Logic and object theory in 19th century: from Bolzano to Frege

Yury Yu. Chernoskutov[1]

abstract. The milestones of the object theory formation in the course of 19th century discussions in philosophy of logic are considered. The view, that the process mentioned was typical first of all for the Austrian tradition in logic and philosophy, is exposed. The hypothesis of the possible impact of that kind of approaches on the development of Frege's logical ideas is examined.

Keywords: object theory, content and object of concept, school of Brentano, Frege

1 Introduction

In the paper we are going to trace the formation of the object theory and its connection with the development of logic in 19^{th} century. There were three views on the stuff and subject of logic in that century. The first prevailed on the continent, its general tenets were found by I. Kant. The (pure) Logic was considered here as a science of the form of thought. The principles of second were laid down by R. Whately, and in fact that principles formed the paradigm of British tradition in the philosophy of logic. The logic was considered here as an inquiry of reasoning, and its formal character was explained by the fact that it deals with the form of language expression. The third approach, which I'd want to designate as 'objectual', has been developed mainly in the framework of the Austrian tradition of logic and philosophy. According to this view, logic is a theory of science (Wissenschaftslehre); logic may be called formal, because it deals with the form of object in general. The Austrian tradition was not so influential and wide-known as both former. Moreover,

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up to now it has been rarely identified as independent tradition. I hope that filling that gap will provide more adequate look on the process of modern logic formation.

Kant's underestimate of the possibilities of *pure logic* is well-known. According to him, it examines forms of understanding a priori, i.e. of the cognitive faculty, which does not have direct connection to any object of knowledge and consequently, being viewed in itself, is contentless. It is only transcendental logic which provides us with the capacity to deal with the 'object in general'. Afterwards the arguments of Kant were reinforced by Adolf Trendelenburg, due to whom, to the word, the term *pure logic* was changed by the habitual nowadays label *formal logic*. This had led to the situation that in the course of 19^{th} century proper *formal logic* did not inspire German philosophers: one should hardly point learnbook or monograph titled as *Formale Logik* and authored by German writer.

2 J.F. Herbart

The first important move to the objectual interpretation of the subject of logic was made by German philosopher Johann Friedrich Herbart (1776–1841) and his school. He did not made object the subject-matter of logical inquiry; his move consisted in shifting that subject-matter from the sphere of epistemology or psychology in the direction of ontology. He is wide-known due to the 'Herbartianism' in pedagogy, history of psychology acknowledge his merits as one of pioneers in mathematization of psychology; but in the histories of philosophy he attracts very few attention nowadays. The situation contrasts sharply to the role his ideas played in the progress of philosophy during his life-time. Herbart was one of the first influential antagonists of German idealism and for a long time his school was in fact the only force advocating rational spirit in philosophy on the background of nearly exclusive domination of speculative constructions. He defined philosophy as 'reworking [bearbeitung] of concepts'. Accordingly, different sections of philosophy supervise different stages, or kinds of that reworking. The first section, logics, is to make concepts clear (draw sharp borderlines between diverse concepts) and distinct (strict distinguish the features of certain concept from each other). The second, metaphysics, deals with

modification of concepts. Finally, esthetics (which includes ethics) accounts for valuating of concepts. Thus, *concept* serves as a central object of not only logic, but also of Herbartian philosophy in general.

Herbart considers concepts as kind of ultimate entities, analysis of which in logic excludes any questions concerning their genesis. Logic deals with concepts as something pre-given, ready-made; it should not ask where they come from. His *Hauptpunkte der Logik* (1808) starts with a claim: 'Logic deals with representations. But it does not deal with the act of representing: thus neither with the way and manner by means of which we arrive at them, nor with the mental states [Gemutszustande] to which we are moved by this'. It is concerned only with this, '*what is represented*'. That represented turns to the subject of logic insofar as it is 'afore grasped, singled out, conceived. This is why it is named a concept'. [6, S. 467]. In his next work, *Lehrbuch zur Einleitung in die Philosophie* (1813) he unfold his views in more details. The concept is described here as 'thoughts, considered in view of what is thought through them', and the latter is explicitly contraposed to the idea of concept as process or 'activity of our mind' [6, S. 77]. Thus, Herbart sharply distinguishes representation as (psychical) act of mind from represented, thinking from thinkable. The distinction provides preconditions for shifting the subject of logic from the scope of epistemology or psychology to that of ontology. The fact partially explains the ease of later reception of Herbartianism by the Austrian logicians and philosophers. Herbart did not introduce into logic the category of 'object' (whether actual or abstract), but, in view of his doctrine of 'what is represented' and of 'thinkable', the step to object looks quite natural and coherent. We should point that in the framework of Kantianism the step is hardly possible.

