

**A BIBLIOGRAPHY:
JOHN CORCORAN'S PUBLICATIONS ON ARISTOTLE 1972–2015**
By John Corcoran

Indeed, one of the great strides forward in the modern study of Aristotle's syllogistic was the realization that it is a system of natural deduction.

—Kevin Flannery, SJ [2001, 219].

Corcoran [...] has convincingly shown that the best formalization of Aristotle's reductio ad impossibile is by means of a natural deduction system.

—Mario Mignucci [1991, 12].

The most radical opponent of Lukasiewicz is J. Corcoran.

—Tadeusz Kwiatkowski [1980, 188].

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Abstract

This presentation includes a complete bibliography of John Corcoran's publications relevant to his research on Aristotle's logic. Sections I, II, III, and IV list 21 articles, 44 abstracts, 3 books, and 11 reviews. It starts with two watershed articles published in 1972: the *Philosophy & Phenomenological Research* article from Corcoran's Philadelphia period that antedates his Aristotle studies and the *Journal of Symbolic Logic* article from his Buffalo period first reporting his original results; it ends with works published in 2015. A few of the items are annotated as listed or with endnotes connecting them with other work and pointing out passages that in-retrospect are seen to be misleading and in a few places erroneous.

In addition, Section V, "Discussions", is a nearly complete secondary bibliography of works describing, interpreting, extending, improving, supporting, and criticizing Corcoran's work: 8 items published in the 1970s, 23 in the 1980s, 42 in the 1990s, 56 in the 2000s, and 69 in the current decade. The secondary bibliography is also annotated as listed or with endnotes: some simply quoting from the cited item, but several answering criticisms and identifying errors.

Section VI, "Alternatives", lists recent works on Aristotle's logic oblivious of Corcoran's research and, more generally, of the Lukasiewicz-initiated tradition. As is evident from Section

VII, “Acknowledgements”, Corcoran’s publications benefited from consultation with other scholars, most notably Timothy Smiley, Michael Scanlan, Roberto Torretti, and Kevin Tracy. All of Corcoran’s Greek translations were done in collaboration with two or more classicists. Corcoran never published a sentence without discussing it with his colleagues and students.

I. Articles

Our first task is to state our subject, which is demonstration.
—Aristotle 24a10 (Ross 1949/1965, 287)

1. 1972. Completeness of an Ancient Logic. *Journal of Symbolic Logic*, **37**, 696–702. MR0317886 (47 #6435).^a

This seven-page paper presents a logic which is a highly compressed and abbreviated model of Aristotle’s second logic. As the title suggests, it includes a mathematical proof that every sentence that follows from a given set of sentences is derivable from the given set— ‘sentence ’, ‘ follows from’ and ‘derivable from’ taken in the senses of the model. This paper, written for mathematical logicians, is not and was not intended to be a contribution to history and philosophy of logic like Corcoran 2009. Nevertheless, it is the most-cited of Corcoran’s works.

2. 1972. Conceptual Structure of Classical Logic, *Philosophy & Phenomenological Research* 33, 25–47.^b
<http://www.jstor.org/stable/2106718>

This paper clears and prepares the ground for Corcoran’s subsequent research in history and philosophy of logic. It divides off from what had been called arguments two categories: (1) those things determined by their premises and conclusion; (2) those things having beyond their premises and conclusion further content sometimes making evident that the conclusion follows from the premises.

3. 1973. A Mathematical Model of Aristotle's Syllogistic. *Archiv für Geschichte der Philosophie*, **55**, 191–219. MR0444423 (56 #2776).
4. 1974m. Aristotelian Syllogisms: Valid arguments or true generalized conditionals? *Mind*, **83**: 278–81. MR0532928 (58 #27178)
5. 1974a. Aristotle's Natural Deduction System, in J. Corcoran, ed., *Ancient Logic and Its Modern Interpretations*, Dordrecht: Reidel. 85–132. MR0497848 (58 #16077).
6. 1974f. Future Research on Ancient Theories of Communication and Reasoning, in J. Corcoran, ed., *Ancient Logic and Its Modern Interpretations*, Dordrecht: Riedel. 185–187. MR0485116 (58 #4971).
7. 1975a. Aristotle on the Underlying Logics of Sciences, *Fifth International Congress of Logic, Methodology, and Philosophy of Science*, XII 11–12.

8. 1975g. An Ancient Generic Theory, *Fifth International Congress of Logic, Methodology, and Philosophy of Science*, XII 37–38. (with Lee Mohler)
9. 1982. Critical Notice: Contemporary Relevance of Ancient Logical Theory. *Philosophical Quarterly*, **32**, 76–86. (with Michael Scanlan)
10. 1989. Argumentations and Logic, *Argumentation* 3, 17–43. MR91b:03006 P R
This is a succinct version of Corcoran’s answer to Aristotle’s *Analytics*.
11. 1992. El Nacimiento de la Logica (The Birth of Logic). *Agora*, **11/2**, 67–78, Spanish translation by J.M. Saguillo and C. Martinez-Vidal of expanded and revised version of an unpublished English paper distributed by the Society for Ancient Greek Philosophy, 1992. R
http://dspace.usc.es/bitstream/10347/1013/1/pg_069-080_agora11-2.pdf
12. 1994. The Founding of Logic: Modern Interpretations of Aristotle's Logic. *Ancient Philosophy*, **14**, 9–24.
13. 2003. Aristotle's Prior Analytics and Boole's Laws of Thought. *History and Philosophy of Logic*, **24**, 261–288. Reviewed by Risto Vilkkko. *The Bulletin of Symbolic Logic*, **11**(2005) 89–91. Also by Marcel Guillaume, MR2033867 (2004m: 03006).
14. 2003. Introduction. George Boole’s *The Laws of Thought*. Buffalo: Prometheus Books. Reviewed: J. van Evra in *Philosophy in Review*. **24**, (2004) 167–169. MR1994936 (2004i:03001)
15. 2006. C. I. Lewis: History and Philosophy of Logic. *Transactions of the C. S. Peirce Society*. **42**, 1–9.
http://muse.jhu.edu/demo/transactions_of_the_charles_s_peirce_society/v042/42.1corcoran.pdf
16. 2007. Notes on the Founding of Logics and Metalogic: Aristotle, Boole, and Tarski. *Current Issues in Logic / Temas Actuales de Lógica*. Imprenta Universidade Santiago de Compostela (University of Santiago de Compostela Press). Reviewed by Alasdair Urquhart *BSL* 14 (2008) 271–2 and by Michael Scanlan *HPL* 30 (2009) 397–401.
17. 2009. Aristotle's Demonstrative Logic. *History and Philosophy of Logic*, **30** 1–20.
18. 2009. Aristotle’s Logic at the University of Buffalo’s Department of Philosophy. *Ideas y Valores: Revista Colombiana de Filosofía*, **140** (August 2009) 99–117.
<http://www.revistas.unal.edu.co/index.php/idval/article/viewFile/12581/13183>
<http://www.redalyc.org/pdf/809/80911887005.pdf>

19. 2010. Essay-Review of: Striker, G., trans. 2009. *Aristotle's Prior Analytics: Book I*. Trans. with Intro. and Comm. Oxford: Oxford University Press. *Notre Dame Philosophical Reviews*.
<http://ndpr.nd.edu/review.cfm?id=18787>
20. 2014. Existential import today: New metatheorems; historical, philosophical, and pedagogical misconceptions. *History and Philosophy of Logic*. 36–61. (Co-author: Hassan Masoud)
Published online 25 Sep 2014. DOI:10.1080/01445340.2014.952947
21. 2015. Existential-import mathematics. *Bulletin of Symbolic Logic*. 21: 1–14. (Co-author: Hassan Masoud)

II. Abstracts

Syllogism should be discussed before demonstration, because it is the genus to which demonstration belongs.
—Aristotle 25b30 (Ross 1949/1965, 300).

