

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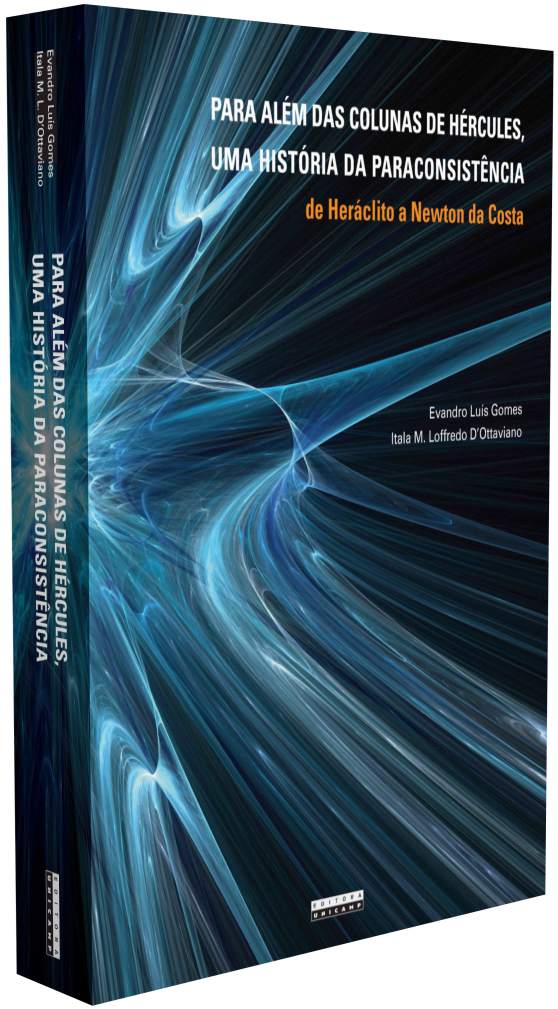

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basic definitions

consistent and inconsistent theories

a theory whose underlying language has a symbol for negation is *inconsistent* if there is a formula of its language such that the formula and its negation are both theorems of the theory; otherwise, the theory is called *consistent*.

basic definitions

trivial theories

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if the underlying logic of a theory is classical logic, or another standard logic such as intuitionistic logic, inconsistency entails triviality, and conversely.

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basic definitions

paraconsistent theories

a logical system is *paraconsistent* if it can be the underlying logic for inconsistent but non-trivial theories, which are called *paraconsistent theories*.

basic definitions

in accordance with the practice of da Costa, Bueno and Krause, our use of the terms 'consistency' and 'inconsistency' is syntactical, according to the original meta-mathematical terminology of Hilbert and his school.

da Costa, Bueno, and Krause, Paraconsistent logics and paraconsistency, in: *Philosophy of Logic*, ed. D. Jacquette, Elsevier, 2006, pp. 791–911.

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inconsistency and triviality

in paraconsistent logics, the scope of the Principle of (Non-)Contradiction is in a certain sense restricted.

in every paraconsistent logic, from a formula and its negation it is not possible, in general, to deduce any formula of the language.

in paraconsistent logics the notions of inconsistency and triviality are, in fact, independent notions.

in paraconsistent logics the Principle *Ex Falso Sequitur Quodlibet* is not valid in general.

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comments

on the ex falso

the *ex falso* has some variants in the history of logic:

- *Ex Falso Sequitur Quodlibet*
- *Ex Impossibili Sequitur Quodlibet*
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motivated by a historical analysis, in special by the discussions on the *ex falso* held by several thinkers during the Middle Ages, though we recognize the distinct logical nuances, we consider the expression *Ex Falso Sequitur Quodlibet* to embrace such principles as special types of the *ex falso*.

as far as we know, the first thinker to use the expression *Idem Esse Ex Contradictione* was John of Salisbury, alluding to Adam of Balsham's school position in the debate

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looking for a name

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‘paraconsistent’ birth certificate

