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NATURALNESS OF PROPERTIES AND SIMPLICITY OF THEORIES

Abstract: *In this paper, I discuss a specific approach to measuring and comparing the simplicity of theories that is based on Lewis's notion of fundamental properties. In particular, I discuss the criterion of simplicity as stated by Williams. According to Williams, the best candidate for a theory is the one which has the shortest definition in terms of fundamental properties. The aim of this paper is to show that the criterion thus specified has two constraints. First, the criterion is not applicable to cases in which candidates for theories that specify fundamental properties are compared. Secondly, the applicability of the criterion in social sciences seems to be unwarranted.*

Keywords: *naturalness; simplicity; David Lewis; fundamental properties*

Přirozenost vlastností a jednoduchost teorií

Abstrakt: *V tomto příspěvku se zabývám specifickým přístupem k měření a porovnání jednoduchosti teorií, který je založen na Lewisově pojetí fundamentálních vlastností. Zejména se zabývám kritériem jednoduchosti, jak ho prezentuje Williams. Podle Williamse nejlepší kandidát na teorii je ten, který má nejkratší definici z hlediska fundamentálních vlastností. Cílem tohoto příspěvku je ukázat, že takto specifikované kritérium má dvě omezení. Zaprvé, kritérium není použitelné v případech, kdy porovnáváme kandidáty na teorie, které stanovují fundamentální vlastnosti. Zadruhé, aplikace tohoto kritéria v sociálních vědách se zdá být neopodstatněná.*

Klíčová slova: *přirozenost; jednoduchost; David Lewis; fundamentální vlastnosti*

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The idea that simplicity of theories should play some role in the theoretical reflection of scientific practice is a part of the philosophy of science since its beginning. While basically no one believes that simplicity plays no role at all, positive answers are varied. In this paper, I will focus on a specific view on simplicity of theories which is based on David Lewis's[1] notion of fundamental properties and advocated by Williams.[2] Williams believes that we should understand Lewis's ranking of properties (based on the notion of fundamental properties) as an "instrument" for stating the criterion of simplicity of theories. According to Williams, the simplest theory is the one with the shortest definition when stated in terms of fundamental properties.

While Williams's proposal settles an interesting line of an interpretation of Lewis, the suggested connection of two normally independent topics – metaphysics of properties and simplicity of theories – may be hard to see. A partial aim of this paper is therefore to clarify the connection between Lewis's views on naturalness of properties and simplicity of theories. The main aim of this paper is to provide a critical reconsideration of the criterion of simplicity, as proposed by Williams, and of its general applicability to a comparison of simplicity of any two theories. While I believe that to understand simplicity in terms of naturalness may sound reasonable in case of some theories, I do not agree that this criterion can be used as a general principle for measuring/comparing simplicity of theories. In the first part of the paper, I will present Lewis's view on naturalness of properties, as well as its connection to the topic of simplicity of theories as advocated by Williams. In the second part of the paper, I will present a critical reconsideration of Williams's criterion of simplicity of theories if used as a generally applicable criterion.

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[1] David Lewis, "New Work for a Theory of Universals," *Australasian Journal of Philosophy* 61, no. 4 (1983): 343–77; David Lewis, "Putnam's Paradox," *Australasian Journal of Philosophy* 62, no. 3 (1984): 221–36.
[2] J. Robert G. Williams, "Eligibility and Inscrutability," *Philosophical Review* 116, no. 3 (2007): 361–99; J. Robert G. Williams, "Lewis on Reference and Eligibility," in *A Companion to David Lewis*, eds. Barry Loewer and Jonathan Schaffer (Oxford: Wiley–Blackwell, 2015), 367–81.

David Lewis on Naturalness

Before I proceed to a critical reconsideration of Williams's proposal, I try to present Lewis's views on naturalness of properties in detail and to elucidate the relation between the naturalness of properties and simplicity of theories.

Lewis introduced the idea of the naturalness of properties in his paper "New Work for a Theory of Universals."[3] The most basic motivation behind the idea was to find a criterion which would allow us to compare objective distinctions and similarities between properties (understood more or less as classes of things). The idea that there are objective similarities between things is intuitively acceptable for philosophers as well as for lay persons. Most people would agree that the class consisting of all the occurrences of water on Earth is in some way more uniform than the class consisting of all animals on Earth. And the class consisting of all animals on Earth is still in some way more uniform than the class consisting of water, dogs, aeroplanes and revolutions.