1. 1972. Aristotle's Natural Deduction System, *Journal of Symbolic Logic*, **37**, 437.
2. 1981. Ockham's Syllogistic Semantics, *Journal of Symbolic Logic*, **46**, 197–198.
3. 1983. Deduction and Reduction: two proof-theoretic processes in *Prior Analytics I*. *Journal of Symbolic Logic*, **48**, 906.
4. 1987. Three Rules of Distribution: One Counterexample, *Journal of Symbolic Logic* **52**, 886–7.
5. 1992. Logical Methodology: Aristotle and Tarski. *Journal of Symbolic Logic*, **57**, 374.
6. 1998. Was Aristotle the first mathematical logician? *Abstracts of Papers Presented to the American Mathematical Society 1998*, 19.
7. 2003. Aristotle's *Prior Analytics* and Boole's *Laws of Thought*. *International Conference on Ancient and Medieval Philosophy: Conference Abstracts*, New York: Fordham University.
8. 2004. Comparing Aristotle's *Prior Analytics* and Boole's *Laws of Thought*. *Bulletin of Symbolic Logic* **10**, 289.
9. 2007e. Existential Import. *Bulletin of Symbolic Logic*, **13**, 143–4.
10. 2007a. Aristotle, Boole, and Tarski. *Bulletin of Symbolic Logic*, **13**, 382–3.

11. 2008a. Aristotle's Many-sorted Logic. *Bulletin of Symbolic Logic*, **14**, 155–6.
12. 2008s. Disbelief Logic Complements Belief Logic. *Bulletin of Symbolic Logic*. 14 (2008) 436. (Co-author: Wagner Sanz)
13. 2009b. Aristotle's Independence Proofs. *Bulletin of Symbolic Logic*, **15**, 244–5. (Coauthor: George Boger).
14. 2009c. Aristotle's underlying logic: a three-hour tutorial. *Bulletin of Symbolic Logic*, **15** 335.
15. 2009t. Aristotle's evasive invalidity omissions. *Bulletin of Symbolic Logic*, **15**, 462. (Coauthor: Kevin Tracy)
16. 2010a. Aristotle's Direct Deductions: Metatheorems. *Bulletin of Symbolic Logic*, **16**,136. (with Newton da Costa and Luis Dos Santos).
17. 2010b. Stating and Misstating Implications and Consequences. *Bulletin of Symbolic Logic*, **16**, 435–36. (with George Boger)
18. 2011b. Protasis in *Prior Analytics*: proposition or premise? *Bulletin of Symbolic Logic*, **17**, 151–2. (with George Boger)
19. 2011e. Existential Import Argument Schemas: Aristotelian and Boolean. *Bulletin of Symbolic Logic*. 17 (2011) 324–5.
20. 2011g. Kurt Ebbinghaus on Aristotle's syllogistic. *Bulletin of Symbolic Logic*. 17 (2011) 325. (with Klaus Glashoff)
21. 2012m. Predicates and predications. *Bulletin of Symbolic Logic*. 18 (2012) 148. (with Corey McGrath)
22. 2012a. Aristotle's syllogistic premises. *Bulletin of Symbolic Logic*. 18 (2012) 300–1.
23. 2012h. Aristotle's syllogistic terms. *Bulletin of Symbolic Logic*. 18 (2012) 301–2. (with Jean-Louis Hudry)
24. 2012g. Aristotle's conception of syllogism. *Bulletin of Symbolic Logic*. 18 (2012) 301. (with Thomas Gezella)
25. 2012l. Discussing incommensurability in Aristotle. *Bulletin of Symbolic Logic*. 18 (2012) 472–3. (with Justin Legault)
26. 2012t. Autonymy and parautonymy in history of logic. *Bulletin of Symbolic Logic*. 18 (2012) 473–4. (with Kevin Tracy)

27. 2012b. Implicational-future sentences. *Bulletin of Symbolic Logic*. 18 (2012) 472. (with George Boger)
28. 2013l. Aristotle and Tarski on consequence. *Bulletin of Symbolic Logic*. 19 (2013) 234. (with Justin Legault)
29. 2013m. Aristotle's "whenever three terms". *Bulletin of Symbolic Logic*. 19 (2013) 234–5. (With Hassan Masoud).
30. 2013t. Barnes on ancient logic. *Bulletin of Symbolic Logic*. 19 (2013) 133. (With Kevin Tracy).
31. 2013m. Predications in ancient logic. *Bulletin of Symbolic Logic*. 19 (2013) 132–3. (With Corey McGrath).
32. 2013l. One-place plural predicates in Aristotle's logic. *Bulletin of Symbolic Logic*. 19 (2013) 254–5. (With Justin Legault).
33. 2013. Heinrich Scholz on Aristotle's underlying logic. *Bulletin of Symbolic Logic*. 19 (2013) 252–3.^c
34. 2013jl. Aristotle, Boole, and Tarski on contradiction. *Bulletin of Symbolic Logic*. 19 (2013) 515. (With Justin Legault).
35. 2013ln. Aristotle: necessary conclusions and necessarily concluding. *Bulletin of Symbolic Logic*. 19 (2013) 515–516. (Coauthors: Justin Legault and Daniel Novotny)
36. 2014b. Aristotelian logic and Euclidean geometry. *Bulletin of Symbolic Logic*. 20 (2014) 247. (Coauthor: George Boger)
37. 2014. Aristotle's syllogisms: basic and extended. *Bulletin of Symbolic Logic*. 20 (2014) 131.
38. Aristotle's semiotic triangles and pyramids. *Bulletin of Symbolic Logic*. Forthcoming
39. Formalizing Euclid's first axiom. *Bulletin of Symbolic Logic*. Forthcoming (Coauthor: Daniel Novotný)
40. Aristotle's third logic: deduction. *Bulletin of Symbolic Logic*. 21 (2015) 102–103. (Coauthor: Kevin Tracy)
41. Ancient motion theories. *Bulletin of Symbolic Logic*. Forthcoming (Coauthor: Stanley Ziewacz)
42. Aristotle's axiomatic beginnings. *Bulletin of Symbolic Logic*. Forthcoming

43. The Aristotle Łukasiewicz omitted. *Bulletin of Symbolic Logic*. Forthcoming
44. Interpreting Aristotle's definition of *sullogismos*. [Draft circulated]

III. Books (editor)

A syllogism is a form of speech in which, certain things being laid down, something follows of necessity from them, i.e. because of them, i.e. without any further term being needed to justify the conclusion.

—Aristotle 24b18 (Ross 1949/1965, 287)

1974. *Ancient Logic and Its Modern Interpretations*. Proceedings of the Buffalo Symposium on Modernist Interpretations of Ancient Logic, Dordrecht: Reidel. MR0392486 (52 #13303). Now distributed in hardback and e-book by Springer Verlag.
<http://link.springer.com/book/10.1007%2F978-94-010-2130-2>
 The collection contains articles by Corcoran on Aristotle, articles by others about Corcoran's work on Aristotle, and other items.
1993. Cohen, M. and E. Nagel. 1934/1962/1993. *An Introduction to Logic*, second edition. Revised with new exercises, new indices, a new bibliography, and a 30-page introduction by J. Corcoran. Hackett Publishing Company, Indianapolis (1993), first edition published by Harcourt, Brace, & World, Inc., New York (1962), originally published as Book I of *An Introduction to Logic and Scientific Method*, Harcourt, Brace, and Company, New York, 1934.
 Section 4 of the 1993 Editors Introduction contains observations about Aristotle's logic and also critical comments about Cohen-Nagel's treatment of Aristotle. In particular, deduction—of conclusions from premises—is clearly distinguished from reduction—of syllogisms to syllogisms. Deduction is described as a method for establishing validity; reduction is described merely as a methodology for “dealing with syllogisms”.
2003. George Boole's *The Laws of Thought*. Buffalo: Prometheus Books. Introduction by Corcoran. Reviewed: J. van Evra in *Philosophy in Review*. 24, (2004) 167–169. MR1994936 (2004i:03001)
 After a thorough point-by-point comparison, Corcoran's Introduction concludes that Boole's level of rigor was below Aristotle's, that Boole was oblivious to indirect deduction (which of course was prominent in Aristotle), and that Boole uncritically followed Aristotelian doctrine even where Boole's system could not consistently support it. Moreover, Corcoran notes that although the result of Boole's work was the overthrow of the paradigm Aristotle established, Boole's aim was not revolutionary. Boole set out to advance the Aristotelian paradigm.

