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Austrian Identity Theory and Russellian Monism: Schlick, Russell and Chalmers*

I. INTRODUCTION: THE COMMON FEATURES OF ALL RUSSELLIAN MONIST VIEWS

In this paper I present Moritz Schlick's views on the mind-body problem in some detail, which, beyond being an original contribution to the topic, may also be seen as a representative of a wider "Austrian" approach to the psychophysical relation, sometimes dubbed as the "Austrian Identity Theory". Further, I will investigate Schlick's connections with certain views of Russell (which they developed independently),[1] and to a representative of kindred contemporary views, namely David Chalmers' "Russellian monist" views.

The motivation for investigating these authors in particular are varied. As for the reasons of scrutinizing Chalmers' present views in particular: Russellian monism about the consciousness-brain relation became rather popular in the last two decades,[2] the main motivation for this development being Russellian monism's promise to solve certain problems which other contemporary naturalist theories, including reductionist, non-reductionist and eliminativist materialism and naturalist property-dualist theories, are notoriously unable to solve – and a major protagonist in this development has been David Chalmers.[3] As for putting Russell on the list: all contemporary Russellian monists consider Russell's (1927, 1948, 1956) views as their common ancestor. As for Schlick: his "Austrian view" on the mind-body problem, propounded in the *Allgemeine Erkenntnislehre* (1918, 1925) is rather similar to the views of Russell, and may also be considered as an alternative to the later-day materialist identity theories of Smart, Armstrong and Lewis – as Herbert Feigl emphasized long ago.[4]

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[1] See Feigl's comment on the independence in Feigl 1975.

[2] See e.g. Stoljar 2001; 2006, Strawson 2006, Chalmers 2013, and some earlier proponents as e.g. Lockwood 1992 and Maxwell 1979.

[3] See in particular his „Panpsychism and Panprotopsychism" (2013).

[4] See Feigl 1975. Russell and Schlick: a Remarkable Agreement on a Monistic Solution to the Mind-Body Problem.

So, by examining Schlick's and Russell's ideas together with Chalmers' Russellian monism in some detail I hope to lay out their similarities and differences, which, besides being of historical interest, may contribute to the evalution of their respective merits and failings.

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According to Alter–Nagasawa 2015, the common features of Russellian monist views are the following:

Structuralism about physics: physics describes its basic properties in only structural/dispositional terms.

Realism about the relevant intrinsic properties: there are intrinsic properties that both constitute consciousness and serve as non-structural/categorical grounds for the structural/dispositional properties described in physics.

Phenomenal or protophenomenal foundationalism: at least some of those intrinsic properties are either phenomenal properties or protophenomenal properties (nonphenomenal properties that perhaps also in combination with structural/dispositional properties, constitute consciousness).

The virtues of Russellian monism over all contemporary naturalist theories of consciousness (reductionist, non-reductionist and eliminativist materialism and naturalist property-dualist theories alike) are, according to Chalmers 2013, the following. Russellian monism solves the problem of mental causation: it accounts for the causal efficacy of qualia, in a way that evades the mental epiphenomenalism *versus* overdetermination dilemma which threatens all other naturalist theories. Further, it answers the conceivability argument: it provides an explanation of why zombies are conceivable which does not imply that qualia are non-physical properties.

Besides these common features, we may find some further fundamental assumptions shared by Schlick, Russell and Chalmers, namely: (1) linguistic physicalism; (2) physicalist dualist property-pluralism; (3) Russellian or Austrian identity theory; and that (4) physical-concept-structuralism grounds all (1), (2) and (3). Somewhat more detailed:

According to (1) linguistic physicalism, *the linguistic-conceptual thesis*, all real entities can be identified by physical (or: microphysical or theoretical physical) terms, i.e. we can refer to any real entity by a physical concept (as well). According to (2), *the ontological thesis*, all Russellian monists are pluralist: they assume that many different kinds of qualities constitute the world. Further, they are dualist in holding that this set of variagated qualities divides into two large groups: phenomenal ("mental") and non-phenomenal ("physical"/non-mental) qualities, and *both* are taken to be real *in the same sense*. Their ontology is also

physicalist in holding that phenomenal qualities reside on the same ontological level as the non-phenomenal, "merely physical" qualities.

As for (3), *the thesis about the psychophysical relation*: they advocate a *Russellian* or *Austrian identity theory*. This is a dual-language view, asserting that since physical concepts determine only the structural properties of qualities (in different senses, see below) hence it is *possible* that the denotatum of some physical concept is a quale; and hence that some physical concepts like "c-fibre firing" *refer to a mental event*, and *not* to an ontologically distinct but co-instatiated *brain event*. Further, there are arguments to the the point that it is in fact so.

For (1), (2) and (3) the following similar arguments may be reconstructed from Schlick's, Russell's and Chalmers' texts.

As for premise (1): Schlick, Russell and Chalmers all hold what Schlick calls epistemic parallelism, namely the view that sychronically with the perception of any mental event, a physical event (a brain event) is also perceptible. This is a very widely accepted view since the late 19th century, considered as empirically well-confirmed. Further, they all reject metaphysical parallelism, i.e. that the parallelly perceived mental and brain events are ontologically distinct. From these two tenets (1) follows, for in case (1) were not true, then the two epistemically parallel perceptions ought to be about ontologically distinct events, since the perceived mental event could not be referred to by a physical concept, hence it were not possible that the perceived mental and the physical events are identical, since necessarily, an event referred to by a mental concept could not be identical with an event referred to by a physical concept.

