Baltic International Yearbook of Cognition, Logic and Communication

Volume 4 *200 YEARS OF ANALYTICAL PHILOSOPHY* Article 11

2008

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Recommended Citation

Peckhaus, Volker (2008) "Language And Logic In German Post-Hegelian Philosophy," *Baltic International Yearbook of Cognition, Logic and Communication*: Vol. 4. https://doi.org/10.4148/biyclc.v4i0.135

The Baltic International Yearbook of
Cognition, Logic and Communication

August 2009 Volume 4: *200 Years of Analytical Philosophy*
pages 1-17 DOI: 10.4148/biyclc.v4i0.135

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LANGUAGE AND LOGIC IN GERMAN POST-HEGELIAN PHILOSOPHY

ABSTRACT:The German debates concerning the need for a reform of logic in post-Hegelian times took place under the label "The logical question", a label introduced by Friedrich Adolf Trendelenburg. The main objective of these debates was to overcome the Hegelian identification of logic and metaphysics without re-establishing the old Aristotelian-scholastic formal logic. This paper presents the positions developed by Friedrich Adolf Trendelenburg, Otto Friedrich Gruppe, and Carl v. Prantl, each of whom advocated the importance of language in logic in order to introduce a more dynamical element into the alleged static character of formal logic.

1. INTRODUCTION

It is commonplace today to say that analytical philosophy did not arise from naught. The philosophies, e.g., of Gottlob Frege, George Edward Moore and Bertrand Russell were strongly embedded in the broader philosophical context of their times. It is clear that the German mathematician and the Cambridge philosophers were influenced by other contemporary philosophical discussions. It is, however, difficult to provide conclusive evidence for exactly what these influences were. One can argue for a kind of genetic approach to the history of ideas regarding the conceptions of interest as elaborations of or critical rejoinders to

particular theories. One can also try to reconstruct some sort of causal chain of influences by listing teacher-student relationships or identifying networks of quotations. The problem is that, as a matter of fact, the web of influences operating on these philosophers was much more complex than can be definitively reconstructed based on the historical evidence we possess, so the field is open for speculation.

When speaking of the philosophical sources or influences of many theories the notion of the "context" of a theory should be taken seriously. In respect to Bolzano's role in the history of analytical philosophy, for example, it might well be worthwhile to present a broad picture of the philosophical debates on topics relevant for our understanding of Bolzano's philosophy, even where the participants in these debates might not have read Bolzano or were not even themselves read by Bolzano. This method does not provide any proof of causal influences but it uncovers the relevant scene of discourses surrounding a given thinker or idea, giving evidence at least of family resemblances among theories and providing hints about candidates for closer inspection.

This paper is devoted to an (informal) group of 19th century German philosophers who can be characterized as "Hegelian anti-Hegelians", i.e. philosophers who were familiar thinking in the context of a Hegelian setting in philosophy and who took up some of Hegel's ideas but who directed their writing nevertheless against the Hegelian system. In particular the paper is concerned with positions about the relation between logic and language presented in German debates on the so-called "logical question" (cf. Peckhaus 1997, ch. 4; Peckhaus 2007). These debates aimed at overcoming Hegel's identification of logic and metaphysics without, however, re-establishing the old Aristotelian-scholastic paradigm of formal logic. The study of language with its dynamical aspects was regarded as an alternative to the allegedly static character of the formal structures dealt with in traditional logic. The suggestions of Friedrich Adolf Trendelenburg (1802–1872), Otto Friedrich Gruppe (1804–1876), and Karl von Prantl (1820–1880) are presented in what follows as examples. Although these authors can hardly be counted among the ancestors of modern logic, they nevertheless stand for important steps in its development from a theory of reasoning to a theory of conceptual structures. These attempts at combining aspects of lan-

guage development with logic hinted at possibilities of using logic to analyze language.