IV. Reviews.

A perfect syllogism is one that needs nothing other than the premisses to make the conclusion evident; an imperfect syllogism needs one or more other statements which are necessitated by the given terms but have not been assumed by way of premisses.

—Aristotle 24b22 (Ross 1949/1965, 287)

1. 1978. Joja, A., "La doctrine de l'universel chez Aristote", in *Mathematical Reviews* 56, #5192 (with Wendy Ebersberger).
2. 1980. Lear, J., *Aristotle and Logical Theory* (1980), in *Canadian Philosophical Reviews* **I** 85–92 (with Michael Scanlan).
3. 1981. Englebretsen, G. "Noncategorical Syllogisms", in *Notre Dame Journal of Formal Logic* (1980), in *Mathematical Reviews* (with Michael Scanlan) 81k:03014.
4. 1982h. Hintikka, J. "Aristotelian Induction" *Rev. International Philosophy* 34 (1980), in *Mathematical Reviews* 82m: 00016.
5. 1982t. Toth, I., "Aristote et les paradoxes de Zénon" *Eleutherie* (1970), in *Mathematical Reviews* 82m: 01011.
6. 1982c. Crowley, C., *Universal Mathematics in Aristotelian-Thomistic Philosophy* (1980) in *Mathematical Reviews* 82m: 01003.
7. 1984. Lear, J., *Aristotle and Logical Theory* (1980), in *Mathematical Reviews* 84h: 03015.
8. 1987. Smith, R., "Aristotle as Proof-theorist", *Philos. Nature.* (1984), in *Mathematical Reviews* 87e:01003.
9. 1988. Saccheri, G. *Euclides Vindictus* (1733), edited and translated by G. B. Halsted, 2nd ed. (1986), in *Mathematical Reviews* MR0862448. 88j:01013.
10. 1990. Cleary, J. *Aristotle on [...] Priority* (1988) in *Mathematical Reviews* 90j:01008.
11. 2011. Review of Skura, T. "A Refutation Theory". *Logica Universalis* 3 (2009), 293–302, in *Mathematical Reviews*. MR2559398.

V. Discussions

When three terms are so related that the third is included in the middle term and the middle term included in or excluded from the first, the extremes can be connected by a perfect syllogism.

—Aristotle 25b32 (Ross 1949/1965, p.300)

Corcoran's work on Aristotle is discussed in the following.
Endnotes contain quotations.

1970s

1. Smiley, Timothy. 1973. What is a Syllogism? *Journal of Philosophical Logic* 2: 136–154.^d

1974

2. Mulhern, John. 1974. Modern Notations and Ancient Logic. In *Corcoran 1974*, 71–82.
3. Mulhern, Mary. 1974. Corcoran on Aristotle's Logical Theory. In *Corcoran 1974*, 133–148.

1976

4. Largeault, Jean. 1976. Review: *Corcoran 1974*. *Archives de philosophie*. 39: 563–83.

1977

5. Berka, Karel. 1977. What is the Nature of Aristotle's Syllogisms? *Acta Universitatis Carolinae, Philosophica et Historica*, vol. 4, pp. 11–28.

1979

6. Berka, Karel. 1979. A reinterpretation of Aristotle's syllogistic. *Organon*, vol. 15, 35–48.
7. Bosley, Richard. 1979. Review: *Corcoran 1974*. *Mind*, New Series, Vol. 88, No. 350 (Apr. 1979), pp. 284–286.^{efgh}
8. Schmidt, Rudolf. 1979. *Die Grammatik der Stoiker*. Braunschweig: Vieweg Teubner.

1980s

1. Clark, Michael. 1980. *The Place of Syllogistic in Logical Theory*. Nottingham: University of Nottingham Press.
http://eprints.nottingham.ac.uk/1547/1/THE_PLACE_OF_SYLLOGISTIC_IN_LOGICAL_THEORY.pdf
2. Englebretsen, George. 1980. On propositional form. *Notre Dame Journal of Formal Logic*, vol. 20 (1980), pp. 101–110.
3. Lear, Jonathan. 1980. *Aristotle and Logical Theory*. Cambridge: Cambridge UP.
4. Kwiatkowski, Tadeusz. 1980. Jan Łukasiewicz – A historian of logic. *Organon* 16–17 (1980–1981), 169–188.ⁱ

5. Novak, Joseph. 1980. Some recent work on the assertoric syllogistic. *Notre Dame Journal of Formal Logic*, vol. 21 (1980), pp. 229–42.^j

1981

6. Englebretsen, George. 1981. *Three Logicians*, Assen, Van Gorcum, 1981.
7. Smith, Robin. 1981. Some studies of logical transformations in *Prior Analytics*. *History and Philosophy of Logic* 2, 1–9.
8. Thom, Paul. 1981. *The Syllogism*. Munchen: Philosophia Verlag.

1982

9. Jongsma, Calvin. 1982. *Richard Whately and the Revival of Syllogistic Logic in Great Britain in the Early Nineteenth Century lessons*. PhD Thesis, University of Toronto.^k
10. Thom, Paul. 1982. Conversion of Propositions Containing Singular or Quantified Terms in Pseudo-Scotus. *History and Philosophy of Logic* 3, 129–149.
11. Thom, Paul. 1982. The Place of Syllogistic in Logical Theory. *Philosophical Books* 23.2 (April, 1982: 73–76. DOI: 10.1111/j.1468-0149.1982.tb01886.x
12. Smith, Robin. 1982. What is Aristotle's eckthesis? *History and Philosophy of Logic* 3, 113–127.

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13. Scanlan, Michael. 1983. On Finding Compactness in Aristotle. *History and Philosophy of Logic* 4, 1–8.
14. Smith, Robin. 1983. Completeness of an eckthetic syllogistic, *Notre Dame Journal of Formal Logic*, 24, 224–32.

1984

15. Smith, Robin. 1984. Aristotle as Proof Theorist. *Philosophia Naturalis* 21: 2–4, pp. 590–597.

1985

1986

16. Stekeler-Weithofer, Pirmin. 1986. *Grundprobleme der Logik: Elemente einer Kritik der formalen Vernunft*. Berlin: De Gruyter.

1987

17. Gasser, James. 1987. *La syllogistique d'Aristote à nos jours*. Neuchâtel : CdRS.

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18. Lear, Jonathan. 1988. *Aristotle: the Desire to Understand*. Cambridge: Cambridge UP.

19. Mráz, Milan. 1988. *K implikaci v Aristotelově logice*. Rozpravy Československé Akademie, Svazek.

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20. Gasser, James. 1989. *Essai sur la nature et les critères de la preuve*. Editions DelVal.

21. Mozes, Eyal. 1989. A Deductive Database Based on Aristotelian Logic. *Journal of Symbolic Computation* 7, 487–507.

22. Smith, Robin. 1989. *Aristotle's Prior Analytics*. Indianapolis: Hackett, 1989.¹

Smith's translation is far superior to all others I know of. It is indispensable for contemporary study of Aristotle's logic. The commentary is the most thorough, most thoughtful, and most rigorous yet produced: it combines the linguistics of a classicist with the logic of a mathematician and the hermeneutics of a philosopher.

23. van Rijen, Jeroen. 1989. *Aspects of Aristotle's Logic of Modalities*. Dordrecht: Reidel.