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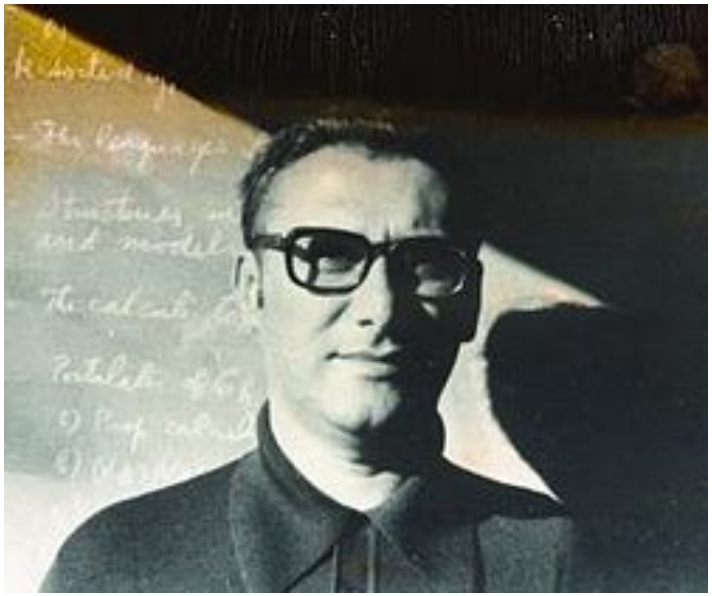
the birth certificate of paraconsistent logic was drawn up in a letter from the Peruvian philosopher Francisco Miró Quesada Cantuarias (1918–2019), the proposer of the name, to Newton da Costa (1929), one of the creators of modern paraconsistent logic.



Newton da Costa, 1960’s

correspondence context

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in the abundant correspondence between them, the letter dated September 29, 1975, is especially remarkable.

in this notable letter, Miró Quesada begins by expressing great contentment over da Costa's having invited him to come the following year to the University of Campinas (Unicamp), in Campinas (São Paulo, Brazil), to participate in the Third Latin American Symposium on Mathematical Logic (III SLALM).

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as noted earlier, a suitable name for the theory of inconsistent and non-trivial formal systems was needed in order to clearly express the theoretical position of its advocates, and thereby favor its understanding and acceptance within the logical-mathematical-philosophical community.

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da Costa's report

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Newton da Costa relates how this came about:

> *It was then that I wrote to Miró Quesada, who viewed the new logic with great enthusiasm, asking him to suggest a name for it. I remember as if it were today that he responded by making three proposals: it could be called metaconsistent, ultraconsistent, or paraconsistent. After commenting on these possible names, he stated that he found the latter to be the best. For me the word 'paraconsistent' sounded splendid, and I began to use it, insisting also that all interested parties do the same.*

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in presenting the first of them, he says:

> *I am very pleased to hear from you about the name that could be given to the logic of inconsistent systems. It is a problem that would be easy if it were not for the pernicious semantic load of the words. I think the ideal name is 'ultraconsistent logics', because 'ultra' in Latin means 'beyond'. Remember the pillars of Hercules: Non plus ultra, and the motto of the colonizers: plus ultra, that is, beyond the columns of Hercules.*

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Letter from Miró Quesada to Newton da Costa, Lima: Sep. 29, 1975, p. 1, lines 15–28, in: Gomes and D'Ottaviano (2017, pp. 610–611).

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admirable metaphor

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The metaphor evoked by Miró Quesada is admirable:

> *Newton da Costa has gone beyond the Herculean pillars of logic – logicae Herculis columnae – that is, beyond consistency, extending the limits of known logicity and reestablishing them through paraconsistent logic.*

the image evoked here by Miró Quesada comes from Greek mythology. Hercules, in carrying out his tenth labor – bringing the oxen of the monster Geryon to King Eurystheus – traveled to the island of Erytheia in the far west of the Mediterranean.

admirable metaphor

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as a memorial to his passage, according to some versions of the myth, Hercules erected two mountains, one in Africa and the other in Europe:

the first being Mount Hacho in Ceuta (or, alternatively, Mount Musa in Morocco), the second being the Rock of Gibraltar.

admirable metaphor

in another version of the myth, the Greek hero split a mountain in the middle, giving birth to the Strait of Gibraltar and thus connecting the Mediterranean to the Atlantic Ocean.

the Pillars of Hercules (*Hercules columnae*) were considered for centuries by the maritime peoples of the Mediterranean world to be the limits of navigation.

like the navigators of the Age of Exploration, Newton da Costa has traversed the Columns of Hercules: the former traveling to a new land, the latter toward new perspectives of logic.

