



SOME CONSIDERATIONS ON THE CONCEPT OF LOGIC IN DEWEY'S THEORY OF INQUIRY AND IN CARNAP'S WORKS ON INDUCTION¹

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Abstract: *This paper aims to discuss some features of the concept of logic which can be found in John Dewey's book *Logic: The Theory of Inquiry* in comparison with the concept of logic that underlies Rudolf Carnap's semantical constructions, especially in the book *Logical Foundations of Probability*. John Dewey proposes in his book that logical forms – understood as the relation between arguments – arise within contexts of inquiry and are concerned with controlling inquiry. This is supposed to overcome the duality between logic and methodology of science, since logical constructions are to be derived from the process of scientific inquiry. This approach would also have the advantage of avoiding problems related to the foundations of logic, which frequently involve metaphysical positions and controversies. Carnap, on the other hand, adopts a method of abstraction for his constructions, that is, he seeks to develop a pure logic, avoiding getting into methodological problems. Dewey's position apparently fails to account for the problem of psychologism and the matter of applications of logic, especially when considered in relation to the points of view presented in his later book *Knowing and the Known*, written with Arthur Bentley. This paper is going to discuss those two problems from Carnap's point of view in order to reassess Dewey's stance on that matter. Thus, we will see two conceptions of logic which apparently are opposed to each other, but it is intended to show that we are dealing with two different approaches with different scopes, and consequently they can and should be brought together in order to clarify epistemological problems.*

Keywords: *Rudolf Carnap. John Dewey. Philosophy of Logic. Pragmatism.*

ALGUMAS CONSIDERAÇÕES SOBRE O CONCEITO DE LÓGICA NA TEORIA DA INVESTIGAÇÃO DE DEWEY E NOS TRABALHOS SOBRE INDUÇÃO DE CARNAP

Resumo: Este artigo tem como objetivo discutir algumas características do conceito de lógica que pode ser encontrado no livro *Logic: The Theory of Inquiry* de John Dewey em comparação com o conceito de lógica que subjaz às construções semânticas de Rudolf Carnap, especialmente no livro *Logical Foundations of Probability*. John Dewey propõe em seu livro que as formas lógicas – compreendidas como a relação entre argumentos – surgem em contextos de investigação e dizem respeito ao controle da investigação. Isto deve superar a dualidade entre lógica e metodologia da ciência, uma vez que as construções lógicas devem ser derivadas do processo de investigação científica. Esta abordagem teria também a vantagem de evitar problemas ligados aos fundamentos da lógica, que frequentemente envolvem posições e controvérsias metafísicas. Carnap, por outro lado,

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adota um método de abstração para suas construções, isto é, ele procura desenvolver uma lógica pura, evitando lidar com problemas metodológicos. A posição de Dewey, aparentemente, deixa de dar conta do problema do psicologismo e da questão das aplicações da lógica, especialmente quando considerada em relação aos pontos de vista apresentados em seu livro posterior *Knowing and the Known*, escrito em colaboração com Arthur Bentley. Este artigo vai discutir esses dois problemas a partir do ponto de vista de Carnap, de modo a reavaliar a postura de Dewey neste assunto. Assim, veremos duas concepções de lógica que são aparentemente opostas uma à outra, mas procuraremos mostrar que estamos diante de duas abordagens diferentes, com escopos diferentes e, conseqüentemente, que podem e devem ser aproximadas de modo a clarificar problemas epistemológicos.

Palavras-chave: Rudolf Carnap. John Dewey. Filosofia da Lógica. Pragmatismo.

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Introduction

In the first pages of the book *Logic: The Theory of Inquiry*, John Dewey presents a paradox involving the current situation with what he calls the proximate and the ultimate subject-matters of logical theory. Such paradox is characterized by the fact that while there is a great deal of agreement among researchers of the proximate area of logic as to how to conduct their studies, the ultimate aspect of logical theory remains under siege by misunderstandings, endless controversies, and confusing metaphysical positions. The proximate subject-matter is what is commonly called logic, the study of formal relations among sentences, propositions and arguments. The ultimate subject-matter is the philosophical assessment on questions as to what those forms are and why such relations are like that. The paradox presented by Dewey consists, therefore, in the fact that there's no general agreement among logicians as to the nature of logic, that is, the nature of the relations and forms dealt with by the researchers in that branch of knowledge – even though their work presents a good rate of progress.

