History of Logic from Aristotle to Gödel (www.historyoflogic.com)

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Leibniz on Logic and Semiotics. Studies in English (First Part: A - K)

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Bibliography

1. "Leibniz's Logic." 1990. *Topoi. An International Review of Philosophy* no. 9:1–90 Contents: Massimo Mugnai: Introduction 1; Hans Burkhardt, Wolfgang Degen: Mereology in Leibniz's Logic and Philosophy 3; Hector-Neri Castañeda: Leibniz's Complete Propositional Logic 15; Wolfgang Lenzen: On Leibniz's Essay *Mathesis rationis* 29; Massimo Mugnai: A Systematical Approach to Leibniz's Theory of Relations and Relational Sentences 61; Gino Roncaglia: *Cum Deus calculat* — God's Evaluation of Possible Worlds and Logical Calculus 83-90.

2. "From Leibniz to Kant." 2018. *Logical Analysis and History of Philosophy / Philosophiegeschichte und logische Analyse* no. 21
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3. Abraham, William E. 1969. "Complete concepts and Leibniz's distinction between necessary and contingent propositions." *Studia Leibnitiana* no. 1:263–279
"There is a widely held view that Leibniz is unable to draw a logical, as distinct from a psychological, an epistemological, or a theological, distinction between necessary and contingent truths.
According to the psychological, view, contingent truths are necessary truths whose analysis is so complex that our minds are unable to complete or grasp the analysis. According to the epistemological distinction, certain facts appear differently to us from how they appear to God. God knows all things non-temporally or timelessly, while we can only know facts as appearing in time. Hence certain propositions must appear contingent to us. According to the theological distinction, contingent truths are necessary(1) truths which are made contingent by their presupposition of the free decree of God, while necessary truths only presuppose his understanding.
I propose to show that Leibniz draws a consistent and distinctly logical contrast, and to show that the above gloomy opinion springs from an indefensible interpretation of the nature and purpose of the "complete concept", as well as an omission to investigate properly what Leibniz means by a reduction, and by a "virtual identity"."
(1) 1 W. & M. Kneale: T*he Development of Logic*, pp. 333-335; also B. Russell: *A Critical Exposition of the Philosophy of Leibniz,* p. 25f.

4. ———. 1975. "Predication." *Studia Leibnitiana* no. 7:1–20
Abstracvt: "Paralogisms concerning Leibniz's predicate doctrine are pointed out and refuted.
Being included means the inverse of derivative; to the two kinds of derivation that Leibniz knows, correspond to two kinds of containment. The two types of entailment provide Leibniz with the possibility to make the logical and irreducible distinction between necessary and conditional truths. The distinction between an individual and a property is made with set-theoretic methods and also with the help of epistemological terms.
The particular categorical form of the declarative sentence implies that there is only one deep grammar for all statements, which are essentially different forms of expression of categorical statements."

5. Alama, Jesse, Oppenheimer, Paul Edward, and Zalta, Edward. 2015. "Automating Leibniz's Theory of Concepts." In *Automated Deduction – CADE 25: Proceedings of the 25th International Conference on Automated Deduction*, edited by Felty, Amy P. and Middeldorp, Aart, 73–97. Berlin: Springer
Abstract: "Our computational metaphysics group describes its use of automated reasoning tools to study Leibniz's theory of concepts. We start with a reconstruction of Leibniz's theory within the theory of abstract objects (henceforth `object theory').

Leibniz's theory of concepts, under this reconstruction, has a non-modal algebra of concepts, a concept-containment theory of truth, and a modal metaphysics of complete individual concepts. We show how the object-theoretic reconstruction of these components of Leibniz's theory can be represented for investigation by means of automated theorem provers and finite model builders. The fundamental theorem of Leibniz's theory is derived using these tools."

6. Alcantara, Jean-Pascal. 2011. "On internal relations in Leibniz, British Neo-realism and Whitehead." *Logique et Analyse* no. 214:173–209
Abstract: "The aim of this paper consists in asking whether Whitehead's philosophy of organism would be a reenactment of Leibniz's doctrine of internal relations. As this terminology depends on Russell's reading of Leibniz, it is first necessary to restore the so-called thesis of reducibility of relations through the opposition of the main commentaries. Secondly, we distinguish Russell's refusal of the axiom of internal relations from Moore's criticism, which is rather related to the exclusiveness of this axiom. Thirdly, we follow Whitehead on relations from 1905 to 1925, agreeing with Russell about the untenable supremacy of the judgement of predication, but getting closer to Moore about the axiom, for the very reason that if there were any internal relation, there could be no process in the nature."

7. ———. 2012. "Leibniz, Modal Logic and Possible World Semantics: The Apulean Square as a Procrustean Bed for His Modal Metaphysics." In *Around and Beyond the Square of Opposition*, edited by Béziau, Jean-Yves, 53–71. Basel: Birkhäuser
Abstract: "Even if Leibniz didn't have the opportunity to actually conceive an explicit modal logic system, remains the fact that he had worked out a modal metaphysics, of hich the inaugural act, in his *Elementa juris naturalis* (c. 1671) was an obvious reference to the Apulean square of opposition. Later, scholars acknowledged in this passage probably one of the first sketch of deontic logic of norms. His modal metaphysics rather deals with the so-called alethic modalities, sometimes expounded through a language such as R.M. Adams wondered whether Leibniz could be "a sort of grandfather of possible worlds semantics for modal logic".[*] In the following study, the Apulean square is used as a hermeneutic tool: however, is the square really well-fitted to express some basic implications of the modal metaphysics? The most remarkable point is that Leibniz was well aware of the K-distributive axiom $(p \supset q) \supset (p \supset q)$ common to the main modal systems today. This awareness dissuaded him to trust the too easy solution of the necessitarianism issue grounded on the well-known distinction coming from Boethius between a "*necessitas consequentiae*" and a "*necessitas consequentis*". Thus Leibniz must consider a proof-theory solution style (for a contingent proposition, the reducibility of the predicate to its subject cannot be achieved). A new square could be making up, however implying a difficulty: if the modal metaphysics cannot admit the logical convertibility of the contingent propositions of which the *dictum* of one is exactly the negation of the *dictum* of the other, known since Aristotle. This is the reason for what the Apulean square could represent a Procrustean bed for Leibniz' modal metaphysics.
At the end, a new modality square may be drawn, according to which each modality in the corner is expressed by quantifications on possible worlds. Whether possible worlds semantics could supersedes Leibniz' own explanation of contingency thanks to this new square of modalities, i.e. a possible worlds square of modalities, will be the topic of a second part of this study."
[*] R. M. Adams, *Leibniz: Determinist Theist, Idealist*, New York: Oxford University Press 1994, p. 9.

8. Andrews, F. E. 1983. "Leibniz's Logic Within His Philosophical System." *Dionysius* no. 7:73–128
Abstract: "The work purports to provide a philosophical history of Leibniz's logical works. The principal conclusion is that Leibniz's work on logical calculi, the modifications in it coinciding with the three periods identified by Couturat, rest upon refinements in the expression of his philosophical system, and end when his

philosophical thought reached that point at which it is manifest that a logical calculus such as he had envisaged is not competent to his philosophical standpoint."

9. Angelelli, Ignacio. 1965. "Leibniz's misunderstanding of Nisolius' notion of "multitudo"." *Notre Dame Journal of Formal Logic* no. 6:319–322
"The Renaissance humanist Nizolius(1) is a remarkable exception in the history of philosophy, where the notion of class appears to be extremely rare. Nizolius substitutes traditional universals by what he calls *multitudines* and during more than four hundred pages he tries to convince his readers that in the real world there are only individuals and collections of individuals. It is not perhaps clear whether Nizolius' *multitudo* comes closer to *class* or to *heap*." (p. 319)
(...)
"Now, it is extremely puzzling that Leibniz seems to have completely missed such a point of Nizolius' theory, because he erroneously thinks that Nizolius' approach leads to such absurdities as {horno} ε {animal}
or to such falsities as {homo}={animal}. How or why this could happen, is indeed quite enigmatic." (p. 319)
(...)
"Nizolius' pyrrhic fame, due to the fact of his having been edited by Leibniz, should be substituted by a more important one: his book is an excellent introduction - in Ciceronian style - to the problems of the notion
of class." (p. 320, notes omitted)
(1) ...Marius Nizolius was born in Brescello (Italy), 1498, and died in 1576. He was a disciple of Valla, and he taught at the University of Parma.
[Leibniz reedited the book *Marii Nizolii de veris principiis et vera ratione philosophandi libri IV*, in 1670, with an important preface.]