As for the arguments in favour of (2): pluralism about qualities follow from external world realism, which was extensively argued for by Schlick and also by Russell (in his realist periods), and taken for granted by Chalmers; and from the claim that different structural properties are associated with different qualities – a view, I take it, is also shared by all three authors. As for dualism: on the one hand, we have direct knowledge of the existence of phenomenal qualities, on the other we also know that there are non-experiencable extra-mental qualities, since this is implied by external world realism. (In the *Allgemeine Erkennntislehre* Schlick argues in detail for the existence of extra-mental qualities, e.g. by arguing against "the philosophies of immanence", neo-Kantian and phenomenalist views, and also against reductionist materialism about phenomenal qualities. Russell also accepts both the existence of percepts and non-experienceable "external to the mind" qualities. Chalmers all the same: he is a realist about both about physical properties and qualia.) As for physicalistic dualism: epistemic parallelism in itself would allow metaphysical parallelism (or natural supervenience), i.e. non-physicalistic property-dualism, but these views apparently cannot account for the causal efficacy of conscious events (or phenomenal properties). Schlick and Russell takes the causal efficacy of the mental for granted, and Chalmers also accepts it in his later Russellian monist views, unlike earlier,

e.g. in Chalmers 1996, where he seemed to lean more towards mental epiphenomenalism. According to physicalistic property-dualism, qualia (or micro-qualia or proto-qualia) are *on the same ontological level* as physical (or microphysical) qualities, hence my label "physicalistic dualism" as opposed to non-physicalistic dualism, according to which qualia naturally supervene on physical properties, hence they form a kind distinct from the kind of physical properties.

In favor of (3), the Schlickian and Russellian consciousness-brain state identity theory: contrary to supervenient physicalism and parallelism, such identity theories can explain the causal efficacy of the consciousness easily: phenomenal property instantiations are *on the same ontological level* as the non-phenomenal property instantiations, and they are *not* adjoined by parallelly instantiated non-phenomenal properties; hence their causal efficacy is not called into question.

(1), (2) and (3) are all supported by (4) structuralism about physical concepts. Structuralism, however, is laid out in various ways by Schlick, Russell and Chalmers. In the next section I will discuss these different accounts of structuralism in more detail.

II. SCHLICK'S VIEWS ON THE NOTION OF THE „PHYSICAL" IN THE *ALLGEMEINE ERKENNTNISLEHRE*

Schlick's views on the "physical" are quite complex, hence I find it enlightening to present it from diverse angles, i.e. by presenting Schlick's views on the meaning of scientific physical terms, his views on the concept of the "physical" and his account of the methods of constructing scientific physical terms.

According to Schlick, *the meaning of scientific physical concepts is* the conceptual role implicitely defined by the axioms of the relevant physical theories. For example, the meaning of electric field "E": the conceptual role "E" plays in the Maxwell-equations. Schlick's model was Hilbert's conception of the meaning of *geometrical concepts*: the implicit definition by the axioms of geometry. An important characteristic of such an account, which is underlined by Schlick, that *no appeal is made to any intuitive element* in the definition. Schlick applied this idea to interpreting the meaning of *theoretical physical terms* (e.g. of physical space, time, mass, charge etc.), also emphasizing the essentially non-intuitive character of the content of these concepts.

As for *the nature of the "physical"*: on Schlick's understanding, the "physical" is *a system of concepts, not a metaphysical category*. "Reality is called 'physical' *in so far as it is designated by means of the spatio-temporal quantitative conceptual system of natural science*" (Schlick 1918/1925/1985. 294). Hence, Schlick contends, a physical entity is *not* an extended and *quality-less* entity (as according to Democritus or

Descartes).[5] *The natural world* consists of variegated *qualities*, among them subjective, experiential qualities, accessible to consciousness and non-subjective, non-experiential qualities, not accessible to consciousness, which depend on each other in law-like ways.

The method of constructing scientific physical concepts is laid out by and large as follows. We obtain scientific physical conceptual systems in several steps.

Step 1. Determining intersubjective qualitative concepts, from the subjective sensory experiences directed at the same *(Ding an sich)* entity.
Step 2. Determining quantitive relations between the properties identified by the intersubjective qualitative concepts.
Step 3. Introducing a theory that explains the quantitive relations (identified in step 2.), such that its theoretical terms are characterized exclusively by non-intuitive/non-experiential quantitative features.

We may illuminate these steps by two examples, by the construction of *the concept of physical space* and of *thermodynamical concepts*. The notion of objective physical space is of fundamental importance for Schlick, since physical spatial location plays a role in the construction of all scientific physical concepts. The steps are the following:

Step 1. Obtaining the concepts of objective, *Ding an sich* space-points from the points of subjective sensory spaces, e.g. the visual field, by the method of coincidences: i.e. by correlating an objective *(Ding an sich)* point to the singularities of the sensory intuitive fields (e.g. the visual experience of a finger pointing to a location on a blackboard) of different subjects observing the same *(Ding an sich)* objects (viz. the finger and the blackboard).[6]
Step 2. Determining quantitive relations between the points of objective space (e.g. the notions of distance, interval).

