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ALFRED SCHRAMM

Metaphysics, Carnap's remedy, and Mach's science

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Alfred Schramm

Karl-Franzens-Universität Graz

Abstract. Starting from the question of whether Ernst Mach's well-known notion of *"Elemente"* (elements) must lead to the verdict that the arch-anti-metaphysician himself may be justly accused of holding an essantially metaphysical position, the idea of *metaphysical neutrality* is explained in Section I. Section II deals with Quine's verdict on *abstract entities*, among which Mach's elements would have to be counted if there were no way out of the Quinean test. Such a way out, it is proposed in section III, is *Carnap's Remedy* : the distinction of *external* and *internal* questions. Finally, in Section IV, the empirical meaning of Mach's notion of elements is explained, from whence it's argued that Mach's "philosophy" is good, non-metaphysical, empirical science.

Résumé. A partir de la question de savoir si la célèbre notion des *éléments* de Ernst Mach doit mener au verdict que Mach soutenait une position fondamentalement métaphysique, l'idée de neutralité métaphysique est expliquée dans la section I. La section II traite de la thèse de Quine à propos des entités abstraites, parmi lesquelles les éléments de Mach pourraient être comptés s'ils ne sont pas exclus du test de Quine. La IIIe section propose une distinction entre questions externes et questions internes, ce qu'on appelle le *Remède de Carnap*. Enfin, dans la section IV, la signification empirique de la notion d' éléments est expliquée, à partir de laquelle pouvons nous argumenter que la philosophie de Mach est une bonne –non-métaphysique– science empirique.

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In this lecture I shall deal basically with the following problem :

Can Ernst Mach, the arch-anti-metaphysician, be justly accused of holding an essentially metaphysical position himself ?

The main problem here is, of couse, with his notorious notion of *Elemente*, the Elements, as I translate it straightforwardly.

The questions will be, to be more specific,

a) Are Elements abstract or in any other way disreputable entities ?

b) If so, does it matter ? That is, must this, pace Quine, already lead to the verdict that it is all Metaphysics ?

c) If not so, then what can we make of the Elements ? They are basic to Mach's views, so, how are they to be understood ?

The outcome of the discussion shall be that Mach's approach is good empirical science, indeed, that it is a science of Unified Science - *eine Wissenschaft von der Gesamtwissenschaft* - and that the philosophy forming the background of this science of Unified Science is good non-metaphysical empiricism.

I shall present my case in an historically inverse order, that is, first state in a cursory manner what should be asked today from a position which is metaphysically neutral (Section I.). Then, in (II.), I shall restate briefly what I call Quines threat : Talk of abstract entities is ontology and, thus, metaphysics. Even worse, if such talk is not kept to a required minimum it leads easily to metaphysical excesses. Next (III.), I shall procede to reaffirming Carnap's remedy against the metaphysician's *'tu quoque'*, especially in respect to abstract entities. And finally (IV.) I intend to observe that, given all these findings, Ernst Mach's staunch anti-metaphysical position remains unblemished by the threatened allegation of an internal practical inconsistency, namely to deny on the one hand any cognitive value of metaphysical presuppositions while, on the other hand, being ontologically committed to making just such a metaphysical presupposition through postulating his so-called 'elements'.

I. Metaphysical neutrality

I have chosen this term in order to side-step the often repeated (and, meanwhile, boring) accusation that Mach's or the Vienna Circle's anti-metaphysical attitude were *hostile*. By 'metaphysical neutrality' I understand the *non-evaluative* position (which really isn't new at all) that metaphysical claims are cognitive-

ly vain, or futile, or superfluous, and this by itself doesn't imply any hostility towards metaphysics at all. Whoever feels happy with her metaphysical convictions may hold them if she wishes. The point of metaphysical neutrality is that this simply doesn't matter, because it doesn't change anything of importance in respect to science or empirical knowledge in general whether a person believes, in addition to what she can claim with good, that is empirical, reasons, that, for instance, there 'really' exists or doesn't exist an 'outside reality' (the issue of *Realism* vs. *Idealism*), or that there 'really' are or aren't abstract entities *(Platonism* vs. *Nominalism)*, or any other metaphysical tenets of such kind.