10. ———. 1967. "On Identity and Interchangeability in Leibniz and Frege." *Notre Dame Journal of Formal Logic* no. 8:94–100
"The main purpose of this paper is to show that Leibniz did not accept what today is usually known as Leibniz's rule of substitutivity (or indiscernibility of identicals, etc.). This purpose is attained by quoting three texts, in Latin, one of them not yet published. Another aim of the paper is to show how Frege believed that the rule Leibniz had used only for restricted calculi, could be extended to the ordinary language. This is construed as the source of the axiomatic status enjoyed by the rule among philosophers in the last century."

11. Arthur, Richard T. W. 2019. "Leibniz in Cantor's Paradise: A Dialogue on the Actual Infinite." In *Leibniz and the Structure of Sciences: Modern Perspectives on the History of Logic, Mathematics, Epistemology*, edited by De Risi, Vincenzo, 71–109. Cham (Switzerland): Springer.

12. Baron, Margaret E. 1969. "A Note on the Historical Development of Logic Diagrams: Leibniz, Euler and Venn." *The Mathematical Gazette* no. 53:113–125
"It was, however, Gottfried Wilhelm Leibniz (1646-1716), who first devoted serious study to the analysis of logical propositions by means of diagrams. He was also the first to conceive the idea of a calculus of logic as a piece of purely abstract mathematics, i.e., mathematics not concerned with space or number. Unfortunately much of the value of this work was lost as only a small proportion of it was published in his life-time.
Leibniz professes always the greatest admiration for traditional logic." (p. 116)
(...)
"Nonetheless, he considered the logic of Aristotle imperfect and wanted to complete it. In so doing, he explored at some length the possibility of representing syllogistic arguments by means of geometric figures developing not only the now familiar circle diagrams attributed to Venn and Euler, but also an ingenious linear form which he considered clearer and easier to work with." (p. 117)

13. Bassler, Otto Bradley. 1998. "Leibniz on Intension, Extension, and the Representation of Syllogistic Inference." *Synthese* no. 116:117–139

Abstract: "New light is shed on Leibniz's commitment to the metaphysical priority of the intensional interpretation of logic by considering the arithmetical and graphical representations of syllogistic inference that Leibniz studied. Crucial to understanding this connection is the idea that concepts can be intensionally represented in terms of properties of geometric extension, though significantly not the simple geometric property of part-whole inclusion. I go on to provide an explanation for how Leibniz could maintain the metaphysical priority of the intensional interpretation while holding that logically the intensional and the extensional stand in strictly inverse relation to each other."

14. Benis-Sinaceur, Hourya. 2023. ""Ars invenendi" today." *Acta Morphologica Generalis* no. 9:1–11
From the original article: *"Ars inveniendi" aujourd'hui*, Les Études philosophiques, 1989, pp. 201-214. Translated from the French by Asunción Álvarez.
"In his obituary of Abraham Robinson(1), Simon Kochen gave a portrait of Kurt Gödel (1906-1978) that will be of interest to Leibniz scholars. Gödel, who, it should be borne in mind, was particularly interested in Leibniz's philosophy, regarded Abraham Robinson's work as the best realisation of the Leibnizian ideal of logic serving as an ars inveniendi for mathematics. In this paper, I would like to examine which aspect of ars inveniendi is done justice by this claim, and which characteristic of contemporary logic it highlights. Given that we are dealing with Abraham Robinson's work, I will only discuss model theory, although there are other domains where logical results may facilitate mathematical discoveries.
Leibniz's project of a "universal calculus"(2) has been widely discussed in the light of the findings of modern logic. By contrast, the idea, which is essential to Leibniz's mathematics and philosophy, that the establishment of calculus presupposes a "concept analysis" has been hardly considered from the point of view of modern logic. Yet this was what Gödel, for whom conceptual analysis is a precious component of scientific research and logic a useful discipline for mathematicians(3), had in mind." (p. 1)
(1) On Abraham Robinson's work in mathematical logic, *The bulletin of the London mathematical society*, vol. 8, part 3, November 1976, 312-315
(2) Cf. in particular, Hans Hermes, Ideen von Leibniz zur Grundlagenforschung: Die ars inveniendi und die ars judicandi, *Studia Leibnitiana, Supplementa*, III (1969), 92-102. And more recently M. Sanchez-Mazas, La caractéristique numérique de Leibniz comme méthode de décision, *Studia Leibnitiana, Supplementa*, XXI (1980), 168-182. I have also previously discussed the coincidence of the arithmetisation of logic at the start of this century with Leibniz's "universal calculus" project (La logique comme ars inveniendi, in A. Robinet (ed.), *Doctrines et concepts. Cinquante ans de philosophie de langue française*. Paris, Vrin, 1988, 321).
(3) Cf. Hao Wang's testimony in *Reflections on Kurt Gödel*, MIT Press, Cambridge (Mass.), London, 1987, 167.

15. Bergmann, Gustav. 1956. "Russell's Examination of Leibniz Examined." *Philosophy of Science* no. 23:175–203.

16. Bertran-San Millán, Joan. 2021. "Lingua characterica and calculus ratiocinator: The Leibnizian background of the Frege-Schröder polemic." *The Review of Symbolic Logic* no. 14:411–446
Abstract: "After the publication of *Begriffsschrift*, a conflict erupted between Frege and Schröder regarding their respective logical systems which emerged around the Leibnizian notions of *lingua characterica* and *calculus ratiocinator*. Both of them claimed their own logic to be a better realisation of Leibniz's ideal language and considered the rival system a mere *calculus ratiocinator*. Inspired by this polemic, van Heijenoort (1967b) distinguished two conceptions of logic—logic as language and logic as calculus—and presented them as opposing views, but did not explain Frege's and Schröder's conceptions of the fulfilment of Leibniz's scientific ideal.

In this paper I explain the reasons for Frege's and Schröder's mutual accusations of having created a mere *calculus ratiocinator*. On the one hand, Schröder's construction of the algebra of relatives fits with a project for the reduction of any mathematical concept to the notion of relative. From this stance I argue that he deemed the formal system of *Begriffsschrift* incapable of such a reduction. On the other hand, first I argue that Frege took Boolean logic to be an abstract logical theory inadequate for the rendering of specific content; then I claim that the language of *Begriffsschrift* did not constitute a complete *lingua characterica* by itself, more being seen by Frege as a tool that could be applied to scientific disciplines. Accordingly, I argue that Frege's project of constructing a *lingua characterica* was not tied to his later logicist programme."

References

van Heijenoort, J. (1967b). Logic as Calculus and Logic as Language. *Synthese*, 17, 324–330.

17. Besler, Arman. 2018. "Syllogistic Expansion in the Leibnizian Reduction Scheme." *Cilicia Journa of Philosophy* no. 2:1–16

Abstract: "The standard inferential scheme of traditional assertoric syllogistic, based on the initial chapters of Aristotle's Prior Analytics, employs single-premissed deductions, i.e., principles of immediate inference, in the reduction of imperfect valid moods to perfect moods. G. W. Leibniz (among others) has attempted to replace this scheme with his own version of syllogistic reduction (the core of which is, again, based on Aristotle's observations on syllogistic transformation), in which the principles of immediate inference themselves are modelled as (and hence justified by means of) valid syllogisms. This paper examines the place of this modelling, i.e. syllogistic expansion, of immediate inferences in Leibniz's scheme of syllogistic reduction (which he describes in his Nouveaux Essais and presents in one of his papers on syllogistic), and shows through this examination that the tenability of the whole scheme actually hinges on the interpretation to be given for the categorical propositional forms."