The first section of this paper sketches the situation of German logic in the early 19th century, which led to debates about the need for reforms in logic. Then the positions of the three advocates of a combination of logic and language mentioned above will be characterized. What will become clear is that the ideas of these thinkers can be regarded as at least partial precursors to the linguistic turn, paving the way toward a recognition of the greater significance of the role of language in philosophical analysis.

2. THE LOGICAL QUESTION

The philosophical discussion in early 19th century Germany was determined by Kant and by the transformations of Kantian philosophy suggested by Hegel and other German idealists. In the preface to the second edition of his *Kritik der reinen Vernunft* of 1787 Immanuel Kant (1724–1804) wrote that logic had followed the safe course of a science since earliest times. For Kant this was evident because of the fact that logic had not been allowed to take any step backwards since the time of Aristotle. But he regarded it as curious that logic had been unable to take any step forward either (Kant 1787, B VIII). Logic therefore seems to be closed and completed. Formal logic - in Kant's terminology the analytical part of general logic - played no prominent role in Kant's system of transcendental philosophy. Its role was that of a negative touchstone of truth, as he stressed (B 84).

Georg Wilhelm Friedrich Hegel (1770–1831) went further than Kant, denying completely the relevance of formal logic for philosophy (Hegel 1812/13, I, Introduction, XV–XVII). Referring to Kant he maintained that from the fact that logic had not changed since Aristotle one could equally well infer that it needed a complete revision (ibid., XV). Hegel created a variant of logic that he regarded as the foundational science of his philosophical system, defining it as "the science of the pure idea," i.e., the idea in the "abstract element of reasoning" (1830, 27). For Hegel, logic thus coincides with metaphysics (ibid., 34).

It was against this background that after Hegel's death the philosophical discussion of formal logic in Germany started again. This

discussion, which centered on the question of the need for a reform of logic that would take it beyond both traditional scholasticism and the metaphysical understanding of logic developed by Hegel, stood under the label of "the logical question", a term introduced by the Neo-Aristotelian Friedrich Adolf Trendelenburg (1802–1872). The debate started after Trendelenburg had published a paper entitled "Zur Geschichte von Hegel's Logik und dialektischer Methode" (On the History of Hegel's Logic and Dialectical Method) in 1842. The subtitle of this paper was "Die logische Frage in Hegel's Systeme" (The Logical Question in Hegel's System). What was the logical question according to Trendelenburg? He formulated this question explicitly towards the end of his article: "Is Hegel's dialectical method of pure reasoning a scientific procedure?" (Trendelenburg 1842, 414). In answering this question in the negative, he initiated a serious reassessment of the status of formal logic within the theory of human knowledge without however proposing a return to the old (scholastic) formal logic. In the course of the subsequent debates the term "the logical question" was used in a less specific way. Georg Leonard Rabus, the early chronicler of the 19th century discussion of logical reforms, wrote that the logical question emerged from doubts concerning the justification of formal logic (Rabus 1880, 1). Wilhelm Leonard Rabus discussed the contributions of 248 authors in his report *Die neuesten Bestrebungen auf dem Gebiete der Logik bei den Deutschen und Die logische Frage* (The Most Recent Effort of the Germans in the Field of Logic and The Logical Question) of 1880. One of the main objectives of this debate was the search for alternatives to formal logic. Though many different thinkers were involved in the debate over the "logical question" in what follows I will draw out the major themes, issues and significance of the discussion by focusing on three significant participants.

3. FRIEDRICH ADOLF TRENDELENBURG

Friedrich Adolf Trendelenburg (1802–1872) was a mighty professor of moral philosophy and pedagogy in Berlin who dominated the University of the Prussian Capital for more than a generation. He was the major figure in post-Hegelian German logic, having inaugurated the debate over the logical question by offering a destructive criticism of

Hegelian logic and also of formal logic. His eminent *Logische Untersuchungen* (Logical Investigations) published in two volumes (Trendelenburg 1840) were not intended as a logical textbook. Rather, he wanted to provide a critical discussion of contemporary logic and present some ideas of his own, a discussion which made sense, as he wrote, "in the times of a culminating absolute logic" (Trendelenburg 1840, preface to the 2nd ed., VI).