There is an asymmetry between prediction and explanation after all : metaphysical hypotheses usually fare pretty well in respect to letting their adherents feel that they now really do understand what is happening in the respective field under consideration, meaning that their theory **explains** something to them. In this sense of explanation, explanatory strength in general is, by itself, certainly not a vice. But a theory must show its mettle, that is, it must show that it doesn't produce this cosy feeling of better understanding spuriously. And this can only be achieved via successful predictions which is, roughly, just another way to ask from a theory that it is empirically **testable.**

It has been said that on this distinction the theory of evolution, which is an important topic in connection with Mach, doesn't fare well because it explains nicely but doesnt predict. This, however, is certainly wrong. Of course, a 'grand' theory like evolution cannot be tested so to say in one piece. There is no crucial experiment 'for or against the theory of evolution'. But there are multifarious ways of testing details derived from it via specific predictions.

'Grand' theories serve as backgrounds for specific predictions, which, nevertheless, hit back on the fabric of the theory if they notoriously turn out bad. This is a peacmeal process, either increasingly eroding or strengthening the theory, which, above all that, keeps on itself constantly changing in various details all the time. It is a constant process of adaptation as we can observe again in connection with Mach's view of the matter.

But the theory of evolution does make predictions in this sense :

If, for instance, a certain bone is found with certain characteristics, then the zoologist will in most cases be in a position to judge from the characteristics, where to fit it in in the evolutionary developement of the according species. That is, he can predict how old the bone will turn out to be. And this can be tested pretty independently, for instance by the radio carbonite method.

So, one must look at individual examples, as Paul Weingartner likes to say. And these usually show that erosion or strengthening of theories comes gradually. But this is a different topic from the present one.

II. Quine's threat : abstract entities

Quine deplores 'that facile line of thought according to which [one] may free-ly use abstract terms [...] without thereby acknowledging the existence of any abstract objects'[Quine 1960, 119]. Such irresponsibility is, according to Quine, to be detested by any respectable person who cares for the ontic impli-cations of her discourse.

In the very last paragraph of his 'Word and Object' Quine admits : 'True, no experiment may be expected to settle an ontological issue' [Quine 1960 276]. But then : So What ?

If it is of no *experimental*, that is, *empirical* import, then let ontological issues be anybody's private hobby. Who cares ? I think, Quine's complaint matters as long as his argument gets through that, if brought into a canonical form, we can be accused of uttering sentences where the variables of quantification contai-ned involve abstract entities, that is, entities (this is not quite Quinean now) of which we cannot have (direct or derived) empirical evidence. Because this quantifying over such variables committs to belief in their existence without any good empirical reasons.

There is an intuitive answer to this which I want to give presently and a Carnapian version of it, as I think, to be explained afterwards. The intuitive ans-wer comes to this :

What is the point of looking at some vague idea (which is usually the case if one refers to conceptual intuitions connected with everyday or scientific ver-nacular language) and then break out in triumphant noises if it turns out to be wanting or even metaphysical if subjected to an analysis with high power logi-cal tools ?. If I may use an analogy, this is like first butchering a stake from an ox and then complaining that under the microscope it shows that some blood vessels have not been properly dissected. Normal language's utterances - inclu-ding connected stimulus meanings - even if canonized in the Quinean manner are simply not appropriate objects for investigating which variables of quantifica-tion they contain and whether their values might be abstract or otherwise fishy objects.

Questions of the latter kind are of course legitimate. However, they are not to be asked in reference to normal language utterances or their canonizations, but in reference to their logical reconstructions. Canonization alone does not yet make a logical reconstruction. So let us look briefly at what Carnap has to say on this.

III. Carnap's remedy : internal and external questions

It might already be considered as one suitable method of trying to find a way out of Quine's trap, so to say, to 'concretize' an eventual object which is suspectedly abstract. Another one would be to reduce it to talk about concrete objects via paraphrasing techniques - a move which is very popular among philosophers with a nominalistic bent. But Carnap has a much better remedy. Indeed, it seems now that he had it, at least implicitly, already before Quine did even set up his trap.

Carnap has, starting from his *Logical Syntax*, repeatedly referred to the distinction between what he calls *internal* and *external* questions. He has called existential statements which assert that there are entities of a specific kind, and which are formulated within a given specified language, an *internal* existential statement. Such statements are usually trivial, because *analytic* in that respective language. But this is obviously not the problem when metaphysical claims are made. The latter are meant to be *external,* that is, claims which are made even before and independently of whether a reconstructive language has been specified. Such claims are called *external* by Carnap. They can be regarded as pseudo-statements if they are meant to be theoretical statements, because theoretical statements ought to be internal. Before the construction of the respective laguage, which to some part is also guided by explanatory techniques in order to settle on the kinds of entities needed and convenient for a reconstruction of theory, existential claims won't even make sense in the required sense of theoretical language. One may, of course try to give meaning to such metaphysical theses, say, about the existence of abstract entities. But this affords the prior construction of a suitable language, *and then the accordingly reconstructed statements will be internal and, thus, again trivial.* Which language to choose and how to construct it, remains, however, a matter of practical convenience and fruitfulness.

