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Review

Notturmo, Mark Amadeus. Objectivity, Rationality and the Third Realm: Justification and the Grounds of Psychologism. Dordrecht, Boston, Lancaster: Martinus Nijhoff Publishers, 1985.

In this book, Notturmo states that in there has been a significant paradigm shift in Philosophy: the shift from an old epistemological paradigm which he denominates EP_1 to a new one which he calls EP_2 . EP_1 is the view that states that there are self-evident truths that exist and remain changeless and eternal. Under this paradigm, these truths guarantee objective knowledge. The EP_2 starts from another point of view in which Philosophy and Science can reach objectivity and certainty, but there is no ultimate absolute guarantee of a certain knowledge, fallibilism is as a simple epistemological truth because of the fallible character of human psychology. Therefore, the purpose of this view is to justify the psychological view of epistemology. To illustrate this paradigm shift, he takes Gottlob Frege as the Philosopher who represents the EP_1 , and he exposes Popper's view as one representing the EP_2 . He takes the subject of anti-psychologism in both philosophers and their notions of the third realm to elaborate his point.

This book is divided in twelve chapters. The first one exposes the issue to be discussed, the following ten he makes a critical exposition of both philosophers, specially their faults in their proposals against psychologism. The final chapter is Notturmo's conclusion, that philosophers and scientists alike can embrace psychologism in epistemology.

In the first chapter, titled "Epistemological Paradigm Shifts: A Game of Chess," he begins with Wittgenstein's statement that language is like a game of chess, and its rules must be followed for that game to be played. What philosophers do is establish logical laws as the rules of the game to play the "philosophical game" and the purpose of Notturmo's book is to explore

the board where philosophers play, also the rules of the game which have been established paradigmatically. For that, he establishes the difference between paradigms EP and EP_2 (1-8).

In the second chapter, titled "What is Psychologism?," he presents various ways in which the word "psychologism" has been conceived, and states that we have to understand this notion, because it is based on a justificacionist epistemology. Frege and Popper don't criticize psychologism because it reduces epistemology to an introspectionist psychology per se, but they are against the epistemological consequences of it, and it is because of this outcome that each one of them, in a different way, they postulate a third realm of objective entities (9-22).

In his third chapter, titled "Psychologism: A Fregean Perspective", Notturmo exposes Frege's anti-psychologist philosophy according to five Fregean theses: The first thesis is that logic is a normative science and not a descriptive or natural science (24, 31). Notturmo is completely wrong with that characterization of Frege's philosophy, and it is in part due to an ambiguity in his exposition, because he says that for Frege, logic is a science of the laws of thought, "thought" meaning in Notturmo's mind the "psychological thinking". This confusion will be cleared up when we discuss the fifth chapter, but it is necessary to point out that in Frege's The Basic Laws of Arithmetic (Grundgesetze der Arithmetik) and in his essay "The Thought" ("Der Gedanke") Frege establishes a very crucial distinction:

[. . .] This is certainly so if logic is concerned with things being held as true [Fürwahrgehaltenwerden] rather than with their being true [Wahrsein]! And these are what the psychological logicians confuse. Thus B. Erdmann in the first volume of his Logik (pp. 272-5) equates truth with general validity and bases this on the general certainty regarding the object of judgement [sic.], and this in turn on the general agreement amongst those who judge. So in the end truth is reduced to the holding as true of individuals. In response I can only say: being true is quite different from being held as true whether by one, or by many, or by all, and it is in no way reduced to it. There is no contradiction in something being true which is held by everyone as false. I understand logical laws not psychological laws of holding as true, but laws of being true (Frege 202-203).

[. . .] In order to avoid any misunderstanding and prevent the blurring of the boundary between psychology and logic, I assign to logic the task of discovering the laws of truth, not the laws of taking things to be true or of [psychological] thinking (Frege 326).

So, Frege explicitly denies that logic has something to do with psychological thinking, it has to do about the laws of being true, in contrast with the psychological “laws” of being held as true. This difference is seen clearer in Husserl's Logical Investigations where he distinguishes between logic in its theoretical dimension (which establishes simply what is), and logic in its normative character (which establishes what ought to be), and he states clearly that logical laws, considered in themselves are not normative in nature, only theoretical (“Prolegomena of Pure Logic, §41). Notturmo doesn't include this important view of logic in his studies, though he quotes Husserl many times (xiv, 12- 15,17,18, 20- 23, 25, 31, 32, 57, 58, 61, 74, 75, 156, 157, 226, 229, 231).