Superficially viewed one could say that Trendelenburg remained close to Hegel. Like Hegel Trendelenburg saw a close connection between logic and metaphysics. But for him logic and metaphysics do not coincide. They cannot be identified as Hegel had claimed. They are nevertheless interrelated and form a unity. It is the task of philosophy to investigate and present the idea of the whole in its parts, and the idea of the general in the particular. Philosophical analysis shows that there are two basic elements fundamental to all scientific disciplines. All particular subjects of science are derivates of general being, all particular methods are specializations of perceiving reasoning ("erkennendes Denken"), i.e, reasoning as such. The first relation leads to metaphysics, the second to logic (Trendelenburg 1840, 6). Only the kind of reasoning that makes it possible to snuggle up to the object and by means of this to grasp it is represented in the different scientific methods of research, properly understood. Such reasoning allows us to establish that something cannot be different from what it is, i.e., it raises the real up to the necessary ("Nur das Denken vermag [...] das Wirkliche zum Nothwendigen zu erheben"). But in the necessary the being is represented. Without being there is nothing necessary (Trendelenburg 1840, 13). Thus, there is a unity between thought and being, logic and metaphysics, but no identity. The unity of logic and metaphysics results from the unification of the relations between reasoning and being. Therefore, logic and metaphysics are both the *theory of science*, but also the basic science, *philosophia fundamentalis*. What connects metaphysics and logic? It is movement, a phenomenon which can be found in both the domain of being and the domain of reasoning (Trendelenburg 1840, 142). Movement in reasoning is constructive movement. It is working with intuitions. The one who looks at a mountain constructs the concept of a mountain by moving his eyes ("The mountain rises"). Constructive reasoning makes it possible for the mind to take

possession of the external world (Trendelenburg 1840, 532). For human beings there is no pure reasoning. By analogy to the fact that a soul without a body has no life there is no reasoning without intuition. "Therefore the first principle of reasoning has to be such that it leads into intuition and that it produces its possibility" (Trendelenburg 1840, 531). For Trendelenburg, this principle is movement.

According to Trendelenburg, Kant had created formal logic by establishing a clear distinction between matter and form (Trendelenburg 1840, 15). Formal logic intends to conceive the forms of reasoning as such without considering the contents in which the forms appear. It intends to understand concept, judgment and inference purely with the help of activities of reasoning related only to itself, not to matter or contents (Trendelenburg 1840, 16). In this understanding formal logic can be treated in isolation, but then the close connection of form and content is given up. This is the reason for Trendelenburg's heavy criticism of the formal logicians of his time. He holds, against their formalistic doctrine, that logic is always logic of content. Logic has formal qualities, but these formal features cannot be isolated from content matter, and therefore logic cannot be isolated from metaphysics. It is noteworthy in this connection that in Trendelenburg's opinion such unity of logic and metaphysics can already be found in Aristotle's *Organon*, which, according to Trendelenburg, does not mainly deal with formal logic. In Aristotelian syllogistics the demanded unity of metaphysics and logic seems to be already present (Trendelenburg 1840, 390).

Attempting to develop a logic of content within the old paradigm of logic as the theory of correct reasoning does not immediately imply that language is or needs to be involved. An understanding of Trendelenburg's position with respect to the relation between logic and language can however be derived from his work on Leibniz; for Trendelenburg saw the unity of metaphysics and logic that he demanded to be already present in Leibniz's logic.