The philosophically interesting question is on the basis of what we can compare classes of such radically dissimilar objects. The answer to this question leads us to a reconsideration of what all those objects have in common. If we talk about such a gerrymandered class, then physical reality seems to be a reasonable candidate for a common ground of comparison. What water, dogs, aeroplanes, and even revolutions have in common is that they "are part of" the same physical world. In fact, if we follow physics, then at the most basic level everything in the world consists of *the same physical particles* – quarks and electrons.

Lewis decided to follow the idea that the most fundamental parts of the world are those proposed by current physics (quarks and electrons) and subsequently that the most fundamental properties in the world are also physical – mass, charge, and spin. This is, to some degree, a consequence of his acceptance of the Ultra–sparse theory of universals (or properties as their equivalent) and, to some degree, a consequence of his reductive approach to properties. Moreover, Lewis proposed to ascribe a specific privileged status to the properties at the most basic microphysical level. The privileged status of the fundamental microphysical properties resulted from the fact that those properties had a potential to be used to explicate all other properties (e.g., macroscopic properties such as being animal or being wooden). In fact, Lewis's strategy is a version of reductionism of macroscopic properties to

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[3] Lewis, "New Work for a Theory of Universals," 343–77.

microscopic ones. In Lewis's terminology fundamental microphysical properties are perfectly natural and all other properties should be explicated in terms of those perfectly natural ones.[4]

Furthermore, Lewis used the idea of fundamental microphysical properties to state an objective criterion for "ranking" properties. Fundamental microphysical properties, such as mass, charge, and spin, are at the bottom of the ranking as perfectly natural properties and they serve as a unit of measurement of relative naturalness of other properties. Relative naturalness of other properties is ranked on the basis of their "distance" from perfectly natural ones. The question is how we can measure the distance of a property from perfectly natural ones. Lewis proposed to measure the distance on the basis of the length of their definitions if stated in terms of fundamental properties.

Lewis's writings give us a little clue on how to spell out the idea of definitions in fundamental properties, but a good example of how such a definition may look like is provided by Theodore Sider.[5] Sider demonstrates such definition on a simplified definition of a hydrogen atom: "$\exists x \exists y (Ex \land Py \land Rxy)$, which should be read as: 'There exist an electron and a proton, the first of which orbits the second'."[6] The idea is that, in one way or another, we should be able to state a chain of definitions which links the property being defined to some fundamental properties even for more complex properties (such as being an animal).

The criterion for ranking properties on the scale from the perfectly natural ones to very unnatural ones is then rather straightforward: the longer the definition, the less natural the property. For example, we can stipulate that the definition of a property being a molecule of water is considerably shorter than the definition of a property being an animal. To define a molecule of water we need only to double the definition of a hydrogen atom and to add the definition of an atom of oxygen, but the definition of the property being an animal consists of definitions (i.e., microphysical descriptions) of all the atoms and molecules which form objects that we call animals.

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[4] See Lewis, "New Work for a Theory of Universals," 357–68.

[5] Theodore Sider, *Writing the Book of the World* (Oxford: Oxford University Press, 2011).

[6] Sider, *Writing the Book,* 120. Sider is generally sceptical about effective ways of defining ordinary properties such as being an animal, but he believes that, theoretically, such definitions could be stated. See Theodore Sider, "Sparseness, Immanence, and Naturalness," *Noûs* 29, no. 3 (1995): 360–77.

Rival Interpretations

While the way how to state definitions of properties in terms of fundamental properties is basically taken for granted, the role of the ranking of properties in Lewis's broader views in metaphysics and philosophy of science has been an object of a lively debate in the recent years. Most of the commentators agree – and Lewis was explicit about it – that one of his aims was to use naturalness of properties to answer some of the sceptical challenges in philosophy (e.g., Putnam's[7] model theoretic argument or Goodman's[8] riddle of induction).

However, opinions of commentators vary in how exactly the idea of naturalness of properties should be used to answer the challenges and how it should fit his broader views on language.[9] Weatherson[10] and Schwarz[11] believe that the criterion for ranking properties is primarily meant to co–determine mental content and by doing so it helps to determine semantic content. On the other hand, Sider[12] believes that the criterion is meant to be used to directly determine the semantic content of particular predicates (taken into account their use). The third line of interpretation is advocated by Williams, who suggests that the criterion for ranking properties should be primarily used for the comparison of (simplicity of) theories and only indirectly as a meaning-determining criterion. Even though it could be interesting to compare the viability of particular proposals with regard to Lewis's writings, it is not in the primary scope of this paper to follow exegetical discussions.

