Theory and History of Ontology (www.ontology.co) by Raul Corazzon | e-mail: rc@ontology.co

Fred Sommers on the Logic of Natural Language

Contents

Introduction

"The essay before you is the fruit of some fifteen years of investigation into the logical syntax of natural language. In the summer of 1965 I read a paper to the Congress on Logic and Scientific Method at Bedford College, London, that presented an algorithm for the algebraic treatment of syllogistic arguments in which categorical propositions were transcribed as fractions and reciprocals.(1) I spent the next two years looking for a more general algorithm with greater expressive power, one that could transcribe relational, multi-general propositions as well as simple categoricals. (...)The first article on the more general calculus was published in Mind, January 1970, as The Calculus of Terms. Unfortunately its message had little effect although I followed it by a series of articles that exploited the new notation and exposed some important consequences for the philosophy of language. It became clear that the current Fregean logic had fully replaced the more traditional logic of terms and that articles could not do justice to the neo-classical alternative that I was advocating.
I had for some years been planning to write a book on the logic of categories but the lack of response to my more recent interests, the logic of terms and its relation to natural syntax, strongly suggested that I must first do book-length justice to these latter topics. I began writing this essay in 1975 and, after several long interruptions and two revisions, completed it in the summer of 1980. I still hope to write the book on category theory. In the present work chapter 13) I do little more than indicate how traditional logic's way with contrariety leads to the conception of categories that is at the basis of Ryle's seminal work in the forties and my own more formal treatment of categories in the early sixties. Indeed it was my recognition of the need for a notion of contrariety that would allow for saying, for example, that Saturday is neither fed nor unfed (which renders both 'Saturday is fed' and 'Saturday is unfed' 'category mistakes') that prompted me to re-examine traditional Aristotelian logic with its characteristic distinction between contrary terms or predicates and contradictory propositions. This distinction is absent in modern logic which uses the forms 'Px' and '-Px' to represent contrary predicates thereby conflating the two oppositions of contrariety and contradiction so fundamental to the classical term-theoretic standpoint. (2) The current use of propositional negation as the sole form of opposition 'precludes the kind of internal term and predicate structure that makes it possible to treat negation as a means of changing around concepts inside the meanings of terms and predicates'. The quoted words are Jerrold Katz's but they are typical of the sort of reaction one gets from linguists who find the restricted grammar of 'standard' logical languages to be at odds with their intuitions into the logical grammar of empirical languages. More generally the theory of logical form that has its source in the formation rules for standard languages poses severe problems for the linguist. The older subject-predicate logic with its classical binary noun-phrase verb-phrase analysis of sentences has been discredited and while some linguists

appear prepared to abandon the classical analysis in favour of analyses that conform more closely to the syntax of modern predicate logic others may welcome a rehabilitated classical logic of 'categorical' sentences that leaves the fundamental binary structure in place." (pp. VII-VIII)

Notes

(1) 'On a Fregean Dogma'. Apparently I was not alone in representing categorical propositions as fractions. Charles Merchant, a mathematician at the University of Arizona, subsequently wrote me of his independent work on this algorithm.
(2) Early treatments of the distinction between negating a sentence and denying predicate may be found in my 'Predicability' (1963) and 'Truth Functional counterfactuals' (1964).

From: Fred Sommers, *The Logic of Natural Language*, Oxford: Clarendon Press 1982.

"Today's orthodox logic came into existence about a hundred years ago when it replaced the traditional syllogistic logic, which itself had been the orthodoxy for many centuries. The arguments for abandoning the old logic were not conclusive. Once entrenched, the new logic felt no need for supporting arguments. Today logic students are given at best some bad old arguments against the old logic, and then are simply presented with the new logic to be learned. No one asks 'Why?'. But Sommers has. He has challenged the deeply entrenched presumption that no syllogistic logic can measure up to the great power and beauty of the predicate calculus. What is more, not only has Sommers shown the emperor to have no clothes, he has produced a fine new suit. He has returned to the venerable but forgotten logic of Aristotle, Ockham, and Leibniz, and has shown that it does have hidden assets which make it more than adequate as an alternative to the orthodox system. So I think this rebellion is well worth joining. And, of course, there's that pleasure I referred to earlier. Sommers speaks of "the perverse pleasure of advocacy-in this day and age-of Aristotle over Frege."I have put this collection together for several reasons. As a supplement to Sommers' own work it illustrates the broad scope of Sommers' challenge to modern orthodox views about logic and language. Not all of those whose work is represented here fully endorse Sommers' programme. Some may explicitly reject parts of it. But all recognize its importance." (Preface by the Editor, pp. X-XI)

From: George Englebretsen (ed.), *The New Syllogistic*, New York: Peter Lang 1987.