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Quesada's second suggestion

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> *For this reason, perhaps it would be better to say 'metaconsistent logics' because 'meta' means 'beyond' or 'after' in Greek, that is, more or less the same thing as 'ultra' (it also means other things with different grammatical cases). It also sounds very nice. It is true that it is a barbarism, or rather a solecism, but this doesn't matter, because 'sociology' is also. The defect of 'metaconsistent' is that 'meta' is associated in the mathematical-philosophical milieu with 'meta-theory' and gives the impression that it is a logic related to meta-language. But aside from this semantic freight, I would not see any objection.*

Letter from Miró Quesada to Newton da Costa, Lima: Sep. 29, 1975, p. 2, lines 1–6, in: Gomes and D'Ottaviano (2017, pp. 610–611).

Quesada's third suggestion

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Miró Quesada then suggests the name that would be destined to travel the world and accurately translate the very spirit of the logics of inconsistent and non-trivial formal systems

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There is, however, another possibility: use 'para', which in Greek means 'next to'. 'Paraconsistent logics' sounds nice, a little esoteric, gives a more or less precise idea of what it is about (logics that are not like the classical ones, but that fall next to them as they can be applied to inconsistent systems), and has the advantage that there is no deforming semantic load. I therefore propose that you choose from the three following names, whose precision is due to their negative semantic load:

1) *Ultraconsistent Logics*
2) *Metaconsistent Logics*
3) *Paraconsistent Logics*

I hope that you like any of the three, and I would be happy to have contributed to baptizing these types of logics that have such great philosophical importance.

Letter from Miró Quesada to Newton da Costa, Lima: Sep. 29, 1975, p. 2, lines 7–20, in: Gomes and D'Ottaviano (2017, pp. 610–611).

the baptismal certificate of paraconsistent logic

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this is undoubtedly the first time in history that the term 'paraconsistent' was written.

Miró Quesada's letter is therefore a primary source unique to the history of paraconsistency, and may be said to constitute the baptismal certificate of paraconsistent logic.

the choice of the name contributed greatly to the effort to establish and legitimize this area of logical-formal research.