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[7] Hilary Putnam, *Reason, Truth, and History* (Cambridge: Cambridge University Press, 1981).

[8] Nelson Goodman, *Fact, Fiction and Forecast* (Cambridge, MA: Harvard University Press, 1955).

[9] See David Lewis, *Convention: A Philosophical Study* (Cambridge, MA: Harvard University Press, 1969); David Lewis, "Languages and Language," in *Language, Mind, and Knowledge*, ed. Keith Gunderson (Minneapolis: University of Minnesota Press, 1975), 3–35.

[10] Brian Weatherson, "The Role of Naturalness in Lewis's Theory of Meaning," *Journal for the History of Analytical Philosophy* 1, no. 10 (2013): 1–19. However, see a critical reassessment of Weatherson's view: Matej Drobňák, "Epistemological Naturalness: What is a Good Heuristic Strategy Good For?," *Logic and Logical Philosophy* 27, no. 1 (2018): 85–104.

[11] Wolfgang Schwarz, "Against Magnetism," *Australasian Journal of Philosophy* 92, no. 1 (2013): 17–36.

[12] Theodore Sider, "Ontological Realism," in *Metametaphysics*, eds. David Chalmers, David Manley, and Ryan Wasserman (Oxford: Oxford University Press, 2009), 384–423; Sider, *Writing the Book*.

With regard to the main aim of this paper, I will focus on the interpretation of Lewis's views on naturalness as provided by Williams[13] and I will take it for granted. In any case, I believe, that the fact whether Williams offers accurate interpretation of Lewis does not have any influence on the main argument presented in this paper. This is mainly because Williams's proposal can be assessed on its own. Regardless of the fact whether Lewis would agree with Williams, Williams's attempt to define the simplicity of theories in terms of naturalness of properties can be seen as a cornerstone of an interesting and original view on similarity of theories. And it is the assessment of a general viability of this view that is in the main focus of this paper.

Williams on Naturalness and Simplicity

The most controversial and original point of the Williams's interpretation of Lewis is his conviction of the specific role naturalness should play in Lewis's views on language. In the line with other commentators, Williams admits that the idea of naturalness of properties can be used to determine meaning, but this is only its secondary function. As Williams argues, the criterion of naturalness is primarily meant to be used as the criterion of simplicity of theories and so its primary function should be to determine which of the candidate theories is the best one – the best theory is the one which best fits the data and if there are more theories which fit the data equally well, then the criterion of simplicity should step in.

In his paper, Williams focuses on one particular application of the criterion – to determine the best candidate for a semantic theory of some language. The secondary feature of the use of the criterion is that by determining the best candidate for a semantic theory, we basically determine semantic contents of particular expressions as well.

When applied to semantics, the best semantic theory should be the one which fits the data better than others. If more semantic theories fit the data equally well, then the best semantic theory is the simplest one. Simplicity of theories is then explicated by Williams as a matter of naturalness. The theory which has the shortest definition in terms of fundamental properties, i.e., which has the lowest syntactic complexity, is the most natural one and so the most simple one. The question that needs to be answered is how we can

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[13] Williams, "Eligibility and Inscrutability," 361–99; Williams, "Lewis on Reference and Eligibility," 367–81.

state and measure the syntactic complexity of semantic theories in terms of fundamental properties.

To achieve this, Williams takes into account semantic theories as presented in Lewis's "General Semantics."[14] According to Lewis, semantic theories consist mostly of clauses assigning semantic values to particular expressions. Williams's proposal is that, in the ideal case, the syntactic complexity of a semantic theory could be stated by the syntactic complexity of all the clauses which it consists of. Since these clauses are mostly clauses which assign semantic values to particular expressions, we can in some sense say that the syntactic complexity of a semantic theory is stated by syntactic complexities of the assigned semantic values.

To understand the connection between the naturalness of properties and syntactic complexity of clauses assigning semantic values, we need to notice that, according to Lewis, properties can play a role of semantic values for predicates. This is a rather unusual position in semantics, but it helps to explain how Lewis's views on properties are interconnected with his views in metasemantics. If we accept that properties can play the role of semantic values, then the syntactic complexity of semantic values can be stated by the definitions of properties in terms of fundamental properties.