18. Blank, Andreas. 2008. "Ramus and Leibniz on analysis." In *Leibniz: What Kind of Rationalist?*, edited by Dascal, Marcelo, 155–166. Dordrecht: Springer

"In the present chapter, I argue for two claims: (1) In the 1547 edition of the *Dialectical Institutions* – the first three volumes Latin edition that came out under his own name(4) – Ramus explicitly dissociates human discourse from truth in the Divine mind. Rather, he holds that dialectics is founded on innate, natural capacities of the human mind which function as a substitute for insight into Divine truth. According to his view, analysis has the task of disentangling the elements of common human discourse, thus providing us with examples, which subsequently, in the process of genesis, fulfill the function of models for forming new discourses. (2) Leibniz's attitude towards Ramus is not a matter of simply accepting or rejecting such an account of the role of analysis in the constitution of discourse. On the one hand, Leibniz does not accept Ramus' views about the connection between analysis and the function of examples as models for constructing new discourses. According to Leibniz, rather, analysis provides us with the concepts and truths that function as starting points for demonstrative arguments. On the other hand, he shares with Ramus the view that philosophical analysis can only explicate what implicitly already is known. As for Ramus, for Leibniz analysis has a purely descriptive starting point in the common usage of language." (pp. 155-156)

(4) For the history of the three-book Latin editions of the *Dialectical Institutions*, see Ong 1958: 200–201. In what follows, I refer to the 1547 edition of the *Dialectical Institutions* as "DI".

All references are to page numbers.

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Ong,W.J. 1958. *Ramus: Method, and the Decay of Dialogue*. Cambridge, MA: Harvard University Press.

19. Błaszczyk, Piotr, Kanovei, Vladimir, Katz, Karin U., Katz, Mikhail G., Kudryk, Taras, Mormann, Thomas, and Sherry, David. 2016. "Is Leibnizian Calculus Embeddable in First Order Logic?" *Foundations of Science* no. 22:717–731
Abstract: "To explore the extent of embeddability of Leibnizian infinitesimal calculus in first-order logic (FOL) and modern frameworks, we propose to set aside ontological issues and focus on procedural questions. This would enable an account of Leibnizian procedures in a framework limited to FOL with a small number of additional ingredients such as the relation of infinite proximity. If, as we argue here, first order logic is indeed suitable for developing modern proxies for the inferential moves found in Leibnizian infinitesimal calculus, then modern infinitesimal frameworks are more appropriate to interpreting Leibnizian infinitesimal calculus than modern Weierstrassian ones."

20. Brancato, Mattia. 2017. "The Young Leibniz and the Principle of Contradiction: Adoption and Use between Philosophy and Mathematics." *Lumières* no. 29:101–118.

21. Brody, Baruch. 1977. "Leibniz's Metaphysical Logic." *The Rice University Studies* no. 63:43–55
Reprinted in: Mark Kulstad (ed.), *Essays on the Philosophy of Leibniz*, Houston: William Marsh Rice University Press 1977, pp. 43-55 and in: R. S. Woolhouse (ed.), *Gottfried Wilhelm Leibniz. Metaphysics and Its Foundations, Gottfried Wilhelm Leibniz. Critical Assessments,* Vol. I, New York, Routledge, 1994, pp. 82-96.
"At the beginning of this century, Russell and Couturat made the important discovery that some of Leibniz's most fundamental metaphysical views (his view that substances do not interact, his theory of pre-established harmony as a soIution to the mind-body problem, etc.) were based upon his intensional analysis of the truth of propositions, upon his logical principle that the predicate is contained in the subject in every true proposition.(1) Since their discovery, this principle has been the subject of much controversy.
Did Leibniz think that it applied to existential judgments? What is its relation to the principle of sufficient reason, another of Leibniz's fundamentalprinciples? Does it have the consequences that Leibniz thought it had?
Strangely enough, throughout all of this controversy, little attention has been directed to Leibniz's reasons for maintaining this principle. It is just this that I want to consider in this paper. I hope to show that (a) it is more or less original with Leibniz, and not something that he borrowed from his predecessors, (b) he had a variety of interesting and important arguments for it, and (c) these arguments reveal that this logicaI principle was based upon certain of Leibniz's fundamental metaphysical presuppositions. In light of this last result, I shall also argue for a reevaluation of the relation between Leibniz's logic and his metaphysics." (p. 43)
(1) Bertrand Russell, *The Philosophy of Leibniz* London: Allen and Unwln, 1900). Louis Couturat, "Sur la Metaphyslque de Leibniz," translated and reprinted In H. Frankfurt's *Leibniz* (New York, 1972): all page references are to this translation.

22. Burdick, Howard. 1991. "What was Leibniz's problem about relations?" *Synthese* no. 88:1–13
Abstract: "The main purpose of the article is to get clear what Leibniz's concerns about relations were. His:
I do not believe that you will admit an accident that is in two subjects at the same time. My judgement about relations is that paternity in David is one thing, sonship in Solomon another, but that the relation common to both is a merely mental thing whose basis is the modifications of the individuals
is best seen as akin to:
'Father' is true of David. 'Son' is true of Solomon. But 'Being a father of' is not true of any individual.
Leibniz, like modern nominalist Nelson Goodman, could not allow the ordered pair (David, Solomon). To establish this I must argue against Hidé Ishiguro's claim that Leibniz should have straightforwardly constructed a logic of relations, and Jaakko

Hintikka's claim that Leibniz could have allowed the use of relational predicates in such forms as '(Ex) Rax' and '(Ey) Ryb'. I must also argue that what they say about the windowlessness doctrine (especially the 'as if' formulation) is beside the point."
References
Frankfurt, H. (ed.): 1972, *Leibniz: A Collection of Critical Essays*, Doubleday, New York.
Hintikka, J.: 1972, 'Leibniz on Plenitude, Relations and the "Reign of Law"', in H. Frankfurt (ed.), pp. 155-90.
Ishiguro, H.: 1972a, 'Leibniz's Theory of the Ideality of Relations', in H. Frankfurt (ed.), pp. 191-214.
Ishiguro, H.: 1972b, *Leibniz's Philosophy of Logic and Language*, Duckworth, London.

23. Burkhardt, Hans, and Degen, Wolfgang. 1990. "Mereology in Leibniz's Logic and Philosophy." *Topoi* no. 9:3–13
"The subject of our paper is the history of whole and part, a topic much neglected in the more recent history of philosophy and theory of science. We shall deal in particular with the part-whole relation in Leibnlz's metaphysics.
The relation of part and whole was by no means always an object of neglect. For Aristotle and the tradition the part-whole relation is a relation fundamental to ontology and metaphysics, being treated as of equal standing with the substance-accident relation and with the four different kinds of cause (material, formal, efficient and final)." (p. 3)
(...)
"The logically basic relation of concept to part-concept is for Leibniz also a whole-part relation -- or at least it seems to be such. At the time of his *Dissertatio*, Leibniz had been convinced that there are minimal, simple concepts, that is concepts which cannot be divided further but which can be known by human beings, and which are the ultimate compository elements of all other concepts. His later view, on the other hand, is that, while there are such simplest or atomic concepts (*notiones absolute primae*), we do not know what they are, so that we have to be content with composite or 'molecular' concepts *(notiones quoad nos primae*). Hence Leibniz does not at all renounce his earlier idea of a combination of concepts. It remains an ineluctable part of his philosophy and the very heart of his logic -- we must always remember that Leibniz is a logician of concepts or terms and not of propositions. For the purpose of his logic, he also reduces the relation of substance-accident to the more easily treatable relation of concept to part-concept, for example the inclusion of the concept animal in the concept man or even the inclusion of the concept married to Susan in the individual concept Peter. " (p. 6, a note omitted)

24. Busse, Ralf. 2020. "A Logical Reconstruction of Leibniz’s Argument for His Complete Concept Conception of the Nature of Substance in *Discours* §8." *History of Philosophy & Logical Analysis* no. 23:447–473.

25. Cabrer, Leonardo, and Gil-Férez, José. 2014. "Leibniz interpolation properties." *Annals of Pure and Applied Logic* no. 165:933–962.