Frege's second thesis, according to Notturmo, has to do with the difference between sense and reference, and how does he apply these notions to proper names and assertive sentences. Frege tries to avoid falling into psychology and uses the word "idea" (Vorstellung) in the psychological sense. An idea can vary from person to person, but the sense of the words can be grasped by everyone. Therefore, the sense (Sinn) cannot be a psychological entity, a word refers to an object through a sense (Sinn). This is also true for assertive sentences, the thought (the sense of an assertive sentence) can be grasped by all, and its reference is a truth value. With this view, one can clearly see the differences between subjective ideas and objective entities (33- 40).

In this part, Notturmo also commits a mistake in his analysis. He bases himself in Frege's book The Foundations of Arithmetic (Die Grundlagen der Arithmetik). He quotes him saying: "never to ask for the meaning of a word in isolation, but only in the context of a proposition" (Notturmo 40). This is known as the context principle, which Frege abandons when he made the difference between sense and reference. When Frege posits the existence of the third realm, he doesn't mention the principle of context anywhere. According to Frege, the sense and reference

of an assertive sentence is determined by the sense and reference of the words in a sentence, not the other way around:

We now inquire concerning the sense and reference of an entire assertoric sentence. Such a sentence contains a thought [Gedanke]. [. . .] If we now replace one word of the sentence by another having the same reference, but a different sense, this can have no effect upon the reference of the sentence. Yet we can see that in such a case the thought changes; since, e.g., the thought in the sentence 'The Morning Star is a body illuminated by the Sun' differs from that in the sentence 'The Evening Star is a body illuminated by the Sun'. Anybody who did not know that the Evening Star is the Morning Star might hold the one thought to be true, the other false. The thought, accordingly, cannot be the reference of the sentence, but must rather be considered as its sense [. . .] (Frege 156).

We have seen that the reference of a sentence may always be sought, whenever the reference of its components is involved; and that this is the case when and only when we are inquiring after the truth- value (Frege 157).

Frege's third thesis exposed by Notturmo has to do with logical relations and mathematical objects, as well as senses in general as third realm objects, not as parts of the physical world nor parts of the psychological one. He compares Frege's position with Brouwer's, who supports a non-platonic view. Brouwer states that mathematical objects are mental constructions, and therefore they can't be objects of what is known to be true, supporting in Notturmo's eyes, a point of view contrary to Frege's. As we have seen Notturmo doesn't take into account the Fregean distinction between laws that are held to be true and the laws of being true. In Notturmo's eyes, Frege regards logical laws as normative laws, and this contradicts Brouwer's position. From Brouwer's intuitionistic point of view, he thinks that being true is different from being known as true. As the reader knows from earlier quotes of Frege, this doesn't contradict Frege at all, as Notturmo would want us to believe in this matter. Where Brouwer does contradict Frege is in his assertion that mathematical and logical objects are mental constructions. This allusion to Brouwer's philosophy prepares the reader for the discussion of

Karl Popper's concept of the third realm, because for Popper, third realm objects are psychological constructs (40-48).

About Frege's fourth thesis against psychological epistemology, he argues that it is necessary to suppose truths of knowledge which a priori, and without these logical and mathematical suppositions, a true epistemology is possible. Frege eliminates a possibility of "a priori mistakes" and therefore a priori truths are separate from the psychological realm. Notturmo makes a contrast with the views of Hume and Mill about this, who didn't hold logical laws as truths in themselves and that nothing can guarantee true conclusions from given premises and rules of inference. Frege, on the other hand, states that knowledge doesn't "create" what is known, but only grasps what is already there (49-57). From this, a fifth thesis is deduced: there can be objective true knowledge.