the baptismal certificate of paraconsistent logic

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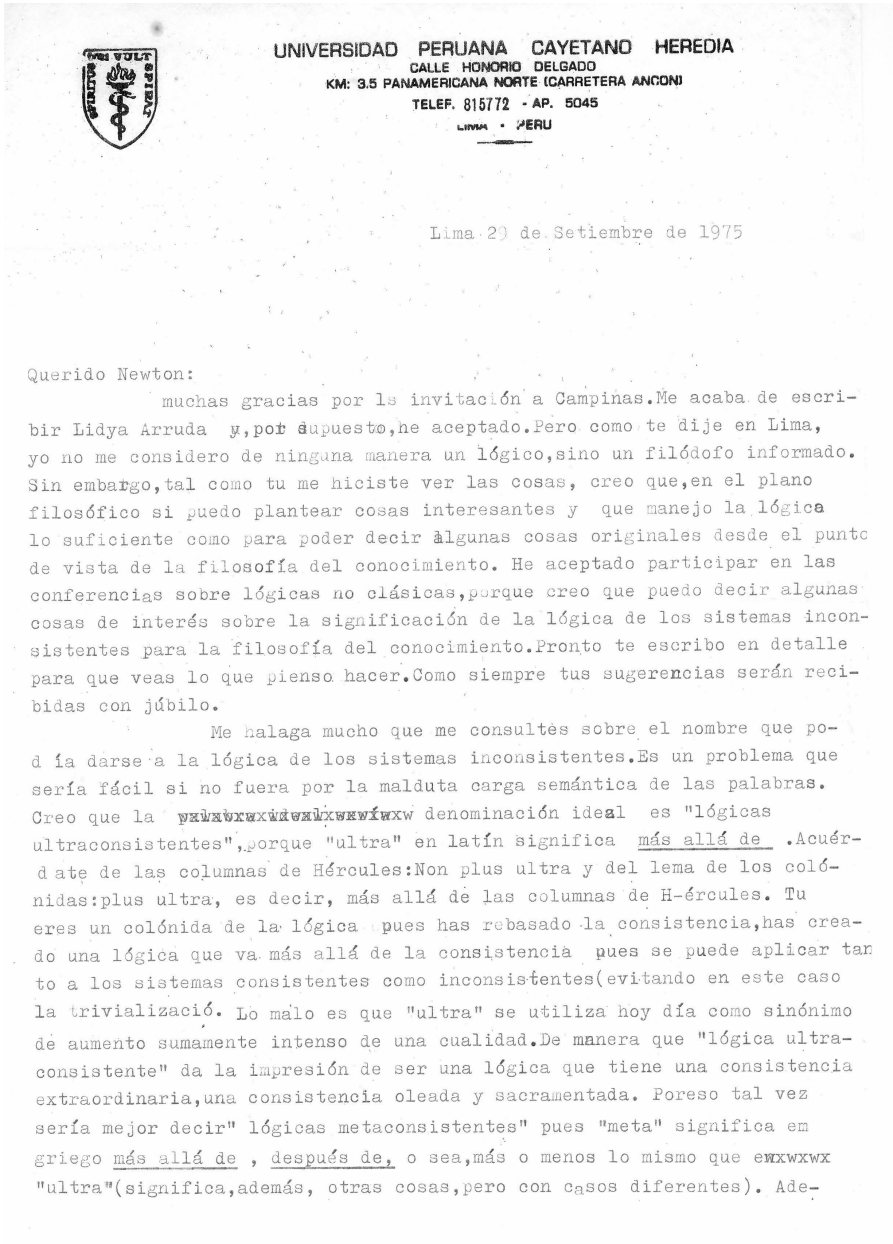

UNIVERSIDAD PERUANA CAYETANO HEREDIA
CALLE HONORIO DELGADO
KM. 3.5 PANAMERICANA NORTE (CARRETERA ANCON)
TELEF. 815772 - AP. 5045
LIMA - PERU

Lima 20 de Setiembre de 1975

Querido Newton:

muchas gracias por la invitación a Campinas. Me acaba de escribir Lidya Arruda y, por supuesto, he aceptado. Pero como te dije en Lima, yo no me considero de ninguna manera un lógico, sino un filósofo informado. Sin embargo, tal como tu me hiciste ver las cosas, creo que, en el plano filosófico si puedo plantear cosas interesantes y que manejo la lógica lo suficiente como para poder decir algunas cosas originales desde el punto de vista de la filosofía del conocimiento. He aceptado participar en las conferencias sobre lógicas no clásicas, porque creo que puedo decir algunas cosas de interés sobre la significación de la lógica de los sistemas inconsistentes para la filosofía del conocimiento. Pronto te escribo en detalle para que veas lo que pienso hacer. Como siempre tus sugerencias serán recibidas con júbilo.

Me halaga mucho que me consultes sobre el nombre que podría darse a la lógica de los sistemas inconsistentes. Es un problema que sería fácil si no fuera por la malduta carga semántica de las palabras. Creo que la ~~xwxwxwxwxwxwxwxwxwxwxwxw~~ denominación ideal es "lógicas ultraconsistentes", porque "ultra" en latín significa más allá de . Acuérdate de las columnas de Hércules: Non plus ultra y del lema de los colónidas: plus ultra, es decir, más allá de las columnas de H-ércules. Tu eres un colónida de la lógica pues has rebasado la consistencia, has creado una lógica que va más allá de la consistencia pues se puede aplicar tanto a los sistemas consistentes como inconsistentes (evitando en este caso la trivialización. Lo malo es que "ultra" se utiliza hoy día como sinónimo de aumento sumamente intenso de una cualidad. De manera que "lógica ultraconsistente" da la impresión de ser una lógica que tiene una consistencia extraordinaria, una consistencia oleada y sacramentada. Poreso tal vez sería mejor decir" lógicas metaconsistentes" pues "meta" significa em griego más allá de , después de, o sea, más o menos lo mismo que ~~wxwxwx~~ "ultra" (significa, además, otras cosas, pero con casos diferentes). Ade-