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1. Barnes, Jonathan. 1990. Review of Smith's 1989 *Aristotle's Prior Analytics*. *Classical Review* NS 40:234–236.^m

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3. Merrill, Daniel. 1990. *Augustus De Morgan and the Logic of Relations*, Kluwer.

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9. Flannery, Kevin. 1991. Review of Smith's 1989 *Prior Analytics*. *Ancient Philosophy* 11: 187–193.
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22. Smith, Robin. 1994. Dialectic and the syllogism. *Ancient Philosophy*, 14, 133–151. PDF
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23. Edel, Abraham. 1995. *Aristotle and his Philosophy*. 2nd ed., New York: Transaction Publishers.

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30. Englebretsen, George. 1996. *Something to Reckon with: the Logic of Terms*. Ottawa: University of Ottawa Press.^s
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39. Striker, Gisela. 1998. Aristotle and the uses of logic. In Jyl Genzler (Ed.) *Method in Ancient Philosophy*. Hardback. Oxford: Oxford University Press.^z
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2000s

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3. Degnan, Michael. 2000. Review of Patterson 1995. *Ancient Philosophy* 20.1, 215–22.^{aa}
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VI. Alternatives

It is clear too that all the imperfect deductions are made perfect by means of the first figure. ... It is possible also to reduce all deductions to the universal deductions in the first figure.

—Aristotle 29a30-b2 (Jenkinson-Barnes 1928/1984, 12)

Parry, William and Edward Hacker. 1991. *Aristotelian Logic*. SUNY UP, Albany.

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VII. Acknowledgements

We call in others to aid us in deliberating on important questions—distrusting ourselves as not being equal to deciding.

—Aristotle 1112b10.

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It must be said, however, that not all publications citing my work on Aristotle show any understanding of it or even contribute to discussion of it. Among those that do show understanding or contribute to its discussion are the following: Abraham Edel, Edgar Andrade, Darcy Cutler, Michael Degnan, George Englebretsen, Kevin Flannery, James Gasser, Pierre Joray, David Keyt, Marcel Guillaume, Mathieu Marion, John Martin, John Mulhern, Mary Mulhern, Sriram Nambiar, Richard Patterson, Paul Thom, Michael Scanlan, Timothy Smiley, Robin Smith, Kevin Tracy, Risto Vilkkö, and John Woods.

It is gratifying to be able to report that after forty years of scrutiny by demanding scholars, to my knowledge few serious objections to my research have come to light—other than those I found myself, some of which I have published. Perhaps the most embarrassing was my

early conflation of reduction [e.g. of an imperfect two-premiss syllogism to a perfect one] and deduction [e.g. of the conclusion of an imperfect three-premiss syllogism from its three premisses using the two-premise perfect syllogisms]. With guilt I remember dismissing a twinge of misgivings when first writing this absurd claim. John Woods justly took me to task on this but only after my mea culpa, which he did not know of, had appeared in print (Corcoran 1983). I further distanced myself from the absurd claim that identified reduction with deduction in Corcoran 2013, where I wrote the following:

The thesis that Aristotle's syllogistic was an underlying logic contradicted all previous views of the syllogistic, e.g. that it was an axiomatic science presupposing a hidden underlying logic or that it was a system of "reductions" as described in the medieval mnemonics BARBARA, CELARENT, etc.

My main outlook—that the syllogistic contains a natural deduction system at its core—has been sustained. I must remind many people of two important points: (1) that Smiley made the same discovery at about the same time; and (2) in several ways what Smiley and I did would have been impossible without the ground-breaking work of Jan Łukasiewicz and two of his students, Stanisław Jaskowski and Alfred Tarski.

The controversy over the Łukasiewicz axiomatic approach versus the Corcoran-Smiley natural-deduction approach has been declared defunct. For example, Simons 2014 wrote:

"Łukasiewicz's trenchant and controversial views sparked a controversy over how to interpret the syllogistic. While ... [sc. Łukasiewicz] did win an early adherent in Patzig (1968), subsequent criticisms by Corcoran (1972, 1974) and, independently, Smiley (1974) established clearly that syllogisms are not propositions but inferences [sc. deductions], and that Aristotle had no need of a prior logic of propositions. That view is now universal among scholars of Aristotle's logic."

Credit for the victory must be shared among the many scholars who developed, articulated, and defended the Corcoran-Smiley natural-deduction approach including Corcoran's Buffalo students, Smiley's Cambridge students, and scholars such as Robin Smith, Abraham Edel, Kevin Flannery, and others.

Sad to say, this cannot be taken to imply that the natural-deduction approach is universally accepted. There are several well-known scholars whose writings reveal an understanding of Aristotle's logic rooted in obsolete scholarship. To be clear—it is not that these people side with Łukasiewicz, or side with Corcoran-Smiley, or even oppose both approaches—these people generally ignore, very occasionally denigrate, the Łukasiewicz scholarship and everything it inspired. Some of them even think that syllogisms have only two premisses. For these people it is as if Łukasiewicz, Corcoran, Smiley, and the rest had done nothing, or nothing worth mentioning.

Among this group are found some well-known names: Jaakko Hintikka, Henry Mendell, Terence Parsons, Anthony Preus, and Paul Vincent Spade, to name five. William Parry might also belong on this list if his 1991 book is taken to represent his views.

Why is it sad that some writings on Aristotle's logic ignore the natural-deduction approach? They all give a distorted view of the history of logic. Those that limit Aristotle's syllogisms to two-premise categorical arguments denigrate Aristotle in the eyes of logicians and analytic philosophers. In addition, they lend support to early symbolic logicians such as Bertrand Russell who ridiculed Aristotle's logic perhaps in an attempt to encourage people to accept modern logic.

Why do able scholars ignore Aristotle's natural-deduction system in their writings? Some have invested considerable work in mastering the intricacies of the medieval scholastic approach, which focuses on reduction and ignores deduction. Others want to avoid anything that highlights deduction and takes attention away from dialectic. Others have not bothered to learn the Łukasiewicz-initiated scholarship.

I have something to say to the small minority who are offended by my approach to history of logic: an approach that combines features of the Baltimore "history of ideas" movement led by Arthur Lovejoy and the Warsaw "mathematical archeology" movement led by Jan Łukasiewicz. This paradigm will be corrected, refined, and ultimately replaced, but by one that incorporates its main features—not by one that repudiates them.

Several publications merely cite my work without even noting that my work—like Smiley's—emphasizes two facts: that geometry was taught axiomatically in the Academy when Aristotle studied there and that the first sentence of *Prior Analytics* connects the *Analytics* to geometry. Łukasiewicz and others never mention that sentence.

^a The main purpose of this paper was mathematical. It was irrelevant, and would have been distracting, to point out that for Aristotle and for me, deduction is a goal-directed activity. The fact that goal-introduction is omitted in these deductions introduces a discrepancy between the model and Aristotle's system. The discrepancy was since corrected in print. See the role of the question mark as goal-introducer in Corcoran 2009: Aristotle's Demonstrative Logic. *History and Philosophy of Logic*. 30 (2009) 1–20. In this 1972 model, there is no separation between direct deductions and indirect deductions: every indirect deduction actually is a direct deduction. Every indirect deduction of a given conclusion from given premises is a direct deduction from the given premises augmented by the contradictory opposite of the conclusion. In the 2009 model, no indirect deduction is a direct deduction: there is a complete separation between direct deductions and indirect deductions.

^b As its title might suggest, this article supplies some of the basic conceptual structure used in my subsequent work and, in particular, framing my approach to history and philosophy of logic. It was written in the 1960's in Philadelphia before I came to Buffalo. In fact, I presented this paper at Buffalo when being interviewed for a position. My original discoveries about Aristotle's logic were all made in Buffalo over a year later. The basic ideas were completed in the summer of 1971 and they were presented in the Linguistics Institute NSF Seminar jointly taught by Edward Keenan and me.