As for thermodynamical concepts:

Step 1. Determining intersubjective qualitative concepts of thermodynamics: pressure, volume, temperature. (As for temperature: correlating the subjective thermal sensations of observers with thermometer readings – the length of the mercury rod; as for pressure: correlating the subjective pressure sensations of observers with pressure-meter readings.)

[5] Schlick 1918/1925/1985. 293.
[6] Cf. Schlick 1918/1925/1985. 272 ff.

Step 2. Determining quantitive relations between such intersubjective qualitative concepts, i.e. between pressure, temperature and volume (for example, the gas law: PV/T=const.)

Step 3. Introducing the *non-qualitative quantitative* concepts of microscopic particles with mass, velocity, location, number, kinetic energy, and explaining the quantitative relations between the intersubjective qualitative concepts in terms of these quantitative concepts, e.g. *the number of particles hitting the wall in a time unit* and *mean kinetic energy*.

As a consequence of the general features of such method of construction, the resulting (*scientific) physical concepts* are *purely quantitative*. And, Schlick contends, *by these quantitative concepts* we can identify *all qualities of the natural world;* both the experiential/ phenomenal qualities with which we are acquainted, and the non-phenomenal ones with which we are not.

As for the concepts of microphysical entities: atoms or electrons are accounted for as bundles of interconnected (microphysical) qualities, like mass, charge etc. Thus, w*e are not acquainted with* the qualities of such *theoretical physical entities* (and hence with microphysical entities), but we *can be identify them by the quantitive physical concepts* the meanings of which are determined by *implicit definitions*, i.e. by their „role" in the relevant physical laws. Hence the *theoretical physical concepts involve no reference to the qualities* of the natural entities – but this does not imply that natural entities have no qualities. As Schlick formulates: qualities are *absent from the physical description of Nature, not from Nature itself*.

Such a view may by dubbed as structuralist in the following respects: scientific physical concepts do not appeal to the intrinsic qualities of physical properties, and their meaning is the conceptual role they play in certain physical law statements, which themselves express relations between physical entities, not their intrinsic qualities.

III. SCHLICK'S MOTIVATIONS AND PHILOSOPHICAL CONTEXT

After briefly canvassing the diverse aspects of Schlick's notion of the "physical", I shall address the philosophical context in which Schlick views emerged, and the question of what motivated his account.

In general, it seems fair to characterize Schlick's project as aiming at a reconciliation of his complex empiricist epistemological theory with his external world realism. The main features of Schlick's epistemological theory proposed in the *Allgemeine Erkenntnislehre,* may be characterized briefly by the following features:

(1) According to Schlick's *general analysis* of the concept of knowledge:
   i. Knowledge is *never intuitive*, it cannot be merely an act of intuition or „living through" (erleben), nor some sort of unification between the object and subject of knowledge – not even in the case of our knowledge about the qualities of phenomenal experiences.
   ii. Knowledge is always *mediated by concepts*; it is always a matter of comparing, fitting into a system.
   iii. Knowledge is a *re-identification* of an already known object as something else.
(2) Knowledge about *the external world* must be "anchored" in sensory experience.
(3) *Physical* knowledge is knowledge gained through the application of physical theories and methods.
   i. The characterization of *physical* knowledge must be based on the investigation of physical science, on the reconstruction of the creation/construction of scientific physical concepts.
   ii. The meaning of *theoretical physical* concepts: the *conceptual role* implicitely defined by the axioms of physical theories.
   iii. The advancement of physical knowledge progresses from the subjective/"perspectival"/qualitative perceptual experiences towards the – more and more – objective/"perspectiveless"/quantitative theoretical descriptions of the phenomena.[7]

Schlick's external world realism was in important respects close to a version of critical realism, propounded earlier by Alois Riehl.[8] Accordingly, the *Ding an sich* world outside consciousness exists and certain aspects of it *can* be known; genuine scientific knowledge is about the nature of the external, *Ding an sich* world.

Schlick's theory of knowledge aims at integrating his external world realism with his empiricist epistemology the following way. It is admitted that we have no *direct* knowledge of the external world; but this is not a problem, for we have no direct knowledge about anything else either (there is no intuitive knowledge whatsoever). But we do know that there is an external world (based philosophical arguments directed against immanence philosophies), and we also have knowledge about (certain aspects of) it, along the way Schlick's general theory of knowledge and his account of physical concepts describe it.

[7] "Perspectival" and "perspectiveless" in the sense of Nagel's use of these terms in Nagel 1986.

[8] See Riehl 1887, Heidelberger 2006.

IV. RUSSELL'S UNDERSTANDING OF PHYSICAL-CONCEPT-STRUCTURALISM

Russell advocated structuralism about physical concepts mainly in his Russellian monist period, e.g. in *The Analysis of Matter* (1927) and in *Human Knowledge* (1948) but he formulated structuralist views already earlier, in the *Introduction to Mathematical Philosophy* (1919), and even in *The Problems of Philosophy* (1912). His brand of structuralism was markedly different from Schlick's as the following quotes attest.

