dialectica

dialectica Vol. 70, N° 4 (2016), pp. 577–588
DOI: 10.1111/1746-8361.12165

It is the Business of Laws to Govern

Jonathan Schaffer[†]

Abstract

Non-Humean accounts of lawhood are said to founder on the Inference Problem, which is the problem of saying how laws that go beyond the regularities can entail the regularities. I argue that the Inference Problem has a simple solution – the Axiomatic Solution – on which the non-Humean only needs to outfit her laws with a law-to-regularity axiom. There is a remaining Epistemic Bulge, as to why one should believe that the posit-so-axiomatized is to be found in nature, but the non-Humean can flatten the bulge. Lawhood serves as a case study of how fundamental posits can do their business.

1. *Introduction*

Van Fraassen (1989, 38–39) – in the course of recommending that the notion of a law of nature be eliminated – argues that the main accounts of lawhood face a dilemma. Humean accounts based on regularities are said to face an *Identification Problem* in saying which regularities count as laws, while non-Humean accounts that go beyond regularities are said to face an *Inference Problem* in saying how laws make for regularities, and thus explaining how they govern events. I argue that the Inference Problem has a simple solution – the *Axiomatic Solution* – which just requires the non-Humean to outfit her laws with a law-to-regularity axiom. In short, the non-Humean need only say that *it is the business of laws to govern*.

The Axiomatic Solution generates an *Epistemic Bulge*: the non-Humean now needs evidence not just for her laws, but for a supplemented version of her laws outfitted with a law-to-regularity axiom. But I argue that the Epistemic Bulge can in this case be flattened. Given that the non-Humean was taking the evidence for her laws to come via an inference to the best explanation for the regularities in nature, such evidence equally supports the supplemented version of her laws, since a law-to-regularity axiom enables her laws to do the very explanatory work they were invoked for in the first place.

The Inference Problem, the Axiomatic Solution, and the Epistemic Bulge have a general interest beyond the metaphysics of lawhood. Similar problems as to how fundamental posits can do their jobs are said to arise in a wide range of cases including chance and grounding, as well as in the classic Bradley–Russell debate about relations. All such problems have a common axiomatic solution. Once a fundamental posit is outfitted with axioms, then there can be no remaining question as to how

[†] Rutgers University; Email: jonathan.schaffer@rutgers.edu

it manages to do what its axioms say, but just a question – answerable if the axioms are properly aligned with the epistemic justification for the posit – as to the evidence for the supplemented version of the posit. Lawhood serves as a case study.

2. The Inference Problem

Consider the Carroll–Maudlin view of laws (Carroll 1994; Maudlin 2007a), which posits fundamental laws written out via a 'Law' operator as:

CM Law p

The Inference Problem for *CM* is supposed to arise in explaining why 'Law p' should entail 'p'. If p states a regularity such as $(\forall x)$ $(\mathrm{F}x \rightarrow \mathrm{G}x)$, then the problem is to explain why a fundamental law entails the regularity:

Inference for CM $\quad \text{Law } (\forall x)(\mathrm{F}x \rightarrow \mathrm{G}x) \rightarrow (\forall x)(\mathrm{F}x \rightarrow \mathrm{G}x)$

In other words, what prevents a law so construed from existing and Fa obtaining, while Ga still fails to obtain? In still other words, how are fundamental laws supposed to govern the course of events, and force Ga to follow into the world upon Fa?

Or consider the Dretske–Tooley–Armstrong view of laws (Dretske 1977; Tooley 1977; Armstrong 1983), which posits a fundamental second-order necessitation universal linking an ordered pair of first-order universals, with laws written via an 'N' predicate as:

DTA $\mathrm{N}<\mathrm{F}, \mathrm{G}>$

In words: being an F necessitates being a G. The Inference Problem is now supposed to come in explaining why the following should hold:

Inference for DTA $\quad \mathrm{N}<\mathrm{F}, \mathrm{G}> \rightarrow (\forall x)(\mathrm{F}x \rightarrow \mathrm{G}x)$

In this vein Lewis (1983, 366) worries: "Whatever *N* may be, I cannot see how it could be absolutely impossible to have *N*(*F*, *G*) and *Fa* without *Ga*." Lewis (1983, 366) then memorably quips that Armstrong has disguised the problem by naming N 'necessitation':

> I say that *N* deserves the name 'necessitation' only if, somehow, it really can enter into the requisite necessary connections. It can't enter into them just by bearing a name, any more than one can have mighty biceps just by being called 'Armstrong'.