It is hard to keep oneself from the comparison of Herbart's 'representable' with Bolzanian 'representation in itself'. The former does not describe his concepts as 'objective' as the latter did on his essences. Herbart didn't go beyond negative characteristics and informed us just of what concepts are not. Namely, they are 'neither real objects, nor actual [wirkliche] acts of thinking' [6, S. 78]. In other words, concepts belong to some intermediate domain between

external things and internal psychical acts. He escapes from positive characterizing the nature of concepts as well as of this intermediate sphere, but we can suppose that he keeps in mind some kind of platonistic world. Actually, each concept 'is given as if in a single exemplar'; what is to the question of relation between concepts and thinking, Herbart says that 'thinking of one and the same concept may be reproduced over and over again' in the consciousness of different human beings, but the fact 'does not bring the duplication of concept' [6, S. 78].

So, the nature of concepts is completely irrelevant to the properties of our cognitive faculties, they are not product of the mind activity. As consequence, Herbart expels any considerations of thinking beyond the competence of logic. Thinking is 'just a mediator, a kind of cart which brings concepts into one place' [6, S. 91]. It is easy to see that logic studies not properties of 'cart', but properties of what is shipped by the 'cart'. When two concepts meet each other in the process of thinking, they are 'suspended and form a question' [ibid.]. Making an answer to that question, we commit a judgment. This interpretation of judgment is very close to doctrines of Brentano and Frege, for both of them explained judgment as affirming (in case of Brentano also rejecting) of content represented. But Herbart believed that any kind of valuating is a psychological, or at least extra-logical process and, consequently, we should evade considerations of that sort as far as we are inside logic. Hence except this, psychological sense of judgment, he adds the logical sense — combination of subject and predicate. Due to distinguishing the judgment in logical sense from judgment as evaluating act, Herbart rejected the Kantian view that different acts of thinking generate different sorts of judgments. For him, the difference of categorical, hypothetical and disjunctive judgments is not the difference in the logical sense; it 'belongs completely to the language form' [6, S. 473]

Summing up, we should conclude that Herbart has distinguished some special sphere, for which he managed to propose only 'apophatic' description, which takes intermediate place between thinking and actual world, and which constitutes the proper subject of logic.

3 B. Bolzano

The next, more decisive move in the direction of object theory and ontological exposition of logic was made by Bernard Bolzano (1781–1848). His early interest was aimed at problems of foundations of geometry, namely he tried to examine the independency of Euclidian fifth postulate. In course of this work he came to belief that Kantian views on the nature of logics and mathematics are wrong. In particular, he discarded the belief that intuition lays in the ground of all mathematics. Another crucial conclusion was that mathematics needs more rigorous logical tools for carrying out its proofs. But formal logic available at the period could not serve the aim satisfactorily, and Bolzano, step by step, started developing his own system of logic. Those efforts resulted in extensive and grandiose, in four volumes treatise *Theory of science* [Wissenschaftslehre] (1837). In the introduction he proposes to take 'sentences in itself [satz an sich], representations in itself [vorstellung an sich] and truths in itself [wahrheit an sich] as a proper subject-matter of logic' [5, Bd. 1, S. 63]. Under those essences in itself Bolzano means objective content of sentences and representations, which is independent of the way of its expressing, of the way of its thinking, of our attitudes, at last of the very fact whether we think of it or not. He separates distinctly the representation in itself from the thinkable, subjective representation: the former is in no way generated by the latter, neither is any special kind of it. He rather prefer to make the latter in some way subordinate to the former, when he says, that 'objective representation... might be named the matter of subjective representation' [4, p. 277, § 271]. The principal property of sentences in itself and representations in itself, which differs them from thinkable sentences and representations, as we can see, consists in their objectivity. Logic, according to Bolzano, is a formal science, but it is due to the fact that it considers the *forms of 'propositions-in-itself'*, not the *forms of thought*. Thereby logics may not be viewed as objectless knowledge and qualifying it as formal will not serve as verdict in unproductiveness.