> There has been a great deal of speculation in traditional philosophy which might have been avoided if the importance of structure, and the difficulty of getting behind it, had been realised. For example, *it is often said that space and time are subjective, but they have objective counterparts; or that phenomena are subjective, but are caused by things in themselves, which must have differences inter se corresponding with the differences in the phenomena to which they give rise*. Where such hypotheses are made, it is generally supposed that we can know very little about the objective counterparts. In actual fact, however, *if the hypotheses as stated were correct, the objective counterparts would form a world having the same structure as the phenomenal world, and allowing us to infer from phenomena the truth of all propositions that can be stated in abstract terms and are known to be true of phenomena*. If the phenomenal world has three dimensions, so must the world behind phenomena; if the phenomenal world is Euclidean, so must the other be; and so on. In short, every proposition having a communicable significance must be true of both worlds or of neither: the only difference must lie in just that essence of individuality which always eludes words and baffles description, but which, for that very reason, is irrelevant to science. (Russell 1919. 61; my emphasis.)

> Thus it would seem that, wherever we infer from perceptions, it is only structure that we can validly infer; and structure is what can be expressed by mathematical logic, which includes mathematics (Russell 1927. 254).

> The only legitimate attitude about the physical world seems to be one of complete agnosticism as regards all *but its mathematical properties* (Russell 1927. 270).

In order to illuminate Russell's conception we have to clarify some of his fundamental notions, namely: intrinsic properties are first-order properties of entities, both monadic and relational. Structural properties are second- or higher-order formal-mathematical properties of intrinsic properties. Physical concepts refer to structural properties of physical (i.e. external worldly) objects, that is to second- or higher-order formal-mathematical properties of them. Some examples of intrinsic properties may be: the location of perceptual events in phenomenal space and time; colour qualities; relations of colours as e.g. colour distance, col-

our temperature; location in physical space, relations between spatial points, e.g. distance.

Structural properties are the abstract, mathematico-logical properties of these intrinsic properties such as reflexivity, symmetry or a transitivity (for example, the similarity of colour qualities is symmetrical and intransitive). These abstract structural properties, Russell emphasizes, say nothing about the intrinsic nature of the properties they are properties of; hence a colour-space and a sound-space may have the same abstract structural properties.

Very briefly, Russell's argues for his structuralist understanding of physical concepts as follows. According to Votsis' (2004) reconstruction, Russell's arguments are based on the Helmholtz-Weyl principle and the Mirroring Relations principle. According to the Helmholtz-Weyl Principle "we assume that differing percepts have differing stimuli" (*The Analyis of Matter*. 255). In short, *different effects* (*i.e. percepts*) *imply different causes* (*i.e. stimuli/physical objects*). The Mirroring Relations Principle asserts that "(…) the relations which physics assumes (…) are not identical with those which we perceive (…) but merely correspond with them in a manner which preserves their logical (mathematical) properties" (*The Analyis of Matter*. 252). In short, relations between percepts mirror (i.e. have the same mathematical properties as) relations between their non-perceptual causes.

From these principles Russell's thesis apparently follows, according to which the structural properties of the external world are knowable, and the scientific physical concepts grasp these structural properties. As it is well-known, Newman (1928) formulated an objection asserting that Russell's structuralism is near-vacous,[9] but I will not address this topic here, since my aim is not the evaluation of Russell's view but its reconstruction and comparison with other structuralist views.

V. RUSSELL'S CONTEXT AND MOTIVATION

Russell's motivation for advocating structuralism about physical concepts was similar to Schlick's: his goal may also be seen as to reconcile external world realism with an epistemology with strong empiricist leanings.[10] Russell was an external world realist from 1898 (since his break with idealism) – though, of

[9] According to objection, in case the cardinality of the physical objects and the percepts representing them is the same, then the existence of a concrete structure of the physical entities isomorphic with the concrete structure of the percepts (which represent the physical entities) follows simply from set theory, hence it provides no empirical information about the properties of the physical objects (except for their cardinality).

[10] Russell's attitude towards empiricism was not so unambiguous as Schlick's. Until around 1912 Russell was a Platonist concerning logic and mathematics, further he accepted the existence of universals and also held that some universals are known directly by acquaintance. These are, of course, no empiricist views.

course, his ontological views changed greatly from his early extreme ontological pluralism towards his later more modest realism. In 1914 he abandoned external world realism in favor of phenomenalism – in e.g. *Our Knowledge of the External World* (1914); The Relation of Sense Data to Physics (1915) etc. –, but then again he switched back to external world realism (*Introduction to Mathematical Philosophy* [1919]; *The Analysis of Matter* [1927]; *Human Knowledge* [1948]). On the other hand, Russell advocated *the principle of acquaintance* since 1905, according to which „whenever a relation of supposing or judging occurs, the terms to which the supposing or judging mind is related by the relation of supposing or judging must be terms with which the mind in question is acquainted" (Knowledge by Acquaintance and Knowledge by Description [1910]). The principle can be viewed as a linguistic grounding of the Cartesian demand for certain knowledge by a meaningfulness criterion: only such statements are meaningful which can be known, in principle, with certainty. Further, after returning to realism from phenomenalism Russell advocated a causal-representational theory of perception: perceptual experiences are caused by the external objects, which they represent.