26. Camposampiero, Matteo Favaretti. 2022. "False Ideas: Leibniz and Aquinas." *Studia Leibnitiana* no. 54:205–224.

27. Capozzi, Mirella, and Roncaglia, Gino. 2009. "Logic and Philosophy of Logic from Humanism to Kant." In *The Development of Modern Logic*, edited by Haaparanta, Leila, 78–158. New York: Oxford University Press
§ 8. *Leibniz*, pp. 110-122.
"The German logician and philosopher Gottfried Wilhelm Leibniz (1646–1716) has a foremost role in the history of formal logic. However, it is almost impossible (and probably misleading) to represent his contributions to logic as a single and coherent set of theories nicely inserted within a linear path of development. There are at least three reasons that rule out such a reassuring view. In the first place, Leibniz contributed ideas—often through scattered and incomplete fragments rather than through structured and polished writings—to a plurality of logically relevant

subjects: from the arithmetization of syllogistic to the theory of relations, from modal logic (and semantic of modal logic) to logical grammar—and the list could be easily extended. Moreover, relevant contributions are often found in works, fragments, or letters not explicitly devoted to the field of logic.
In the second place, most of Leibniz's writings testify to a work in progress in the deepest meaning of the expression: Different and sometimes incompatible strategies are explored in fragments dating back to the same years or even to the same months, corrections and additions may substantially modify the import of a passage, promising and detailed analysis remain uncompleted or are mingled with sketchy hints. Nevertheless, there is a method in Leibniz's passionate and uninterrupted research: a deeper unity that is given by a set of recurring problems and by the wider theoretical framework in which they are dealt with. Last but not least, it should always be kept in mind that Leibniz's works known by his contemporaries and immediate successors constitute a very limited subset of his actual production.
It is only during the twentieth century that Leibniz's role in the history of logic came to be fully appreciated, and this appreciation is connected to at least two different moments: the publication by Louis Couturat, in 1903, of the *Opuscules et fragments inédits de Leibniz* (Leibniz 1966; see also Couturat 1901), many of which were devoted to logic, and the progress made during the second half of the century in the publication of the complete and critical edition of Leibniz's texts (*Leibniz* 1923–). Almost three centuries after his death, this edition (the so-called Akademie-Ausgabe) is, however, still to be completed." (pp. 110-111)
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Couturat, Louis. 1901. *La Logique de Leibnitz d'après des documents inédits.* Paris: Alcan.
Leibniz, Gottfried Wilhelm. [1903] 1966. *Opuscules et fragments inédits de Leibniz*, ed. L. Couturat. Alcan: Paris. Reprint Hildesheim–New York: Olms.
Leibniz, Gottfried Wilhelm. 1923–. *Sämtliche Schriften und Briefen*. Herausgegeben von der Preussischen (Deutschen) Akademie der Wissenschaften zu Berlin. Darmstadt–Leipzig–Berlin: Akademie.

28. Castañeda, Hector-Neri. 1974. "Leibniz's Concepts and their Coincidence *Salva Veritate*." *Noûs* no. 8:381–398
"My primary purpose here is to contribute to a better understanding of Leibniz's view of concepts and their coincidence salva veritate. I also want to advocate a certain Darwinian methodology for future studies in Leibniz's philosophy. These goals will be pursued through a critical examination of Hide Ishiguro's recent and valuable book *Leibniz's Philosophy of Logic and Language*.[1]
(...)
Here I dispute Ishiguro's five main theses about Leibniz's view of concepts. These are (A)-(E) below. In my opinion, these interesting theses run counter to crucial texts, but, more importantly, they destroy the significance of Leibniz's work in logic and distort his ontology without enhancing the value of his contribution to the philosophy of logic or the philosophy of language.
I have something to say about Ishiguro's treatment of Leibniz's view of relations and of existence, but I cannot go into full details here.
Fortunately, and unexpectedly in the course of working on the problems of referential opacity, I have developed a system of ontology in [2] that is thoroughly Leibnizian in its handling of relations and of existence.
It shows how relations are beings of reason by being instances of the pre-established harmony. Thus, that system contains an indirect, partial reply to Ishiguro's discussion on pages 103ff." (p. 381, a note omitted)
References
[1] Hide Ishiguro, *Leibniz's Philosophy of Logic and Language* (Ithaca: Cornell University Press, 1972).
[2] Hector-Neri Castafeda, "Thinking and the Structure of the World," *Philosophia* 4 (1974).

29. ———. 1976. "Leibniz's Syllogistico-Propositional Calculus." *Notre Dame Journal of Formal Logic* no. 17:481–500

"In his research in logical theory after 1680 Gottfried Wilhelm Leibniz worked intensively at devising a formal calculus that would be interpreted as a general logic. He was convinced that the classical types of categorical propositions were the fundamental ones, so that the central core of his general calculus had to consist of the theory of the syllogism. He conceived the rest of the logical relationships between propositions as developments of syllogistics. Thus, the calculus he was aiming at was not to be merely a calculus that could have a double interpretation: as a syllogistic calculus and, alternatively, as a calculus of other types of implication. His general calculus was to have the principles of syllogistics and the other logical principles together at once. His calculus would be powerful enough to handle mixed inferences involving classical syllogisms and other reasonings.

Undoubtedly because of his algebraic researches and his view on the nature of truth, Leibniz took it for granted that a fully satisfactory logical calculus must be an equational one. Thus, his first efforts at treating the theory of syllogism were directed toward the construction of an equational syllogistic calculus. (And he anticipated some equations of Boolean algebra.) His *General Inquiries about the Analysis of Concepts and Truths* (1686), referred to here as [I],(1) contains a series of reflections on the syllogistic equations. He tries several approaches, and discovers some valid equations. But two things are of special interest to us now: (i) Leibniz formulates there principles that allow the generalization of syllogistics to propositional logic; (ii) Leibniz moves toward a higher level of abstraction. In his [2], *The Primary Bases of a Logical Calculus* (August 1, 1690), he takes up the topic again, and this time he begins with general logical principles and discusses applications to syllogistics. He distills the general system in [3], *The Bases of a Logical Calculus* (August 2, 1690).

My purpose here is to examine critically the system slowly developed by Leibniz in those three papers. " (p. 481)

References

C: Couturat, L., ed., *Opuscules et fragments inedits de Leibniz*, Presses Universitaires de France, Paris (1903).

P: Parkinson, G. H. R., ed. and trans., *Leibniz's Logical Papers,* Clarendon Press, Oxford (1966)

[1] *General Inquiries about the Analysis of Concepts and Truths* (1686) in C 356-399, and in P 47-89.

[2] *The Primary Bases of a Logical Calculus* (August 1, 1690), in C 235-237 and in P 90-92.

[3] *The Bases of a Logical Calculus* (August 2, 1960), in C 421-423, and in P 93-94.

30. ———. 1990. "Leibniz's Complete Propositional Logic." *Topoi* no. 9:15–27

"Here I argue that the concluding round of logical theorizing in Leibniz's *Generales Inquisitiones*, Sections 195-200, 6 is a brilliant short essay. It contains a significant logical accomplishment. With minor editing, it should have been published in 1686 or soon thereafter.

Our current standards of rigor would require more editing, but no revision of principles, except a clarification about the association of conjunction.

The *GI* is a manifold of philosophical reflections undergirded by a series of logical investigations. Leibniz's goal is to construct a general logical calculus that encompasses traditional syllogistics. He makes attempt after attempt at developing the envisaged calculus.

(...)

"I submit that Leibniz is completely justified in claiming that the principles he has given are fundamentals of logical form. (Since Latin does not have articles, it is not clear that he meant the fundamentals, or simply some fundamentals.) At any rate, a set of principles for a certain logical domain may be complete; yet there are always equivalent alternative characterizations of the same domain of valid inferences. Hence, the issue of uniqueness is not so important as whether the principles under

consideration are valid and of central value. The next important question is whether the set of such principles is in an appropriate sense complete.
Here I want to argue for two major theses. First, the principles Leibniz formulates in GI 195-200 are valid, important, and exciting. Second, with the adjunction of the principle of associativity of conjunction, which Leibniz does not mention, although he uses it all over, the set of principles he formulates explicitly includes a redundant complete formulation of the standard propositional calculus. Moreover, these principles also contain a full characterization of the truth-table semantics of propositional logic. Furthermore, that calculus includes a correct Boolean treatment of syllogistics." (p. 15)
(6) *Generales Inquisitiones de Analysi Notionum et Veritatum*, hereafter *GI*. I have consulted the Latin text in Couturat's *Opuscules* 356-399, to be referred to as *C* followed by page number, and also the Latin text and its German translation in Franz Schupp (ed.), G. W. Leibniz: *Allgemeine Untersuchungen über die Analyse der Begriffe und Wahrheiten* (Hamburg: Felix Meiner Verlag, transl. and long commentary by Schupp, 1982), to be cited as *S* followed by page number. I have made special use of Parkinson's translation in Leibniz: *Logical Papers* 47--87, referred to as *P* followed by page number. With several revisions it is the text I exegesize here. (...)