the letter, page two

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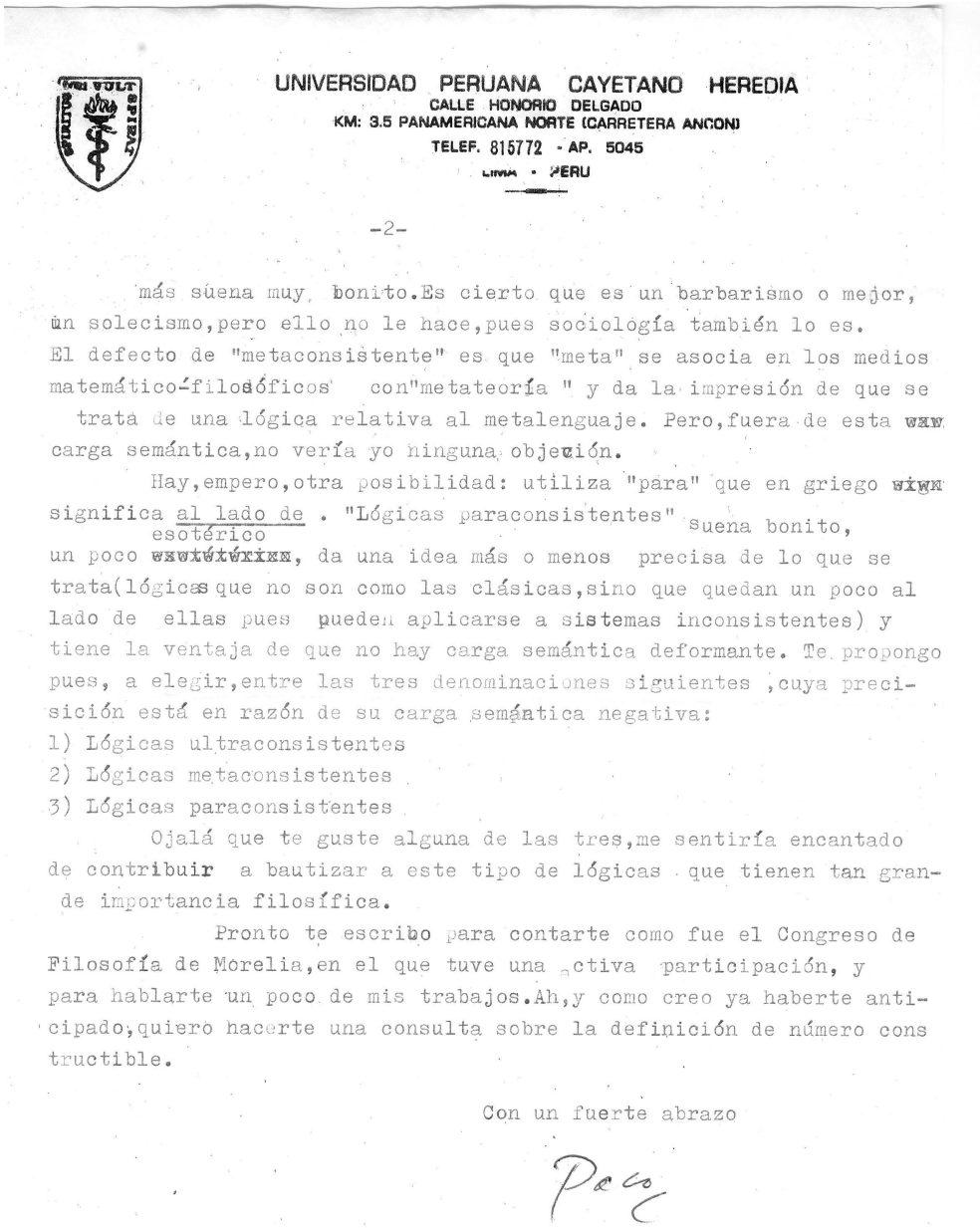