These views, however, seem to be *prima facie* in conflict. For on the one hand, the content of perceptual sentences are external objects and properties, but on the other, according to the principle of acquaintance, for a sentence to count as possibly expressing knowledge, its terms must refer to objects with which we are acquainted; but we are not acquainted with external objects, only with sense data or percepts (plus universals). Russell's solution to this problem is the following. We *do not know* the intrinsic qualities of the objective world, since our perceptual experiences of the external world screen them off (the veil of experience). But *we can know* the structural properties of the external world. For we can know the structural properties of our percepts, since they are abstract, second-order properties of the intrinsic properties of our percepts with which we are acquainted. And the structural properties of our percepts are *isomorphic* with structural properties of those objective, external (extra-mental) events that are spatio-temporarily continous with our percepts and cause them. Further, knowledge claims about the structural properties of the external objects *can be formulated meaningfully* because *we know these structural properties*, since they are isomorphic with the structural properties of our percepts, and we know the latter by relying on our acquaintance knowledge about the intrinsic properties of our percepts.

As it is well-known, Russell then abandoned his Platonism due to the influence of Wittgenstein. However, his later views concerning universals were still ambiguous. Nonetheless it is evident that his interest turned towards empirical sciences and the nature of empirical knowledge. Further, that his analysis of the meaning of sentences about the external world may be seen as expressing an empiricist attitude, due to its being constrained by the principle of acquaintance, which may be seen as (a partly) empiricist criterion of meaningfulness.

VI. PHYSICAL-CONCEPT-STRUCTURALISM BY CHALMERS

Among the contemporary advocates of physical-concept-structuralism the dominant view is that microphysical terms are causal-role concepts.[11] A characteristic representative of such views is Chalmers' account: according to him, physical concepts – among them microphysical concepts – describe *the functional/causal role* their referents play. For example, the meaning of "mass" is to be understood as: the property *that plays the "mass-role"*, i.e. an entity having the property of mass causes other entities also having mass to move in certain ways, and other entities having mass cause it to move in certain ways. (Somewhat more precisely: an entity having mass m_1, in the neighbourhood of another entity having mass m_2, behaves (moves, exerts force) in accordance with the equation $F = km_1m_2/r^2$).

Such an account of microphysical concepts can be accommodated both with Chalmers current Russellian monist views, and his earlier non-physicalist naturalist property-dualist view (proposed in *The Conscious Mind*, 1996). According to the former some microphysical concepts refer to micro-phenomenal qualities or proto-phenomenal qualities identifying them by their causal role (not by their micro-phenomenal qualities). According to the latter, they refer only to non-phenomenal microphysical qualitities.

Chalmers' motivation for structuralism about physical concepts, in contrast with Schlick and Russell (and Maxwell), was *not* the goal of *reconciling external world realism and empiricist epistemology*. Such a reconcilition was a real task for Schlick or Russell, partly because external world realism was a real issue for them; phenomenalism and different versions of neo-Kantianism were serious

[11] Among the contemporaries or near contemporaries, Grover Maxwell's view is historically very significant as it represents an important link in the story leading from Russell's physical-concept-structuralism towards the contemporary Russellian views, which all take physical concepts to be causal-role concepts. Maxwell held, similarly to Russell, that *all physical concepts* are *theoretical concepts* (all entities *not given* to the mind are theoretical entities). But, contrary to Russell, he interpreted the meaning of theoretical terms in the framework of the Ramsey-sentence account of the meaning of theoretical terms. Accordingly, *theoretical terms have reference*, and their reference is determined indirectly, by their role in the network of the *causal (and logical) relations* expressed by the physical theory, i.e. "by description". Thus theoretical terms, hence *all physical terms*, *refer to external objects*, which are identified by their structural properties. But at the same time, the identifying descriptions of physical terms contain only terms with the reference of which *we are acquainted* (viz. only terms referring to the phenomenal qualities and to logical relations which appear in the Ramsey-sentence), in line with what Russell's *principle of acquaintance* demands.

Accordingly, we cannot know any intrinsic properties of physical events by direct observation, i.e. by acquaintance, *the whole physical world is unobservable*. But by description, i.e. with our physical theories we can obtain knowledge about certain properties of the physical world, namely the structural (higher-order) properties of physical events. These structural properties are *the causal roles* of the physical events. In general, *all theoretical physical concepts* are causal role concepts, according to Maxwell. More specifically, brain event concepts like "c-fibre firing" are also causal-role concepts, which refer to a causal structure which a certain event-complex of the c-fibre regions of the brain possesses (see Maxwell 1979).

contenders in the early 20th century when they formulated their structuralist views; and an epistemology according to which knowledge must be anchored in perceptually observable facts was not readily reconcilable with it.

However, the later developments in philosophy of science and analytic metaphysics in the 20th century reshaped the theoretical context in such a way that the original formulation of problem became obsolete. With the idea, advocated by the logical empiricists, that the best available knowledge about the physical world is provided by physical science, which need not and cannot be be justified from without, by a special *philosophical* epistemology, and with realism about the content of physical theories, the original question was overcome. So what, then, were the sources and motivations of Chalmers' structuralism?

