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LOGIC AND COGNITIVE SCIENCE: FREGE'S ANTI-PSYCHOLOGISM[1]

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O objetivo deste artigo é contribuir para a reabilitação do psicologismo como doutrina sobre os fundamentos da lógica. O psicologismo define-se por dois princípios: 1) os fatos sobre o raciocínio humano são relevantes para a seleção de princípios que são prescritos pela lógica normativa e 2) as entidades lógicas (conceitos, proposições, argumentos, etc.) são entidades mentais. Só o segundo princípio é analisado aqui. Em primeiro lugar, damos um argumento que busca provar que o platonismo de Frege é incompatível com sua visão da lógica como disciplina normativa. Em seguida, apresentam-se refutações dos argumentos antimentalistas de Frege.

The paper's purpose is to contribute to the rehabilitation of psychologism as a doctrine about the foundations of logic. Psychologism is defined as consisting in two tenets: 1) Facts about human reasoning are relevant to the choice of principles that are prescribed by normative logic, and, 2) Logical entities (concepts, propositions, arguments, etc.) are mental entities. Only the second tenet is discussed in the paper. There is first an argument to the effect that Frege's Platonism is incompatible with his view of logic as a normative dis-

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cipline. Then refutations are presented of Frege's anti-mentalist arguments.

I

For most of this century psychologism has been regarded as a completely misconceived, even a disreputable view. When Musgrave asserts that "Nowadays only a few cranks officially subscribe to that view about the nature of logic [psychologism]" (Musgrave 1972, pp. 593-608), he is just echoing the general feeling that prevails, even today, among logicians and philosophers. The conventional wisdom is that this lowly reputation psychologism has acquired is well deserved, that it is indeed a hopeless doctrine, and that Frege is the man who deserves the credit for having decisively established this.

The triumph of anti-psychologism together with the hegemony of behaviourism in psychology gave rise to a gap between logic and thinking. Psychologists did not have any use for logic, and logicians said very little about the relationship of their studies to human reasoning[2]. The advent of cognitive science introduced an element of disturbance into this situation, since from its point of view one cannot isolate the study of cognition from that of logic.[3]

Being in sympathy with the general trend of cognitive science, I subscribe to the view that logic and thinking are closely related. I also believe that their relationship cannot be properly un-

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[2] Cf. Macnamara (1986). Concerning psychology, I am referring only to the Anglo-Saxon tradition; to Piaget, in particular, the remark obviously does not apply.

[3] That remark does not apply to the position known as *eliminative materialism*, which is usually associated with the view that the connectionist approach is sufficient to account for all human cognitive processes (cf., for instance, Churchland, (1986)). However, such a position represents a minority trend within cognitive science, given that most connectionists do acknowledge the existence of a symbolic level in the human mind, to which logical issues are relevant (cf., for instance, Smolensky (1988)).

derstood if one adheres to orthodox anti-psychologistic conceptions concerning the foundations of logic. Other authors in the field of cognitive science have expressed similar feelings. Macnamara, for instance, in the work mentioned earlier, makes some proposals along these lines. However, psychologism has acquired such a halo of crankiness that Macnamara is very careful to dissociate himself from the authors attacked by Frege; he is at pains to avoid having the label 'psychologism' attached to his position. To my mind, the time has come for a change in this type of attitude. My claim is that doctrines can be formulated nowadays which have sufficient affinities with those attacked by Frege to deserve the name 'psychologism', and which can at least compete on an equal footing with other views about the nature of logic. My purpose in this paper is to contribute towards the vindication of that claim.

In this first, introductory, section, I will propose a characterization of psychologism, and then indicate more precisely what the aims of the present paper are. Before getting to that point, however, a preliminary discussion is needed.

From a theoretical point of view, one should recognize the existence of three different disciplines that can be given the name of 'logic'. There is, first, *normative* logic, whose aim is to *prescribe* how we *ought* to think (or to reason, or to make inferences) — in the same way as ethics prescribes norms for other types of conduct. Secondly, there is *descriptive* logic, which aims at *describing* how we *in fact* think. The study of processes of thought is included in that of cognition, so descriptive logic is part of cognitive psychology (and thus also of psychology *tout court*), and, from another point of view, of cognitive science. The existence of descriptive logic is postulated here only for theoretical purposes. I am not claiming that there should be departments of descriptive logic or anything of the kind, and also nothing essential hangs on the occurrence of the word 'logic' in the term 'descriptive logic'. Finally, the third discipline is *formal* logic. Formal logic studies the formal

aspects of a certain class of symbolic systems. Mathematics can also be practised in this formal way, and when that is the case, there is no essential difference between the two disciplines.

This threefold distinction, I maintain, constitutes the proper framework for the discussion of psychologism, and it should be acceptable to all parties in the dispute nowadays. If one leaves aside formal logic, then one obtains the proper framework for the discussion of psychologism in Frege's time.

