History of Logic from Aristotle to Gödel     by Raul Corazzon | e-mail: rc@ontology.co

### Annotated Bibliography on the Ancient Stoic Dialectic (Second Part: F - Z)

### BIBLIOGRAPHY

1. Frede, Michael. 1974. *Die Stoische Logik*. Göttingen: Vandenhoeck & Ruprecht.

   Inhaltverzeichnis: (I) Einleitung 9; A.Der Gegenstand dieser Arbeit 9; Die äussere Geschichte der stoischen Logik 12; (II) Die Aussage 32; A. Der stoische Begriff der Aussage 32; 1. Die stoischen Bestimmungen der Aussage 32; 2. Aussagen ändern ihren Wahrheitswert 44; 3. Die Vergänglichkeit von Aussagen 48; B. Die Arten von Aussagen 49; 1. Die Unterscheidung von einfachen und nichteinfachen Aussagen 49; 2. Dier Arten von einfachen Aussagen 51; 3. Die Arten von nicht-einfachen Aussagen 73; 4. Logisch wahre Aussagen 105; C. Die Modalität von Aussagen 107; (III) Der Schluss 118; A. Die gültigen Schlüsse 118; 1. Die stoische Definition des Schlusses 118; B. Die Syllogistik 124; 1. Der stoische Begriff des Syllogismus 124; 2. Die elementaren Syllogismen 127; 3. Die nicht-elementaren Syllogismen 167; (iv) Arten von Schlüssen, welche mit Hilfe des 2. Themas analysiert werden 181; 4. Die Vollständigkeit der stoischen Syllogistik 196; 5. Der Formalismus der stoischen Syllogistik 198; Indices 202; (I) Literaturverzeichnis 202; Sachregister 208; Verzeichnis griechischer Termini 209; Verzeichnis lateinischer Termini 210; Bemerkungen zum Text 210; Stellenregister 211-224.

   Reviews (in English): Robert Edlow, *Mnemosyne*, 29, 1976, pp. 199-200; A. C. Lloyd, *Mind*, 86, 1977, pp. 286-289; Ian Mueller, *The Philosophical Review,* 86, 1977, pp. 226-229.

2. ―――. 1974. "Stoic Vs. Aristotelian Syllogistic." *Archiv für Geschichte der Philosophie* no. 56:1-32.

   Reprinted in: M. Frede, *Essays in Ancient Philosophy*, Minneapolis: University of Minnesota Press 1987 pp. 99-124.

3. ―――. 2009. "The Stoic Notion of a *Lekton*." In *Language. Companions to Ancient Thought. Vol. 3*, edited by Everson, Stephen, 109-128. Cambridge: Cambridge University Press.

4. Gabriel, Gottfried, Hulser, Karlheinz, and Schlotter, Sven. 2009. "Zur Miete bei Frege – Rudolf Hirzel und die Rezeption der stoischen Logik und Semantik in Jena." *History and Philosophy of Logic* no. 30:369-388.

   Abstract: "It has been noted before in the history of logic that some of Frege's logical and semantic views were anticipated in Stoicism. In particular, there seems to be a parallel between Frege's *Gedanke* (thought) and Stoic *lekton*; and the distinction between complete and incomplete lekta has an equivalent in Frege's logic.

   However, nobody has so far claimed that Frege was actually influenced by Stoic logic; and there has until now been no indication of such a causal connection. In this essay, we attempt, for the first time, to provide detailed evidence for the existence of this connection. In the course of our argumentation, further analogies between the positions of Frege and the Stoics will be revealed.

The classical philologist Rudolf Hirzel will be brought into play as the one who links Frege with Stoicism. The renowned expert on Stoic philosophy was Frege's tenant and lived in the same house as the logician for many years."

5.    Gardies, Jean-Louis. 1985. "Sur le *διεζενγμενον* de la logique stoïcienne." *Logique et Analyse* no. 28:385-394.

6.    Gaskin, Richard. 1997. "The Stoics on Cases, Predicates and the Unity of the Proposition." In *Aristotle and After*, edited by Sorabji, Richard, 91-108. London: Institute of Classical Studies.

7.    Gould, Josiah. 1974. "Deduction in Stoic Logic." In *Ancient Logic and Its Modern Interpretations. Proceedings of the Buffalo Symposium on Modernist Interpretations of Ancient Logic, 21 and 22 April, 1972*, edited by Corcoran, John, 151-168. Dordrecht: Reidel.
"In their logical theory Stoic philosophers made use of a simple but important distinction alleged to hold among valid arguments, a distinction to which Aristotle had first called attention.(1) They distinguished those arguments whose validity is evident from those whose validity is not evident and so needs to be demonstrated. The Stoics, having supposed that the distinction obtains, raise and answer the question, how does one demonstrate the validity of those arguments whose validity is not plain? The Stoics appear to have set forth both a discursive method of demonstration and a test for validity. In this paper I examine these two facets of Stoic logic.(2)
The paper is in three parts. The first is essentially terminological and taxonomic. There I record Stoic definitions of logical terms and I give three Stoic classifications of arguments, appending samples from the writings of Sextus Empiricus.(3) This provides and puts on exhibit an array of typically Stoic arguments to which I refer in the second part of the paper. There I examine Sextus' contention that the disagreement among the Stoics over the criterion of truth for a conditional proposition renders inefficacious the test that had been set forth as sufficient for judging the validity of an argument, and I argue that Sextus' charge has to be qualified. Even if an unqualified form of Sextus' accusation could be established, its importance, I maintain, would be diminished by the fact that the Stoics didn't make extensive use of this test anyhow. As I show in the third part of the paper, the Stoics ordinarily claim to prove the validity of all valid arguments(4) not by means of a test but by means of a calculus of propositions(5) having its base in a theory of deduction, which includes a language consisting of connectives and variables, axiomatic inference schemata, and rules of derivability. I conclude with a statement about the Stoic theory of deduction in relation to systems of logic developed in the 19th and 20th centuries and to Aristotelian syllogistic." (p. 151)
(1) *Prior Analytics* I.24b22-26, 27a16-18. The distinction between plainly valid syllogisms and non-evidently valid syllogisms is for Aristotle the distinction between 'perfect' syllogisms, on the one hand, and 'imperfect' syllogisms, on the other. A perfect syllogism is one in which, as Aristotle frequently puts it, the necessity (of the conclusion if the premises be assumed) is evident. That the Stoics presupposed this distinction is made clear in Part III of this paper.
(2) I wish to thank my colleagues, James A. Thomas and Harold Morick, for helpful critical remarks on an earlier draft of this paper. I am also enormously indebted to John Corcoran for many incisive remarks and helpful suggestions on two later versions of the paper.
(3) Sextus is the richest source we have for a knowledge of Stoic logic. Being a Sceptic he is extremely critical of the Stoics. He also tends to be tediously repetitious. He appears to have quoted and paraphrased with care, though there aren't always non-circular ways of checking this. As Mates has observed (*Stoic logic* (1961), p. 9), "any parts of Stoic logic which he found either too difficult or too good to refute will be absent from his account", but even so there is enough material in Sextus to extract a fairly good account

of the elements of Stoic logic.

(4) Mates refers in several places (pp. 4, 58, 82) to and gives evidence for the Stoics' claim that their propositional logic was complete.

(5) The Stoics didn't call their logic a calculus of propositions (Diogenes Laertius groups Chrysippus' books dealing with the subject under the heading 'Logic in Relation to Arguments and Moods', *Vitae* VII. 193); but Stoic logic shares so many similarities with modern propositional logic, calling their logic 'a calculus of propositions' while anachronistic is at least not baneful, and it is, in fact, in my view illuminating to use this expression to refer to Stoic logic.