31. Castro-Manzano, J. Martín. 2017. "Re(dis)covering Leibniz's Diagrammatic Logic." *Tópicos, Revista de Filosofía* no. 52:89–116
Abstract:"In this paper I attempt to retrieve Leibniz's linear diagrammatic logic for his syllogistic and highlight its computational and logical features by providing a formal approach to it in metalogical terms, which is something that, as far as we know, has not yet been accomplished. Thus, in this contribution I pursue two goals, one historical and the other logical: i) to bring more attention on the algorithmic aspects of Leibniz's linear diagrammatic system for his syllogistic, which I believe has been neglected because of a general bias against diagram-based reasoning; and ii) to prove the metalogical properties of the system in order to argue that such a system is a *bona fide* logical system."

32. Cobreros, Pablo, Egré, Paul, Ripley, David, and Rooij, Robert. 2013. "Identity, Leibniz's Law and Non-transitive Reasoning." *Metaphysica* no. 14:253–264.

33. Cook, Roy T. 2000. "Monads and Mathematics: the Logic of Leibniz's Mereology." *Studia Leibnitiana* no. 32:1–20
Summary: "There are profound connections between Leibniz' mathematics and his metaphysics. This paper aims to increase understanding of both of these areas by examining Leibniz's mereology (the theory of parts and wholes). First, Leibniz' mereology will be reconstructed primarily on the basis of his work "Initia rerum mathematicarum metaphysica". This ambitious program begins with the simple notion of compresence, then moves on to more complex notions such as equality, similarity, and homogeneity, and culminates in Leibniz's definition of the notions of part, whole, and composition. In the course of the essay, further insights are gained in other areas, e.g. in relation to the identity of the indistinguishable. Finally, within the framework of the presented theory, I will try to dispel a misunderstanding regarding Leibniz's analogy between monads and mathematical points, which relates to the spatiality of monads."

34. Correia, Manuel. 2002. "Categorical Propositions and 'logica inventiva' in Leibniz's *Dissertatio de arte combinatoria* (1666)." *Studia Leibnitiana* no. 34:232–240
Summary: "In his *Dissertatio de arte combinatoria,* G.W. Leibniz develops a method to find predicates from a subject and subjects to a predicate, and he sets up a formula to calculate their number. In what follows I would like to explain how this method works and why it forms both a part of what Leibniz calls *logica inventiva* and a direct consequence of his theory of variations, which forms the central part of his *Dissertatio*. In the last section of this article I will go into some theoretical and historical connections between *logica inventiva* and Aristotelian logic. In particular, I will explain how Leibniz's method relates to some traditional attempts to

determine the *tota minora* of a given term, and whether the Aristotelian theory of categorical propositions was able to support Leibniz's method of finding subjects and predicates to be justified within *logica inventiva*."

35. Cortes, Alberto. 1976. "Leibniz's principle of the identity of indiscernibles: A false principle." *Philosophy of Science* no. 43:491–505.

36. Costa, Emanuele. 2016. "Leibniz on Relations: From (Soft) Reductionism to the Expression of the Universe." *Journal of Early Modern Studies* no. 5:143–167.

37. Costantini, Filippo. 2025. "Leibniz's Mereology: A Logical Reconstruction." *Review of Symbolic Logic*:1–35.

38. Dalla Chiara, Maria Luisa, and Mugnai, Massimo. 1989. "A Formal Reconstruction of Leibniz' Intensionale Semantics." In *The Leibniz Renaissance. International Workshop, Firenze, 2-5 giugno 1986*, 55–70. Firenze: Olschki.

39. Daniel, Stephen H. 2009. "Ramist Dialectic in Leibniz's Early Thought." In *The Philosophy of the Young Leibniz*, edited by Kulstad, Mark, Lærke, Mogens and Snyder, David, 59–66. Stuttgart: Franz Steiner.

40. Dascal, Marcelo. 1988. "On Knowing Truths of Reason." In *Leibniz. Questions de logique*, edited by Heinekamp, Albert, 27–37. Stuttgart: Steiner Verlag.

41. ———. 2008. "Leibniz's Two-Pronged Dialectic." In *Leibniz: What Kind of Rationalist?*, edited by Dascal, Marcelo, 37–72. Dordrecht: Springer.

42. ———. 2011. "Leibniz vs. Locke on the role of logic in the workings of reason." In *Natur und Subjekt: Akten des IX. Internationalen Leibniz-Kongresses, Hannover, 26. September bis 1. Oktober 2011. Teil 1*, edited by Breger, Herbert, 201–207. Hannover: Gottfried Wilhelm Leibniz Gesellschaft.

43. de Lorenzo, Javier, and Ibarra, Andoni. 2020. "The fanciful optimism of Miguel Sánchez-Mazas. Let us calculate... = Freedom and Justice." *Theoria: Revista de Teoría, Historia y Fundamentos de la Ciencia* no. 35 (3):255–265.

44. De Risi, Vincenzo. 2019. "Leibniz on the Continuity of Space." In *Leibniz and the Structure of Sciences: Modern Perspectives on the History of Logic, Mathematics, Epistemology*, edited by De Risi, Vincenzo, 111–169. Cham (Switzerland): Springer.

45. Debuiche, Valérie, and Rabouin, David. 2019. "On the Plurality of Spaces in Leibniz." In *Leibniz and the Structure of Sciences: Modern Perspectives on the History of Logic, Mathematics, Epistemology*, edited by De Risi, Vincenzo, 171–201. Cham (Switzerland): Springer.

46. Di Bella, Stefano. 2005. "Leibniz's Theory of Conditions: A Framework for Ontological Dependence." *The Leibniz Review* no. 15:67–93
Abstract: "The aim of this paper is to trace in Leibniz' s drafts the sketched outline of a conceptual framework he organized around the key concept of 'requisite'. We are faced with the project of a semi-formal theory of conditions, whose logical skeleton can have a lot of different interpretations. In particular, it is well suited to capture some crucial relations of ontological dependence. Firstly the area of 'mediate requisites' is explored - where causal and temporal relations are dealt with on the basis of a general theory of 'consequence'.
Then the study of 'immediate requisites' is taken into account - a true sample of mereological inquiry, where Leibniz strives for a unitary treatment of part-whole relation, conceptual inclusion and inherence. Far from simply conflating these relations one with another and with causality, therefore, Leibniz tried to spell them out, while at the same time understanding them within a single conceptual framework."

47. Doull, Floy Andrews. 1991. "Leibniz's Logical System of 1686-1690." *Theoria.Revista de Teoria, Historia y Fundamentos de la Ciencia* no. 6:9–28
Abstract: "Logical works of this period, beginning with "Generales Inquisitiones" and ending with the two dated pieces of August 1, 1690 and August 2, 1690, are

read as a sustained effort, finally successful, to develop a set of axioms and an appropriate schema for the expression of categorical propositions faithful to traditional syllogistic. This same set of axioms is shown to be comprehensive of the propositional calculus of "Principia Mathematica", providing that 'some A is A' is not a "thesis" in an unrestricted sense. There is no indication in the works of this period that Leibniz understood just how significant is this logical system he developed. But it is undeniable that he held tenaciously to this particular set of axioms throughout the period, a set of axioms of great power."

48. Drago, Antonino. 2008. "The square of opposition and the four fundamental choices." *Logica Universalis* no. 2:127–141
Abstract: "Each predicate of the Aristotelian square of opposition includes the word “is”. Through a twofold interpretation of this word the square includes both classical logic and non-classical logic. All theses embodied by the square of opposition are preserved by the new interpretation, except for contradictories, which are substituted by incommensurabilities. Indeed, the new interpretation of the square of opposition concerns the relationships among entire theories, each represented by means of a characteristic predicate. A generalization of the square of opposition is achieved by not adjoining, according to two Leibniz’ suggestions about human mind, one more choice about the kind of infinity; i.e., a choice which was unknown by Greek’s culture, but which played a decisive role for the birth and then the development of modern science.
This essential innovation of modern scientific culture explains why in modern times the Aristotelian square of opposition was disregarded."