The paragraph on page 38 of this paper about Aristotle shows that I had fully accepted the then-common interpretation of *Prior Analytics* that was completely oblivious to Aristotle's natural deduction system. Moreover, other aspects of this paper also show roughness since smoothed out. Specifically, I then divided premise-conclusion arguments into valid and invalid but instead of dividing argumentations into cogent and fallacious, I tried to get the word 'sound' to play a role its history rendered it unsuitable for: a role for which 'cogent' is perfectly suited.

^c Corcoran 2013, 252: "Different scholars working independently in the 1970s are currently credited with discovering that Aristotle's syllogistic was an *underlying logic* embodying deductive reasoning intended to obtain theorems from axioms of axiomatic sciences—as in pre-Euclidean geometry ([3], p. xvi). The expression 'underlying logic' had been introduced by Alonzo Church in the 1950s ([1], pp. 57-58 and 317-329). Aristotle's rules of sentence and deduction formation were so detailed that strong completeness results were obtained—an underlying logic is *strongly complete* if every sentence satisfied by all models of given premises is obtainable from those premises using the logic's rules. The thesis that Aristotle's syllogistic was an underlying logic contradicted all previous views of the syllogistic, e.g. that it was an axiomatic science presupposing a hidden underlying logic or that it was a system of "reductions" as described in the medieval mnemonics BARBARA, CELARENT, etc."

^d Smiley 1973, p.154: (Added in proof) Since this article was written I have learnt of concurrent work by Prof. J. Corcoran (to appear in *Journal of Symbolic Logic*, *Archiv für Geschichte der Philosophie*, and *Mind*). Corcoran's approach to the syllogistic is very similar to that advocated here, but his treatment is independent and distinctive and provides further strong support for the new approach.

^e Bosley 1979, p. 284: "The book under review is a collection of papers either read at a symposium in 1972 or written in connection with the symposium. There is too little unity and evenness to address a general judgment to the reader; I can make a general remark: the collection has the interest of an issue of a journal of second standing."

COMMENT: No authors or editors should ever be surprised or disappointed to learn that their works do not have universal appeal to informed scholars. In fact, there are informed scholars whose disapproval should be welcomed. Nevertheless, I am disappointed with Bosley's elliptical, pompous, subjective, and uninformative remark. Despite Bosley's one disrespectful sentence his review raises some important issues: it is worth careful study. JC

^f Bosley 1979, p. 285: "In 'Aristotle's Natural Deduction System' John Corcoran argues that Aristotle developed a natural deduction system."

COMMENT: The review never mentions the fact that Corcoran was arguing against the then-well-established view that the syllogistic was an axiomatic theory. Lukasiewicz, the father of modern study of Aristotle's logic, is not mentioned in the review; the word 'axiom' does not occur. Moreover, the review disputes some details of the Corcoran interpretation, but it fails to pronounce on the larger issue of whether the natural-deduction approach is basically correct. And sadly, it does not mention Smiley's meticulous exposition of Aristotle's Greek text. JC

^g Bosley 1979, p. 285: "In describing his system Mr. Corcoran proposes to 'restate ... perfect syllogisms as rules of inference' (p. 109). If one means to give a correct interpretation of Aristotle's discussion of assertoric syllogisms, it is a mistake to hold that a syllogism is a rule. It is also a mistake to assert that '... each application of a rule of inference is (literally) a first figure syllogism' (p. 92). A syllogism is a piece of reasoning: in particular, the act or the achievement of reaching a conclusion. One does not aid the cause of interpretation by suggesting that in executing the act in the first figure one applies a rule. In any case nothing is both a rule and an application of a rule."

COMMENT: Corcoran repeatedly emphasizes, contrary to Lukasiewicz, that every premise and every conclusion of a syllogism is something having a truth-value: not a schema, not a propositional function, not a form, and not a formula with free variable occurrences. The Barbara rule is a kind of universal having each Barbara syllogism as an instance. But Bosley's construal of Corcoran, which might well be fair—Corcoran should not be expected to write in such a way as to block every conceivable misconstrual—raises the issue of whether Aristotle's word *sullogismos* is always used for a mental process or act taking place in a single person's mind during a single time interval, whether it is always used for the particular result or product of that act, whether it is always used for something more abstract that is involved in every such act or result regardless of who performs it, or whether it is always used in some other way, or whether it is used in various ways throughout *Prior Analytics*. One reason for presenting a mathematical model instead of a full interpretation was to avoid the obligation to answer this and other questions that are difficult or unanswerable. See Corcoran's "Aristotle's demonstrative logic" for further discussion along these lines. JC

^h Bosley 1979, p. 285: Mr. Corcoran's interpretation rests in part upon a misunderstanding of the notions of perfect and of imperfect syllogisms. He means to account for a perfect syllogism when he writes, 'If the reasoning in a deduction actually shows that the conclusion follows from the premisses, the deduction is said to be sound' (p. 92). But a perfect and an imperfect syllogism do not differ in point of having their conclusiveness shown. They differ in the means for reaching the conclusion.

COMMENTS: (1) Corcoran regrets trying to force the word 'sound' to carry a meaning its history renders unsuitable if not impossible: 'cogent' is the word suggested by John Kearns and adopted in later articles. (2) Bosley missed Corcoran's point: the issue is not "having their conclusiveness shown" but "showing their conclusiveness". The imperfect syllogism does not produce knowledge that its conclusion follows from its premises but the perfect and the perfected do. JC

ⁱ Kwiatkowski 1980: "The most radical opponent of Lukasiewicz is J. Corcoran."

^j Novak's "Conclusion" makes several points that are now widely accepted.

^k Jongsma 1983, pp. 3f: But the person to whom I owe the greatest debt is Professor John Corcoran [...]. In addition to generally supporting my studies in history of logic, he has read and criticized the thesis as a whole. I especially appreciate the measure of clarity which my discussions with him have provided regarding the philosophical issues at stake in the thesis. Though my dialogue with him on the appropriate use of present-day notions in philosophy of logic and logic proper for interpreting history of logic, I have come to see how contemporary philosophy can be of genuine service to history of logic.

^l Smith 1989, p. xvii: One principal virtue of Corcoran's approach, which is especially important in the context of a translation of the *Prior Analytics*, is that it permits a formal model which stays very close to Aristotle's actual text, since it allows us to read formally precise natural deductions straight out of it.

^m Jonathan Barnes was in a foul mood when he wrote this informative and revealing review. Barnes's second sentence contradicts the book's title and his third sentence denigrates the back cover of the paperback edition.

Everyone following the Lukasiewicz-Corcoran controversy should read it carefully. Barnes, formerly considered sympathetic to the Lukasiewicz view as fine-tuned by Patzig, says volumes by saying nothing on the

subject. Smith's book may have silenced him on this issue. The names Łukasiewicz and Corcoran do not occur nor do the expressions 'axiomatic system' and 'natural deduction system'. Corcoran is referred to indirectly by Barnes in the first paragraph which gratuitously criticizes *the blurb* that appears on the back of the paperback edition. Readers of the hardback will not know what Barnes is talking about. The blurb was not written by Smith: it is signed 'John Corcoran'. Barnes called it "a fatuous puff".

Everyone interested in translating Aristotle's *Prior Analytics* will benefit from reading Barnes's many insightful comments and criticisms of Smith's translation. It is worth noting that this review of Smith 1989 appeared in 1990: an unusually prompt response. Moreover Barnes's 2007 book maintains his silence on the issue of whether Aristotle's syllogistic is better regarded as an axiomatic system or a natural-deduction system.

ⁿ Mignucci, 1991, 11: Nowadays two interpretations seem to have a following among scholars. One is the Łukasiewicz interpretation [...]. The other [...] I believe is the true one [...].

^o Mignucci, 1991, 12: J. Corcoran, 'Aristotle's natural deduction system' [...] 1974, has convincingly shown that the best formalization of Aristotle's *reductio ad impossibile* is by means of a natural deduction system.

