The algebra of grammar: A lesser known work of Viennese fin-de-siècle linguistics

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1.   Introduction

Theoretical linguistics was not been a show-case discipline at the University of Vienna throughout the nineteenth and well into the twentieth century. In contrast to other parts of the German-speaking area, where theoretical grammar, in the sense of abstract analysis of structural principles underlying the grammatical organization of language as such, was cultivated by scholars like August Ferdinand Bernhardi or Karl Ferdinand Becker, in both cases against opposing authorities like Jacob Grimm,[1] the Viennese academic tradition confined its conception of general linguistics to largely descriptive and compilatory work. This culminated in Friedrich Müller's bulky account of the world's languages, which was largely based on his collections and notes taken during a three-year circumnavigation initiated by the Imperial Academy of Sciences (Müller 1876-1888). In the first chapter of the first volume of this work, under the heading "Language as such (in abstracto)" ("Die Sprache an und für sich (in abstracto)"), a strong stance against the formal analysis of linguistic structure is taken. Müller, who is recorded in the history of the language sciences as the founder of linguistic ethnography, explicitly denies any relationship between language and logic, characterizing the latter as a purely formal branch of science, confined to judgements and akin to mathematics in the use of algebraic calculuses, while the former is claimed to be an object of historical science, dealing with particular forms pertaining to reality (Müller 1876, 14). The deduction of grammatical principles from logical categories is rejected by Müller as "totally misguided" ("vollkommen verkehrt").

This verdict ex cathedra seems to be in consonance with the contemporary neogrammarians' aversion to all kinds of abstraction, expressed in Hermann Paul's famous dictum "[…] 'away with all abstractions' must be our slogan if we want to succeed in determining the factors of what is really going on" (Paul 1880, 13).[2] Although, as Paul hastened to

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[1]Grimm's discontent with works on general grammar based on logical principles like Bernhardi 1801 or Becker 1841 seems to have been the typical suspicion of the collector's mind towards deductive reasoning, cf. Gardt (1999, 275).

[2]In the original formulation: "[…] 'weg mit allen abstractionen' muss für uns das losungswort sein, wenn wir irgendwo die factoren des wirklichen geschehens zu bestimmen versuchen wollen".

clarify in a footnote in the second edition of his seminal book (Paul 1886, 11), that the notion of abstraction used in this slogan was meant to designate a particular kind of ideas and not the general concept of abstraction as a mental operation, but nevertheless an epistemological bias against conceptual rigor and strict formalism remains palpable and characterizes mainstream linguistics of that period. Even a scholar as open-minded as Georg von der Gabelentz, who pointed the way ahead in several branches of linguistics, remained negative with respect to the value of what he called "general or philosophical grammars", setting them apart as "for the most part children of our philosophical era, beautiful children for some part, but deprived of viability" (Gabelentz 1891, 11).[3]

At the University of Vienna, the perennial debate about the nature of linguistic science as either inductive or deductive, if at all perceived by the academic guild entrusted with the subject of language studies, was settled in favor of the former. As late as in 1923, Paul Kretschmer, who was the first to hold a chair of General and Comparative Linguistics, established in 1899,[4] expressed the attitude against the deductive analysis of language in all clarity, deploring that mainly syntax had suffered most from the confusion of linguistic inquiry with logical reasoning. Rather than logic, Kretschmer claimed psychology to provide account of the "facts of language" (Kretschmer 1923, 3),[5] thus continuing the reliance of the Neogrammarians on experimental psychology as the key to the explanation of linguistic structure and its change over time. This was most explicitly pursued in the work of Albert Thumb and Karl Marbe on analogy, a strongly inventive study of psycholinguistics *avant la lettre* (Thumb and Marbe 1901). In the field of syntax, Kretschmer's urge for a psychological foundation for linguistic reasoning was fulfilled by his own successor, Wilhelm Havers,[6] who downgraded the role of logic as a skeleton of grammar by reappraising the notion of "popular logic" ("Volkslogik") and by confronting the "logic of reason" ("Verstandeslogik") with the "logic of sentiments" ("Gefühlslogik"; Havers 1931: 32-35).

The notion of General Linguistics is equivocal across time and space, embracing on occasions fields of study that strongly intersect with neighboring disciplines. The impulse for what was later associated with the specific intellectual climate in terms of linguistic theorizing at the Alma Mater Rudolphina Viennensis in the decades before and after World War I came typically enough not from the language sciences themselves but from psychology, as in the case of Karl Bühler, and from philosophy, as in the case of the Vienna Circle.