8. Gourinat, Jean-Baptiste. 1999. "La définition et les propriétés de la proposition dans le Stoïcisme ancien." In *Théories de la phrase et de la proposition de Platon à Averroès*, edited by Büttgen, Philippe, Dieble, Stéphane and Marwan, Rashed, 133-150. Paris: Éditions rue d'Ulm.

9. ———. 2000. *La dialectique des Stoïciens*. Paris: Vrin.

10. Graeser, Andres. 1978. "The Stoic Theory of Meaning." In *The Stoics*, edited by Rist, John M., 77-100. Berkeley:: University of California Press.

Reprinted in: A. Graeser, I*ssues in the Philosophy of Language Past and Presen*t, Bern: Peter Lang, 1999, pp. 121-144.

"Whether or not the Stoics conceived of any "science" corresponding in scope and methods to formal semantics in the sense described, for example, by J. Moravcsik (1) seems hard to determine. Evidence regarding this issue is scanty, particularly in view of the fact that some of the isolated testimonies relating to the Stoic theory of meaning are extremely difficult to assess and still require good deal of extensive analysis. From the meager reports concerning the bare essentials of this theory as incorporated into later manuals and elsewhere, it would appear, however, that in the course of their school's history the Stoics developed a fairly detailed semantic theory. It is a theory of meaning that has invited comparison with modern theories and obviously stood it well. In fact, it is generally agreed that the Stoic account of semantics is superior to and more sophisticated than the more influential one offered by Aristotle in theDe Interpretatione (16a3-18).(2) It is also considered to figure among the very few definitely modern-minded contributions to the systematic study of philosophical problems carried out by ancient Greek thinkers.

Semantics in general, according to Stoic philosophers, seems to be an integral part of what they called "Logic" or "Dialectic" respectively, that is, the study of the utterance and the study of the utterance as meaningful. It is integral inasmuch as the Stoic conception of logic is one that depends again on their theory of meaning. In the analysis of meaning three components seem to been distinguished. The components or aspects under consideration are: first, the sign (sèmainon, i.e., that which signifies) which is a phoneme or grapheme; second, the significate (sémainomenon, i.e., that which is signified) which is expressed by the sound which we apprehend as it arises in our mind; and third, the external object referred to." pp. 77-78

(1) *Understanding Language* (The Hague, 1975) 21.

(2) On this most influential text in the history of semantics, see N. Kretzman, "Aristotle on Spoken Sound," in J. Corcoran, ed., *Ancient Logic and its Modern Interpretations* (Dordrecht and Boston, 1974) 3-21.

11. Hájek, Alan. 2009. "Two Interpretations of Two Stoic Conditionals." *Logical Analysis and History of Philosophy* no. 12:206-221.

"Four different conditionals were known to the Stoics. The so-called 'first' (Philonian) conditional has been interpreted fairly uncontroversially as an ancient counterpart to the material conditional of modern logic; the 'fourth' conditional is obscure, and

seemingly of little historical interest, as it was probably not held widely by any group in antiquity. The 'second' (Diodorean) and 'third' (Chrysippean) conditionals, on the other hand, pose challenging interpretive questions, raising in the process issues in philosophical logic that are as relevant today as they were then.

This paper is a critical survey of some modern answers to four of the most tantalizing of these questions; the issues that I will discuss arise out of interpretations of the Diodorean and Chrysippean conditionals as expressions of natural law, and as strict implications.

I will reject these interpretations, concluding with my own proposal for where they should be located on a 'ladder' of logical strength." (p. 206)

12. Hamelin, Octave. 1902. "Sur la logique des Stoïciens." *Année Philologique* no. 12:13-26.

Repris dans *Cahiers philosophiques* 2017/4 (n° 151), pp. 127-136.

13. Hay, William. 1969. "Stoic Use of Logic." *Archiv für Geschichte der Philosophie* no. 51:145-157.

"To sum up. I began by reporting briefly the present widely held opinion that Stoic logic was a logic of propositions. I reminded us that in twentieth-century logic, the logic of propositions, consists of rules governing inferences according to their sentence-connectives and that it by no means exhausts the rules of logic. Rather propositional functions or predicates are added to that, and in turn many-place predicates are added. Some investigators have supposed that Stoic logic was confined to a logic of propositions. That restriction may be suggested by the concentration of the Stoics on singular propositions as those which express what exists most clearly and by their claim that all inferences depend on their logic. If, however, the Stoics had no more logic than the logic of propositions, they had no way of accounting for believing (much less for knowing) non-simple propositions in conditional or disjunctive forms, so that such non-simple propositions would be useful in inference.

Evidence was introduced that the Stoics had and used a rule of instantiation in conditional propositions. This led us to see a use for their rules about the three kinds of simple propositions, those with indefinite subjects,tis,ti, 'someone,' 'something;' those with definite subjects, demonstrative articles such asoutos,touto, 'this one', 'that thing' and those with intermediate subjects, 'Socrates', 'Dion',anthropos, 'a man'.

There is further evidence that the Stoics claimed to be able to rephrase universal propositions of the Peripatetic form as conditional propositions with indefinite subjects. Some philosophers from other schools acknowledged that the conditionals followed from the standard universal. There was disagreement about the converse. The charge was made that the Stoics failed to acknowledge eternal forms and that they replace them by things which existed in the mind only, or rather since they were corporealists in the body of the knower only. Another paper would be required to discuss the place of these grasps in the Stoic account of knowledge and of ethics, for action involves how I take things." (pp. 155-156)

14. Hirzel, Rudolf. 1879. "De Logica Stoicorum." In *Satura Philologa. Hermanno Sauppio Obtulit Amicorum Conlegarum Decas*. Berlin: Weidemann.

15. Hitchcock, David. 2005. "The Peculiarities of Stoic Propositional Logic." In *Mistakes of Reason. Essays in Honour of John Woods*, edited by Peacock, Kent A. and Irvine, Andrew D., 224-242. Toronto: University of Toronto Press.

16. Hossenfelder, Malte. 1967. "Zur Stoischen Definition von Axioma." *Archiv für Begriffsgeschichte* no. 11:238-241.

17.    Hülser, Karlheinz. 1983. "The Fragments on Stoic Dialectic: A New Collection." In *Meaning, Use, and Interpretation of Language*, edited by Bäuerle, Rainer, Schwarze, Christoph and Stechow, Arnim von, 235-249. Berlin: Walter de Gruyter.

"For the Stoics dialectic was the discipline where they developed their theory of cognition and of language as well as some kind of grammar und formal logic. All those topics were formed into a system and a lot of remarkable statements made about them. Hence, Stoic dialectic had much influence, and founded the western tradition of systematic linguistic theory. But the original writings of the Stoics are, nevertheless, lost. Thus, in order to study the origins of systematic linguistic thought, we have to collect the testimonies and fragments on Stoic dialectic from many scattered sources, i.e. from later authors who mentioned, reported or criticized Stoic ideas. In the last centuries this task was performed by different scholars. I only mention Rudolf T. Schmidt (1) and -- above all -- Hans v. Arnim whose 'Stoicorum veterum fragmenta' is the famous standard collection of fragments on all the three parts of Stoic philosophy up to now (2). With regard to Stoic dialectic Prof. U. Egli came up with the idea that it would be worth the trouble to collect the fragments once again. Ile applied for a research program, sponsored by the 'Deutsche Forschungsgemeinschaft (DFG)', and asked me to realize what he had in mind, the result of which is a new collection of fragments on Stoic dialectic, the subject of this paper.

