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IS RELATIVIZED BSA ANTI-REALIST?

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IS RELATIVIZED BSA ANTI-REALIST?

A Master's Thesis

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To *Ayça*

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ABSTRACT

IS RELATIVIZED BSA ANTI-REALIST?

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This thesis investigates one version of Best System Accounts (BSA) of laws of nature: relativized BSA. I argue that relativized BSA, unlike its proponents claim, is an anti-realist account. In the second chapter, I argue that relativized BSA cannot give a plausible metaphysical story for Humean Laws. In the third chapter, I show how acceptance of explosive realism brings irreducible pragmatic elements that render relativized BSA anti-realist. I suggest that there is a general tension between BSA's naturalist-friendliness and scientific realism.

Keywords: Best System Account, Laws of Nature, David Lewis, Relativized BSA

ÖZET

GÖRECELİ EN İYİ SİSTEM ANALİZİ ANTI-REALİST Mİ?

Sonsayar,Utku
Yüksek Lisans, Felsefe Bölümü
Tez Danışmanı: Dr. Öğr. Üyesi Yehezkel Sandy Berkovski

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Bu tez, En İyi Sistem Analizleri'nden bir tanesi olan “Göreceli En İyi Sistem Analizi”ni (Göreceli EİSA) ele almaktadır. Göreceli EİSA, taraftarlarının savunduğunun aksine, bir anti-realist doğa kanunu analizidir. İkinci bölümde, göreceli EİSA'nın Humecu doğa kanunları için metafiziksel bir hikaye sunmadığı savunuyorum. Üçüncü bölümde ise “Patlayıcı Realizm”in kabulünün Göreceli EİSA'nın içine indirgenemez pragmatik unsurları yerleştirdiği gösteriyorum. Tezin son bölümünde ise EİSA'nın natüralist eğilimleri ile bilimsel realizm arasındaki genel bir uyumsuzluğu ortaya koyuyorum.

Anahtar Kelimeler: En İyi Sistem Analizi, Doğa Kanunları, David Lewis, Göreceli EİS

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INTRODUCTION

What are laws of nature? Are they mere regularities or do they produce or govern events in the world? Humeans argue that laws are mere regularities that have their status of law in virtue of their role in systematization. For Humeans, regularities and laws are ontologically on a par. Anti-Humeans disagree. They argue that laws are distinguished by mere regularities in virtue of distinct metaphysical machinery in the world. These distinct metaphysical machinery, i.e. necessitarian relations between universals, laws as primitives, counterfactuals, dictate the behavior of events in the world.

One Humean Account that is popular within the literature is David Lewis' Best System Account(BSA). David Lewis, following Hume, argues that there are no necessary connections within nature. For Lewis, laws are regularities that are the axioms or theorems of the Best System. Those that are sympathetic to naturalist-friendliness and metaphysical modesty of BSA have offered amended versions of Lewis' BSA. In this thesis, I investigate one specific version defended by Cohen and Callender: relativized BSA.

In the first chapter, I present a detailed analysis of Lewis' BSA. Particularly, I outline the relationship between Humean Mosaic, perfectly natural properties and laws. The resulting outline acts as a guideline for what Lewis calls "Package Deal".

In the second chapter, I present various objections against BSA that have led to revised versions of BSA. After I present these objections, I illustrate how the relativized BSA developed by Cohen and Callender solves various problems that the original BSA faces. After presenting relativized BSA, I argue that relativized BSA abandons Humean Mosaic and it is not clear what they offer as a replacement. I argue

that without Humean Mosaic, relativized BSA is a pragmatic account of laws not a realist one.

In the third chapter, I show how relativized BSA's commitment to explosive realism renders relativized BSA a projectivist or a pragmatic account of lawhood. I investigate two candidates that Cohen and Callender offer for explosive realism: Kitcher's modest realism and Carnapian metaontology. I maintain that Kitcher's modest realism and Carnapian metaontology are pragmatic accounts of kinds based on the following reason: both accounts are not compatible with metaphysical claim of scientific realism.

In the fourth chapter, I summarize the general tension between BSA's naturalist-friendliness and its status as a realist account of lawhood. Relativized BSA's conformity to scientific practice pushes BSA to introduce irreducible pragmatic elements into its ontology and account of laws which is part of its metametaphysics. I conclude by arguing that metametaphysics is much relevant to first-order metaphysical questions.

CHAPTER 1: Lewisian Best System Account

In this chapter, I present David Lewis' Best System Account(BSA) and illustrate how BSA is a conjunction of different metaphysical theses. First, I begin by introducing Lewis' Humean Supervenience. Then, I show how Lewis' Humeanism about lawhood is tied to his metaphysics. Finally, I dissect how BSA is a package deal that includes commitment to views about fundamental ontology and laws.

1.1 Perfectly Natural Properties and Humean Supervenience

In "New Work for a Theory of Universals" (Lewis, 1983), following Armstrong (1983), Lewis argues that not all properties are equal. Among sparse properties, there is an elite minority that are called perfectly natural properties. (Lewis 1983: 343) Lewis argues that he has been convinced that these properties are serviceable in duplication, laws, causation, counterfactuals, materialism and modality. For Lewis, the distinction between perfectly natural properties and the rest can be treated either as a primitive, in terms of Armstrong's universals, or in terms of resemblance classes of tropes. (Lewis 1986: 63)

According to Lewis, fundamental physics discovers perfectly natural properties while discovering laws. These include properties like mass, spin and charge which are involved in fundamental laws. (Lewis 1983: 364) For instance, the law of universal gravitation tells us that every object in the universe attracts every other object with a force which for any two bodies is proportional to the mass of each and varies inversely as the square of the distance between them. On Lewis' account, the law of universal gravitation is our guide to the perfectly natural property of mass. However, it is crucial to notice that being a perfectly natural property is a second-order property, it is a property of property. There is nothing within fundamental physics that ascribes

naturalness to the inventory of properties like mass, spin or charge. Thus, the distinction between natural and nonnatural properties is a metaphysical claim.

Lewis' characterization of perfectly natural properties stems from his metaphysics of duplication. He argues that x and y are qualitative duplicates, if they share the same perfectly natural properties. (Lewis 1983: 355) Under his analysis of duplication, the perfectly natural properties come out as intrinsic to the particulars that instantiate them meaning that perfectly natural properties characterize the particular that instantiate them independently of what other particulars are like.

‘We distinguish intrinsic properties, which things have in virtue of the way they themselves are, from extrinsic properties, which they have in virtue of their relations or lack of relations to other things.’ (Lewis: 1986)

Moreover, perfectly natural properties are categorical. They are not instantiated in virtue of their nomic or causal role and they are non-modal. (Lewis, 1994: 474) The categorical properties are best understood in contrast to dispositional properties or powers. For instance, if perfectly natural properties are dispositional, a property of negative charge is disposed to attract positive charges and dispositional properties of a particular dictate the behavior of other distinct particulars. Lewis' commitment to categorical properties denies this. For Lewis, the fact that there is an instantiation of a negative charge has no bearing on the instantiation of other distinct properties. Accordingly, perfectly natural properties are freely recombinable. For every possible combination of instantiation of perfectly natural properties, there is a corresponding possible world that matches such a combination. Call this PRINCIPLE OF RECOMBINATION. Given the principle of recombination, perfectly natural properties are the basic constituents of possible worlds. (Lewis 1986: 60)

Following Bigelow (1988), Lewis argues that truth is supervenient on being. He maintains that any contingent truth i.e truths about counterfactuals, laws, causation, nomic necessity, about the world depends on the distribution of perfectly natural properties throughout space-time. He calls the distribution of perfectly natural properties and relations throughout space-time HUMEAN MOSAIC.

“Humean Supervenience is yet another speculative addition to the thesis that truth supervenes on being. It says that in a world like ours, the fundamental relations are exactly the spatiotemporal relations: distance relations, both spacelike and timelike, and perhaps also occupancy relations between point-sized things and spacetime points. And it says that in a world like ours, the fundamental properties are local qualities: perfectly natural intrinsic properties of points, or of point-sized occupants of points. Therefore, it says that all else supervenes on spatiotemporal arrangement of local qualities throughout all of history, past and present and future.” (Lewis, 1994: 474)

According to Lewis’ Humeanism, natural properties are instantiated at point-sized particles and their relations are geometrical or topological. Lewis argues two worlds cannot be different without a difference in the distribution of perfectly natural properties. Call this HUMEAN SUPERVENIENCE. In this picture, the world is nothing but the distribution of perfectly natural properties and relations, i.e Humean Mosaic. Two worlds cannot differ in any aspect without a difference in their Humean Mosaic.

1.2 Best System Analysis

Lewis denies Armstrong’s analysis of lawhood in terms of necessary relations between second-order universals. Instead, he opts for a regularity analysis of lawhood. Lewis argues that a regularity analysis should be selective in distinguishing between accidental generalizations and lawful generalizations. Following, Ramsey, he argues that laws have their character in virtue of their role in systematization. In his analysis laws of nature have their status of laws in virtue of their epistemic role, not upon distinct metaphysical machinery in the world.

“I take a suitable system [that is, a best systemization] to be one that has the virtues we aspire to in our own theory building, and that has them to the greatest extent possible given the way the world is.”

(Lewis: 1999: 41)

“The standards of simplicity, of strength, and of balance between them are to be those that guide us in assessing the credibility of rival hypotheses as to what the laws are. “

(Lewis:1986: 123)

Lewis argues that laws of nature are regularities that are the axioms of the Best System. (Lewis 1994: 478) The Best System is the one that strikes the best balance between simplicity and strength. First, the system must be informative: intuitively, it must contain many truths about the world. Lewis argues that informativeness is assessed by considering the possible worlds that are excluded by the system i.e more possible worlds excluded means that the system is more informative. Second, the system must be simple: it must be syntactically less complex and include fewer numbers of axioms. However, simplicity and strength are competing virtues. A system that includes a long list of truths about the world is informative but complex, whereas a very simple system is not really informative. Lewis maintains that the best system will strike a good balance between simplicity and strength. How good the balance will be depends on whether nature is kind to us. The laws will be the regularities that are the axioms of the best system. Lewis shows that such a characterization of laws is problematic.

