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A NEW FIELD: EMPIRICAL LOGIC BIOPROGRAMS, LOGEMES AND LOGICS AS INSTITUTIONS

1.

Without exception, or very nearly so, logic and epistemology as academic disciplines are determined rationalistically; consequently, only rationalistic methods are considered appropriate methods of research in these fields.

By "rationalistically" I mean "in concordance with some rationalist, as against empiricist or pragmaticist philosophy". A rationalist(ic) philosophy may be taken to contain – by definition – an assumption of the sufficiency of rational (cognitive) methods. This is usually combined with an assumption (which is often occult) of a scale of values that puts the pure uses of reason at the extreme positive end of the spectrum of functions of a human organism. Let us call this "rationalism$_2$", and let "rationalism$_1$" stand for all philosophies that claim that the use of one's cognitive capacities is a necessary condition for scientific success, though not the only necessary condition; and which contain no overt or hidden assumption of a hierarchy of values among the necessary conditions. Rationalism$_1$ is often a constituent of empiricist and pragmaticist thought, and it is something like a category mistake to confound it with rationalism$_2$.

Logic and epistemology as academic disciplines are still determined rationalistically$_2$ with almost no exception. Neither Wittgenstein's philosophy of Logical Truth as tautologous nor his later teachings have changed that; for the value criterion of rationalism$_2$ is not *basically* that of Importance of Content, but that of Distance from the Familiar, from the trivial, the commonplace, from that which is accessible to the *vulgus*.

In wide circles logic is identified with mathematical proof theory – basically. At the rise of a new, more comprehensive "philosophical logic" (an expression first used in a modern sense, I believe, by Professor Rescher), hopes were raised that this might develop into a field of knowledge and insight of real cultural and social importance. I think it is fair to say that these hopes have been frustrated. In

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contemporary "philosophical" logic a rationalistically$_2$ determined mathematical proof theory is still taken, tacitly and sometimes openly, as the (only) nucleus, in the sense that all other logical research is conceived and classified either as extensions of mathematical proof theory (modal logics are usually looked at this way) or as mathematical alternatives (intuitionistic logic); or else as "applications" of some system that is itself classified in one of these ways.

Real systematic connections between the pursuits of logicians and empirical research are uncommon. They are tacitly supposed to be impossible by the prevailing definition of the discipline. Once in a while a lonely voice of protest or skepticism can be heard. Thus, in connection with Michael Dummett's assumption that questions about fatalism and the determinateness of the future belong to the set of questions that can be settled on purely analytic logico-linguistic grounds, Adam Morton of Bristol University drily remarks [1]: "As if physics could not come into it too." But the attitude towards logic, and the very notion of logic among mathematicians and philosophers alike, are such that remarks like these are not easily absorbed.

There are a few symptoms of a retreat from rationalism$_2$ even among mathematicians. By far the most interesting example of this that I know of is Yu. Manin's statement: "A proof only becomes a proof after the social act of accepting it as a proof", and the fact that *The Mathematical Intelligencer* brought an excerpt from a book by Manin, which begins with exactly the sentence quoted [2]. This is an eminently pragmatical (pragmaticist) insight.[1] Furthermore, much of what is said by Davis and Hersh [3] or in the recent empiricist philosophy of mathematics by Kitcher [4] may help, if only in the long run, to bring about a more realistic assessment of the uses of mathematics,[2] and so about the appropriate place of mathematics in the system of cultural values.

In the meantime pragmatical semantics and dialogue logic may, if nothing is done, lose their impetus as alternative ways of looking at things; namely if we allow them to be dominated rather than served by people in search of new academic playgrounds, whose main cultural objective is association with high-status fields; or by metaphysical mathematicians in search of a home in the maximally distant. Some persons are quite explicit concerning this question of the relative status of academic pursuits. Thus ten years ago a cultural magazine quoted one of L. E. J. Brouwer's direct students as saying:[3]

To do mathematics, particularly in its most abstract form viz., the foundations of mathematics, is the most essential (task for a thinker), to which even every human contact must be subordinated, and which leads to absolute truth, the pure idea.