49. ———. 2012. "Pluralism in Logic: The Square of Opposition, Leibniz'Principle of Sufficient Reason and Markov's Principle." In *Around and Beyond the Square of Opposition*, edited by Béziau, Jean-Yves and Jacquette, Dale, 175—189. Basel: Birkhäuser
Abstract: "According to the present pluralism in mathematical logic, I translate from classical logic to non-classical logic the predicates of the classical square of opposition.
A similar unique structure is obtained. In order to support this new logical structure, I investigate on the rich legacy of the non-classical arguments presented by ingenuity by several authors of scientific theories. A comparative analysis of their ways of arguing shows that each of these theories is severed in two parts; the former one proves a universal predicate by an ad absurdum proof. This conclusion of every theory results to be formalised by the A thesis of the new logical structure. Afterwards, this conclusion is changed in the corresponding affirmative predicate, which in the latter part plays the role of a new hypothesis for a deductive development. This kind of change is the same suggested by Leibniz’ principle of sufficient reason. Instead, Markov’s principle results to be a weaker logical change, from the intuitionist thesis I in the affirmative thesis I. The relevance of all the four theses of the new logical structure is obtained by studying all the conversion implications of intuitionist predicates. In the Appendix, I analyse as an example of the
above theories, Markov’s presentation of his theory of real numbers."

50. Duffy, Simon. 2006. "The differential point of view of the infinitesimal calculus in Spinoza, Leibniz and Deleuze." *Journal of the British Society for Phenomenology* no. 37:286–307.

51. Dummett, Michael. 1956. "Leibniz's Interpretation of his Logical Calculi by Nicholas Rescher." *Journal of Symbolic Logic* no. 21:197–199.

52. Dyck, Corey W. 2021. "Before and Beyond Leibniz: Tschirnhaus and Wolff on Experience and Method." In *The Experiential Turn in Eighteenth-Century German Philosophy*, edited by de Boer, Karin and Prunea-Bretonnet, Tinca, 17–36. New York: Routledge.

53. Elgueta, Raimon, and Jansana, Ramon. 1999. "Definability of Leibniz Equality." *Studia Logica*:223–243
"Given a structure for a first-order language *L*, two objects of its domain can be indiscernible relative to the properties expressible in *L*, without using the equality symbol, and without actually being the same. It is this relation that interests us in this paper.
It is called Leibniz equality. In the paper we study systematically the problem of its definability mainly for classes of structures that are the models of some equality-free universal Horn class in an infinitary language *L* subscript kappa kappa, where kappa is an infinite regular cardinal."

54. Englebretsen, George. 1981. *Three Logicians: Aristotle, Leibniz, and Sommers and the Syllogistic*. Assen: Van Gorcum
Preface VII; Introduction 1; *Three logicians*; Aristotle 9; Leibniz 28; Sommers 42; *The syllogistic*; Contemporary mathematical logic 67; Syllogistic logic 77; Concluding remarks 109; Bibliography 113; Index 116-118.

55. ———. 1982. "Leibniz on Logical Syntax." *Studia Leibnitiana* no. 14:119–126.

56. ———. 1986. "A Note on Truth and Existence in Leibniz." *Manuscrito.Revista Internacional de Filosofia* no. 9:7–9
"Leibniz was able to connect the notion of truth for a sentence with the idea of existence for individuals. Words and sentences are taken to both denote individuals and signify concepts. iI a true sentence two conditions must hold. The concept signified by the subject and the word denoted by the sentence must be the actual word."

57. ———. 1987. "Subjects." *Studia Leibnitiana* no. 19:85–90.

58. ———. 1988. "A Note on Leibniz's Wild Quantity Thesis." *Studia Leibnitiana* no. 20:87–89.

59. Esquisabel, Oscar M. 2012. "Representing and Abstracting: An Analysis of Leibniz's Concept of Symbolic Knowledge." In *Symbolic Knowledge from Leibniz to Husserl*, edited by Lassalle Casanave, Abel, 1–49. London: College Publications.

60. ———. 2017. "Perspectivism, expression, and logic in Leibniz: a foundational essay." In *Für unser Glück oder das Glück andere. X. Internationaler Leibniz-Kongress Hannover, 18. – 23. Juli 2016*, edited by Li, Wenchao, 73–87. Hildesheim: Georg Olms.

61. Faller, Mark. 2012. "The Optimal and the Necessary in Leibniz' Mathematical Framing of the Compossible." In *Metaphysics: Aristotelian, Scholastic, Analytic*, edited by Novák, Lukás, Novotný, Daniel D., Sousedík, Prokop and Svoboda, David, 209–226. Frankfurt: Ontos Verlag.

62. Ferrari, Massimo. 2023. "Leibniz and the Vienna Circle." In *Logic, Epistemology, and Scientific Theories – From Peano to the Vienna Circle*, edited by Cantù, Paola and Schiemer, Georg, 89–113. Cham (Switzerland): Springer.

63. Festa, Rosanna. 2025. "The Reform of Logics and the Calculation Principles in G. W. Leibniz." *International Journal of Science, Engineering and Technology* no. 13:1–4
Abstract: "The systems are mathematical; so on we have complex systems; convex-complex systems; notable systems; analytical systems; affines systems; hyperbolic systems and algebraic systems. So making a distinction of the mathematical entities G. W. Leibniz and its metaphysics evaluates the concept of a priori."

64. Finkelstein, David. 1977. "The Leibniz Project." *Journal of Philosophical Logic* no. 6:425–439.

65. Galvan, Sergio. 2012. "Logic of Existence, Ontological Frames, Leibniz's and Gödel's Ontological Proofs." In *Ontological Proofs Today*, edited by Szatkowski, Miroslaw, 215–242. Frankfurt: Ontos Verlag

"1. Intrduction
The aim of this article is twofold. First, I intend to present the fundamental outlines of two conceptions of ontological frame. The first one connected to Kant's concept of possible object and the second one related to Leibniz's.
Leibniz maintains that the source of possibility is the mere logical consistency of the notions involved, so that possibility coincides with analytical possibility. Kant, instead, argues that consistency is only a necessary component of possibility. According to Kant, something is possible if there is a cause capable of bringing it into existence; to this end consistency alone is not sufficient. Thus, while the Leibnizian notion of consistency is at the root of the concept of analytical possibility, the Kantian notion of possibility is the source of real possibility. This difference underlies the distinction between the ontological structure (which is characterized by Kant's interpretation) and the Leibnizian ontological structure. Both structures are presented as the semantic basis for two systems of logic of existence (**PE** and **PEL**), the second of which is the Leibnizian extension of the first. The distinction between the two different conceptions of ontological structure plays an important role in the discussion of Gödel's ontological proof, that can be formally interpreted on the ontological frame of the pure perfections.
While this proof, under some emendation condition, is conclusive in the context of Leibniz's ontological structure, it is not so within the Kantian one. Then, in the second part of this paper I'll say something about their relations to Leibniz's and Gödel's ontological argument." (pp. 215-216)

66. Garcia Rodrigues, Antonielly, and Dias, Eduardo Mario. 2023. "Proofs of valid categorical syllogisms in one diagrammatic and two symbolic axiomatic systems."1–66
Preprint available on Academia.edu.
Abstract: "Gottfried Leibniz embarked on a research program to prove all the Aristotelic categorical syllogisms by diagrammatic and algebraic methods. He succeeded in proving them by means of Euler diagrams, but didn't produce a manuscript with their algebraic proofs. We demonstrate how key excerpts scattered across various Leibniz's drafts on logic contained sufficient ingredients to prove them by an algebraic method –which we call the Leibniz-Cayley (LC) system– without having to make use of the more expressive and complex machinery of first-order quantificational logic. In addition, we prove the classic categorical syllogisms again by a relational method –which we call the McColl-Ladd (ML) system– employing categorical relations studied by Hugh McColl and Christine Ladd. Finally, we show the connection of ML and LC with Boolean algebra, proving that ML is a consequence of LC, and that LC is a consequence of the Boolean lattice axioms, thus establishing Leibniz's historical priority over George Boole in characterizing and applying (a sufficient fragment of) Boolean algebra to effectively tackle categorical syllogistic."