In chapter four, titled "The Logic of Philosophical Taxonomy", Notturmo exposes the contrast between psychologism and Fregean philosophy about epistemology and ontology. According to him, in Frege these two aspects are related. When Frege wrote his essay "On Sense and Reference" he defined as synthetic judgments, or propositions in the form " $a = b$ " as provider of knowledge, because "a" and "b" are two different senses with the same reference, and these senses are not provided a priori. Also, the objectivity of third realm objects makes possible the intersubjective communication in which we can talk, not about "my" Pythagoras' Theorem nor about "your" Pythagoras' theorem, but of Pythagoras' Theorem in-itself. We could think that Fregean anti-psychologism depends on truths that are independent of the knower; and that this anti-psychological view is an ontological one. However, Notturmo says: "I wish to emphasize is that what hangs on this ontological thesis pertains to epistemology" (67). The reason for this statement is because the Fregean notion of "grasping" third realm objects is not clear and it seems like the third realm would have an epistemological purpose. This is in part correct when we take into account that in Frege's essay "The Thought", Frege states that scientists look for facts, and facts are nothing more than thoughts which have truth as reference (Frege 342). However, Notturmo wants to imply that Frege's main interest is to develop an epistemological philosophy, as Hans Sluga and others think. For them, Frege is

close to a neo-Kantian worried about epistemological aspects. It is true that Frege refers to certain epistemological aspects, but when we take into account his main works, specially his Conceptual Notation (Begriffsschrift), his Foundations of Arithmetic, Basic Laws of Arithmetic I and II, and his essays "Function and Concept," "On Sense and Reference," "Comments on 'On Sense and Reference'," "On Concept and Object," "Logic," "Logic and Mathematics" and many more, one realizes that his main interest was not epistemology, but philosophy of mathematics. Most of his life was dedicated to attack psychologism in order to state that arithmetic is derived from logic. Even at the end of his life, when he took a neo-Kantian turn to look for the epistemological basis of arithmetic derived from Euclidean geometry, his main focus was philosophy of mathematics. If his focus would have been an epistemological one, then it doesn't make sense how he never explains his notion of "grasping" thoughts. In fact it was quite the opposite, Frege was terrorized by the idea of falling in psychologism, and wanted to stay away from epistemological issues as far as he could. Therefore it is completely wrong to say that he was moved by epistemological considerations.

Notturmo, basing himself on this mistake, compares Frege with Locke and Mill, who denied the possibility of communication of knowledge and its objectivity. He also compares him to Kant, who denied the psychological character of logical laws, because they were a priori laws of thinking (as a normative science). Notturmo points out that the psychologist would interpret this Kantian characterization of logic as laws that are a priori valid for the individual who thinks them. Since Notturmo believes that Frege thinks logical laws are normative laws, he states that Frege made a difference between normative logic and laws of psychological thinking. That's why Notturmo says that for Frege, anti-psychologism (in the sense of denying that logic is a branch of psychology) states the truth of logical laws in an absolute manner (65-75).

In the fifth chapter, titled "Frege and the Psychological Reality Thesis," Notturmo talks about different ways of conceiving psychologism basing himself on thinkers like Elliott Sober, Haack and Brentano. In this discussion of this chapter is practically nourished by the wrong belief that Frege thought that logical laws are normative, or in a sense laws of thought. He argues that Haack is wrong in stating that Frege would reject any kind of psychologism, because

Frege's philosophy would be compatible with Haack's "weak psychologism" in which logic determines how the mind must think (80).

Notturmo quotes Kant for whom logical laws are a priori laws of thinking, but who doesn't give into account how the mind can contradict itself if this was the case. Notturmo points out that the psychologist could interpret this characterization of logic as valid a priori laws for those who think it. Following his confusion that Frege saw logic as a normative science, he says that Frege stated that logic is the laws of thought, but "thought" understood as a third realm entity, different from the psychological process of thinking. Then, for him, Frege, to avoid confusions, declares logical laws as laws of truth. The problem with such an assertion is that he refers to "The Thought" to substantiate this claim. However, before "The Thought," Frege already defined logic as the laws of being true in his Basic Laws of Arithmetic I, in which, as we saw above, logic deals with the laws of being true. Also, if one alludes to "The Thought" to substantiate this claim, one can see Frege distinguished in that essay between "thoughts" and psychological processes of thinking or ideas, between his notion of "thinking", which is the grasping of thoughts, from the mere psychological thinking (Frege 329). Notturmo's confusion of not being able to give an account this fact in Frege's work is because of the bad translation of Frege that Notturmo quotes, and he translates "thought" for what should be translated as "thinking", because it refers to the act of thinking (77- 88).

