Comparing Systems Without Single Language Privileging

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Abstract

It is a standard feature of the BSA and its variants that systematizations of the world competing to be the best must be expressed in the same language. This paper argues that such single language privileging is problematic because (1) it enhances the objection that the BSA is insufficiently objective, and (2) it breaks the parallel between the BSA and scientific practice by not letting laws and basic kinds be identified/discovered together. A solution to these problems and the ones that prompt single language privileging is proposed in the form of privileging the best system competition(s).

1 Introduction

According to the Best Systems Analysis (BSA), the laws of nature are the theorems of the best systematization of the world—with 'best' standardly understood to mean the simplest and most informative (on balance). It is currently a standard feature of the BSA (since Lewis 1983) and its variants (Loewer 2007; Schrenk 2008; Cohen and Callender 2009) that a single language must be privileged as the language in which all systems competing to be the best will be expressed. Two problems have led these authors to adopt single language privileging: The first is the Trivial Systems Problem (TSP), according to which, in brief, allowing for suitably gerrymandered languages can guarantee that the "best" system will have axioms and theorems undeserving of the name "law" (see Lewis 1983 for its initial development). Language privileging provides a quick fix to the TSP as long as the privileged language is not among the suitably (and problematically) gerrymandered. The second is the Problem of Immanent Comparisons (PIC) suggested by Cohen and Callender (2009). The PIC takes it to be the case that there are only "immanent" measures for simplicity, strength, and their balance—that is, measures defined for only one language. With single language privileging, no two systems ever need to be compared when expressed in different languages, and so having to use only immanent measures is not an issue.

Though single language privileging solves these problems for the BSA and its variants, it creates new ones of its own. For one, the BSA is already often criticized for being insufficiently objective—because it is unclear that there is an objective answer to the question of what makes a system the best—and single language privileging has the potential to fuel those criticisms by requiring proponents of the BSA to say which language gets privileged. Relativizing laws to languages (as in Schrenk 2008 and Cohen and Callender 2009) goes some way to resist such criticisms, but, as Bialek (2017) argues, relativity itself should be minimized (as much as scientific practice allows) when responding to those who employ the 'insufficiently objective' critique of the BSA. Another issue with language privileging—a version of which is suggested in a specific critique of Lewis (1983) by van Fraassen (1989), and is here newly generalized as an issue for *any* single language privinleging—is that it breaks the supposedly close connection in scientific practice between the discovery of the laws and the discovery of basic kinds.[1]

Both problems are, ultimately, overstated, and may be resolved not with single language privileging, but with the privileging of *classes* of languages. This addresses both of the issues just raised. For one, it restores the co-discovery of laws and basic kinds to the BSA by making the search for laws (via a best system competition conducted in the course of scientific practice) include a search through a class of languages for the one that yields the best system-language pair. It also helps to limit the degree to which laws may need to be relativized to language by reducing the problem of privileging a language (class) to the already present problem of choosing a measure of 'best'.

The outline of this paper is as follows. I begin, in Section 2, by laying out the PIC. In Section 3, I argue that the PIC ignores the existence of measures (illustrated by the

[1]Depending on the specific interests of the author, there has been talk of "basic kinds" (as in Cohen and Callender 2009), "fundamental kinds" (Loewer 2007), and "perfectly natural predicates" (Lewis 1983). These are progressively more restrictive ways of interpreting the predicates of a language that appear in the axioms of a best system expressed in that language. Throughout the paper I use the more general phrase "basic kinds", but nothing about that usage precludes a more restrictive reading.

Akaike Information Criterion) that, while not transcendent (since they cannot compare systems expressed in *any* two languages), are also not immanent (since they can compare systems expressed in *some* different languages). Being sensitive to the existence of such measures suggests a slightly different problem of *transcendent* measures, which may be resolved through privileging classes of languages. The problem for single language privileging of breaking the connection between the discovering laws and basic kinds is developed in Section 4, and its resolution via language-class privileging is demonstrated. In Section 5, I argue that the question of which language class to privilege is reducible to the question of which measure(s) of 'best' (simplicity, informativeness, etc.) should be used. Lastly, in Section 6, I note that the reducibility just introduced suggests a new solution to the TSP that is focused on choosing appropriate measures of 'best', with the conclusion being that none of the problems that have prompted language privileging actually require it for their resolution.