Trendelenburg was one of the main figures responsible for the discovery of Leibniz's philosophy and logic in the middle of the 19th century. It was part of his duties as secretary of the Philosophical-Historical Class of the Royal Academy of Science at Berlin to care for the memory of Gottfried Wilhelm Leibniz, the famous founder of the academy. One of Trendelenburg's great feats in this respect was a lecture he gave in

1856 on the occasion of a commemorative day at the Berlin Academy of Science. In this lecture "Über Leibnizens Entwurf einer allgmeinen Characteristik" ("Leibniz's Sketch of a Universal Characteristics"; Trendelenburg 1857) he presented Leibniz's *characteristica universalis* and his philosophical calculus to a broader public, a presentation which became the reference point for mathematical logicians at the end of the 19th century - Gottlob Frege and Ernst Schröder, for instance, when they recognized Leibniz's anticipations of their own logical systems.

In the beginning of this lecture Trendelenburg addresses the relationship between epistemology and language. He argues that the progressive human spirit does not, in its search for knowledge, owe as much to the existence of any real thing as it does to the linguistic sign or representation of that thing. The sign evokes affects and emotions with the help of gestures and sounds. It has according to the laws of the association of ideas the power to create certain intuitions and to order them in the one who hears or applies them. The relation between cognition and language is dialectical: on the one hand reasoning becomes free through signs, while on the other hand it will be determined by them (Trendelenburg 1857, 37–38).

Trendelenburg sees in Leibniz' conception of a universal characteristics his demand for a unity of metaphysics and logic fulfilled. According to Leibniz, this universal theory of signs together with a *calculus ratiocinator*, a tool designed for calculating with concepts, should be used as an *organon* for general science, a device for generating new truths from given truths (*ars inveniendi*), but also for evaluating given hypotheses and thus for solving disputes (*ars iudicandi*). The metaphysical significance of the *characteristica universalis* is to be found in the fact that it attempts to produce a non-arbitrary one-to-one correspondence between simple concepts, on the one hand, and the simple signs that represent them, on the other. If successfully completed such a language would make it possible to construct all possible complex concepts from the list of simple concepts. The tools Leibniz proposed using for this task were combinatorial and calculative methods that would be applied directly to the simple symbols of the language. Trendelenburg, though sympathetic to the majority of Leibniz's program, was skeptical of these methods. He even suggests omitting this part from Leibniz' program (Trendelenburg 1857, 55):

> If the side of calculation, invention and discovery is eliminated from general characteristics there remains an attractive logical task: the sign, distinguishing the elements and, with this, being distinct and avoiding contradictions, the reduction of blind intuitions to the sharply thought contents, the complex ones to the simple ones contained in them. There remains the task of finding a sign which is, similar to our number script, determined by the concept of the thing itself.

This is a utopian metaphysical program, as Trendelenburg conceded, because it presupposes that the analyses of given concepts can be brought to an end, a task that was proved to be impossible under the given state of science (ibid.). Nevertheless Leibniz's idea of *characteristica universalis* might have provided a methodological tool for Trendelenburg's logic of content. For it was meant to provide a way to create a linguistic representation of all possible content matter together with the relations between all its elements, a linguistic mapping of conceptually reconstructed reality.

4. OTTO FRIEDRICH GRUPPE

Otto Friedrich Gruppe was a big critic of Hegelian philosophy and perhaps an even bigger critic of speculative philosophy of any kind (cf. Peckhaus 2004). After Fritz Mauthner's praise of his first philosophical book *Antäus* (Gruppe 1914) originally published in 1831 the year of Hegel's death, Gruppe is sometimes regarded as an important forerunner of modern philosophy of language and philosophy of science, even as one who played a role in laying the foundations of Logical Positivism and the philosophy of the Vienna Circle (Cloeren 1971, 17), a qualification which can justly be doubted. Important to understanding Gruppe's attitude towards logic are his two other books on philosophy: His *Wendepunkt der Philosophie im 19. Jahrhundert* (Turning Point of Philosophy in the 19th Century) of 1834 and his *Gegenwart und Zukunft der Philosophie in Deutschland* (The Present and Future of Philosophy in Germany) of 1855. Both books give logic a central place in Gruppe's criticism of speculative philosophy. The reason for this may well have been the fundamental role of logic in Hegel's system. Gruppe how-

ever not only criticized Hegel's identification of logic and metaphysics he also demanded a radical revision of the entire logical tradition from its beginnings in Aristotle. It is remarkable that he should have seen Hegel's logic to belong to this tradition.