The situation is not likely to change for the better unless we become quite conscious about the existence of such attitudes and beliefs and unless we recognize and are quite open about the fact that dialogue logic and further theory of argumentation cannot flourish under such philosophical circumstances.[4] Nor is it to be expected that the new and subtle methods of data collecting and information processing (computerization) will abolish the need for an improvement of human logic(s).

2.

Dialogue logic embedded in a wider theory of argumentation ought, in due time, to bring about an improvement of the systems of logic that actually dominate the modes of reasoning and argumentation in human affairs. For this purpose we shall have to develop a téchne that has more to offer than applications of familiar systems of mathematical logic to Mary and Bill. That is to say: we need to set up a new sub-discipline of logic as a new academic discipline, a *technical normative logic* which is to be used clinically as well as constructively. However, this technical or clinical logic is not likely to become much of a blessing if it is to be based directly on the results of a "pure" logic, philosophical or not. It should be based on a theoretical logic which is systematically related, in a scientifically appropriate manner, to the results of an *empirical logic*.

As a matter of crude fact neither mathematical logic in the narrower sense nor the new "philosophical logic" has ever led to nontrivial systematic contributions to the understanding and subsequent improvement of the models of thought and of argument that are found in the *polis*. It is not only that one has not yet reached the stage at which such clinical assistance would be within reach. It is that nothing points in the direction of possible future successes of this kind. The field of research in question is not yet organized in such a way that this will ever be possible. It is strange that people are aware of this fact and yet they do not seem to mind that this is the case.

An empiricist cultural reorientation is needed in logic. This reorientation is not likely to come from those who are trained only in mathematics nor from those who are trained only in philosophy.

3.

In addition to rationalistic$_2$ neo-philosophical logic there is among logicians a relatively recent interest in something called (natural) Language. Here empirical linguistic methods and results are combined with rationalistic logical methods. This yields a field of research that certainly should be regarded as a neighbouring field or at least as a field of potential interest to students of dialogue and intersubjective argumentation.

In psycholinguistics, artificial intelligence and linguistics empirical research is being done on the conceptual and inferential capacities and inclinations of human individuals, as well as empirical research on the development of such capacities. There are even empirical studies of processes of an epistemological kind, in addition to the pyschological theory of learning. To readers of this journal all this is well known. Occasionally someone who is doing one of these types of empirical research will explicitly refer to cultural and social concerns as the moving force behind his own research (cf. Abelson [6], Schank and Abelson [7], Bickerton [8]) and go on to deplore the way things are in linguistics. Schank and Abelson, for instance, write ([7], p. 7):

> After a long obsession with syntactically dominated deep representations, recent work in linguistics has oriented deep representations much more towards considerations of meaning . . .. Despite this reorientation linguists have managed to miss central problems.

And not only linguists but logicians, too. Of course, from the point of view of intellectual history it is only to be expected that if such things can be truthfully said of one of these sciences, then it will be true of the other one as well. Bickerton, an expert on so-called pidgins and creoles, complains ([8], p. 297) that

> [t]he leading figures in generative grammar have simply ignored creoles and shown a positive antipathy to the mere idea of language origins; as for acquisition, while they have theorized about it, they have not deigned to get their hands dirty by actually examining it.

For "generative grammar", substitute "intensional logic" or even "philosophical logic". The leading figures in philosophical logic, as defined by contributions to the *Journal of Philosophical Logic*, have simply ignored lodgins and logoles and shown a positive antipathy to the mere idea of logic origins; as for acquisition, they have not deigned to get their hands dirty by actually examining it.

Are there lodgins and logoles? In any case there are, in practical thought and uses of language, *logemes* (I think this neologism is better than Foucault's "epistemes"), although most people only have an eye for isolated components of such logemes.

In any case, empirical research of the kinds mentioned, often referred to as "cognitive science", clearly forms a third field (or, set of fields) of neighboring interest, though based on other kinds of competence and as yet with results of other kinds than those envisaged here. They tend to concern capacities and piecemeal inclinations and their development rather than connections between the said inclinations, that is, rather than actual logical systems-in-use. A firm grip on the differences between actual logemes is necessary for the success of dialogue logic and the general theory of intersubjective human argumentation.

4.