If this is so, then the simplest semantic theory is the one which has the shortest overall definition of all the properties that are assigned as semantic values to predicates by the clauses of the theory. Generally speaking, the criterion of simplicity as proposed by Williams says that the best candidate for a theory is the one with the shortest definition, if defined in terms of fundamental properties.

Simplicity of Theories

Before I move to a critical reconsideration of Williams's proposal for a comparison of simplicity of theories, one thing needs to be explicitly stated. There is no indication in Williams's writings that he would intend to apply the criterion of simplicity beyond the comparison of semantic theories. At the same time, however, there is no indication in his writings that his criterion of simplicity should be applied to semantic theories only. It makes sense that Williams focuses on semantic theories, because he tries to provide an expla-

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[14] David Lewis, "General Semantics," *Synthese* 22, no. 1 (1970): 18–67. For a general overview of semantic theories and their assessment see: Lukáš Bielik, "How to Assess Theories of Meaning? Some Notes on the Methodology of Semantics," *Organon F* 19, no. 3 (2012): 325–37.

nation of how Lewis's view on naturalness could solve sceptical challenges in metasemantics. In other words, he focuses on one particular application of his criterion of simplicity of theories. But the criterion of simplicity of theories, as stated by Williams, should be, in principle, applicable to any two competing theories. If we are be able to state definitions of competing theories in terms of fundamental properties, then we should be able to compare their lengths, i.e., to compare their simplicity in accordance with Williams's criterion. However, the sole fact that it is "technically" possible to use the criterion for any two theories does not automatically guarantee that such a use of the criterion can provide reliable results for any two theories. With regard to this, the aim of this paper can be seen as a discussion of possible problems that we might run into if the criterion of simplicity, as stated by Williams, is applied beyond the comparison of candidates for the best semantic theory.

There are two reasons that justify a critical assessment of the criterion and its general applicability beyond semantics. Firstly, there is no reason to suppose that semantic theories should be treated differently than any other theories with regard to the comparison of their similarity. The second reason is that Williams's proposal has a surprisingly wide reach with regard to the topics and problems related to simplicity of theories that are standardly discussed – and so it deserves at least some discussion from the perspective of philosophy of science. Even though the idea of grounding the notion of simplicity of theories in the notion of naturalness has been overlooked so far, I believe that it represents an interesting alternative to more traditional views on simplicity – despite its deficiencies.

Based on which aspects of simplicity of theories are in question, discussions within the philosophy of science can be roughly divided into three thematic areas:[15]

A) Firstly, philosophers discuss whether simplicity can serve as an indicator of future success of a theory – and so it is a *qualitative criterion* – or if it is only an aesthetic criterion which says more about a subjective preference of scientists than about empirical plausibility of a theory.[16]

B) Secondly, philosophers discuss which aspects of theories we should compare with regard to their simplicity. This is an important point, because

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[15] For a general overview see Hugo Keuzenkamp, Michael McAleer, and Arnold Zellner, "The Enigma of Simplicity," in *Simplicity, Inference and Modelling*, eds. Arnold Zellner, Hugo Keuzenkamp, and Michael McAleer (Cambridge: Cambridge University Press, 2001), 1–10.

[16] A wider discussion of qualitative and aesthetic understanding of simplicity see James McAllister, "The Simplicity of Theories: Its Degree and Form," *Journal for General Philosophy of Science* 22, no. 1 (1991): 1–14.

our decision influences the result of comparison. How simple a theory is depends on which aspects of theories we assess. For example, we can focus, e.g., on ontological parsimony or syntactical complexity. Theory A can end up simpler when compared with theory B according to one aspect (e.g., number of types of objects postulated), or more complicated according to another aspect (e.g., number of expressions needed to state a theory).