Thus, sentences like 'There exist classes of objects' or 'There don't exist classes of objects' or other sentences which would be metaphysical *pace* Quine, are either both devoid of theoretical meaning if posed externally, or one of them is trivially, presumably analytically, true and the other one false, if stated internally.

Thus, I think we can remain tolerant *vis a vis* any claimant as long as she states clearly what she means by her theses and can propose the language to be constructed in order to internalize, that is, give meaning to, her statements. And then there will in general no metaphysics be involved if the variables of quantification refer, so to say, to 'abstract entities'. Because then it will have to be explained what that means - actually something which Quine hasn't done so far and probably never will, due to his insistence to give 'experimental meaning'

as he calls it, to analytical sentences. (This latter remark was, of course, meant internal to some suitable metalanguage, for instance to L1 of Carnap's *Replies* of 1963.)

IV. Mach's science

But even if we have Carnap's remedy in order to disable Quine's threat in respect to ontological commitments, there is still the fact left that Mach himself seems not to have stated very clearly what his elements are, and Mach certainly did not give us or propose a logical reconstruction (including explications of terms, choice of a language, a.s.o.) of his philosophy. (He couldn't have, at his time.) So, Mach spoke and wrote in the material mode, if we look at it from a Carnapian perspective. And justly so, as I think, because this is the proper way of expressing oneself **if one intends to put forward empirical claims**. What Mach presents especially in his *Analysis of Sensations* and in his *Knowledge and Error* are empirical claims, it is his scientific theory of science. Indeed, I think even that it is literally true and that Mach is serious when he claims : 'There is no Machian Philosophy !' ([Mach 1991, 300] ; similary in several further passages in his writings). Nevertheless, it is also true that there is a philosophy shining through all his writings and we cannot evade any longer getting at this core of the matter.

Mach is, so to say, a non-metaphysical, holistic conventionalist realist, his position is, as Rudolf Haller says, 'half-way between instrumentalist-conventionalist and realist-criticist' [Haller 1993, 38f]. I shall refer to this characterization as 'Haller's diagnosis'. And indeed, this characterization is as exactly to the point as any short formula trying to fit Mach's position possibly could be. The seemingly inconsistent, namely, as Haller's diagnosis states, to merge both conventionalism and critical realism **and** being non-metaphysical, this is the specific philosophical background which guides Mach's science.

One passage of Mach's *Analysis of Sensations* contains most of the main pieces of his view. I must quote in length :

> I want to [...] point out that my view eliminates all metaphysical questions, whether they are taken for merely not solvable at present or for senseless at all. Furthermore,[...] that everything we can know of the world, must express [...] itself in sensations, which can, in a precisely explainable way, be cleared from the individual influences of the observers. [...] Everything we may want to know is then delivered by solving a mathematical task, namely, by finding out the functional dependency of the sensual elements among each other. This knowledge is the sum total of all the knowledge of 'reality'. The bridge between physics in its

widest sense and scientific psychology is provided by the *identical* elements, which are, depending on the respective investigation, either physical or psychical objects.[1]

Be careful to note that Mach says that everything we can know of the world must **express itself** in sensations, he does **not** say '**is**' or '**are**' sensations. Furthermore, that the elements **themselves** are not to be split up into, say, outward physical and inward psychical ones, they remain identically the same. This latter idea is stressed in a further passage from the Analysis :

Where next to, or instead of, the terms 'element' or 'complex of elements' the terms 'sensation' or 'complex of sensations' are used, one must be aware that the elements are sensations only *in this connection*, in this *functional dependence*. At the same time but in other functional dependencies they are *physical objects*. This additional naming of the elements as sensations is used only because most common people are much more acquainted with the elements in their faculty of being sensations (colors, sounds, pressures, spaces, times, a.s.o.).[2]

