



ORDER: GOD'S, MAN'S AND NATURE'S

Natural Laws and Social Conventions Exceptions as a case study*

Giulia Pravato
Ca' Foscari University of Venice

Abstract: The topic of *exceptions* and *violations* has received some attention in relation to both *social conventions* and *natural laws*. In this paper I investigate comparatively the two cases with three main concerns. First, I introduce a framework for conceptualizing ways of not following conventions. Second, I argue that it is less easy to find genuine exceptions to laws than a quick glimpse at the *ceteris paribus* literature would suggest and that different meanings of '*ceteris paribus*' appear in that literature, making the expression ambiguous. Third, I argue that there is no straightforward route from alleged exception-ridden laws (aka, *ceteris paribus* laws) to an anti-realist stance on laws.

1. Introduction

The topic of *exceptions* and *violations* has received some attention in relation to both *social conventions* and *natural laws*. In this paper I will investigate comparatively the two cases, in order to see (i) if they can shed some light one on the other and (ii) if through the lenses of exceptions we can learn something more about the two concepts at issue. *Regularities*, roughly understood as constant (or frequent) conjunctions of properties or events, are ubiquitous both in nature and in society. Where do these regularities come from? Some seem due to mere happenstance: accidental regularities ('All gold cubes are smaller than one cubic mile') and statistically frequent actions, i.e. mere convergent habits of behaviour ('going to the cinema on Saturday nights'). Others have a 'modal character' in that, at least *prima facie*, they seem to *govern* or *guide* the events in the world: philosophers talk of law-like regularities that couldn't fail to obtain, viz. *laws*¹ ('All copper conducts electricity') and of rule-like regularities that guide our actions, viz. *norms* or *conventions* ('If you write in German, capitalize all nouns', 'If you drive in England, keep to the left-hand side of the road'). Philosophers of science (natural or social) have

* I wish to thank Eleonora Montuschi for help and constant advice throughout the work on this paper. I've also greatly benefited from discussions with Luigi Perissinotto, my PhD supervisor at the University of Venice Ca' Foscari, and Eric Martin and other participants in the LSE "Order Project" reading group on laws of nature during Lent term 2011. I particularly thank the Templeton Foundation for a very profitable and enjoyable semester spent as a project research student at the Centre for Philosophy of Natural and Social Science at LSE.

¹ A couple of terminological notes. First: the regularities or patterns that science aims to discover are generally called 'natural laws' or 'laws of nature'. I find this usage a bit confusing. It suggests that only physics or chemistry traffics in laws, whereas the concept of law concerns – or at least is used in – all empirical disciplines from physics to economy and from biology to anthropology. Therefore, for want of a better label, from now on I will call them simply 'laws' or 'empirical laws'. Second: sometimes a distinction is drawn between *scientific laws* (or *laws of science* or *law-statements*) and *laws of nature* (or *laws*, full stop). In what follows, I will use both the epistemic and the metaphysical characterization. The correct disambiguation, though, should be easily derivable from the context. I will return to this distinction later on.

long struggled to spell out the intuitive difference between events that just happen and events that, in a certain sense, are constrained or guided. However, philosophers have generally accepted a familiar and plausible story about what distinguishes *empirical* laws from *legal* or *moral* laws as well as from other kinds of *rules*: while the latter may be broken without losing their status as laws or rules, an alleged violation or exception to the former counts as a falsification of the law (see, for example, Hart 1961 and Frege 1956).² If a body doesn't behave according to Newton's laws, this means that our laws need to be revised; on the other hand, if someone doesn't keep a promise it is the violator and not the moral system that is at fault.

This distinction is supported by the view that 'whatever else a law may be, it is at least an exceptionless regularity' (Lewis 1986, p. 45). This view, though, is nowadays highly contested: it is claimed that many, if not all, laws do have exceptions.

Now, one could be tempted to reason along the following lines: since normative laws, in contrast with descriptive ones, allow for exceptions, why – taking quite literally the 'law' in 'laws of nature' – could one not point at the normative or prescriptive import of empirical laws as a way out of the problem of exceptions? A route of this kind has been taken by Lange (1993, 2000) and, in a different form, by Lowe (1980, 2009). Even if motivated by different problems, many in the heyday of neo-empiricism, but also later on, have suggested that empirical laws (or at least some of them) be interpreted as *semantic conventions* or *rules of inference* (see, for example, Carnap's 'P-rules', Sellars's 'material rules of inference' and Ryle's 'inference-tickets').³

Another way to get round the problem of exceptions is to observe that order and regularities in the world are not completely grounded in an objective structure independent of our scientific practice: in Cartwright's slogan 'it takes a nomological machine to get a law of nature' (1999, p. 49). Very briefly, this means that we live in a messy world (a 'dappled world' to say it with Cartwright) and that the order (i.e. the laws) we see in nature is, to a great extent, the result of our cognitive and experimental activity (see also Teller (2004) for a similar account).

Roughly, thus, here is the problem I will be concerned with: what consequences should be drawn from the case of exception-ridden laws? In particular, do exceptions provide arguments for adding some subjective-conventional or regulative ingredient to our concept of empirical law? To assess this problem, I'll first of all discuss analytically one concept, that of *convention*, that comprises subjective and regulative elements. After providing an explication of 'convention' and 'deviation from a convention', I'll turn to the key question that can now be reformulated as follows: are exceptions to empirical laws, in particular if interpreted in terms of *ceteris paribus* clauses, genuine violations comparable with the ones that concern conventions?

This paper defends two related theses. First, I argue that there is no straightforward route from alleged exception-ridden laws to an anti-realist stance on laws. To be fair there are two disambiguations of 'convention' according to which laws might turn out to be 'partially conventional' or endowed with a 'regulative force': but while one covers quite a loose sense, the other only shows – if endorsed – that all exceptions talk is wrong-headed in the first place. This obviously doesn't mean that stronger anti-realist views

² Hart: 'If the stars behave in ways contrary to the scientific laws which purport to describe their regular movements, these are not broken but they lose their title to be called "laws" and must be reformulated' (p. 187). Frege: 'The word "law" is used in two senses. When we speak of laws of morals or the state we mean regulations which ought to be obeyed but with which actual happenings are not always in conformity. Laws of nature are the generalization of natural occurrences with which the occurrences are always in accordance' (p. 289).

³ See Carnap (1937), Sellars (1948) and Ryle (1963) respectively.

cannot plausibly be defended; it only shows that they don't seem to be supported by the sort of arguments that appeal to *ceteris paribus* clauses and the like.

Second, I argue that it is less easy to find genuine exceptions to laws than a quick glimpse at the *ceteris paribus* literature would suggest and that '*ceteris paribus*' pick out at least two different things: in some cases, the conditions of application of a law are preliminarily restricted to an ideal model or set-up and, accordingly, there is no room for exceptions; in others, the conditions of application cannot be fully spelt out in advance because context-sensitive, or epistemologically unknown or yet metaphysically indeterminate.

The paper also provides a framework for conceptualizing deviations from conventions, or as I shall call them, ways of not following a convention. Being a topic barely touched on in the literature, I deal with it pretty extensively. Even though part of what I say in that section is not directly relevant to the central argument of the article, I take the analysis to be nevertheless of some independent interest.

2. A bit of conceptual analysis

I've indicated the epistemological attitude towards violations as an intuitive criterion to distinguish between laws and conventions. In the following section (2.1), I'll briefly dig a bit deeper into our intuitive characterizations of the contrast between laws and conventions. After indicating some similar problems that concern the two notions in question (2.2), I'll provide some terminological and conceptual clarifications, which will be used in the rest of the paper (2.3).

2.1 Drawing the line

To refine to some extent the first rough 'violations' criterion, I'll introduce three common ways to draw the line between laws and conventions. The concept of convention is sometimes explained in contrast with that of law.⁴ At first glance, the contrast is pretty clear. Here are some ways of spelling it out:

- (i) *Laws are discovered; conventions are invented*: We arrive at, or agree on, a convention and we discover a law. Laws are given to us, conventions are up to us. We choose conventions, but we face laws. Roughly speaking, 'we can change our conventions, whereas we can't change the laws'.
- (ii) *Laws are true for every time and place in the universe; conventions are historically and geographically variable*. Bodies fall when dropped as much in Europe as in Asia and they fell in the fifteenth century just as they fall now. In contrast, we switched from the imperial to the metric system, although some countries still stick to the old one.
- (iii) *Laws are in nature; conventions are in society*. Laws are supplied by 'nature' or 'the world', whereas conventions are artificial, human-made stuff. As a result it might seem that, basically, laws are the subject matter of natural sciences whereas conventions are the subject matter of social sciences.

It is easy to show that (iii) is untenable. What's wrong with the idea of linking laws to nature or natural sciences and conventions to society or social sciences? The problem is, arguably, that social sciences as much as natural sciences aim at discovering laws: as physicists discover the law of universal gravitation, so economists discover the law of

⁴ See, for example, Hume (1740) and Burge (1975, p. 254): '[...] conventions are not determined by biological, psychological or sociological law: the conventions a given person learns are "historically accidental"'.

supply and demand or ecologists rely on Malthus's exponential law.⁵ So, what is socially constructed can be explained by laws pretty much as what is, so to speak, naturally given.⁶ So much for (iii).⁷

Let's now go back to (ii). That *universality* is a requirement of law-likeness (Nagel 1961, p. 59) is often contested (see Cartwright 1999, p. 6: 'there is no universal cover of law') and even by philosophers of a Humean bent (see Earman 1978, p. 180: "universality is not a condition *sine qua non* for laws"). In a sense, it comes as no surprise that laws may have a restricted scope: laws emerge when and where 'what they are laws of emerges' (therefore, 'no sexually reproducing organisms, no Mendelian law', Mitchell 2002, p. 340; analogously, Gresham's law applies to money, not to everything). A certain pluralism, on the other hand, is generally associated with the idea of conventionality. But Hume's analysis of justice (Hume 1740), among others, suggests that the notion of 'the only possible convention' is not, as a matter of conceptual necessity, contradictory, as Lewis took it to be. (See Lewis 1969, p. 70).

To conclude, a few words about (i). The idea that laws of nature are *discovered* has been challenged. An anti-realist about laws contests precisely the claim that laws are 'out there' ready for us to uncover them. (This view can be developed in many ways; more on this below.)⁸

2.2 Law scepticism and conventions scepticism

Neither the notion of *empirical law* nor that of *convention* is uncontroversial. In both cases there are different kinds of scepticism.

First, there is a *definitional* scepticism: the concept of law of nature has been said to be 'elusive and vague': 'there is no distinct kind to be found in nature that fits well our notion of a natural law' (Mumford 2004, p. 127). From this point of view 'convention' is by far in a worse position: not only 'convention' is not a 'natural kind'. The notion, as Goodman (1989, p. 80) once rightly observed, besides being ambiguous has two main meanings that seem to be at odds with each other (viz. 'conventional' is both the 'usual' against the 'deviant' and the 'artificial' against the 'natural').

Second, there is a *modal* scepticism. This is the Humean view dubbed by A. Bird 'minimalism about laws' (1998, p. 26): laws are nothing over and above unbroken regularities. In turn, some philosophers – starting from Lewis (1969) – have tried to define conventions avoiding normative terms (see also Millikan 2005).