C) Thirdly, answering which aspects we should focus on does not automatically answer how simplicity of a theory should be measured. Let us say that we decide that syntactic complexity is a relevant parameter for the comparison of simplicity. Even if this is so, the final result of measuring of syntactic complexity depends on how we decide to state a theory; which theoretical tools (what kind of terminology) we decide to employ in our linguistic representation of a theory and which syntactic features of the linguistic representation of a theory we decide to count.[17]

Williams's proposal could be used to resolve all three issues mentioned above. First of all, Williams's proposal presents simplicity as a qualitative criterion. On the basis of Lewis's views on naturalness of properties, a theory which scores better in the comparison of simplicity is also metaphysically privileged and so the comparison should grant better prospects of a theory.[18] With regard to the second thematic area, naturalness of properties can also be used to settle which aspects of theories should be compared – namely the length of definitions of the clauses that a theory consists of.[19] And it also answers how simplicity should be measured – by counting the number of fundamental properties that takes part in those definitions. The most interesting part of Williams's proposal is that it is able to maintain a syntactical character of measuring simplicity and, at the same time, it is able to explain why the criterion of simplicity is a qualitative criterion. All those features make the Williams's proposal for measuring simplicity of theories to be a rather interesting outline of a theory that might be generalized and further developed. However, as I will try to show in the rest of the paper, this

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[17] In the same vein, in the discussions of evaluation of theories on the basis of Bayesian statistics and probability, Jeffryes suggested that the number of adjustable parameters should be among relevant criteria for comparing simplicity. However, the number of adjustable parameters depends on how we decide to state a theory (what kind of equations we decide to use etc.). For a pioneering work on this topic see Harold Jeffreys, *Theory of Probability* (Oxford: Clarendon Press, 1961).

[18] For a wider discussion of metaphysical privilege of natural properties see Sider, *Writing the Book*.

[19] And so it is a syntactical criterion.

proposal for measuring simplicity of theories has also several constraints that might make it less appealing than it may seem at first glance.

General Applicability

The first constraint is related to the role that fundamental properties play in the criterion of simplicity. Simply put, the criterion of simplicity, as stated by Williams, cannot be used to decide the best candidate for the "fundamental" theory (i.e., the theory that specifies fundamental properties). For William's criterion of simplicity to work, it is necessary to specify fundamental properties first. And the decision about the fundamental properties is the decision about the best "fundamental" theory. The fundamental theory is a metaphysical theory that we adopt in order to specify which properties will be considered as fundamental.[20] As in the case of all other theories, it is possible that there will be more candidates and some criterion for deciding between them must be adopted.

If the criterion of simplicity is used to decide the best candidate for the "fundamental" theory and the fundamental properties are defined by up-to-date physics, then the criterion will always affirm the position of an up-to-date physical theory when compared to other candidates. For example, suppose that someone proposes that mass, charge, and spin are not fundamental properties and she shows that the physical reality can be described in terms of some esoteric properties such as energetic vibrations. This esoteric theory is in no way a continuation of physics – it does not show that there is another layer of fundamental properties under the layer of mass, charge and spin, but it claims that physical reality needs to be studied from a completely different perspective. Suppose also that both theories fit the data equally well and there is no difference in their predictive power. In the spirit of the criterion of simplicity, as proposed by Williams, we should compare the lengths of definitions of both candidates for the best fundamental theory (an up-to-date physical theory and the esoteric theory) when defined in terms of fundamental properties. We have two options how to proceed. Firstly, we can state both definitions in terms of fundamental properties as proposed by up-to-date physics. This practically means that the definition of an up-to-date physical theory will be most probably the shortest one of all possible candidates because it *is* stated in terms of fundamental properties. Such a comparison would always confirm the superior position of an up-to-

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[20] I am grateful to an anonymous reviewer for pointing this out.

date physical theory, because no other theory can warrantedly score better than the one that is stated in terms of fundamental properties.

Secondly, we could compare the length of definitions of both theories when defined in terms of their own fundamental properties (in terms of up-to-date physical properties and esoteric properties respectively). This strategy may sound reasonable. After all, Lewis accepted physical properties as fundamental because those were properties proposed by the best theory. If there is another candidate for the fundamental theory, then maybe we should reassess in terms of which properties we state definitions as well. However, the question of how we can compare two theories if they are defined in terms of different fundamental properties now arises.