In his polemic against psychologism, Frege emphatically defends the view that logic is a normative discipline, as the following passages show:

> Logic has a closer affinity with ethics. The property 'good' has a significance for the latter analogous to that which the property 'true' has for the former. (1979, p.4)

> It will be granted at the outset that the laws of logic ought to be guiding principles for thought in the attainment of truth, yet this is too easily forgotten, and here what is fatal is the double meaning of the word 'law'. In one sense a law asserts what is; in the other it prescribes what ought to be. Only in the latter sense can the laws of logic be called 'laws of thought': so far as they stipulate the way in which one ought to think. (1962, p.12)

> Like ethics, logic can also be called a normative science. How must I think in order to reach the goal, truth? (1979, p.128)

In so far as it presents itself as a science, psychology must be descriptive. The relationship between psychologism and psychology, together with Frege's emphasis on normativeness, may give the impression that, as far as this issue is concerned, the disagreement consisted in this: that for Frege logic was a normative discipline, while for the adherents of psychologism — i.e., for the 'psychological logicians', as Frege called them — logic was descriptive. That, however, was not the case (otherwise the distinction above would not, of course, be acceptable to both parties).

As far as Frege is concerned, he did acknowledge the possibility of descriptive studies of human reasoning:

> Of course if we see the task of logic to be that of describing how men actually think, then we shall naturally have to accord great importance to language. But then the name logic is being used for what is really only a branch of psychology. (1979, p.143)

> To explain how thinking and judging take place is certainly a feasible undertaking, but it is not a logical one. (1979, p.146)

As one can see, for Frege it is important that such studies be placed in the realm of psychology, and be denied a logical nature. That, however, is no reason to prevent us from saying that he did allow the possibility of descriptive logic, according to the characterization given above.

Concerning the psychological logicians, it is a reasonable conjecture that they, conversely, did not reject the idea of normative logic. One of them, Sigwart, called it the 'Ethics of Thought'.[4]

Logic has always been associated with the ideals of rigour and precision. The knowledge we have attained so far about our own processes of thought is however so limited that the level of rigour and precision with which which we can talk about them is immensely lower than that with which we can study the formal properties of symbolic systems. It is thus very tempting for logicians either to ignore in their researches the difficult problems that appear when one tries to give an account of the relationship be-

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[4] Sigwart is mentioned by Resnik (1980, p. 50). It is not easy to ascertain the psychological logicians' views due to the difficulty in having access to their writings (cf. *ibid.*, p.27) — a difficulty that can be attributed to the very success of the anti-psychologist drive. Since this paper is focused on substantive issues concerning the foundations of logic, not on historical matters, I believe there is no harm in leaving as conjectures these general statements about the psychological logicians' attitude towards normative logic.

tweeen formal studies and thinking, or even to deny explicitly that such a relationship exists, i.e., to claim that logic has nothing to do with thinking.

It is hard to see on what grounds one could deny the possibility of the domain I called 'descriptive logic' — if the name is taken just as a label. There is indeed nowadays a number of researches in the field of cognitive science which can be cited as existence proofs for descriptive logic.[5]

It is also evident that the idea of rational debate, which underlies the whole scientific and philosophical enterprise, has at its core normative logical principles. If logic abdicates the prerrogative of issuing those norms, then another domain must assume the role of legislator. But then that would again become just a question of names.

The formal logician can claim, of course, that formal logic is the one and true logic, and in doing so he would have the advantage of avoiding the problems connected with the relationship between logic and thinking. There would however be a high price to pay, namely, that logic would lose a good part of its philosophical significance by becoming irrelevant to the issue of rationality.

As far as the relationship between normative logic and descriptive logic is concerned, two basic positions can be considered. The first holds that the former is completely independent of the latter, i.e., that in the choice of principles which are actually prescribed as norms, no facts about human reasoning are taken into account. This is clearly the view maintained by Frege.

The second position consists in the claim that descriptive logic is relevant to normative logic, and it can assume many forms depending on the precise manner in which the results of descriptive logic function as inputs for normative logic. Some of those forms

[5] For example, Wason (1966), Mynatt *et al.* (1977), and Cheng and Holyoak (1985). Cf. also Evans (1982), Johnson-Laird (1983), and Gardner (1985, ch. 13).

amount to an identification of the contents of the two logics, i.e., to the view that the way in which we in fact think is the way we ought to think. Such a view is liable to the charge of relativism, and it was the objection that Frege raised against the psychological logicians — see for instance his criticism of Erdmann (Frege 1962, p.14).

Although one may endorse Frege's criticism of Erdmann, that does not mean that it is impossible to hold that descriptive logic is relevant to normative logic without falling into relativism. In recent years a lively debate has been going on about this topic.[6]

Let us call 'logical entities' the entities that normative and descriptive logics deal with, namely, concepts, propositions, arguments, etc.

A definition of psychologism can now be given, which consists in two tenets. Psychologism is the doctrine according to which, (1) descriptive logic is relevant to normative logic, and, (2) logical entities are mental entities.

In this paper, only tenet (2) will be argued for. In the next section, I will develop a critique of Frege's Platonism as an account of the nature of logical entities. This discussion refers basically to normative logic. The remaining sections deal with the difficulties a mentalist account of logical entities must face, many of which were raised by Frege.

II

Since normative logic refers to thinking, and thinking is a mental process, it would seem evident that the entities normative logic is about should be mental entities. That, however, was not Frege's view.

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[6] Some important contributions to that debate are: Goldman (1978), Stich and Nisbett (1980), Cohen (1981), Thagard (1982) and Resnik (1985).