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más suena muy bonito.Es cierto que es un barbarismo o mejor, un solecismo,pero ello no le hace,pues sociología también lo es. El defecto de "metaconsistente" es que "meta" se asocia en los medios matemático-filosóficos con"metateoría " y da la impresión de que se trata de una lógica relativa al metalenguaje. Pero,fuera de esta carga semántica,no vería yo ninguna objeción.

Hay,empero,otra posibilidad: utiliza "para" que en griego significa al lado de . "Lógicas paraconsistentes" suena bonito, un poco esotérico, da una idea más o menos precisa de lo que se trata(lógicas que no son como las clásicas,sino que quedan un poco al lado de ellas pues pueden aplicarse a sistemas inconsistentes) y tiene la ventaja de que no hay carga semántica deformante. Te propongo pues, a elegir,entre las tres denominaciones siguientes ,cuya precisición está en razón de su carga semántica negativa:

1) Lógicas ultraconsistentes
2) Lógicas metaconsistentes
3) Lógicas paraconsistentes

Ojalá que te guste alguna de las tres,me sentiría encantado de contribuir a bautizar a este tipo de lógicas que tienen tan grande importancia filosífica.

Pronto te escribo para contarte como fue el Congreso de Filosofía de Morelia,en el que tuve una activa participación, y para hablarte un poco de mis trabajos.Ah,y como creo ya haberte anticipado,quiero hacerte una consulta sobre la definición de número constructible.

Con un fuerte abrazo

Paco

the name made public

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the name was finally made public at an important continental logic event, the Third Latin American Symposium on Mathematical Logic (III SLALM).

such continental event was held at the Institute of Mathematics, Statistics and Computer Science (IMECC, nowadays the Institute of Mathematics, Statistics and Scientific Computation) at the University of Campinas (Unicamp) from July 11 to 17, 1976.

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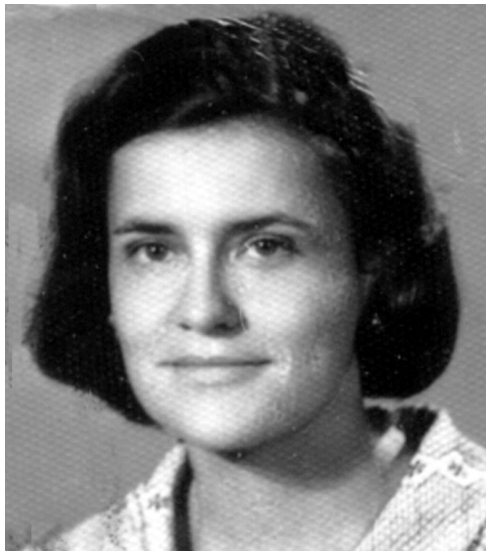

Ayda Ignez Arruda

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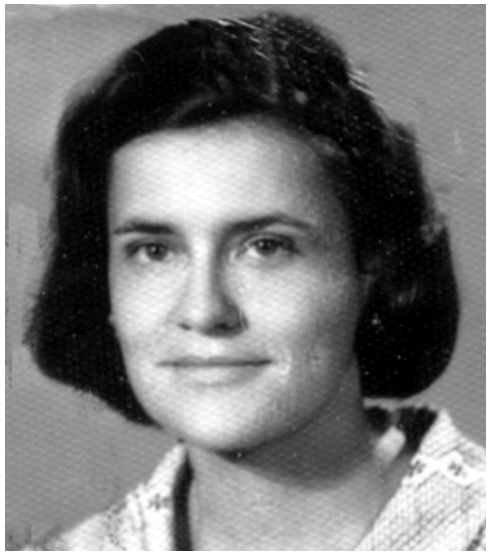

Ayda Ignez Arruda

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the *Proceedings of the III SLALM, Non-classical logics, model theory and computability*, were published in 1977 by North-Holland, edited by Ayda Arruda, Newton da Costa and Rolando Chuaqui.

but the lecture delivered by Quesada and the communications presented by Alves and Lungarzo are not in the book, for they were not sent by the authors for publication.