One motivation may have been that structuralism about microphysical concepts underlies Russellian monism, which, according to Chalmers, facilitates a more adequate account of the consciousness-brain relation then the alternatives (namely that it solves the problem of mental causation and answers the conceivability argument). It is worth remarking that while other proponents of physical-concept-structuralism also recognized this implication, it was not their main motivation for accepting it; it was rather taken as a further bonus for those wishing for a naturalistic account of the consciousness-brain relation.

However, some further motivations may be unearthed from Chalmers' works. It seems Chalmers' microphysical-concept-structuralism is based on what we may call as *the functional analysis thesis*:

> (FA) The meaning of *all* physical concepts, viz. micro- and macrophysical, chemical, biological and cognitive psychological concepts is provided by a *functional analysis* which identifies the causal role of the denotatum of the terms.

So if the general (FA) thesis is justified, so is microphysical-concept-structuralism. But what are the sources and the support for the functional analysis thesis? In my view, these may be the following:

> A. (FA) may be based on Chalmers' account of the meaning of natural kind terms.
> B. (FA) may help to explain why the ontology of the physical has a layered structure.
> And perhaps also
> C. (FA) may be based on the „Canberra Plan".

Let's see these in turn.

A. The meaning of natural kind terms. In my view, one source of Chalmers' understanding of the meaning of microphysical concepts is his *theory of meaning of natural kind terms*. *Prima facie*, there is a plausible connection here; after all, if there are natural kinds *at all*, *electron* or *charge* seem obviously candidates for being natural kinds.

Chalmers' semantic theory about natural kind terms may be seen as a synthesis of Kripkean and Fregean insights. The gist of these views may be illustrated roughly as follows.[12] According to Kripke, the meaning of "water" is: the substance that has those *essential properties* (in this case: chemical consitution) which that substance has which plays the "water-role" *in our world*. According to the Fregean view: "water" is the substance which plays the "water-role" whatever it(s constitution) may be. Chalmers embraces both these aspects of meaning in his two-dimensional semantics, expressing it by the concepts of primary and secondary intension. According to the primary intension, "water" is the substance that which plays the "water-role" in world *w*, considering *w* as actual. According to the secondary intension, "water" is the substance that which plays the "water-role" in world *w*, considering *w* as counterfactual. Now, if electron is a natural kind, then accordingly the secondary intension of "electron" is: the entity that which actually plays the "electron-role", in all worlds. (As for the primary intension, the issue is more controversial: for it may be argued that in the case of fundamental microphysical types such as electron, the "role" and the intrinsic property which it identifies are necessarily connected so that it is not possible that the "electron-role" is played by some property different from that which is the realizer of the role in our world – unlike in the case of "water" and other higher-level types.)

Some doubts, however, may be raised about such an extension of the theory of meaning. For the theory of natural kind terms of Kripke, and also of Chalmers, relies on *the ordinary language use* of such terms, and some related *metaphysical* and *semantic intuitions* and arguments: i.e. on *a piece of analytic metaphysics*. But it is questionable whether the meaning microphysical terms can be adequately based on such grounds.

In other words, the theory of meaning Chalmers extends to microphysical terms (like "electron", "proton", "charge", "spin") is originally about macrophysical or chemical kind terms ("water", "gold") or macro-biological kind terms ("tiger"). But is such an extension readily acceptable? Kripke himself did not indicate much how his theory should be applied to theoretical terms. There are certain problems with the application of Kripke's account of the meaning of natural kind terms to the meaning of theoretical terms like microphysical terms (cf. e.g. with Papineau 1996) and these problems may be inherited by Chalmers' account of microphysical terms. However, I shall not pursue this issue here any further.

B. (FA) helps to explain why the ontology of the physical has a layered structure. Another source of support for the (FA) thesis may be the supposition that if we accept (FA) then we have an explanation of the layered ontological structure of physi-

[12] Chalmers 1996, Chalmers 2006a.

cal phenomena, which Chalmers accepts (in line with the widespread view). For Chalmers hold that

> (1) All higher-order physical properties (i.e. chemical, biochemical, biological, cognitive psychological) are metaphysically determined by the microphysical properties. And
> (2) Every physical property is metaphysically determined by properties one level below; these determining properties are also metaphysically determined by other properties one level below them; and *a fortiori*, until the lowest (micro)physical level which is *not* determined by anything under it, these are the ultimate fundamental properties.[13]

This layered structure of metaphysical determination is explicated by Chalmers, relying on the (FA) functional analysis thesis as follows. Of any property P_n on level *n* a *reductive explanation* can be given, namely: there exists another property P_{n-1} (or a set of properties P_{n-1}^1,…, P_{n-1}^m), on level *n-1* which *satisfies the functional description* of P_n, viz. it *realizes the causal role* associated with P_n. This is so down until the lowest level; but of P_0, the property realizing the causal role of P_1, a functional analysis cannot be given, P_0 is an irreducible ultimate quality.

Now, relying on this account we may obtain a justification of (FA), in the following way: *if* (FA) is true, *then* the layeredness of the ontology of the physical *can be well explicated* relying on (FA). That is, we can explicate *how* microphysical properties metaphysically determine higher-level physical properties. The explanation is provided by the level-by-level reductive explanations of P_n-s by P_{n-1}-s, (i.e. P_{n-1}-s realizing the causal roles of P_n-s) which is enabled by the assumption that all P_n-s (expect for P_0) have a functional analysis. Although this is *not a conclusive argument* in favour of (FA), nonetheless it provides *strong support* for it (especially if there is no alternative explicatory conception).