Third, there is a *factual* scepticism. According to this view, the problem runs deeper. The problem lies not in the inflationary conception of laws ('capital "L" Laws' as P. Smith (2006) calls them). The problem is that there are no *regularities* or *uniformities* in the first place (cf. Cartwright 1999, Lange 2002, p. 411 – 'a law need not be associated straightforwardly with a regularity'). Analogously, some philosophers have claimed that

⁵ Of course here one might say that there are no such things as economic or sociological laws. But that obviously doesn't mean that the alleged laws turn out to be conventions. It only means, for those who endorse this scepticism, that social sciences aren't able to provide good explanations and predictions.

⁶ Once again, how exactly generalizations work in social sciences and differ from those in natural sciences is a question I'll put aside for now.

⁷ Can we say, conversely, that a natural scientist, a physicist or a biologist, for example, studies conventions? I think not. What one can say, though, is that (i) a natural scientist, or better a scientific community, constantly invents and adopts conventions; (ii) conventions often inform or underlie scientific practice in a way that many philosophers have tried to account for.

⁸ Here, again, it has been found more difficult than expected to make sense of the fact that conventions are 'invented'. In particular, so-called 'implicit conventions' can be said to be 'invented' only in a *sui generis* sense.

conventions do not require regular conformity; in other words, they do not imply, as a matter of conceptual necessity, regularities in behaviour (see Gilbert 1983 and Millikan 2005).

2.3 Disambiguating laws and conventions

'Law' and 'convention' are two fundamental concepts in both the natural and the social sciences. However, they are far from being clear-cut and well-understood notions. Apparently, the concept of law is more homogeneous than that of convention. The impression is that, roughly, 'laws'-analyses are explicating pretty much the same concept of law⁹ and providing different *theories*, whereas conventions scholars are tackling a concept that is highly ambiguous and in so doing are sometimes dealing with 'different things'.¹⁰ Anyway, this is a far cry from being uncontroversial. I'll now provide some distinctions which I will rely on in the rest of the paper.

2.3.1 Conventions

The notion of convention enters philosophy via two main routes: philosophers endorsing *conventionalist views* and philosophers (in particular philosophers of social sciences) investigating *social conventions*.

We can first make a distinction between *conventions* and *conventionalism*. *Conventionalism* is basically a *no fact of the matter* thesis: different theories (claims, explanations, frameworks, etc.) are available and there is *no fact of the matter* as to which of them is true or correct. Which one we choose is a matter of convention.¹¹

Some forms of conventionalism are thoroughly uncontroversial; the most interesting ones that philosophers have tried to articulate, though, are more contentious.¹²

Almost all the analyses of *conventions* focus on what I will call 'uncontroversial conventions'. As a result, the connection with the *no fact of the matter*-conventionalism is not necessarily investigated by conventions scholars.

Before introducing the second distinction, a preliminary note is due. There is a huge debate on whether all conventions are kinds of *rules*¹³. Now, the concept of *exception* is

⁹ For example, Bird (2006) says: 'There is a unity to what are called laws. We call something a law if we take it to be a general, explanatory, and non-accidental relationship among properties that is fundamental and not derivable from other such principles' (p. 453).

¹⁰ In other words, one can provide fairly homogenous examples of laws; if asked for examples of conventions, instead, one will probably come up with a variety of meanings that are less prone to be accounted for within one and the same framework.

¹¹ The 'no fact of the matter' can be spelled out in different ways: (i) there is no fact of the matter simply because any factual question presupposes a descriptive language; (ii) alternatively, it might be that the empirical evidence underdetermines the choice of this or that theory. Note that (i) and (ii) seem to point out two different uses of the words 'convention' and 'conventional'. According to the first, what is 'conventional' is a rule of description or representation. According to the second, conventional is only our *choice*, and not the content of that choice (be it a rule, a sentence, etc.).

¹² Here are some examples of conventionalist theses. In *ontology*: there is no fact of the matter about what there is (= no fact of the matter about what things the world is made up of). In *philosophy of logic*: there is no fact of the matter as to whether an argument is really valid. In *geometry*: there is no fact of the matter as to whether our space is curved or flat. In *theoretical physics*: there is no fact of the matter as to whether two events A and B are simultaneous. In *biology*: there is no fact of the matter as to which is the correct level of selection (group, individual or genic).

¹³ In his analysis Lewis (1969) claims that conventions are *not* rules. Indeed his definition of conventions is in terms of *regularities* instead of *rules*. Lewis is not merely claiming that 'conventionality' doesn't fit *only* rules. His thesis is stronger: no convention is correctly understood as a rule. In particular, there are three features that Lewis (cf. p. 107) doesn't seem willing to associate with conventions: (i) codification or formality; (ii) sanctions; (iii) standards of correctness. Ruth Millikan (2005) has added another reason not to intend conventions as rules: (iv) conventions are better understood as flexible patterns. Andrei Marmor (2009) has replied that (i) depends on a formalistic conception of rule that is far from being the intuitive

particularly interesting in connection with that of a *rule*. So, for now, the conventions I will talk about are, basically, *arbitrary rules*. (However, not all cases of conventionality seem to be dependent on the concept of rule: e.g. some *no fact of the matter* theses clearly don't).

I turn now to the second distinction mentioned. There are two interesting and disjoint types of conventions: I will call them *Lewis-conventions* and *Carnap-conventions*. *Lewis-conventions* (from now on, *L-conventions*) are arbitrary rules that serve a common interest by solving a coordination problem between a group of two or more agents.¹⁴ *Carnap-conventions* (from now on, *C-conventions*) are conventions that do not regulate a form of behaviour but lay down what a thing must be like to satisfy a certain description.¹⁵

To understand the difference between *L-conventions* and *C-conventions* let's have a look at the following example. Systems of measurement are often considered as paradigmatic cases of conventionality. Many physical-geometrical quantities can be measured with alternative systems: we have the Celsius scale and the Fahrenheit scale; the metric and the imperial systems; the Gregorian and the Persian calendars; the dollar and the pound. These are typical *L-conventions*: a population or a scientific community chooses one device among many possible alternatives to achieve a common purpose (in this case, comparing and calculating quantities or exchanging goods). (Notations or systems of representations may supply further cases of *L-conventions*: the Russellian and the Fregean logical notation; the Cartesian coordinate system and the polar

concept of rule. In reply to criticisms along the line of (iv), Glock (2002) has said that they depend on a 'calculus model' of rigid rules that is by no means the only option available.

(ii) and (iii) express *normativity requirements* that Lewis doesn't want to be constitutive of the notion of convention. But to avoid them one only needs to say that conventions are not *norms*. In other words, there seems to be a conceptual space between *regularities* and *norms* or *normative rules*: this space is occupied by rules minimally defined as instructions on how to behave in situations *S*. As an example of this intermediate zone one can mention the Weberian notion of *custom*, a rule that, different from a *convention*, is devoid of external sanctions (Weber 1968). Similarly, Bicchieri's notion of *descriptive norm* (see Bicchieri 2006) seems to capture a concept of rule free of normative implications.

¹⁴ Lewis's probably too intellectualistic picture overlooks the fact that conventions do not always have a social or useful function: many conventions seem to be safeguarded by 'inertia, superstition and ignorance' (Burge 1975, p. 253) or merely by the 'weight of precedent' (Millikan 2005). The stability of these kinds of conventions – which may well be called *conformist conventions* – is assured by a psychological tendency to 'do as the others do' or to be conformist. Moreover, even in the case of *L-conventions* – i.e. conventions that do have a function – their reproduction often seems to be driven more by a 'pressure towards conformity' (Guala 2008, p. 13) than by the calculations of instrumental rationality. (Relying on this consideration Guala concludes that probably there are no *Lewis-conventions*.)

¹⁵ That this is a relevant notion of convention not captured by *L-conventions* is remarked by Marmor who, following Searle's distinction, talks of 'constitutive conventions'. In turn, Searle's notion is clearly informed by Wittgenstein's concept of grammar. The reference to Carnap is meant to highlight what appears as a flaw in Lewis's analysis: the fact that Lewis, despite his declarations to the contrary, does nothing to rescue Carnap's conventionalism (in particular Carnap's conventionalist account of necessity) from Quine's arguments. This is indeed an oddity in Lewis's analysis. The point can be made by asking ourselves: what exactly is the purpose of Lewis's *Convention*? Lewis is a bit confused. He seems to conflate two points which are indeed quite different. (i) On the one hand he presents his work as an 'effort to rehabilitate analyticity' (cf. Acknowledgments); (ii) on the other he aims at rescuing the 'platitude that language is ruled by convention' (p. 1).

Now, one might think that Lewis is going to proceed along the following lines: if we can make sense of the notion of convention, then we have at least a first tool to explain in which sense an analytic sentence is 'true purely by linguistic conventions'. But this is definitely not Lewis's plan. On the contrary, Lewis ends up siding with the Kripkean notion of analyticity as 'truth in all possible worlds' (to the point that Quine rightly comments that Lewis finishes 'where some began'). We are then led to wonder what (i) and (ii), that is *analyticity* and *convention*, have to do one with another in Lewis's explication.

coordinate system; the geographic and the diagrammatic maps of London's Tube system).

Now, take the International System of Units. Why is a metre the length of the path travelled by light in a vacuum in a certain fraction of second? Or why is a second defined on the basis of the behaviour of a caesium-133 atom? Because, nowadays, that is how these units (of lengths or of times) are defined by the international scientific community. I say 'nowadays' because they were once defined in different ways (the metre, for example, as the forty-millionth part of the circumference of the earth or, later on, as the platinum-iridium bar, in Paris, at the melting point of ice). These conventions – which define or constitute something – are typical cases of *C-conventions*.

What do *L-conventions* and *C-conventions* have in common? Both of them seem to be, at least to a certain extent, *arbitrary*: they are not forced by a logical, metaphysical or physical necessity (= an unmodifiable state of affair)¹⁶ or by another convention in place. Their arbitrariness is, so to speak, proved by the possibility of alternative instruments of coordination or different definitions.

A few remarks before we move to laws.

(i) *L-conventions* and *C-conventions* seem to play a role both in the *Lebenswelt* and in the context of our epistemic activities. Examples on the 'social life' side are easy to provide: take our *units of measure and exchange* as an *L-Convention* and take the *rules of any game* you like as an example of a *C-convention*. On the 'epistemic life', you'll find that on the one hand the so-called methodological rules of science can be interpreted as *L-conventions* (see Zamora-Bonilla 2010); on the other hand, the central statements of a scientific theory have often been considered as *C-conventions* (see Carnap 1937 or Poincaré 1952).

(ii) Both types of conventions can be explicitly agreed upon or can arise and evolve in other ways. Not all conventions, thus, are explicit instructions or codified rules. On the other hand, it is also true that a convention, even if not originated by agreement, can later be 'written down somewhere' (this is indeed the case, e.g., with traffic regulations).