In his *Wendepunkt*, Gruppe wrote that he had declared war on all those activities of German men which were called speculative philosophy and which claimed dominion over science under this name (Gruppe 1834, 1). His opposition was directed against metaphysics and speculative philosophy, understood as the philosophy that attempts to develop knowledge out of pure concepts, be it by logical inferences from concepts or by construction from concepts (Gruppe 1834, 12). He looked for a logic that represented a model for "the true act of judging, for progressive knowledge" (Gruppe 1834, VII). In his *Wendepunkt* (turning point) he had attempted to arrive at an understanding of such a true act and at the true method of reasoning and understanding that involved it. The title of his book, "turning point", did not refer to a new evaluation of the historical development of contemporary philosophy, but to Gruppe's own renunciation of the old paradigm of philosophy (*ibid*.). This turning away was made possible, according to Gruppe, by two recent developments in philosophy and the sciences. The first was the so-called Baconian method, i.e. Francis Bacon's inductive method, the predominant method in science. The second was new research on the historical development of languages, which was very fashionable during Gruppe's time. Gruppe's new paradigm for logic was language which according to him helps illuminate and make possible the true nature of the act of understanding. "There is no reasoning without language and there is no language without reasoning. They are related with each other" (Gruppe 1834, 28).

Gruppe develops his own logical theory in the fourth chapter of the *Wendepunkt*. He reports that traditional logic deals with judgments *and* inferences but that it obviously regards inferences as more important for the progress of understanding. Therefore the theory of inferences forms the focus of traditional textbooks on logic "as if we could expect salvation, as if truth could be secured, progress of understanding supported, and above all mistakes prevented" simply by studying inference (Gruppe 1834, 34). Gruppe disagrees on all points. For him the focus on the traditional doctrine of inferences should be abandoned. It

should be replaced by a focus on the theory of judgments, and judgments should be formed according to the example of scientific propositions. Judgments like "all humans are mortal" should be exchanged with judgments like "the spark is electrical." The latter judgment relates an isolated phenomenon to a class of phenomena which is itself isolated. This isolation can be transcended by connecting new phenomena with other phenomena that are also members of the class (Gruppe 1834, 35–36). What could this mean? Although a judgement like "All men are mortal" is not analytic in the Kantian sense, i.e. the concept of mortality is not contained in the concept "man" its contents can hardly be regarded as new because in communicative practice the idea of a human being cannot be separated from the idea that a human being is mortal. In Gruppe's view judgements in empirical sciences differ. A judgement like "All sparks are electrical" combines concepts from classes of phenomena which can be dealt with in isolation. It is possible to discuss sparks without relating them to electricity. It is also possible to discuss electricity without referring to sparks. The judgement relates both to each other and provides new information by connecting isolated classes of phenomena.

Gruppe furthermore opposes the opinion that the theory of concepts has to precede the theory of judgments. Proponents of this position hold that judgments are simply combinations of concepts. Against this opinion Gruppe stresses "that concepts are the results of judgments and that they are continuously extended with the judgments and only explained with them" (Gruppe 1834, 43). In traditional logic concepts are regarded as something fixed, determined by definitions, in any case something given, complete. But, Gruppe maintains, concepts are something dynamical, changing with the on-going acts of reasoning (Gruppe 1834, 57).