Introducing of ideal entities into logic is not the only novelty. Along with objective representation in itself Bolzano distinguishes object [Gegenstand] of representation: 'Under the object of repre-

sentation I mean that (existing or non-existing something), of which it is said that it is represented, or that there is a representation of it' [5, Bd. 1, § 49]. Bolzano repeatedly stresses that object of representation is an independent entity, which should not be mixed with the representation in itself: 'one should distinct sharply representation in itself and object of representation'; it should not be 'confused with the object of representation' [4, p. 277, § 271]. The object of representation plays an essential role in his logic: most of principal logical relations are defined in terms of object. Moreover, he in fact excludes from the consideration sentences, which do not deal with any object. He believes that 'if not all sentences, than at least all true sentences are to have an object they deal with' [4, p. 208, § 196].

The logical innovations designed by Bolzano were essentially intended to make logical apparatus applicable to the mathematical reasoning, and more generally, to make it appropriate as a theory of science, *Wissenschaftslehre*. Those innovations were discussed more than once, and I'd want just to pay attention that above described shifting to ontology was an important component of implementing this intention. The fact is that Bolzano detaches acutely the subject of logic from epistemology and psychology, and makes it to inquire the formal properties and relations of objective entities. Besides, Bolzano first introduced into logic three-partial structure '(objective) representation in itself — (subjective) thinkable representation — object of representation'. Subsequently we'll face repeatedly the structure in the doctrines of Austrian philosophers, in various clothes and not only in logic.

4 R. Zimmerman

Robert Zimmerman (1824–1898) was one of last pupils of Bolzano. Since 1852 he served as professor in the university of Prague, since 1861 up to the end of his life — in the university of Vienna. His role in the expansion of Bolzano's doctrines among Austrian philosophers and in particular, in the Brentano school, is a disputable matter. At least personally Brentano explicitly placed responsibility for rebirth of some Bolzanian platonistic ideas among a number of his

pupils on Zimmerman. I'd want to pay some attention to the role of Zimmerman in the rise of the object theory.

In course of Austrian education reform (one of renovations induced by the revolution of 1848) philosophy of Herbart was prescribed as obligatory doctrine for teaching in the universities of Habsburg monarchy. A new educational subject was incorporated into the curriculum of ober-gymnasiums, *philosophische propädeutik*, consisting of two parts: *empirical psychology* and *formal logic*. Young Zimmerman was charged to work out the textbook for the new discipline, and it was published in 1852-53, in two parts. The second part, *Formale Logik*, reproduced carefully a number of principal ideas of Bolzano's *Wissenschaftslehre*, sometimes word for word. But in one point author declines from the teaching of master, and the change became the birth of the object theory. The point is that Bolzano propounds rather theory of representations in itself which were characterized by objectness (*Gegenstandlichkeit*), than the proper object theory; i.e. his representations were divided into objectual and objectless. The latter, in turn, might be accidentally objectless (e.g. golden mountain) and in general objectless, or imaginary (e.g. round square) [5, Bd. 1, S. 297, 304–306]. But he didn't try to classify or in any way to discuss the objects of representations. It seems that just Zimmerman was first who addresses himself to tackle the matter, in the text of the second volume of the first edition of *Propädeutik*. The object of representation, he says, could be actual or non-actual; non-actual objects are of two kinds: possible and impossible. [2, S. 9]. Thus, as we can judge, it was R. Zimmerman who first tried to correlate an object to the representation of any kind (including objectless!).

The second edition of *Propädeutik* (1860) was reworked significantly. A number of Bolzano's theories and definitions were superseded by those adopted from Herbart, in particular, it does not contain discussions of representation in itself and of its object. But some another novelty was introduced there, which appeared to be very impactful in subsequence. I mean the principal characteristics, by which Zimmerman describes the concept. Those are, first, the content (what is thought in the concept), and second, the object (what concept refers to) [3, S. 19]. Content and object have noth-

ing in common except the very fact that an object is thought by means of content. Another one remarkable point which worth to be mentioned — insistence that neither content of the concept, nor its object, are interchangeable with the word, which denotes that concept. [3, S. 24].

In the second edition the problems related to the object theory are considered in the second volume of *Propädeutik*, i.e. in *Psychology*, not in *Logic*. Howbeit, Zimmerman didn't recall here of possible and impossible objects. Nevertheless we may fix that for seven years most schoolboys over the all Austrian empire learned the logic after the first edition of his textbook and absorbed the idea of 'impossible object'. It is even more important for us here that the distinction of content and object, exercised in the second edition, appeared to be survivable, and it became afterwards one of the principal breakpoints in the school of Brentano.