The formal data of this new collection are the following ones: The collection which amounts to 1257 fragment-numbers (plus ca. 70 additional a-numbers) embraces about 1800 texts, the greatest part of which is quoted in Greek or Latin as well as translated into German; various commentaries are inserted. All this comes to 978 crowded typewritten pages. Superadded are some indices and an introduction by the editor. The book is entitled *Die Fragmente zur Dialektik der Stoiker* - zusammengestellt, ins Deutsche übersetzt und teilweise kommentiert - von K. Hülser (the abbreviation of which will be FDS), and is forthcoming: In 1982 it is published in 8 volumes within the publications of the 'Sonderforschungsbereich 99' at the University of Konstanz (Fed. Rep. of Germany). This edition, though it has a small number of copies and no ISBN-number, serves its purpose as a citable on for the time being (available in the library of the University of Konstanz), but will be replaced by a more 'genuine' one as soon as possible. [*]

As for the kind and the content of the new collection, three approaches will be offered in the following. The first one starts from the function of collections of fragments in general; it will explain why v. Arnim's collection is insufficient and a new one necessary, and consequently it leads to certain requirements concerning FDS. The second approach, then, starts from the arrangement of fragments in FDS and will show some systematic aspects of Stoic dialectic connected with it. The third one eventually is centered on the problem of intended completeness; in some cases this aim, being unterstood systematically, leads to interesting results though it widens the concept of fragments." (pp. 235-236)

(1) R. T. Schmidt, *Stoicorum grammatica*, Halle 1839; repr. Amsterdam 1967. A German translation with an introduction and some additional notes by K. Hülser was published in Braunschweig / Wiesbaden 1979, completed by a bibliography on Stoic dialectic by U. Egli.

(2) H. v. Arnim, *Stoicorum veterum fragmenta* Vol. IV (Indices, by M. Adler), Leipzig 1903-1905, 1924; repr. Stuttgart 1964.

[* The definitive edition is: *Die Fragmente Zur Dialektik Der Stoiker,* Stuttgart: Frommann-Holzboog 1987-88, 4 volumes.]

18.    ———. 1992. "Sextus Empiricus und die Stoiker." *Elenchos. Rivista di Studi sul Pensiero Antico* no. 13:233-276.

19.    Ierodiakonou, Katerina. 1990. *Analysis in Stoic Logic*, University of London, London.
Unpublished dissertation (a PDF version can be downloaded from British Library Document Supply Service).
Abstract: "This thesis focusses on the notion of analysis in Stoic logic, that is to say on the procedure which the Stoic logicians

followed in order to reduce all valid arguments to five basic patterns. By reconsidering the uses of its Aristotelian homonym and by examining the evidence on the classification of Stoic arguments, I distinguish two methods of Stoic analysis and I discuss their rules: (i) the analysis of non-simple indemonstrables, which constitutes a process of breaking up an argument by means of general logical principles ; and (ii) the analysis of (yllogistic) arguments, which replaces demonstration and is effected by employing standard well-determined rules. The ancient sources provide us with concrete examples illustrating the first type of analysis; however, there is no single text that reports the exact procedure of analysing (syllogistic) arguments. Modern scholars have reconstructed in different ways this type of Stoic analysis; I deal with all of them separately and show that the proposed reconstructions are insightful but historically implausible. Based on the textual materiel concerning the notion of analysis not only in its Stoic context but also in some other of its uses, and especially in mathematical practice, I suggest an alternative reconstruction of the Stoic method of reducing valid arguments to the basic indemonstrables."

20.     ———. 1990. "Rediscovering Some Stoic Arguments." In *Greek Studies in the Philosophy and History of Science*, edited by Nicolacopoulos, Pantelis, 133-148. Dordrecht: Kluwer.

21.     ———. 1993. "The Stoic Indemonstrables in the Later Tradition." In *Dialektiker und Stoiker. Zur Logik der Stoa und ihrer Vorläufer*, edited by Döring, Klaus and Ebert, Theodor, 187-200. Stuttgart: Franz Steiner.

22.     ———. 2006. "Stoic Logic." In *A Companion to Ancient Philosophy*, edited by Gill, Mary Louise and Pellegrin, Pierre, 505-529. Malden: Blackwell.
"Conclusion. As I indicated at the beginning of the chapter, it was only towards the middle of the twentieth century that Stoic logic began to be studied on its own merits and not as an appendix to Aristotle's syllogistic. To a great extent it was the revival of interest in the logical contributions of the Stoics that convinced scholars to investigate more carefully the other parts of Stoic philosophy, namely ethics and physics. The literature on Stoic logic that has since been published has managed to reconstruct a logical calculus, which still surprises us with its sophistication and its similarities to modern systems of logic. At the same time, though, it also has become clear that we should not fail to take seriously into account what differentiates Stoic logic from its modern counterparts. For only in this way can we get a better understanding of how the history of logic has evolved in close connection to the other parts of philosophy, and more importantly, only in this way do we have a chance to appreciate the peculiar features and insights of ancient logic." (p. 527)

23.     Imbert, Claude. 1980. "Stoic Logic and Alexandrian Poetics." In *Doubt and Dogmatism. Studies in Hellenistic Epistemology*, edited by Schofield, Malcolm, Burnyeat, Myles and Barnes, Jonathan, 183-216. Oxford: Clarendon Press.

24.     Jedan, Christoph, and Strobach, Nico. 2002. *Modalities by Perspective. Aristotle, the Stoics and a Modern Reconstruction*. Sankt Augustin: Academia Verlag.

25.     Jennings, Raymond Earl. 1994. *The Genealogy of Disjunction*. New York: Oxford University Press.
See Chapter 10 *Stoic Disjunction*, pp. 252-275.

26.     Kahn, Charles H. 1969. "Stoic Logic and Stoic Logos." *Archiv für Geschichte der Philosophie* no. 51:158-172.
"'I turn now to the principal claim of Professor Hay's paper (*): that the logic of the Stoics was not exclusively a logic of propositions but that it included arguments whose major premise was, in effect, a universally quantified conditional, "(x) (If Ax,

then Bx)," instead of the ordinary conditional composed of two self-contained sentences "If A, then B." Hay brings evidence of three sorts to bear in favor of this thesis. (1) First of all, there are the logical and historical considerations already alluded to: how could the Stoics have claimed to reduce all valid arguments, including the Aristotelian syllogism, to their five undemonstrated schemata, if they did not have some device equivalent to quantification"? (2) Secondly, there is the question of the epistemic function of logic: where the major premiss is a conditional such asIf Plato lives, then Plato breathes interpreted truth-functionally, and I am able to draw the conclusionPlato breathes, how could I be in a position to know or believe the conditional premiss without already knowing or believing the conclusion? (For the truth of the conditional depends upon the truth of the consequent in this case, since the antecedent is taken as true.) But the epistemic problemwill not arise in this form if the major premiss may be universally quantified. I do not need to know that Socrates breathes - I do not need to know anything about Socrates at all - in order to agree that if anything is alive, that same thing (or animal) breathes. (3) Furthermore, Hay calls our attention (and apparently for the first time) to several decisive texts in which the Stoics make theoretical use of generalized conditionals of the form 'If anyone is born under the Dog Star, he will not die at sea.' Finally (4) Hay suggests that the Stoic motive for the alleged reformulation of universal propositions as conditionals was their desire to avoid positing essences or classes or universals of any sort.

I am inclined to believe that Hay's principal thesis is correct, at least in principle; but it raises new problems almost as serious as those it solves. First of all, did the Stoics realize that they were introducing quantification when they offered a conditional compounded in this way of two indefinite propositions? If so, this seems to defeat their claim that all valid arguments could be reduced to their five undemonstrated forms. But if they didnot see this, they were poorer logicians than Aristotle at a crucial point they will have set up a propositional calculus only at the cost of distorting the facts concerning quantification. We seem to be faced with a dilemma. Either Stoic logic is based solely on the propositional connectives, and then it is epistemically sterile. (This appears to be Mueller's view.) Or else it involves generalized conditionals and a rule of instantiation, but then it is defective as logic since we are left without any account of the quantified conditional. (a) I suspect that the latter is likely to be true, and that by formulating indefinite conditionals to achieve generality, and then instantiating for a definite, ostensibly indicated subject, the Stoics believed that they could in fact do without quantification, i. e. without any theory involving 'all' and 'none.' " (pp. 163-164)

(*) [*Stoic Use of Logic*, 1969]

(a) I have oversimplified in order to put the problem sharply. It is worth noting that the decisive text fromDe Fato is explicitly meta-linguistic: "If G (a generalized conditional) is true, then C (an ordinary conditional) is also true" (see Hay, note 15). Therefore arguments making use of such a rule of instantiation will be valid but not necessarily reducible to one of the five undemonstrated schemata (compare the examples in Mates, p. 64 and p. 65 n. 32). In the Symposium discussion in St. Louis several suggestions were made for reconstructing the Stoic generalized conditional without quantification theory, as the meta-linguistic representation for a "bundle of individual conditionals" (Quine,Methods of Logic, p. 13), much as an axiom schema may represent an infinite set of individual axioms. I leave it to others to decide how far such a suggestion can be worked out systematically.