According to Dewey, this is merely an apparent paradox: the aim of his book is to resolve the paradox by establishing the ultimate subject-matter of logic as the theory of inquiry and showing that the proximate subject-matter has to do with some operations that arise in the process of inquiry. Thus, Dewey aims at setting forth his well-known theory of inquiry that allows understanding of the continuity between the proximate and the ultimate subject-matters of logic.

Dewey says that one of the criteria for the evaluation of his theory of inquiry as a working hypothesis for logic's ultimate subject-matter is that "it be able to order and account for what has been called the proximate subject-matter. If it cannot meet the test thus imposed, no amount of theoretical plausibility is of avail" (DEWEY, [1938], p. 11). In other words, Dewey considers that his proposal will be worthless if it doesn't respect the particularities of logical research in the proximate subject-matter. This means, roughly speaking, that in Dewey's framework every research in the proximate subject-matter of logical theory, just like any inquiry, follows the *modus operandi* described in chapter 6 of *Logic* as the stages of inquiry. At the same time, the discoveries brought to light by logical inquiries must be thought of as tools to improve processes of inquiry.

This aspect is granted in Dewey's proposal by considering the proximate logical theory to be the research on forms of reasoning and on relations among propositions as they appear in contexts of inquiry in general. Indeed, as Dewey claims (DEWEY, [1938], Part II), no logical form can be found without reference to a

context of inquiry. That is, all those relations studied and discussed both by traditional and modern logicians are to be understood as parts of a process of inquiry. This doesn't mean that logic must refer to existential objects in its inquiries, that is, logic can be formal since it deals with abstract relations, but logic shouldn't be *merely* formal because it can be understood in existential situations posed by the context of inquiry. The confusion about logic as merely formal, in Dewey's view, started when logicians sought to separate the forms of Aristotelian logic from the content that was attached to such forms in the context of inquiry of ancient science – when ancient science became obsolete, contents were dropped and logicians tried to keep the forms, taking logic to be merely formal. Dewey's proposal is precisely to reattach logic to a context of inquiry, that is, a context of reasoning, knowledge, and discovery (DEWEY, [1938], chapter 5).

Dewey's standpoint allows us to overcome the duality between logic and methodology of science, since the propositional relations studied by the logic of science have to be connected to the stages in the development of a scientific inquiry. And since Dewey's proposals allow us to see science as continuous with common sense knowledge, the proximate logical theory is concerned with the abstraction of the ways of thinking and reasoning.

This point of view runs the risk of leading into some very serious controversies in the field of logic. Two of them are interconnected and are going to be presented below. Our discussion will be carried out in relation to the proposals of Rudolf Carnap, who developed researches in the proximate subject-matter of logical theory.

1. Psychologism

The first problem is that Dewey's point of view seems to conflict with the stance known as the opposition to psychologism in logic. Such criticisms were presented by logicians, mathematicians and philosophers since the second half of the nineteenth century.² The basic idea is that logic doesn't need any reference to modes of thought or to ways of reasoning: logic is an abstract field of knowledge that attains considerable progress by means of the detachment from concrete existential things. In the debates on psychologism in logic, very little reference to Dewey can be found. Carnap is one of the authors that mentioned Dewey's theory of inquiry in relation to this question. So, let us see how Carnap presents the problem of psychologism and how he assesses Dewey's position about it.

In his 1950 book *Logical Foundations of Probability*, which aims at laying the foundations of inductive logic, Carnap sustains the separation between logic and psychology on the grounds that logic deals with relations among sentences (or propositions represented by sentences) which “are independent of the contingency of the facts of nature” and are objective, that is, “whether one of those relations does or does not hold in a concrete case is not dependent upon whether or what any person may happen to imagine, think, believe, or know about these sentences” (CARNAP, [1950] 1962, p. 38).

In Carnap's view, psychologism appears in two forms: primitive psychologism is the assumption that logic deals with the ways people happen to think; qualified psychologism is the proposal that logic must prescribe the adequate ways of thinking

² For more information on that, see Coffa, (1991).

and reasoning – in other words, qualified psychologism doesn't say that logic studies the ways people think, but the ways people should think. Carnap contends that the description of modes of thought and the prescription of better ways of doing that are fields of psychological research. Logical research, on the other hand, has to do with abstract relations among propositions – such propositions and relations are often found in thought, or in some modes of reasoning, but it's not the case that thoughts are the subject-matter of logic. As Carnap says, "the characterization of logic in terms of correct or rational or justified belief is just as right but not more enlightening than to say that mineralogy tells us how to think correctly about minerals" (CARNAP, [1950] 1962, p. 41). In other words, logic deals with thought in the same way as any other science does, but it doesn't mean that thought belongs to the field of research of all sciences.