There is, however, a problem with such a justification. This argument in support of the (FA) thesis may work only if (1), the claim that higher-level physical properties *metaphysically supervene* of on microphysical ones, is *independently justified*. But this seems not so. For Chalmers argues for (1) by an (in)conceivability argument. Briefly: if we set all microphysical facts, then it is *inconceivable* that some higher-level physical fact would be different from what it actually is. (An example of such a scenario may be: if we set all microphysical facts of the world then it is not conceivable that a particular wombat having in actual fact two offsprings, could have only one, or three; see Chalmers 1996. 73).

But *why* would it be *inconceivable* that there may be higher-level physical properties which are not fixed by the microphysical properties? Because Chalmers *denies* the existence of *emergent physical properties* which are not determined

[13] Cf. e.g. Chalmers 1996. 43–46, Chalmers–Jackson 2001.

metaphysically (i.e. not entailed a priori) by the microphysical properties. The problem is, however, that Chalmers seems to ground the exclusion of such higher-order emergent physical properties *on the (FA) thesis*, together with the further idea based on (FA), according to which *all properties can be reductively explained in terms of one level lower properties*. For if a property is reductively explainable in terms of properties one level below, then this is tantamount to the claim that the lower-level property implies, *logically determines* the higher-level one. Hence there is no such logical possibility that the lower-level property is instantiated while the higher-level property does not; hence such a scenario is *inconceivable*.

But then, Chalmers' *inconceivability argument for (1)* the metaphysical supervenience thesis, *relies on (FA)*, the functional analysis thesis. Hence the justification of (FA) cannot be that (1) the metaphysical supervenience thesis can be well explicated by the (FA), since such justification would require that the truth of (1) does not depend on (FA) – but it does, it seems.

There is also another formulation of the argument for the metaphysical supervenience of all higher-level physical facts on microphysical facts provided in Chalmers-Jackson 2001. Accordingly, PQTI, the conjuction of all microphysical (P), phenomenal (Q), that's all (T) and indexical (I) truths implies M, where M is any arbitrary macrophysical truth, like e.g. „Water is H_2O", or „Water is to be found in lakes on Earth" etc.[14]

PQTI implies M, because

(1) PQTI implies complete information (in the language of physics) about the structure, dynamics, composition and distribution of macroscopic systems.
(2) This information about the structure, dynamics, composition and distribution of macroscopic systems, and appearance implies ordinary macroscopic truth, such as M.

So, for example „Water is H_2O" is implied by PQTI (in particular by P, the complete set of microphysical facts).

According to Chalmers, such a justification for the thesis that microphysical facts (P) imply all macrohysical facts is that the thesis is „extremely plausible". So, we may ask, *why* is this thesis *extremely plausible*?

i. One support for the „extreme plausibility" claim is that Chalmers rejects that there is downward causation from higher-level physical states to microphysical states. If we allowed for a downward causal capacity of some higher-level physical properties then the entailment thesis would fail. In „Strong and Weak

[14] Here I will not address the particular issues which were debated between Chalmers and Jackson with Block and Stalnaker, i.e. whether the explicit definability of the concepts of higher-level properties in terms of microphysical concepts are required for the entailment thesis to hold (Block–Stalnaker 1999, Chalmers–Jackson 2001). I am not concerned with this issue here, because the worries I discuss seem to be grounded even if we accept Chalmers' position in this debate.

Supervenience" (2006b) Chalmers contends that downward causation is not logically impossible, however, there is no empirical evidence for it, so he is sceptical about it. So, accordingly, Chalmers' view is that the metaphysical supervenience thesis has a strong empirical support.

ii. Second, Chalmers also argues as follows:

> (the information in P) includes complete information about the structure and dynamics of the world at the microphysical level: in particular in includes or implies the complete truth about the spatio-temporal position, velocity and mass of microphysical entities. This information suffices in turn to imply information about the structure and dynamics of the world at the macroscopic level, at least insofar as this structure adn dynamics can be captured in terms of spatiotemporal structure (position, velocity, shape, etc.) and mass distribution. For example, for any given region of space and time, the information in P implies information about the mass density in the region, the mass density in various subregions, the causal connections among various complex configurations of matter in the region, and the extent to which the matter in the region behaves or disposed to behave as a coherent system. (…) The central point here is that a macroscopic description of the world in the language of physics is implied by a microscopic description of the world in the language of physics. Such a thesis is extremely plausible: it is not subject to any worries about the translation between vocabularies, and involves only a change in scale. (Chalmers–Jackson 2001. 330.)