By 'Frege's Platonism' I mean the doctrine (expounded in 'The Thought', and in 'Logic')[7] whose fundamentals are the following. Reality is composed of three ontological realms. The first one is the realm of the external world, of material things, which exist independently of us and are perceptible by the senses. The second is the realm of the inner world, of sensations, feelings, products of imagination, desires, etc. The third realm, finally, is the domain of entities which, like those of the first, are external to us, and exist independently of us, but, like those of the second, are not material things, cannot be seen, touched, etc. We can have knowledge about them because we are endowed with a special mental capacity, which Frege calls 'the power of thought' (*die Denkkraft*) — an eye of the mind by means of which we can *grasp*, or *apprehend* the entities of the third realm. By being apprehended, a entity which belongs to the third realm acts on the inner world of the person who apprehends it, and through this it can have an effect on the domain of material things. On the other hand there is no causal chain going in the other direction and ending in the third realm. The third realm is unchangeable, it is not affected by anything that can happen in the first or the second realms.

Now, it is clear that we can only adopt a normative attitude in relation to our actions, i.e., to the things we can control directly by the exercise of our will. We can say that we *ought* to behave, to talk, or to reason in one way or another, but it does not make sense to assert that an object that is external to us — a stone or a planet — ought to be or to do anything. This applies *a fortiori* to the entities of the third realm, given their property of being unchangeable, unaffectable by anything.

To the entities in relation to which we can be normative, we can also adopt the descriptive attitude. That is why concerning our

[7] In the volume of Frege's posthumous writings (Frege, (1979)) there are two pieces entitled 'Logic', the first written between 1879 and 1891, the second in 1897. I will use the name 'Logic' to refer to the latter one.

conduct there is ethics on the one side, sociology or anthropology on the other; concerning the use of language, normative and descriptive linguistics[8], and concerning reasoning — if logic is conceived as dealing with mental entities — normative and descriptive logics. If, on the other hand, one holds that logic is about entities which are external to us, independent of our will, then logic can only be descriptive — for the same reason that there is no normative physics or chemistry.

Those are my reasons for maintaining that there is an inconsistency in a conception of logic as both Platonic and normative. In Frege's writings one can find the view that the laws of logic are the normative principles for our thinking, as witness the second of the quotations given in the previous section. In other passages, however, he expounds a different account — which can be interpreted as an attempt to extricate himself from the inconsistency that has been pointed out. His move is to conceive logic as containing *two* sets of laws: the first and more fundamental one corresponds, in Frege's terminology, to the *laws of truth* (*Gesetze*

[8] One of the moves that brought modern linguistics into being was a critique of traditional grammar, and an essential part of that critique was a challenge to its assumed role of legislator, of authority in charge of establishing norms of correctness for users of language. Since then the orthodox view has been, to quote from an introductory text, that 'linguistics is **descriptive**, not prescriptive. A linguist is interested in what *is* said, not what he thinks *ought* to be said. He describes language in all its aspects, but does not prescribe rules of "correctness" ' (Aitchison 1978, p. 13. Bold script and italics in the original.) In many textbooks this position is strongly emphasized, usually as part of a demonstration of the scientific character of the discipline. More careful writers also point out, however, that this claim is not incompatible with the existence of a normative discipline about language. Lyons (1969), for instance, states the orthodox view that 'The linguist's first task is to *describe* the way people actually speak and write their language, not to *prescribe* how they ought to speak and write', but then adds: 'It should be stressed that in distinguishing between description and prescription, the linguist is not saying that there is no place for prescriptive studies of language.' (Lyons 1969, p. 43)

des Wahrseins); they are, one can say, the descriptive laws of Platonic logic. It is the second set that is normative, that consists in rules for reasoning. The difference between them can be brought out by an example. 'If **A** and **B**, then **A**' is a law of the first kind, with **A** and **B** being entities external to, and independent of us, it is analogous, from the relevant point of view, to an assertion like 'the earth is bigger than the moon'. The corresponding law in the second set would be something like: 'if one believes that '**A** and **B**' is true, then one must also believe that **A** is true'.

What Frege says in 'Logic' is: 'We must assume that the rules for our thinking and for our holding something to be true are prescribed by the laws of truth. The former are given along with the latter'. (1979, p.128) My view is that this move has a forced, *ad hoc* nature. Frege himself feels uncomfortable about it, as the continuation of the passage just quoted shows:

> Consequently we can also say: logic is the science of the most general laws of truth. *The reader may find that he can form no very precise impression from this description of what is meant. The author's inadequacy and the awkwardness of language are probably to blame for this.* (1979, p.128, my italics.)

In 'The Thought' Frege is more explicit about the descriptive character of the laws of truth, deriving from their similarity with the laws of nature, and about their relationship to the rules for thinking:

> The word 'law' is used in two senses. When we speak of laws of morals or the state we mean regulations which ought to be obeyed but with which actual happenings are not always in conformity. *Laws of nature are generalizations of natural occurrences with which the occurrences are always in accordance. It is rather in this sense that I speak of laws of truth.* This is, to be sure, not a matter of what happens so much as of what is. Rules for asserting, thinking, judging, inferring *follow from* [*ergeben sich aus*] the laws of truth. (1967, p.17, my italics)

One asks: according to which principles do the rules for thinking follow from the laws of truth? Not, of course, according to the rules for thinking themselves, since they are, so to speak, the conclusion. And neither according to the laws of truth: those refer only to the entities of the third realm, no combination of them can yield as conclusion rules for thinking, which must refer to mental entities.