2 The Problem of Immanent Comparisons

The "Problem of Immanent Comparisons" (PIC) begins with an appeal in Cohen and Callender (2009) to a distinction in Quine between *immanent* and *transcendent* notions. Quine writes: "A notion is immanent when defined for a particular language; transcendent when directed to languages generally" (Quine 1970, p. 19). Measurements of simplicity, since they depend on the language in which a system is expressed, are taken by Cohen and Callender to be immanent in this Quinean sense. Strength, or informativeness, is similarly immanent, since it is assumed to depend on the expressive power of the language in which a system is expressed. And, to finish out the set, balance is said to be immanent as well, since it will be a measure dependent on immanent measures of simplicity and strength. If two systems are competing to be the best and are expressed in different languages, then we would need transcendent measures of simplicity, strength, and balance, in order to implement the best system competition. But "there are too few (viz. no) transcendent measures" of simplicity, strength, and balance (Cohen and Callender 2009, p. 8). Cohen and Callender write that

> *Prima facie*, the realization that simplicity, strength, and balance are immanent rather than transcendent—what we'll call *the problem of immanent comparisons*—is a devastating blow to the [BSA and its variants]. For what counts as a law according to that view depends on what is a Best System; but the immanence of simplicity and strength undercut the possibility of intersystem comparisons, and therefore the very idea of something's being a Best System.
>
> (Cohen and Callender 2009, p. 6, emphasis in original)

The only solution to the PIC, since (supposedly) systems can only be compared when they are expressed in the same language, is to adopt single language privileging.

3 Neither Immanent nor Transcendent

The issue with the PIC is that it ignores the existence of a large middle ground of measures that are neither immanent nor transcendent. To start, let us examine the central claim of the PIC: that simplicity, strength, and balance must be immanent measures. In defense of the idea that simplicity is immanent, Cohen and Callender

(2009, p. 5) defer to Goodman (1954) by way of Loewer, who writes: "Simplicity, being partly syntactical, is sensitive to the language in which a theory is formulated" (Loewer 1996, p. 109). Loewer and Goodman are exactly right. Simplicity is language sensitive. For example, let us adopt a naive version of simplicity, $SimpC(-)$, that is measured by the number of characters it takes to express a sentence (including spaces and punctuation). Consider the following sentence.

> This sentence is simple.

Its *SimpC*-simplicity is 24 characters. The same sentence in Dutch is

> Deze zin is eenvoudig.

The sentence's *SimpC*-simplicity now is 22 characters. So the *SimpC*-simplicity of a sentence depends or is sensitive to the language in which the sentence is expressed. Does that language sensitivity mean that *SimpC* is immanent? It depends on what is meant by being "defined for a particular language".

SimpC is, in some sense, "defined for a particular language". Insofar as the measure gives conflicting results for a sentence expressed in different languages, it would be ill-defined if we took it to be directed at sentences irrespective of the language in which they are expressed. One way of dealing with this would be to think that we have a multitude of distinct simplicity measures: $SimpC_{\text{English}}(-)$, $SimpC_{\text{Dutch}}(-)$, and so on. But doing that disguises an important fact: each of these measures of simplicity is *the same measure*, just relativized to particular languages. Drawing our inspiration from the "package deal" of Loewer (2007)—in which the BSA holds its competition between system-language pairs (or packages)—we could just as easily deal with the language sensitivity of *SimpC* by saying it is defined for sentence-language pairs. We don't need, then, different measures of simplicity. Just the one will do:

$$\begin{aligned} SimpC(\ulcorner\text{This sentence is simple.}\urcorner, \text{English}) &= 24 \text{ char.} \\ SimpC(\ulcorner\text{This sentence is simple.}\urcorner, \text{Dutch}) &= 22 \text{ char.} \end{aligned}$$

In this way, *SimpC* is better understood as transcendent, and not immanent, because it is, as Quine put it, "directed to languages generally".

Of course, *SimpC* can't be directed to *all* languages, since it will be undefined for any languages that don't have a written form with discrete characters. This suggest that there is an important middle ground between immanent and transcendent measures. When a measure falls in that middle, as *SimpC* seems to, I will say that it is a "moderate measure".