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[3]In the original formulation: "die s[o] g[enannten] allgemeinen oder philosophischen Grammatiken, meist Kinder unseres philosophischen Zeitalters, schöne Kinder zum Theil, aber nicht lebensfähige".

[4]Kretschmer held the chair of "Allgemeine und Vergleichende Sprachwissenschaft" in the Department of Oriental Studies after the premature death of Friedrich Müller. In 1923, the Department of Indo-European Studies (Indogermanisches Institut) was founded with Kretschmer as its head, and his venia legendi adapted to "Allgemeine und Indogermanische Sprachwissenschaft" (cf. Pfeiffer 2001).

[5]"Nicht die Logik, die die Gesetze des richtigen Denkens sucht, sondern nur die Psychologie, die alle Erscheinungen des Seelenlebens objektiv beobachtet, kann den sprachlichen Tatsachen gerecht werden".

[6]Havers held the chair of General and Indo-European Linguistics until 1953, navigating the department through the critical years of the Nazi regime relatively safely by entering compromising concessions in terms of adherence to organizations to a minimal degree and keeping maximal possible distance from the ideological perversion of Indo-European studies at that time. His firm moral principles as a catholic Rhinelander may have rescued him from posing in the Alma Mater's hall of shame, so that he is not recorded in the literature reviewing the dire spirits of this tenebrous chapter of the past, e.g. Taschwer (2015).

2.   The Stöhr syndrome: inveterate polymathy

In the summer of 1898, one of the most polymathic representatives of modern thinking on the threshold to the twentieth century was hit by a cruel stroke of fate. At the age of 60, in the third year after his move from the German division of the Charles-Ferdinand University of Prague to the University of Vienna, where he had been offered the newly created Chair for the Philosophy of the Inductive Sciences,[7] Ernst Mach remained hemiplegic after a cerebral vascular accident and had to resign from teaching. One of his most brilliant younger colleagues, not much less polymathic than Mach himself, was appointed as his successor after Mach's formal retirement in 1901.

Adolf (also Adolph) Stöhr, born 1855 in St. Pölten (Lower Austria), is characterized in the biographical literature and in reference works mainly as a philosopher and psychologist. However, his intellectual activities were remarkably multifarious. According to Angetter (2010, 291), in 1873, at the age of eighteen and freshly graduated from high school (Gymnasium), he served as an official interpreter for Arabic, Persian and Turkish at the fifth World Exhibition in Vienna. This experience could have paved his way into diplomatic service, which he considered as an occupational goal – registering at first for the study of law – but the main subjects he eventually chose for study were botany, in particular plant physiology, and philosophy.

Stöhr's record of publications is impressive, with the center of gravity lying in the second half of his academic career and in the fields of logic, philosophy and psychology, covering such disparate topics as ethics, cell biology, elementary physics and visual perception. The bulk of monographs and textbooks he produced in the two decades following his appointment eclipsed his earlier works, two of which were devoted to the logical foundation of language phenomena, the first one on the theory of names (Stöhr 1889) and the second on the algebra of grammar (1898).

Although sometimes referred to as a linguist (e.g., by Austeda 2006, 251), Stöhr is not recorded in prosopographical or biographical handbooks of linguistics (e.g., Auroux & Stammerjohann 2009). This is not surprising in view of the fact that he remains unmentioned also in encyclopedias of philosophy,[8] even in the German-speaking area, e.g. Volpi (ed., 2004). Johnston (1972, 199) calls Stöhr "one of the least known of Austrian thinkers", while ironically citing from an enthusiastic dedication of Stöhr's disciple Felix M. Cleve, who reports that Ernst Mach considered Stöhr's oeuvre as something that "will be understood and admired in 200 years" (Johnston 1972, 437). In fact, Stöhr's works are cited frequently by Mach, always appreciative, adverting to their originality and scientific potential (e.g., Mach 1905, 113, where the problem of logical metalanguage is discussed).

While Stöhr's study on the theory of names is still recorded sporadically in bibliographies on theoretical onomastics, his monograph on the algebra of grammar has received attention only from some of its author's contemporaries, without further impact on the development of the field. An exception to the general neglect is Arens (1969, 531), by whom Stöhr is remembered *en passant* in a chapter devoted to the (exclusively) German

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[7]The official designation of the chair was "Philosophie, insbesondere Geschichte und Theorie der induktiven Wissenschaften".