“Given system S, let F be a predicate that applies to all and only things at worlds where S holds. Take F as primitive, and axiomatise S (or an equivalent thereof) by the single axiom $\forall xFx$. If utter simplicity is so easily attained, the ideal theory may as well be as strong as possible. Simplicity and strength needn't be traded off. Then the ideal theory will include (its simple axiom will strictly imply) all truths, and a fortiori all regularities. Then, after all, every regularity will be a law. That must be wrong.” (Lewis, 1983: 367)

The problem is that the formulation of simplicity allows for a free choice of primitive vocabulary which trivializes the Best System. (van Fraassen, 1989) David Lewis' solution to the trivialization problem is to restrict the language in which the best system is formulated to a language whose primitive predicates only refer to perfectly natural properties. Thus, the language of the Best System would be couched in terms of perfectly natural predicates. Call this NATURALNESS CONSTRAINT.

NATURALNESS CONSTRAINT: The language of the Best System should only include perfectly natural predicates.

Since the language of the Best System is restricted to candidate systems that only include perfectly natural predicates, BSA systematizes truths about the distribution of

perfectly natural properties and relations i.e Humean Mosaic. In this picture, laws are the regularities that are the axioms of the Best System that systematizes the Humean Mosaic.

1.3 The Problem of Ratbag Idealist

“The worst problem about the best-system analysis is that when we ask where the standards of simplicity and strength and balance come from, the answer may seem to be that they come from us. Now, some ratbag idealist might say that if we don't like the misfortunes that the laws of nature visit upon us, we can change the laws-in fact, we can make them always have been different-just by changing the way we think! (Talk about the power of positive thinking.) It would be very bad if my analysis endorsed such lunacy. I used to think rigidification came to the rescue: in talking about what the laws would be if we changed our thinking, we use not our hypothetical new standards of simplicity and strength and balance, but rather our actual and present standards. But now I think that is a cosmetic remedy only. It doesn't make the problem go away, it only makes it harder to state. (Lewis;1994: 479)”

On Lewis' BSA, standards of simplicity and strength are constitutive of lawhood. However, if these standards of simplicity and strength are *solely* grounded by our psychology, this would make laws of nature depend on our psychology too. Accordingly, laws of nature would change by changing the way we think about standards of simplicity and strength.

Lewis denies the possibility that laws of nature would change in virtue of a change in our psychology i.e change in our thinking about standards of simplicity. However, Lewis does not propose an argument for the objectivity of standards of simplicity. Instead, he maintains that laws *partially* depend on our psychology. If nature is kind to us, there would be a best system which would strike the best balance between simplicity and strength while not being affected by the partial dependence of standards upon our psychology. Even though Lewis does not offer any conclusive reason for the hope, he argues that it is a reasonable one.

The problem of ratbag idealist and trivialization worry gave rise to two central questions for the decision procedure for the Best System. The first question is the language question. “In which language should the Best System be formulated in”

(Eddom & Meacham, 2015:117) The second question is the metrics question. “Which metrics should we use to evaluate candidate systems?” (Eddom & Meacham, 2015:117)

Lewis’ answer to the first question is to appeal to NATURALNESS CONSTRAINT. Lewis argues that the Best System should be formulated in a language whose primitive predicates refer to perfectly natural predicates. NATURALNESS CONSTRAINT eliminates the trivialization worry and renders laws objective since perfectly natural properties are the objective joints of reality. According to Lewis, the language couched in terms of perfectly natural properties is objectively correct. Moreover, Lewis’ answer to the second question is to reserve the order of question. He does not offer an account of standards for judging the best system that is objective enough. Instead, he argues that the reasonable hope that there would be *robustly* Best System entail that standards by which we judge the candidate system would be objective enough too. Thus, the objectivity of standards are entailed by the expected objectivity of the best system.

The objectivity of standards and language of the best system can be understood with reference to Lewis’s conception of an ideal physicist that discovers the fundamental laws and properties. Lewis assumes that Limited Oracular Perfect Physicist has all the relevant information about the Humean Mosaic i.e distribution of all the perfectly natural properties and relations. From this information, LOPP is able to come up with systematization of all the truths about the Humean Mosaic. (Hall, 2015: 265) Since all the information available to her is given in terms of a language that involves only perfectly natural predicates, she is able to judge which system will strike the best balance between simplicity and strength. Thus, the laws on her world will be the laws she says there are. (Hall, 2015:265)

“What makes our LOPP a perfect physicist is that, given as evidence any information about the world, she is perfectly able to judge what hypotheses about the fundamental physical laws are most strongly supported by that evidence. What makes her oracular is that she has, as evidence, quite a lot of information about the world. (Hall, 2015: 265)”

1.4 Debugging BSA

It is crucial to outline what Lewisian BSA is committed to since amended versions of BSA reject certain parts of Lewisian BSA while incorporating other components.

1. All the facts about the world, including nomic facts, supervene on the distribution of perfectly natural properties and relations, or on HUMEAN MOSAIC. (Broad Supervenience Claim)

1.1 Perfectly natural properties are intrinsic to the individuals that instantiate them and categorical (non-modal).

1.2 Perfectly natural properties are instantiated by point-sized particles or by points and relations among them are spatio-temporal relations.

1.3 The distribution of perfectly natural properties and relations is called the HUMEAN MOSAIC.

1.4 Fundamental physics discovers perfectly natural properties while discovering fundamental laws.

1.5 Perfectly natural properties are fundamental properties.

2. For every possible distribution of perfectly natural properties and relations, there corresponds a possible world. (PRINCIPLE OF RECOMBINATION)

2.1 Every fact about the world reduces to facts about the distribution of perfectly natural properties and relations, or to truths about Humean Mosaic. (HUMEAN REDUCTIONISM)

3. Laws are regularities that are the axioms or theorems of the best system. (Humeanism about laws of nature)

3.1 The best system is the one that strikes the balance between simplicity and strength. System S_1 is simpler than S_2 if and only if S_1 is syntactically shorter

than S_2 . System S_1 is stronger than S_2 if and only if S_1 eliminates more possible worlds than S_2 .

3.2 The best system is couched in a language whose predicates refer to perfectly natural properties. (NATURALNESS CONSTRAINT)

3.2.1 Laws are the regularities that are the axioms of the systematization of truths about HUMEAN MOSAIC.

3.3 There is a reasonable hope that “nature is kind to us” which is secured by the possibility of a robustly Best System. (Metrics-Objectivity)

Humean Supervenience is an implementation of various theses. First, there is the broad supervenience claim on which all the facts about the world, including facts about causation, counterfactuals, laws, nomic necessity supervenes on distribution of perfectly natural properties and relations i.e non-modal facts. Second, according to Humean Supervenience, perfectly natural properties are instantiated by point-sized particles or by points and relations among them are spatio-temporal relations. This is a specific thesis about the character of perfectly natural properties. Third, according to PRINCIPLE OF RECOMBINATION, for every possible distribution of perfectly natural properties and relations, there corresponds a possible world. However, notice that with PRINCIPLE OF RECOMBINATION broad supervenience claim turns into something stronger. (Weatherson: 2015: 102) Given that the distribution of perfectly natural properties and relations characterize the world, every fact about the world reduces into facts about the distribution of perfectly natural properties and relations. Call this HUMEAN REDUCTIONISM.

Thus my account explains, as Armstrong's does in its very different way, why the scientific investigation of laws and of natural properties is a package deal; why physicists posit natural properties such as the quark colours in order to posit the laws in which those properties figure, so that laws and natural properties get discovered together. (Lewis, 1983: 368)

The outline captures “the package deal” notion of accounts of lawhood. BSA involves not just philosophical conception of lawhood but also includes characterization of metaphysical structure, its ontology and canonical scheme for representing lawhood

and its ontology. However, first, remember that BSA is rival to governing conceptions of lawhood which argues that laws govern the events in the world. Unlike Humeanism on which nomic facts about the world reduces into non-nomic facts, for governing conception there is a metaphysical machinery that is responsible for nomic necessity of laws, i.e dispositions, powers or primitive laws. The core idea in BSA is the rejection of governing conception of lawhood which is captured by the thesis (3). Thus, I argue that the thesis (3) is central to any account of lawhood that purports to be a version of BSA. However, notice that (3) alone do not render one's metaphysics Humean *tout court*. For instance, Demarest (2013) argues for an anti-Humean ontology equipped with Humean laws. Her account adopts (3), Humeanism about laws, but rejects fundamental categorical properties. She instead argues that fundamental properties are dispositional properties and laws are the summaries of the distribution of fundamental dispositional properties. Thus, Humeanism about laws (3) does not automatically entail positing categorical fundamental properties, i.e Humean Supervenience (2).

BSA's ontology departs from Anti-Humean accounts of properties that characterize natural properties as inherently modal. BSA defends an ontology that takes properties to be non-modal and deny that properties are instantiated via their causal or nomic role. This is guaranteed by principle of recombination and characterization of perfectly natural properties as categorical. The instantiation of a property within a certain region does not have any bearing on the instantiation of another property in that region on Lewis' account. Thus, there are no necessary connection e.g dispositions, powers, that dictate the instantiations of properties within BSA's ontology.

On Lewis' BSA, perfectly natural properties are fundamental, they are the basic constituents of reality. The distribution of perfectly natural properties constitute the fundamental structure of reality. Thus, with HUMEAN REDUCTIONISM, every fact about the world reduces to facts about this fundamental structure. Moreover, on BSA, what regularities are, is given in terms of patterns of distribution of perfectly natural properties. The notion of regularity is metaphysically tied to the fundamental structure

i.e HUMEAN MOSAIC. There are three claims to be pointed out: First, according to Lewis, there is a fundamental structure of reality which is the Humean Mosaic. Second, regularities are patterns in the Humean Mosaic. Third, laws are the regularities that are the axioms of the best systematization of Humean Mosaic. These three claims will be central to the discussion of relativized BSA in the next chapter.

CHAPTER 2: RELATIVIZED BSA

In this chapter, I begin by presenting the objections that led to revised versions of BSA. Secondly, I introduce the relativized BSA developed by Cohen and Callender and show how they attempt to solve three problems that the original BSA faces. Third, I argue that relativized BSA's commitment to explosive realism dispenses with Humean Mosaic. However, relativized BSA does not have an alternative for Humean Mosaic. I argue that this is problematic on two grounds: on relativized BSA there cannot be any account of the supervenience of high-level law on the low-level laws and rejection of Humean Mosaic introduces irreducibly pragmatic elements into relativized BSA.