If the laws of logic are descriptive, then they have the same status as the laws of natural sciences. Frege does make that comparison:

> Any law asserting what is can be conceived as prescribing that one ought to think in conformity with it, and is thus in that sense a law of thought. This holds for laws of geometry and physics no less than for the laws of logic. The latter have a special title to the name 'laws of thought' only if we mean to assert that they are the most general laws, which prescribe universally the way in which one ought to think if one is to think at all. (1962, p.12)

What Frege has in mind is that to any (descriptive) natural law — for instance, 'unlike electric charges attract each other' — there corresponds a normative principle — 'one should believe that unlike electric charges attract each other'. Since natural laws are not regarded as 'laws of thought', there must be a special reason for the laws of logic to deserve that title, and that reason is their universality.[9]

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[9] There is a passage in 'Logic' where Frege makes the same comparison to justify the view that the laws of logic ought *not* to be called 'laws of thought': 'I therefore think it better to avoid the expression 'laws of thought' altogether in logic, because it misleads us into thinking of the laws of thought as laws of nature. If that is what they were we should have to assign them to psychology. We could, with equal justice, think of the laws of geometry and the laws of physics as laws of thought or laws of judgement, namely as prescriptions to which our judgements must conform in a different domain if they are to remain in agreement with the

Frege thus makes the comparison between the laws of logic and the laws of natural sciences in order to decide whether the former should or should not be called 'laws of thought'. But it is clear that it is not just that which is at stake, but also the much more important question of whether logic is or is not a normative discipline. The natural sciences are considered to be paradigmatic cases of descriptive studies; if the laws of logic are analogous to natural laws, then it follows that logic should also be regarded as a descriptive discipline. The recourse to their universality, which is already somewhat doubtful as a justification for granting them the name 'laws of thought' is clearly insufficient to avoid that conclusion — since this kind of universality has nothing to do with the question of normativeness.

That is not the most serious difficulty, however. The problem is that the analogy between natural science and logic does not hold, for the following reasons. In order to pass from a natural law to the corresponding normative principle, all one has to do is to prefix it with 'one should believe that...'. Now, if one applies the same operation to a law of logic like 'if **A** implies **B**, and **A** is true, then **B** is true', what one gets is 'one should believe that if **A** implies **B**, and **A** is true, then **B** is true'. What is needed instead however, is something like 'if one believes that **A** implies **B**, and that **A** is true, then one should believe that **B** is true' — which is, of course, the rule of inference of modus ponens. The point is that logic cannot do without rules of inference, and rules of inference cannot be obtained from the descriptive laws of Platonic logic in the same way as normative belief principles can be derived from laws of nature.

In a logical system, it is naturally possible to replace some rules of inference by the corresponding axioms; however, if one

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truth. Logic, then, is no more the right place for conducting psychological investigations than is geometry or physics.' (1979, pp.145-6)

does that to *all* rules, then one can never pass from one set of beliefs to another, that is, one cannot make inferences — which is what the normative dimension of logic is supposed to regulate. That is, of course, the import of Carroll's paradox.

The conclusion is thus that Frege's way out leads very quickly to a dead end. To the difficulty of combining Platonism with normativeness one must add the serious problems it has in itself. There is first the ontological problem: given a principle of parsimony, Platonism, by ascribing a special ontological status to logical (and mathematical) entities, is *ceteris paribus* inferior to any materialist or dualist ontology. Secondly, and more crucially, there is the problem of explaining how essentially different substances can interact. Here again Frege lets his awareness of the difficulty come to light, as one can see in the following passage from 'Logic':

> But still the grasping of this law [of gravitation] is a mental process! Yes, indeed, but it is a process which takes place on the very confines of the mental and which for that reason cannot be completely understood from a purely psychological standpoint. For in grasping the law something comes into view whose nature is no longer mental in the proper sense, namely the Thought[10] ; and this *process is perhaps the most mysterious of all.* (1979, p.145, my italics)

These difficulties Platonism has to face have, however, already been sufficiently aired in the literature, so I will not elaborate on them further. Let us now begin the examination of the problems that the mentalist alternative has to face.

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[10] Following the usual convention, the term 'Thought' is capitalized when it is used in the Fregean sense — in which it designates the non-mental entities belonging to the third realm and corresponding to propositions.

III

The first difficulty for a mentalist conception of logic hinges on the alleged private nature of mental entities and it corresponds to the problem of other minds. The idea is that one has epistemological access only to one's own sensations, feelings, thoughts, etc., but one cannot observe those entities in other people. So, if logic is about mental entities, then each person could have only his own logic, referring only to his own thoughts. Logic would not exist as public, shareable knowledge.

The argument based on the privacy of the mental — let us call it the *argument of other minds* — rules out the possibility not only of mentalist logic, but also of any mentalist psychology. This is one of the arguments in favour of behaviourism, both logical and methodological, and it has often been discussed in the cognitivist literature. I will proceed as follows: I will first give a summary exposition of the solution to the problem of other minds that is put forward by cognitive science. The only details to be touched upon in this exposition will be those needed for the discussion of Frege's version of the argument — which will be discussed in the second part of this section. In the next section, I will deal with another argument of Frege's which is also grounded in the problem of other minds, but slightly different from the one under consideration now. For the first part of the present section I will rely heavily on Paul Churchland's *Matter and Consciousness* (1984), where the main contributions of the cognitivist tradition to the philosophical debate are competently presented — although briefly and at an introductory level — and where references to the source literature are given.