^p Scanlan 1991: "In the early 1970s, working independently, J. Corcoran and T. Smiley each gave treatments of Aristotle's logic as a natural deduction system that did not involve propositional logic [Corcoran, Arch. Gesch. Philos. 55 (1973), no. 2, 191–219; MR0444423 (56 #2776); Smiley, J. Philos. Logic 2 (1973), no. 1, 136–154]. Aristotle's syllogisms were viewed as direct and indirect deductions in a language in which all sentences belong to one of the four categorical types. Aristotle's claimed "reduction" of all syllogisms to the two universal syllogistic forms of the first figure, traditionally called Barbara and Celarent, was seen as the proof-theoretic assertion that every deduction can be transformed into one using only these two rules. This approach accounts much more closely for the fine details of terminology and reasoning in specific passages of the *Prior analytics* than previous interpretations of Aristotle's logic."

^q Degnan 1994, p.82: "Timothy Smiley and [sc. John] Corcoran, working independently, showed that Aristotle's theory of deduction contains a self-sufficient natural deduction system that presupposes no other logic."

^r Reyes et al. 1994, p. 61: "The work of Łukasiewicz on syllogistic has been criticized by Corcoran [5]. In particular, Corcoran disputes the view of Łukasiewicz that the Aristotelian syllogistic constitutes an axiomatic theory. The main thrust of Corcoran's work is to show that it is rather '[...] an underlying logic which includes a natural deductive system and that it is not an axiomatic theory as had previously been thought'."

^s Englebretsen 1996, p. 49: "I have offered a slightly different survey of Aristotle's logic [...]. Corcoran and Scanlan 1982 is an ideal place to start. Also see the essays in Corcoran 1974."

^t Striker 1996, p. 203: Ever since Łukasiewicz reinstated Aristotle as the founder of formal logic, there has been a wealth of studies of Aristotle's syllogistic as a formal system. Against Łukasiewicz's claim that syllogistic is a system in which certain theses function as axioms, others as theorems derived from these, it has been argued—convincingly, to my mind—that it would be historically more accurate to represent syllogistic as a system of natural deduction [...].

^u Striker 1996, p. 205n: The currently favored translation "deduction", though perhaps less misleading than

.stnemugra eb ot smsigollys sekat eltotsirA taht tniop eht tuo gnirb ton seod ,~msgollys~

COMMENT: Given the absence of a definition of 'argument', the reader is at a loss to determine what Striker thinks 'deduction' doesn't bring out. JC

^v Striker 1996, p. 207: John Corcoran has argued that the distinction between a perfect and an imperfect syllogism is that between a full deduction and a valid inference which needs filling out.[...] Corcoran concludes that the long deduction will then count as a perfect syllogism. But this no longer agrees with Aristotle's own explanation of the term *teleios*.

COMMENT: Striker's magisterial pronouncement does not include any clues as to what she takes "Aristotle's own explanation of the term *teleios*" to be or where it disagrees with what I wrote on this point. What I wrote was discovered and published independently by Scholtz, Smiley, and probably others. JC

^w Thom 1996, p.4: In proof theory, I follow the definitive work of Smiley and Corcoran in using a natural deduction analysis of the syllogistic.

^x Martin 1997, p.1: My goal in this paper is to reconsider John Corcoran's now classical work on the syllogistic. Corcoran's purpose was to argue against two key theses of the interpretation of Łukasiewicz (1957) and others: that syllogisms should be construed as conditionals [...] and that Aristotle's reduction [sic][...] should be viewed as an axiomatic theory.

^y Lamarque 1997, pp. 251f: “A more accurate interpretation of Aristotle's strategy [sc. than the Lukasiewicz interpretation] was offered by Corcoran (1974). In this work Aristotle's method is cast in the form of a natural deduction system. Corcoran convincingly shows that Aristotle's proofs [sc. deductions] can be read as objects generated by an underlying logical calculus which does not presuppose propositional logic.”

COMMENT: Aristotle's completed syllogisms were intended not just as deductions—showing that their respective conclusions follow from their premise sets—but also as exemplifications of his theory of deduction. Of course, they are “proofs” in that they prove that their respective conclusions follow from their premise sets. But it is misleading to call them proofs without explaining that they do not prove their conclusions to be true. Normally, when something is called a proof it is implied that the proof's conclusion is true and that the proof proves it. Lamarque is not the only person who bungles this point.

^z Striker's opening paragraph states as her own view a summary of the results of Corcoran 1974, as she generously and candidly reports in her footnote (1998, p.209).

^{aa} Degnan 2000, p.215: In the mid-seventies John Corcoran and Timothy Smiley published ground-breaking articles on Aristotle's assertoric syllogism which rescued Aristotle's reputation as a logician from W. V. O. Quine's and Bertrand Russell's criticisms.

^{bb} Flannery 2001, p.219: Indeed, one of the great strides forward in the modern study of Aristotle's syllogistic was the realization that it is a system of natural deduction.

^{cc} Flannery 2001, p.202: The approach I take here is somewhat different from John Corcoran's, although it owes much to it. According to Corcoran, “an imperfect syllogism is ‘potentially perfect and is made perfect by adding more propositions which express a chain of reasoning from premises to the conclusion’ [Corcoran 1973, p. 195; see also p. 205; see also Smiley 1973, p.137]. I agree that, according to Aristotle, a syllogism is perfected by performing additional operations; but the perfected syllogism does not seem to be this augmented chain of reasoning. As the above texts [sc. 28a3-7, 29a31-36] show, the perfected syllogism, for Aristotle, becomes a perfect (i. e., first figure) syllogism in the process of being perfected.

^{dd} Striker 1998 states: “I take it to be generally agreed by now that formal syllogistic is best represented as a system of natural deduction, rather than an axiomatized theory” (p. 212).

^{ee} Woods 2001, Ch I: Aristotle's own [sc. completeness proof] attempt, which doesn't quite succeed, is to be found at *Prior Analytics* I 23. However, Corcoran has shown how to repair Aristotle's proof. See John Corcoran, “Completeness of an Ancient Logic”, *Journal of Symbolic Logic* 37 (1972), 696-702.

^{ff} Woods 2001, Ch II: Here is Corcoran on the point: “My opinion is this: *if* the Łukasiewicz view [that Aristotle's logic is an axiom system] is correct *then* Aristotle cannot be regarded as the founder of logic. Aristotle would merit the title no more than Euclid, Peano, or Zermelo insofar as these men are regarded as founders, respectively, of axiomatic geometry, axiomatic arithmetic, and axiomatic set theory. (Aristotle would merely have been the founder of ‘the axiomatic theory of universals’)” (“Aristotle's Natural Deduction System”, 98). I note, in this connection, that Gentzen's structural rules are not by any means exclusive to the Gentzen calculi. They hold in Frege's system and in virtually every other logic published subsequently. Why do I invoke the name of Gentzen? Why isn't the core theory of validity a Frege-logic or Whitehead & Russell logic? My answer is that Gentzen was the first (along with Jaskowski, independently) to break with the axiomatic tradition in modern logic and to show that natural deduction systems have all the power of axiomatic set-ups. Because I hold, with Corcoran, that Aristotle conceived of logic in natural deduction terms, it is seemly to use the honorific “Gentzen” in reconstructing Aristotle's conception of validity.

^{gg} Woods 2001, Ch 4: Corcoran makes the interesting proposal, in which I concur, that Aristotle's “distinction between perfect and imperfect syllogisms suggests a clear understanding of the difference between deducibility [...] and implication [...]—a distinction which modern logicians believe to be their own (cf. Alonzo Church, *Introduction to Mathematical Logic*, Princeton: Princeton University Press, 1956, p. 323, fn. 529)”. This is an insightful remark.