Following van Fraassen's and Lewis's influential discussions, the Inference Problem has long been considered among the worst problems facing non-Humean accounts of lawhood. Thus Armstrong (1993, 422; 1997, 228–230) has attempted multiple replies invoking various specific metaphysical features of universals. I think that it is no problem whatsoever (and that the subtle metaphysics of universals does not matter to the issue).

Two provisos: First, I will mainly focus on *CM*. What I say straightforwardly generalizes to most other forms of non-Humeanism about laws (including *DTA*), but I must leave that to the reader.

Secondly, I am not defending non-Humeanism about laws. Indeed, I have some sympathies for Humeanism about laws (in the Mill–Ramsey–Lewis *best systems* form articulated by Lewis 1994; cf. Loewer 1996; Schaffer 2007; Cohen and Callender 2009). I am only saying that, whatever problems the non-Humean might have, the Inference Problem is not among them.

3. *The Axiomatic Solution*

3.1. *Working primitives*

Everyone needs their fundamental posits. Anytime one introduces such a posit one has to say what work it does, which means not just introducing a term (e.g. 'Law', 'N') for it, but also outfitting it with axioms which specify its connections.[1] Some axioms characterize *internal connections* between the posit and itself. For instance, one says that a posited relation is transitive by introducing a term 'R' along with the axiom:

Transitivity $(\mathrm{R}ab \,\&\, \mathrm{R}bc) \rightarrow \mathrm{R}ac$

And some axioms characterize *external connections* to surrounding matters. For instance, one adds that the posited relation is extensional by adding the axiom:

Extensionality $\mathrm{R}ab \rightarrow ((\exists x)\ x = a \,\&\, (\exists x)\ x = b)$

A posit without axioms would be an idle wheel. This much should be uncontroversial.

To illustrate, consider the modalist who posits fundamental modal facts, written via the operator 'Box'. What does her posit do? The modalist must outfit it with axioms. For instance, she might say that her operator has the inferential role given in S5:

[1] I think of these axioms as meaning postulates and so as being analytic to their terms. But nothing here should turn on issues concerning analyticity (cf. Williamson 2007). One could also think of these axioms as being essential to their posits.

K	Box $(p \rightarrow q) \rightarrow (\text{Box } p \rightarrow \text{Box } q)$
T	Box $p \rightarrow p$
4	Box $p \rightarrow$ Box Box p
B	$p \rightarrow$ Box ~ Box ~ p

If she were not allowed to say that her posited modal facts figured in inferences of this or some other sort, her posit would be idle.

Or consider an unusual sort of knowledge-first theorist, who maintains that knowledge is not just conceptually irreducible but also metaphysically fundamental. She needs to outfit her posit ('K') with axioms, possibly including:

Factivity	K$sp \rightarrow p$
Belief	K$sp \rightarrow$ Bsp

In this way she can put her posited epistemic relation to some work.

So when one considers the non-Humean who is positing fundamental laws written out in terms of a 'Law' operator, one must allow her to outfit her laws with axioms in just the same way. I say that she need only include *Inference for CM* as an axiom. Structurally there is no difference between *Inference* and the *T* axiom for modal facts, and there is also a formal analogy between *Inference* and the *Factivity* axiom for knowledge. Including this axiom immediately dissolves the Inference Problem.