Gruppe's special target is Aristotle's logic, the source of the miserable state of 19th century logic. He shares the view that Aristotle's logic was fruitless, common among contemporary critiques of formal logic and that it does not prevent us from committing many serious fallacies, as can be shown by experience. But Gruppe goes further, claiming that Aristotle's logic is false, an outrageous evaluation as he concedes, contradicting the standard view. It is false because it fails to represent the true act of reasoning. Its apparent correctness is nothing else than mere

tautology, i.e. it has no contents and can never lead to knowledge. The act of synthesis is kept external. Aristotle's logic and with it all other logical conceptions that followed deal only with tautologies, they contain no knowledge, and thus imply no progress (Gruppe 1834, 140). Gruppe claims that a standard syllogism like "all humans are mortal, Cajus is human, therefore Cajus is mortal" (i.e. a mood BARBARA with individual concepts) is no inference at all because if one says "all", then some are already included. "This is immediately clear by the assumed validity of this word and I do not need any inference for it" (ibid.). Obviously Gruppe does not really understand what is going on in logic. He confuses the validity of a syllogism of mood BARBARA in its application to individual concepts with the justification of this inference using the *dictum de omni*, according to which something valid for all is also valid for every individual comprised. Gruppe criticizes the claim that the inference has formal validity. He concludes: "Syllogistic inferences are correct in the case that they are tautological and empty. In all other cases they are useless and wrong" (Gruppe 1834, 142), wrong because it is not able to model real acts of reasoning.

In his last book on logic (Gruppe 1855), twenty years later, Gruppe presents a sort of historical contextualization of his ideas. He takes notice of the 2000 years of development of logic since Aristotle, without giving up the essentials of his criticism. He knows the logical calculi of the pre-Kantian time, in particular the Leibnizian attempts published in Erdmann's edition (Leibniz 1839/40). He mentions that Leibniz's method is intended as a "general art of investigating and inventing, covering at the same time observation and experiments". In Leibniz's calculi he sees the youthful hopes in action, which the mature man could not fulfill. He concludes that the fact that Leibniz gave up these attempts in later years "testifies to the impossibility inherent in the matter itself" (Gruppe 1855, 130–131). He mentions Johann Heinrich Lambert's *Neues Organon* (New Organon; Lambert 1764) and his work on logic and the reform of metaphysics (Lambert 1771), but thinks that Lambert's *Organon* in no way comes up to the Aristotelian model. He also refers to the disdain for logic in post-Kantian times, not due to the falseness of formal logic, but to the confusion caused by the vast number of different conceptions. He therefore welcomes the attempts to go back to the "pure Aristotle" referring to Adolf Trendelenburg's publication of extracts of Aristotelian formal logic in Latin language (Trendelenburg 1836). The confusion could be removed following this strategy, Gruppe says, but one should consider the fact that since Aristotle's writings 2000 years have gone by. Trendelenburg's edition clearly shows the differences in time and of standpoints (Gruppe 1855, 156). Nevertheless given all these developments Gruppe stresses the falseness of Kant's dictum that logic was completed with Aristotle. Gruppe concludes: "As contradictory and ruinous as the existing logic might be, in 2000 years of development it went far beyond Aristotle, even if it could furtively and artificially manifest progress only on false foundations" (264).

5. CARL VON PRANTL

Carl von Prantl (1820–1888) is best known for the four volumes of his *Geschichte der Logik im Abendlande* (History of Occidental Logic) published between 1855 and 1870, the first history of logic and still a standard work in the field, covering the period from ancient times to the 16th century. It has its merits even today for its extensive quotes from the treasures of logic textbooks he found in the Munich libraries. He regarded his historiographical work as a service for science – and as a heavy burden. In the preface to the fourth volume, which deals with late Scholastics, he wrote that he often felt reminded of Lessing's saying "No pain is in vain if it spares pain for others; I have not read the useless uselessly, if from now on the one or the other has not to read it again" (Prantl 1855-1870 Vol. 4, III). Prantl stressed that he had always reminded himself to treat his subject in such a way that in the near future there would be no need for writing a history of logic again. The reasons for this are given in passages of the preface where he evaluates the topics treated. He wrote that certainly all readers will feel that at least nine tenths of everything presented in this volume rests upon a worthless and even brainless confusion.