67. Glashoff, Klaus. 2002. "On Leibniz's Characteristic Numbers." *Studia Leibnitiana* no. 34:161–184
Abstract: "In 1679, Leibniz wrote nine manuscripts on three different arithmetical models of Aristotelian logic. This was a part of his project of a "calculus universalis". First we show the precise relations of these three models to each other by presenting three criteria which serve the purpose of classifying models of Aristotelian logic. This facilitates the understanding of Leibniz' constructions. Our method is of special value for the sophisticated third model, the domain of which consists of pairs of natural numbers. We present a simple approach to Leibniz' definitions which on first sight appear complicated. We show that it is possible to deduce, from the "universal positive" relation a (= "All ..."), the other three "Aristotelian relations" i, o, and e. – It has always been difficult to understand the exact nature of Leibniz' characteristic numbers because of his misleading nomenclature, since he utilized the signs + and – in order to designate the "positive" and "negative" part of a characteristic number pair. We present a new interpretation of Leibniz' symbolism, showing that the number pairs should be interpreted as

numerator and denominator of a rational number. Thus we can identify the last model as the natural extension of the first and second one, showing the continuity in Leibniz' different attempts towards an arithmetization of logic. – We close our paper by discussing two well known problematic aspects of Leibniz' characteristic numbers, formulating two open questions concerning the formal structure of the system."

68. ———. 2010. "An Intensional Leibniz Semantics for Aristotelian Logic." *The Review of Symbolic Logic* no. 3:1–11
Abstract: "Since Frege's predicate logical transcription of Aristotelian categorical logic, the standard semantics of Aristotelian logic considers terms as standing for sets of individuals. From a philosophical standpoint, this extensional model poses problems: There exist serious doubts that Aristotle's terms were meant to refer always to sets, that is, entities composed of individuals. Classical philosophy up to Leibniz and Kant had a different view on this question—they looked at terms as standing for concepts ("Begriffe"). In 1972, Corcoran presented a formal system for Aristotelian logic containing a calculus of natural deduction, while, with respect to semantics, he still made use of an extensional interpretation. In this paper we deal with a simple intensional semantics for Corcoran's syntax—intensional in the sense that no individuals are needed for the construction of a complete Tarski model of Aristotelian syntax. Instead, we view concepts as containing or excluding other, "higher" concepts—corresponding to the idea which Leibniz used in the construction of his characteristic numbers. Thus, this paper is an addendum to Corcoran's work, furnishing his formal syntax with an adequate semantics which is free from presuppositions which have entered into modern interpretations of Aristotle's theory via predicate logic."

69. ———. 2012. "On Negation in Leibniz' System of Characteristic Numbers." In *Mathematik - Logik - Philosophie: Ideen und Ihre Historischen Wechselwirkungen*, edited by Löffladt, Günter, 175–183. Frankfurt am Main: Harri Deutsch.

70. Govindarajulu, Naveen, and Bringsjord, Selmer. 2016. "Leibniz's Art of Infallibility, Watson, and the Philosophy, Theory, and Future of AI." In *Fundamental Issues of Artificial Intelligence*, edited by Müller, Vincent C., 183–200. Cham (Switzerland): Springer
Abstract: "When IBM's Deep Blue beat Kasparov in 1997, Bringsjord (Technol Rev 101(2):23–28, 1998) complained that despite the impressive engineering that made this victory possible, chess is simply too easy a challenge for AI, given the full range of what the rational side of the human mind can muster. However, arguably everything changed in 2011. For in that year, playing not a simple board game, but rather an open-ended game based in natural language, IBM's Watson trounced the best human *Jeopardy!* players on the planet. And what does Watson's prowess tell us about the philosophy, theory, and future of AI? We present and defend snyoptic answers to these questions, ones based upon Leibniz's seminal writings on a universal logic, on a Leibnizian "three-ray" space of computational formal logics that, inspired by those writings, we have invented, and on a "scorecard" approach to assessing real AI systems based in turn on that three-ray space."

71. Griffin, Nicholas. 2012. "Russell and Leibniz on the Classification of Propositions." In *New Essays on Leibniz Reception: In Science and Philosophy of Science, 1800-2000*, edited by Krömer, Ralf and Chin-Drian, Yannick, 85–127. Dordrecht: Birkhäuser
"In this paper, however, I do not propose to assess Russell's interpretation of Leibniz, nor his contribution to Leibniz scholarship (12) - both of which would require more knowledge of Leibniz and Leibniz scholarship than I possess. Rather, I want to look at one aspect of the contribution that Russell's foray into Leibniz scholarship made to the development of his own philosophy, in particular his philosophy of logic. Russell's interpretation of Leibniz was famous for treating almost the whole of Leibniz's philosophy as the outcome of his logical doctrines. This was not a view that Russell had when he started his study of Leibniz, but an

interpretation he arrived at in the course of his work. It was a view that had a clear attraction to Russell and one which was consonant with Russell's own recently acquired position on how philosophy should be conducted; a view which placed logic at the beginning of philosophy, and the analysis of propositions at the beginning of logic. (13) This was a view that Russell thought he shared with Leibniz, though some prominent Leibniz scholars dissented (e.g., Duncan [1901]). After a summary of Leibniz's premisses, Russell begins his account with the following bold declaration: 'That all sound philosophy should begin with an analysis of propositions, is a truth too evident, perhaps, to demand a proof. That Leibniz's philosophy began with such an analysis, is less evident, but seems to be no less true' (POL, p. 8). Russell and Leibniz differed, however, on how propositions were to be analyzed. It is Russell's treatment of Leibniz's account of propositions, and its relation to Russell's own account, on which I want to concentrate in this paper. It will require a little background on where Russell stood philosophically in 1899." (p. 88)
(...)
Russell summed up Leibniz's position with admirable concision as follows:
Every proposition is ultimately reducible to one which attributes a predicate to a subject. In any such proposition, unless existence be the predicate in question, the predicate is somehow contained in the subject. The subject is defined by its predicates, and would be a different subject if these were different. Thus every true judgment of subject and predicate is analytic - i.e., the predicate forms part of the notion of the subject - unless actual existence is asserted. Existence, alone among predicates, is not contained in the notions of the subjects which exist. Thus existential propositions, except in the case of God's existence, are synthetic, i.e., there would be no contradiction if the subjects which actually do exist did not exist. Necessary propositions are such as are analytic, and synthetic propositions are always contingent. {POL, pp. 9-10)
I shall examine the various parts of this account in what follows. The view that the predicate is contained in the subject is dealt with in § 2. The thesis, which I shall call (SP) that all propositions are of subject-predicate form (SP-propositions, for short) is considered in §3. The vexed question of whether this means that all propositions are analytic occupies §4, and the question of whether any propositions arc synthetic is considered in §5. The remaining two sections deal with Russell: §6 with the relation between the containment thesis and Russell's conception of analysis and § 7 with what Russell might have learnt about relations from his study of Leibniz." (pp. 90-91)
(12) There is a mass of usefule information about the book, its composityion and its reception, in O'Briant [1979].
(13) In a letter of 5 May 1900 Russell told Couturat, then at work on his own book on Leibniz's logic (Couturat [1901]), that, while POL was on the whole of Leibniz's philosophy, it was the logie that interested him and he decided to write the book only after he discovered that the whole of Leibniz's system was based on his logic ([BRLC], i, pp. 170-1).
References:
[BRLC] Russell, Bertrand, *Correspondance sur la philosophie, la logique et la politique avec Louis Couturat* (1897-1913), ed. Anne Françoise Schmid (Paris: Kimé 2001).
[POL] Russell, Bertrand, *A Critical Exposition of the Philosophy of Leibniz* (London: Allen and Unwin, 1975; 1st edn., 1900).
[Coutura 1901] Couturat, Louis, *La Logique de Leibniz d'aprés des documents inédits* (Paris: Alcan).
[Duncan 1901] Duncan, G. M. , Reivew of *POL, Philosophical Review*, 10, pp. 288-97.