27.  Kidd, Ian G. 1989. "*Orthos Logos* as a Criterion of Truth in the Stoa." In *The Criterion of Truth. Essays Written in Honour of George Kerferd*, edited by Huby, Pamela and Neal, Gordon, 137-149. Liverpool: Liverpool University Press.

28.  Kneale, William, and Kneale, Martha. 1962. *The Development of Logic*. Oxford: Clarendon Press.
     Reprinted 1975 with corrections.
     See Chapter III:The Megarian and the Stoics pp. 113-176.

29.  Labarge, Scott. 2002. "Stoic Conditionals of Necessity and Explanation." *History and Philosophy of Logic* no. 23:241-252.
     Abstract: "An examination of a particular passage in Cicero's *De fato* (*Fat.* 13-17) is crucial to our understanding of the Stoic theory of the truth-conditions of conditional propositions, for it has been uniquely important in the debate concerning the kind of connection the antecedent and consequent of a Stoic conditional should have to one another. Frede has argued that the passage proves that the connection is one of logical necessity, while Sorabji has argued that positive Stoic attitudes toward empirical inferences elsewhere suggest that that cannot be the right interpretation of the passage. I argue that both parties to the debate have missed a position somewhere between them which both renders a connection between antecedent and consequent that is not merely empirical and makes sense of the actual uses to which the Stoics put the conditional. This will be an account which grounds the connection between antecedent and consequent in *aprolêpsis*, a special kind of concept which plays a special epistemological role for the Stoics, especially in grounding scientific explanations. My contention will be that Stoic conditionals are true when there is a conceptually necessary connection between antecedent and consequent such that the former explains the latter via *aprolêpsis*."

30.  Leeman, Anton Daniël. 1954. "Posidonius the Dialectician in Seneca's Letters." *Mnemosyne* no. 7:233-240.

31.  Lefebvre, René. 2007. "Représentation et évidence : les stoïciens face à leurs adversaires de l'Académie." *Elenchos.Rivista di Studi sul Pensiero Antico* no. 28:337-367.

32.  Löbl, Rudolf. 1986. *Die Relation in der Philosophie der Stoiker*. Amsterdam: Rodopi.
     Inhaltsübersicht: Literaturangaben 7; Einleitung 13; Teil I: 17; A. Physis 19; B. Logos 62; Teil II: 111; A. Die äusseren Relationen 113; B. Die inneren Relationen 129; C. Die transcendentale Relationen 134; Excursus: Zu Physik 141-150.

33.  Long, Anthony Arthur. 1978. "Dialectic and the Stoic Sage." In *The Stoics*, edited by Rist, John M., 101-124. Berkeley: University of California Press.
     Reprinted in: A. A. Long, Stoic Studies, Cambridge: Cambridge University Press, 1996, pp. 85-106.

34.  Luhtala, Anneli. 2000. *On the Origin of Syntactical Description in Stoic Logic*. Münster: Nodus Publikationen.
     Contents: Acknowledgments 9; 1. Introduction 11; 2. Ancient Grammar 16; 3. Truth, Meaning and Existence 30; 4. Aristotle 40; 5. The Stoics; 6. Apollonius Dyscolos 146; 7. General conclusions 193; Bibliography 197; Index Nominum 209-214.
     "This study examines the dialectical origin of syntactical description in our traditional grammar. Two famous texts take pride of place in containing the first descriptions of a 'clause' in Greek literature, namely Plato's *Sophist* and Aristotle's *Peri hermeneias*. These descriptions arose in the context of a more general inquiry into the nature of truth and language which gave rise to the first speculations on the form of the logical proposition in Greek Antiquity. By establishing as the unit of propositional analysis a combination of two linguistic items, *Onoma* (`name', 'noun') and *rhema* (`verb', 'predicate') these philosophers laid the foundation for the doctrine of the parts of speech which later constituted the core of ancient grammar. Their concern was to establish the two functional constituents of the proposition, roughly the subject and the predicate, by means of which true and false statements could be made. The object of their concern -- the minimal statement consisting of a noun and a verb -- came to figure as the point of departure for syntactical analysis when it began to be pursued in independent grammatical treatises. In the grammar of Apollonius Dyscolus (2nd century A.D.), which is our first extant grammatical treatise on syntax, syntactical description proceeds from the minimal self-sufficiency (*autoteleia*) of the linguistic expression. But the description of the minimal sentence by Apollonius bears witness to the distinctly Stoic origin of the notion of self-sufficiency." (p. 11)

35.     Łukasiewicz, Jan. 1967. "On the History of the Logic of Propositions." In *Polish Logic 1920-1939*, edited by McCall, Storrs, 66-87. Oxford: Oxford University ress.
        Originally published in Polish as: "Z historii logiki zdan", *Przeglad Filozoficzny*, 37, 1934; translated by the author in German as:" Zur Geschichte der Aussagenlogik", *Erkenntnis*, 5, 1935, pp. 111-131.
        Translated in English also in: Ludwik Borowski (ed.), Jan Łukasiewicz, "Selected Works", Amsterdam: North-Holland, 1970, pp. 197-217.

36.     ———. 1967. "Philosophical Remarks on Many-Valued Systems of Propositional Logic." In *Polish Logic 1920-1939*, edited by McCall, Storrs, 40-65. Oxford: Oxford University Press.
        Originally published in German as: "Philosophische Bemerkungen zu mehrwertighen Systemen des Aussagenkalküls", *Comptes rendus des séances de la Société des Sciences et des Lettres de Varsovie*, 23, 1930.
        Translated in English also in: Ludwik Borowski (ed.), Jan Łukasiewicz, *Selected Works*, Amsterdam: North-Holland 1970, pp. 153-178.

37.     Mates, benson. 1949. "Stoic Logic and the Text of Sextus Empiricus." *American Journal of Philology* no. 70:290-298.
        "The text of Sextus Empiricus contains a number of corrupt places which can easily be corrected by reference to a few technical terms and elementary concepts of Stoic logic. It is the aim of the present paper to prove this assertion with respect to a certain class of cases and, in so doing. to show that any future editor of Sextus ought to have a clear understanding of Stoic logic." (p. 290)

38.     ———. 1953. *Stoic Logic*. Berkeley: University of California Press.
        Second revised edition 1961.
        Contents: I. Introduction 1; Chapter I. § 1: The problem § 2: Stoic authors to be considered §3: Sources for Stoic logic; Chapter II. Signs, sense, and denotation 11; § 1: Exposition of the Stoic theory § 2: Comparison with modern theories; Chapter III. Propositions, truth, and necessity 27; § 1: Propositions § 2: Truth § 3: Necessity and Possibility; Chapter IV. Propositional connectives 42; § 1: Implication § 2: Disjunction § 3: Conjunction and the other logical connectives § 4: The interdefinability of the connectives; Chapter V. Arguments 58 § 1: Definition and Classification § 2: The five basic types of Undemonstrated Argument § 3: The Principle of Conditionalization § 4: The analysis of non-simple arguments § 5: Invalid arguments; Paradoxes; Chapter VI. Evaluations of Stoic logic 86; § 1: The judgments of Prantl and Zeller § 2: The confusion aboutsunemménon - § 3: Conclusion; Appendix A. Translations 95; Appendix B. Glossary 132; Bibliography 137; Indices -141-148.