[8]E.g. the *Stanford Encyclopedia of Philosophy*, https://plato.stanford.edu/cite.html (accessed March 1, 2017).

tradition of content-related grammar ("inhaltsbezogene Grammatik"), a direct derivative of Humboldt's conception of the "inner form of language". Arens puts Stöhr's ambitious quest for the essence of meaning on a par with Julius Stenzel's ideas on the foundations of concept formation (Stenzel 1925). However, similar to the case of Stöhr, this author's works on the philosophy of language (e.g. Stenzel 1934) are eclipsed by his prolificacy in other fields (Greek thinkers, metaphysics, and philosophical historiography, in this case), likewise received by contemporaries only (e.g. Cassirer 1929, 129), so that the appraisal remains ephemeral.

3.   The graticule of language

Stöhr's attempt to construct an account of grammar that is independent of any particular manifestation in terms of phonology, morphology and syntax departs from a strict division of two domains of semantics, viz., the theory of names and the theory of grammar. The latter, according to Stöhr, is autonomous in the sense that it is entitled to pretend that all problems of the theory of names are somehow settled, whether this be the case or not. Having himself produced a treatise on the theory of names roughly a decade before the publication of the work devoted to grammar, Stöhr could feel safe to have settled the issue of the semantics of underived terms to a degree that allowed him to tackle the problem of their combination.

Algebraic representation of the logical structure of expressions is implemented in its utmost strictness in Stöhr's approach: the lexical meaning or reference of the items as well as their sound shape is absolutely irrelevant to the representation, nor does their grammatical value in terms of parts of speech have any bearing at the algebraic level; only the logical content of operations is taken into account. The strictness of the abstraction from any linguistic guise of the items and relations in language structure is expressed implicitly by Stöhr when he refers to typological variation of languages as "structural style" ("Baustil").

The basic element of the algebra of grammar is the minimal sign, which is not called *morpheme*, since that term, coined in 1880 by Baudouin de Courtenay, was not yet current at the time (cf. Mugdan 1986, see also Luschützky 2000). Stöhr's definition, distinctively simple and straightforward, has escaped the attention of morphologists to the present day, so that it may be worth being quoted here: "Let a specifically configured combination of sounds which, according to general agreement in a language, denotes a particular sense, but cannot be further decomposed into meaningful combinations, be expressed algebraically with the sign *a*." (Stöhr 1898, 5).[9]

The body of Stöhr's treatise consists in a detailed analysis of semantic categories and relations reduced to their logical essence, encompassing syntax and morphology in their full extension, i.e. including intersentential links and word-formation. For example, the chapter on "incorporating derivations" contains a list of semantic patterns ranging from the formation of collectives of the type *man → mankind,* to concepts of motion and direction like *hill → downhill* or *home → homeward,* to causality, privativity and so on. For

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[9]"Eine bestimmt geordnete Combination von Lauten, welche nach allgemeiner Übereinkunft innerhalb einer Sprache einen bestimmten Sinn bedeutet, jedoch nicht weiter in sinngebende Combinationen zerlegt werden kann, sei algebraisch durch das Zeichen *a* ausgedrückt".

the exemplification of his algebraic formulae with real language forms, Stöhr relies mainly on Ancient Greek, with specimens from other languages also interspersed, e.g. Hungarian. For instance, motivation as a component of an event is illustrated with the Greek constructions *Διὰ τὴν νόσον* 'because of the illness' and *τῆς ὑγιείας ἕνεκα* 'for the sake of health', with the comment that one and the same event may be induced by an existent illness as the driving force, but at the same time have the purpose to bring about health.