^{hh} Patterson 2002, pp. 178f: Some of my reservations about this sort of analysis are implicit in what has gone before. First, at a very general level, my own aim has been to analyze Aristotle's modal proofs in a way that allows us to think them through as he did. This is not so unusual. As Robin Smith remarks, John Corcoran's formal model (and Smith's own, which essentially follows Corcoran's) of the assertoric syllogistic “stays very close to Aristotle's actual text, since it allows us to read formally precise natural deductions straight out of it.” By contrast, Łukasiewicz's model incorporates the whole of the propositional calculus, and his proofs of the moods recognized by Aristotle are carried out using its resources, typically in ways that can hardly be read directly out of the text step-by-step.

Comment: Notice Patterson comes close to implying that Aristotle's syllogisms are natural deductions.

ⁱⁱ Patterson 2002, pp. 241f: The reader should consult especially John Corcoran, "Aristotle's Natural Deduction System," in *Ancient Logic and Its Modern Interpretations*, ed. John Corcoran, pp. 85-131, for a defense of "deduction" as a translation of *sylogismos* and a view of "syllogisms" as deductive structures. [See also Timothy Smiley, "What Is a Syllogism?" *Journal of Philosophical Logic* 2(1973): 136-54; Robin Smith, *Aristotle, Prior Analytics*, translated, with introduction, notes, and commentary (Indianapolis: Hackett, 1989) (hereafter cited as *Notes*), p. 106 (on 24a12) and esp. pp. 109f. (on 24b 18-22); and Jonathan Barnes, "Proof and the Syllogism," in *Aristotle on Science: The Posterior Analytics*, ed. E. Berti (Padova: Antenore, 1981), pp. 17-59.] For defense of a narrower construal, see Michael Frede, "Stoic vs. Aristotelian Syllogistic," *Archiv für Geschichte der Philosophie* 56 (1974): 1-32. This issue is related to the view of "incomplete" syllogisms - as opposed to "complete" (*teleios*) ones - as deductive structures requiring certain steps (conversions of premises or conclusion, use of *reductio ad impossibile*) to make them into valid deductions. (For discussion, see the works by Corcoran, Smiley, and Smith just cited.)

COMMENT: Patterson's last sentence needs work. The worst mistake might be the implication that incomplete syllogisms are invalid; all syllogisms are valid in the sense that their conclusions follow from their respective premises. Does Patterson make this point in his book? Does he define valid? Another, but related, mistake is that, although there is no way to make an incomplete syllogism valid since it already is such, there is a way to make it cogent: to make it evident that its conclusion follows from its premises. For Patterson's 'make them into valid deductions' put 'make them into cogent deductions'. Validity is semantic and ontic; cogency is pragmatic and epistemic. A third mistake is in Patterson's enumeration of the steps used to complete an incomplete syllogism: use of the four perfect first-figure syllogisms is incorrectly omitted and conversion of conclusions is incorrectly included.

^{jj} Patterson 2002, pp. 280: Again, I use "complete" and "perfect" indifferently as translations of *teleios*. John Corcoran and Timothy Smiley strongly prefer "complete" on grounds that it indicates something important about the "completion" (*epiteleisthai, teleiousthai, perainesthai*) of a syllogism, namely, that this consists in supplying additional steps so as to make a valid premise-conclusion argument (i.e., a set of premises and a conclusion that they imply) into a deduction (i.e., an extended discourse that makes it evident that a certain conclusion is implied by certain premises). See especially Corcoran, "Aristotle's Natural Deduction System," and T. Smiley, "What Is a Syllogism?" Cf. Robin Smith, *Notes*, p. 110.

In fact, one could use the terms "perfect" and "perfecting" in this way, too, because "perfect" (as a translation of *teleios*) often means "not missing any parts." Thus, although I find the view of Corcoran, Smiley, and Smith attractive and plausible, I shall use both terms.

COMMENT: The only "reason" I know of for using 'perfect' is that it is the Anglicization of the Latin word *perfectus* used to translate *teleios*. The word *perfectus* meant *finished, done, completed*, and the like: connoting the end result of a process. But, as often happens, Anglicization added meanings such as *excellent* or *wonderful*, and the added meanings render 'perfect' an inappropriate translation. We could not praise students by saying their papers were complete. Of course, there are qualifications to be made: we need a discussion rather than a quarrel. When will commonsense come to Aristotle scholarship?

^{kk} Smith 2007, §3: . On this basis, I am persuaded that the theory contained in the *Prior Analytics* was developed largely to serve the needs of Aristotle's theory of demonstration, especially this argument: here, as in much of the early history of modern symbolic logic, logical theory arose to meet the needs of the philosophy of mathematics.

^{ll} Guillaume 2004: In fact, many of Corcoran's remarks throughout this very rich paper [...] will be of interest to the reader, including his discussion of recent studies concerning the Aristotelian system and the conclusions that he makes [...]. The author states, "The gulf between modern logic and Boole is much greater than that between modern logic and Aristotle". In fact, starting on the very first page he argues, "where Aristotle had a method of deduction that satisfies the highest modern standards of soundness and completeness, Boole has a semi-formal method of derivation that is neither sound nor complete". He adds in his conclusion that "the method of countermodels for independence proofs (that demonstrate the absence of logical consequence) is prominent in *Prior analytics*, but sadly absent from *Laws of thought*". He also asserts that Aristotle "proves mathematically that two of his four two-premise rules were eliminable. There is nothing in Boole's writings remotely comparable to this." And these are only three of the many examples cited by Corcoran of Aristotle's superiority over Boole.

^{mmm} Woods and Irvine 2004, p.53: Here is Corcoran on the point: "My opinion is this: if the Lukasiewicz view [that Aristotle's logic is an axiom system] is correct then Aristotle cannot be regarded as the founder of logic. Aristotle would merit the title no more than Euclid, Peano or Zermelo insofar as these men are regarded as founders, respectively, of axiomatic geometry, axiomatic arithmetic and axiomatic set theory. (Aristotle would merely have been the founder of "the axiomatic theory of universals") [Corcoran, 1974b, p. 98].

ⁿⁿ Woods and Irvine 2004, p.55: Corcoran's opinion is that Aristotle did not require of syllogisms as such that they have just two premisses. That he did not impose this restriction is suggested

“by the form of his definition of syllogism [...], by his statement that every demonstration is a syllogism [...], by the context of chapter 23 of *Prior Analytics*, and by several other circumstances [...] Unmistakable evidence that Aristotle applied the term in cases of more than two premises is found in *Prior Analytics I*, 23 (especially 41a17) and in *Prior Analytics II*, 17, 18 and 19 (esp. 65b17; 66a18 and 66b2).” [Corcoran, 1974b, p. 90].

Still, it is clear that Aristotle often does reserve the term "syllogism" for two-premiss arguments. We follow Corcoran in supposing that such a restriction is explicable by the fact that Aristotle thought if all two-premiss syllogisms are deducible in the logic of the *Prior Analytics*, then all direct syllogisms whatever are also deducible. COMMENT: The expression of the view shared by Woods, Irvine, and me needs work. For “Aristotle thought if all two-premiss syllogisms are deducible in the logic of the *Prior Analytics*, then all direct syllogisms whatever are also deducible” put “Aristotle thought if all incomplete two-premiss syllogisms are deducible, then all incomplete syllogisms—whatever the number of premisses—are also deducible”. The qualification “direct” is at the very least unnecessary. It also misleading in a strange way. What we are talking about is incomplete syllogisms not completions of them. However, ‘direct’ and ‘indirect’ do not apply to incomplete syllogisms at all: it would be a category mistake to say of a given incomplete syllogism, devoid of intermediate steps, that it is direct or indirect. The attributes of being direct and of being indirect refer to the manner of completion. Whether this mistake vitiates other passages in this generally accurate work, I did not notice. Whether this mistake is a result of other mistakes in this work, I could not say without further investigation. JC

^{oo} Tracy 2006, p. 2: Aristotle was not the first to conceive of axiomatic procedures. Euclid’s axiomatic geometry is surely descended from axiomatic approaches to geometry contemporary with or earlier than Aristotle (Corcoran, “Aristotle, Boole, and Tarski”). But he is the first, as far as we know, to have conceived of studying deduction itself; he is the first to have developed a formal logic.