39.     Mau, Jürgen. 1957. "Stoische Logik. Ihre Stellung gegenüber der Aristotelischen Syllogistik und dem Modernen Aussagenkalkül."

40.     Mignucci, Mario. 1965. *Il significato della logica stoica*. Bologna: Patron.
        Indice: Avvertenza 7; Introduzione 9; Cap. I - LO STATUS QUAESTIONIS. 1. Le interpretazioni del Prantl e dello Zeller 17; 2. La rivalutazione della logica stoica 19; 3. L'interpretazione del Lukasiewicz 29; 4. Le posizioni successive al Lukasiewicz 33; 5. Discussione dell'interpretazione del Lukasiewicz 40; Cap. II - LA CONCEZIONE DELLA LOGICA. 1. La rappresentazione 67; 2. La conoscenza intellettuale 80; 3. La definizione di esprimibile 88; 4. L'incorporeità degli esprimibili 96; 5. La logica come scienza filosofica 103; 6. La natura della dialettica 109; Cap. III - LA DOTTRINA DELLE PROPOSIZIONI. 1. La definizione di proposizione 119; 2. La polemica della scuola megarica sulla validità del condizionale 130; 3. La concezione stoica del condizionale 139; 4. Le proposizioni congiuntive e disgiuntive 148; Cap. IV. LA TEORIA DEGLI ARGOMENTI. 1. La definizione di

argomento 157; 2. Gli argomenti anapodittici 166; 3. La teoria degli anapodittici e la sillogistica aristotelica 178; Bibliografia 191; INDICI. Luoghi citati 201; Nomi di persona 209-212.

41. ———. 1967. "Il problema del criterio di verità negli stoici antichi." In *Posizione e criterio del discorso filosofico*, edited by Giacon, Carlo, 145-169. Bologna: Patron.

42. ———. 1988. "The Stoic Notion of Relatives." In *Matter and Metaphysics. Fourth Symposium Hellenisticum (Pontignano, August 21-28, 1986)*, edited by Barnes, Jonathan and Mignucci, Mario, 129-221. Napoli: Bibliopolis.

"The fragments of the Stoics which are explicitly concerned with a theory of relations are few, scattered and difficult to interpret. The largest of them is preserved in Simplicius' commentary on the *Categories* (165.32 ff.;SVF ii 403) and it expounds an important distinction which the Stoics made between two kinds of relatives. This doctrine is attributed to the Stoics, but no representative of the school is mentioned. Echoes of it are reflected in some sceptical arguments reported by Sextus Empiricus (*M* VIII 455-456) and Diogenes Laertius (IX 87-88) (1). Besides, there are some related passages in the scholia on Dionysius Thrax's *Ars grammatica* which are supposed to go back to Apollonius Dyscolus (II century A.D.), where, although the Stoics are not explicitly named, Stoic material is believed to be used and referred to (2). There is also a text of Sextus (*M* VIII 453-454; *SVF* II 404) in which a general definition of relatives is attributed by him to the Dogmatists and reasons can be given for saying that his Dogmatists must be identified with the Stoics. Finally, some passages in which the name of Chrysippus is tied to questions which are supposed to concern our problems are difficult to interpret and on closer inspection they reveal themselves not to pertain to the theory of relatives (3).

In the face of this complicated situation in our sources, I will examine first Simplicius' passage, trying to disentangle it from spurious connections with other parts of the Stoic doctrine which have generated more than one misunderstanding of it. Secondly, I will inquire to what extent a possibly general definition of relatives implied in Simplicius' distinction is consistent with the statements reported by other sources, in order to determine whether Simplicius' report can be inserted in a coherent framework. This sketch of the plan of our inquiry shows that we confer a central role on Simplicius' passage, and this assumption might be disputed, since Simplicius is a late authority and no Stoic master of the first generation is mentioned in it. We will discuss these problems later. Whatever their solution might be, it must be pointed out that Simplicius' text is almost the only one in which a relevant aspect of the Stoic doctrine of relatives is expounded and discussed. The other sources are much vaguer and mostly concerned with a general characterization of the notion of relative. Therefore, it is difficult in this situation not to confer a special position on Simplicius passage." pp. 129-130

1) These texts are not found in von Arnim's collection. They will be discussed in section VIII.

(2) These passages too are not in von Arnim. We will examine them later (cf. sections XI-XII).

(3) I am thinking especially of three passages we will consider later, namely Varro *De lingua latina* X 59 (SVF a 155); Plutarch, *De Stoicorum repugnantibus* 1054EF (*SVF* II 550); Aulus Gellius *Noctes atticae* VII 1, 1-6 (*SVF* II 1169): cf. sections XIV and XV.

43. ———. 1993. "The Stoic *Themata*." In *Dialektiker und Stoiker. Zur Logik der Stoa und Ihrer Vorläufer*, edited by Döring, Klaus and Ebert, Theodor, 217-238. Stuttgart: Franz Steiner.

44. ———. 1999. "The Liar Paradox and the Stoics." In *Topics in Stoic Philosophy*, edited by Ierodiakonou, Katerina, 54-70. Oxford: Clarendon Press.

45.     Milne, Peter. 1995. "On the Completeness of Non-Philonian Stoic Logic." *History and Philosophy of Logic* no. 16:39-64.
Abstract: "The majority of formal accounts attribute to Stoic logicians the classical truth-functional understanding of the material conditional and exclusive disjunction.These interpretations were disputed, some Stoic logicians favouring modal and/or temporal analyses; moreover, what comes down to us of Stoic logic fails to secure the classical interpretations on purely formal grounds.It is therefore of some interest to see how the non-classical interpretations fare. I argue that the strongest logic we have good grounds to attribute to Stoic logicians is not complete with respect to the non-classical interpretations of disjunction and the conditional."

46.     Mueller, Ian. 1969. "Stoic and Peripatetic Logic." *Archiv für Geschichte der Philosophie* no. 51:173-187.
"We know that one of the issues dividing the Stoics and the Peripatetics concerned the use of logic. Alexander [of Aphrodisias] (1) insists that only Peripatetic logic is an organon for philosophy, an instrument for making unknown things known through known premisses. Since the Stoics called logic a part of philosophy, they may well have considered their propositional logic a theoretical discipline for which epistemological considerations were irrelevant. This modern attitude seems quite commensurate with the Stoics' presentation of logic. They seem to have been interested in technical devices and formalization for its own sake.
I suggest, then, that an important disagreement between the Peripatetic and Stoic logicians concerned the power of their respective logics to represent arguments. The Peripatetic claims were that all scientific proofs are categorical syllogisms and that the inference schemata of the Stoics represented techniques of argument having no place in science. The Stoic reply was that the first claim is false since there are very elementary relational arguments in mathematics which are not syllogisms. Moreover, they pointed out that all conclusive arguments, including categorical syllogisms, could be represented as propositional arguments by a (trivial) technical device. Formally the Stoics held an unassailable position, but they were vulnerable to attack on methodological grounds, since establishing the truth of the premisses of the newly formulated argument seemed to involve making an inference in terms of the old logic. The Peripatetics therefore insisted on the claim, believed for many centuries after them, that their logic was the instrument of science. We do not know the Stoic response to this claim, but it is reasonable to suppose that they retreated to the view that the theory of deductive inference was a technical discipline studied for some ethical end perhaps, but not as the method of scientific discovery." (p. 184)
(1) *In Analyticorum Priorum* 1 ff.