When he states that the Fregean notion of logical laws as the laws of truth, he proceeds to add that logic preserves truth when it is applied, always taking into account the truth of the premises. However, he claims that the psychological view that logic is to be regarded as the laws of thinking processes (how we ought to think), it is not incompatible with the notion of logic as laws of truth. Logic can have a role in one part of psychological processes of inference, which does not contradict with Frege's philosophy. In this respect, Notturmo's statement is correct, the grasping of logical laws occur through thinking, in the sense of grasping notions, and psychologically we could apply them to our judgments. However, this concept of thinking as grasping, as Notturmo well points out, is not at all clear in Frege (87- 89). But we see again, how he commits the thousandth time the mistake of viewing Frege's notion of logic as normative.

This last statement made by Notturmo, gives way to the sixth chapter: "Truth, Recognition and Cognitive Authority," in which he says there is no need to posit a third world or a third realm. He wrongly states that Frege was worried about epistemological problems. For him, the notion of "grasping" that Frege mentions is vague:

Nevertheless, what we know of Frege's epistemology is admittedly sketchy and only serves to underscore the kernel of truth that engenders [what Notturmo calls] myth: Frege did not consider it a task to articulate a detailed epistemology. But the fact that Frege articulated a detailed epistemology does not imply that he was not motivated by epistemological consideration. (94)

He exposes the fact that Frege hoped that the empiricists reexamine their theories of knowledge, and mentions Dummett who says that Frege introduces the notions of sense and reference to explain the differences between sentences with cognitive value and those without it. But, contrary to what Notturmo, Sluga and Dummett state, Frege made the difference between sense and reference to better elaborate his logicist theory. Without making this difference between sense and reference, Frege's philosophy would depend on the problematic notion of "content of possible judgment" (beurteilbarer Inhalt) and "conceptual content".

The second source of the myth, according to Notturmo, is the belief that Frege substituted epistemology for logic as the primordial philosophical discipline. He argues that this doesn't mean the Frege was not interested in epistemological problems, and he uses Hans Sluga's statements as evidence to back this claim; he also points to the end of Frege's life in which he abandons his logicist project and turns into a kind of Neo-Kantian philosopher (93-100). Notturmo is wrong. As we already stated, it is obvious that Frege's primordial interest was Philosophy of Mathematics. This philosophy had epistemological consequences, and Frege noted them, but that didn't mean that epistemology is what drove Frege to elaborate his logicist views.

The third source of the myth is that Frege talked about "laws" or "truths" instead of "beliefs." He could refer to truths in an absolute, eternal and immutable sense, independent of the knower. Therefore, they belong to the third realm, because they are not the product of the

minds of individuals. Notturmo points out the existence of the third world is not contrary of a psychological epistemology, which makes logical laws an a priori condition for knowing, and he asks: "[. . .] what are the connections between absolute truth, objective certainty and aprioricity" (102). He also uses the Kantian statement that all valid a priori judgment is apodictically certain, but this only means that they are based on the intuition that they are apodictically true, while a true statement remains eternally true. From this point on, Notturmo states that Fregean anti-psychologism doesn't admit in a certain way the non-existence of the third realm, because logical laws have to be absolutely true, so that they become necessary and a priori valid. If this was not the case, their cognitive authority would be subverted and the a priori certainty would be denied. Though this is the case, we fail to see how Frege could be interested so much in epistemological issues. The outcome of this, according to Notturmo, is the formulation of questions like: what role does the third realm play, if the epistemological process is a psychological process? Also, how can we support the notion of "grasping" when such a concept is formulated in an ambiguous manner? However, it is clear, through this analysis of all of Notturmo's confusions about Frege's philosophy, that for him this notion of the uselessness of the third realm is a step for EP₂ (102- 109).

In chapters seven and eight, titled "Popper, and Fallibilistic Anti-Psychologism" and "Justification, Rationality, and the Grounds of Psychologism" respectively, deal with Karl Popper's anti-psychologist philosophy. We won't discuss them in full detail, except to expose essential issues for Notturmo's views.

Due to Popper's opposition to the possibility of the verification of a conjecture, Popper does not believe in verificationism nor justificationism (dogmatism). Then, the majority of Notturmo's arguments favoring psychologism center around the Fries' trilemma: if scientific statements are not accepted dogmatically, then there would be a way to justifying them; if we demand a justification in a logical sense, then those statements can be justified based on other statements, and those are justified by other statements, until there is an infinite regress; the only way to avoid dogmatism and infinite regress is psychologism, this means, the doctrine that statements can only be justified not only through other statements, but also through perceptual

experience (128). What would be Popper's position but skepticism? The problem is that Popper doesn't consider himself a skeptic, because he states that scientific theories can be closer to the truth than others. He states that truth exists, but he doesn't state this in a dogmatic manner (111- 131).