So the extreme plausibility is based on the idea the microscopic and macroscopic objects and states of affairs are characterized by the same kinds of properties (with the concepts of "spacetime position", "velocity", "mass" having the same meaning both in the micro and macro descriptions). However, even if we accept this account of the relation between the macroscopic and the microscopic descriptions of the world in the language of physics (which may be questioned cf. e.g. Block-Stalnaker), it is clear that biological properties of macroscopic biological systems (i.e. complex macrophysical systems) are not described in the language physics; so that all biological facts are implied by the microscopic description of the world is not obvious. Here again, the (FA) thesis may come to the rescue. For provided there is a functional description of the biological property, then according to Chalmers' assumption it is in principle possible to find some biochemical properties satisfying this causal/functional description, and then some lower-level chemical properties satisfying the causal roles of the biochemical properties, *a fortiori* until we get to the level where the realizer properties are described in the language of *physics*. But then, it seems, in order to support the general metaphysical supervenience thesis about physical phenomena, according to which all higher-level physical facts are metaphysically determined by the microphysical facts, we again relied on the (FA) thesis, so the metaphysical supervenience thesis is not independently justified.

C. The Justification of (FA) in line with the „Canberra Plan"?

Just to mention very briefly a further possible support for the (FA) thesis: Chalmers and Jackson also advocated a general metaphysical programme, the so-called „Canberra Plan", according to which *all* concepts, not only scientific physical concepts but also folk concepts, ought to be constructed in the way theoretical physical concepts are. Accordingly not only „charge" is what actually plays the „charge-role", but also „free will" is what actually plays the „free will role", and „Gödel" who actually plays the „Gödel-role". So if it were true that for *all terms* a corresponding causal-functional concept can be provided, according to the methods of the Canberra Plan, then this may provide support for the (FA) thesis such that it does not rely implicitly on the thesis according to which microphysical truths (or the PQTI) logically entail all higher-level physical truths.

I think, however, that no further support is available for the (FA) thesis from this direction, since the Canberra Plan is an extension of the (FA) thesis to *other kinds of concepts* beyond the theoretical physical concepts. Further, it seems, such extension leaves untouched the objections against (FA) formulated above.

To sum up: we have seen that Chalmers' view about the meaning of physical concepts *comes from a very different background, theoretical framework* than Schlick's and Russell's. Further, that Chalmers' arguments for his version of physical-concept-structuralism have their own problems, namely:

(1) It is not unambiguous that the theory of meaning about ordinary (macrophysical or macrobiological) natural kind terms ("water", "gold", "tiger") is readily applicable to microphysical terms.
(2) The argument for (FA) based on the layered ontology of the physical seems question-begging.
(3) The Canberra Plan does not provide a further justification of (FA), since it is an extension of it to other (not physical) concepts.

III. CONCLUDING REMARKS: THE VIRTUES OF SCHLICK OVER RUSSELL AND CHALMERS

Since the content, background and motivation of Schlick's, Russell's and Chalmers' structuralism about physical concepts are rather different, it is difficult to give an evaluative comparison of them. Therefore I focus instead on some virtues Schlick's account may have over the others'.

The general method of determining the meaning of physical concepts. Schlick grounds his theory about the meaning of theoretical physical concepts *on the reconstruction of the actual methods* of concept formation in physical sciences. Russell, in con-

trast, bases his account on a specific philosophical theory of perception, and also on a strong philosophical epistemological constraint, expressed by the principle of acquaintance. This seems too restrictive, and further, it is in opposition with Schlick's general approach, according to which *scientific knowledge need not and cannot be justified from without, by philosophy*. As for Chalmers: he bases his account on a conceptual analysis grounded in ordinary and philosophical (metaphysical, linguistic and epistemological) intuitions, in the vein of contemporary analytic metaphysics.

The explanation of why physics does not grasp the intrinsic qualities of natural phenomena. Schlick explains more plausibly *why scientific physical concepts do not involve the qualities* of their referents. This is a consequence of the general features of scientific physical concept formation; i.e. it simply follows from the proposition that theoretical physical descriptions are purely quantitative, they leave out qualities from the description of nature, but not from nature itself. For Russell this is a consequence of his quasi-Cartesian account of the perception-world relation, according to which perceptual experiences screen off the intrinsic properties external objects. This seems too a restrictive. (Note also, that this formulation of "screening off" would be nonsensical according Schlick, a sort of category-mistake.) According to Chalmers, *all* physical concepts can be functionally analysed, and functional descriptions *eo ipso* leave out the qualities of their referents. But the functional analysis thesis seems not sufficiently supported.

Explaining (away) dualistic intuitions. The meaning of scientific physical concepts involve no appeal to qualia; hence the intuitiveness of qualia not being physical. But scientific physical concepts may nonetheless refer to qualia – hence the explaining away of the intuition. (Note that this way of explaining away dualistic intuitions is *not* a *refutation of property-dualism, rather its acceptance*, as it accepts the reality of qualia *on a par with* non-phenomenal physical qualities. So it is rather the *refutation of non-physicalistic* property-dualism, according to which qualia naturally supervene on non-phenomenal physical properties, and the *vindication of physicalistic property-dualism*, according to which qualia are on the same ontological level as non-phenomenal physical qualities.)

So we may conclude that Feigl was right, the views of Schlick and Russell (and we may add: Chalmers) are in fact *in a remarkable agreement*: they all accept (1) linguistic physicalism; (2) physicalist dualist property-pluralism; (3) a dual-language account of the consciousness-brainstate identity thesis, i.e. Austrian or Russellian identity theory; and that (4) structuralism about physical concepts play a substantive role in the grounding of (1)-(3). However, they also *importantly differ* in how they lay out the structuralist idea, both in content, context and motivation.

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