This attitude toward the topic of his research is a sign of his skepticism concerning the paradigmatic logic of his time. It is therefore not astonishing that Prantl entered the debate on the reform of logic. Already in 1849 he had published a booklet entitled *Die Bedeutung der Logik für den jetzigen Standpunkt der Philosophie* (The Significance of Logic for the Present Standpoint of Philosophy, Prantl 1849). In the first

part he discussed critically the logic of his time, a discussion that led him to an alternative "Sketch of a Linguistic Logic". In the critical part, he argued above all against formal logic, in particular against Friedrich Fischer, who had published a textbook on logic in 1838 entitled *Lehrbuch der Logik für akademische Vorlesungen und Gymnasialvorträge* (Textbook of Logic for Academic Courses and Lectures at Secondary Schools), but also against the Kantian logician August Twesten, and against one of the most important Herbartian philosophers of the time, the mathematician and philosopher in Leipzig, Moritz Wilhelm Drobisch. He rejected formal logic because "it is not capable of explaining the basic problem, i.e. the essence of human reasoning and reasoning as such" (Prantl 1849, 5). It contains "for the most part that tangled mass of Medieval Scholastics in whose nominalism material reasoning almost perished" (ibid.). It could not achieve its claim to serve as a formal organon of science because it is not true that "'abstract' reasoning" is common to all sciences; what is common according to Prantl is rather speech and language (Prantl 1849, 6–7). These criticisms show the direction of his own philosophy. Prantl started from Hegel but rejected the consequences of Hegel's dialectical idealism (cf. Prantl 1849, 17–43). He was open to Herbart's Critical Realism (ibid., 68–71) and Krause's philosophy of identity (ibid., 84–87), but also interested in Friedirch Adolf Trendelenburg (107–112), and Hermann Lotze (115–118).

In the much shorter systematic part, his sketch of a linguistic logic, Prantl neither accepts a pure logic of content nor a strict distinction between form and content. A future philosophy, according to Prantl, has to accept the facts of dialectical philosophy and of the primacy of language over reasoning. He writes: "*Language* is that synthesis which has to develop logic as the science of human reasoning " (Prantl 1849, 128). For the construction of logic this means (Prantl 1849, 133–134):

> Usually the *synthesis* appears in the form that used to be called the sentence; for logic this synthesis is called judgment. The *thesis*, which is singled out by the synthesis, is the word set out autonomously; for logic it is called *concept*. The aim of the dialectical development is the *antisynthesis* in which the word consciously returns into the sentence and its relation to it; this return is called inference.

Twenty six years after this first attempt in his "Reformgedanken zur

Logik" ("Thoughts on the reform of logic") of 1875 he still wanted to leave the "expatiated path of the common formal school logic" (Prantl 1875, 160). He announced his view of the "logic of the future" (Prantl 1875, 159). He again advocated the primacy of language viewed as integrated into a dialectical setting. The main task of philosophy on his view is to find the essentials that unite oppositions. Language, e.g. is the inseparable unit of thought and sound (Prantl 1875, 162). The development of language depends on the temporal sense of humans. Prantl looks for the essential unit of oppositions. The temporal sense is expressed in verbs of sentences (Prantl 1875, 187). This proves the significance of verbs in language. The sentence expresses language as containing thoughts. It is regarded as the realization of the force of reasoning in the natural sound (Prantl 1875, 189). Applied to logic, this means that the theory of judgment has to precede both the theory of concept and the theory of inference (Prantl 1875, 190). Therefore the traditional order of logic as the theory of concept, judgment and inference has to be reversed. From a cognitive perspective the "force of reasoning", the thinking movement, finds its expression in sentences as representations of thoughts.