So it seems to me that the Inference Problem is based on a confusion. Thus imagine someone saying to the modalist who accepts the *T* axiom, "I cannot see how it could be absolutely impossible to have Box *p* but not *p*. How does your Box govern the truths?" Such a person has simply not understood that the modalist has posited something whose work includes underwriting this very inference via *T*. Or imagine someone saying to the metaphysical knowledge-firster who accepts *Factivity*, "I cannot see how it could be absolutely impossible to have K*sp* but not *p*. How does your K dictate the truths?" Such a person has simply not understood that the knowledge-firster has posited something whose work includes underwriting that very inference via *Factivity*. Thus when Lewis (1983, 366) says to Armstrong: "I cannot see how it could be absolutely impossible to have *N*(*F*, *G*) and *Fa* without *Ga*", I reply that Lewis has not understood that Armstrong can and should stipulate that N is a relation such that *Inference for DTA* holds.[2]

[2] Indeed Lewis himself (1983, 352) – in the course of criticizing Armstrong's "one over many" argument for universals – insists that "I accept it as primitive" is a legitimate move when it comes to accounting for sameness of type:

> Not every *account* is an *analysis!* A system that takes certain Moorean facts as primitive, as unanalysed, cannot be accused of failing to make a place for them. It neither shirks the compulsory question nor answers it by denial. It does give an account.

Of course there are many differences between the modalist who accepts *T*, the metaphysical knowledge-firster who accepts *Factivity*, and the non-Humean who accepts *Inference for CM* (*/DTA*, etc.). Perhaps most saliently, some non-Humeans think of the laws as not merely entailing but concretely "producing" the associated regularities (cf. Maudlin 2007b), while it is unclear in what sense the modalist thinks Box *p* produces *p*, and it is highly doubtful that the metaphysical knowledge-firster would speak of K*sp* as in any way producing *p*. But that is a matter that goes beyond the Inference Problem, which was merely to link the law to the regularity. And, moreover, that is a matter that the non-Humean may handle in the same way if she wishes, by introducing a further notion of 'produces' along with axioms such as:

Production for CM	$\text{Law } p \rightarrow \text{Produces}<\text{Law } p, p>$
Productivity	$(\text{Produces}<p, q> \ \& \, p) \rightarrow q$

Indeed, these two axioms entail *Inference for CM*, so she could downgrade that claim to a theorem.[3] Either way she is outfitting her fundamental posit with axioms that put it to work.

In short: (1) the non-Humean may include her associated inference principle as an axiom (or as a theorem of deeper axioms) associated with her posit, and (2) doing so immediately dissolves the Inference Problem. The non-Humean should simply outfit her laws with an axiom yielding the requisite inference, just as the modalist may outfit her modal facts with the *T* axiom, and the metaphysical knowledge-firster should outfit her knowledge relation with *Factivity*.

Of course, there are constraints needed on the axiom one can invoke. For instance, the axioms need to be logically consistent. (That is not an issue here.) More substantively, there is an epistemic constraint on the axioms. One must have reason to think that the posit so axiomatized is actually to be met with in nature (§4.1). I am not saying that one can outfit a fundamental posit with any axioms whatsoever; I am only saying that one must outfit such a posit with some axioms that put it to work.

3.2. Bradley and Russell on relations

The solution I offer to the Inference Problem in some ways echoes Russell's solution to one of Bradley's regresses of relations. Bradley – in the course of recommending that the notion of a relation be eliminated – argues that positing

[3] *Proof*: Suppose Law $(\forall x)(Fx \rightarrow Gx)$. Then Produces $<\text{Law } (\forall x)(Fx \rightarrow Gx), (\forall x)(Fx \rightarrow Gx)>$ by *Production for CM*, and then $(\forall x)(Fx \rightarrow Gx)$ by *Productivity*. So $(\forall x)(Fx \rightarrow Gx) \rightarrow (\forall x)(Fx \rightarrow Gx)$, as was wanted.

fundamental relations cannot generate relatedness but merely yields a regress. The particular Bradleyan regress at issue starts from the idea that one wants to relate the individuals *a* and *b*, by positing that they stand in relation *R*. But then – if *R* is just some further posited entity "in between" *a* and *b* – one merely moves from:

$$a \quad b$$

To:

$$a \quad R \quad b$$

And now it can seem as if the problem of relating entities just re-arises, since now one must link *a* to *R*, and link *R* to *b* by some further relations, *ad infinitum*.[4]