A *lodgin* would be an initial logic, originating in a certain company of users of language (a certain culture or sub-culture), not yet made explicit as a system and thereby subjected to theoretical reflection, and unadulterated by other logics. In all likelihood, the modes of argument in early Greek thought [9] constitute a lodgin in this sense. A *logole* would be a set of interlocking tenets and rules that owe some of its components to one lodgin (or logole), and some to one or more other lodgins (or logoles). The history of logic is almost always whig history – no logoles (or lodgins) are subjected to description and scrutiny except those that, in our eyes, bear witness to the glory of Man. Few historians of logic (or anyone else) study logoles/logemes as a consequence of their earlier or present practical importance; they study them because of their excellence. There are exceptions to this rule but, characteristically, they are not taken up into the standard surveys of the History of Logic. Let me mention two: Leonard Nelson's analysis of Fichte's logic [10] and E. W. Beth's analysis of logical patterns in Plato's and Aristotle's philosophies [11].

In all these cases only fragments are described of what, in reality, must have been a connected set of assumptions and principles (in fact, whig history of logic is no different here). The analyst-historian usually does not try to describe the whole network. This is not surprising. There is as yet no serious discussion of methods suitable for this kind of

research. People doing work in this field are academic loners. It is not (yet) a high-status field. There are no organizations and journals devoted to the promotion of the investigation into logoles that are not predecessors of modern logic. But this could change. We then could develop standards for more complete, and *comparable*, descriptions of such "systems" (networks of tenets and rules, explicit or implicit). In my opinion a complete description of a lodgin or of a logole, in fact of any logeme, would have to contain at least the following parts:[5]

I. A section on most general categories: *a*. in which adherents to that logic speak, *b*. in which they think. One might speak here of subjective ontological (*b*) and syntactic (*a*) categories.

II. The way in which these people construe their "model structures" out of these categories, *1*. when functioning in the semantic role of Producer, *2*. when functioning in the semantic role of Interpreter. If there turns out to be no distinction, then this should be presented as an empirical result, not as an a priori theoretical truth.

III. A survey of the syntactic principles they seem to follow; with first emphasis on those that, in the Theoretician's eye, seem particularly central to inference and critical discussion; this set can be enlarged in a later theory.

IV. Empirical findings concerning rules of induction and of deduction.

V. A study of their concepts of truth or related notions; of the assumed relationships between the (a) truth/falsity distinction and the distinction agreed/not-agreed as applied to statements.

VI. Further semantic principles that are operative among adherents of this logic, and the situational and semiotic conditions under which they are operative (there may be several sets of such principles; for instance, pertaining to the Producer/Interpreter distinction).

VII. A discussion of how these semantic principles issue, theoretically, in the observed principles of induction and of deduction (see *sub* IV).

VIII. A survey of "fundamental" principles of inference that, though recognized as valid or valuable in contemporary

Western theoretical logic, are found *not* to be operative in (monological or dialogical) argumentation among adherents to this logic, and a discussion of the possible explanations why they are missing.

IX. A study of those semiotic relations among human beings, God(s), and other features of Nature that are assumed among the adherents of this logic.

Finally, at the level of "high theory",

X. Hypotheses about connections between the empirical results concerning such assumed semiotic relations on the one hand and results reported on under I–VIII on the other.

Cultural anthropologists sometimes report on semiotic-relational assumptions found in other cultures, and historians of philosophy report on such assumptions among peoples who have a written philosophy. They cannot, however, be expected to link this to results of the kinds we have mentioned under I–VIII, partly because they do not have the required training but also and more importantly because systematically presented results of these kinds are hard to come by. For this fact there is no other explanation than that rationalists-in-sense-2 have so dominated the philosophy of logic – of what logic is, and of what the *discipline* logic should be – that almost no one with the right kind of training has ever contemplated taking up the task of furnishing the world with knowledge of these kinds. Hence the political world, in the broadest sense of this word, still knows near to nothing about the lodgins and logoles that dominate human discourse.

5.

In order to bring about an improvement in the direction of a science of logic with empirical and cultural bearings it is necessary, I believe, that we learn to see logics *as institutions*. Rationalists$_2$ never do.