So which conception of *SimpC* is the right one? The "devastating blow" that immanence deals to the BSA and its variants is that it "undercut[s] the possibility of intersystem comparisons" (Cohen and Callender 2009, p. 6). In our naive example,

$$SimpC_{\text{English}}(\ulcorner\text{This sentence is simple.}\urcorner)$$

is—if *SimpC* is immanent—incomparable to

$$SimpC_{\text{Dutch}}(\ulcorner\text{This sentence is simple.}\urcorner).$$

But obviously it's not. ⌜This sentence is simple.⌝ is *SimpC*-simpler in Dutch than in English (when being *SimpC*-simpler means having a lower value of *SimpC*).

Nothing prevents a transcendent or moderate measure from taking a language as one of its arguments. Such a measure is transcendent (or moderate), but language sensitive, and, importantly, it allows for comparisons even when a variety of languages are involved. That being the case, the mere language sensitivity of simplicity, strength, and their balance is not enough to guarantee that they are immanent, nor is it enough to guarantee the incomparability of systems expressed in different languages.

In response to the existence of a measure like $SimpC$, it might be suggested that there may well be transcendent (or moderate) measures plausibly named "simplicity" (etc.), but these are not the ones relevant to the BSA; the measures that *do* appear in BSA will be immanent. It is absolutely right to question the plausibility of a measure as naive as $SimpC$ having a role to play in the BSA. (I certainly do not intend to defend $SimpC$ as the right measure of simplicity for the BSA.) But I do not think it is clear why we should assume that the right measures are immanent. Rather, I think that moderate measures are, if anything, the norm, and an example may be found in the selection of statistical models.

Following Forster and Sober (1994), statistical model selection has standardly been associated in philosophy with the Akaike Information Criterion (AIC):

$$AIC(M) \quad = \quad 2[\text{number of parameters of } M] - 2[\text{maximum log-likelihood of } M]$$

The full details of AIC are not terribly important for our purposes here; it is enough to point out that that first term is concerned with the *number of parameters* of the statistical model M. Forster and Sober note that the number of parameters "is not a merely linguistic feature" of models Forster and Sober (1994, p. 9, fn. 13). But the number of parameters is *a* linguistic feature of a model. Since AIC can compare models with different numbers of parameters, it can—if we think of statistical models as the system-language pairs of the BSA, and AIC as central to the best system competition[2]—compare systems expressed in different languages. AIC is thus a moderate measure.

It is important to note, however, that AIC is also not a transcendent measure. Kieseppä (2001) offers a response to critics of AIC who are concerned that the measure is sensitive to changing the number of parameters of a model by changing the model's linguistic representation. The response turns on the justification of "Rule-AIC", which says to pick the model with the smallest value of AIC, on the grounds that the predictive accuracy of model M is approximately the expected value of the maximum log-likelihood of M minus the number of parameters of M. Crucially,

> the theoretical justification of using (Rule-AIC) is valid when the considered models are such that the approximation [just mentioned] is a good one.
>
> (Kieseppä 2001, p. 775)

Let M be parameterized to have either k or k' parameters. Then there are two claims that are relevant to the justification of Rule-AIC:

$$\text{predictive accuracy of } M \approx E[(\text{maximum log-likelihood of } M) - k]$$

$$\text{predictive accuracy of } M \approx E[(\text{maximum log-likelihood of } M) - k']$$

[2]To make the connection between AIC and the BSA even stronger, it it worth noting that Forster and Sober (1994) take the "number of parameters" term to be tracking the simplicity of a model.

The predictive accuracy of M is independent of the number of parameters used to express M.[3] But the right side of the approximation in each claim *does* depend on the number of parameters. In general, both of these claims will not be true. Since Rule-AIC is only justified by the truth of these approximations, it will only be applicable to whichever parameterization of M makes the approximation true. The only time when both claims are true, and thus when AIC is applicable to both parameterizations, is when the difference between E[(maximum log-likelihood of M) $- k$] and E[(maximum log-likelihood of M) $- k'$] is negligible. Kieseppä concludes:

> This simple argument shows once and for all that the fact that the number of the parameters of a model can be changed with a reparameterisation does not in any interesting sense make the results yielded by (Rule-AIC) dependent on the linguistic representation of the considered models.
>
> (Kieseppä 2001, p. 776)

From the epistemic perspective that is Kieseppä's concern, I can find room to agree that there is no "interesting sense" in which Rule-AIC is language dependent. This is because, if we are looking to employ Rule-AIC in statistical model selection, what is available to us is a procedure to check if the given parameterization is one that can support the justification of Rule-AIC. If the justification will work, then Rule-AIC applies, and if not, not. Rule-AIC isn't language dependent "in any interesting sense" insofar as it simply doesn't apply to the problematic languages/parameterizations that undermine its justification.