The cognitivist strategy for dealing with the problem of other minds consists in justifying the attribution of mental entities to other people not on the basis of the argument from analogy, but on the conception of mental entities as theoretical entities, like at-

oms, electromagnetic waves, and other unobservable entities of the physical sciences. According to the standard hypothetico-deductive account of scientific knowledge, one is justified in believing in the existence of such entities on the grounds that they are part of theories by means of which one can explain and predict observable phenomena. In the case of mental entities, the theory of which they are part is that which is now called 'folk psychology'. Since folk psychology does have explanatory and predictive power concerning (observable) human behaviour, one is justified in attributing mental entities to other people. (Cf. Churchland 1984, pp. 67-72.)

The sketch of the solution to the problem of other minds presented above justifies the attribution of mental entities in a very general fashion. In order to clarify just what is attributed when one attributes a certain type of mental entity to someone else, the account must be further developed. The idea is roughly as follows (cf. Churchland 1984, 56ff.). The meaning of mental terms is a function of their place within the network of principles and laws that constitute folk psychology. Those principles and laws describe causal relations between aspects of the environment, of the mental entities, and of behaviour. Each type of mental entity is thus characterized by its relationships with the environment, with other entities and with behaviour.

Let us now consider a question which will be especially relevant when I discuss Frege's formulation of the argument of other minds. The question is: does the characterization outlined above capture all aspects of mental entities? In other words, given two mental entities with the same causal/relational properties, can we say that they are identical? One reply that has to be considered is the negative one, supported by the claim that mental entities have intrinsic phenomenological properties which can differ even if their causal relationships are all the same. I am talking of course about *qualia* and about the arguments based on that notion, the most discussed being the inverted spectrum argument.

It is my conviction that within the reductionist framework there is a possibility of surmounting the problem of *qualia*, i.e., of including *qualia* in the characterization of mental entities. (Cf. Churchland 1984, pp.59-61.) However, I will not explore this possibility here, since it is unnecessary as far as the justification of mentalism in logic is concerned. The first reason for this assertion is that the reality of *qualia* is more plausible in connection with mental entities like sensations. Logic however does not talk about these, but about propositional attitudes, especially beliefs, and it is odd to think of each belief as having its own peculiar phenomenological quality. But, more decisively, even if one admits that beliefs have *qualia*, one is not prevented from being a mentalist in logic. It is not necessary that our discourse about mental entities be able to capture all characteristics of mental entities, it enough that we can talk about *some* of them. Thus one can maintain that when mental entities are referred to in logic, their *qualia* are abstracted, in the same way as, in celestial mechanics, for instance, one talks about the mass and density of celestial bodies, ignoring their chemical constitution. (Cf. Churchland 1984, p.60.)

Before considering Frege's formulation of the argument of other minds, two final remarks are necessary. The first concerns the epistemological status of mental entities of other people, as compared to one's own mental entities. The fact that the former are not inaccessible does not mean that they are epistemologically identical to the latter. One can express that by recognizing that one's own mental entities can still be said to be *private*, in the sense that everyone has exclusive access to them, and that they in some sense *belong* to each one. They are not private only in the sense of being unknowable by other people.

The second remark is a reminder that folk psychology is so ingrained in our ways of thinking about people that it is very difficult for those who reject as unjustifiable the attribution of mental entities to other people to remain consistent with this view. There

is, so to speak, a folk psychology trap for anti-mentalists — into which behaviourists are very prone to fall. The same is true of Frege, as I will have occasion to point out a couple of times in the remainder of this paper.

Let us now see how Frege develops his argument:

> My companion and I are convinced that we both see the same field; but each of us has a particular sense-impression of green. I notice a strawberry among the green strawberry leaves. My companion does not notice it, he is colour-blind. The colour-impression, which he receives from the strawberry, is not noticeably different from the one he receives from the leaf. Now does my companion see the green leaf as red, or does he see the red berry as green, or does he see both as one colour with which I am not acquainted at all? These are unanswerable, indeed nonsensical, questions. For when the word 'red' does not state a property of things but is supposed to characterize sense-impressions belonging to my consciousness, it is only applicable within the sphere of my consciousness. For it is impossible to compare my sense-impression with that of someone else. For that it would be necessary to bring together in one consciousness a sense-impression, belonging to one consciousness, with a sense-impression belonging to another consciousness... I said that the word 'red' was applicable only in the sphere of my consciousness if it did not state a property of things but was supposed to characterize one of my sense impressions. Therefore the words 'true' and 'false', as I understand them, could also be applicable only in the sphere of my consciousness, if they were not supposed to be concerned with something of which I was not the bearer, but were somehow appointed to characterize the contents of my consciousness. The truth would be restricted to the content of my consciousness and it would remain doubtful whether anything at all comparable occurred in the consciousness of others. (1967, p.27)[11]

The first thing to point out is that Frege falls into the folk psychology trap. He asserts that it is impossible to compare his

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11 The passage omitted contains another argument of Frege's which leads to the same conclusion expressed in the second part of the quotation. That argument will be discussed in section VI below.

sense-impressions with those of someone else, yet a few lines above he says that the colour-impression his companion receives from the strawberry and from the strawberry leaves are not noticeably different from each other. But how can he have this knowledge? For if he can assert that about his companion's sense-impressions from the strawberry and the leaves, this means he can compare them with his own sense-impressions caused by the same objects — those *are* noticeably different from each other.