2.1 Objections against BSA

2.1.1 Against Perfectly natural properties

Van Fraassen (1989, 49) argues that NATURALNESS CONSTRAINT on the Best System would cause a possible mismatch between the ideally best theory in physics and the Best System. Imagine that a physicist formulates a theory whose basic primitive predicate is a non-perfectly natural predicate. It may be that such a theory scores well on informativeness, simplicity and other standards according to which physicists evaluate their theories and comes out as the best physical theory. However, since the language used by the physicist does not involve perfectly natural properties, such a theory would not count as the Best System. Thus, it is possible that an ideal physical theory does not match the Best System. Laws within the ideal theory would not earn the title of laws due NATURALNESS CONSTRAINT. However, notice that this is untenable given the reasonable expectation that the laws within an ideal theory would match the laws within the Best System. Therefore, there is a mismatch between laws

formulated within BSA and laws within scientific practice which is a serious problem for Lewisian BSA.

The second argument against perfectly natural properties is that they are not empirically accessible. Assume that there two worlds W_1 and W_2 such that, the generalization $(x) (Fx \supset Gx)$ is part of the best system in W_1 and F and G are perfectly natural properties in W_1 . Whereas in W_2 the generalization is part of the Best System even though F and G are not perfectly natural properties. Notice that there is no way of telling which world we are in. In other words, there is no epistemological story that could back up the naturalness of F and G in W_1 . (Cohen & Callender, 2009: 13) Since there is no epistemological story for being a perfectly natural property on BSA, there is a missing epistemological story for lawhood as well.

The third argument against perfectly natural properties is that BSA cannot capture special-science laws. On BSA, in order for a regularity to be a law, it should involve reference to perfectly natural properties. However, it seems that the Best System that includes regularities in biology would be couched in a language whose predicates are not perfectly natural. Thus, regularities that count as laws in biology would not count as laws of nature on BSA. It seems that scientific practice involves not only laws of physics but also special science laws. Thus, because of the original BSA's commitment to NATURALNESS CONSTRAINT, the original BSA cannot account for special science laws. (Cohen & Callender, 2009: 16)

2.1.2 Against Humean Supervenience

Lewis argues that the perfectly natural properties are instantiated at points or by point-sized particles and natural relation among them are geometrical. The inventory of perfectly natural properties are supplied by contemporary physics e.g mass and charge as natural properties and distance relations between points in four-dimensional Euclidean space time. (Loewer 2020: 14) These perfectly natural properties are not instantiated in virtue of their nomic role and hence are categorical or non-modal.

Loewer argues that quantum field theory and general relativity involve reference to properties that are instantiated by their nomic role. For instance, quantum entanglement involves states that are instantiated via relation between distinct space-time regions. (Loewer 2020: 15) These relations between distinct space-time regions cannot be interpreted in terms of categorical properties of each electron. Moreover, Loewer argues it is hard to make sense of Everettian and spontaneous versions of wave function in terms of Humean Supervenience. In the light of this, findings from contemporary physics contradict Humean Supervenience.

2.2 Naturalist-friendliness and Metaphysical Modesty

Proponents of Humeanism about laws of nature (3), dispense with perfectly natural properties and Humean Supervenience. Mismatch objection against perfectly natural properties, Loewer's objections against Humean Supervenience and Cohen and Callender's emphasis on special-science laws point out a common desideratum for revised versions of BSA:

NATURALIST-FRIENDLINESS BSA should conform to scientific practice without imposing prior metaphysics.

Proponents of amended versions of BSA argue that BSA is naturalist-friendly and metaphysically modest. First, on BSA, standards that are used to evaluate scientific theories are constitutive of laws. Since scientific standards are integrated into BSA, there is a direct link between scientific practice and laws. Secondly, BSA has an austere ontology that is only committed to mosaic of events, particulars and properties. BSA's austere ontology contrasts with rival Anti-Humean theories which are ontologically committed to dispositions, powers, primitive laws. Proponents of BSA argue that austere ontology is a virtue of BSA since a theory with less metaphysical posits is better than a theory with more populated metaphysics.

Proponents of revised versions of BSA retain BSA's naturalist-friendliness and metaphysical modesty while eliminating Lewis' metaphysics. This results in a shift in

the methodology of revised versions of BSA. Instead of imposing metaphysics that is not motivated by current scientific findings, revised versions attempt to conform to scientific practice by investigating the domain of each science. This will be crucial since relativized BSA attempts to strengthen BSA's ties with scientific practice.

2.3 Relativized BSA

Cohen and Callender argue that metaphysics of BSA is perspicuous compared to its governing alternatives. All there is to BSA is properties, individuals, events with deductive relations about these entities which are enumerated by our best scientific theories. (Cohen & Callender, 2009: 2) BSA's science-friendly features make it attractive for Humeans who are motivated by investigating our best scientific descriptions of the world. Moreover, they argue that laws of nature are indispensable tools of scientific practice. The role of laws in scientific practice is to find principles from which knowledge we have about the physical world can be derived. (Weinberg, 1987:64; Feynman 1963:1) The attempt to formulate basic principles by appealing to virtues of simplicity and strength in science is the core motivation of BSA. Thus, BSA's core motivation is to dovetail a philosophical account of lawhood with the role of laws in scientific practice.

2.3.1 Three desiderata for BSA

Cohen and Callender argue that there are three desiderata that BSA should meet: i) avoiding the problem of inter-system comparison of simplicity, strength and balance; ii) making laws epistemically accessible and iii) allowing for special-science laws.

Among these desiderata, their core motivation is to avoid the problem of inter-system comparisons of simplicity, strength and balance. The problem is that simplicity of candidate systems can only be compared with respect to a certain set of basic kinds. There is no inter-system comparison that is carried on independently of a set of basic kinds. Thus, inter-system comparison is immanent rather than transcendent. (Cohen &

Callender, 2009: 5) Given that the inter-system comparison is immanent and it is carried out with respect to a set of basic kinds, there is no way of comparing candidate systems that have different sets of basic kinds because the notion of simplicity interpreted as syntactical and language-dependent. Moreover, it is not only simplicity that is affected by inter-system comparisons. Strength of the candidate systems is also affected by the problem of inter-system comparisons. Original BSA argues that the strength is measured by the number of possible worlds that are ruled out. Without appealing to possible worlds, we could say that strength is how much truths about the world are derived from the axioms of the deductive system. However, how much truths about the world are derived depends on the basic kinds of each candidate system. If the competing systems do not agree on the basic kinds, there is no way of assessing the strength of the system. Finally, since how much balanced the candidate system depends on simplicity and strength, the problem of inter-system comparison for balance is parasitic on simplicity and strength too and therefore affects balance too. Thus, the notion of simplicity, strength and balance are immanent notions rather than a transcendent one. Cohen and Callender argue that the problem of immanent comparisons is not that there are too many immanent metrics and we are unable to choose among them. Rather, there is no transcendent measure by which we choose the Best system among the candidates.

The problem of immanent comparisons is not that of selecting one from among a range of otherwise acceptable but immanent metrics to apply to a range of axiomatic systems—it is not a problem of choosing one from too many. What is needed to solve the problem is a transcendent simplicity/strength/balance comparison of each axiomatization against others. The problem is not that there are too many immanent measures and nothing to choose between them, but that there are too few (viz., no) transcendent measures. (Cohen & Callender 2009: 8)

Cohen and Callender argue that a plausible theory of lawhood should include special science laws whereas Lewis' BSA does not allow for special science laws. The reason is that the language of the candidate system is restricted to basic predicates that only refer to perfectly natural properties, i.e. NATURALNESS CONSTRAINT. However,

special science laws involve properties that refer to non-perfectly natural properties. Given this, regularity statements that involve reference to non-fundamental properties have to be translated into regularity-statements that are couched in microphysical vocabulary. However, while adding huge informativeness, the resulting candidate system would be too complex and therefore not simple. Thus, the law would not make it into the Best System.

Cohen and Callender claim that BSA should secure the epistemic accessibility condition for lawhood. The epistemic accessibility objection against perfectly natural properties also holds for some of the governing conception of laws. Following Armstrong, assume that the regularity $(x) (Fx \supset Gx)$ holds in virtue of a necessitation relation between universals F and G. We test whether two worlds could be distinguished by these necessitation relations. In the world W_1 , $N(F,G)$ holds whereas in W_2 it does not hold. There is no epistemological story that would tell us the world which we are in. Second-order relations between universals do not provide us with such a story. Cohen and Callender, following Earman (Earman, 1986: 85), name the test the *empiricist loyalty test*. The aim is to make sure that properties that distinguish the world where regularity R_1 counts as a law from the one in which it is not. (Cohen & Callender, 2005: 9)

2.3.2 Formulation of Relativized BSA

Cohen & Callender formulates *relativized* BSA that solves the problem of immanent comparisons, makes lawhood epistemically accessible and allows for special science laws. Moreover, their account is flexible so that scientists' interests figure in the Best System. The central idea in the relativized BSA is that simplicity, strength and balance of the candidate systems are assessed relative to an inventory of specific choice of kinds (or predicates P_k). Since the assessment is relative to a selected kind, a regularity is a law if it appears in the immanently Best System relative to the basic kind K. (Cohen & Callender, 2009: 22) Relativized BSA solves the problem of immanent comparisons because being relative to chosen kind K; simplicity, strength

and balance now could be assessed with respect to this chosen kind. Moreover, relativized BSA takes conformity to scientific practice seriously by allowing special-science laws. Original BSA accounts do not allow for special science laws since perfectly natural properties only denote predicates taken from fundamental physics. By relativizing chosen kinds, laws in biology, chemistry and other sciences can be counted as laws. For instance, in the original BSA kinds like life and entropy do not appear in laws of nature since they do not denote perfectly natural properties. The relativized BSA allows kinds like life and entropy to be featured in laws of nature. Finally, considering that the chosen kinds are epistemically accessible, the laws of relativised BSA would be epistemically accessible as well. Moreover, Relativized BSA's solution to trivialization worry and language problem is to take dismiss the generalization $\forall xFx$ by appealing to scientists' interest. There is nothing intrinsically deficient about this generalization, however scientists are not interested in the Best System in which the predicate F is true of all things in the world in which S is the best system. Thus, the trivialization worry is solved by taking scientific interests seriously rather than by appealing to metaphysics.

2.3.3 Explosive realism comes to rescue

On relativized BSA, laws are relativized to chosen kinds within each autonomous science. Since kinds are crucial to relativized BSA, Cohen and Callender adopt *explosive realism* which, they claim, dovetails their analysis of lawhood.

Explosive realism is the thesis that there are infinitely many ways of carving the world into kinds. The choice between different kinds depends on how they are congenial to our scientific purposes, interests and our cognitive apparatus. Some kinds will be beneficial for certain scientific purposes e.g explanation, prediction, while other kinds would be eliminated. The world does not consist of a uniquely true division of kinds. Thus, explosive realism is rejection of *pure metaphysical realism* according to which the world has a fixed structure which consists of pre-packaged units. On explosive realism, the division into kinds does not track a uniquely true

carvings into kinds. Instead, the decision procedure for choosing kinds is best understood as pragmatic.