Also Notturmo mentions the Nagel-Popper controversy, in which Popper denied the inductive factor as a justification of scientific theories. Notturmo states that the validity of an inductive inference depends on the fact that scientific theories base themselves on statements that are justified by sensory perceptions (131- 142). However, he doesn't give any account of the fact that the formulation of scientific theories is non-inductive. We could refer to Semmelweis' case and the search for the cure for childbirth fever as an example of this (Hempel 4- 18). Scientific theories can be formulated and oriented by empirical statements, but they are never justified in a dogmatic manner. They could be changed or refuted. The process of formulating scientific theories is deductive, not inductive.

Then, on chapter 9, titled "Subjectless Knowledge and the Third World," Notturmo compares Frege's third realm notion with Popper's. As in Frege's case, Popper's first and second world are the material and the psychological worlds respectively. But, with respect to the third world, for Popper, its objects are constructions of the mind, has therefore its basis on the second world, but nevertheless it is autonomous from it. Logical relations and mathematical objects are in the third world, but according to Popper there are also other kinds of objects. For example, when I'm talking about the Iliad, I'm not talking about a physical book called the Iliad, but about a content; when I talk about the Bible in general, I'm not talking about this book called "The Holy Bible" or to that one called "Jerusalem Bible", I'm referring to the content of the Bible as such. The same is true for works of art, plays, music, etc. Also forming part of this third world are scientific problems, social institutions which are non-material objects. However, the greatest difference between Frege and Popper is that for Frege we discover third realm objects, in Popper's case on the other hand these objects originate as a product of human activity. These objects for Frege are completely independent of the human mind; but for Popper they are human constructs and we can derive true statements from them as a result of human

intellectual activity. For him, though these third world objects are psychologically created, they can guarantee scientific objectivity, even though none of these objects are dogmatically infallible. In this third world, the process of conjecture and refutation is carried out (143- 157).

Notturmo evaluates the Popperian notion of theory selection: in Popper there can be fallibilistic but objective knowledge. Popper nonetheless denies an absolute objective knowledge, and at the same time rejects that knowledge ought to be justified. Notturmo is right when he says: "Popper, it seems, must believe that objective knowledge is a sort of unjustified true belief - how strange!" (152)

Notturmo compares Popperian and Fregean anti- psychologism. In Fregean "epistemology," as Notturmo calls it, it is necessary to justify logical truths, and there is a need of admitting a priori truths. This is clearly not Popper's case, because he rejects logical dogmatism and that there may be infallible knowledge. The same happens with the third realm. For Frege, logical objects are not originated in the psychological realm nor from experience, they already exist in the third realm and they are eternally true. In Popper's case, the third realm is the means to provide logical criticism and a notion of a subjectless knowledge, knowledge without a knower, which is a concept that is nowhere to be found in Frege's writings (152- 154).

In the following chapters 10 and 11 titled "Observation and Criticism" and "Truth and the Denigration of Inquiry: Two Faces of Relativism" respectively, Notturmo shows Popper's failure to legitimize his notion of the third world, avoiding dogmatism, logical justification and psychologism simultaneously in light of Fries' trilemma. This happens for two reasons. The first is because the problem of empirical equivalence of scientific theories: which theory is better than the other to explain something, if both explain the same facts? Popper's criteria of the simplicity of theories is not adequate for this. What happens if we have basic statements that are not refutable? If we say: "All swans are white," and we find a non- white bird, but with the same main physiological characteristics of a swan, this doesn't necessarily mean a refutation of that original statement. We could classify that non- white bird as a different specie. Either way, even if we change it, or we stick with the original definition, we would have no alternative but to accept the basic statement, old or new, dogmatically. However, Popper doesn't justify

any alternative that justifies a statement as a kind of dogma of thought. The remaining alternative is a pragmatic justification, which at the bottom is a psychological justification. Popper uses the vague notion of "rationality" to reject psychologism, which he makes it equivalent to irrationality. What is "rational" when we make a basic statement? Apparently, under this point of view, Popper is not capable of defending himself about psychologism, and at the same time, he falls on relativism (169- 171).