(iii) There is much discussion about whether conventions are *norms*, i.e. whether conventions set standards and/or are sanctioned when violated, or whether they just describe de facto regularities. Glock (2010) has rightly distinguished between two kinds of norms: *prescriptive norms*, i.e. norms of the form 'a ought to do F in situation S' and *permissive norms*, i.e. norms of the form 'a is entitled to F in situation S'. Using this distinction we can say that whereas *L-conventions* *can* be prescriptive norms, *C-conventions* are permissive norms. I've just said that *L-conventions* only *can* be prescriptive norms. This is indeed what Lewis claims. Why is Lewis willing to eschew 'normative terms' from his definition of convention? One motivation is probably rooted in his naturalistic metaphysics. Anyway, I think there is another more interesting reason that, even if not explicit in Lewis's quick discussion of the point, can be so reconstructed. When we think of a norm, we have in mind something that one *ought* to do (for example, one ought to keep promises). Now, a norm need not be universally or quasi-universally followed in a population in order to count as a norm. A norm is valid even if the *normal* behaviour is not in accordance with it. A convention which is too often deviated from, on the other hand, doesn't seem to count as a convention any more. If the normal behaviour is not in accordance with a convention then it seems that the convention is not operative any more.

Obviously, this use of the notion of convention can be considered eccentric. One can observe, for example, that we often call something a convention even if it is not generally followed. Or one can protest that the very distinction between second-order norms and

¹⁶ Or, avoiding the 'necessity' vocabulary, they are not determined by logic or experience.

conventions is unmotivated. One might say that, simply, we have some rules – call them norms or conventions – and our attitudes towards them is not indiscriminate: we still value some of them even if we often violate them, whereas we no longer stick to some of them if they happen not to be generally followed.¹⁷

Still it seems that there is a distinction to be made between rules that involve only *prudential (or instrumental) oughts* and rules that have a more *demanding or normative* character. Signalling systems or units of measurement fit into the first category, whereas ‘not to cut in front of someone else in a queue’ or ‘saying please and thank you’ seem to fit better into the latter one. On the other hand, L-conventions tend to acquire a normative force: *empirical expectations* are reinforced by *normative expectations*.¹⁸ As a result, even if it is not generally followed any more, a deviation is still considered to be something wrong (see, for example, what happens with linguistic conventions).

Before moving to the topic of deviation, I’ll now provide a preliminary framework for handling laws.

2.3.2 Laws

There is much discussion nowadays on the *metaphysics* of laws of nature. As different metaphysics are invoked to tackle the problem of exceptions, a brief survey of the various options may be useful. Before that, however, a few terminological and classificatory notes on the very concept of ‘law’ are in order.

So far I’ve talked indiscriminately of ‘laws’. However, it is important to keep in mind the distinction between *law-statements* and *laws* (see footnote 1). The former are linguistic entities while the latter are the truth-makers for laws. The truth-makers are different according to one’s metaphysical picture: empirical regularities, necessitation relations among universals, causal powers, normative features of our scientific practice, nothing at all.

Another piece of terminology, this time of a less philosophical nature. Laws form a very mixed bag. Nagel (1961) sketched a taxonomy, but a more exhaustive classification is still missing, at least to my knowledge. Let me just recall here the distinction first drawn by Mill between *laws of coexistence* and *laws of succession*: while the former express timeless relations between properties (e.g. Ohm’s law that connects voltage, current and resistance), the latter state or describe concrete facts (e.g. ‘Arsenic is poisonous’). That there is a distinction of this kind to be made¹⁹ already suggests why, as I will argue later on, it is very difficult to find a unitary reading of *ceteris paribus* clauses.

Let’s sketch the *metaphysical* menu now. What is a law of nature? The three most popular answers are the Humean view, the Governing theory and the No-Laws account. According to the Humean perspective in one of its variants – the original/naïve analysis, the MRL²⁰ *Best System account* or the *Better Best System account* (Cohen and

¹⁷ The most controversial point here seems to concern whether all *social rules* are *conventions*. There are some social rules – for example some *moral* rules – that we are inclined to consider *unconditional* or endowed with intrinsic value. We follow a convention, basically, because everyone does and we could follow an alternative one if everybody were to switch to that one. But we do not follow a moral norm because everyone else does: we have independent, good reasons to do that (see Marmor 2009, for example). On the other hand, it has been argued that many, if not all, moral norms can be interpreted as conventions modifying a bit Lewis’s original definition. This view – which was indeed first held by Hume – is defended, for example, by Sugden (2004) and Verbeek (2008). Sugden, in particular, distinguishes three categories of conventions: conventions of *coordination*, conventions of *property* and conventions of *reciprocity*. As a result, some moral norms are explained in a conventionalist framework.

¹⁸ The distinction between empirical and normative expectations comes from Bicchieri (2006).

¹⁹ A similar distinction is made, for example, by Cartwright (1983), Keil (2003), Faye (2005).

²⁰ MRL means Mill, Ramsey, Lewis.

Callender 2009) – laws are just regularities in the mosaic of nature. The *Governing conception* has it that laws govern or guide the events in the world: in Armstrong's version, for instance, laws are necessary relations between universals. *No-Laws view's* friends, finally, claim that science can do without laws. Laws' work is taken over by symmetries, models (law-statements are just 'tools in our model building tool kit' to borrow Teller's apt phrase, cf. Teller 2002), causal powers and the like. In a sense, the Humean story may be considered a kind of No-Laws view as long as it defends a reduction of *nomic* facts to particular matters of fact. It's worth noting, though, that No-Laws views that don't buy Humean insights are not only sceptical on the metaphysical import of laws; they are first and foremost sceptical on the first-order question whether regular associations of events ever happen. To conclude, let me just mention a fourth option that I'm going to discuss more analytically later on, viz. the *normativist* view: laws express normative features of our epistemic practices.

3. Violated laws and conventions

I will now proceed as follows. First I'll discuss a very simple example of an L-convention, individuating some ways of 'not following a convention'. Then I'll turn to a C-convention and show how the very idea of violation becomes problematic in that case. After that, against the background of the distinctions provided in (2.3.2), I'll consider the idea of 'violated laws' or 'laws with exceptions' offering a draft of a taxonomy.

3.1 Not following a convention

Let's start by discussing L-conventions. According to Lewis's first definition, L-conventions are 'perfect conventions': *everyone* conforms to R (where 'R' stands for a regularity), *everyone* expects *everyone* else to conform to R, and so on. Very soon, though, Lewis notes that 'we cannot hope to find many perfect specimens in reality' (1969, p. 76). This drives him to introduce the notion of 'degrees of conventionality' (pp. 76–80): universal quantifications can be relaxed to *almost*-universal quantifications. Besides the imperfection of human institutions, we might wonder whether a convention that everyone in a population P follows would still be considered a convention and not, instead, a *law*.

To understand Lewis's relaxation of the universal quantification operators, we have to keep in mind the distinction between two universal quantifications: (i) the one over instances of recurrent situations S and (ii) the one over members of the population P involved in any one instance. This seems to give rise to two different kinds of exceptions. I'll start by considering case (i). For now, I'll assume that a population is a group of two or more people defined by reference to some parameter.

3.1.1 'Instances of recurrent situations S'

When can two situations be considered as instances of the same recurrent coordination problem or, avoiding the coordination talk, as two instances of the same circumstance (state of affairs, etc.)? Shortly after introducing the topic of coordination by precedent, Lewis notes: 'I have been supposing that we are given a coordination problem, and then given exactly the same problem twice. But, of course, we could never be given the same problem twice' (p. 37).

The relevance of this remark will soon become clear. What I am going to do now is to outline some ways of not following a convention in some instances of S. I'll discuss a very simple convention. Our population is made up of Bob and Ken, who have adopted this 'phone convention':²¹ when a call is cut off, the original caller calls back, while the called party waits.

²¹ This is one of the eleven 'sample conventions' discussed by Lewis (1969).

(1) Suppose Bob calls Ken and after a couple of minutes they are cut off. Ken has a special phone charge that allows him to call for free until the end of the month and was just telling Bob about it before being cut off. So, even if both Bob and Ken are party to the convention 'If original caller, call back; otherwise wait', in this case Ken decides to call back and Bob waits. The call is then restored successfully.

The general convention is suspended in this particular case: we can say that it is an exception to the general rule. Our convention is an 'unless-convention'.

(2) Suppose, again, that Bob and Ken are cut off. This time Bob, the original caller, doesn't call back; Ken waits for a while until he gets another call. As a result, Bob and Ken fail to coordinate. Either Bob or Ken has not followed the convention. Who has made a mistake? I suggest that we need to distinguish between two sub-cases:

(a) Suppose it's the second or third time that Bob and Ken have been trying to coordinate. The first two times Bob called Ken and it was he who called back when they were cut off. Today Ken calls Bob and they are cut off. Bob doesn't call back. The question 'Who has made a mistake?' doesn't have an answer. Why? Because no matter what Bob does, he does something analogous to what Ken and he had done before. 'We have a precedent in which [Ken] called back and a precedent – the same one – in which the original caller called back.' 'If so', Lewis says, 'there is room for ambiguity about what would be following precedent and doing what we did before' (p. 37).

(b) Suppose, instead, that Bob and Ken have successfully coordinated on many occasions, conforming to the regularity: 'If original caller, call back; otherwise wait.' This time Bob, the original caller, doesn't call back. In this case, one is inclined to say that Bob is wrong, because we have a well-established precedent that functions as a judge (that settles the question).²² At the same time, though, it seems that no matter how many instances of past conformity we can count, there is still no fact of the matter for following a precedent; there are always 'innumerable alternative analogies', Lewis says, 'no matter what I do this time, I do something analogous to what we did before'. Any behaviour is compatible with some rule or other or, more specifically, anything can count as a precedent under some analogy.

Suppose, for example, that in all preceding instances, Bob and Ken were cut off after no more than two minutes. It happens now that they are cut off after more than 30 minutes. Bob could motivate his action saying that he was following the established convention only for short calls. He could say something like this: 'The precedent I was following (i.e. the rule I have been following so far) was "Call back if you are the original caller, and the call is cut off after no more than two minutes; don't call back if you are the original caller and the call is cut off after more than 30 minutes"'.²³

As some have observed (see Cubitt and Sugden 2003 and Sillari 2011) Lewis's problem here is basically the same as Wittgenstein's rule-following paradox or Goodman's paradox: why 'quaddition', 'grue' or the 'occasional' equilibrium is mistaken? Here I will be concerned only with Lewis's answer. In a nutshell, his answer is that 'we happen uniformly to notice some analogies and ignore others'. We share 'some common

²² As Lewis puts it: 'Several precedents are better than one, not only because we learn by repetition but also because differences between the precedents help to resolve ambiguity' (p. 40).

²³ Another explanation could be this one. This time Bob is following a different pattern. Suppose, for example, that in all past instances Bob didn't call back when they were cut off after more than 30 minutes. This happened just a couple of times but now it happens again and Bob decides to project that pattern. An account on these lines, however, drops the very idea of a rule being followed, replacing it with that of a pattern (see Millikan 2005 for a view of linguistic conventions in terms of patterns instead of rules).

inductive standards' (p. 56) and these in turn are 'ultimately grounded in common conceptions of the "naturalness" of analogies'.

It must be noted that here Lewis's account is more on the *genetic* level than on the normative one. He is more concerned with how conventions reproduce themselves than with what entitles us to correct deviant behaviours. Be that as it may, if conventions, as Lewis says, tend to become *norms* then we can say that in this case 'not following the convention' amounts to making a mistake.