The biggest advantage of Lewis's proposal is that it states an objective criterion for measuring and comparing naturalness of properties because it settles a measure unit – all the definitions/theories eligible for comparison of naturalness/simplicity must be stated in terms of the same fundamental properties (mass, charge, and spin). The number of these fundamental properties in definitions is then what we count. If two theories are defined in terms of different fundamental properties, then we need some rule for "unit conversion" to be able to reasonably compare the two theories. As far as I know, there is no such rule for fundamental properties and I do not believe that it is possible to find such a rule at all. Any "unit conversion" for fundamental properties can be settled only with respect to the results of their mutual comparison, but this is exactly what we try to find out. In other words, to find out and compare the values of different fundamental properties in definitions requires knowing how theories defined in different fundamental properties score in comparison of simplicity and this is something we do not know until we settle the value of different fundamental properties. Simply said, we end up in a vicious circle. Because of that, it is not possible to use the criterion of simplicity, as proposed by Williams, to determine the best candidate for the fundamental theory. The decision about the best candidate for the fundamental theory, i.e., the decision about which properties will be considered to be fundamental must be made without relying on the criterion of simplicity – at least, if stated as it is discussed here.

Naturalness and Social Sciences

The first constraint stated in the previous section aims at the possibility to use the criterion of simplicity, as stated by Williams, for a comparison of

theories which aspire to settle fundamental properties. As I tried to show, the comparison is obstructed if fundamental properties are in question. The second constraint has even wider scope – I believe that it is doubtful whether the criterion of simplicity, as stated by Williams, can play any significant role in the case of social sciences. As far as I can see, there are at least two reasons that might problematize the applicability of the criterion in social sciences.

Firstly, the applicability of Williams's criterion of simplicity in social sciences depends on the success of reductionism. Basically, all the social sciences are interested in phenomena which are (more or less) dependent on behaviour of people. For example, results of an economic research in purchasing power (very roughly) depend on willingness and ability of individuals to work (and pay for the work) and subsequently to spend money. Results of linguistic research depend on linguistic behaviour of some community of speakers, and so on. The criterion of simplicity can be used for a comparison of theories in social sciences only if someone shows how to state theories standardly engaged with phenomena related to human behaviour and cooperation in terms of fundamental properties. This is possible only if someone can show how social sciences can be "translated" into the language of physics without any loss.

Despite many attempts, the future prospect of concluding debates between reductionism and anti-reductionism looks poor. Debates on reductionism in social sciences are ongoing since seventies and each attempt to vindicate reductionism has been followed by a rival proposal that tried to undermine it. Such discussions can be found, e.g., in philosophy of mind. Any attempt to reduce mental states to neurological states of brain, e.g., Churchlands' eliminativism,[21] is counterbalanced with an attempt to show its deficiencies[22] and to vindicate anti-reductionism (see, e.g., Fodor's[23] and Putnam's[24] argument from multiple realization).

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[21] Patricia Churchland, *Neurophilosophy* (Cambridge, MA: MIT Press, 1989); Paul Churchland, *Matter and Consciousness* (Cambridge, MA: MIT Press, 1988).

[22] The most common arguments against eliminativism include self-refutation and the problem of qualia.

[23] Jerry Fodor, "Special Sciences, or the Disunity of Science as a Working Hypothesis," *Synthese* 28, no. 2 (1974): 97–115; Jerry Fodor, "Special Sciences: Still Autonomous After All These Years," *Philosophical Perspectives* 11 (1977): 149–63.

[24] Hilary Putnam, "The Nature of Mental States," in *Mind Language and Reality: Philosophical Papers, Vol. 2*, ed. Hilary Putnam (Cambridge: Cambridge University Press, 1975), 429–40.

Similar discussions can be found in sociology. Wilson's[25] attempt to build sociology on biological grounds has been immediately questioned by Sahlins[26] and Lenski[27] for omitting cultural influences and mechanisms as driving forces in shaping social aspects of our behaviour and in shaping the organization of human societies in general. Wilson's idea that all aspects of human conduct can be explained in terms of biological determination was criticized especially with respect to explanations of particular sociological phenomena. Motivations and decisions of a person in various social situations were sometimes rather forcibly explained as a result of deep evolutionary (or otherwise biological) mechanisms instead of relying on intuitive psychological explanations. While we can say that we have *some* ways how to reduce social sciences to biological theories (and subsequently to physics), it is not so clear that we will be able to provide a full reduction without misrepresenting important aspects of social phenomena. In any case, even after fifty years of discussions, reductionism is far from providing conclusive evidence and reaching a general consensus.