The proponent of relativized BSA, by embracing explosive realism, denies the idea that there is a structure of reality. By embracing explosive realism, relativized BSA adopts a particular image of the world. In this picture, the world is like an “amorphous dough” (Dummett, 1981: 577). Kinds act as cookie-cutters which carve the reality into divisions. (Eklund, 2007: 385) Since explosive realism is the rejection of the idea that reality has a structure, relativized BSA rejects Humean Mosaic. Remember that Human Mosaic is posited based on the assumption that reality has a fundamental structure. However, explosive realism denies the idea that reality has a structure that is divided into kinds. Thus, relativized BSA denies the existence of Humean Mosaic.

2.4 No Mosaic No Realism

Cohen and Callender claim that explosive realism occupies a middle ground between naive relativism/projectivism and robust metaphysical realism. However, I argue that, unlike Cohen and Callender claim, explosive realism collapses into projectivism.

The MRL approach is superior to other non-Governing views: it is admirably realist when compared against projectivism (e.g., Goodman 1954; Ayer 1956; Ward 2002), and suffers from far fewer problems than the naïve regularity analysis (Swartz 1985).

Cohen and Callender (2009:2)

Remember that in the original BSA, laws are the regularities that systematize truths about the Humean Mosaic and the regularities are the patterns within the Humean Mosaic, i.e distribution of perfectly natural properties. Commitment to Humean Mosaic requires commitment to a certain view about realism about structure and its constituents properties. What metaphysically explains the regularities on the original BSA, is the Humean Mosaic as its structure and the perfectly natural properties and relations that constitute the Humean Mosaic. Humean Mosaic and the patterns on the Humean Mosaic exist independently of our carvings into kinds and realism about

regularities require that regularities do not depend on agents for their existence. However, relativized BSA by adopting explosive realism, views the world as an amorphous dough which lacks any structure. Since realism about structure is required for Humean Mosaic, relativized BSA also denies Humean Mosaic. By denying the Humean Mosaic, it is not clear *what* relativized BSA systematizes, in other words there is no target of explanation for the candidate systems.¹

Notice that on relativized BSA, regularities do not hold independently of our carvings. Instead, the world is carved into kinds and regularities based on certain scientific goals and interests. Then, based on these divisions into kinds, if they are congenial to our scientific goals and interests, laws are devised based on these kinds. However, such a procedure for devising laws begins by carving into kinds without an attempt to match the structure of reality. The world itself does not dictate a particular choice of kinds and every possible carvings is equally legitimate from the point of nature. Thus, on explosive realism kinds are not discovered but instead projected onto the world. Without Humean Mosaic, for relativized BSA, there is no target of explanation for which we offer carvings. In other words, scientific claims about the kinds do not stand for a mind-language independent world, but instead it is best to construe these scientific claims about kinds as pragmatically. Each carving purports to give a different conception of the world which is not discovered but made-up. This is a problem for relativized BSA since relativized BSA is not a projectivist or pragmatic about its ontology but realist about its ontological commitment.

Cohen and Callender could respond back by saying that there is no need for a Humean Mosaic. Instead, regularities and kinds are system-dependent and there cannot be any metaphysical template that is system-independent. Conception of laws and kinds within scientific practice can be best understood by looking *within* the practice rather than imposing a priori metaphysical assumptions that hold independently of scientific practice. The standards for judging which kinds will be

¹A similar point has been noted by Demarest (2019: 393) and Ned Hall (2015: 18). However, the point has not been elaborated in detail and in terms of methodology with respect to metaphysics of science.

picked up will depend on the *internal* standards within each autonomous sciences. For instance, standards by which we judge which kinds we choose will be different in biology than say physics. The choice between kinds in biology does not depend on a system-independent metaphysical claim. Moreover, the same response also holds for the regularities within candidate systems in each science. Regularities that are posited by the candidate systems in each sciences are system-dependent, but this does not entail that they are subject or agent dependent. The content of statements about regularities and kinds are still scientific descriptions about regularities and kinds in the world. Moreover, another response worth pursuing is that relativized BSA is modest in acknowledging that it is possible for scientists to get the kinds wrong. Imagine a scientist who proposes a system S_1 consisting of the non-fundamental basic kind K_1 . Being devised in terms of non-fundamental basic kind directly prevents laws of the system S_1 according to Lewisian BSA. However, such a system, even though not couched in fundamental terms, could be simple and informative and score well on predictive power and explanatory power. Given that an empirically successful theory which got the kinds wrong is a possibility, there is no *prima facie* reason for abandoning such a system. Moreover, such a skeptical possibility gives us a reason for treating the choice between kinds and system in terms of pragmatic considerations not in terms of metaphysics. Thus, what counts as regularity is not given in terms of some privileged metaphysical structure, but in terms pragmatic standards within each science.

2.5 Supervenience Problem

If Cohen and Callender follow this response, they face another problem. Assume that we run the competition for laws in each autonomous sciences. It comes out that there is a Best System in biology, physics, chemistry and in other sciences. Cohen and Callender maintain that each Best System is ontologically committed to properties, events, particulars within its own domain. Moreover, entities within each autonomous sciences are metaphysically autonomous, they all equally exist in the world. However, this is contradictory with the supervenience claim. Cohen and Callender argue that

special sciences are supervenient kind laws, namely that laws and kinds in the special sciences supervene on the lower-level physical laws and kinds. However, it is not clear how supervenience can be defended while entities within each special science is ontologically on a par. The supervenience claim requires that there is an ontological difference between fundamental and the non-fundamental. Without Humean Mosaic that backs up the difference between fundamental and the non-fundamental, there cannot be any supervenience. Moreover, the supervenience claim cannot be defended by appealing to intra-system considerations because statements that involve the supervenience of high-level laws and kinds on the low-level physical laws and kinds would require bridging laws and statements that would link the former to the latter. In other words, there needs to be a distinct vocabulary for translating special science laws to microphysical vocabulary. This would be problematic for three reasons: First, there is no reasonable hope that the special science laws and kinds are translatable to microphysical vocabulary. Second, even if the translation would be possible, there would not be the best system that would strike a good balance of simplicity and strength because the system would be incredibly complex. Third, if the translation would be possible the metaphysical autonomy of the special science wouldn't be defended. The linguistic reduction of the high-level entities into low-level microphysical entities would entail metaphysical reduction of the former to latter for. Entities within special sciences would be metaphysically reduced to the entities within fundamental physics. However, this would collapse the second desideratum of relativized BSA according to which laws and kinds in special sciences are metaphysically autonomous. Thus, given these three reasons and relativized BSA's commitment to metaphysical autonomy of entities within special sciences, the supervenience claim cannot be accounted for. Thus, the supervenience claim and the conception of regularity could only be explained by appealing to irreducibly pragmatic elements. For instance, it could be argued that the explanatory fruitfulness or predictive success of a certain candidate system is a good reason by accepting a particular notion of regularity within that system without appealing to distinct metaphysical claims about regularity. Given this, the only route for relativized BSA is

to ascribe to pragmatism or projectivism regarding laws and kinds which will render the relativized BSA anti-realist account of lawhood.²

Remember that for Lewis' BSA what metaphysically explains the supervenience claim and regularities within the best system is the distribution of perfectly natural properties and relations i.e Humean Mosaic. Even though the existence of perfectly natural properties and specific characterization of these fundamental properties are not plausible theses given the objections I have provided, any version of BSA that is Humean should defend a crude view of the Humean Mosaic. This would still involve distribution of properties and relations that constitute the mosaic. Even though Lewis' characterization of fundamental properties as instantiated by points or point-sized particles would be rejected, there should be naturalist-friendly characterization of the distribution of fundamental properties and relations. Laws would be still given in terms of the distribution of these fundamental properties and relations, even though much of Lewis' metaphysics is rejected. Moreover, the crude Humean Mosaic does not need to assume pure metaphysical realism according to which there is a uniquely true carving into kinds. Instead, BSA could defend a *moderate realism* on which there is a basic structure of reality for which not all carvings are equally legitimate. Even though our pragmatic interests and goals would figure in deciding between kinds, these standards would *not* be irreducible. Even though there would be a selection of kinds that would depend on our interest, the picture of reality on moderate realism would be an amorphous dough, instead the basic structure of the world would dictate a particular choice of kinds while retaining pragmatic elements.

Relativized BSA's collapse into pragmatism or projectivism is a symptomatic of a deeper issue regarding methodology. Notice that in the Lewisian BSA, Lewis argues that physics provides us the inventory for perfectly natural properties. The

² Indeed, Cohen and Callender accede this point in their following paper. (Cohen and Callender: 2010) They argue that lacking any metaphysical explanation for the supervenience claim does not pose any problems for relativized BSA. I argue that it is a problem that stems from irreducibly pragmatic elements in their account of lawhood.

methodology for depicting perfectly natural properties is strictly Quinean in spirit. (Quine, 1953) Lewisian BSA is committed to fundamental properties which are committed by our best fundamental physical theories. However, relativized BSA is committed to the Carnapian/Kuhnian conception of theories and theory-change. Cohen and Callender argue explicitly that theory change is due to pragmatic considerations rather than rational compulsion. Theory change interpreted in Carnapian metaontology gives us a completely different picture regarding metaphysics of science. Relativized BSA and original BSA disagree more than in their account of laws, they disagree in their methodology concerning metaphysics of science. The following chapter addresses the deeper issue of how methodology of metaphysics of science affects our first-order metaphysical inquiry, particularly I argue for two claims. First, I argue that relativized BSA's methodology is not a suitable one for realism. Second, in section 3.5, I argue that Cohen and Callender's view of kinds is not congenial to scientific realism, especially against pessimistic meta-induction.

CHAPTER 3: METAPHYSICS OF SCIENCE AND LAWS

In this chapter, I argue that metaphysical questions about laws are interwoven with questions concerning methodology for metaphysics. Not every methodology is suitable for realist metaphysics about lawhood, particularly accounts of laws that are irreducibly pragmatic cannot be construed as realist. Following this, I argue that relativized BSA is anti-realist because it is irreducibly pragmatic. Finally, I maintain that the same worries are also valid for any account of BSA that takes metrics or standards to be a constitutive element of lawhood.