Before moving on, let's sketch a first typology of the cases discussed so far. I would define case (1) as an *unless*-exception (or *ceteris paribus* exception). Case (2) brings to the fore the notion of mistake. I suggest that we distinguish between *plain mistakes* and what, for lack of a better label, I'll call */mistake/*. What is a *plain mistake*? Suppose we have this situation: Bob and Ken have adopted the 'cut-off' convention 'If original caller, call back; otherwise wait' and have always stuck to it so far. This time, though, Bob doesn't call back even if he was the original caller.

We have a *plain mistake* if (i) Bob was absent-minded and when asked why he didn't call back, he says he has made a mistake. We also have a *plain mistake* if (ii) a new member of a community or population P follows an alternative cut-off convention (for example, John, who has just moved to a new country, follows the convention which is in place in his own country: 'If original caller, waits; otherwise calls back.' He still hasn't learned the 'right' convention.). We can say that in these two cases, Bob has committed a *prudential* (or *instrumental* or *strategic*) mistake.

Let's now move on to */mistake/*. I have suggested that in case (a) there is no room for the notion of mistake because of the *indeterminacy* of the precedent. What about case (b)? I would say that even in this case neither Bob nor Ken has necessarily made a mistake. There are two ways of accounting for this 'apparent mistake' or */mistake/*: (i) the case can be considered as an *unless*-convention (see above). Bob has projected an 'unfamiliar' pattern; (ii) the case in question is *not* an instance of S: it is a different problem. Bob is introducing a *new different convention*. The reason why he isn't making a mistake is not that his behaviour can be interpreted according to a different projection. He isn't making a mistake because, from his perspective, he is trying to solve a different problem. In this case the deviation from the convention is a first step towards a new possible convention that could serve cases similar to this new one.

What is the difference between (i) and (ii), i.e. between an *exception* to a convention and a *different convention*? In many cases the answer is not well settled: what might become an alternative convention may be still *in fieri*. If the exceptional cases turn out to be very frequent, a new convention will probably become established.

It is also important to distinguish what I have called *different conventions* from *alternative conventions*. An *alternative convention* can be defined as follows: given a function or an end and a convention C_1 that fulfills that function or achieves that end, an alternative convention C_2 is an equally good way of fulfilling *that* function or achieving *that* end. Bob and Ken want to restore a call if they are cut off. They can choose between many conventions (e.g. C_1 : the original caller always calls back; C_2 : the called party always calls back; C_3 : the alphabetically first (or the older) always calls back). The distinction between a different convention and an alternative convention depends obviously on how broadly the notion of 'problem to be solved' or 'end to be achieved' is defined. Suppose the cases in which Bob and Ken are cut off after 30 minutes become more and more frequent. They start to perceive this case as different from the ones where they follow, let's say, C_1 (or C_2 or C_3 if they have chosen one of these). So they gradually set up a new convention (let's call it C_N) for that new problem. This is not an alternative way of

solving the same problem – they stick to the old convention for the usual cases when they are cut off after a few minutes. If these new problems were to happen very rarely we would probably say that C_1 is an ‘unless-convention’ and that these cases are exceptions to it. Otherwise we would say that a new convention has emerged that solves a different problem.

However, here the problem is that if we narrow too much the concept of ‘problem to be solved’, an apparent non-conformity to an instance of a problem can be interpreted as ‘solving a different problem’. This would be a way to avoid the ‘almost’ qualification introduced by Lewis (‘almost any instance of S’). If in an instance of S the convention is not followed, this means that the case is not really an instance of S. Similarly, with respect to the ‘almost everybody in P’ qualification, one could say that if someone doesn’t follow the convention he is not actually a member of P (P would be analytically defined in terms of conformity).

In any case, I think that the distinction between another way of solving the same problem (or of doing the same thing) on the one hand and a way of solving a different problem (or of doing a different thing) on the other is rather intuitive.

Are there other ways of ‘not following a convention’? I suggest that we fill in the framework with other three items.

(1) *Self-interested (or egoistic) deviation*. Suppose Bob has called Ken and they are cut off. Bob was telling Ken something really important and so he knows Ken will call him back, even if he doesn’t. So he thinks: why not save the money for the call and wait for Ken to call back?²⁴ Is this a mistake? Obviously it’s not a *prudential* mistake.²⁵ Is it a *moral* mistake or maybe another kind of mistake? It can be claimed to be so; anyway, this doesn’t need to concern us here.

(2) *Revolutionary deviation*. Now, suppose Bob is tired of the convention ‘If original caller, call back; otherwise wait’. He comes to think, for example, that this convention is not fair. The original caller has already paid when the line is cut off. So, if their common interest is to restore the conversation, it seems more reasonable that the party called will call back, so that at the end of the day, they will have split the cost of the call. So he decides to violate the convention, hoping that in the long run his new convention will take over from the old one.

(3) *Anti-conformist deviation*. John is a member of a population P where almost everyone follows the convention C. He has always hated to do ‘as everyone does’ even if what everyone does makes some sense (for example, serves some common interest). So he decides to breach the convention.

3.1.2 ‘Exceptional members’

Up to now, we’ve been dealing with exceptional instances more than with exceptional members (cf. §3.1 for the distinction). As a matter of fact, the *revolutionary deviation* and the *anti-conformist deviation* are probably better conceived as cases of exceptional members. Some members of P decide not to follow the convention in any instance of S. A few times Lewis dubs these members ‘abnormal agents’. He has in mind mainly ‘children and the feeble-minded’ (see p. 75). At some points Lewis seems to be suggesting that, as long as children or idiots ‘lack any conditional preference for conformity to an alternative’ or ‘have the proper preferences but not as an item of common knowledge’ (p. 75), they are not parties to the convention. Lewis seems to be

²⁴ A more significant case is probably the one described by Sugden (2004), p. 152: ‘[...] take the case of a convention of mutual restraint between neighbours. Normally it pays me not to annoy my neighbours too much because if I do, they may retaliate; but if I am about to move house, it may no longer be in my interest to show restraint.’

²⁵ As a matter of fact, this is not so obvious. See Amadae (2011).

assuming that exceptional members are only ‘defective members’, so to speak. But if, as our previous analysis should have shown, not all deviations are mistakes or irrational behaviours, the category of ‘exceptional members’ is much broader than Lewis would have us believe.²⁶

3.1.3 Summary and conclusion so far

To sum up, we have distinguished five types of ‘not following a convention’: (i) unless-exception; (ii) plain mistake; (iii) new different convention; (iv) revolutionary deviation; (v) anti-conformist deviation. This framework can be extended to include many other rules one wants to consider conventional, for example *moral norms* or *juridical laws*.

I hope, moreover, that our previous analysis has shown that the assumption – common to many analyses of conventions – that the phenomenon of deviation from a convention is conceptually irrelevant and behaviourally irrational, needs revision. In particular, if a convention can be described as an instrument *I* to solve a problem *P* between agents *As* in a situation *S*, we must keep in mind (i) that *P*, *As* and *S* (a) can have a degree of indeterminacy and, above all, that (b) they can change, making necessary a new *I*; (ii) that the problem *P* may vanish making *I* inertial and useless; (iii) that even if our variables *P*, *As* and *S* do not change (in a relevant way), a better *I* may be designed. In particular, as several studies have pointed out, many social conventions emerge that are inefficient or harmful – technically speaking, Pareto-inefficient²⁷ (e.g. discriminatory practices).

3.1.4 C-conventions

Is the framework outlined applicable to *C-conventions*? There is a sense in which a C-convention can obviously be violated. For example, Bob and Ken can play a tennis match allowing the ball to bounce twice (while they can’t, let’s say, play tennis hitting the ball at a speed faster than that of light). On the other hand, one is tempted to say that the first scenario described doesn’t count as playing tennis. A violation of a C-convention entails a change in the very activity or meaning it constitutes. To use Wittgenstein’s words: ‘If you follow other rules than those of chess, you are *playing another game*.’²⁸ There seems to be a sense, thus, in which a C-convention cannot be violated.

This point, however, has to be handled with care. If we go back to our units of measures and to the way they have been defined and redefined over time, we are not inclined to say that those changes have been accompanied by a change in the meaning of the words (‘meter’ or ‘second’, for example). We might say that a convention, intended as a coordination agreement, has been taken over by another slightly different convention that provides a better solution to the same problem. A C-convention may come to be violated so often as to become modified (alternatively, the precisification may happen through a more explicit stipulation). This is generally the way our concepts change or our games evolve.²⁹

²⁶ To this, Lewis could reply that as long as a convention is in place and works well, deviation is irrational. This is not quite true either. Why should a self-interested deviation be irrational? But aside from that, unless one wants to rule out as irrelevant the dynamics of conventions, exceptions deserve a more careful investigation.

²⁷ An outcome of a game is *Pareto-efficient* if there is no other outcome that makes every agent at least as well off and at least one agent strictly better off.

²⁸ Similarly, talking about the laws of logic, Ayer says that ‘there is [...] a sense in which it is impossible for anything that happens to contravene the laws of logic [...] If we break the rules according to which our method of description functions, we are not using it to describe anything’ (1956, p. 810).

²⁹ The same point can be made by saying that most of our conventions are indeed collections of sub-conventions: for example the game of tennis has many rules. And obviously, only taken together are they constitutive of the game of tennis. So if someone didn’t follow any of the rules of tennis, he would

Are there C-conventions that cannot be violated in this second sense but only in the first one? This is a tricky question that I'm not going to address here. Suffice it to say that, for example, Carnap and Wittgenstein would answer positively.

3.2 Violated laws?

Can we make sense of the idea of a 'violated law'? There is a *semantic* sense in which a law cannot be violated. If a law *describes* something, then there is no such thing as 'violating a description'. Only if we take laws to be *prescriptions* can we say that someone or something has not followed a law. Still, even in this case, to talk of 'violation' seems deeply counter-intuitive: we could maybe make sense of human beings or intentional agents following or violating an empirical law, but what about all the other entities in the world? It seems absurd to say that a stone doesn't follow Newton's laws. The upshot is that all this talk of 'governance', 'following', 'obligation' and 'violation' is largely *metaphorical*. As a result, the idea of 'violated laws' seems motivated either by *semantic* or by *metaphorical* confusion³⁰ (or by a mixture of the two). This diagnosis has been put to use in various ways. To mention but two, Schlick argued that the so-called problem of the 'freedom of the will' (i.e. 'Is free will compatible with determinism?') was only generated by a misunderstanding of the kind just described.³¹ Another quite interesting use is provided by an argument against some uses of the concept of 'nature': when someone says that, e.g., genetic engineering goes against the laws of nature, he is told that, since laws are just true descriptions of the world, no sense can be attached to the idea of violating a law.

Anyway, we can avoid part of the confusion by talking about *exceptions* instead of *violations*. In this case, though, we face another problem – a *logical* problem. According to a common view, law-statements are properly formulated as 'all-statements' with this logical form: $\forall x (Fx \rightarrow Gx)$. If this is the correct form of a law, then it follows that an exception to a law can't exist: a putative exception is always a counter-instance or a counter-example to the law. As Popper would have said, an exception is enough to falsify a law. Following this assumption, many have claimed that a law must at least describe an exceptionless regularity.

It has been pointed out, though, that most laws are not strict exceptionless regularities. The laws of *special sciences* and the laws of *social sciences* – it is claimed – are almost always plagued with exceptions. But *physics*, at least according to a few philosophers, is not better off (see, for example, Cartwright 1983 and 1999, Pietroski and Rey 1995, and Lange 2000). There are many questions that arise from this picture.