[3]This is intuitively true. It is also true in the formal definition of predictive accuracy given in Kieseppä (1997) and used in this argument from Kieseppä (2001).

However, from the perspective of the BSA and the PIC, these failures of Rule-AIC *are* interesting. AIC (the measure) is not immanent, but it is also not transcendent; it is merely moderate. *Some* reparameterizations of considered models will lead to the inapplicability of Rule-AIC. If Rule-AIC was how we were deciding which system was best, the existence of these problematic reparamterizations would be, as Cohen and Callender put it, a *prima facie* devastating blow to the BSA.

Towards the end of their introducing the PIC, Cohen and Callender write that

> 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 and Callender 2009, p. 8, emphasis in original)

Cohen and Callender are probably right that there are "too few (viz., no) transcendent measures". In response to this, PIC says that measuring the goodness of a system must be done with immanent measures, and so no systems expressed in different languages may be compared in the best system competition. But non-transcendence is not a guarantee of immanence. We might call the problem that remains the *problem of transcendent measures* (PTC). Measures like AIC are not immanent, but they also aren't transcendent. That non-transcendence gives rise to a degree of language sensitivity that will *sometimes* prevent us from comparing systems expressed in different languages.

In response to the PIC and the supposed immanence of measures appropriate for the BSA, Cohen and Callender (2009) proposed the Better Best Systems Analysis (BBSA), which relativizes laws to single languages. According to the BBSA, a best system competition is run for every language L (with some restrictions on "every" that aren't especially important here) where all the competing systems are expressed in L and the theorems of the system that is the victor of the competition are the laws *relative to* L. But now it seems that we might have at our and the BSA's disposal moderate measures. In the face of the non-transcendence of these measures—that is, in the face of the PTC—the BBSA's strategy of language relativity is still a good one.[4] Our language relativity does not, however, have to involve privileging *single* languages. The alternative is to relativize to *classes* of languages constructed to ensure the applicability of the measures employed in our best system competition.

4 Discovering Laws and Kinds Together

Before saying more about what relativizing laws to classes of languages would be like in any detail, it is important to say something about why we should pursue language-class relativity over the single language relativity of the BBSA. So, why should we? The reason is that one of the great virtues of the BSA and its variants is their offering of a metaphysics for laws that parallels the search for laws that is to be found in scientific practice, and that parallel is broken by single language privileging. A feature of the

[4]Without going into excessive detail about benefits (and costs) of the BBSA's relativity strategy over competitors, I hope it is enough to note that relativizing the laws allows us to sidestep the question of which language should be privileged entirely, since, ultimately, all languages will get a turn at being privileged, and thus, effectively, none are privileged over all.

search for laws in scientific practice is that it happens in conjunction with a search for the basic kinds of the world. This feature encourages us to acknowledge the importance of language in the BSA, since the basic kinds of the world are, presumably, going to correspond with the basic kinds that appear in the language in which the laws are expressed. Thus, when Lewis first recognizes the language sensitivity of simplicity, he concludes on a celebratory note by saying that the variant of single language privileging he introduces has the virtue of "explaining" why "laws and natural properties get discovered together" (Lewis 1983, p. 368).

For Loewer's Package Deal Analysis, the idea that laws and kinds are discovered together is central to the view. Indeed, the phrase "package deal" has its roots in Lewis, who says just before the "discovered together" remark that "the scientific investigation of laws and of natural properties is a package deal" (Lewis 1983, p. 368). While Loewer ultimately endorses a version of single language privileging, it is accompanied with a rough account of how a "final theory"—i.e., a candidate system-language pair—is arrived at:

> a final theory is evaluated with respect to, among the other virtues, the extent to which it is informative and explanatory about truths of scientific interest as formulated in [the present language of science] SL or any language $SL+$ that may succeed SL in the rational development of the sciences. By 'rational development' I mean developments that are considered within the scientific community to increase the simplicity, coherence, informativeness, explanatoriness, and other scientific virtues of a theory.
>
> (Loewer 2007, p. 325)

If the practice of science parallels the Package Deal Analysis, then the processes of discovering the laws and basic kinds are one and the same.