3.1 Relativized BSA and Varieties of Realism

Cohen and Callender do not require their account of kinds to subscribe to particular thesis about realism. Instead, they advocate a family of views which they view is similar in spirit. These include Kitcher's modest realism in philosophy of science; ontological pluralism and explosive realism in metaphysics. I will call this family of views *relativized realism(s)*. The central idea to any member of this family of views is that conceptual relativity is compatible with correspondence theory of truth.

In the preceding chapter, I focused on explosive realism in metaphysics and argued that explosive realism is not compatible with Humeanism about lawhood for the following two reasons: embracing explosive realism distorts the robust sense of regularity by introducing irreducibly pragmatic elements and the broad supervenience cannot be accounted for while adopting explosive realism. However, the arguments against relativized BSA in chapter 2 depend on explosive realism in metaphysics and do not tackle deeper issues about *realism* itself. The understanding was that the world allows for infinitely many carvings into kinds among which none is uniquely true and each carving being equally favourable "from the perspective of nature". However, each candidate in the family of views given by Cohen and Callender are different in

their interpretation of realism. Versions of relativized realism that are irreducibly pragmatic do not dovetail metaphysics of BSA. Since each version of relativized realism are different, I will investigate two particular metametaphysical views: Carnapian metaontology and Kitcher's modest realism.

3.2 Realisms all the way

In the second chapter I have argued that explosive realism distorts the notion of regularity in the relativized BSA. In order to secure the intelligibility of patterns or regularities, relativized BSA should adopt a moderate realism according to which there is a basic ontological structure of the world. Without this moderate realism, relativized BSA is not a realist metaphysical account of lawhood. This structure should exist independently of carvings into kinds and conceptual schemes. In contrast, if the existence of regularities/patterns and kinds/predicates depend on *us* and on the language which they are couched in, the realism about these regularities that constitute lawhood is best viewed as pragmatic or projectivist. Moreover, if relativized BSA is committed to a particular view in relativized realism which interprets scientific theories as pragmatic or instrumental, relativized BSA becomes not a metaphysical account of lawhood but a pragmatic account of lawhood. Accordingly, scientific theories are viewed as useful for certain goals such as explanation, prediction or manipulation without being true.

However, a metaphysical account of lawhood requires that scientific theories are true (or approximately true). In other words, any metaphysical account of lawhood requires acceptance of *scientific realism*. If the type of relativized realism that relativized BSA is committed to is realism only by the name, it is not a realist account of lawhood. Thus, the *sine qua non* for metaphysical account of laws is commitment to a type of realism that incorporates pragmatic elements without making pragmatic elements irreducible. Thus, the type of relativized realism should be compatible with scientific realism and should not fall to pragmatism about kinds or regularities.

Even though the broad understanding of relativized realism denies that reality come up with pre-packaged carvings into kinds, the kinds that are congenial to our scientific interests should purport to refer to mind-language independent reality; these kinds should exist independently of our carvings and minds; we should know that these kinds exist. These three conditions can be classified as semantic metaphysical and epistemological³. For my purposes, it is sufficient only to focus on the first two conditions.

The *semantic claim* is the thesis that scientific claims should be interpreted literally as claims which are about the world and truth-apt. This type of literal interpretation is the denial of instrumentalism at the semantic level. On instrumentalism scientific claims are interpreted as instruments for predictive success or explanatory fruitfulness and therefore they are not taken to be literal statements about reality. If scientific claims are taken to be elliptical for pragmatic purposes, they are not about the world. This undercuts the possibility of metaphysical accounts of lawhood for which we want scientific claims about the world to denote what really exists. However, notice that semantic claim is not by itself enough to engender metaphysics. It could be the case that scientific claims are interpreted literally as purporting to refer to reality but they nonetheless fail to refer. Not only should scientific claims be about reality but they should succeed in being claims about reality. In other words, the scientific entities that scientific claims denote should exist which is the *metaphysical claim*. The opposing view against the metaphysical claim is metaphysical constructivism. Metaphysical constructivism argues that mind and language independent reality is unknowable. The knowable world⁴ is constructed by the application of concepts. (Devitt, 2001) Even though scientific claims are interpreted literally, they do not refer to a mind and language independent world but instead to the constructed world mediated by concepts. Thus, metaphysical constructivism is robustly anti-realist in

³ Notice that these theses are central tenets of scientific realism. I argue that a metaphysical account of lawhood should satisfy all the conditions.

⁴The notion of a knowable world is related to the epistemological claim. However, for purposes of space I do not focus on this relation.

taking scientific claims referring only to scientific representations but not to the independent reality.⁵ Thus, in order to secure realism, the chosen member of relativized realism should not fall into either instrumentalism or metaphysical constructivism. I present two versions of relativized realisms that Cohen and Callender mention; Carnapian metaontology and Kitcher's modest realism. I maintain that these two types of relativized realism cannot be the correct methodology for metaphysics for science since they are not strictly realist.

3.3 Relativized BSA and Carnapian Metaontology

Cohen and Callender argue that their view of theory change is Carnapian i.e theory changes happen as a result of pragmatic needs and not as a result of rational compulsion. Relativized BSA is in accordance with Carnapian metaontology. However, it is yet to be seen whether Carnapian metaontology is compatible with metaphysics of laws.

3.3.1 Carnapian Metaontology

The initial motivation for Carnap is to rescue the empiricist from the dilemma caused by abstract objects. On the one hand, certain expressions denote certain entities and among them are abstract objects. On the other hand, taking abstract objects as designata leaves the empiricist with no choice but to embrace Platonic ontology. (Carnap, 1950: 20) Abstract entities, especially in scientific contexts seem hard to avoid. Given the dilemma, Carnap argues that there is a way for the empiricist to accept abstract entities like propositions, numbers, classes and etc. The solution relies on the formulation of linguistic frameworks and two types of questions: internal and external questions. (Carnap, 1950: 21)

⁵ This echoes the Kantian distinction between noumenal and the phenomenal world. The noumenal world is the world as it is in itself. Even though we believe in the noumenal world it is not accessible to us. Only the phenomenal world which is the world as it appears to us is knowable. The phenomenal world is partly constructed from our representations and hence depend on us. (Godfrey-Smith, 2003: 181)

Carnap argues that in order for us to talk about new kinds of entities we should introduce new ways of speaking which are subject to new rules and the procedure of doing so is called construction of a linguistic framework. The notion of linguistic frameworks allows Carnap to distinguish between two types of questions: “Questions of existence of certain entities” that are raised *within* the framework are called *internal questions* whereas questions that are concerned with the existence of reality of the system of entities as a whole are called external questions. (Carnap, 1950: 21) Following this, Carnap argues that internal questions are answered by means of new forms of expression and the rules that are introduced in the construction of the framework. These answers can be formulated either by purely logical methods or by empirical methods. (Carnap, 1950: 22) External questions demand a scrutiny upon linguistic frameworks given their “problematic” nature.

In the construction of linguistic frameworks, two steps are crucial: 1) the introduction of a general term for the new kind of entities e.g number, color, proposition and etc. 2) “introduction of variables of the new type” (Carnap, 1950: 30) The new entities that are introduced are values of the variables. In order to elucidate internal/external distinction and the notion of frameworks, I will use two examples of linguistic frameworks: the framework of numbers and properties.

What is central in the introduction of linguistic frameworks is that we introduce new forms of expressions which are subject to a new set of rules and this holds for *introduction of every framework*. Consider the system of numbers:

- “(1) numerals like "five" and sentence forms like "there are five books on the table";
- (2) The general term "number" for the new entities, and sentence forms like "five is a number";
- (3) expressions for properties of numbers (e. g., "odd", "prime"), relations (e. g., "greater than"), and functions (e.g., "plus"), and sentence forms like "two plus three is five";
- (4) numerical variables etc.) and quantifiers for universal sentences ("for every n, ...") and existential sentences ("there is an n such that ...") with the customary deductive rules.”

(Carnap, 1950: 24)

After the new forms of expression and new set of rules are introduced, internal questions are answered. Notice that internal questions that are raised in the number framework are answered by purely logical methods rather than empirical methods. The answer to an internal question like “Is there an even number greater than one thousand?” is analytic and logically true. The analyticity of the answer holds in virtue of the set of rules that are introduced in the construction of the linguistic framework.

In the case of number framework, there is a further question that is raised by the philosopher: “Are there numbers?”. If the question is understood as an internal question the answer is analytic and true. It is sufficient to investigate the rules that are involved in the construction of the framework. In this case, from the rules (4) which states that “There is an n such that n is a number.” and (2) which is the introduction of general terms, e.g five is a number, it follows that there are numbers and thus the answer to the internal question is analytical and true. (Carnap, 1950: 24) However, philosophers seem to raise a metaphysical question which can be paraphrased as follows: “I don’t mean the internal question but the external question which is raised prior to acceptance of the framework?”. (Carnap, 1950:24) Thus, the philosopher is concerned with the ontological status of numbers i.e whether they are real or not. Carnap argues that external questions raised in this sense are non-cognitive and pseudo-questions. The underlying premise for this claim involves Carnap’s conception of “real.”

“To be real in the scientific sense means to be an element of the framework; hence this concept cannot be meaningfully applied to the framework itself. Those who raise the question of the reality of the thing world itself have perhaps in mind not a theoretical question as their formulation seems to suggest, but rather a practical question, a matter of practical decision concerning the structure of our language. “ (Carnap, 1950: 23)

For Carnap, the notion of real only appears within the system but it cannot be applied to the system of framework itself. The mistake of the metaphysician is her inability to divorce the notion of real from its cognitive content and apply it to the system of entities. Given that the notion of real applies only to the elements of the system but

not the system itself, the acceptance of frameworks does not mean a belief, assertion or assumption in the reality of the entities that are introduced by the framework. Thus acceptance of framework does not imply “any need of theoretical justification.” (Carnap, 1950: 31) Instead, the external question concerning the framework can be construed as a practical or pragmatic question as to whether it would be beneficial to accept the framework for the “purposes for which the language is intended to be used”. (Carnap, 1950: 23) For instance, if we are to accept the number framework, the external question becomes “Would acceptance of the number framework serve the purpose which it was intended to be used for or whether it would be beneficial for our purposes?”