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da Costa describes a phenomenon unique in the history of logic:

> *Two or three months later, the miracle took place; the term circled the world, and all centers directly or indirectly linked to logic in the northern and southern hemispheres began to use it. I think that very few times in the history of science (and certainly in the history of logic) has anything similar happened, because not only did the word travel the whole world, but the logic itself that Miró Quesada called 'paraconsistent' gained a formidable impulse. It became one of the most debated logical theories of our time.*

da Costa, *La filosofia de la lógica de Francisco Miró Quesada Cantuarias* in: *Lógica, razon y humanismo: la obra filosofica de Francisco Miró Quesada C.*, ed. Sobrevilla and Belaunde, Lima, 1992, p. 70.

hellenic roots

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Quesada's suggestion of employing the preposition 'para', taken from Attic Greek, was absolutely successful. In ancient Greek the preposition 'παρὰ' takes in a broad semantic spectrum, even admitting opposite denotations among its meanings.

ancient Greek, explains Muracho, makes use of invariable words, initially 18 prepositions, which, before verbs add to the verbal meaning (action or state) a spatial relationship and, by metaphor, a temporal relation.

Muracho, *Língua grega*, 2 ed., São Paulo: Discurso Editorial; Petrópolis: Vozes, 2003, vol. 1, p. 530.

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‘παρὰ’ original meaning

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in this sense, ‘παρὰ’ means ‘next to’, in complete opposition to the idea of ‘within’.

the original concrete meaning of ‘παρὰ’, Muracho explains, is ‘next to’ or ‘along with’, as Quesada pointed out above, and its meaning varies in accord with the grammatical case of its object.

Muracho, *Língua grega*, 2 ed., São Paulo: Discurso Editorial; Petrópolis: Vozes, 2003, vol. 1, p. 533.

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‘παρὰ’: dative case meaning

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when the object is in the dative case, ‘παρὰ’ can have the meaning ‘at the side of’, as in the following example:

οἱ παρὰ βασιλεῖ ὄντες

those who are aside the king

[the court, the aulics, the closest to the king]

Xenophon, *An.* 1, 5, 1 quoted from Muracho, *Língua grega*, 2 ed., São Paulo: Discurso Editorial; Petrópolis: Vozes, 2003, vol. 1, p. 592.

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‘παρὰ’: accusative case meaning

when the object is in the accusative case, ‘παρὰ’ can have the meaning of ‘beyond’, as in the following example:

> καὶ παρὰ δύναμιν
>
> *even beyond his power*
>
> *[stand aside, surpassing]*

Thucydides, 8, 2, 2 quoted from Muracho, *Língua grega*, 2 ed., São Paulo: Discurso Editorial; Petrópolis: Vozes, 2003, vol. 1, p. 594.

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the term ‘paraconsistent’

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these are the etymological roots that allow the term ‘paraconsistent’ to encompass distinct philosophical visions of paraconsistency, from the most sober to the most exaggerated

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- dialethic logic – Priest and Routley
- transconsistent logic – Priest
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the term ‘paraconsistent’

these suggestions, however, did not go anywhere, probably due to the great semantic capacity of the term ‘paraconsistent’.

the term very well translates the logical character of inconsistent (contradictory) but non-trivial logics, while at the same time it is capable of harboring diverse philosophical visions of the ontological study of contradiction.

the term ‘paraconsistent’

these suggestions, however, did not go anywhere, probably due to the great semantic capacity of the term ‘paraconsistent’.

the term very well translates the logical character of inconsistent (contradictory) but non-trivial logics, while at the same time it is capable of harboring diverse philosophical visions of the ontological study of contradiction.