47.     ———. 1978. "An Introduction to Stoic Logic." In *The Stoics*, edited by Rist, John M. Berkeley: University of California Press.
"The charge of uselessness permeates the ancient literature on Stoic logic. Alexander [of Aphrodisias] is very concerned to defend Aristotelian logic as the tool(organon) of philosophy and science, a means for making unknown things known through known premises. For Sextus no logic is capable of serving these functions. The gist of both men's attack on Stoic logic is that with its arguments there is no way to establish the premises without first establishing the conclusion. The attack is usually made in terms of the first undemonstrable argument and depends upon the truth-functional interpretation of the conditional. Suppose one wishes to prove 'the second' by establishing 'the first' and 'If the first the second.' Then if 'the first' is established, the only way to establish 'if the first the second' is to establish 'the second,' i.e., to establish the conclusion one is trying to prove. Similar objections could be raised against the other undemonstrable arguments. In each case, when the second premise is taken as true, then the obvious truth-functional argument for the first premise requires establishing the truth of the conclusion. There is no way out of this situation, a fact that strongly suggests that Sextus's insistence on applying the truth-functional interpretation to the conditional represents an argumentative device rather than an accurate reflection of standard Stoic doctrine. If the first premise of an undemonstrable

argument expresses a stronger than truth-functional connection between its component propositions, there is no reason why the first premise cannot be established independently of the conclusion.

Of course, the position I have just ascribed to the Stoics means that philosophically a great deal of weight must be placed on the knowledge of necessary connections between propositions. Many of Sextus's arguments are directed against the possibility of such knowledge. To consider these arguments would take us outside the domain of logic and into epistemology. The point I wish to make is that the Stoics could have claimed universality for their propositional logic without subjecting themselves to attacks on grounds of uselessness. But to what use did the Stoics put their logic? It is tempting to suppose that the Stoics might have treated logic as a technical discipline developed for its own sake. The picture of Chrysippus analyzing innumerable arguments into the undemonstrable points makes it seem certain that to some extent logic was pursued for its own sake. But at least some Stoics thought of logic as more than a self-sufficient technical discipline.

(…)

The most important inferences from signs would be those based on he first undemonstrable syllogism. Questions about the viability of inferences from sign to thing indicated or commemorated would almost certainly end up as questions about the connection asserted to hold in the first premise, i.e., as questions of metaphysics or epistemology. One cannot expect logic to settle such questions, nor is there any reason to think the Stoics expected it to. The thrust of their logic was to provide a framework in which questions of inferential validity could be settled and questions that fell outside of logic, e.g., whether sweat implies the existence of pores, made precise. It seems fair to say that Stoic achievement in this area remained unparalleled until the time of Leibniz." (pp. 22-25)

48. ———. 1979. "The Completeness of Stoic Propositional Logic." *Notre Dame Journal of Formal Logic* no. 20:201-215.

"In this paper I wish to pursue in more detail the question of the completeness of Stoic propositional logic. I shall bring out certain anomalies in Becker's [1957] argument which obscure the precise sense in which his system is complete. The Kneales' system (*) will be shown to be complete in a stronger sense than Becker's but not to be as historically plausible a reconstruction of the Stoic theory. In conclusion I shall suggest a modification of both systems which is historically more plausible than either and also complete in the stronger sense. In the course of the paper I will also discuss other logical and historical points about the systems. I shall take for granted the truth-functionality of the Stoic propositional connectives but disregard interdefinability relationships. I will also formulate the systems of Becker and the Kneales in ways which diverge slightly but unproblematically from their own presentations." (p. 202)

(*) William and Marta Kneale, *The Development of Logic*, Oxford, 1962.

49. Mühl, Max. 1962. ""Der *Logos Endiathetos* und *Prophorikos*" Von der älteren Stoa bis zur Synode von Sirmium 351." *Archiv für Begriffsgeschichte* no. 7:7-56.

On the history of the distinction between "internal discourse" and "uttered discourse".

50. Nasieniewski, Marek. 1998. "Is Stoic Logic Classical?" *Logic and Logical Philosophy* no. 6:55-61.

Abstract: "In this paper I would like to argue that Stoic logic is a kind of relevant logic rather than the classical logic. To realize this purpose I will try to keep as close as possible to Stoic calculus as expressed with the help of their arguments."

51. Nasti de Vincentis, Mauro. 1981. "Logica scettica e implicazione stoica. A proposito di *Adv. Math.* VIII 462-481." In *Lo scetticismo*

*antico. Vol. II*, edited by Giannantoni, Gabriele, 501-532. Napoli: Bibliopolis.

52.        ———. 1984. "Stopper on Nasti's Contention and Stoic Logic." *Phronesis.A Journal for Ancient Philosophy* no. 29:313-324.
Reply to M. R. Stopper [pseudonym of Jonathan Barnes], "Schizzi Pirroniani", *Phronesis,* 28, 1983, pp. 265-297.

53.        ———. 1988. "The Third and Fourth Acccount of Conditionals in Sextus Empiricus." In *Temi e prospettive della logica e della filosofia della scienza contemporanee. Vol. I: Logica*, edited by Cellucci, Carlo and Sambin, Giovanni, 219-226. Bologna: CLUEB.

54.        ———. 1989. "Stoic Implication and Stoic Modalities." In *Le teorie delle modalità. Atti del Convegno Internazionale di storia della logica*, 258-263. Bologna: CLUEB.
"A new account of Stoic connexive conditional is given, according to which (in order to agree with textual evidence) the truth-conditions for the so-called Chrysippean implication are a function of the modality of the clauses."

55.        ———. 2002. *Logiche della connessività. Fra logica moderna e storia della logica antica*. Bern: Haupt.
Indice: Premessa 7; Introduzione 11; 1. L'interpretazione classica e le sue varianti 39; 2. Lapars destruens: le difficoltà dell'interpretazione classica 69; 3. Lapars construens: verso una nuova interpretazione 95; 4. Obbiezioni, risposte e conferme 123; 5. Implicazione crisippea e implicazione boeziana 151; 6. Considerazioni conclusive e problemi aperti 173; Appendice: La dottina boeziana dellarepugnantia - Scelta di testi 193; Riferimenti bibiografici 231-232.
Recensione di Luca Castagnoli, *Elenchos,* 25, 2004, pp. 179-192.

56.        ———. 2004. "From Aristotle's Syllogistic to Stoic Conditionals: *Holzwege* or Detectable Paths?" *Topoi. An International Review of Philosophy* no. 23:113-137.
"This paper is chiefly aimed at individuating some deep, but as yet almost unnoticed, similarities between Aristotle's syllogistic and the Stoic doctrine of conditionals, notably between Aristotle's metasyllogistic equimodality condition (as stated at *Prior Analytics* I 24, 41b27-31) and truth-conditions for third type (Chrysippean) conditionals (as they can be inferred from, say, Sextus Empiricus *Outlines of Pyrrhonism* II 111 and 189). In fact, as is shown in §1, Aristotle's condition amounts to introducing in his (propositional) metasyllogistic a non-truth-functional implicational arrow '', the truth-conditions of which turn out to be logically equivalent to truth-conditions of third type conditionals, according to which only the impossible (and not the possible) follows from the impossible. Moreover, Aristotle is given precisely this non-Scotian conditional logic in two so far overlooked passages of (Latin and Hebraic translations of) Themistius' Paraphrasis of *De Caelo* (CAG V 4, 71.8-13 and 47.8-10 Landauer). Some further consequences of Aristotle's equimodality condition on his logic, and notably on his syllogistic (no matter whether modal or not), are pointed out and discussed at length. A (possibly Chrysippean) extension of Aristotle's condition is also discussed, along with a full characterization of truth-conditions of fourth type conditionals."