And it seems Cohen and Callender are also on board with laws and kinds being discovered together when they offer this nice remark on the phenomenon:

> historical disputes between theorists favoring very different choices of kinds seem to us to be disputes between two different sets of laws [...] it has happened in the history of science that people have objected to particular carvings—most famously, consider the outrage inspired by Newton's category of gravity. But given the link between laws and kinds, this outrage is probably best seen as an expression of the view that another System is Best, one without the offending category. If that other system doesn't in fact fare so well in the best system competition—as in the case of the systems proposed by Newton's foes—then the predictive strength and explanatory power of a putative Best System typically will win people over to the categorization employed. While it's true that some choices of [kinds] may strike us as odd, no one would accuse science—the enterprise that gives us entropy, dark energy, and charm—as conforming to pre-theoretic intuitions about the natural kinds of the world. Yet these odd kinds are all embedded in systematizations that would produce what we would consider laws.
>
> (Cohen and Callender 2009, pp. 17–18)

With everyone in agreement, what is the problem? Language privileging, essentially, happens *before* the identification (in the BSA and its variants) or discovery (in scientific practice) of the laws. Though Cohen and Callender will not "accuse science" of "conforming to pre-theoretic intuitions about the natural kinds of the world", that is exactly what the BBSA (and any other single language privileging variant of the BSA) does when it privileges sets of kinds prior to a best system competition. Furthermore, PIC makes it such that "the predictive strength and explanatory power of a putative Best System" cannot "win people over to the categorization employed" because comparing two putative Best Systems expressed in different languages (with different "categorizations") is supposed to be impossible.[5]

Relativizing to classes of languages solves this problem. Scientists are able to approach the discovery of laws and kinds with pre-theoretic intuitions about how to systematize the world, the language to use when doing that, and the best system competition. As we will see below, the intuitions regarding language and the best system competition will locate them in a particular language class. Scientists will move away from their intuitions about language (and systematizing) when, much as Loewer describes above, there are languages in the relevant language class that may be paired with systems to yield a system-language pair that is scored better by the best system competition than the pre-theoretic system-language pair.[6]

[5]At least, it is impossible according to PIC for the BSA and its variants. If it *is* possible for scientists, then it is wholly unclear why it would be impossible for the BSA.

[6]This movement is only metaphorical for the BSA, where all the possibilities are considered and judged simultaneously. It is helpful, though, to think in the more methodical terms—of considering particular transitions from one system-language pair to another, the benefits that they might bring, and then adopting them or not—because that is what will happen in actual scientific practice.

5 Limiting Language Relativity

Let us begin addressing how language-class relativity can work by looking in more detail at the single language relativity of the BBSA. In the BBSA, there are the fundamental kinds K_{fund}. The set of all kinds $\mathcal{K}$ is the set including K_{fund} closed with respect to supervenience relations—that is, $\mathcal{K}$ includes every kind that can be defined as supervening on the arrangement of the K_{fund} kinds in the actual world. A language L is determined by the set of kinds for which it has basic predicates, and there is a language L_i for every $K_i \subseteq \mathcal{K}$. For any two languages L and L', the supervenience relations between the kinds of the languages and K_{fund} can be thought of as schemes for *translation* between L and L'. The set of all languages $\mathcal{L}_{\text{all}}$ can be thought of as the set of languages that includes L_{fund} closed with respect to all translations. A class of languages $\mathcal{L}_i$ is a set of languages including L_{fund} closed with respect to some acceptable (all, in the case of $\mathcal{L}_{\text{all}}$) translations.