First, are the *generalizations* of, say, biology, psychology or economics really *laws*? There is a verbal question and a conceptual question in the vicinity. The verbal one is this: we can decide to rule out these generalizations from the status of law by stipulating that, by definition, a law doesn't have exceptions. The conceptual one is this: is it correct to reconstruct the discoveries of these sciences in terms of laws? Both these explanations assume that we have a quite well-understood notion of law, which is

obviously not be playing tennis. (Cf. also Putnam's 'law-clusters' concepts = concepts whose identity is not given by a single criterion of application.)

³⁰ This attitude is clearly expressed, for example, by Schlick: 'The laws of celestial mechanics do not prescribe to the planets how they have to move, as though the planets would actually like to move quite otherwise, and are only forced by these burdensome laws of Kepler to move in orderly paths; no, these laws do not in any way "compel" the planets, but express only what in fact planets actually do' (1939, p. 147).

³¹ In a nutshell, here is how Schlick's argument runs: 'When we say that a man's will "obeys psychological laws", these are not civic laws, which compel him to make certain decisions, or dictate desires to him, which he would in fact prefer not to have [...] they describe the nature of the will in the same manner as the astronomical laws describe the nature of planets' (1939, p. 148).

exemplified by our physical laws, and which doesn't allow room for exceptions. Those who support this view are not committed to the idea that disciplines like biology or economics are not scientifically legitimate or are not really sciences (e.g. testable, supported by evidence, can figure in explanations). Their claim, rather, is that the scientific legitimacy of the generalizations used in these disciplines is better construed not in terms of laws but in terms of 'invariant generalizations' (Woodward 2002) or 'vague claims' typical of 'work-in-progress theories' (Earman and Roberts 1999, p. 471). Second. So far I've talked about *exceptions* to empirical laws. In the literature, however, one often comes across the phrase '*ceteris paribus* laws': most if not all laws – it is claimed – are hedged by *ceteris paribus* (from now on, *cp*) clauses or *provisos*. A common complaint is that too many things are put under the same umbrella of '*cp* laws' or 'laws with exceptions' (cf. S. Smith 2002, p. 257, Woodward 2002, p. 305, Mitchell 2002, p. 348, Kincaid 2004, p. 179). From this some have concluded that either 'there is no such thing as a *ceteris paribus* law' or, in any case, providing a semantic for *cp* sentences is a wrong-headed enterprise.

All these considerations prompt three questions which I will deal with as follows. (i) How are we to interpret the clause '*ceteris paribus*'? Is there a homogenous reading? (ii) Are all '*cp* laws' correctly interpreted as laws with exceptions? (iii) Are all the cases we want to count as exceptions adequately described in terms of *cp* clauses?

Let me start by introducing some examples of generalizations that are generally, even if not uncontroversially, considered as laws:

1. All ravens are black
2. Law of Universal Gravitation: between any two bodies there is an attractive force proportional to their respective masses and inversely proportional to the inverse of the square of the distance between them
3. Law of Demand: if price goes up, demand goes down and vice versa
4. Smoking causes lung cancer
5. Mendel's law of segregation: in sexually reproducing organisms the members of a pair of alleles of every gene segregate into different gametes during meiosis.

All these generalizations have been said to be riddled with exceptions. At first glance, there are many things one could come up with to tackle this problem. First, one could say that (1)–(5) are not *genuine laws*. Second, (1)–(5) are *chancy laws*, i.e. they are to be construed as probabilistic or statistical generalizations (for example: 'Most ravens are black'). Third, (1)–(5) require a *cp* hedge (e.g. 'Smoking causes lung cancer, *cp*'). Fourth, you could pick up the suggestion this paper started out with: (1)–(5) are more akin to rules or norms than to descriptions (e.g. 'If price goes up, infer that demand goes down, *cp*' or, in a different version, take 'All ravens are black' to be a standard to which an actual individual may conform). Fifth, the *nomological* has to be reduced to the *dispositional*. In other words, law-statements are to be reconstructed as statements about non-Humean properties: capacities, causal powers or dispositions. As these tendencies do not always manifest themselves, the problem of exceptions is solved. Sixth, you could say that all the putative exceptions are not *genuine exceptions* to the laws in question: for example, because they are not excluded by the law-statements in the first place; or because they merely reflect our epistemological limits, be they predictive (e.g. we fail to take into account other laws or facts operative in a concrete situation) or explanatory (e.g. our law is indeed false: there is an alternative law which embraces both the new phenomenon and cases previously subsumed under the first putative law).

Apparently, none of these proposals fits (1)–(5). One might well accept that there is a small number of laws, but obviously would want to count (2) among them. The

probabilification strategy will not do for many reasons; the most relevant in our case is that none of the laws (1)–(5) is adequately construed in probabilistic terms.³² We would need to find probabilities of all the phenomena that can lead to exceptions and this seems clearly impossible (see Roberts 2004).

I'll deal with normative accounts more extensively below, so let's move now to the *dispositionalist* suggestion. I have distinguished this view from the *cp* view. Even if the dispositionalist account is sometimes considered as a gloss of 'All Fs are Gs, *cp*', this is not quite true. Dispositionalist readings, by saying that dispositions and not regular overt behaviours are the objects of scientific investigation, strictify, so to speak, *cp* laws by turning them into strict laws. So, for example, Cartwright (2002) claims that (4) should be construed as 'Smoking has the capacity to cause lung cancer'. This sentence, she claims, 'is a precise claim: it states a matter of fact that is either true or not; it is not vague; and it has no *ceteris paribus* clause that needs filling in' (2002, p. 430). However, this account faces some problems if we consider our sample (1). To mention just one: is the albino raven one that fails to manifest his disposition of being black?

Let's have a look at the *third* view, which is by far the most common in the literature. Here the suggestion is that many laws are not strict regularities or statistical regularities but *hedged* regularities or *cp* regularities. In other words, they have the form: 'All Fs are Gs, *cp*' (i). As is well known, the main problem here is *semantic*: what is the content of (i)? It seems that either (i) has no determinate content (*semantic indeterminacy*) or it has no content at all, reducing it to a tautology (*semantic vacuity*).³³ Another point that is often overlooked is related to what Earman and Roberts have called a '*lazy sense of ceteris paribus*' (1999, p. 461). Sometimes scientists do not list all the exceptional circumstances (for 'laziness' or for epistemological limitations, say). Anyway, in principle these conditions could be made explicit and incorporated into the generalizations as *assumptions*. In this case, similarly to what happens with the probabilification strategy, we anticipate occasional exceptions by refining our law, specifically by appending some *assumptions* to the law or by listing some *boundary conditions*. As an example, consider the 'Law of diminishing marginal utility' in economics, which states that the first unit of consumption of a good or service yields more utility than the second and subsequent units. This law assumes many things: among the others, it assumes that the units of a commodity are *homogenous* (i.e. identical in respect of size, quality, etc.). So, the fact that people derive more and more utilities by reading more and more different books will not count as an exception, because it violates one of the assumptions.

This brings us to the *sixth* suggestion. One could try to apply the reading just sketched to all our examples (1)–(5), claiming that there are no *genuine* 'laws with exceptions': all putative exceptions are either 'lazy' exceptions or they signal that our nomological framework needs to be revised and strengthened.³⁴

Leaving aside for the moment the plausibility of this view, I wish to mention two related points that seem to me relevant. First, a credible theory of exceptions must prevent 'immunization strategies': it mustn't happen that any exception can be accommodated through *ad hoc* manoeuvres. In other words, we must make room for *falsifying exceptions* or *Popper-exceptions* as one might dub them. Jonathan Lowe (1980, 1987) contrasts the case of the *albino raven* with that of the *black swan*. Basically, following his

³² As further evidence that the problem of exceptions and that of probabilities fall apart, note that a probabilistic law may in turn be strict or plagued with exceptions or *cp* clauses.

³³ Here are two other *epistemological* problems (that can be seen as derivative of the semantic one). *Cp* laws seem to lack two typical features generally attributed to laws: *instance confirmability* and *counterfactual support* (see Goodman 1973). As a result it seems that they cannot be properly *tested* and they do not have any *predictive* power.

³⁴ Incidentally, this was Spinoza's position on the possibility of miracles (see Spinoza 1670, ch. 6).

example, we have to distinguish between abnormal members of the species that can be qualified as exceptions (e.g. the albino raven) and normal members of recognized subspecies which are to be qualified as counter-instances (e.g. the Australian black swan).³⁵ Second, the whole question of exceptions has to be distinguished from what in philosophy of science usually goes under the name of ‘approximate truth’. Let’s take the Gravitation Law. It is one thing to say that this law is, strictly speaking, false and only approximately true (because of General Relativity); it is another to say that the Law of Gravitation has exceptions,³⁶ whatever this might mean. Following all these suggestions, one might then argue that all the alleged exceptions are either *lazy exceptions* or *Popper-exceptions*.

Before putting everything together, it is time to go back to the first of our original questions by discussing two *normativist* accounts of law.

3.2.1 Two ‘Normativist’ accounts

At the outset of this paper I briefly hinted at Jonathan Lowe’s and Mark Lange’s proposals as two *normativist* accounts of laws. The label is indeed used by the two authors (see Lowe 2009, p. 151, and Lange 1993, 2000).

To my mind, there are at least two versions of law-*normativism*. Let’s consider them in turn.

- (1) Some philosophers of science have claimed that laws of nature are not statements (not true or false propositions) but *rules of inference*, viz. instructions for the formation and transformation of propositions. In this picture the function of laws is to tell us not what is the case but what we ought to do (example: from ‘X is water’ infer that ‘X boils at 100°’; from ‘X is copper’ infer that ‘X is an electronic conductor’) (see Ramsey 1931). In a slightly different variant, laws, or better *some* laws, are *meaning postulates*: e.g. the laws of mechanics or the laws of conservation of energy are stipulations about how the words ‘force’, ‘energy’, etc. are to be used in mechanics or physics (see Carnap 1937 or Poincaré 1952). In either case, it seems, laws can tolerate exceptions: a *rule* need not be associated straightforwardly with a regularity and a definition is not violated in any relevant sense – if one comes across an exception, that only means that one is not using the concepts correctly.

As far as I can tell, today there are at least two heirs of this ‘Wittgensteinian instrumentalism’ as Musgrave (1999) dubbed it. They roughly match the two attitudes I’ve just sketched out.

The *first* one is represented, for example, by Lange (2000). His account of lawhood is not a metaphysical or reductive analysis in the usual sense. It is, rather, a statement of the ‘root commitment’ we undertake when we believe in a certain law. This root commitment is the belief in the reliability of the *inference rule* concerning how certain claims ought to be used to justify certain other claims. Law-statements, in other words,

³⁵ Dealing with conventions we have seen the distinction between two operations of universal quantification. The two quantifications define two types of exceptions: exceptional members and exceptional situations. Is there something similar as far as laws are concerned? Take the genetic law of segregation. Certain types of genes (e.g. segregation-distorters) do not behave as the law dictates. Now, we can ask ourselves: what are exactly these ‘exceptional genes’? Are they more similar to the black swans or to the white ravens? It seems that segregation distorters are indeed a category of genes whose behaviour can, in principle, be explained by a more general law for example. If this is the case they are ‘exceptional’ only because Mendel’s laws are not powerful enough. But instead why not consider all cases affected by meiotic drives as ‘abnormal’ genes? These are empirical and methodological questions that I will not explore further.