"Frederic Sommers was born on 1 January 1923 in New York City. He was educated at Columbia University, where he received his BA and then his PhD in philosophy in 1955, writing a dissertation on "An Empiricist Ontology: A Study in the Metaphysics of Alfred North Whitehead." Sommers began his academic career at Columbia University, where he was assistant professor of philosophy from 1955 to 1963. He moved to Brandeis University in 1964 as associate professor of philosophy, was promoted to full professor in 1966, and held the Harry Austryn Wolfson Chair of Philosophy from 1965 until his retirement in 1993.
Sommers was a staunch proponent of a traditionalist view of logic, albeit in a "modern" guise. He has consistently expressed the view that progress in logic should have stopped, if not with Leibniz, than at least before Frege, devising a variant of syllogistic very close to that undertaken by Leibniz. His "Calculus of Terms" applies a system of pluses and minuses to the subjects and predicates of categorical syllogisms, to indicate inclusion and exclusion, the copula and the negation of the copula, as well as for affirmation and denial, with a universal statement having the form + (–...) or – (+...) for the subject term and a particular statement having the form + (+...) or – (–...) for the subject term. His system is essentially that of Leibniz's, with Leibniz's "=" and "±" replaced in Sommers's notation by "+" and "–" respectively. In *Logic of Natural Language* Sommers developed the system in more detail together with a consideration of its purported philosophical implications. He argued that his calculus of terms is significantly different from the predicate logic; but Gregory MCCulloch [1984] argued that there really is no such difference. Sommers claims that his calculus of terms is an elaboration of Leibniz's proposal.
Sommers argued that the subject–predicate semantic analysis of syllogistic propositions with the proper treatment, retains as much deductive power as Frege's calculus, and in a important sense is more expressively powerful than Frege's function-theoretic quantification theory, because it is closer to natural language while being able to handle polyadic relations.

In Sommers's calculus, relational terms are represented in the form ' $R \pm A \pm B \pm .... \pm K$', where R is the relation and some/all A, some/all B, ..., some/all K are objects of R. Thus Sommers is able to analyze such propositions as "All censors withhold some books from minors" as "$W + B - M$." Sommers's "Ordinary Language Tree" for mapping relations among Aristotelian categories was based upon his efforts to arithmeticize Aristotelian syllogistic as a calculus of terms. In Sommers's tree, genera and species give way to subjects and predicates, treated as classes. His book *The Logic of Natural Language* (1982) provides a detailed, systematic and unified elaboration of the Ordinary Language Tree and the Calculus of Terms and explores the philosophical import of this logical system. His *Invitation to Formal Reasoning: The Logic of Terms* (2000) provides a textbook elaboration of the logic of terms."

From: Irving H. Anellis, "SOMMERS, Frederic Tamler", in: John R. Shook (ed.), *The Dictionary of Modern American Philosophers*, Bristol: Thoemmes 2005.

EExcerpts from his publications (in progress)

"The thesis I will be arguing for belongs to the premodern -- which is to say, pre-Fregean-tradition of logical theory whose major figures from Aristotle to Leibniz never doubted that the sentences of a natural language like Greek or English that entered into deductive reasoning could, for logical purposes, be parsed in ways familiar to the grammarian. Implicit in the program of traditional formal logic is the idea of a logical syntax of natural language in which the grammarians' nounphrase/verb-phrase analysis is the fundamental pattern. (...)The idea of a logical syntax of natural language stands opposed to what the Fregean believes about logical form. Frege himself held that an adequate account of inferences expressed in natural language requires translation into a new idiom, the idiom of a language expressly constructed for use by logicians.
This new logical language is no mere convenience: Frege believed that the syntax of natural language was logically useless, misleading, and incoherent. Being convinced of this, Frege did not criticize the grammarian for misconstruing natural language. On the contrary, from Frege's standpoint the grammarian could well be right in his description of the syntax of natural language. If so the inadequacy is not in the grammarian but in his subject-matter. Michael Dummett aptly sums up Frege's reaction to the phenomenon that the natural languages lack a perspicuous logical grammar with the words 'so much the worse for natural language'." (pp. 1-2)

From: Fred Sommers, *The Logic of Natural Language*, Oxford: Clarendon Press 1982.

Extensions of Sommers' Term Logic

"Conclusion.
NTL [*Numerical Term Logic*] works within the assumption that all logical statements are affirmations as to the quantity of members of a set (or subset). Sommers' logical system and Modem Predicate Logic, although opposed in many ways, have at least one thing in common: they may each formulate statements that affirm only either that a set is empty, or that it is not. In Sommers' system's primary scheme, whether a subset is non-empty is indicated by the copulation of two terms (with a primary "+"), each of which represents one of the intersecting sets; and whether a set is empty is indicated by the denial of such a copulation (with a primary "- "). Despite its quantificational difficulties, Sommers' system is remarkably expressive, deductively powerful, theoretically well founded (as well as relatively faithful to the structure of natural language); indeed, it surpasses MPL [*Modern Predicate Logic*] in each of these respects. In building upon the notational foundation of Sommers' system, NTL not only retains these important advantages, but, in fact, amplifies them enormously. In NTL, variable numerical quantity is incorporated as a formal element of logical copulation; thus, in an NTL primary scheme analogous to Sommers', to what degree a subset is non-empty would be indicated by the copulation of two terms (with a binary "+x"), each of which represents one of the intersecting sets; and to what degree a subset is empty would be indicated by the denial of a copulation of this kind. NTL therefore becomes infinitely

more expressive than Sommers' system-not merely in the fact that it may formulate statements with quantities of infinite magnitude, but also in the fact that it accounts for various types of quantification (fractional, subjective natural language quantification, etc.); it also becomes far more powerful than Sommers' system in its deductive scope (for it handles inferences involving different kinds of numerically quantified statements uniformly), is theoretically stronger (for example, in its accounts of "wild quantity", vacuosity, and subalternation), and is more loyal than Sommers' system to the structure of natural language (for it requires no contortionism in its expression)." (pp. 103-104)

From: Lorne Szabolcsi, *Numerical Term Logic,* Lewiston: Edwin Mellen Press 2008.