Of the various replies to this regress, I think that Russell has it exactly right in saying that fundamental relations simply relate from the start, end of story. What it is to be a relation between *a* and *b* is to relate *a* to *b*, and to posit fundamental relations just is to posit entities capable of doing that very sort of job. It is the business of relations to relate. In this vein Betti (2015, 40) writes: "[I]s it not the business of a completion to complete and the business of glue to glue? Is it not the business of a *relation* to *relate*? Indeed: the business of a relation, so goes the slogan, is to relate …"

I am urging the same form of reply on behalf of the non-Humean who claims a need to posit fundamental laws over and above the events. Just as the Russellian should say that it is the business of relations to relate, I think that the non-Humean should say that it is the business of laws to govern. Part of what it is to posit fundamental laws is to posit entities capable of doing the job of entailing regularities among the events. Nothing but confusion can arise from not letting fundamental posits do their work.

4. *Objections*

4.1. *The Epistemic Bulge*

The most natural objection to the Axiomatic Solution to the Inference Problem is that it generates an *Epistemic Bulge*, as to why one should think that fundamental

[4] As Bradley (1897, 21) writes:

> [L]et us make [the relation] more or less independent. "There is a relation *C*, in which *A* and *B* stand; and it appears with both of them." But here again we have made no progress. The relation *C* has been admitted different from *A* and *B*,. . . [So there] would appear to be another relation, *D*, in which *C*, on one side, and, on the other side, *A* and *B*, stand. But such a makeshift leads at once to the infinite process.

In this vein Bradley (1897, 33) concludes: "The problem is to find how the relation can stand to its qualities; and this problem is insoluble."

laws – if axiomatically loaded with the power to govern – are found in nature. In general, once a fundamental posit is outfitted with axioms, then one needs evidence not just for the claim that the posit is found in nature, but for the further claim that the supplemented version of the posit outfitted with those axioms is found in nature. After all, one can axiomatize the knowledge relation so that knowledge entails that grass is purple. But then the right thing to say is that there is no such relation to be found.

The Epistemic Bulge is of a sort commonly associated with analytic solutions. Whenever a philosopher says that it is analytic of a given term that something holds of it, one can grant her the term, introduce a new term shorn of that meaning postulate, and then demand reason to think that the old term and not the new term is satisfied in nature. So it is thought that axiomatic/analytic solutions simply “push the bulge under the rug”, yielding epistemological questions for why one thinks that it is the loaded term that is satisfied in nature.

Here is how this plays out for the Axiomatic Solution to the Inference Problem: Start with the *CM*-style non-Humean who is introducing a Law operator, axiomatized in part via *Inference for CM*. Let her have the word ‘law’. But introduce a new operator ‘Schlaw’ axiomatized just like ‘Law’ except without *Inference for CM*. The question then becomes, why think that there are laws which govern, rather than schlaws which do not govern?

This is an excellent question, but it is also one for which the standard non-Humean already possesses a straightforward answer. Recall that the standard non-Humean says that fundamental laws should be posited as an *inference to the best explanation for the regularities* (Armstrong 1983, 73; cf. Foster 1983; Fales 1990).[5] This inference already favors laws over schlaws. Consider laws: they entail the regularities, which is a very good indicator of an explanatory connection. But consider schlaws: they do not entail the regularities, and indeed – shorn of any connective axiom – seem to have no interesting relation whatsoever, explanatory or otherwise, to any regularities. So the starting point epistemology of the standard non-Humean already favors laws over schlaws, and so already flattens the Epistemic Bulge.[6]

[5] Though see Hildebrand (2014, 5) for an argument that adding fundamental laws (without further constraints) does not make regularities any more likely, “because it doesn’t do anything to make laws giving rise to regularities more probable than laws giving rise to irregularities.” For present purposes I take no stand on whether the starting point epistemology of the non-Humean is viable. (If not then the non-Humean loses the debate before the Inference Problem comes into play.) My point is rather that, if the starting point epistemology of the non-Humean is viable, then it also serves to flatten the Epistemic Bulge.

[6] In the main text I am staying neutral on the nature of explanation, since this is not only a point of long-standing controversy, but it is often a point of controversy in the very dispute at issue over Humeanism. The most general thing to say is that a full non-Humean package needs to bundle in a notion of explanation, and this notion of explanation is subject to the (independently plausible) constraint that it vindicates an explanatory preference for laws over schlaws.