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1 Mach (Analyse), p. 300: 'Ich möchte... zu bedenken geben, daß meine Auffassung alle metaphysischen Fragen ausschaltet, gleichgiltig ob sie nur als gegenwärtig nicht lösbar oder überhaupt ... als sinnlos angesehen werden. Ferner... daß alles, was wir von der Welt wissen können, sich notwendig in den Sinnesempfindungen ausspricht, welche in genau angebbarer Weise von den individuellen Einflüssen der Beobachter befreit werden können (S.281). Alles was wir zu wissen wünschen können, wird durch die Lösung einer Aufgabe von mathematischer Form geboten, durch die Ermittlung der funktionalen Abhängigkeit der sinnlichen Elemente voneinander. Mit dieser Kenntnis ist die Kenntnis der "Wirklichkeit" erschöpft. Die Brücke zwischen Physik im weitesten Sinne und der naturwissenschaftlichen Psychologie bilden eben dieselben Elemente, welche je nach dem untersuchten Zusammenhang physische oder psychische Objekte sind.'

(There is a problem of translation whether to state the German 'psychisch' as 'psychological' or as 'psychical'. But let me use the term 'psychical' for those mental entities or processes which are the objects of investigation for scientific psychology. No other ghostly connotations involved.)

2 Mach (Analyse), p. 13: 'Wo ... neben oder für die Ausdrücke 'Element' oder 'Elementenkomplex' die Bezeichnungen 'Empfindung', 'Empfindungskomplex' gebraucht werden, muß man sich gegenwärtig halten, daß die Elemente nur in der bezeichneten Verbindung und Beziehung, in der bezeichneten funktionalen Abhängigkeit Empfindungen sind. Sie sind in anderer funktionaler Beziehung zugleich physikalische Objekte. Die Nebenbezeichnung der Elemente als Empfindungen wird bloß deshalb verwendet, weil der meisten Menschen die gemeinten Elemente eben als Empfindungen (Farben Töne, Drücke, Räume, Zeiten u.s.w.) viel geläufiger sind, während nach der verbreiteten Auffassung die Masseteilchen als physikalische Elemente gelten, an welchen die Elemente in dem hier gebrauchten Sinne als 'Eigenschaften, 'Wirkungen' haften.'

and a few paragraphs later,

> A color is a *physical object* as long as we are interested, for instance, in its dependence on the source of the light. Are we, however, interested in its dependence on the retina [...], then it is a *psychological* object. Not the *substance*, but the *direction of our investigation* is different.[3]

So, neither are the elements just 'sensations' as they have been interpreted by many scholars, nor do the objects of the world consist merely of sensations, as has been interpreted by others. But then, the Machian elements show some baffling characteristics indeed and it is no surprise that they have been interpreted in such diverse ways.

They are AS SUCH, 'in themselves' one might be tempted to say, neither physical nor psychical, or they are either, depending on the line of investigation, because neither physical nor psychical things AS SUCH have independent existence. So then, what are they ?

Remember Haller's diagnosis. There is the critical realist aspect in Mach's position. The best we can say of Mach's elements is that they serve in his view for a general notion of *substance*. And it's there, it exists, but it depends on the respective aspect of interest, how it shows. This is really very near to a 'thing in itself' but it isn't and we must not mistake it for one. Because the Kantian 'thing in itself' is beyond our cognition, while the Machian existing substance shows, is even immediately given to us, in just the form in which we our selves are part of it : in the form of elements.

Once more, from yet another passage :

> [As the elements as physical and as psychical] [...] certainly are in either sense both immediately given and identical, the whole question of what is real and what fictional loses its import as matters stand, simple as they are. Here we have the elements of the real world and the elements of the self at the same time. Whatever is left which may for us be of interest from here on, is the *functional dependence* (in the mathematical sense) of these elements among each other.[4]

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3 Mach (Analyse), p. 13: 'Eine Farbe ist ein physikalisches Objekt, sobald wir z.B. auf ihre Abhängigkeit von der beleuchtenden Lichtquelle achten. Achten wir aber auf ihre Abhängigkeit von der Netzhaut, so ist sie ein psychologisches Objekt, eine Empfindung. Nicht der Stoff, sondern die Untersuchungsrichtung ist in beiden Gebieten verschieden.'