The purposes for which the language is intended to be used, for instance, the purpose of communicating factual knowledge, will determine which factors are relevant for the decision. The efficiency, fruitfulness, and simplicity of the use of the thing language may be among the decisive factors. (Carnap, 1950:23)

Carnap argues that even though external questions are not theoretical in nature, nevertheless they are influenced by theoretical knowledge. For instance, when considering whether to adopt the thing language “which is spatio-temporally ordered system of observable things and events” (Carnap, 1950: 22), our decision would be influenced by its purpose, namely communicating factual knowledge. Furthermore, pragmatic decisions depend on factors like efficiency, fruitfulness, and simplicity. (p.23) Thus, the only legitimate form of external question that can be raised prior to acceptance of the framework is the pragmatic one. (Carnap, 1950: 39)

3.3.2 Carnapian irrealism

Cohen and Callender’s adoption of Carnapian metaontology matches their overall agenda. Linguistic frameworks overlap with the notion of candidate systems. Each candidate system can be viewed as a linguistic framework. The rules for talking about kinds in the candidate systems are introduced which involves introduction of general terms along with new types of variables. Then, the candidate systems are evaluated

with respect to a chosen predicate/kind (P_K/K) and the laws would be the generalizations that appear in all the immanently Best Systems relativized to basic kinds K . Thus, Humeanism about lawhood would appear as a semantic rule within the candidate system.

However, there is one crucial difference. Carnapian metaontology eschews external factual questions, namely the questions concerning the reality of the linguistic frameworks; whereas relativized BSA cannot do away with external factual questions. Carnapian metaontology is irrealist in that it rejects the dichotomy between realism and anti-realism altogether. The question of the reality of the system of entities simply does not arise. Imagine that we run the Best System relativized to kind K within particle physics and L is the regularity that appears in the Best System S_1 relativized to kind K . This Best System is only pragmatically useful and reality of the relativized Best System is a pseudo-statement. Acceptance of the Best System S does not amount to a metaphysical commitment to the Best System S . Commitment to Best System S is only interpreted as pragmatic usefulness of the Best System S but not as a commitment to its reality. Furthermore, the choice between candidate systems is *entirely* pragmatic. If the standards by which we judge the candidate system would not be irreducibly pragmatic, pragmatic elements could be interpreted in a realist line. For instance, if simplicity is one of the tenets of pragmatic choice between frameworks, one available option would be to analyze simplicity in line with higher credences.⁶ However, on Carnapian metaontology, the choice between different candidate systems is irreducibly pragmatic. Thus, if the idea that Carnapian metaontology is congruent with relativized BSA is taken seriously, the resulting relativized BSA is pragmatic not metaphysical.

At the first glance, Carnapian metaontology seems to satisfy the semantic claim. Within the framework, the basic kinds seem to *purport* to refer to entities outside the

⁶ Hicks (2018) gives an account of simplicity in the BSA as congenial to this line of interpretation. The notion of simplicity is linked with notion evidence which saves BSA from being purely pragmatic theory of laws.

language. For instance, imagine that we introduce the system of Newtonian mechanics. The basic kind mass purports to refer to a certain magnitude. However, Carnapian metaontology avoids the dichotomy by maintaining that there is no question of realism. Only intelligible external question is whether given certain fixed purposes like predicting the behavior and motion of elementary particles, Newtonian mechanics is pragmatically useful or not. Metaphysical claim is rejected by eliminating the possibility that Newtonian mechanics could be a true scientific description of reality. Carnapian metaontology dispenses with metaphysical theorizing altogether. Thus, the Best System cannot be seen as a true scientific description of regularities but only as a pragmatically useful framework for certain purposes. However, relativized BSA requires these regularities to be true in that they correspond to mind and language independent reality.

Another reason why Carnapian metaontology is not a suitable methodology for relativized BSA is that Carnapian metaontology, even though irrealist, amounts to metaphysical constructivism.⁷ Consider a phenomenalist who restricts her language to sense-data and a realist who uses the thing language. Carnap argues that acceptance of phenomenalist language or thing-language should not be interpreted as accepting or believing in the reality of sense-data or things. Given that the notion of real is only applicable to the elements internal to the framework, sense-data is real with respect to the proponent of phenomenalist but unreal to the proponent of thing-language⁸. The external factual question “Are there sense-data?” is relegated to the status of pseudo-

⁷ The motivation is to show that without taking linguistic frameworks in line with candidate system in relativized BSA, Carnapian metaontology is still problematic for metaphysical account of lawhood.

⁸ Sense-datum is not a term introduced within the thing-language. The immediate worry is that there is no coherent way of rejecting sense-datum internal to the thing-language since the term does not even come up within thing-language. I argue that sense-datum’s absence from the thing-language is a justified reason for rejecting the existence of sense-datum within the thing-language. However, one can argue that rejection of sense-datum within thing-language requires the term sense-datum to figure in things language which in turn requires that there should be translation rules for inter-framework comparisons. I do not address worry but it is suffice to say that sense-datum is clearly not real within thing-language.

question. This question only makes sense if it is interpreted as a question whether to adopt the phenomenalist framework. Sense-data exists only if the phenomenalist framework is adopted and only within that framework. This makes the existence of sense-data dependent on the acceptance of the phenomenalist framework and hence to the pragmatic choice upon which we decide whether to adopt the framework or not. Given that the existence of sense-data depends upon the framework, the world as conceived in Carnapian metaontology is framework-laden. In other words, there is no separate, mind and language independent world upon which our scientific terms and claims refer to. The world is constituted by the framework which we choose by pragmatic considerations and our purposes. Thus, Carnapian metaontology collapses into metaphysical constructivism which violates metaphysical realism.

3.4 Kitcher's Modest Realism: Too Modest?

In *Science, Truth and Democracy*, Kitcher advances an account of scientific realism that is compatible with conceptual relativity. Kitcher attempts to secure correspondence theory of truth while maintaining that carving into kinds depends on our interest and scientific programme rather than corresponding to objective pre-packaged units or objective labels. First, Kitcher argues against metaphysical constructivism by pointing out that there is a mind, language independent world. Following this, Kitcher argues that science provides true claims about this mind and language independent world. Thus scientific claims are interpreted literally about claims about the mind and language independent world. However, Kitcher denies that there are objective divisions within nature which science attempts to uncover. Reality does not have a division into pre-packaged units or a fixed structure. Instead, carving into kinds depends upon creatures like us and descriptions that we care about. In other words, there is an independent reality which our scientific practice is directed at but this reality does not consist of objective categories which match kinds. (Dieguez, 2011) There is no privileged language or conceptual scheme which refer to natural kinds; instead, there are a variety of classifications that are relative to our abilities, interests and aims. Moreover, there is no conceptual scheme or language which can

give us complete inventory of nature or complete description of reality. Instead, scientific descriptions are invariably selective in describing and explaining reality. (Kitcher, 2001: 46) Notice that this does not mean that the selection between scientific descriptions are arbitrary or that they are *all* equally valid. Depending upon our interests and purposes, some descriptions are better than its alternatives.

Kitcher proposes an analogy for characterizing modest realism. He uses map-making in order to illustrate how modest realism incorporates modesty in allowing kinds to be devices according to our interests and realism about mind-independent reality.

The history of map-making illustrates the modest realism with which I began. Consider some of the maps of our planet offered by the geographers of the past, maps of the entire globe. Later maps appear superior to earlier ones in two major respects. First, they include entities that were previously omitted, the New World and Australasia being the most striking examples. Second, their depictions of the spatial relations among the entities commonly represented are more accurate; the margins of the various countries follow actual coastlines more closely. We make these judgments without believing that any of the maps ever produced is completely accurate, even while admitting the possibility that earlier maps might occasionally deliver a more accurate representation of some local features, and that the kind of convergence we appreciate visually need not be monotonic. (Kitcher, 2001: 55)

Map-making analogy dovetail Kitcher's general understanding of scientific representation along with modest realism. First, the map represents things that exist independently of human cognition. The map of London underground attempts to represent London underground which exists independently of map-making. Moreover, the things presented on the map do not cover every entity within the domain of explanation. There is no map that represents every aspect of its target. For instance, consider the political map of the world in which countries and their borders are represented. In contrast, the geological map of the world represents geological features like rock units. Both the political map and geological map of the world represent the same target but each represents different aspects of the same target. Thus, the same target can be represented differently and each representation already depends on the purpose of representation. What is crucial for Kitcher is that each map

can be assessed in terms of accuracy. Earlier maps of the globe lacked America and Australasia whereas contemporary maps include (Kitcher, 2001: 60) America and Australasia. In that sense, the latter maps of the world are more accurate than the earlier ones. Kitcher uses the element of accuracy in map-making to illustrate maps can be depicted as true and false. Thus, map-making analogy demonstrates the idea that scientific representations which are tied to certain purposes can nonetheless be rendered approximately true or false. However, the contrast between map-making and scientific representations and theories are crucial since map-making is solely viewed as practical matter. Thus, accuracy is not only crucial for practical concerns but also obtaining significant epistemic truths. Scientific practice and scientific theories aim to reach a better understanding of phenomena in nature which are context and purpose dependent. Thus, even though scientific practice is intimately tied to questions concerning aims, conventions and context, science still aims to reach epistemically significant truths. (Kitcher, 2001: 61)

On modest realism, there is no one single accurate map of the world which is context-independent. Instead, the accuracy of the map is connected to the purpose and conventions of the map-making along with our cognitive apparatus. Acknowledging this aspect of map-making gives rise to an understanding of categorization that is conflictory with pure realism about kinds. Context-dependency and the impact of our interests within scientific representations gives us a picture of carving into kinds. In this picture, it is not that the world has a privileged structure over and above our interests in which we discover kinds that match this structure. Instead, for certain scientific purposes, certain usage of kinds are more congenial than its alternatives in meeting these purposes.

In Kitcher's account the division into kinds itself is epistemic, nonetheless scientific claims that use these divisions correspond to reality. Scientific claims concerning different categorization of species accurately represent the mind-independent reality but the categorization itself does not match any mind-independent structure. The divisions themselves are not treated realistically but epistemically depending upon our

conventions, aims and cognitive apparatus. Modesty of modest realism is to embrace the claim that there are different ways of knowing the same target without concluding that these different ways of knowing the same target amounts have ontological implications. If there are different conceptualizations of species within biology, this does not mean that each conceptualization of species has a counterpart in reality. (Kitcher, 2001: 62)

I argue that Kitcher's modest realism avoids the distinction between decision procedure for diving nature into kinds and the metaphysical status of kinds. There needs to be a distinction between decision procedure for division into kinds and the status of these divisions as are truth-apt. It may be that our decision procedure for division into kinds are amenable to scientific interests and purposes in which our divisions into kinds do not presuppose a labeled reality. However, once the existence of certain kinds are confirmed via evidence and the existence of certain other kinds are rejected, this gives us a good reason to confirm that the formulated kinds match the natural divisions within the world. Otherwise, the idea that the scientific representation involving kind K_1 refers to target phenomena in mind-independent reality does not make sense. This is because without some structural isomorphism between the representation and reality's structure, the division into kinds are treated as categories imposed upon the world by our representations. (Dieguez, 2011: 18) Since the world does not have a basic structure on modest realism, the scientific claims about kinds would correspond to the world made up by our conceptual schemes. Thus, there are two options. Either modest realism collapses into metaphysical constructivism in which mind-language independent reality is replaced with representation constructed reality or conceptual schemes or the scientific claims about the kinds are construed as pragmatically useful tools for explanation, predictions, unification and manipulation.