It is not sufficient to realize that there may be a more or less extensive, more or less rigid logical bioprogram. Though insight into the bioprogram may be important enough in some respects, *such insight will not suffice* to bring about a theoretical logic that can support a technical logic which can be used constructively as well as clinically.

An important recent book by John L. Pollock is based on the insight

that *languages* are institutions [13]. Anyone who believes that languages are institutions and should be studied and described as such, should have no difficulty in taking the step to logics. In Pollock's book one may find a wealth of ideas that can be used in connection with logics. For example, there is the notion of an institution itself. "For philosophical purposes", Pollock writes, "the institution can be identified with the set of its constitutive rules" (p. 211). In the case of logics the constitutive rules comprise at least the set of rules distributing rights and obligations over the players. One may want to add also the *ends* for which a certain linguistic company (culture) seems to have invoked certain argumentative uses of language, in as much as those uses of language – rules and obligations of the players in debates – can be seen to implement these ends. "The conception of institutions which emerges from [Pollock's] examples is that they are essentially moral and legal instruments of a certain sort, and participation consists of the performance of acts whereby one acquires certain kinds of moral and legal obligations with respect to the institution" (p. 223). When applied to logic(s), this is exactly the insight that is needed for the purpose described in section 2.

Pollock rightly emphasizes the need for an "explanation" of conventions. Elsewhere I have distinguished conventional from semi-conventional *validity*, as kinds or, rather, sources of "logical validity", which is usually constituted jointly from semi-conventional validity (a yes-or-no-thing) in combination with problem-solving validity (which comes in degrees, but is often undecidable) [14, 15].

Let me add one distinction, or dimension, to Pollock's set of institutionalist notions for dealing with semantical problems. That is the notion of *semantic roles*, the distinction of Producer and Interpreter; corresponding to the distinction of two kinds of linguistic competence.[6] (I owe the latter distinction to Roy Harris.) I have had the opportunity to verify that persons who are inclined to see Language(s) as Mirrors of Nature (as Richard Rorty very aptly expresses it), cannot accept Producer and Interpreter as *semantic* roles but can only see them as "pragmatic roles", something external to semantical theories. However, on a more pragmatist (as against objective-ist) philosophy of language this distinction of roles is either of no use at all as an instrument of theoretical problem-solving or else it is a component of semantics itself (a vital one, I think). It is a sort of a semantical cousin of Lorenzen's Proponent/Opponent distinction in the science of logic.

Pollock does not make this distinction of two semantical roles, with two kinds of linguistic competence, though his distinction between "sent-propositions" and "received-propositions" is related to it. I do not think that my distinction becomes superfluous in terms of his; for in fact his book as a whole is rather strongly biased in the direction of the Producer (supply-side semantics). The parts of semantics that are of particular interest in the study of logic (i.e., of "logical validity") is, I would say, those that pertain to the process of interpretation (demand-side semantics). (Montague's "theory of language", it seems to me, is mainly a theory of interpretation, hence demand-side semantics.)

By a *pragmatization* of a scientific or of a philosophical theory I shall mean the reinterpretation, reorganization and reformulation of the theory in such a way that its institutional features are made explicit or at least are more strongly suggested than before. Pollock himself in his last book offers a considerable amount of such pragmatization, and the Producer-Interpreter distinction is an adjacent contribution. It is not difficult to give further examples. A particularly interesting example much avant la lettre is the reorganization of the infinitesimal calculus on the basis of Weierstrass' definition of the concepts of limit (or, his precization of statements of limit), now without infinitesimals but in terms of "quantifiers": "For all ϵ there is a δ such that . . . ." Abraham Robinson has shown that if ones sole aspiration is to guarantee that "the calculus" be free from contradiction, then Weierstrass' move is superfluous. However, in the light of Lorenzen's dialogical reinterpretation of the "quantifiers" (itself a beautiful example of pragmatization) it is possible to see that the Cauchy-Weierstrass formulation of the calculus brings out its institutional or pragmatical features [16], whereas Robinson goes in the other direction: from a (proto-)institutional to an objectivist (here in the sense of: an a-personal conceptualist) formulation.

Yet another example is the introduction of *dialectical model structures* for dialogue logics, in combination with dialectical values (Agreed, Not-agreed) in the place of truth-values (True, False) or epistemic values (Known, Unknown) [15].