By way of comparison, think of Russell who claims excellent reasons (largely from mathematics) for positing fundamental relations. When Russell adds that it is the business of relations to relate, he is not compromising his epistemology, for he not only has excellent reasons for positing relations (let us grant) but he equally has excellent reasons for positing relations that actually manage to relate. 'Schrelations' – relations that do not manage to relate – do not have the epistemic support that relations have. So Russell's starting point epistemology already favors relations over schrelations, and so can flatten the epistemic bulge associated with positing fundamental relations that actually manage to do the work of relating things.

In general, axiomatic/analytic solutions put pressure on the epistemology associated with a given metaphysically fundamental posit. The epistemology must justify the invocation of the posit so axiomatized rather than one shorn of the associated axiom. In this way the Epistemic Bulge is really a requirement that each of the axioms for the posit is aligned with the epistemic justification for the posit. This serves to constrain which axioms may be affiliated with a given posit, and thus constrains when axiomatic solutions are viable. I am adding that the non-Humean about lawhood is able to meet this crucial additional constraint.

Interestingly – and by way of seeing the strength of the epistemic constraint – I suspect that a non-Humean who would trade *Inference for CM* for *Production for CM* and *Productivity* (in order to say that the laws do not merely entail but actively "produce" the regularities: §3.1) may fall afoul of the epistemic constraint. For there are now three conceptions of laws on the table: 'inf-laws' axiomatized via *Inference for CM*, 'null-laws' with no associated axioms, and 'pro-laws' axiomatized via *Production for CM* and *Productivity*. The non-Humean who posits pro-laws has a further epistemic bulge, insofar as she needs to say what the additional evidence is for her pro-laws with additional "productive" powers, as opposed not just to null-laws but also to inf-laws. Given that the evidential base is ultimately going to be the regularities in nature, and that inf-laws already directly entail regularities, it is hard to see how there could be additional support for pro-laws over inf-laws, and so it is hard to see how this additional bulge could get flattened.[7]

[7] By my lights the non-Humean who takes the causative notion of "production" too seriously has confused her fundamental operation with a concrete object like a printing press, for those are the sorts of entity that can serve as producers. (There is also an analogous version of the reply to Bradley that goes beyond claiming that it is the business of relations to relate, and posits a production relation by which relations "produce" relatedness. This reply to Bradley is not only unneeded and implausibly causative, but worse: it undoes Russell's solution by reinserting a relation between relations and relatedness.)

4.2. Some residual problem?

If the non-Humean can posit fundamental laws governed by axioms that yield the requisite inference, with no residual epistemic problem, is there anything remaining to the Inference Problem? One finds a widespread claim in the literature that adding an axiom is not enough to solve the Inference Problem. In this vein, Tooley (1987), after giving an axiomatization (which includes a *T*-style axiom, just as I recommend), feels compelled to add a speculative discussion about why a necessitation relation between universals is fit to satisfy his axioms. Further commentators, including Sider (1992) and Pagès (2002), accept that Tooley's axiom is not enough to solve the Inference Problem, and go on to critique Tooley's speculative discussion.

Indeed there is a small literature devoted to the idea that there may be something about *universals* which makes them specially apt to solve the Inference Problem. Tooley (1987), Armstrong (1993, 1997) and Pagès (2002) all suspect that there is something about the subtle metaphysics of universals that plays a crucial role in the solution to the Inference Problem (see Sider 1992 and Hildebrand 2013 for critical concerns). This literature is premised on the idea that a mere axiom is not enough. While it would be interesting – if only to help the non-Humean narrow down her options – if universals enabled a special solution to the Inference Problem, I think that none of that is needed. (The Axiomatic Solution does not invoke appeal to any special features of universals, or even presuppose that there are universals at all.)

It is hard to find a clear statement of the idea that an axiom is not sufficient to solve the Inference Problem, though the matter seems to be regarded as obvious or at least passes without question. In this vein, Sider (1992, 262) writes: "The solution by stipulation is, of course, somewhat unsatisfying … How does [Tooley's relation] do its stuff? … [T]he inference problem remains." So perhaps there is some problem about *how the law does its stuff*? Relatedly Pagès (2002, 228–229) – after distinguishing "the validation requirement" which is to account for the validity of the inference from law to regularity, from "the explanatory requirement" which is to add something such that "not only is the inference preserved, but its nature explained" – then adds that "although [Tooley's solution] apparently satisfies the validation requirement, it plainly fails to satisfy the explanatory requirement." So perhaps there is some residual problem about *explaining the nature of the inference*?