Notturmo, comparing the Popperian notion of rationality with Kuhn's philosophy, he states in practical terms, that though there are significant differences between Kuhn and Popper, there are some aspects which Popper shares with Kuhn. It can be that basic or main statements are not falsifiable; also Popper states that there can be falsifiable theories, but which are not definitely falsifiable, and for Kuhn there are no falsifiable paradigms through empirical data (175- 178).

Notturmo exposes the problem of the translatability of paradigms, and states that Kuhn doesn't deny that there may be this kind of translatability. What he denies is that there is a neutral linguistic frame of reference that provides basis for comparison between theories and paradigms. This is so, because there exists an indetermination of the communications of meanings, and sometimes the translations of paradigms can be partial and imperfect. That's why paradigms are incommensurable (178- 181).

Where Popper sees a certain rationality, Kuhn sees persuasion, because he explicitly rejects the EP_1 of pre-existing or a priori knowledge, and therefore the main or basic scientific statements are not "rationally" justified, because they are not infallible. They are justified within the paradigms which they are in and offer that frame of "rationality."

The most important part is the role of the notion of truth in scientific investigations. In Popper, the notion of truth (in the Tarskian sense) is a regulative idea of science, but for Kuhn it plays any significant role in paradigms. Anyhow, for these EP_2 philosophers absolute truth can't be discovered, they only play a regulative role, though in Kuhn's case, this notion of truth depends on the paradigm that the scientific community accepts.

Notturmo then proceeds to compare EP_1 with EP_2 using Frege and Popper as references.

He says: "While Frege was opposed to psychological justification, Popper is opposed to psychological justification" (193). For Notturmo, this doesn't help at all to solve Popperian anti-relativism, mainly because Popper has no arguments against relativism: all basic and main principles of science cannot be rationally justified. For Notturmo, Popper and Kuhn are both relativists in their own manner. He states that scientific institutions, as any other one, has to justify itself dogmatically at some level (182- 197).

The final chapter, titled "Psychologism without Tears," is a conclusion of his demonstration that there has indeed been a paradigm shift in philosophy. ER suggests that there is a certain knowledge, while EP₂ denies it. It would be vain to ask that all our knowledge be justified rationally, according to what has been shown by the Fries trilemma, and science constitutes itself in statements of universal characters. There are differences with respect to the notions of third world, for EP₁ third world objects pre-exist and can be grasped, while for EP₂ they are psychologically constructed. We could say that in a strict sense there is no absolute truth, there is only a priori knowledge in a strict sense. Mathematical consistency is justified for pragmatic reasons. Notturmo quotes Hilary Putnam who claims that there could be a change in logical laws for empirical reasons. He also quotes Quine and Putnam in the case of quantum mechanics, in which there have been proposals a modular logic with the purpose of formalizing this science. Notturmo accepts the possibility of a revision of logic through experience, because logic is also fallible. For him, the psychologism vs. anti-psychologism debate there lies a cognitive authority, if theories and statements can claim cognitive authority (218). For him, logic establishes rules by which philosophy plays the game. Finally, he recognizes that with psychologism and relativism we end up in a state of constant insecurity and doubt. The duty of philosophy, according to him, is not to investigate truth, justification and cognitive authority, but understanding or wisdom: how can we play the philosophical game. We can't claim epistemological infallibility, because there is no serious possibility that mistakes are not made while conjecturing. He ends up this eloquent but ridiculous statement:

[. . .] I know that many philosophers will dissent from my vision of philosophy -
 "It's not serious enough!" But then, what do you mean by "serious"? I would never

claim that my philosopher is likely to end up with a high paying job and a house in the suburbs. But he might, if he's lucky, have some fun [?]. (223)

All Notturmo has shown about his work is the existence of two paradigms. However, it is false to say that there has been a paradigm shift in philosophy. Though I do agree that we have to evaluate Popper's problems regarding his anti-psychologistic arguments, which in some aspects it shares some views from Kuhnian relativism, this doesn't mean that in philosophy there has been a paradigm shift. When Frege was writing at his time, the vast majority of philosophers were influenced by psychologistic notions of mathematics and logic. Frege shows the inconsequences of psychologism, specially through the confusion between concept and object (which Notturmo never deals in his book) and confusion between laws of being true and laws being held as true (which Notturmo never shows in his book). Frege also made a difference between sense, reference and subjective ideas in an attempt to avoid psychologism, subject which is dealt poorly in Notturmo's book. The senses and mathematical symbols refer to objects, and depending on the arithmetical relations that is established by the objects, these mathematical thoughts are either true or false, not because our psychological constitution makes us think that way, but because it is that way. The same thing happens with logical laws.