6.

Now what could empirical logic be? Empirical research must be organized around some initial idea. We have referred to the possibility

of systematic "pragmatization" of philosophical and scientific theories, for instance of logical systems and their model structures. Such pragmatization brings a theory (a system) in closer contact with the empirical or practical world, and this may suggest empirical research of various kinds that may seem irrelevant to logic as long as the theory is kept in its objectivist or solipsist-subjectivist form. Pragmatization cannot itself be called empirical research, though it may be said to be a proto-empirical activity. An example of empirical logical research is the investigation and systematic description of lodgins and logoles and of logemes in general.

No attempt will be made here to stipulate a definition of "empirical logic". However, I have one more idea to offer concerning empirical logical research. This is the notion of a *dialectical field*. Every milieu of n users of language ($n \geqq 1$) is based on a dialectical field (or on a set of superimposed dialectical fields). The field is constituted from written and spoken tenets about such semiotic features as pertain to the accomplishment of critical discussion, in particular about verbal rights and obligations, but also linguistic encouragement and discouragement, be it from persons now alive or in books that are cherished in this company. A language-user m who is introduced into a given field is subjected to field forces Δ_i, resulting in attracting (including) or repelling (excluding) forces that may be conceived of as depending both on m and on Δ_i (call these forces $m \circ \Delta_i$).

It is the fact that one can distinguish quite different kinds of dialectical fields that makes it a notion of great value for an empirically based science of logic. Elsewhere[7] I have distinguished Brouwer-fields and Beth-fields. Among Brouwer-fields one can distinguish strong, or deontic, Brouwer-fields from weak Brouwer-fields. In our department at Groningen University we now intend to undertake a systematic investigation of Lenin-fields, based on Lenin's own writings. At this moment scales of measurement stronger than simple classification (distinction of types) are not within conceptual reach; but this may change.

Furthermore, an empirical logic needs *empirical methods*. Usable empirical methods in the narrower sense are:

1. Inquiry and interview methods taken from the social sciences. Such methods have been used in logical studies by Arne Naess and his associates (the Oslo-school), who ap-

plied them to contemporary uses of logical constants and also to uses of the word "true".

2. Methods of synchronic historical analysis; these yield descriptions of the logical foundations of philosophical and other conceptual structures, in other words: of logemes. That is to say, one does not only study isolated logical (or, to our minds, illogical) principles of foreign logics, but also and above all how they interlock. Compare section 4.

Synchronic historical analysis is also the method par excellence in the investigation of dialectical fields. By means of computers these methods can be strengthened and refined and their reach vastly enlarged.

7.

In section 1 I commented on the prevailing rationalistic attitudes to logic and epistemology. Let me add some remarks of a slightly more speculative nature. The rationalists are primarily interested in validity and assume that, by definition, everything worth doing for a logician should take its origin in insights about "logical validity" (absolute Proof). People with a general pragmatist/empiricist inclination are, I believe, inclined to start out from an initial interest in fallacy or in conflict of opinion. They may then develop an instrumental interest in "logical validity" and in the semantical models that are associated with this notion in various modern systems, in order to have something to compare the contexts of conflicts and fallacies with so as to bring their fallacy-generating features to the fore. If this is true, it suggests important things about the organization of logic courses for students with a pragmatical-empirical orientation. The received way of organizing them is the other way round (if something as impure as conflicts and fallacies are mentioned at all; usually they are not).

This pragmatists' interest in fallacy and conflict may be compared (and is perhaps cognitively related) to Duns Scotus' conceptual innovation of a plurality of simultaneously possible worlds as against the (rationalistic$_2$) cognitive restriction to – in the most frivolous case – a plurality of temporally distinct possible worlds;[8] to Darwin's emphasis on individual variation as a first principle in biology, as against the older inclination to disregard variability as, at best, conceptually secondary as compared to the notions of genus and species themselves.

Naturally, I recommended, in section 2, for the purposes mentioned there, an empiricist philosophy of logic, with a corresponding reorganization of the field.