³⁶ In other words, there is a distinction to be drawn between a putative true law being false and a putative law not being a law or being a law riddled with exceptions.

are not descriptions of regularities, but *reliable rules* for drawing inferences. If this is the case, the law's reliability is not undermined by possible breakdowns covered by *cp* clauses, as long as a tacit understanding is shared among scientists of what makes a factor qualify as 'disturbing' or as 'like the other cases' where what counts as 'disturbing' depends on a scientist's purposes and interests.

The *second* one is endorsed by people like Friedman (2001), Faye (2005) and, to a certain extent, Stump (2011). Here the basic idea seems to be that some laws must be reconstructed as *meaning postulates* or *definitions* used to set up a descriptive vocabulary for a certain domain (cf. Faye, p. 89).³⁷ Two features distinguish these accounts from Lange's one: (i) only theoretical or fundamental laws are linguistic rules; (ii) Lange's analysis is more focused on scientific practice, whereas the other accounts are motivated also by semantic and ontological concerns.

The upshot is that Lange's rules are conceived more as (metaphysically and semantically neutral) methodological norms of reasoning than as language rules.

- (2) A second version of normativism is provided by Lowe. His idea is, basically, that the title 'law' attached to the natural laws is not a 'mere relic of a theocentric perspective on the natural world'. On the contrary, empirical laws have the modal features of normative laws. In particular, natural laws statements do not quantify over individuals but 'carry reference to *sorts* or *kinds*, conceived as setting *norms* or *standards* to which actual individuals may conform in greater or lesser degrees' (2009, p. 156). And, Lowe comments, 'this, indeed, is why the title "law" is so appropriate [...] For *laws*, whether of man, God or indeed nature precisely are normative: they set or register certain standards' (2009, p. 150).

One can easily understand why the analogy offers a way out of the problem of exceptions: if a criminal violates the penal code this does not falsify it, being perfectly compatible with it.

Lange's and Lowe's accounts are quite different: the latter is logically and ontologically revisionist, so to speak, while the former is more concerned with scientific practice, and laws' roles in scientific work.³⁸ Both accounts, though, have an *objectivist* flavour. How is that possible? Isn't the normativity associated with laws supposed to come from a lawmaker or, alternatively, from human conventions?

According to Lowe's story, nomicity is normative but is still an objective feature of the world: as we noticed a little while ago, law-like generalizations have different truth-conditions from accidental generalizations.³⁹ The main challenge to this view is to explain the nature and genesis of this normativity. If the norms aren't *supernatural imperatives* as Descartes and Robert Boyle thought (see Harrison 2009), nor – at least partially – *human conventions* as Poincaré, Ryle or Carnap suggested, then we need some plausible naturalized story about the source of nature's normativity. A way to clarify this idea is to strengthen the Aristotelian ontology already embraced by Lowe, by pointing out the active and dynamic character of the natural world. Many philosophers have urged that we should indeed adopt an Aristotelian ontology instead of the more

³⁷ Faye's account, like Lowe's, accommodates the parallel between *legal* and (some) *scientific* laws (see p. 101).

³⁸ Here I am concerned mainly with Lange 1993 and 2000. Lange's last book (*Laws and Lawmakers*) is a contribution to the *metaphysics* of laws of nature. Here, in contrast, I will deal more with his *epistemology* of laws of nature as is developed in his earlier works.

³⁹ In Lowe's view, the correct logical form of a law-statement is captured not by the standard first-order predicate logic, but by a new sortal logic that apparently commits us to the objective existence of sorts or kinds as items existing over and above the individuals that belong to or instantiate them.

austere Humean one, admitting that the entities of the material world have dispositions, capacities, powers or tendencies.

What about Lange's normativism? Lange clearly states that the reliability of a law is an objective property. This objective feature is spelled out in terms of stability or persistence under counterfactual variation.⁴⁰ He doesn't accept, thus, the position he ascribes to Toulmin, Hanson and Ryle according to which 'the laws are just the inferential rules that we respect – are simply what we do' (2000, p. 189).

4. Laws vs Conventions Again

Back now to where we started. In short, I claimed *first* that exceptions don't push laws towards conventions and *second* that the metaphysical significance of exceptions to laws should be handled cautiously.

- (1) Let me start with this latter point. What consequences should we draw from our discussion of 'violated laws'? I suggest that, first of all, we distinguish between two different uses of the modifier '*ceteris paribus*': *cp* may refer either (i) to an *idealized* or *stipulated* set-up, easily specifiable by listing some modelling assumptions or (ii) to the *indeterminacy* of the conditions of application of a law, due to their context-sensitivity or opacity.

Take Galileo's law of free fall: falling bodies accelerate to Earth with the acceleration of 9.8 m/s^2 . Are feathers, snowflakes or autumn leaves exceptions to the law? No, because the law assumes that there is no wind resistance and if the setting is not as stipulated, the law simply doesn't apply (or, better, if we want to predict where the object will fall, we probably need two or more laws jointly). Boyle's law, Snell's law or Hooke's law function in a similar way: $pV = k$ only applies to gas molecules that have no volume, Snell's law of refraction applies only to optically isotropic media and Hooke's law applies only to some materials and only to linear stress/strain relationships. For this reason, carbon dioxide at high pressures and low temperatures, Iceland spars and rubbers are not genuine exceptions as long as they are excluded from the law statement.

This first use of *cp* clauses corresponds to what Hempel (1988) called an 'assumption of completeness'. A further problem is whether the so-called 'fundamental laws' really need such provisos. S. Smith (2002) and Earman, Roberts and Smith (2002) argue that the whole idea is only prompted by the conflation of laws and non-nomic modelling assumptions or, in other words, law/theory and law/theory *application*. In particular, drawing a distinction between laws and *differential equations* derived from laws, they claim that only the solution of these equations describes the concrete temporal behaviour of a system. Coulomb's law or the Gravitation Law cannot thus be accused of lying⁴¹ because they do not describe actual temporal behaviour (see Earman, Roberts and Smith 2002, pp. 286, 287).

Therefore idealizations, approximations and 'falsity' are not in the laws – which don't have a temporal content and 'do not even purport to describe the motion of any body' (S. Smith, p. 245) – but in the non-nomic modelling assumptions. Some laws, though, seem to *depend* on non-nomic (or even anti-nomic) assumptions. Galileo's law, for example, assumes that there is no resistance from the air and Kepler's law assumes that there are only two bodies in the universe. Earman, Roberts and Smith claim that 'because they

⁴⁰ Lange's account of stability is quite detailed and complicated, but this need not concern us here.

⁴¹ Here is Cartwright's well known example: 'No charged objects will behave just as the law of universal gravitation says; and any massive objects will constitute a counterexample to Coulomb's law' (1983, p. 57).

depend on such non-nomic assumptions they are not laws' (p. 286) (and indeed they are derivable from Newton's laws).

We have, thus, the following picture. If *cp* means 'idealized' or 'stipulated' there are no real exceptions. Moreover, if the law is a 'top-grade' law (like Universal Gravitation or the law that for any electron and any proton their charges are equal and opposite or whatever other candidate) provisos-talk is actually out of place since these laws do not purport to describe any concrete temporal behaviour; if, in contrast, non-nomic modelling assumptions enter in the law-statement itself, then two choices are available: one could say that these are not laws or that they are derivative laws. Be that as it may, in all these examples it's *idealization* or *stipulation* – either at the 'application level' or at the 'law level' – that plays a role.

Things are different when, as is often the case in the special and social sciences, the conditions of application of a law are not transparent. Take the law of demand: *cp*, if price goes up, demand goes down. What does '*cp*' refer to? Even if we make some assumptions (perfect competition, no political regulations, no change in taste, income, etc.), we still fail to account for many variables that may contravene the law (Giffen goods, snob effects, humanitarian feelings, etc.). The problem here is that the 'practice of refining antecedents' (Musgrave 1999, p. 151) doesn't seem a viable option: 'The range of possible interfering factors is indefinitely large and indefinitely varied' (Roberts 2004, p. 160). Other similar examples come from chemistry (e.g. the law of definite proportion: *cp*, 'any chemical compound consists of elements in unvarying proportions by mass'), biology (e.g. '*cp*, ravens are black'), ecology (e.g. Malthus's law: '*cp*, populations grow exponentially'), nutrition science (e.g. '*cp*, nuts are healthy').

In all these cases the conditions of application cannot be fully spelled out. Why? Sometimes, call this *context-sensitivity* – the content of a *cp* clause cannot be specified in advance but there is an implicit grasp among scientists of what would count as an interference.⁴² At other times, call this *epistemic opacity* – we 'do not know how to state the conditions under which the qualified regularity holds' (Earman, Roberts and Smith, p. 284): unknown variables, lower-level laws, etc. Third, call this *metaphysical unsettledness* – one could say that the opacity or indeterminacy is in the object itself: chemical, biological and social properties are so complex, contingent, unsettled and fragile that even with the best of knowledge, 'escape clauses' could not be explicitly listed.

To sum up, I have argued that under the stipulative reading there are no real exceptions to laws. Under the indeterminacy reading, things are more complicated. In a sense, since we cannot specify a complete set of conditions, we will come across exceptions all the time. On the other hand, one might say that in an epistemically ideal world all the exceptions could be explicitly listed (see Schrenk 2008). A similar tactic to make the same point consists in saying that most exceptions are only exceptions to the *law-statements* and not to the *law* itself. *Real exceptions* (contrasted to *pseudo-exceptions*) would be 'naturalized miracles', so to speak, i.e. 'exceptions that are inherent in nature itself, a basic part of reality' (Schrenk 2007, p. 35) and not, simply, defects in our current best 'scientific laws'.

⁴² To be sure, this is the case also with 'derivative laws' in physics. Anyway, I take it that in the scenario I am now describing the problem runs deeper; as many more variables enter the scene, the role of context becomes less predictable.

- (2) Let's turn now to the first point. I think that the framework I've sketched out may prove useful to answer the problem that motivated this paper: what consequences should be drawn from the circumstance that many laws are haunted by exceptions? Should that delete or narrow the distance between laws and conventions? Let's take the three characterizations I started with: (i) '*Laws are discovered; conventions are invented*'; (ii) '*Laws are true for every time and place in the universe; conventions are historically and geographically variable*'; (iii) '*Laws are in nature; conventions are in society*'.

(ii) and (iii) are deeply related and one could quickly get rid of the problem by saying that 'first-class' laws are indeed both universal and natural. On the other hand, one would be then left with quite very few fundamental physical laws. As a matter of fact, this is a view one could endorse. One could say that this robustness (universality and naturalness) is exactly the defining feature of laws and what distinguishes them from conventions. However, I think a less drastic tactic is available. So let's grant it that it's not universality and naturalness that distinguish laws from conventions.

It looks as if we are left with (i). I've tried to show that at least in some cases exception-talk is not justified. But even where it is, the inference from a failure of a law to its exception-ridden character is not always justified: sometimes 'lazy exceptions', epistemic limitations, etc. will do. But I don't want to buy the 'epistemically ideal world' picture. Let me explain, therefore, if and in what sense exceptions push laws towards conventions.