^{pp} Tracy 2006: Both Corcoran (“Aristotle’s Natural Deduction System”) and Smiley (“What is a syllogism?”) reconstruct Aristotle’s logic as a natural deduction system in this way.

^{qq} Tracy 2006, p. 174: As Corcoran observes, “[Aristotle’s] theory of propositional form is very seriously inadequate. It is remarkable that he did not come to discover this for himself, especially since he mentions specific proofs from arithmetic and geometry. If he had tried to reduce these to his system, he may have seen the problem”.

^{rr} Tuominen 2007, p. 43: It has often been pointed out that this definition [of *sullogismos*] does not restrict inferences to syllogisms [sic] in the three figures, i.e. the two-premise three-term inferences discussed in the *Prior Analytics*. Because of this some scholars have started to translate ‘*sullogismos*’ as ‘deduction’. However, others have pointed out that this translation is not quite appropriate because Aristotle’s definition of syllogism excludes some deductions, for instance ones whose premise or premises [sic] are identical with the conclusion and those that have redundant premises. I have here left ‘*sullogismos*’ untranslated as ‘syllogism’; the dialectical syllogism is not syllogism in the more narrow sense of the syllogistic figures of the *Analytics*. Nonetheless, we should also note that the very same definition is presented in the *Prior Analytics*.

COMMENT: The claim that ‘deduction’ is not appropriate because according to Aristotle’s definition excludes certain items that would be called deductions by some people--e.g. there is no “*sullogismos*” whose conclusion is among its premises and there is none with redundant premises—is amazing. It is at once a non-sequitur and a petition. It is a non-sequitur because the word ‘deduction’ in English is not so sharply defined as to necessarily include the items mentioned. It is a petition because the premise that such items were excluded by Aristotle has not been established.

^{ss} Bar-Am 2008, p. 145: J. Lukasiewicz [1951] started the modern fashion of anachronistic formal studies of Aristotle’s logic. [...] The following texts are the best known, formal studies of Aristotle Logic: G. Patzig 1968, T. J. Smiley 1973, J. Corcoran (ed.) 1974, J. Lear, 1980, P. Thom 1981.

^{tt} Aristotle could not make a clear-cut distinction between the search for the purely formal (logic) and the search for informative truth (science). Some modern admirers of Aristotle take it for granted that he had made this distinction

clearly and endorsed it. Others invent new terms so as to avoid the issue. Notable among these is J. Corcoran (2003 p. 286). By contrast, the terrific M. Grene writes (1963 p. 69): “We may, therefore, legitimately consider Aristotelian logic not as the first adumbration of a formal system but as a discipline enabling the student to acquire scientific knowledge”. Later on (ibid., p. 71) she adds: “Aristotle’s logic is not a pure logic, a system valid for ‘all possible worlds’, like the formal systems envisaged by Leibniz.”

^{uu} Louis Groarke 2009, p. 100: We discuss these passages in detail below. For the moment, simply note that authorities now translate Aristotle’s *sullogismos* as “deduction” (including Robin Smith, John Corcoran, Terence Irwin, Gail Fine, Timothy Smiley, A. J. Jenkinson, and so on, to name a few). This is accurate [...].

^{vv} Malink 2009: Both Corcoran, ‘Completeness’, and Smith, ‘Ecthetic Completeness’, intend to prove that a certain deductive system for Aristotle’s syllogistic is complete with respect to (i.e. strong enough to prove everything valid in) a certain semantics. The proposition ‘BaB’ is valid in their semantics, but not provable in their deductive systems. So the proof of completeness fails when propositions such as ‘BaB’ are admitted.

COMMENT: This remark needs work. To begin with, no one-term sentence is valid in the semantics in question for the simple reason that the language admits no such sentences. Moreover, it is a category mistake to criticize a proof for not proving what it did not claim to prove. Further, Malink is accusing Corcoran and Smith of a mathematical blunder that he should have known they did not make. Scores of qualified people read Corcoran’s proof and found it flawless. What was Malink thinking? Besides, Corcoran and Smith are not discussing “a certain deductive system”, i.e. one system: Corcoran discusses one, Smith another. Also, neither Corcoran nor Smith is discussing provability: both are discussing deducibility of conclusions from premises. Malink’s ‘intend’ implies doubts about whether Corcoran and Smith achieve their stated goals: after forty years of acceptance such doubts are unwarranted and unsubstantiated. To disagree with Corcoran, Smith, and many others on the debatable role of one-termed propositions such as “Every good is a good” in Aristotle’s syllogistic it is not necessary or even relevant to discuss completeness proofs. In fact, bringing up the subject of completeness proofs is a non-sequitur that suggests a lapse of focus or worse. Moreover, in the absence of arguments adduced by the opponents, the reader deserves to be suspicious. There are further difficulties with Malink’s remark.

^{ww} Raymond 2010, p. 194: This section outlines the basis for the interpretation, drawing out how Aristotle historical intuitions concerning polarity (things that never combine) and inseparability (things that never separate). As we will see, these two intuitions are germane to logic, understood as natural deduction (e.g. Smiley 1973, Corcoran 1974, and Smith 1989).

^{xx} Castelnérac, Benoit, and Mathieu Marion, 2013, p.24: This is not the place for a critique of this approach, already severely undermined since pioneering work by Timothy Smiley and John Corcoran in the 1970s. We would like simply to say a word about Aristotle’s context. Much of the work in the history of logic in this tradition has shown a remarkable lack of sensitivity to it. With Łukasiewicz, history of logic looked more like an attempt at fitting Aristotle’s text onto the Procrustean bed of one’s own axiomatic conception of logic, and, although work by Smiley and Corcoran certainly fitted the text much better, it was also ahistorical.

^{yy} Castelnérac, Benoit, and Mathieu Marion, 2013, p.28: The key papers here are Smiley (1973) and Corcoran (1974a). See also Lear (1980) and Smith (1989), which incorporates the Smiley-Corcoran approach in the translation and commentary.

^{zz} Keyt 2013: Can it be proven that the conclusion of every valid categorical argument is deducible from its premises by means of Aristotle’s inference rules without first proving that every such argument is a chain argument? The answer is that it can be. Using the sophisticated methods of modern metatheory, John Corcoran has done it (Corcoran, 1972).

^{aaa} Marion 2013, p. 18: There is certainly no need to see axiomatic systems everywhere when one looks at the history of logic, given that the introduction of that approach only dates from Frege. Moreover, that these are less suited for modelling Aristotle’s syllogistic has been independently shown by John Corcoran and Timothy Smiley in the early 1970s, when they interpreted Aristotle’s syllogistic not as an axiomatic system requiring an underlying logic, but as an underlying logic itself, which is best modelled (in the ordinary sense of the word ‘model’) as a Gentzen-style system. They also gave completeness proofs for their respective systems and thus restored Aristotle’s stature as a logician.

^{bbb} Simons 2014: Łukasiewicz’s trenchant and controversial views sparked a controversy over how to interpret the syllogistic. While the principles did win an early adherent in Patzig (1968), subsequent criticisms by Corcoran (1972, 1974) and, independently, Smiley (1974) established clearly that syllogisms are not propositions but

inferences, and that Aristotle had no need of a prior logic of propositions. That view is now universal among scholars of Aristotle's logic. In retrospect, it appears that Łukasiewicz was keen to wish onto Aristotle his own (Fregean) view of logic as a system of theorems based on a propositional logic.

^{ccc} Tennant 2014, Abstract: I use the Corcoran–Smiley interpretation of Aristotle's syllogistic as my starting point for an examination of the syllogistic from the vantage point of modern proof theory.