Perhaps I am missing the obvious, but I simply do not understand what these problems might be. Again imagine the modalist who posits fundamental modal facts, axiomatized in part by *T*. Is there any mystery in "explaining the nature of the inference"? Does one still need to be told how the operator "does its stuff"? Likewise imagine the metaphysical knowledge-firster who posits a fundamental knowledge relation, axiomatized in part by *Factivity*. Is there any mystery in explaining the nature of factivity? Does one still need to be told how knowledge does its stuff? Or imagine Russell positing fundamental relations, and Bradley demanding an explanation for how relations can relate. When Russell says that it is the business of relations to relate, should one say that the problem remains and side with Bradley against the existence of relations? I am saying that everyone needs their fundamental posits, and every posit needs to be outfitted with axioms (or else it is idle). One never needs to do anything further to explain the nature of these inferences beyond saying that they are axiomatic, and one never needs to say anything further about how the posit does its stuff beyond saying that it is the business of the posit to do so.

Relatedly, there is a widespread claim in the literature that the non-Humean idea of the laws "governing" nature is obscure, and perhaps rooted in a crude theological conception of laws (cf. Loewer 1996; Beebee 2000, 580–1). I think that the non-Humean who accepts *Inference for CM* as an axiom has made all the sense of governing she needs, with no theological hangover. The non-Humean is positing laws whose business it is to govern, end of story. That is as deep as "governing" gets and as deep as it needs to get. (The non-Humean who would prefer to work with *Production for CM* and *Productivity* may be more liable to this complaint.)

In the end the non-Humean about laws has a fundamental posit. The work of the posit is given by its associated axioms, in the way that holds for all such posits. These axioms can and should include a law-to-regularity axiom, and so the Inference Problem may be resolved, and the capacity of fundamental laws to govern may be understood. I conclude that, whatever problems the non-Humean about laws might have, the Inference Problem is not among them.[8]

5. *Concluding generalizations*

The Inference Problem, the Axiomatic Solution and the Epistemic Bulge have a general interest that extends beyond lawhood, modality, knowledge and relations, to the assessment of proposed fundamental posits generally. Similar issues arise with *chance*, where Lewis (1994, 484; cf. Schaffer 2003, 32–33) enjoins:

[8] Remaining problems include a conflict with free recombination, and with parsimony (insofar as the Humean can successfully account for lawhood without any additional posits). But the conflict with free recombination arises only given that 'Law *p*' entails '*p*', and the worry about explanatory parsimony most directly concerns whether the Humean alternative is viable. (In my view, the non-Humean about laws should adopt the Axiomatic Solution to the Inference Problem offered here, and then couple it with a denial of free recombination plus an attack on the Humean alternative. The Humean can and should still contest these two coupled claims. That is where the action should be, once the Inference Problem is set aside.)

> [P]osit all the primitive un-Humean whatnots you like… But play fair in naming your whatnots. Don't call any alleged future of reality 'chance' unless you've already shown that you have something, knowledge of which could constrain rational credence…

I say that the non-Humean about chance should simply include an axiom connecting her posit to rational credences. It is the business of chance to rationalize (see Hall 2004, 106). Similar issues arise in the metaphysics of grounding, where some (including myself: Schaffer forthcoming) posit *grounding principles* connecting determinates and determinables *inter alia*. Audi raises the question of how such operations can do their work,[9] and I offer the same style of reply: it is the business of operations to operate.

Most generally, everyone needs their fundamental posits, and these posits must be outfitted with axioms (or else they are idle). It is a bad question – albeit one that has tempted excellent philosophers from Bradley through to van Fraassen and Lewis – to ask how a posit can do what its axioms say, for that work is simply the business of the posit. End of story. It is a good question to ask why one should believe that the posit so axiomatized is to be found in nature. But that question may be answered if the axioms and the epistemology are properly aligned, as they look to be in the case studies of fundamental laws outfitted with *Inference for CM*, and fundamental relations whose business it is to relate.*

References

Armstrong, D. 1983, *What is a Law of Nature?*, Cambridge: Cambridge University Press.