72. Grosholz, Emily, and Yakira, Elhanan. 1998. *Leibniz's Science of the Rational*. Stuttgart: Franz Steiner.

73. Gruver, Natascha. 2017. "Calculus ratiocinator: aspects of Leibniz' contribution to origin of symbolic logic." In *Für unser Glück oder das Glück andere. X. Internationaler Leibniz-Kongress Hannover, 18. – 23. Juli 2016. Band 6*, 487–497. Hildesheim: Georg Olms.

74. Hacking, Ian. 1971. "The Leibniz-Carnap Program for Inductive Logic." *The Journal of Philosophy* no. 68:597–610.

75. Hailperin, Theodore. 1988. "The Development of Probability Logic from Leibniz to MacColl." *History and Philosophy of Logic* no. 9:131–191
Abstract: "The introduction has a brief statement, sufficient for the purpose of this paper, which describes in general terms the notion of probability logic on which the paper is based. Contributions made in the eighteenth century by Leibniz, Jacob Bernoulli and Lambert, and in the nineteenth century by Bolzano, De Morgan, Boole, Peirce and MacColl are critically examined from a contemporary point of view. Historicity is maintained by liberal quotations from the original sources accompanied by interpretive explanation.
Concluding the paper is a summary."

76. Heidegger, Martin. 1984. *The Metaphysical Foundations of Logic*. Bloomington: Indiana University Press
Translated by Michael Heim.
Original German edition: *Metaphysische Anfangsgründe der Logik im Ausgang von Leibniz,* (Sommersemester 1928), Herausgegeben von Klaus Held, Frankfurt: Klostermann, 1978, (Heidegger Gesamtausgabe, 26).

77. Herget, Don Emil. 1987. "Non-standard categorical syllogisms: four that Leibniz forgot." *History and Philosophy of Logic* no. 6:1–13
Abstract: "In his "Mathesis rationis" Leibniz discounted out of hand four categorical propositions that would have considerably broadened the resultant syllogistic logic. He did this despite the facts both that he had devised a suitable manner for expressing the latent quantification over terms, and that he had reasoned adequately to determine which of the syllogisms in the resulting broadened logic were valid. Leibniz's reasons for discounting these non-standard propositions are shown to be inadequate, and the resultant syllogistic logic is outlined."

78. Ishiguro, Hidé. 1971. "Leibniz and the Ideas of Sensible Qualities." *Royal Institute of Philosophy Lectures* no. 5:49–63
"IN order to understand the thoughts of Leibniz it is important to stop putting Leibniz into the convenient pigeon-hole of rationalist, and stop thinking of him merely as the metaphysician and constructor of systems so vividly ridiculed by Voltaire in *Candide*. Most important of all, one should not attempt to see Leibniz's philosophy as a completely articulated and integrated whole or as built on three or five metaphysical and logical principles. It is better to remember that Leibniz was a very prolific writer, who was interested in the most varied aspects of philosophy, logic, mathematics, natural science, jurisprudence, history and philology: a man who was constantly trying to work out a large number of heterogeneous theories and thoughts. The collected editions of his writings make up more than twenty thick volumes, and these hardly exhaust his manuscripts." (p. 49)
(...)
"In the first part of this paper, I will attempt to expound some of the views Leibniz held about our ideas of sensible qualities such as colour and heat, which I believe throw light on Leibniz's views on logical analysis and semantics in general. In the second part of this paper, I will discuss the problem of property identity, which is raised by Leibniz's views." (p. 50, a note omitted)

79. ———. 1972. "Leibniz's Theory of the Ideality of Relations." In *Leibniz: A Collection of Critical Essays*, edited by Frankfurt, Harry, 191–213. New York: Doubleday
Reprinted in: V. Chappell (ed.), *Gottfried Wilhelm Leibniz*, New York: Garland pp. 243-265.

80. ———. 1979. "Contingent Truths and Possible Worlds." *Midwest Studies In Philosophy*
Reprinted in R. S. Woolhouse (ed.), *Leibniz: Metaphysics and Philosophy of Science,* New York: Oxford University Press 1981, pp. 357-367.

81. ———. 1990. *Leibniz's Philosophy of Logic and Language*. Cambridge: Cambridge University Press
Second revised edition.
First edition London, Duckworth, 1972.

82. Johnson, A. H. 1960. "Leibniz's method and the basis of his metaphysics." *Philosophy* no. 35:51–61.

83. Jourdain, Philip E. B. 1916. "The logical work of Leibniz." *The Monist*:504–523
Reprinted in: Roger S. Woolhouse (ed.), *Gottfried Wilhelm Leibniz: Vol. 3: Philosophy of Science, Logic, and Language*, London: Routledge 1994, pp. 421-435.

84. Juniewicz, Maciej. 1987. "Leibniz's modal calculus of concepts." In *Initiatives in Logic*, edited by Srzednicki, Jan, 36–51. Dordrecht: Martinus Nijhoff.

85. Karofsky, Amy. 1999. "The primitiveness of Leibnizian alethic modalities." *History of Philosophy Quarterly* no. 16:297–320.

86. Kauppi, Raili. 1968. "Substitutivity *salva veritate* in Leibniz and in modern logic." *Ratio* no. 10:141–149
"Problems concerning substitutivity are discussed in the light of examples from Leibniz, Frege, Carnap, Mates, Putnam. Leibniz reduced truth to interconceptual relations, which accordingly must not be changed by substitutions *salva veritate*. In moderm logic "salva veritate" has an entirely different meaning. Attempts to formulate conditions of substitutivity, applicable e. g. to belief sentences of everyday language, in terms of intensional isomorphy, are criticized. heir failing depends on the fact that a substitution *salva veritate* in such a sentence presupposes empirical knowledge, not expressed by this sentence, about the linguistic usage, theknowledge, the opinions, etc. of the person concerned."

87. Kluge, Eike-Henner W. 1977. "Frege, Leibniz et alii." *Studia Leibnitiana* no. 9:266–274.

88. ———. 1980. "Frege, Leibniz and the Notion of an Ideal Language." *Studia Leibnitiana* no. 12:140–154.

89. Kneale, William, and Kneale, Martha. 1962. *The Development of Logic*. Oxford: Clarendon Press
Reprinted 1975 with corrections.
Chapter V. *Logic after the Renaissance:* § 2. *The interests of Leibniz* (p. 320-336) and § 3. *Leibniz's Calculus de Continentibus et Contentis* (pp. 336-345).

90. Konkova, Antonina, and Legeydo, Maria. 2022. "Intensional Semantics for Syllogistics: what Leibniz and Vasiliev Have in Common." *Logic and Logical Philosophy* no. 31:339–356
Abstract: "This article deals with an alternative interpretation of syllogistics, different from the classical (extensional) one: an intensional one, in which subject and predicate are not associated with a set of individuals (the extension of the concept) but a set of attributes (the content of the concept).
The authors of the paper draw attention to the fact that this approach was first proposed by Leibniz in works on logical calculus, which for a long time remained in the shadow of his other philosophical works. Currently, the intensional approach is gaining more and more popularity due to the development of non-classical logics, and the article will present several existing intensional formal syllogistic semantics. The paper will also consider another historical approach to syllogistics, associated with the name of the Russian logician Nikolai Vasiliev, who is not only one of the founders of non-classical (non-Aristotelian logic) but also of a different intensional

interpretation of such logic. The authors, along with the already known formalizations of Vasiliev's ideas, present two new systems. One of them is a reconstruction of one type of imaginary logic with statements of three qualities: affirmative and two types of negative statements (with absolute and ordinary negation). The second system is the one that is adequate to semantics, in which instead of the four classical ones, only three types of statements are presented (two particular statements are replaced by one - accidental), and their significance is determined through the relation of the classical logical entailment. Both of them are interpreted intensionally.
The intensional approach in logic and, in particular, in syllogistics allows us to expand the class of accepted principles (which occurs due to the expansion of the class of correct moods of syllogisms)."

91. Krajewski, Wladyslaw. 2001. "Aristotelian and Leibnizian Concepts of Possibility." In *Aristotle and Contemporary Science. Vol. 2*, edited by Sfendoni-Mentzou, Demetra, Hattiangadi, Jagdish and Johnson, David M., 51–56. Bern: Peter Lang.