In the *Logical Foundations of Probability*, Carnap presents a vast collection of relations which can be established among sentences in an inductive fashion, that is, in terms of the support some sentences (called the evidence) give to some other sentence (the hypothesis). Although many of those relations are apprehended from the observation of scientific activity and especially from scientific reasoning, Carnap's logical constructions are not efforts towards the justification or the validation of those practices. On the contrary, Carnap takes the observation of science as a source for his logical abstractions. The idea is to study relations among sentences in abstract terms in order to prepare the way for the improvement of such relations and consequently of our thinking. But this improvement is already a task of application of inductive logic – and then, it's not anymore a matter of pure logic, since psychology would be fundamentally important in such endeavor, which was called by Andre Carus *language engineering*, that is, the study of how to improve our means of communicating and thinking (CARUS, 2007, pp. 38-42).

However, Carnap did not pursue the task of application of inductive logic. His interests were focused on the establishment of the field of research on pure inductive logic, but always yielding the possibility of application. Carnap conducted such pure logic study at least as far as it is possible to investigate it without turning into applied logic. Thus, we can understand his opposition to psychologism in the *Logical Foundations of Probability* as a concern about granting pure research on logic without necessarily thinking about applications.

When Carnap discusses psychologism in logic, he mentions Dewey's book *Logic: The Theory of Inquiry*. Carnap says that it is a book on the art of thinking in certain situations, and it is not a book on logic. According to Carnap, there's no confusion between the two fields of study in that work, only in the title. Therefore, he exempts Dewey from his criticism to psychologism. This confusion is due to, in Carnap's words, "the fact that many logicians (...) have erroneously characterized this field as the art of thinking has caused Dewey, who actually works on the art of thinking (...) to choose the title '*Logic*'" (CARNAP, [1950] 1962, p. 40).

In the mentioned book, Dewey even presents some criticisms to psychologism: in talking about the strategy taken by logic in the 19th Century, Dewey says that some logicians, in building their theories, "have disastrously compromised their case by basing their logical constructions ultimately upon psychological theories that reduced 'experience' to mental states and external associations among them" (DEWEY, [1938], p. 86). That is, Dewey is against the justification of logic in psychological terms, or, in other words, logic is not to be about mental states. On the

contrary, says Dewey, logic is to be based “upon the actual conduct of scientific inquiry” (DEWEY, [1938], p. 86).

Dewey, therefore, presents himself as against what Carnap and others called psychologism in logic – both primitive and qualified. On the other hand, Dewey wants logic to be attached to certain features of the actual conduct of scientific inquiry. As we saw above, this has to do with the continuum between the proximate and the ultimate subject-matter of logical theory Dewey aims to establish. So far, so good: since Carnap doesn’t talk about Dewey’s book anymore in the *Logical Foundations of Probability*, it is highly possible that he considered the theory of inquiry to be a perfectly adequate application of logic, as he understood it. We must remember, of course, that applications were not Carnap’s main area of expertise, although he always emphasized the importance of such endeavor. However, Carnap seems not to have noticed that Dewey wanted logic to be necessarily directed towards the theory of inquiry: this is indeed not so clear in *Logic: The Theory of Inquiry*, but it was clarified a decade later in Dewey’s collaboration with Arthur Bentley.

2. Pure and applied logic

During the forties, Dewey and Bentley presented a stream of criticism to Carnap and others who were researching on pure logic. Such criticisms were published in their 1949 book *Knowing and the Known*. In the texts signed by Bentley (and agreed by Dewey), one can find heavy criticisms, as well as a strange kind of humor that can be easily interpreted as insult, to logicians such as Carnap, Alfred Tarski, C. I. Lewis, Ernest Nagel, and others. The basic idea behind that weird rhetoric adopted by Bentley is that pure logic research such as the one we found in Carnap’s texts is not adequately related to a theory of inquiry, in the sense that such research should aim at improving forms of inquiry (BENTLEY; DEWEY, [1949], chapter 1). In other words, Dewey and Bentley didn’t understand the purpose of doing a pure logic research if it was not in order to improve ways of knowing. In their view, modern logic was dealing with hypostatized forms with no significant connection with any kind of experience.³

But it was clearly a misunderstanding, for the modern logicians were seeing something that Dewey and Bentley were not: they were noticing that logic, understood as a research on pure formal relations could have applications besides those on epistemology – and even applications much beyond the range of their foreseeing, just like it had happened to mathematics. In the mid forties, some of these applications were already in view by the community of readers in modern logic; an evidence of that is the review Alonzo Church wrote of some papers by Bentley and Dewey which some years later composed the book *Knowing and the Known*. Church was involved in early researches on electronic computers and artificial intelligence, and one of his comments in such review was that the “success which modern mathematics has had and modern logic is beginning to have by the abstract method is such that further progress on this road is not likely to be blocked by a bare dictum of the sort before us” (CHURCH, 1945, p. 133).