Armstrong, D. 1993, "The Identification Problem and the Inference Problem", *Philosophy and Phenomenological Research*, **53**, pp. 421–422.

Armstrong, D. 1997, *A World of States of Affairs*, Cambridge: Cambridge University Press.

Beebee, H. 2000, "The Non-Governing Conception of Laws of Nature", *Philosophy and Phenomenological Research*, **61**, pp. 571–594.

Betti, A. 2015, *Against Facts*, Cambridge, MA: The MIT Press.

Bradley, F. H. 1897, *Appearance and Reality: A Metaphysical Essay* (2nd edition), London: Swan Sonnenschein & Co.

Carroll, J. 1994, *The Laws of Nature*, Cambridge: Cambridge University Press.

Cohen, J. and Callender, C. 2009, "A Better Best System Account of Lawhood", *Philosophical Studies*, **145**, pp. 1–34.

Dretske, F. 1977, "Laws of Nature", *Philosophy of Science*, **44**, pp. 248–268.

Fales, E. 1990, *Causation and Universals*, London: Routledge.

Foster, J. 1983. "Induction, Explanation, and Natural Necessity", *Proceedings of the Aristotelian Society*, **83**, pp. 87–101.

Hall, N. 2004, "Two Mistakes about Credence and Chance", *Australasian Journal of Philosophy*, **82**, pp. 93–111.

[9] In his comments on my "Beyond Fundamentality" at the 2016 *Central APA*.

* Thanks to Paul Audi, Marco Dees, Heather Demarest, Michael Townsen Hicks, Barry Loewer, Ted Sider, Tobias Wilsch, and the anonymous referees for *dialectica*.

Hildebrand, T. 2013, "Tooley's Account of the Necessary Connection between Law and Regularity", *Philosophical Studies*, **166**, pp. 33–43.
Hildebrand, T. 2014, "Can Primitive Laws Explain?", *Philosopher's Imprint*, **13**, pp. 1–15.
Lewis, D. 1983, "New Work for a Theory of Universals", *Australasian Journal of Philosophy*, **61**, pp. 343–377.
Lewis, D. 1994, "Humean Supervenience Debugged", *Mind*, **103**, pp. 473–490.
Loewer, B. 1996, "Humean Supervenience", *Philosophical Topics*, **24**, pp. 101–127.
Maudlin, T. 2007a, "A Modest Proposal Concerning Laws, Counterfactuals, and Explanations", in: *The Metaphysics within Physics*, Oxford: Oxford University Press, pp. 5–49.
Maudlin, T. 2007b, "The Whole Ball of Wax", in: *The Metaphysics within Physics*, Oxford: Oxford University Press, pp. 170–83.
Pagès, J. 2002, "The Dretske-Tooley-Armstrong Theory of Natural Laws and the Inference Problem", *International Studies in the Philosophy of Science*, **16**, pp. 227–243.
Schaffer, J. 2003, "Principled Chances", *British Journal for the Philosophy of Science*, **54**, pp. 27–41.
Schaffer, J. 2007, "Causation and Laws of Nature: Reductionism", in: J. Hawthorne, T. Sider and D. Zimmerman, eds, *Contemporary Debates in Metaphysics*, Oxford: Basil Blackwell, pp. 82–107.
Schaffer, J. forthcoming. "The Ground between the Gaps", *Philosophers' Imprint*.
Sider, T. 1992, "Tooley's Solution to the Inference Problem", *Philosophical Studies*, **67**, pp. 261–275.
Tooley, M. 1977, "The Laws of Nature", *Canadian Journal of Philosophy*, **7**, pp. 667–698.
Tooley, M. 1987, *Causation: A Realist Approach*, Oxford: Oxford University Press.
Van Fraassen, B. 1989, *Laws and Symmetry*, Oxford: Clarendon Press.
Williamson, T. 2007, *The Philosophy of Philosophy*, Oxford: Blackwell Publishing.