First, we have seen that both Lowe's and Lange's accounts are strongly objectivist. Anyway we know that conventions have a *regulative* aspect and we might wonder whether this aspect should come in somewhere in their accounts. I've expressed some perplexities about a Lowe-style account of laws normativity. What about Lange's proposal? Lange distances himself from the traditional instrumentalist account. How? Basically, he says that rules of inference can be also statements. How is that possible? I take it that Lange's idea is this: that 'copper is electrically conductive' can be a true description that functions as a premise. But in being a true description it's not performing its function as a law (an accidental generalization could do the same). It is its being used as a *reliable rule of inference* that makes it a law. This is somewhat reminiscent of Carnap's idea that the choice between the two options (i.e. considering laws as 'premises' or as 'rules of inference') is not, so to speak, constrained by the world but is a matter of convenience (see Carnap 1937, p. 180). This idea might be explained by borrowing a suggestion from David Lewis (1969). Not all rules, Lewis notes, are conventions. Some rules 'may have nothing to do with the conduct of a human agent, except that human agents might benefit by taking account of them' (p. 100). In this sense, if there is something *regulative* in a law of nature, it imitates a cookery rule rather than a rule of a game.⁴³ C. I. Lewis hinted at something similar regarding 'logical facts': 'the facts summarized by a system, and the relations of these facts, are not created by the system nor dependent on the process of inference by which the system grows. Geometry did not wait for Euclid, nor logic for Aristotle. Inference or other system-building sets up guide-posts or makes a map of facts, but it does not create the geography of them. This is true even of logical facts. We cannot "relate them in certain ways": they either are so related or they are not. We can only *select* certain relations to be our guides. [...] We can select the relations to be followed as guides and thus delineate a structure of facts in ways which are suited to our purposes (1932, p. 257).

We could apply these considerations to laws as well. What we have now may be called a *selective conventionalism*. Recall the view (endorsed by Cartwright and Teller, for example) according to which 'it takes a nomological machine to get a law of nature'.

⁴³ The distinction between the two kinds of rules comes from Wittgenstein (1974).

What is the role of the subject and of his conventions in this case? I think the only plausible sense is a very loose, even if not irrelevant, one: the world provides some regularities and, based on our physical-biological apparatus, our cognitive abilities, our interests and needs, we *select* or *choose* some of them and – here is the conventional aspect – we decide to *treat* them as laws.

There is a *second* way one could take to let ‘conventions’ enter into laws. We have seen that in some cases the *cp* clause either is not necessary or stands for an ‘assumption of completeness’. Recall, now, our C-conventions. In a sense, they can’t be violated: if you break a C-convention you are not using it to describe anything. Here is, therefore, a conventionalist strategy one could avail oneself of. Say that at least some laws of nature imitate C-conventions: fundamental laws (such as Newton’s laws of motion, the Law of Universal Gravitation, etc.) do not purport to describe empirical/temporal facts; other derivative laws, like Boyle’s law or Snell’s law, work like definitions (viz. they define materials).⁴⁴ A view along these lines would obviously require a lot of refinement and details. Let me just say here, that all this could explain in which sense ‘the laws of physics lie’ and, relatedly, truth and explanation fall apart (Cartwright 1983): laws lie if taken to describe temporal facts about reality, but if that is not their business in the first place, all ‘lies’ are on the explanation or application side.⁴⁵ At the end of the day, though, the difference between Cartwright’s ‘no-facticity view’ of laws and the view defended, for example, by Earman, Roberts and Smith is more one of perspective than a substantive disagreement.

If some laws resemble C-conventions, this doesn’t mean at all that they cannot be modified or that they cannot be revised without ‘changing the subject’. Indeed, despite playing a definitional role, they may well be ‘known only a posteriori to be valid’ (Faye 2005, p. 89) and, accordingly, may be changed when new findings or information come along. This may prompt one to ask whether, in fact, there is a significant difference between the selective conventionalism and this – apparently more committing – second strategy. One could even follow van Fraassen’s suggestion that talking of ‘meaning postulates’ or of ‘empirical postulates’ doesn’t really make any difference.⁴⁶

A *third* point now. As we have seen above, according to many accounts a defining feature of conventions is their *arbitrariness*, viz. the availability of equally good alternative ways of fulfilling the same function. (This is indeed typical of what we called ‘L-conventions’.) Could laws be conventional in this sense? Arguments from empirical underdetermination typically follow this train of thought. Many systematizations or assemblies of observations are, effectively or in principle, possible; as a result, the choice of one of them is merely one of *convenience* for a given purpose.

Note, though, that it is one thing to say that if our interests and purposes had been different we would probably have chosen different regularities as laws. It is quite another

⁴⁴ That this is indeed the case, is suggested by S. Smith (2002).

⁴⁵ It goes without saying that this avenue is not as straightforward as it might seem from reading my brief description. The problem was clearly epitomized by Cartwright’s dictum about physical laws: ‘Rendered as descriptions of fact, they are false; amended to be true, they lose their fundamental explanatory force’ (Cartwright 1980). That is to say, you may well blame the application instead of the theory; but whether here or there, the problem still comes in.

Moreover, we must bear in mind the problem of ‘falsifying exceptions’. This was clear to Ayer who, in a ‘Cartwright-sounding’ passage, says: ‘The more we put into our definitions, the more uncertain it becomes whether anything satisfies them: this is the price that we pay for diminishing the risk of our laws being falsified’ (1956, p. 813).

⁴⁶ ‘[...] the divergence may not represent a disagreement but merely a difference in perspective’ (van Fraassen 1970, p. 328).

to say that given our current biological and psychological constitution, many options are available to describe correctly a portion of reality.

But if made to work, would this strand of conventionalization be required by the problem of exceptions? A trace of subjectivity, associated with the notions of ‘simplicity’ and ‘strength’ in Best System accounts à la Lewis, has long been detached and criticized, independently of hedged laws.⁴⁷ What one could say, though, is that if exceptions enter the stage, while building a Best System for a science it won’t be sufficient to search for the best combination of strength, simplicity and fit. A further variable – call it the state of being ‘exception-ridden’ – will have to be taken into account. As a result, we could have different Best Systems according to the degree of exceptions-tolerance allowed.

Fourth. It is generally thought that the problem of exceptions is fatal to ‘regularity’ or Humean analyses. To me, though, this only shows that we should drop the ‘exceptionless’ requirement. This would probably be a problem for a *pure* or *naïve* regularity theory, viz. the view that being an exceptionless regularity is enough for being a law (if regularities constantly broke down, what would distinguish them from mere rules of thumb?). But according to more sophisticated accounts, being a law is also a matter of being part of a Best System and why couldn’t we include hedged laws in our Best System? Best System accounts for hedged laws have actually been provided by Schrenk (2008) and Cohen and Callender (2009). Recall that, in Best System accounts, a degree of subjectivity seems to affect law-likeness independently of *cp* laws. This prompted Roberts (1998) to suggest that the term ‘law of nature’ is *indexical*. But exception-ridden laws make this indexicality much stronger: simplicity and strength are not only relativized to a *world* or a *culture* but to a discipline’s *purposes* and *standards* as well.⁴⁸

A final remark. Against the considerations sketched out so far, it may be urged that *hedged laws* can, in principle, be changed and it is exactly for this reason that they bear some resemblance to conventions. But this suggestion is misleading. That in a non-competitive market the laws of demand and supply do not hold, doesn’t mean that they are conventional in the sense in which, for example, the choice between Pound or Dollar is conventional. At most, it shows that our society could be structured differently and in that case different regularities would emerge.

5. Conclusion

In the *Introduction*, I took up three tasks. First, to outline a picture of ways of ‘not following a convention’; second, to show that *cp* clauses sometimes ‘lie’, as one might say; third, to argue that if exceptions call for some conventionalization, it is one of very limited scope.

Let me start with the last two points and go back once more to the ‘drawing the line’ section. If neither (i) *universality* nor (ii) *exceptions-freedom* nor (iii) *naturalness* are indispensable for being a law, what does distinguish laws from conventions? If an empirical regularity may have a restricted scope, may break down and may be social, why is a law any different from a convention? I hope I’ve provided some reasons for thinking that at least some laws enjoy (i)–(iii). But even when this is not the case, I

⁴⁷ As is well known, Lewis tried to overcome the problem by introducing the notion of *perfectly natural* properties and relations.

⁴⁸ Unless, needless to say, one adopts a strong reductionism. Cohen and Callender (2009) claim this non-reductionist relativisation allows one ‘to make the metrics of strength, simplicity, and balance sensitive to the concerns of ecologists, biologists, and so on, each of whom may weigh and understand these standards slightly differently’ (p. 27).

suggest that we pick up the inventing/discovering distinction as, after all, a good way to draw the line.

That a convention is, in a certain sense, invented doesn't prevent the same convention from being treated, in some circumstances, as a descriptive tool (e.g. think what happens with linguistic conventions when we talk of 'linguistic laws'). Conversely, a law, even if, properly speaking, discovered, may be used as a rule. Still, though, what distinguishes laws from conventions is that laws describe and explain while conventions prescribe and guide.

To be sure I have taken for granted that a reductive and deflationary account of physical necessity is tenable. In other words, I have ruled out the possibility that there are *necessary facts* in nature and I have assumed that whether a given true proposition should count as a law is, in a broad sense, conventional or subjective. I have thus adopted a *classification* conception of necessity rather than a *governing* one or an *Aristotelian* one. I haven't presented much of an argument for this view. However, my motives are the usual metaphysical ones: against a *governing* conception, I reject the idea that necessity plays a role in truth-making; against an *Aristotelian* one, I'm suspicious of non-Humean truth-makers and, more generally, of primitive, metaphysically heavyweight, notions. In other words, if exceptions can be dealt with within a more simple and more deflationary ontological framework, we should stick to it.⁴⁹ To conclude let me sketch, in a very tentative way, some general thoughts on the concept of *order* that somehow underlie what I've been discussing so far. In the 'conventions' section, I considered many ways of 'not following a convention'. The violations I described, however, are fraught with intentional concepts and, as a result, have no matching counterparts in a law account. Still, I want to suggest that the order we *make* and the order we *describe* have a common underlying structure. Deviations from the norm/convention or exceptions to the laws may signal various analogous things: (i) occasional exceptional situations or abnormal and non-ideal items; (ii) a defect in the order we are trying to make or a limitation in our nomological framework; (iii) the general non-robustness of human-made order and the fact that some areas investigated by sciences might have no seamless and smooth order. In case (i) we may, respectively, add some *cp* clauses or consider the exceptional members as 'defective members'. In addition we may need an explanation of these non-ideal factors or members. In case (ii) we should revise our conventions⁵⁰ and our laws: in both cases, it wouldn't be methodologically wise to overlook the "exceptional". In case (iii) we come to accept exceptions as rooted, so to speak, in the complexity of the subject matter itself.

To sum up: typically, an exception falsifies a law but not a convention. In this case 'disorder in laws' typically calls for a revision of our descriptive framework, while 'disorder in conventions' typically signals a mistake on behalf of the violator. But this is not the whole story. Sometimes, the violation of a convention does indeed undermine its validity, calling for a revision. Conversely, an exception to a law may well be negligible or tolerable.