To illustrate, let us consider a 'coin flip' world. Such a world is a string of `H`s and `T`s, which we will assume are the only two fundamental kinds. Another set of kinds might be $K_{\text{ex}} = \{\mathtt{a}, \mathtt{b}, \mathtt{c}, \mathtt{d}\}$, where the translation that gets us to the corresponding language L_{ex} from L_{fund} maps the pairs `HH`, `HT`, `TH`, and `TT`, to `a` through `d`, respectively. An example of a class of languages that includes L_{ex} could be $\mathcal{L}_{\text{n-tuple}}$: Let an acceptable translation for $\mathcal{L}_{n\text{-tuple}}$ be one that, for a given n takes the set of all n-tuples of `H` and `T`, and maps them to a set of kinds $K_n = \{k_{n,1}, k_{n,2}, ...k_{n,2^n}\}$. L_{fund}, then, is just L_1. When `a` through `d` are $k_{2,1}$ through $k_{2,4}$, our K_{ex} and L_{ex} are precisely K_2 and L_2. All, and only, the languages that may be formed through this procedure will be members of the class $\mathcal{L}_{\text{n-tuple}}$.

A language-class relative variant of the BSA will run a best system competition for every class of languages $\mathcal{L}_i$. Then $\mathcal{S}$ is the set of all systematizations of the world, the set of all competing system-language pairs for the $\mathcal{L}_i$-relative best system competition is given by $\mathcal{S} \times \mathcal{L}_i$.

We can apply this conception of language-class relativity to our other running example of statistical model selection with AIC. Recall that *some* reparameterizations of statistical models would prove problematic for the use of AIC. To reparameterize a model is akin to translating it from one language to another. We can understand, then, the problem of language sensitivity for AIC as being related to some set of problematic translations. If we subtract these problematic translations from the set of all translations, then we have a set of acceptable translations which defines a class of languages that we can call $\mathcal{L}_{AIC}$. $\mathcal{L}_{AIC}$ is precisely the set of all languages such that a system expressed in any one of them will be comparable to a system expressed in any other using AIC. As long as the moderate measures used in the best system competition have clearly problematic and/or acceptable translations associated with them, then the class of languages that may be used to express competing systems will be determined by the measures used in the best system competition.

This will have one of two effects on the extent to which the BSA must be relativized to classes of languages, but before going into those details it will be helpful to characterize "competition relativity". Competition relativity should be understood in much the same way that language relativity is understood. The competition of the BSA is the thing that takes system-language pairs as its inputs, and outputs a best pair from which we can read off the laws. The competition decides what system-language pair is best by considering how well they measure up with respect to some collection of theoretical virtues (like simplicity and informativeness) and the actual world. Much as we might worry about what language to privilege, and side-step that problem by relativizing laws to languages so that every language takes a turn as the privileged one, we might also worry about which competition, or which set of theoretical virtues, to privilege. Competition relativity sidesteps the problem of which collection of theoretical virtues to use (and weighting between them, and means of measuring them, etc.) by relativizing laws to every way of formulating a best system competition.[7]

So, either the BSA will be committed to competition relativity or not. Suppose that it is not. For convenience, suppose further that Rule-AIC is all that there is to the best system competition. In that case, the BSA will always be run using the $\mathcal{L}_{AIC}$ class of languages. Language-class relativity is not required since there is only one language class that will ever be relevant to the BSA—namely $\mathcal{L}_{AIC}$, as determined by the best system competition. Now suppose that there is competition relativity. A different best system competition must be run for every competition function C_i in the set of all possible competition functions $\mathcal{C}$. In principle we will need to run best systems competitions for every pair in $\mathcal{C} \times \mathbb{L}$, where $\mathbb{L}$ is the set of all language classes. Let $\mathcal{L}_j$ be the class of languages constructed according to the translations that are acceptable for the measures that comprise C_i when $i = j$. In practice, however, it will only make sense to run a competition once for each $C_i \in \mathcal{C}$, since the pairs $C_i, \mathcal{L}_j$ will be unproblematic only when $i = j$. Language-class relativity in this situation will be redundant with competition relativity. We also have it that, in either case (of needing competition relativity or not), single language relativity remains unnecessary for all the same reasons that recommended language-class relativity.

[7]See Bialek (2017) for an extended discussion of competition relativity and the possibility of its inclusion in the BSA.

6 The Trivial Systems Problem

The redundancy of any sort of language privileging relativity with competition relativity offers an interesting solution to the Trivial Systems Problem (TSP) that initiated the trend of single language privileging.