The way Frege views the third world, it is not something that is unnecessary as Notturmo claims, but a condition of possibility for truth. For Frege, the existence of thoughts is a fact, independently if we recognize them or not. Paraphrasing Frege, if I'm writing this Saturday February 15, 2003 at 4:14 pm, it doesn't matter if the rest of the world believes the contrary or if I later deny it and no longer believe I did it, that thought will be eternally true. This is why Frege makes the important distinction between what everybody believes or holds to be true, and what is true. Notturmo pointed out that Fregean notion of logic consists of laws of truth in the normative sense, and not on the notion of being true, to then state that he was moved by epistemological considerations. By doing this, Notturmo loses a very important aspect of Fregean philosophy, and he takes advantage of that omission to then state that psychologism has an advantage, and to state that this Fregean philosophy sowed the seed for the paradigm shift.

But there is a question that we have to deal with here first. Has actually such a paradigm shift taken place? There were psychological philosophies in Frege's time, take for instance Franz Brentano, Spencer, F. A. Lange, K. Kroman, G. Heymans, O. Liebmann, Sigwart, all of them who influenced XIXth century philosophy. When Frege first wrote his Conceptual Notation and his Foundations of Arithmetic, it was the psychological view of mathematics and logic that dominated. Frege's view was not popular at that time. On the other hand, supposedly after Popper and Kuhn, according to Notturmo, the EP₁ view was left behind. But what about the philosophies of Kurt Gödel, Jerrold J. Katz, James R. Brown and Michael Resnik who are Platonists too and have influenced greatly contemporary philosophy of mathematics? Why do we have to pay attention exclusively to anti-Platonists like Benacerraf, Putnam and Quine?

We have to answer also the statement that there exists a possibility that logic changes for empirical reasons and give quantum physics as an example of this. We could accept the possibility of the development of a modular logic to formalize quantum phenomena, but Heisenberg's uncertainty principle and the particle-wave duality of quanta do not deny in any way the truth of the principle of no-contradiction. The principle of no-contradiction doesn't refer to quanta nor to Heisenberg's uncertainty principle. It is a logical law that is always true in itself, always, eternally, doesn't matter what happens in the empirical world.

All of this shows that because Popper doesn't give any solution to Fries' trilemma, far from justifying psychologism, convinces us that Popper's approach to this issue is incorrect. We can establish logical and mathematical entities like starting points to justify the entire scientific investigation. If we don't, then, as Notturmo points out, we fall inevitably in relativism, even if we use the notion of "truth" as a regulative idea.

Finally, I would like to make some comments that Notturmo makes in his Preface, in which he exposes the fact that philosophy led him to believe that God does not exist (ix). Many times, he talks about many Platonist notions similar to the notion of third realm, and one of these objects is supposedly God (3, 21), because third realm objects are eternal, changeless, always true, not in the material world, etc. To correct this Notturmean theology, the notion of

God has nothing to do with logical relations or mathematical objects, and even thoughts themselves (in the Fregean sense). Even if God didn't exist, the principle of no-contradiction would continue to be true. It can be that Notturmo imagines that the denial of third realm objects would be apodictically the denial of God's existence. However, from a Platonist point of view, this claim is unfounded. Definitely, if he wanted to show that God doesn't exist, he never did.

I wish to mention the fact that his characterization of both paradigms is inadequate for contemporary mathematical Platonism. For example, Platonism can embrace epistemological fallibilism without any problems. The fact that we fail to know or know in an imperfect manner some mathematical truths doesn't mean necessarily that these truths don't exist (Brown 18-23). Where would this category fit with respect to both paradigms. Would fallibilistic Platonism fit in EP_1 or EP_2 ?

Contrary to what Notturmo believes, the duty of Philosophy is to find universally valid truths, and not so much to have fun, though it doesn't mean you can't have fun in the process.

I wish to finish also saying that despite Notturmo's rejection of Frege's or Popper's notion of third realm or world 3, he recognizes that this controversial notion cannot be so easily dismissed, it seems that Popper's philosophical claim of the objectivity of scientific theories and statements cannot be understood without this notion (Notturmo 2000, 148-149).

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