Secondly, it is questionable whether the criterion of simplicity, as stated by Williams, should have any decisive role in social sciences. The idea that simpler theory is the one which is metaphysically more homogeneous is in the heart of Williams's proposal. This is granted by the units of comparison – microphysical fundamental properties. More complicated theories "consist of" a bigger number of fundamental properties and because of that we can assume that they are also metaphysically less homogenous. The idea that the simplest theory must be also the most metaphysically homogenous one sounds quite reasonable when applied on sciences such as chemistry, astronomy or geology.[28] At the heart, objects of research of all those disciplines can be easily explained in terms of physical processes and so we can assume that more complicated candidate theories require also more complicated

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[25] Edward O. Wilson, *Sociobiology: The New Synthesis* (Cambridge, MA: Harvard University Press, 1975).

[26] Marshall Sahlins, *The Use and Abuse of Biology: An Anthropological Critique of Sociobiology* (Ann Arbor: University of Michigan Press, 1977). See also Winch's book for a more theoretical attempt to vindicate anti-reductionism and recent incarnations of his ideas: Peter Winch, *The Idea of a Social Science and its Relation to Philosophy* (London: Routledge, 1958); Phil Hutchinson, Rupert Read, and Wes Sharrock, *There is No Such Thing as a Social Science: In Defence of Peter Winch* (Aldershot: Ashgate, 2008).

[27] Gerhard Lenski, "Reviewed Work: *Sociobiology: The New Synthesis.* by Edward O. Wilson," *Social Forces* 55, no. 2 (1976): 530–31.

[28] With some provisos we could probably talk about natural sciences in general.

explanations in terms of physics and therefore their definitions in terms of microphysical fundamental properties are also longer.

However, even if there is some way how to state theories within social sciences in terms of microphysical fundamental properties, the question why microphysical (metaphysical) homogeneity of those theories should have any impact on their soundness and subsequent acceptance needs further reasoning. This is not only the question of feasibility of Williams's criterion of simplicity, but, even more importantly, it is the question of its legitimacy.

The biggest advantage of Williams's criterion is that is offers an objective procedure for measuring simplicity – in the sense that conditions under which we compare candidates are the same for all of them. But why should we expect that an economic theory which focuses on a development of the real estate market must be also simpler with regard to microphysical properties such as mass, charge, and spin? In other words, why should we expect that Williams's criterion sets the right conditions for measuring simplicity of theories in social sciences?

Decisions of investors in real estate market are standardly resulting from a rational reconsideration of several aspects – including their income, the price of a real estate and (very often) an interest rate on mortgage. In order to provide a working theory that would be able to track and predict a development of the real estate market, psychological and economical explanations might be of a very good use. With respect to such explanations, the metaphysical homogeneity of a theory does not seem to be a reasonable decisive criterion. The fact that the expression "an interest rate on mortgage" can be defined in terms of x^n microphysical fundamental properties does not provide any substantial information related to a possible successfulness of a theory. Measuring simplicity of theories in social sciences in terms of metaphysical homogeneity means that we are applying measures that are not effectively engaged in determining the future prospect of those theories. With regard to this, the applicability of the criterion of simplicity, as proposed by Williams, beyond natural sciences seems to be questionable. This is not to say that simplicity should not play any role in social sciences at all. However, it might be more useful to look for criteria that may better fit their object of study – similarly to natural sciences.[29] The reason why microphysical properties are well-suited for natural sciences is that they provide a ground that is common for all of them. In a similar way, social sciences

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might look for something that they have in common – psychological or behavioural terminology could be a good first guess.

Conclusion

The aim of this paper is twofold. My partial aim was to show the connection between Lewis's views on naturalness and the criterion of simplicity of theories, as proposed by Williams. The main aim of this paper was to show that the criterion of simplicity, if based on the notion of fundamental properties, has a limited applicability. As far as I can see, there are at least two constraints that prevent its general applicability to a comparison of simplicity of theories. The first constraint is that the criterion of simplicity is not able to determine the best candidate for a "fundamental" theory (i.e., the theory that determines fundamental properties). The second constraint is that while the acceptance of the criterion of simplicity based on the notion of fundamental properties sounds reasonable in the case of natural sciences, it is doubtful whether it is legitimately applicable in the case of social sciences. With regard to the objects of research in social sciences, there is not much reason to suppose that microphysical homogeneity of those theories should have any impact on their soundness and acceptance. Two questions now arise: a) whether we should use the criterion as stated by Williams and b) whether there is no better way how to measure simplicity of theories within social sciences.

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