57.        ———. 2006. "*Boethiana*. La logica stoica nelle testimonianze di Boezio: nuovi strumenti di ricerca." *Elenchos* no. 27:377-408.
"In view of the importance of Boethius' "In Ciceronis Topica" as a source for Stoic logic, argues for the constitution of an index of divergent readings between the editions of Orelli (Zurich 1833) and Migne, including those omitted by Stangl (1882). Such an index would show that while Orelli's edition is better, sometimes the reading of Migne is to be preferred. Includes considerations on the gradual Stoicization of Aristotelian syllogistics, on Boethius' reliability as a source for Stoic logic, and on the genuine *editio princeps* of Boethius' "De topicis differentiis" (Rome 1484, rather than Venice 1492."

58. ———. 2006. " Conflict and Connectedness. Between Modern Logic and History of Ancient Logic." In *Logic and Philosophy in Italy. Some Trends and Perspectives*, edited by Ballo, Edoardo and Franchella, Miriam, 229-251. Monza: Polimetrica.

59. Normore, Calvin G. 1991. "Medieval Connectives, Hellenistic Connections; the Strange Case of Propositional Logic." In *Atoms, Pneuma, and Tranquillity. Epicurean and Stoic Themes in European Thought*, edited by Osler, Margaret J, 25-38. Cambridge: Cambridge University Press.

60. Nuchelmans, Gabriel. 1973. *Theories of Proposition. Ancient and Medieval Conceptions of the Bearers of Truth and Falsity*. Amsterdam: North-Holland.
Chapter 4. The Stoic *lekton* 45; 5. The Stoic *axioma* 75-88.
"The Stoic conception of the bearers of truth and falsity centres around the notion of *axioma*. As an *axioma* is a species of the genus *lekton*, I shall first discuss the nature of the *lekton*. It will be maintained that the word *lekton* must have had several shades of meaning, although the deplorable state of our sources makes it impossible to reach a high degree of certainty about the exact borderlines between these different nuances and their ascription to definite authors or periods." (p. 45)
"As we saw in the foregoing chapter, an *axioma* is a complete and independent *pragma* which is expressed in a speech act of asserting. The complete and independent *pragma* is the thought of an action or passion and its indispensable complements. In so far as this *pragma* is put into words it is a *Iekton*; in so far as it is expressed in a speech act of asserting it is an *apophanton* or *axioma*, an asserted thought-content. A *pragma* such as 'Plato liking Dion' can be expressed in different speech acts: for instance, in a yes-or-no question, 'Does Plato like Dion?', in a wish, 'May Plato like Dion', or in an assertion, 'Plato likes Dion'. On the other hand, the same type of speech act, say asserting, may be related to different *pragmata*; for I may assert many different things. Reflections of this kind must have led the Stoics to a distinction between the generic element of the *pragma* or *Iekton* and the specific element of the speech act in which a certain thought is expressed.
As a rule, then, an *axioma* is a thought-content which is in fact asserted. Nevertheless, the Stoics used the name *axioma* also for the antecedent and consequent of a conditional, although as parts of the composite whole these are not actually asserted. This may be accounted for by the fact that *axioma* originally meant that which is assumed or taken to be true. Or, as I suggested at the end of 4.2.5, the Stoics may have regarded the antecedent and consequent as potential *axiomata*, just as they held that a privative assertion of the form 'Un(kind he is)' contains the potential *axioma* 'Kind he is'. Such an assertable would lie somewhere between the neutral *pragma* or Iekton and the factually asserted *axioma*." (p. 75)

61. Orth, Emil. 1959. "Lekton = Dicibile." *Helmantica* no. 32:221-226.
"L'article est en latin. L'Auteur y explique le sens de *lekton*, terme stoïcien, en analysant la gnoseologie stoïcienne, sans faire appel aux textes. Il ajoute un bref aperçu de l'histoire du terme où il signale, entre autres choses, qu'Apulée, *Peri hermeneias*, emploie *pronuntiabile* pour *lekton* et Augustin, *Principia Dialecticae*, 5, P.L., 32, 1411, *dicibile;* Isidore de Seville, *Etymol.* 2, 22, 2, *dictio*. L'article n'est pas conçu comme une recherche philologique, mais comme un exposé théorique." *Bulletin Augustinien pour 1959*.

62. ———. 1962. "Stoicorum *Lekton* = Iudicium, Dicibile." *Emerita* no. 30:59-61.

63. O'Toole, Robert R., and Jennings, Raymond. 2004. "The Megarians and the Stoics." In *Greek, Indian and Arabic Logic. Handbook of the History of Logic, Vol. 1*, edited by Gabbay, Dov and Woods, John, 397-522. Amsterdam: Elsevier.

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https://www.historyoflogic.com/biblio/logic-stoics-biblio-two.htm

64.    Pozzi, Lorenzo. 1974. "Il nesso di implicazione nella logica stoica." In *Atti del Convegno di storia della logica (Parma, 8-10 Ottobre 1972)*, 177-187. Padova: Liviana.

65.    Preti, Giulio. 1956. "Sulla dottrina del *Semieion* nella logica Stoica." *Rivista Critica di Storia della Filosofia* no. 10:5-14. Ristampato col titolo: *La dottrina del segno nella logica Stoica* in: G. Preti, *Saggi filosofici. Storia della logica e storiografia filosofica.* Vol. II, Firenze: La Nuova Italia, pp. 3-16.

66.    Repici, Luciana. 1993. "The Stoics and the *Elenchos*." In *Dialektiker und Stoiker. Zur Logik der Stoa und Ihrer Vorläufer*, edited by Döring, Klaus and Ebert, Theodor, 253-270. Stuttgart: Franz Steiner.

67.    Rist, John M. 1981. "The Importance of Stoic Logic in the *Contra Celsum*." In *Neoplatonism and Early Christian Thought. Essays in Honour of A. H. Armstrong*, edited by Blumenthal, Henry Jacob and Markus, Robert Austin, 64-78. London: Variourum.

68.    Rüstow, Alexander. 1910. *Der Lugner. Theorie, Geschichte, und Auflösung*. Leipzig: Teubner.
Nachdruck: New York, Garland, 1987.

69.    Schubert, Andreas. 1993. "Die Stoischen Vorstellungen." In *Dialektiker und Stoiker. Zur Logik der Stoa und ihrer Vorläufer*, edited by Döring, Klaus and Ebert, Theodor, 271-290. Stuttgart: Franz Steiner.

70.    Sedley, David. 1982. "On Signs." In *Science and Speculation. Studies in Hellenistic Theory and Practice*, edited by Barnes, Jonathan, Brunschwig, Jacques, Burnyeat, Myles and Schofield, Malcolm, 239-272. Cambridge: Cambridge University Press.

71.    ———. 1982. "The Stoic Criterion of Identity." *Phronesis.A Journal for Ancient Philosophy* no. 27:255-275.

72.    ———. 1984. "The Negated Conjuction in Stoicism." *Elenchos. Rivista di Studi sul Pensiero Antico* no. 5:311-316.

73.    ———. 1989. "Le critère d'identité chez les Stoïciens." *Revue de Métaphysique et de Morale* no. 94:513-533.
Traduction française deThe Stoic Criterion of Identity (1982).

74.    Speca, Anthony. 2001. *Hypothetical Syllogistic and Stoic Logic*. Leiden: Brill.
Contents: Acknowledgments VII; Abstract IX; Preface XI-XIII; 1. The Aristotelian Background 1; 2. The Greek Commentators on Aristotle 35; 3. Boethius:On hypothetical syllogisms 67; 4. Boethius:On Cicero's Topics 101; References 135; General index 139; Index locorum 141.