⁴⁹ What about 'miracles'? As is well known, among the shortcomings the Humean view suffers from, is the 'miracles problem'. Briefly, the problem is that on a regularity view, miracles seem to be *logically impossible*, whereas our modal intuition seems to be that they are *naturally* or *physically impossible*, but logically possible (in other words, they are *conceivable*). Some have argued that only a normative account can offer a way out of the problem of miracles. For example, Mumford says that 'the entailments that hold for laws of nature have more in common with the laws of the land than the laws of logic' (Mumford 2001, p. 198). Here I have only been concerned with 'non-miraculous' exceptions.

⁵⁰ One might protest, here, that point (ii) is not true for moral norms. One could say that moral norms are *necessary* and that, as a result, 'the violator is always at fault'. I would reply that even a moral norm, construed as 'necessary valid', may be sharpened or supplied with some provisos.

A good methodology should discourage 'immunization strategies' and 'ad hoc justifications' and should make us able to recognize (i)–(iii) and to distinguish one from the other. Needless to say, there is no general and a priori recipe for 'getting things right'.

Bibliography

- Amadae, S. M. (2011) 'Normativity and Instrumentalism in David Lewis' Convention', *History of European Ideas*, 37, 325–335.
- Ayer, A. J. (1956) 'What Is a Law of Nature?' in M. Curd and J. A. Cover (eds.), *Philosophy of Science: The Central Issues*, Norton, New York, 1998.
- Bicchieri, C. (2006) *The Grammar of Society. The Nature and Dynamics of Social Norms*, Cambridge University Press, Cambridge.
- Bird, A. (1998) *Philosophy of Science*, McGill-Queen's, Montreal.
- Bird, A. (2006) 'Looking for Laws', *Metascience*, 15, 441–454.
- Burge, T. (1975) 'On Knowledge and Convention', *The Philosophical Review*, 84, 249–255.
- Carnap, R. (1937) *The Logical Syntax of Language*, Routledge & Kegan Paul, London.
- Carroll, J. (1994) *Laws of Nature*, Cambridge University Press, Cambridge.
- Cartwright, N. (1980) 'Do the Laws of Physics State the Facts?' *Pacific Philosophy Quarterly*, 61, 64–75; reprinted in M. Curd and J. A. Cover (1998) (eds.), *Philosophy of Science: The Central Issues*, Norton, New York, 1998.
- Cartwright, N. (1983) *How the Laws of Physics Lie*, Clarendon Press, Oxford.
- Cartwright, N. (1999) *The Dappled World. A Study of the Boundaries of Science*, Cambridge University Press, Cambridge.
- Cartwright, N. (2002) 'In Favor of Laws that Are Not *Ceteris Paribus* After All', *Erkenntnis*, 57(3), 425–439.
- Cohen, J. and C. Callender (2009) 'A Better Best System Account of Lawhood' *Philosophical Studies*, 145, 1–34.
- Cubitt, R. and R. Sugden (2003) 'Common Knowledge, Salience and Convention: A Reconstruction of David Lewis's Game Theory', *Economics and Philosophy*, 19, 175–210.
- Drewery, A. (2001) 'Dispositions and *Ceteris Paribus* Laws', *British Journal for the Philosophy of Science*, 52(4), 723–733.
- Earman, J. (1978) 'The Universality of Laws', *Philosophy of Science*, 45, 173–181.
- Earman, J. and J. Roberts (1999) 'Ceteris Paribus, there is no problem of provisos', *Synthese*, 118, 439–478.
- Earman, J., J. Roberts, and S. Smith (2002) 'Ceteris Paribus Lost', in *Ceteris Paribus laws*, J. Earman, et al. (eds.), *Erkenntnis*, 52 (Special Issue), 281–301.
- Faye, J. (2005) 'How Nature Makes Sense', in J. Faye, P. Needham, U. Scheffler & M. Ursch (eds.), *Nature's Principles*, Springer Verlag.
- Frege, G. (1956) 'The Thought: A Logical Inquiry', *Mind*, 259, 289–311.
- Friedman, M. (2001) *Dynamics of Reason: The 1999 Kant Lectures at Stanford University*, CSLI Publications, Stanford.
- Gilbert, M. (1983) 'Notes on the Concept of a Social Convention', *New Literary History* 14, 225–251.
- Glock, H.-J. (2008) 'Meaning, rules, and conventions', in D. Levy and E. Zamuner (eds.), *Wittgenstein's Enduring Arguments*, Routledge, London, pp. 156–178.
- Glock, H.-J. (2010) 'Does Language Require Conventions?', in P. Frascaola, D. Marconi, and A. Voltolini, *Wittgenstein: Mind, Meaning and Metaphilosophy*, Palgrave Macmillan.
- Goodman, N. (1973) *Fact, Fiction and Forecast*, Bobbs-Merrill, Indianapolis.
- Goodman, N. (1989) 'Just the Facts, Ma'am!', in M. Krausz (ed.), *Relativism: Interpretation and Confrontation*, University of Notre Dame Press, Notre Dame.
- Guala, F. (2008) 'Are There Lewis Conventions?', working paper.

- Harrison, P. (2009) 'Laws of Nature, Moral Order and the Intelligibility of the Cosmos', in D. Work (ed.), *New Vision 400: Engaging the Big Questions in Astronomy and Cosmology*, Taylor and Francis 2011.
- Hart, H. L. A. (1961) *The Concept of Law*, Clarendon Press, Oxford.
- Hempel, C. (1988) 'Provisoes: A Problem Concerning the Inferential Function of Scientific Theories', *Erkenntnis* 28, 147–164.
- Hume, D. (1740) *A Treatise of Human Nature*, Oxford University Press, Oxford 2000.
- Keil, G. (2003) 'How the Ceteris Paribus Laws of Physics Lie' in J. Faye, P. Needham, U. Scheffler & M. Ursch (eds.), *Nature's Principles*, Springer Verlag, 189–222.
- Kincaid, H. (2004) 'There are Laws in the Social Sciences', in C. Hitchcock (ed.), *Contemporary Debates in Philosophy of Science*, Blackwell, Oxford, pp. 168–185.
- Lange, M. (1993) 'Natural Laws and the Problem of Provisos', *Erkenntnis* 38, 233–248.
- Lange, M. (2000) *Natural Laws in Scientific Practice*, Oxford University Press, New York.
- Lange, M. (2002) 'Who's Afraid of Ceteris Paribus Laws? Or: How I Learned to Stop Worrying and Love Them', *Erkenntnis* 57, 407–423.
- Lange, M. (2009) *Laws and Lawmakers: Science, Metaphysics, and the Laws of Nature*, Oxford University Press, Oxford.
- Lewis, C. I. and Langford, C. H. (1932) *Symbolic Logic*, New York.
- Lewis, D. (1969) *Convention: A Philosophical Study*, Harvard University Press, Cambridge.
- Lewis, D. (1986) *Philosophical Papers*, vol. 2, Oxford University Press, New York.
- Lowe, E. J. (1980) 'Sortal Terms and Natural Laws. An Essay on the Ontological Status of the Laws of Nature', *American Philosophical Quarterly*, 17, 253–260.
- Lowe, E. J. (1987) 'Miracles and Laws of Nature', *Religious Studies*, 23, 263–278.
- Lowe, J. (2009) *More Kinds of Being: A Further Study of Individuation, Identity, and the Logic of Sortal Terms*, Wiley-Blackwell, Oxford.
- Marmor, A. (2009) *Social Conventions: From Language to Law*, Princeton University Press, Princeton NJ.
- Millikan, R. (2005) *Language: A Biological Model*, Oxford University Press, Oxford.
- Mitchell, S. (2002) 'Ceteris Paribus – An Inadequate Representation for Biological Contingency', *Erkenntnis*, 57, 329–350.
- Mumford, S. (2000) 'Normative and Natural Laws', *Philosophy*, 75, 265–282.
- Mumford, S. (2001) 'Miracles: Metaphysics and Modality', *Religious Studies*, 37, 191–202.
- Mumford, S. (2004) *Laws in Nature*, Routledge, London and New York.
- Musgrave, A. (1999) *Essays on Realism and Rationalism*, Rodopi, Amsterdam.
- Nagel, E. (1961) *The Structure of Science: Problems in the Logic of Scientific Explanation*, Routledge and Kegan Paul.
- Pietroski, P., and G. Rey, (1995) 'When Other Things Aren't Equal: Saving Ceteris Paribus Laws from Vacuity', *British Journal for the Philosophy of Science*, 46, 81–110.
- Poincaré, H. (1952) *Science and Hypothesis*, Dover, New York.
- Ramsey, F. P. (1931) 'General propositions and causality', in R. B. Braithwaite (ed.), *The Foundations of Mathematics and Other Logical Essays*, Routledge & Kegan Paul, London.
- Roberts, J. (1998) "'Laws of Nature" as an indexical term: A reinterpretation of Lewis's best-system analysis', *Philosophy of Science*, 66 (Supplement), 502–511.
- Roberts, J. (2004) 'There are no Laws of the Social Sciences', in C. Hitchcock (ed.), *Contemporary Debates in Philosophy of Science*, Blackwell, pp. 151–167.
- Ryle, G. (1963) "'If", "So" and "Because"' in M. Black (ed.), *Philosophical Analysis*, Prentice-Hall, Englewood Cliffs, NJ, pp. 302–318.
- Schlick, M. (1939) *Problems of Ethics*, Prentice-Hall, New York.
- Schrenk, M. (2007) *The Metaphysics of Ceteris Paribus Laws*, Ontos Verlag, Heusenstamm bei Frankfurt.

- Schrenk, M. (2008) 'A theory for special sciences laws', in H. Bohse, K. Dreimann, & S. Walter (eds.), *Selected papers contributed to the sections of GAP.6, 6th international congress of the society for analytical philosophy*, Mentis, Paderborn.
- Sellars, W. (1948) 'Concepts as Involving Laws and Inconceivable without Them', *Philosophy of Science* 15, 287–315.
- Sillari, G. (2011) *Rule-following as coordination: A game-theoretic approach*, working paper.
- Smith, P. (2006) *Laws of Nature*, ms.
- Smith, S. (2002) 'Violated Laws, *Ceteris Paribus* Clauses, and Capacities', *Synthese*, 130, 235–264.
- Spinoza, B. (1670) *Theologico-Political Treatise*, Cambridge University Press, Cambridge, 2007.
- Stump, D. (2011) 'A Reconsideration of the Status of Newton's Laws', in M. Shaffer and M. Veber (eds.), *What Place for the A Priori?* Open Court, Chicago and La Salle, pp. 177–192.
- Sugden R. (2004) *The Economics of Rights, Co-operation and Welfare*, Palgrave-Macmillan, New York.
- Teller, P. (2004) 'The Law-Idealization', *Philosophy of Science*, 71, 730–741.
- Verbeek, B. (2008) 'Conventions and Moral Norms', *Topoi*, 27, 73–86.
- van Fraassen, B. (1970) 'On the Extension of Beth's Semantics of Physical Theories', *Philosophy of Science*, 37, 325–339.
- Weber, M. (1968) *Economy and Society*, G. Roth and C. Wittich (eds.), University of California Press, Berkeley.
- Wittgenstein, L. (1974) *Philosophical Grammar*, Blackwell, Oxford.
- Woodward, J. (2002) 'There is No Such Thing as a *Ceteris Paribus* Law' *Erkenntnis*, 57, 303–328.
- Zamora-Bonilla, J. (2010) 'Science: the rules of the game', *Logic Journal of the IGPL*, 294–307.