The next crucial stage of the development of Austrian tradition in logic and philosophy was the advent of Franz Brentano, who lectured in the University of Vienna since 1874. Sometimes the very formation of the Austrian philosophy is connecting primarily with his activity. Meanwhile, as we can conclude from the above stated, the school of Brentano has not started its way from the blank space. Brentano felled into the community, members of which studied logic in the gymnasiums with the textbooks of Zimmerman, and philosophy at the universities — in the framework of Herbartian doctrines. We can cite, as an exemplary philosopher of that generation, Alois Riehl (1844–1924), who graduated from the Graz University in 1865. In full agreement with the tenets of Bolzano and Zimmerman, he believes that 'The form of science is a subject of special science, and that science is logic' [1, p. 88], and that logic is 'a theory of universal incontradictory relationships between objects in general', while the laws of thought in logical sense are 'the laws of thinkable, objectual in general' [1, p. 89].

5 F. Brentano

Franz Brentano (1838–1917), who suggested in his *Psychologie vom empirischen Standpunkt* (1874) the project of descriptive psychology, considered intentionality as an immanent property of psychical

phenomena. Every mental act ought to correlate with its intentional object. While in the simplest and basic act of representation some object is thought only, than in act of judgment the object represented is affirmed as existing or is rejected as non-existing. Consequently, all judgment should be considered as existential. Brentano has demonstrated, in what way basic forms of judgments of traditional logic can be reduced to the existential form. In the result of his reduction particular judgments are being transformed into affirmative existential, and universal — into negative existential. The syllogistics constructed on the ground of this theory of judgment, consists of two rules, or forms of inference; it does not require the traditional division on figures and does not admit exactly those modes, which free logics of our days use to discard. Besides, it does not postulate that premises are to contain exactly two terms, and in general, it looks more flexible than traditional theories of syllogism. Thus, just as in the case of Bolzano, introducing of object into logic had led to the radical reforming of the latter.

Alas, just as in the case of Bolzano, the reforming did not have direct influence on the process of logic development. According to witty remark of Peter Simons, '... Brentano played Kerensky to Frege's Lenin, because when the revolution came in 1879 in the shape of Frege's *Begriffsschrift*, it involved a complete break with tradition and put Brentano's modest advance in the shade' [8, p. 42]. Yet one radical difference in views of Bolzano and Brentano formed the core for one of crucial collisions inside the school of Brentano. While distinguishing act of representation and object of representation, Brentano rejects decisively any kind of 'third entity', which could remind Bolzanian objective representation or Zimmermanian content of concept. Considerable group of his students, including A. Höfler, K. Twardowski and E. Husserl, did not take the side of master on this point, causing his great and explicit disappointment.

6 G. Frege and the school of Brentano

It is often pointed out, in the works on Frege, the striking similarities of his views on logic and mathematics with those of Bolzano; the pointing is usually followed by the ascertaining that there are no any

evidences that former had ever studied the works of latter. Hereafter I'd want to specify both of the claims. First, there is a good reason to believe not only that similarity between the two authors do exist, but even more: a number of Frege's ideas look as if he was very close to the Austrian tradition in logic and philosophy. Second, there is good reason to conclude, that Frege get learned the ideas of Bolzano at least through third parties, not later than in the end of 1880s.

In his first revolutionary work of 1879, *Begriffsscrift*, Frege suggested the theory of judgment, which is strikingly relative to Brentanian one. Recall that Frege distinguished there thinkable content, which may be constituted by any combination of representations on the one hand, and the act of proper judgment, which consists in asserting of this content being thought. Surely, it is quite reasonable to assume here the influence of Herbart, whose ideas were doubtless known to Frege. The hypothesis is amplified by the fact that some other claims of Herbart are reproduced in this work almost word to word. But if we take into account that this Frege's theory of judgment is combined with breaking away the traditional decomposing of judgment on subject and predicate, than the kinship between mathematician from Jena and philosopher from Vienna looks far more persuasively. Of course, this affinity cannot prove the fact of Frege's acquaintance with *Psychology from Empirical Point of View*, but the circumstance that this kind of treatment the judgment was not practiced by anybody else except these two authors, looks remarkable.

In his next seminal work, *Die Grundlagen der Arithmetik* (1884) Frege draws strict distinction between concept and object. As it was stressed above, the accentuation on this distinction is a specific feature right of Austrian philosophical community. Of course, just fixation of this affinity cannot prove anything, but if we take into account that creating of the opus was preceded by the correspondence of the author with Brentano's pupil and colleague Karl Stumpf, than our suspicions would increase substantially. Moreover, it is well known that the very idea to expose his views on the nature of natural number and general strategy of deriving arithmetic from logic in 'prose', without using the technique of *Begriffsschrift*, was suggested to Frege by none other than Stumpf.