Let us now consider his question 'does my companion see the green leaf as red, or does he see the red berry as green, or does he see both as of one colour with which I am not acquainted at all?' Now if the question is taken to refer to the *qualia* of his companion's colour-impressions, then indeed no reply is available (at least for the time being). But then the fact that the companion in the thought-experiment is colour-blind only confuses the issue, for questions of that type would still be unanswerable even if he were normal. The experiment would be just a variation of the inverted spectrum argument. If, on the other hand, one interprets the question as referring to the causal/relational properties of the colour-impressions, then an answer can be provided: the colour-impression caused by either the strawberry or by the leaves is not of the same type as any colour-impression of a normal person. We do, however, have knowledge about it; if the need arises for giving a name to it a convenient choice would be 'either-red-or-green', since it indicates the mapping that exists between the colour-impressions of the colour-blind person and those of people with normal colour-vision.

Let me finally come to the main point of the argument. Its structure is the following. For someone to know the mental entities of another person is equivalent to comparing them with his own mental entities, and that in turn is the same as being able to apply some predicates both to his and to the other person's mental entities. The only way to compare mental entities belonging to differ-

ent people is to bring them together in one consciousness. It is, however, impossible to do that, and hence if there is a predicate that is applicable to one's own mental entities, then it is not applicable to those of anybody else. Consequently, if one applies the predicates 'true' and 'false' to his own mental entities, he cannot do the same to those of other people. The predicates 'true' and 'false' are fundamental in logic, so — if logical entities are taken to be mental entities — each person would have his own logic, referring only to his own mental entities.

The unwarranted premiss, on account of which the whole argument falls to the ground is, of course, the assumption that one needs to bring together in one consciousness the mental entities of different people, in order to compare them. The solution to the problem of other minds sketched above provides an alternative way of carrying out this task.

IV

'The Thought' is the only work in which the epistemological inaccessibility that Frege ascribes to mental entities is not qualified. In all other writings where psychologism is dealt with, this inaccessibility is only relative. In 'Sense and Reference', for instance, he says: 'It is indeed possible to establish differences in the ideas, or even the sensations of different men; but an *exact* comparison is not possible, because we cannot have both ideas together in the same consciousness'. (1960, p.60), and in *The Basic Laws of Arithmetic*: 'We must never forget that different people's ideas, however similar they may be (which, incidentally, we cannot *accurately* determine)...' (1962, p.17. Italics mine in both quotations.)

Now, if the epistemological inaccessibility of mental entities is only relative, then the argument that relies on it to establish the conclusion that logic cannot be about mental entities becomes

rather weak. What I believe Frege does is to use this qualified inaccessibility as a premiss for a slightly different argument from what I called the argument of other minds. This is what he says in another passage where the relative privacy of mental entities is asserted:

> We do not directly observe the processes in the mind of another, only the effects they have in the physical world. Strictly speaking therefore, we can only form a *superficial* judgement of the similarity between mental processes, since we are unable to unite the inner states experienced by different people in *one* consciousness and so compare them. If the content of the sentence 2+3=5 is exactly the same, in the strictest sense, for all those who recognize it to be true, this means that it is not the product of the mind of this person and a product of the mind of that person, but that it is grasped and recognized as true by both equally. (1979, p.4)

As we can see, Frege presents the argument in the form of a conditional. For the conclusion to go through the antecedent must be asserted, that is, we must know that 'the content of the sentence 2+3=5 is *exactly the same, in the strictest sense*, for all those who recognize it to be true'. Now, if we have that knowledge, the content of the sentence 2+3=5 cannot be a mental entity, because mental entities of different people cannot be *accurately* compared.

The structure of the argument would thus be the following: Logical knowledge is accurate. Mental entities cannot be accurately known. Therefore logical knowledge is not knowledge of mental entities.

The solution to the problem of other minds presented in the previous section does not guarantee that mental entities can be accurately known, but neither does it imply that they can only be superficially known. Its import is just that, whichever may be the case, the reason cannot reside simply in their private nature. Frege does not present any other evidence for the relative unknowability of mental entities. Thus nothing prevents us from reversing the ar-

gument to: Logical knowledge is accurate. Logical knowledge is about mental entities. Therefore, at least some mental entities can be accurately known.

V

So far I have talked about logical entities only in general terms. The issue must now be framed in a more specific form; I will do so by restricting the discussion in this section and the next one to the most important of logical entities, propositions, in section VII to concepts. Nothing is lost by these restrictions, since the points made in relation to each of the two kinds of logical entities apply as well to all other ones. The purpose of the restrictions is just to facilitate the exposition, and to keep in tune with Frege's own way of approaching the issues.

The term 'proposition' is already associated with some particular options from among the alternative replies to the question under consideration. A better term with which to start the discussion would be 'truth-bearer', since the capacity for being either true or false is a property everybody agrees those logical entities do have. There is a difficulty however, in that one needs to refer to individual entities of the type in question; with 'proposition' one says 'the proposition [that p]' — for instance, 'the proposition [that the earth is blue]'; an expression like 'the truth-bearer [that the earth is blue]', on the other hand, does not sound right. My option is to use the term 'proposition' with the meaning of 'truth-bearer', i.e., I will not from the outset attribute to propositions any of the properties which are the subject of the controversies concerning the nature of that type of logical entity.

The question under discussion from now on is thus 'what is the nature of propositions?', and the thesis is that propositions are mental entities. I will now consider an argument that can be raised against it, which I call *'the one-many argument'*. In logic, one

talks about *the* proposition [that **p**] — for instance, 'the proposition [that **p**] is self-contradictory' or 'the proposition [that **p**] implies the proposition [that **q**]'. This usage is associated with there being only *one* proposition [that **p**]. Now, if propositions are mental entities, then there are as many propositions [that **p**] as there are minds which conceive them. Therefore propositions cannot be mental entities.