Therefore, Church warned Dewey four years before the publication of *Knowing and the Known* that there were some implications of his and Bentley’s position they were not noticing. Forty years before, in 1905, Charles Sanders Peirce wrote a letter

³I have discussed in further detail the arguments given by Dewey and Bentley against Carnap in CUNHA, 2012.

to Dewey (although historians are not sure if Peirce actually sent the letter) commenting his *Studies in Logical Theory*, one of Dewey's first sketches of a theory of inquiry.⁴ Peirce shows himself "somewhat surprised" for Dewey having found any good in a recent paper published by Peirce, "for your [Dewey's] *Studies in Logical Theory* certainly forbids all such researches as these which I [Peirce] have been absorbed in for the last eighteen years". Such researches Peirce talked about had to do, among other subjects, with algebra – a branch of mathematics which deals with abstract relations (cf. PEIRCE, 2010). One reason Peirce presents for his statement is that Dewey's stance "is contrary to a maxim I [Peirce] never infringe[s] 'Never permanently bar the road of any true inquiry'".⁵ This maxim taken by Peirce sounds like a condensed version of Carnap's principle of tolerance that, as we will see below, aims at granting freedom to inquirers of special fields of science; the maxim also sounds like Church's phrase, which talks about blocking the road of progress.

If Dewey's *Logic* is taken from this point of view presented in *Knowing and the Known*, then we cannot consider his proposal to have passed his own test: that of accounting for the research on the proximate subject-matter of logic, since Dewey seems to forbid applications of logic other than those to epistemology. With that, Dewey's theory of inquiry seems to be a form of what Carnap called qualified psychologism, since it proposes that the results of proximate logical inquiry should be exclusively directed at the improvement of ways of inquiring and thinking.

But, in another sense, we can see Dewey's logic as a tool for understanding inquiries in modern logic. As I tried to show in another paper, Carnap's logic can be construed as a field of inquiry, just like those described in *Logic: The Theory of Inquiry*. That is, Carnap's investigations on semantics, modal logic and inductive logic can be viewed by a Deweyan reader as researches conducted in a specific context of inquiry: that of developing logical tools by means of the understanding of relations among sentences in abstract form. In that paper, I discussed the claim that some positions in logical research couldn't be accepted by Dewey because they are committed to the traditional duality between form and content. Such claim may be found in *Logic: The Theory of Inquiry* when Dewey criticizes positivism, but, as I sustain, it cannot be directed at Carnap. My answer is that Carnap's position, if understood properly, that is, if the principle of linguistic tolerance receives the adequate treatment, does not assume such commitment in a hypostatized manner, which is the aim of Dewey's criticism (CUNHA, 2010).

Carnap's principle of tolerance states that linguistic forms are not to be prohibited by philosophers and linguists; on the contrary, philosophers must set up conventions as to how to understand and represent linguistic forms. This is intended to "grant to those who work in any special field of investigation the freedom to use any form of expression which seems useful to them. (...) *Let us be cautious in making assertions and critical in examining them, but tolerant in permitting linguistic forms*" (CARNAP, [1953] 1956, p. 221). Hence, Carnap's work of developing logical tools can be seen as an endeavor in the direction of enriching our repertoire of logical conventions, and consequently, our possibilities of improving our logical understanding of that part of the world for which he developed such tools: science.

⁴ For the development of Dewey's theory of inquiry, see NAGEL, [1986].

⁵ This letter, as well as some comments about it, can be found in the correspondence of John Dewey, published in DEWEY, 1999, item 00806, dated *circa* April 15th, 1905.

Dewey points out that when an inquiry is over, a problem is solved, and new problems appear, in a continuum; it couldn't be different in Carnap's inquiries: every tool developed by Carnap begs the question of application, among others, of course. Carnap in many texts says that he considers himself to be more useful in the pure research, leaving to others the task of inquiring into the context of application of his tools.