75.    Stakelum, James W. 1940. *Galen and the Logic of Propositions*. Romae: Angelicum.
"These pages, restrictedly entitled *Galen and the Logic of Propositions*, originally formed part of an academic dissertation, *Galen's Introduction to Dialectic*. The threefold purpose of the larger study was to present Galen's *Dialectic* in a clear light, to examine his doctrine and weigh its importance as to originality or historical precedent, and from these considerations to draw conclusions as to its influence on succeeding generations. The doctrine, scattered throughout the Galenic text, was gathered under five headings: I. Galen's Introductory Remarks; II. Logic of Propositions; III. Aristotelian Term Logic; IV. Other Classes of Syllogisms; V. Applied Logic. Owing to the limited size of the volumes of this series, published under the sponsorship of Father I. M. Bochenski, O. P., it is impossible to publish here the whole result of the inquiry. Accordingly, we have selected for presentation our Introduction -- rearranged as Part One in several short chapters -- and the most important portion of our examination of Galen's *Dialectic*, dealing

with the logic of propositions. The latter section is divided into three parts. A brief conclusion completes the essay.

It is traditional to attribute to Galen an eminent position in the field of logic, but rarely do we find specific reasons assigned for this eminence. The composition of this dissertation has, for me, definitely determined Galen's position in the history of logic. It is hoped that it will serve a similar purpose for others."

76. Stopper, M.R. 1983. "Schizzi Pirroniani." *Phronesis.A Journal for Ancient Philosophy* no. 28:265-297.
Critical notice of: Gabriele Giannantoni (ed.), *Lo scetticismo antico. Atti del convegno organizzato dal Centro di studio del pensiero antico del C.N.R., Roma 5-8 novembre 1980*, Napoli: Bibliopolis, 1981.
M. R. Stopper is a pseudonym of Jonathan Barnes.

77. Stump, Eleonore. 1987. "Boethius's in Ciceronis Topica and Stoic Logic." In *Studies in Medieval Philosophy*, edited by Wippel, John F., 1-22. Washington: Catholic University of America.
"Besides what In *Ciceronis Topica* shows us about Boethius, it is also a valuable source for us as a witness to the thought and culture of his period.
(...)
"But perhaps the most interesting unexplored section in In *Ciceronis Topica* is Boethius's presentation of Stoic logic, and that is the part I want to concentrate on in this paper. Rather than dwell on the main theme of *In Ciceronis Topica*, the art of discovery and its instruments, the *Topics*, I want to focus instead on just that small part of Boethius's commentary in which he relates the *Topics* to Stoic dialectic or logic and reveals his understanding of that part of Stoicism. We are beginning to understand the ancient art of discovering arguments, and it has garnered increasing attention among contemporary scholars. But as far as I know, Michael Frede (30) is alone among recent historians of philosophy in considering Boethius's contribution to our understanding of Stoic logic; and even he gives only a brief discussion of a small part of the relevant Boethian text. So in what follows I will concentrate on just the fifth book of *In Ciceronis Topica*, in which Boethius discusses the so-called undemonstrated modes or argument forms of the Stoics. I need to make plain here that my area of interest and expertise is Boethius and not the Stoics; but I think that in *In Ciceronis Topica* Boethius sheds some light on a vexing problem which has troubled students of Stoic logic for some time." (pp. 6-7)
(30) Michael Frede, *Die stoische Logik*, (Göttingen: Vandenhoeck and Ruprecht, 1974), pp. 148-53, 160-62.

78. Tracy, Kevin. 2006. *The Development of Dialectic from Aristotle to Chrysippus*, University of Pennsylvania.
Available at ProQuest Dissertation Express order number: 3225558.
Abstract: "From Aristotle onward, formal logic was an element of ancient Greek dialectic (*dialektiké*). Aristotle'sPrior Analytics (4th century BCE) is the earliest evidence of a formal logic in antiquity. The evidence for the formal logic of the Stoic philosopher Chrysippus (3rd century BCE) is fragmentary; nonetheless it makes clear that not more than a century or so after *Prior Analytics*, Chrysippus revolutionized formal logic. The scholarship on Stoic logic has not yet presented the history of dialectic from Aristotle to Chrysippus as an intelligible narrative. Without such a narrative, one cannot explain what, in general, motivated the innovations of Chrysippus, what made Stoic logic coherent as a unified project, or what relationship that project had to earlier work in logic. This dissertation approaches the problem through the presentation and interpretation of the ancient source material. First it describes the logical doctrines of Aristotle, Theophrastus, and the 'Megarics' in such a way as to make clear what questions these predecessors left for Chrysippus. It then describes how Chrysippus addressed these questions. Finally, it uses the resulting narrative to give a detailed account of Stoic formal logic. The dissertation yields five principal conclusions. First, neither the Peripatetics or the

'Megarics' described logical forms of propositional logic; Chrysippus was the first to do so. Second, the guiding aim of Chrysippus' logic was to avoid adopting a semantic stance in describing logical forms and explaining logical relationships. Third, the Stoics distinguished 'valid' (*hugies*) from 'true' (*aléthes*), so that *sunartésis* is a standard for the validity rather than the truth of the Stoic conditional (*sunhémmenon*). Fourth, the Stoics produced derivations for categorical arguments in their deduction system. Fifth, the Stoic deduction system is roughly analogous to the first-order fragment of Frege's system, except on two points: it most likely was not designed to accommodate the use of polyadic predicates with multiple quantifiers, although the possibility for doing so inheres in its approach to the analysis of propositions, and it uses the 'natural' approach rather than the 'axiomatic' approach of Frege."

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"In his critical survey of Stoic dialectic Sextus states that the doctrine of the expressible, which plays an important part in the theory of knowledge, has been repeatedly put into question:(1) the *lekton* is an incorporeal, together with time, place and empty space, it belongs to the group of incorporeal objects generally accepted by the Stoics. In their opinion incorporeals are not active, they are unable to effect or produce something: yet they are indispensable in view of a coherent understanding of the universe.(2) Within this framework it was agreed that each argument is composed of incorporeal expressibles, since it is a combination of sentences which are considered to be complete *lekta*.(3) The question however was asked whether expressibles are really necessary, if they are totally ineffective. Even the meaning of the notion is questionable: it is obviously related to language, but it is not a component neither of spoken nor of written language. In other words it is not a verbal utterance and yet it is referred to by linguistic terms.(4) So it seems to have a definite function in the Stoic theory of knowledge." (p. 133)
(1) Sextus,M 8. 336. The author states that the existence of expressibles has been heavily discussed: there was no agreement about this issue. In some other passage Sextus even speaks of an unending debate (8. 262). Sextus lived in the second half of the second century and in the beginning of the third A.D.: at that time Stoicism was still very influential. No other philosophical school ever accepted this doctrine, but it was not disregarded: philosophers had to cope with it especially in their dialectic.
(2) Sextus,M 8. 262. An incorporeal object could not affect anything, nor could it be affected. For it could only be affected by something corporeal, and that is excluded, since corporeal and incorporeal are not on the same level.
(3) Sextus,M 8. 260-261; 8. 404: every proof is composed of incorporeal expressibles. In Sextus' opinion a vicious circle is unavoidable.
(4) Sextus,M 8. 264: according to Sextus *lekta* are signified and among them are also propositions, which are regarded as complete expressibles.

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"This paper develops an interpretation of the fourth account of conditionals in Sextus Empiricus's *Outlines of Pyrrhonism* that conceptually links it with contemporary 'relevance' interpretations of entailment. It is argued that the third account of conditionals, which analyzes the truth of a conditional in terms of the joint impossibility of antecedent and denial of consequent, should not be interpreted in terms of a "relative" incompatibility of antecedent and denial of consequent because of stoic acceptance of the truth of some conditionals of the form $p \rightarrow -p$ and its converse. Rather, It is suggested, ancient attempts to avoid the so-called paradoxes of implication involve the fourth account of conditionals. I hypothesize that this account is related to stoic attempts to define truth conditions for conditionals in terms of a theory of the concludency (validity) of arguments in opposition to the more common procedure (represented by the first three accounts of conditionals) of specifying truth conditions for conditionals 'semantically' and using those truth conditions in the development of a theory of argument validity."

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