Frege does formulate the one-many argument, not however concerning logical entities, but mathematical ones. He says in *The Foundations of Arithmetic*:

> If the number two were an idea, then it would have straight away to be private to me only. Another man's idea is, *ex vi termini*, another idea. We should then have it might be many millions of twos on our hands. We should have to speak of my two and your two, of one two and all twos. (*FA*, pp. 37[e])[12]

It is easy to see that the issue here concerns the distinction, widely employed in cognitive science, between *types* and *tokens* — in this case, between proposition types and proposition tokens. At first sight the assertions of logic are about proposition types, while the entities that exist in minds are proposition tokens. That however does not solve the problem, because now one can ask: what is the nature of proposition types? My reply is: each proposition type corresponds to the class of propositions tokens of that type; expressions like '*the* proposition (type) [that **p**]' are to be analyzed as 'all propositions (tokens) [that **p**]'. 'The proposition [that **p**] is self-contradictory' and 'the proposition [that **p**] implies the proposition [that **q**]' are thus to be understood as 'all propositions [that **p**] are self-contradictory' and 'all propositions [that **p**] imply all propositions [that **q**]'.

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[12] I thank Dr. Donald Gillies for having drawn my attention to that passage. It is quoted on p. 39 of Gillies (1982).

The situation here is not different from the one we find in the natural sciences. Let us take biology as an example. The primary reality for the biologist are individual living beings, the specimens. Specimens however are grouped into species, and more important than assertions that refer to particular specimens are those that indicate characteristics common to all members of a species. One way of expressing the latter type of assertion is illustrated by the following example: 'the horse is a four-legged animal', which is understood as 'all horses are four-legged animals' (or, as Frege himself suggests in another context, 'all properly constituted horses are four-legged animals' (1960, p.45)). To give just one example from another discipline: in physics one says 'the electron has a charge of $1.6*10^{-19}C$' meaning 'all electrons have a charge of $1.6*10^{-19}C$'.

VI

I will consider, in this section and the next, two of Frege's objections that are best understood as obstacles to this account based on the type/token distinction. It is clear that this account can only be maintained if all proposition tokens of each proposition type have properties in common, if there are interesting things that can be truthfully asserted about all of them. If the mental entity in each mind that corresponds, for instance, to [the earth is blue] is completely different from the analogous entity in another mind, then it would not make sense to group them together as tokens of the same type. In other words, proposition tokens of each type must form a natural kind. Each of Frege's two arguments in question corresponds to a reason for asserting that proposition tokens are different from each other, which amounts to saying that they do not form a natural kind.

Before we proceed let us recall that 'idea' is the term Frege uses for what I have been calling a 'mental entity'. The argument I

am going to discuss clearly applies not only to propositions, but to all types of logical entities conceived as mental entities — i.e., in Frege's terminology, to ideas.

Now, the first objection is that different people's ideas are different from each other *in principle*, i.e., *just in virtue of belonging to different minds*. That is the objection on which Frege lays greater stress, it occurs at various places in his writings on psychologism.[13]

The passage chosen for comment is the one omitted from the long quotation given in section III, which deals with the problem of other minds (see footnote 11). In that quotation, let us recall, Frege claims that because ideas belonging to different people cannot be compared, the question of whether any two of them are the same cannot be answered, it is senseless. Then he continues:

> Now even if it were possible to make an idea disappear from one consciousness and, at the same time, to make an idea appear in another consciousness, the question whether it is the same idea in both would still remain unanswerable. It is so much of the essence of each of my ideas to be the content of my consciousness, that every idea of another person is, just as such, distinct from mine. (1967, p.27)

To make sense of Frege's line of reasoning, the term 'distinct' at the end of the quotation must be interpreted as 'different in such a way as no predicate is applicable to ideas belonging to different people'. If ideas belonging to different people are distinct in this sense, then the argument can proceed along the same lines as the argument of other minds, i.e., if the predicates 'true' and 'false' are applicable to one's own ideas, they are not applicable to anybody else's ideas, and thus one can have only a private logic, referring only to one's own ideas (cf. section III above).

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[13] Besides the passages that I will quote, cf. also 1979, pp. 3 and 130.

Those considerations are just meant to clarify the place of the point about the difference in principle within Frege's whole argument. As regards refuting it, there is not much to be said, after the type/token distinction is introduced. Frege's allegation seems to rest on nothing more than a lack of appreciation of the distinction. This is perhaps seen even more clearly in the following passage from *The Basic Laws of Arithmetic*:

> [There is] an equivocation on the word 'idea': at some times it seems to mean something that belongs to the mental life of an individual and that merges with other ideas with which it is associated, according to the laws of psychology; at other times it seems to mean something standing apart from everyone in the same way, where a possessor of the 'idea' is neither mentioned nor even tacitly presupposed. These two uses of the word cannot be reconciled; for those associations and mergings occur only within the individual mind whose ideas are involved, and have only to do with something belonging to that mind as idiosyncratically as its pleasure or its pain. We must never forget that different people's ideas, however similar they may be (which, incidentally, we cannot accurately determine), nevertheless do not coincide but have to be distinguished. Every man has his own ideas, which are not those of any other. (1962, pp.16-7)

Frege asserts that those two uses of the word idea cannot be reconciled. The reply is that of course they can be reconciled. What is required is just to understand the ambiguity in terms of the type/token distinction. If one does that, then it is no more difficult to effect this reconciliation than it is to do the same thing for the two uses of the word 'horse' — the one which occurs in 'the horse is a four-legged animal' with the one in, for instance, 'my horse is a four-legged animal'.