The linguistic element of Prantl's logic can also be found in his interpretation of logical mistakes. According to Prantl, such mistakes rest on the "insufficient or wrong exploitation of the thinking value of language containing thoughts" (Prantl 1875, 203). Tools for the logical analysis of mistakes in logic are grammar and semantics. The reason is that the theory of judgment is regarded as the theory of the forming of concepts by cognitive acts. In such a theory grammatical rules can be understood as rules for correct reasoning. Mistakes can be regarded as violations of such rules.

It is remarkable that Prantl also took notice of the new mathematical logic. In 1886 he published a paper entitled "Ueber die mathematisirende Logik" ("On the Mathematized Logic"). By "a mathematizing logic" he understands a presentation of the laws of reasoning that rest in principle on mathematical intuitions. It is neither a "mathematical logic", i.e., a special logic of mathematics, nor a "logical mathematics", because this would imply that there is an illogical mathematics (Prantl 1886, 497). Prantl distinguishes two types of mathematizing logic, the first stands for the attempt to transfer the mathematical method

to philosophy; the second is a mathematization of logic proper. He finds precursors in early modern logic, in Gottfried Wilhelm Leibniz, Gottfried Ploucquet, Johann Heinrich Lambert and Christoph Gottfried Bardili, but also takes the British variation of logic seriously, represented by George Bentham, William Hamilton, Augustus De Morgan, George Boole, and finally William Stanley Jevons. He also sees precursors in inductive systems such as those suggested by John Stuart Mill and Herbert Spencer. It is clear that he does not accept this kind of logic. He criticizes the one-sided focus on extensions of concepts or thoughts that leads to the quantificational paradigm of the authors mentioned. The quantificational categories that ensue from these systems hardly give access to the essence of concepts and thoughts and, with this, the essence of being. He conceded the power of mathematics in quantitative fields, but concerning logic he says (Prantl 1886, 512):

> The qualitative essence of things and the qualitative determinations of thought objects are surely a topic of thought operations (and therefore of the logic developing their laws) equal to the quantitative.

Sticking to the old categories, he demands that quality and quantity each have their special place and role in language expressing thoughts. It is therefore not astonishing that he regards the quantification of the predicate celebrated as one of the main advances of 19th century logic as the main problem of contemporary logic, and as the source for the one-sidedness of mathematical logic (513).

6. CONCLUSIONS

The authors presented still regard logic as a theory of correct reasoning. In its manifestation as formal logic the latter was seen as paradigmatically represented by Aristotelian-scholastic syllogistics. A main point of criticism held in common by these authors was their rejection of the doctrine that the laws of formal logic are independent of the content of the sentences or judgments involved. The aim of most critiques was to model the dynamic aspect of reasoning, i.e. reasoning as a process. This led to a focus on language as the expression of thought. The dynamics of language was considered to be manifest in its variability and its historical development. Logical investigations were enriched by semiotic,

grammatical, and semantic considerations. The architecture of logic itself was changed. The traditional core, the theory of inferences with syllogistics at its center, was pushed into the background. The new core was the theory of judgments, as in Frege's *Begriffsschrift* (Frege 1879), some years later.

The theories discussed indicate that and how linguistic aspects moved into the interest of philosophical debates on logic in 19th century Germany. Contrary to the proponents of formal logic, the authors attempted to overcome Kant's strict distinction between form and matter in logic. They demanded that the quantitative and qualitative aspects of the expression of thoughts be unified. Their picture of language combined therefore syntactical, semantical and – because they considered linguistic changes - even pragmatical aspects. This goes beyond the syntactical focus of formal logicians of the time, which has to be acknowledged even if one concedes the significance of the semantical approaches in Frege's logic or of the early model theory that can be found in the algebra of logic. It fits into this picture that metaphysical questions were not eliminated, as the re-discovery of Leibniz's *characteristica universalis* shows. Given all these aspects the authors can be regarded as early precursors of the linguistic turn.

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