Fritz Mauthner, one of the most sober-minded of all sceptics and most radical of all relativists ever harbored by philosophy of language in its enchanted castle, could not resist referring to Stöhr's reasoning as a showcase example for illicit generalization of logical categories over grammatical facts, yet shared with Stöhr the admiration for Mach and his contempt for metaphysics. In the third volume of his *Beiträge zu einer Kritik der Sprache*, devoted to the relationship between language and logic, Mauthner dismisses Stöhr's endeavor to develop an algebraic ratiocination of language as an example for the futility of any attempt to capture the layout of grammar by means of logical analysis (Mauthner 1913, 4). The gap between Stöhr's "artificial language" ("Kunstsprache") and the grammars of "real languages" ("Grammatiken der Wirklichkeit") is judged as unbridgeable by Mauthner, who acknowledges Stöhr's incisive discernment but at the same time curls his lip at the undue faith of the author of *Algebra der Grammatik* in the kind of logic that he considers to be unique ("er ist zu gläubig für d i e Logik und ihre Algebra" [emphasis in original]). Mauthner misses exhaustiveness in the logical relations encoded by Stöhr's algebra, but this is a drawback of which any formal account of grammar can easily be accused, and the reproach is also unjust in view of Stöhr's explicit admission that his catalogue of derivational types is incomplete (Stöhr 1898, 15).

Stöhr believed in the practical applicability of his algebra as a pivot for interlingual conversion, especially between typologically distant languages, thus anticipating the endeavors to program algorithms for automatic translation. He compared his system of language-independent representation of meaning to ideographic writing systems, which can be interpreted by speakers of any language (Stöhr 1898, 137), and recommended his system as the basis for a future artificial language ("wirkliche Kunstsprache") that would bridge all the disparities of human tongues.[10]

Despite of its notational peculiarities and technical ambition, Stöhr's text is agreeably accessible thanks to the clarity of his unpretentious style, but at the same time it is radically hermetic. More than in other works, he refrains from spelling out his position in the context of previous and contemporary research. The twenty-four chapters of the treatise on grammar do not include any reference to philosophical traditions or to linguistic research of the time; there are no footnotes and no references to any literature. This is probably a deliberately chosen allure, meant to signalize the genuinely philosophical, i.e. unpreconditioned character of his thinking, and it evokes a semblance to the style of the young Wittgenstein's *Tractatus*, although it lacks the harshness and apodictic appeal of this distinctive piece of writing that was published in the year of Stöhr's death in German as *Logisch-philosophische Abhandlung* and struck the attention of the Vienna Circle.

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[10]Because of this aspect, Stöhr's algebra would have deserved to be mentioned in Eco (1993), but that work concentrates on the more remote history of the idea of a universal language.

The direct involvement of Stöhr in the genesis of the Vienna Circle was impeded by his fatal illness (he died in 1921 at the age of 66).[11] After Otto Neurath's expulsion from Germany, where he had been imprisoned under the accusation of aiding and abetting high treason, the formal founding of the Vienna Circle was prepared by him and his brother-in-law Hans Hahn, who had moved from Bonn to hold the chair of Mathematics in Vienna (Stadler 2015, 41). According to Sigmund (2015, 84), in early 1921 they were in search of an exponent of academic philosophy who would revalue the image of the enterprise, aiming at Stöhr, but due to his unavailability it took a year until this role was taken over by Moritz Schlick.

The lack of attention that Stöhr's *Algebra der Grammatik* received after its publication, in an era when the pathways along which the philosophy of language developed were full of blind bends and linguistics was not receptive for approaches of the kind, has the sole benefit of having left this text a refreshing *trouvaille* for the erudite connoisseur, a species of which the consignee of this *donum natalicum* is a most sublime representative.

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[11]For biographical details see Austeda (ed., 1974). In 1954 a Street in Strebersdorf, a part of the 21st district of Vienna, was named after Stöhr, in a neighborhood that is remarkably topical, remembering a whole band of coevals and colleagues of Stöhr in the Philosophical Faculty of the Alma Mater Rudolphina: Stöhrgasse departs from Arnimgasse, which is not named after the famous romantic poet Achim von Arnim, but after his great-nephew Hans von Arnim (1859-1931), a classical philologist and colleague of Stöhr from 1900 till 1914; it crosses Miklosichgasse, named after Franz von Miklosich, the founder of Slavic philology, and runs parallel to Bonitzgasse, named after Hermann Bonitz, the first professor in the Department of Classical Philology, founded in 1849. From Bonitzgasse departs Jirečekgasse, named after Josef Konstantin Jireček, a Professor of Slavic Philology coeval to Stöhr. West of Stöhrgasse, Arnimgasse and Miklosichgasse unite to Stowassergasse, named after Joseph Maria Stowasser, the author of the Latin dictionary from which, since its first publication in 1894 to the present day, almost all Austrian grammar-school pupils, including the author, have acquired their Latin vocabulary.

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