Section 3 briefly refers to empirical orientation in some neighboring fields. In section 4 I pointed out that all societies are dominated by (lodgins and) logoles; that what happens in the political world at large is structured to some extent by clashes between various (lodgins and) logoles, each of which is less than optimal as an instrument for conflict resolution in cases of avowed opinion. Section 5 invited the reader to study logics as institutions and to pragmatize known systems and theories of logic, semantics, etc., so as to bring their institutional features to the fore. In section 6, finally, I recommend world-wide empirical investigation and classification of dialectical fields. These would be the first steps on a road that may, some day, lead to dialectical forecasting (by telecommunication): "a dialectical D-field, of intensity 9 on the Scale of Dichter, dominates Vladivostok and is expected to reach Western Europe at the end of the week." That will enable practitioners of logic in Western Europe to rush to their desks and prepare for the tempest.

NOTES

[1] Its chances of quick absorption into the mainstream philosophy of mathematics may be assessed from a perusal of the invited reaction, in the same issue of *The Mathematical Intelligencer*, by Solomon Fefermann of Stanford University. Fefermann does not discuss Manin's ideas at all and bypasses every one of his remarks.

[2] These are, of course, considerable. We could not live without them. The same holds of all specialized competence in the testing of the strength of materials (e.g., laboratory testing of metals, concrete, etc.) and of competence in the construction of instruments.

[3] The citation was unauthorized, but may serve us as an illustration of the cultural danger signalized here.

[4] In the Netherlands, and in some other areas, the obstinacy of this rather old-fashioned rationalism$_2$ can be understood in the light of the philosophy both of mathematics and of life in general of L. E. J. Brouwer; to which Beth's philosophy stands in glaring opposition. Brouwer was a rationalist$_2$ in the extreme. He took his philosophy from German idealism, which he adopted lock, stock and barrel with the exception of its logic in the narrower sense. He did adopt its hatred towards "formal" logic and its general semiotic outlook. People who do not recognize the enormous difference between what I call rationalism$_1$ and rationalism$_2$ sometimes construe Brouwer's rejection of mathematical realism as a kind of pragmatism. This requires that "pragmatism" be defined as the airy and arrogant doctrine that anything (that pays, or glorifies the Thinker), goes. That has nothing to do with seriously paying attention to practical needs

and possibilities; for instance, in the way of the mathematician Gerrit Mannoury, leading analyst in the Dutch Significs group, who to some extent tempered Brouwer's earlier extreme expressions of sympathy for human and cultural callousness and even for extreme cruelty [5].

[5] I have tried to carry out this program for one system of logic – one logeme – that has been and still is of enormous cultural and political influence, viz., the German idealist logic that reached its theoretical apex in the *Logik* by G. W. F. Hegel. The differences between that logic and "ours" have caused many people, not only among Hegelians but also among the critics of this system of thought, to deny that it could be studied as a system of logic. These persons seem to assume that the issue is to be settled on account of IX alone, in the sense that if the assumed semiotic relations among humans, God and Nature are found either to differ too strongly from those that "we" assume, or if they theoretically dominate the answers to questions I–VIII, X in a very strong manner, then these other theoretical questions may not be studied as problems concerning a *logic* at all – irrespectively of findings. To people who persist in this attitude: "Hegelian (or any other exotic logic) is no *logic* at all", the right answer would be that "metaphysics" and "ontology" can and should be studied *also as* components of logemes. The point is that this and other exotic systems *function as* logics, certainly politically (in the narrower sense), both on the left and on the right. Probably the most complete description of this logeme so far is in [12]. Note that Heyting's axiomatization of Brouwer's logic is a partial description of the whole Brouwer logeme. See further section 6.

[6] The terms "speaker" and "hearer" suggest that the two roles must be or at least are normally played by different users of language. Producer and Interpreter as semantic roles represent different kinds of linguistic competence that can be played by one person as well as by different persons (or machines).

[7] Paper forthcoming in a collection of contributions to the Section on General Methodology, VII. ICLMPS (Salzburg, 1983), eds. P. Weingartner and C. Pühringer.

[8] I am much indebted here to a paper 'Contingentietheorieën' (Theories of Contingency) (pre-publication) by A. Vos of the Department of Theology, Utrecht University.

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