Therefore, Carnap's proposals don't point in the direction of a theory of inquiry in the sense that the logical tools developed by Carnap are not intended to be used in an inquiry – at least not directly. This appeared as a problem in Dewey's eyes, but one can easily see that Carnap's logic is not supposed to be completely devoid of applications – on the contrary, it is supposed to be applicable to many fields of knowledge, such as computing, mathematics, and, why not, the theory of inquiry. Nevertheless, the application of Carnap's logic is a work for another researcher, for Carnap preferred not to chase such task.

Concluding Remarks

Summing up, Dewey seems to have failed to see that logical theory, in its proximate subject-matter, could be applied to something else than the theory of inquiry – which he proposed as the ultimate subject-matter. If in early 20th Century Peirce noticed that abstract logical research (such as his or Boole's algebra) could be helpful for mathematics, making Dewey's position sound like an anachronism, no wonder how a 21st Century reader feels when has contact with a point of view that, if had been followed strictly, could have hindered the revolution computers brought to our world.

But this is not a reason to rule out the discussion on how Dewey's position can be brought together with modern logic. Apart from the fact that the theory of inquiry works very well as an instrument for understanding logical inquiry, it is important to remind that all the preoccupation Carnap had in explaining that his logic was an investigation in a pure context, and that the application of his proposals should be the object of another investigation, appeared mostly after the publication of the criticisms by Dewey and Bentley. Although there is no explicit reference in Carnap's writings to such criticisms, it is possible that his worry was a reaction to the ado produced by *Knowing and the Known*.

Another passage that sounds like an answer to Dewey and Bentley in the *Logical Foundations of Probability* is when Carnap explains that the subject-matter of logic is abstract. Carnap says that the logician works with schemata of sentences constructed in an artificial language with exact rules, but this doesn't mean that logical systems necessarily neglect actual situations of science and practical life. Carnap says that "on the contrary, the final aim of the whole enterprise of logic as of any other cognitive endeavor is to supply methods for guiding our decisions in practical situations" (CARNAP, [1950] 1962, p. 217). But the path towards actual situations is a matter of application of logic, something which requires a pragmatic theory in connection with the semantics Carnap is building in his book. However, Carnap points out that such a theory of pragmatic concepts should not be apart from semantics. In fact, he abides to a semiotic proposal, taken from Charles Morris, which considers that language must be understood as syntax, semantics and

pragmatics, without disregarding any of the three dimensions.⁶ In Carnap's words "the repudiation of pure radical semantics (...) in favor of a merely pragmatistical analysis of the language of science would lead to a method of very poor efficiency, analogous to a geometry restricted to observable spatial properties" (CARNAP, [1950] 1962, p. 217). On the other hand, considering pure semantics to be something complete in itself is analogous to an abstract geometry that by definition cannot have any application.

Hence, however Dewey's theory of inquiry accounts for logic in a very good instrumental way, helping philosophers to understand what logicians do in their inquiries from a pragmatic point of view, such theory cannot be regarded as the only application possible of the tools developed by logicians. But, at the same time, one shall not overlook the possibility of improving methods of inquiry with tools developed by modern logic. Nevertheless, this is a matter of application of logic, and a different context of inquiry must be established to deal with that.

In the book *Experience and Nature*, Dewey presents natural science as an activity which begins with experienced matters and then goes into theory, getting distant from experience by means of reasoning and calculation, but finally comes back to experience. In his words, "theory may intervene in a long course of reasoning, many portions of which are remote from what is directly experienced. But the vine of pendant theory is attached at both ends to the pillars of observed subject-matter" (DEWEY, [1925], p. 11). In view of what has been presented in this paper, it seems that Dewey and Bentley were criticizing pure logic but they didn't notice that it was just a long course of theoretical intervention which had stemmed from experienced problems and would soon be attached to observable subject-matter in applications.

The theory of inquiry must be regarded as a possible application of logic, but not the only – necessary – one. This raises the question as to the validity of considering the theory of inquiry as the ultimate subject-matter of logic. A possible answer is that there is no problem about that, since the applications of logic in the most diverse branches of science end up, though indirectly, presenting new ways of knowing and thinking, as computers have been showing.

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⁶ On Carnap's relation to Charles Morris's semiotic theory, or *scientific empiricism*, see CARNAP, [1950] (1996). Also, see RICHARDSON, (2007), and (CUNHA, 2009).

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