4 Mach (Erkenntnis), p. 10f.: '[Da die Elemente als *physische* und als *psychische*] ... gewiß aber in beiderlei Sinn unmittelbar gegeben und *identisch* sind, so hat bei dieser einfachen Sachlage die Frage nach Schein und Wirklichkeit ihren Sinn verloren. Wir haben hier die Elemente der realen Welt und die Elemente des Ich zugleich vor uns. Was uns allein noch weiter interessieren kann, ist die *funktionale Abhängigkeit* (im mathematischen Sinne) dieser Elemente *voneinander.*'

and, again,

> For me, the physical and the psychical are, in their essence *identical* and *immediately given* ; they differ merely under the respective investigation.[5]

Mach's naturalistic monism is metaphysically neutral : as far as existence claims go, namely in respect to elements, they are empirically justified through immediate experience. And above this, no existential claims are made. The rest is mathematics and calculating devices, guided by considerations of economy, i.e., convenience.

So, starting from this basis, any realistic interpretation of theoretical terms or scientific laws is unwanted and, in Mach's view, even naive. It would consist merely in an unjustified extrapolation into an outside domain of something which is really nothing more than economically structured restrictions on our expectations. (That's how he explains laws of nature.) All that is 'outside' is also 'inside', namely elements. And the individual person poses in the same capacity as does a measuring device in some physical investigation.

If one would object that the elements measured or sensed must have some properties to be measured or sensed, the answer will be : 'yes, but doesn't this depend as well on the measuring instrument or the sensual apparatus ?'

Think of it : we are used to odours. We sense them, and we have the tendency to reify them, that is, speak of odours as existing 'in the outside world'. This here is a sweet fragrance, that there stinks. Such is the world. But imagine, evolution would have gone slightly different. Imagine that we would hear high clicks and low clicks instead. Wouldn't we then reify in just the same way : This here is a highclick, that there's a lowclick. Out there in the world ?

Mach's view of the matter is indeed radically different from Kant's. The consequence to be drawn from our example is not that there are 'things in themselves' which are unrecognizable in principle, but rather, that there are elements which are just as we recognize them : There is a complex of elements which is such (may be even : which has such properties) that my sensual apparatus reacts in sensing sweet fragrance or sensing stink. And if evolution would have been different, the sensual apparatus would react in highclickers or lowclickers, or whatever else. There is nothing more to say about reality, outside or inside. In this sense, physical things have, indeed, such properties as these appear to the observer.

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5   Mach (Erkenntnis), p. 12, Anm.1: '...Für mich ist das Physische und Psychische dem Wesen nach *identisch,* unmittelbar *bekannt* und *gegeben,* nur der Betrachtung nach verschieden.

That much for the critical realist aspect. The instrumentalist aspect can be treated here more briefly.

I quoted already that, starting from the empirical basis of sensual experiences, all what's left is calculatory convenience in respect to the functions which are to organize our talk and expectations of further sensual experiences to come.

This goes just further up in the developement of evolution. Animals already sense, they even may form rudimentary concepts. Rudimentary capacities of thinking might even be better described as 'it is thinking in this or that individual'. Man's capacity of turning thoughts themselves into objects of thoughts leads to an even wild proliferation of conscientiously forming hypotheses. There is an ascent from poesy via religous and/or philosophical myth to science, 'the latest acquisition in the evolutionary developement'. Its main capacity is to regiment the excesses of the flourishing of the foregoing phantasies. This is where convention, guided by principles of economy, has its place. It is a choice of convention which ought to lead to the *adaption of the thoughts to the facts and among each other*. If the thoughts are inconsistent, then it depends on which of them is taken to be more important or more trustable in order to be retained or not. And if reached consistence, it is the ideal of economic or organic connections which shall lead the construction of theories. But any reification of theoretical claims or entities is not called for. This would merely mean to fall back into the primitive stage of reifications, of ontologically dividing between physical and psychical.

This throws also some light on the much-debated issue of atomism. Mach didn't object to talking about atoms, he objected to giving them the status of an objective 'outside' reality of independent real objects as distinct and severed off from any direct experience, which would be the old distinction between the physical properties of the world and psychical ones of the observer again. In Carnapian terms, he objected against making external claims about atoms. Talk of atoms can be perfectly innocent, if it is meant internal. But it is metaphysics, if taken external. It is perfectly innocent if meant as useful, because economic, calculatory devices. But it is metaphysics if taken as a separate category of things, ontologically speaking.

The Machian **science** is itself part of the whole enterprise of Unified Science. (Whether this gets us into a malign self-referentiality, I don't know yet.) But this Machian science can go on, it can indefinitely be persued like any science is persued : namely, in patches and pieces at different levels of depth - here a problem of detail, there a proposal for an advance at a wide reaching and high level of generality, and, yet at another spot, a retreat from a cherished hypothesis.

But the Machian **Philosophy,** on the other hand, is still waiting for a full explication.

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