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several important and recognized logicians from various countries participated as invited speakers in the Third Latin American Symposium on Mathematical Logic in 1976.

from Latin America and Brazil, alongside Ayda Arruda, Newton da Costa, Rolando Chuaqui, and Roberto Cignoli, among others, there also participated in the event young logicians who are nowadays well-known points of reference in Latin American logic.

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D'Ottaviano, then a doctoral student, witnessed the atmosphere of effusive revelry and acceptance that accompanied Quesada's lecture and suggestion of the term 'paraconsistent logic'.

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in 1989, D'Ottaviano participated in the First World Congress on Paraconsistency (I WCP), held in Ghent, Belgium, when Jerzy Perzanowski proposed the alternative name 'parainconsistent logic' for the paraconsistent systems.

she also participated in the *Jaśkowski Memorial Symposium*, held in Toruń, Poland in 1998, when Perzanowski once again presented his proposal.

in both meetings, D'Ottaviano publicly protested and argued against Perzanowski's suggestion.

Perzanowski, Fifty years of parainconsistent logics, *Logic and Logical Philosophy*, 7, 1999, pp. 21–24.

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although we do not have the letter from da Costa that Quesada was responding to, da Costa talked about the event under discussion in a book honoring the 70th year of his Peruvian correspondent:

> *Several years ago when I needed a convenient and meaningful name for a logic that did not from the start eliminate contradictions as false, that is, as absolutely unacceptable, Miró Quesada helped me. On this point, it should be remembered that, at that time, all logics thoroughly condemned contradictions. The new logic in which I worked therefore still found a great deal of resistance; it was little publicized, and those who were aware of it were, for the most part, skeptical about it.*

da Costa, *La filosofia de la lógica de Francisco Miró Quesada Cantuarias* in: *Lógica, razon y humanismo: la obra filosofica de Francisco Miró Quesada C.*, ed. Sobrevilla and Belaunde, Lima, 1992, p. 69.

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Da Costa's account shows how difficult the early days of paraconsistent logic were.

if today paraconsistency is a theoretical option among many alternatives, at the time it was first proposed, in its beginnings, it was necessary for the pioneers of paraconsistency to overcome resistance in order for the new perspective on logicity to be legitimately admitted.

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on this point, the name 'paraconsistent' seems to have played a key role.

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with regard to the choice of the name, and to Quesada's suggestion of the term 'paracomplete' for describing those logics as duals as the paraconsistent ones, in which the Principle of the Excluded Third does not hold, da Costa states:

> *It does not seem to me an exaggeration to say that in these two episodes the name created the thing named. Is this not a miracle? Or, if someone prefers, an act of magic? As the answer has to be positive, the appellation of 'magician' should be applied to Miró Quesada.*

da Costa, *La filosofia de la lógica de Francisco Miró Quesada Cantuarias* in: *Lógica, razon y humanismo: la obra filosofica de Francisco Miró Quesada C.*, ed. Sobrevilla and Belaunde, Lima, 1992, p. 70.

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today, Newton da Costa looks back on these events and recognizes once again their importance:

> *I think the name is fundamental. When Professor Miró Quesada, a great friend of mine, a Peruvian, suggested this name, in a matter of months the whole world was talking about paraconsistent logic. In this case, the name almost created the discipline. [...] In fact, he was a full professor at the Faculty of Law there at the University of San Marcos, and perhaps the first book on juridical logic in Latin America was written by him.*

Entrevista de Newton da Costa in: Gomes and D'Ottaviano, *Para além das Colunas de Hércules*, p. 655, lines 368–371; 373–375.

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Francisco Miró Quesada suggested to Newton da Costa an all-embracing name for inconsistent but non-trivial formal systems, and, in spite of other proposals, the term 'paraconsistent' prevailed.

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Miró Quesada, in presenting his master's touch, to the international academic community during the Third Latin American Symposium on Mathematical Logic, ineradicably left his mark on the history of paraconsistency and paraconsistent logic.

a tribute to Newton and Paco

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gracias!

obrigado!