Both options are untenable for relativized BSA since relativized BSA is a realist account of lawhood that should meet the metaphysical component of scientific realism. Collapsing either into metaphysical constructivism or robust pragmatism

violates the realism of relativized BSA. Hence, modest realism collapses into either metaphysical constructivism or is irreducibly pragmatic that prevents from relativized BSA as a candidate metaphysical theory of lawhood.

3.5 Perspectivalism

Relativized MRL adds to the reasons to doubt the possibility and intelligibility of such a characterization by offering a picture of laws that is essentially perspectival. (It bears repeating, however, that the perspectives in question need not be subject-dependent.) (Cohen and Callender, 2009: 30)

Cohen and Callender maintain that relativized BSA is essentially perspectival. Perspectivalism by itself does not entail that perspectives are subject-dependent. However, the type of perspectivalism that explosive realism embodies is not compatible with the metaphysical claim of scientific realism. Consider the claim that electrons have negative charge. This is a scientific claim that holds independently of carving the world into electrons, it is a perspective-independent fact. However, on the type of perspectivalism that Cohen and Callender adopts, claims about electrons are true in virtue of perspectives. This is because, on explosive realism, the world resembles an amorphous dough and facts about the world are shaped by our scientific perspective. There is no perspective-independent structure upon which claims about kinds correspond to.

Consider the map of the New York underground. First, the map represents things that exist independently of human cognition and independently of map-making. Moreover, the things presented on the map do not cover every entity within the domain of explanation. On explosive realism, the target of the map i.e New York, and the map itself overlaps and there is no true statement about New York underground independently of mapping. In contrast, on Lewisian BSA, the claims about the kinds correspond to facts about the Humean Mosaic. It is in virtue of corresponding with the Humean Mosaic that certain claims e.g claims about natural properties are true. Even though Lewis' characterization of Humean Mosaic is too strong in assuming that there

is one uniquely true way of carving into the world, the naturalist-friendly Humean Mosaic can be offered by appealing to theoretical constituents of theories that are invariant and stable across. (Kitcher 1993: 149)

To do so, it is crucial to see that our division into kinds is not formulated *ex nihilo*. Instead, they depend on the causal-historical context and previous scientific discoveries that survived various theory-changes. One of the strategies for defending scientific realism is to resist pessimistic induction (Laudan, 1981) by arguing that scientific knowledge is becoming better at capturing perspective-independent facts. (Psillos, 1999: 108) Certain divisions into kinds are already eliminated from the body of scientific knowledge e.g. *elan vital*, *aether*, *phlogiston*, *effluvial theory of static electricity* and replaced with certain theoretical claims about kinds that are approximately true. Scientific body of knowledge imposes *scientific* constraints on the structure of reality. Thus, not all divisions into kinds or perspectives are legitimate from the point of nature. A *moderate* Humean Mosaic can be characterized by appealing to statements about kinds within theories that are approximately true. In this view, our theories aim to capture reality's scientific joints rather than its metaphysical joints. (Loewer, 2020: 13) The properties that constitute the structure of reality are the ones that are committed by our best true scientific theories and that are proved to be stable and invariant. Thus, Humean Mosaic is characterized not by appealing to metaphysically elite properties but scientific elite properties that figure in scientific explanations, causation and counterfactuals. The distribution of scientifically elite properties and relations constituted the Humean Mosaics. Laws are the regularities that are the axioms of the best system that summarizes distribution of scientifically elite properties and relations.

All in all, by adopting explosive realism, relativized BSA collapses into projectivism. We first carve nature depending upon their interests. In other words, we do not *discover* kinds, we engage in world-making that is suitable for our scientific interests and goals. (Goodman, 1954) What the candidate systems are committed to are best seen as concepts we impose on the world and laws that axiomatize the distribution of

the imposed kinds. In order for relativized BSA to count as a realist account, there needs to be a metaphysical template for which laws will be regularities that summarize truths about that template. This template is characterized by appealing to a selection of facts about the worlds that are posited by our theories.

3.6 General Moral

Both Carnapian metaontology and Kitcher's modest realism are not compatible with relativized BSA. The general moral to be drawn is that commitment to conceptual relativity regarding kinds undercuts any metaphysical account of lawhood by being irreducibly pragmatic or falling into metaphysical constructivism. Remember that Cohen and Callender offer a realist Best System account of lawhood in which laws are true generalizations that appear in the immanently Best System that is relativized to chosen kinds. Any family of relativism violates the Best System account being counted as realist. Regularities or generalizations in the Best System account cannot be realistically interpreted given that explosive realism undercuts metaphysical realism.

A crucial desideratum for relativized BSA is to avoid collapsing into projectivism /metaphysical constructivism or pragmatism. However, embracing Kitcher's modest realism or Carnapian metaontology, BSA turns into a projectivist or pragmatic account of lawhood which are anti-realist.

The difficulty I raised against relativized BSA does also pertain to other accounts of BSA in different ways. The central issue is to navigate BSA in such a way that NATURALIST-FRIENDLINESS is established without imposing prior metaphysics. This was particularly problematic for the original BSA since it was committed to perfectly natural properties and Humean Supervenience. In contrast, the original BSA has been regarded as naturalist-friendly because it appeals to standards of simplicity-strength in scientific practice for metaphysical theorizing and it dispenses with necessary connections in nature. However, as the previous discussion proves, offering an account of lawhood that incorporates NATURALIST-FRIENDLINESS may as well

interpret scientific practice irreducibly pragmatically. The further constraint on the account of lawhood is to offer a theory of lawhood that conforms to scientific practice without being irreducibly pragmatic or without being a metaphysical constructivist account. This is not to say that scientific practice should be realist *tout court*, indeed scientific practice provides significant epistemic truths that are congenial to certain scientific purposes. Theories are evaluated in terms of theoretical usefulness, kinds are posited and revised in line with interests. The criticism against relativized realism is not that science should be devoid of theoretically useful apparatus to find phenomena. Instead, the criticism is to interpret scientific practice in such a way that pragmatism embedded in scientific standards and our theories do not transfer to the whole scientific enterprise and violate scientific realism.

I have argued that relativized BSA is not a realist account of lawhood given its commitment to relativized realism. However, it has yet to be seen whether the same worry applies to any version of BSA. There are two separate theses that BSA should commit in order to be counted as a realist Humean account of lawhood. First, laws should be regularities that are the axioms or theorems within the Best System that balances simplicity and strength. Humeanism about lawhood contrasts with governing conception in which modal structure of the world underwrites laws, causation and counterfactuals. Humeanism rejects any metaphysical machinery underwriting laws in favor of a regularity account in which laws are ontologically on a par with other regularities. Second, BSA is committed to realism about ontological structure. Facts about the world reduces to facts about this ontological structure. If one is Humean in her ontology, this ontological structure is taken to be devoid of necessary connections i.e powers or dispositional properties. The facts about the ontological structure are what the laws reduce to. In other words, laws are nothing but summaries of this fundamental ontological structure. Thus, what the laws are depends on the characterization of fundamental ontology.

These two theses require BSA to embrace scientific realism and hence be committed to both semantic, metaphysical and epistemological claims. However, the urgent

problem for BSA is to give a realistic interpretation of simplicity and strength without falling into pragmatism. According to BSA, it is not only that metrics like simplicity and strength are heuristic tools to determine laws of nature, instead these epistemic standards are constitutive of lawhood.

“...the Humean reductionist is taking standards that both sides endorse—but that his anti-reductionist opponent views as solely epistemic standards—and elevating them to the status of standards that are constitutive of laws of nature.”

Hall (2015:15)

In the original BSA, Lewis assumes a conception of scientific practice in which the physicist has all the relevant information about the Humean Mosaic and is able to systematize the distribution of perfectly natural properties to come up with the laws. The information is summarized in terms of simplicity and strength which are standards implicit in scientific practice. However, there is a sense in which standards of simplicity and strength are up to us. This threatens the robust sense of realism for BSA and objectivity of lawhood. “The problem of the ratbag idealist” is that if standards of simplicity and strength depend on us, we could change the laws by just the way we think. Lewis is hopeful that we could come up with laws in a way that the problem of the ratbag idealist is circumvented.

Given that the standards of simplicity and strength are viewed as scientific standards in theory-building, the construal of these epistemic standards is connected to a larger concern of how to understand theoretical usefulness without affecting realism. If scientific standards involve facts about theoretical usefulness and our psychological make-up without any reference to how the world is, the worry is Best System slides into relativism and hence to anti-realism. It is an undeniable fact that our interests and purposes figure in capturing what the world is like and that there are pragmatic elements in scientific practice. Moreover, the Lewisian picture of LOPP in which the scientists operate outside the universe observing the Humean Mosaic is untenable. Instead, scientists operate within the universe and try to come up with theories that match their interests and purposes. BSA acknowledges this point in incorporating

scientific standards of simplicity and strength into laws of account. The opposite direction is to fall into anti-realism by overemphasizing scientists' role and eliminating the role of the world in scientific practice. Thus, standards that scientists use should involve how these standards are rendered useful with respect to the world. This requires BSA to pay careful attention to inputs of scientific practice that includes observation, experimentation and evidence. Otherwise, irreducible pragmatic elements threaten scientific realism and therefore the metaphysical account of lawhood.

Hall formulates a thought-experiment which captures the worries I have offered against BSA. Imagine that scientists have two candidates for the Best System and let's call them SAFE and SORRY. These two systems equally satisfy scientific criteria in that they offer two systems which the best balance of strength and simplicity. However, if they are to do an experiment to find which one is correct, they are confronted with a dilemma. If they are to perform the experiment and if SORRY is the Best System there would be a second big bang. If SAFE is the Best System, there would be no big bang and SAFE would be confirmed. Since a Second Big Bang is a huge risk, scientists do not perform the experiment. In this case, there is a tie between the best systems. (Hall, 2015: 20) However, according to BSA, the laws are not determinate until the experiment can be carried out. Another way of putting this is to say that laws are not discovered but instead they are constructed. This is precisely the type of difficulty that is set upon BSA. As the thought experiment shows, given that BSA is a realist and metaphysical account of lawhood BSA should not collapse into this type of projectivism or pragmatism.