VII

In this final section I will discuss the argument of Frege's which can be construed as a second objection to the type/token view of logical entities. As I said before, this objection consists in another reason for holding that mental entities belonging to different people are different from each other. The reason now is that they are different not just because they belong to different people; they are different *as a matter of fact*.[14]

The first thing to point out about this argument is that it is inconsistent with, that is, it cannot be put forward conjointly with the argument of other minds. If the mental entities of other people are unknowable, how can one claim that they are different from one's own mental entities? In relying on both arguments in his critique of mentalism, Frege falls again into what I have called 'folk psychology trap' in section III. However since the argument of other minds has been refuted, one must present independent grounds for rejecting the other.

In 'Sense and Reference' Frege formulates the argument under consideration for proper names, in 'Logic' for concepts. He could have done the same for propositions, or any other type of logical entity. I will begin with a quotation from 'Logic':

> Anyone who hears the word 'horse' and understands it will probably have straightaway a picture of a horse in his mind. This picture, however, is not to be confused with the sense of the word 'horse' [i.e., the concept [of horse]]; for the word 'horse' gives no clue to the colour of the horse, or to its carriage when standing still or in motion, or to the side from which it is seen and the like. If different men were able, say, immediately to project onto a canvas the ideas that sprung up in their minds on hearing the word 'horse', then we should be presented with quite different pictures. And even with the

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[14] This argument is discussed and rejected by Sober (1978), who calls it the *variability argument*.

> same man the word 'horse' does not always conjure up the same idea. Here a great deal depends on context. We may compare e.g. the sentences 'With what joy he rides his gallant horse' and 'I just saw a horse stumble on the wet asphalt'.
> So there can be no question of the same idea always being associated with the word 'horse'. (1979, p.139)

The type/token view does not require that all tokens of a type be absolutely identical, it is enough that they have a set of aspects, a nucleus that is common to all. Let us call the mental entity that is activated when someone hears a word like 'horse' a 'notion', and let us admit that mental pictures are idiosyncratic and changeable. Now, Frege's argument would only be effective if each notion consisted only of a mental picture — or of only idio-syncratic, changeable elements. However, this premiss is false. Its negation is an empirical assumption, but one which is a fundamental element of our conception of ourselves, and of the nature of knowledge. If the notions that correspond to each word, for each person, did not have anything in common, then communication would be impossible, each person would be shut up in his own private world, there would be no public, shareable knowledge, the very idea of philosophical debate would not make sense.

Frege would, of course, accept part of this view. In fact he himself says things like:

> ... we cannot come to an understanding with one another apart from language, and so in the end we must always rely on other people's understanding words, inflexions and sentence constructions in essentially the same way as ourselves. (1960, p.45)

How does he reconcile this recognition with the argument under consideration? By asserting that the nucleus of each notion which is the same for everyone is a non-mental, a third realm entity. That is his fundamental mistake. It is easy to show that, if the goal is to account for human communication, then the postulation

of the third realm is both unnecessary and insufficient (cf. Currie 1982, pp. 162-166). In communication, one person, by talking, makes another person conceive an idea which is essentially similar to the one the first person wants to communicate. What matters is thus that people can have essentially similar ideas. The existence of third realm entities does not by itself ensure that this condition is met, because of the possibility that different people may grasp its entities differently. For communication, it is *grasped Thoughts* that matter, not Thoughts. The postulation of the third realm is thus insufficient; an essential similarity in the grasping faculty of different people must also be assumed. This assumption, however, makes the third realm also unnecessary. If one has to postulate something about the minds of people, it is simpler and more economical to postulate that they can have similar ideas. The third realm is superfluous.

Many of the things Frege says about ideas indicate that for him all mental entities are essentially changeable, indefinite, idiosyncratic.[15] His only assertion, however, which can be construed as evidence for this view is that *some* mental entities (e.g. mental pictures) have those characteristics.

In 'Logic' one reads: 'Whereas ideas (in the psychological sense) have no fixed boundaries, but are constantly changing and, Proteus-like, assume different forms, Thoughts always remain the same' (1979, p.135), and in the *The Foundations of Arithmetic* the same argument is put forward in relation to mathematical entities: '...sensations are absolutely no concern of mathematics. No more are mental pictures, formed from the amalgamated traces of earlier sense-impressions. All these phases of consciousness are characteristically fluctuating and indefinite, in strong contrast to the defi-

[15] Sober (1978) suggests that this view of Frege's concerning mental entities is explainable by the way psychology was done at the time, more precisely, by the introspectionist methodology, which failed to produce consistent results, thus making psychological phenomena appear idiosyncratic and fluid.

niteness and fixity of the concepts and objects of mathematics.' (1974, pp.v-vi.)

Frege's argument thus has a structure analogous to the one discussed in section III, and it can be expressed thus: Logical entities are unchanging, precise, and the same for everybody. Mental entities are changeable, indefinite, and idiosyncratic. Therefore logical entities are not mental entities.

The counter-argument I put forward, by analogy, is: Logical entities are unchangeable, precise, and the same for everybody. Logical entities are mental entities. Therefore, at least some mental entities are unchangeable, precise, and the same for everybody.

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