Finally, immediately before the termination of his work on final modification of his system, Frege examined the work of another one, not so famous member of the Brentano school, Benno Kerry (1858–1889). One of three epoch-making papers, published in the beginning of 1890s, *Über Begriff und Gegenstand*, appeared as a response to one of Kerry's critical remarks against Frege, made in his paper [7, Bd. XIII]. The work had a series of eight articles, published from 1885 to 1891. Frege is often mentioned and discussed in initial four articles, the fourth is completely devoted to the analysis of Frege's ideas. In fact, Kerry was the first Frege-inquirer[2], for he examines carefully all Frege's works, published before 1887. Taking into account the lack of interest to the ideas of Frege in that period and the frustration caused by it, I cannot believe that Frege didn't study writings of Kerry very attentively. But the latter, in the process of argumentation, refers regularly to the statements of Brentano and his disciples. But it is Bolzano whom he sites especially often and extensive. More than once he refers to Bolzano and Frege in one footnote. In a word, all this may not us assume that Frege did not have knowledge of the ideas of Bolzano, at least in the exposition of Kerry.

Moreover, the question arises, if some conclusions of another Frege's paper of that period, *Über Sinn und Bedeutung*, were inspired by analogous considerations, which he might face over and over again in the text of Kerry. I mean his splitting of *beurteilbare Inhalt* into sense and denotation. The point is that Kerry was one of those who adopted the triple of Bolzano and Zimmerman, which included not only object, but also (ideal) content of concept. Besides, as far as I know, Kerry was the first who extend the distinction up to mathematical concepts. In particular, the second article of his opus is completely devoted to considerations of the relationships between content and object of concept. For instance, he pays attention, that when some concept contains mutually exclusive features, the concept is objectless. [7, Bd. X, S. 444]. In the first article we meet the following noteworthy reasoning: "The remarkable advantage of conceptual representations against intuitive one consists in the fact

[2]It is curiously, that the second one was a student of Brentano as well, E. Husserl.

that several completely different may refer to one and the same object. Completely different concepts: 'the chancellor of the German Reich in 1884' and 'the owner of Warzin in 1884' refer to one and the same person" [7, Bd. IX, S. 460]. Really, the idea that different (contents of) concepts might correspond to the same object was rather habitual for the school of Brentano and served as a subject of a discussion in the period which immediately preceded to the appearance of Fregean theory of *Sinn* and *Bedeutung*. For example, Oskar Schmitz-Dumont in his article [9] published in the same volume of *Vierteljahrschrift* with the second article of Kerry explains that equality sign in A = $\phi(a,b)$ is justified by the fact that 'the symbols have the same content, but the forms in which the content is expressed, are different' [9, S. 199–200].

Another student of Brentano, Anton Marty, deserves our attention. He is identified as most probable addressee of Frege's letter dated 29.08.1882. In the second article of his *Über subjectlosse Sätze un das Verhältniss der Grammatik zu Logik und Psychologie* (published in the *Vierteljahrschrift* again) he pays three pages of attention to discuss Fregean theory of judgment, exposed in the *Begriffsschrift* [10, S. 185–188]; in the third article of the same work he discusses the theory of denotations in terms very close to those of later Fregean. He states that there necessarily must be given some mediating link between language expression and its denotation (*Bedeutung*), which he calls an *Etymon*. He differs two functions of the sign: manifestating (*kundgebung*) and denoting, the former being primary function, while the latter secondary one [10, S. 299]. Moreover, he remarks that this mediating *Etymon* serves as 'the way by which signs are denoting' [10, S. 301], and expands his considerations of denoting from names to sentences (Aussagen). Marty was a true follower of Brentano and did not purport any Zimmerman-like kind of the object theory, for him the denotation of name consists in representation; his theory in general was rather psychologistic one.

7 Conclusion

We don't have direct evidences that Frege has adopted some of his ideas from anybody from school of Brentano. But I strongly suppose that the fact that three-partial semantical structures and elements

of object theory appeared at Frege's works in the beginning of 1890s, *after* his getting knowledge of the ideas of Austrian colleagues, is not contingent. Except this, it might be supposed that Frege's idea that the extension of concept is an object with equal rights as proper object, was a result of careless use of some ideas of Brentanian school.

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