CHAPTER 4: METAMETAPHYSICS OF SCIENCE

4.1 Naturalistic Turn in Metaphysics

Metaphysics has taken a naturalistic turn. Naturalistic return sets the methodology for metaphysics that is devoid of pre-epistemic universal conceptions about scientific practice (Dieguez, 2011) Instead, naturalistic turn emphasizes the need for investigating science *within* rather than imposing our a priori conception of what science is and what science ought to figure out. This understanding of philosophy of science and metaphysics pays careful attention to scientists' decision procedure for theories, scientific explanation and prediction. In contrast, the kind of conception of science that Lewis adopts in original BSA is pervaded with pre-epistemic conceptions of what science is. Metaphysics divorced from scientific practice and scientific findings are no longer welcome. (Ladyman, James & Ross, Don 2007; Chakravartty, Anjan (2017); Maudlin, (2007)) Traditional metaphysical questions that are answered by a priori armchair considerations are transformed to questions about what each sciences tell us about existence in the world. Thus, metaphysics have been more interested in scientific joints of reality to provide an accurate picture of reality.

Notice that traditional metaphysics and naturalized metaphysics agree on the task of metaphysics. The primary aim of metaphysical inquiry is concerned with the nature of reality. However, they disagree about the methodology of how to answer these questions about the nature of reality. Traditional metaphysicians offer conceptual analysis that is done purely by a priori methods e.g thought experiments, whereas naturalized metaphysicians reject any metaphysics that disregards science.

Our core complaint is that during the decades since the fall of logical empiricism, much of what is regarded as 'the metaphysics literature' has proceeded without proper regard for science. The picture is complicated, however, by the fact that much activity in what is

classified as philosophy of science is also metaphysics, and most of this work is scientifically well informed. This book is an exercise in metaphysics done as naturalistic philosophy of science because we think that no other sort of metaphysics counts as inquiry into the objective nature of the world.

(Ross, Ladyman, Spurrett, 2007: 7)

The disagreement between traditional metaphysician and a proponent of naturalized metaphysics could be captured in terms of *metametaphysics*. Metametaphysical questions are questions about the foundation of metaphysics. (Manley, 2009:1) Metametaphysics investigates whether first-order metaphysical debates are substantive and attempts to give account of the procedure for answering these metaphysical questions. The traditional metaphysicians and a proponent of naturalized metaphysics disagree on the correct procedure for answering metaphysical questions. For instance, naturalized metaphysicians appeal to relativity theory to answer questions concerning the nature of time whereas traditional metaphysicians do conceptual analysis to find the correct theory of time. However, settling the metametaphysical debates require us to do metaphysics. Metametaphysical questions are not settled independently of first-order metaphysical questions. (Bennett, 2009:43) In order for the naturalized metaphysics to argue that traditional metaphysician uses an incorrect procedure for settling metaphysical questions, she has to show that the first-order metaphysics proposed by the traditional metaphysics give an incorrect account of reality. This requires her to assess her opponent's metaphysics with respect to scientific findings. Thus, metametaphysical debate itself is blended with metaphysics.

4.2 BSA and Metametaphysics

Revised versions of BSA can be viewed as the part of the programme for naturalized metaphysics. The primary motivation of BSA is to defend a view of lawhood that is in conformity with scientific practice. BSA is careful about abandoning any unnecessary metaphysical commitment that they view as divorced from scientific findings. Remember that perfectly natural properties and Humean Supervenience of Lewisian

BSA is discarded from the relativized BSA because Humean Supervenience is at odds with findings from quantum mechanics and Lewisian BSA creates a mismatch problem. Following this, Cohen and Callender are careful to delineate relativized BSA with respect to scientific practice. Their account allows for special science laws and respects the role of lawhood in each autonomous sciences. Moreover, they are tolerant with respect to proposals of kinds in each autonomous science e.g physics, biology, botany, and economics. This leads them to reject pure metaphysical realism which argues that there are kinds that carve reality at its joints. Instead, they adopt relativized realism which argues that there is no unique structure of reality and a unique language that matches this structure.

The crucial point is to notice that there is a distinct metametaphysical route that relativized BSA follows. There is a subject-matter for relativized BSA's metaphysics which has a corresponding procedure that matches this subject-matter. Relativized BSA attempts to account for inter-system comparisons of the systems, pass the empiricist loyalty test and allow for special science laws and it embraces relativized realism to accomplish this task. Thus, relativized realism constitutes the metametaphysics of relativized BSA. Relativized realism proposes the sets of metaphysical questions that should be answered e.g questions concerning kinds, ontology and laws and the procedure for answering these questions e.g comparing systems in terms of simplicity and strength relative to kinds that appeals to scientific practice. Relativized BSA is a part of a naturalistic metaphysics programme which takes metaphysical questions and the procedure of answering them that is congenial to scientific practice. I have argued that the metametaphysical route followed for relativized BSA i.e relativized realism, is not suitable for metaphysical account of lawhood since it violates scientific realism. Embracing scientific realism is necessary for any realist account of lawhood and relativized realism is incompatible with scientific realism.

Another point of departure for relativized realism as a methodology was the abandonment of realism about structure. Relativized realism characterizes reality as

an amorphous lump for which our carvings or categorizations proceed in line with scientific purposes, interests and our cognitive apparatus. Each autonomous science has its own purposes suited for the type of phenomena it investigates and there is no unique science and corresponding language which matches the structure of reality. However, notice that such a project abandons the notion of fundamentality within metaphysics of science. It has been argued that there is a fundamental structure of the world and physics attempts to give scientific descriptions of the fundamental phenomena. Fundamental physics is a unique and privileged inquiry into this fundamental structure. Accordingly, the role of lawhood within physics is to capture how these laws account for the fundamental phenomena.

One of the great ideas in the history of physics is that macroscopic objects are composed of an enormous number of microscopic constituents-material particles or atoms whose motions determine the motions and other behavior of the macroscopic objects they compose. Our understanding of the concept of an atom involves the claim that they are the constituents of ordinary macroscopic physical objects. Laws describing the behaviors of atoms are posited to explain how that can be. For example, laws governing the motions of atoms account for macroscopic thermodynamic phenomena. Specifying laws that cover the motions of atoms involves introducing further properties and entities; mass, charge, subatomic particles, the electromagnetic field, the quantum mechanical wave function and so on and laws that cover them. (Loewer, 2020: 16)

Fundamental physics has a distinctive purpose that separates it from other sciences. Physics is privileged in that it accounts not only for microscopic objects but also macroscopic objects. This is due to the fact that all macroscopic objects are constituted of microscopic particles or atoms that dictate the behavior of the macroscopic objects. Call this MICROPHYSICALISM⁹. According to microphysicalism, everything in the universe is composed of microphysical objects which account for

⁹ Pettit's own characterization of microphysicalism is as follows: "Physicalism - better, perhaps, microphysicalism - is the doctrine that actually (but not necessarily) everything non-microphysical is composed out of microphysical entities and is governed by microphysical laws: and this, in a sense which means that the micro-physical facts supervene contingently on the microphysical..." (Pettit, 1994: 253)

the behavior of the macrophysical objects. In other words, microphysical objects are the movers and shakers of the universe, they are ontologically responsible for all the macroscopic behavior in the universe. Since microscopic entities are ontologically primary in that they determine the behavior of macroscopic objects that they compose, they are fundamental. Thus, the notion of fundamentality stems from microphysicalism. The job of physics is to give an account of these fundamental microphysical ontology along with fundamental laws that capture their behavior.¹⁰

For Cohen and Callender, kinds posited by special sciences are called supervenient kinds which hints at microphysicalism. However, providing an account of microphysicalism is not among the project of relativized realism and relativized BSA. Each science is treated as positing distinct kinds, ontology and laws. Thus, it is not the case that relativized BSA fails to account for microphysicalism, it simply does not embrace such a project. This is the metametaphysical point of departure for relativized realism and hence relativized BSA. This shows us that naturalized metaphysics is not a unitary project. According to different philosophical projects e.g accounting for microphysicalism, you have different metaphysical theories that are oriented in different directions. Relativized BSA abandons the global metaphysics project in favor of accounting for special science laws and inter-system comparisons.

It should be acknowledged that there are certain constraints on metaphysics of laws projects. I have argued that if relativized BSA is to account for the notion of regularity, they cannot abandon realism about structure. Secondly, I have argued that the family of views called relativized realism cannot be the correct account for metaphysics of laws because any realist account of lawhood requires scientific realism and commitment to each of its components i.e semantic, metaphysical and epistemological. Thus, any metaphysical theory of lawhood already embodied significant metametaphysical commitment i.e its methodology and subject-matter which should be evaluated in correspondence with its metaphysics.

¹⁰ I do not say use the “governing” expression so as to remain neutral between non-Humean and Humean in characterizing microphysicalism.

CONCLUSION

In the first chapter I have presented the original BSA and provided a thorough analysis by paying careful attention to how its metaphysics is related to science particularly physics. In the second chapter I introduced relativized BSA and argued that relativized BSA cannot give a metaphysical account of regularities which is problematic for any Humean account of lawhood equipped. The third chapter I argued that commitment to scientific realism is required for any metaphysical account of lawhood and relativized BSA's commitment to any member of relativized realism violates scientific realism by introducing irreducibly pragmatic elements into its metaphysics or by collapsing into projectivism. In the final chapter, I maintain that metametaphysical issues are deeply entrenched with naturalized metaphysics and metametaphysical commitment of metaphysical accounts of lawhood should be salient so as to evaluate metaphysical projects.

Naturalized metaphysics views science as an accurate road-map to discovering the nature of reality. However, how our metaphysics conforms to scientific practice is a deeply complicated issue which should be dealt with great care and the thesis aimed to show that any realist account of lawhood should be compatible with scientific realism in treating our scientific theories as approximately true. One lesson we learn from relativized BSA is to acknowledge that our metametaphysical commitment provides us an account of how our first-order metaphysics is guided by the methodology we find to be suited. Thus, methodological concerns about the relationship between science and metaphysics that constitute our metametaphysics should be carefully investigated in order to formulate metaphysical accounts that are in line with certain aims and are faithful to various constraints imposed upon our metaphysics by science and philosophical projects.

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