Recall that the TSP is concerned with the possibility of suitably gerrymandered languages that can guarantee that the "best" system will have axioms and theorems undeserving of the name "law". In the introduction fo the problem, Lewis imagines a system S and predicate F "that applies to all and only things at worlds where S holds" (Lewis 1983, p. 367). The system S, then, maybe be expressed by the single axiom $\forall xFx$, simultaneously achieving incredible informativeness—because of the specific applicability of F—and incredible simplicity—because, Lewis assumes, '$\forall xFx$' is about as simple as a system could be. So S will be the best system despite a variety of reasons why it shouldn't be, the foremost of which are that: (1) $\forall xFx$ will be a law unlike any we would expect to find, (2) F would be a basic kind unlike any we would expect to find, and (3) every regularity of the world is a theorem of $\forall xFx$, so there would be no distinction between accidental and lawful regularities.

The problem is solved as long as we can avoid languages that include problematic predicates like F. Single language privileging solves this problem as long as the privileged language does not include the (or any) problematic predicate(s). Language-class privileging likewise solves the problem as long as no language in the class includes the (or any) problematic predicate(s). That alone might be enough said, but the redundancy of language-class choice on competition choice offers a more nuanced solution: The best system competition could be chosen such that the corresponding class of languages does not include F or any similarly problematic predicates. But it could also be chosen such that F and its ilk are certain to not be the best. Lewis assumes with no discussion that $\forall xFx$ is an incredibly informative and simple system, but, even if that is true for the measures/competition, it need not be true for every competition. If there is competition relativity, then there may be competitions for which a trivial system like $\forall xFx$ is the victor, but for the same reasons that such a system is problematic, scientists will simply be uninterested in the laws relative to those competitions.[8] If there isn't competition relativity, it seems unlikely that science would unequivocally endorse a competition that yields a trivial system (or, if it does, then we would need to take a step back and seriously reconsider our aversion to such a system).

In the end, there is no apparent need for any language privileging or relativity in the BSA.[9] Its role in solving the problems of immanent (or transcendent) comparisons and trivial systems will be unnecessary (if a single moderate best system competition can be identified) or redundant with competition relativity.

[8]In much the same way that Cohen and Callender (2009) allow for there to be uninteresting sets of laws determined relative to languages that include F-like predicates.

[9]The problems discussed is not the only reason one might want to adopt language relativity in the BSA. It should also be noted that one of the virtues of the BBSA's single language relativity is that it allows the view to accommodate an egalitarian conception of special science laws. Language relativity, however, is not the only way of getting special science laws out of the BSA. This is an important issue to which the discussion in this paper is relevant, but a proper exploration of it warrants a more focused and extended treatment.

References

Bialek, M. (2017). Interest relativism in the best system analysis of laws. *Synthese 194*(12), 4643–4655.

Cohen, J. and C. Callender (2009). A better best system account of lawhood. *Philosophical Studies 145*(1), 1–34.

Forster, M. and E. Sober (1994). How to tell when simpler, more unified, or less ad hoc theories will provide more accurate predictions. *The British Journal for the Philosophy of Science 45*(1), 1–35.

Goodman, N. (1954). *Fact, Fiction, and Forecast.* Cambridge, MA: Harvard University Press.

Kieseppä, I. (1997). Akaike information criterion, curve-fitting, and the philosophical problem of simplicity. *The British journal for the philosophy of science 48*(1), 21–48.

Kieseppä, I. (2001). Statistical model selection criteria and the philosophical problem of underdetermination. *The British journal for the philosophy of science 52*(4), 761–794.

Lewis, D. (1983). New work for a theory of universals. *Australasian Journal of Philosophy 61*(4), 343–377.

Loewer, B. (1996). Humean supervenience. *Philosophical Topics 24*(1), 101–127.

Loewer, B. (2007). Laws and natural properties. *Philosophical Topics 35*(1/2), 313–328.

Quine, W. V. O. (1970). *Philosophy of logic.* Harvard University Press.

Schrenk, M. (2008). A theory for special science laws. In S. W. H. Bohse, K. Dreimann (Ed.), *Selected Papers Contributed to the Sections of GAP.6*, pp. 121–131. Paderborn: Mentis.

van Fraassen, B. C. (1989). *Laws and symmetry.* Oxford: Oxford University Press.