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## Three theories of physical law

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Historically, there have been three principal theories that would allow that physical laws are propositions. The earliest of these, the Prescriptivist Theory, has it that physical laws have been issued by God, that He has prescribed that Nature should (would?) behave in certain ways and not in others. Indeed, the very etymology of the expression “physical *laws*” evidences this antique mode of regarding this class of propositions.<sup>1</sup>

The Prescriptivist Theory endures in some religious writings. It can be found, for example, in the Reform Jewish High Holiday service:

There was a silence; there was chaos; there was a voice. A mind went forth to  
form worlds: now order reigns where chaos once held sway.  
The law makes evening fall; the law brings on the dawn.  
The moon follows accustomed paths, constellations their patterned ways.  
Sovereign is the will that orders the stars in their courses in the endless skies:  
Sovereign is that will! (Stern 1978, p. 25)

Among secularists, however, this belief – that physical laws are prescriptions – is no longer seriously credited, nor, for that matter, is even the weaker thesis that physical laws are legislated instruments subscribed to.

Teachers of secular philosophy, for example, are often quick to point out to their beginning students that there are sufficient disanalogies between physical laws and legislated laws so as to make the commonality of terms (“law”) more misleading than helpful. They may argue that

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<sup>1</sup> One might think that the thesis that physical laws are prescriptions is incompatible with the thesis that physical laws are propositions. For one might argue that prescriptions are not the sorts of things that can be true or false, and a fortiori cannot be identified with any subset of the class of propositions. But this argument is question-begging. There is no incoherence whatever in saying that one finds out what God’s prescriptions are just by finding out which of a certain class of propositions are true. I hardly want to argue that physical laws are prescriptions; indeed, I am adamant to deny this; but I do at least want to allow the logical possibility that they might be. [For an argument (not endorsed by this author) to the effect that moral laws are natural (physical) laws, see Walker 1963, ch. 14.]

although one is probably well-advised to comply with most legislated laws – including God’s commandments – one can, at one’s peril, ignore them. But no such latitude is possible in the case of physical laws. One cannot, even at one’s peril, fail to act in accord with the physical law that water is most dense at 3.98° C. And so on.

Only two theories concerning the nature of physical laws have survived (or so it is thought) in contemporary secular philosophy: the Necessitarian and the Regularity. [Later in this essay (particularly in Chapters 10 and 11), I will criticize the Necessitarian Theory in such a way as to reveal that I think it to be the latter-day successor to the Prescriptivist Theory, that it is nothing but Prescriptivism-without-a-Prescriber. But this is to anticipate considerably.]

Throughout much of this essay, the Necessitarian and Regularist views of physical laws will be hurled at one another. Aphoristically, they may be stated this way:

*Regularist:* Physical laws derive their truth from the actual (i.e., instanced) connections (between states and between events) in the world. Physical laws, therefore, express only what *does* occur.

*Necessitarian:* Physical laws (and antecedent conditions) determine which connections can and cannot occur; physical laws, that is, express what *must* occur in particular circumstances.

Necessitarianism exists in two versions: the material and the formal. The earlier, the material, was part – although a somewhat inchoate part – of the intellectual milieu of the early eighteenth century. Oddly, it seems to have been Hume himself, in the course of criticizing the theory (“There are necessary connections in Nature”), who gave it its first explicit articulation (see Buchdahl 1969, p. 43). Two hundred years later, Ducasse (1966, 1969) was again to promote the material version. The other version, the formal, is clearly the currently preferred formulation. It is to be found in the writings of, for example, Popper (1959a), Kneale (1950, 1961), Molnar (1969), and von Wright (1974). Where Hume’s contemporaries and Ducasse were intent to place the necessity of the causal relation *in re*, these later philosophers place the necessity in physical laws. But the difference, however, is more one of style than of ultimate significance. (More on this in Chapter 4.) Either way, the upshot is the same: Events in the world must accord with a nonlogical, natural (ontological) necessity.

The Regularity Theory might best be thought to be a negative theory. It is the theory that there is no natural necessity, either *in re* or in physical laws. Regularists, that is, deny natural necessity in both its forms and under all its names: “causal,” “ontic,” “nomological,” “etiological,” or what have you.

The Regularity Theory is a species of logical atomism (see Chapter 7). And although hardly as extreme as the brand found in Wittgenstein’s *Tractatus* (1961) – which has it that *all* general truths are reducible to singular (or ‘atomic’) propositions (sections 4.26, 4.411, 4.52) – the Regularity Theory does want to ‘locate’ the truth-conditions of physical laws wholly in the events of the world’s unfolding history and in the states actually instanced. Again aphoristically, this may be stated by saying that physical laws are ‘descriptive’ of what is and of what happens.

The Necessitarian view, while also advertising itself as a descriptive (as opposed to prescriptive) account, assigns to physical laws a different logical-cum-ontological status. Rather than it being physical laws that take their truth from what happens, it is something of the other way around: It is the physical laws that set the bounds on what can and cannot occur. For the Necessitarian, there is some sense in which physical laws have ‘primacy’ over mere occurrences. Laws impose ‘constraints’ on the way the world is and on what occurs therein.

Necessitarianism shares with the Regularity Theory the thesis that physical laws are descriptions; but it also shares with the Prescriptivist Theory the view (just mentioned) that physical laws are irreducible to statements about what happens; physical laws are statements about what *can* or *must* occur. (Later, in Chapter 8, I will call this common aspect of the Necessitarian and Prescriptivist theories – the view that physical laws are irreducible – the Autonomy Theory of Physical Laws. The Autonomy Theory is not a full-blooded theory in its own right, but a partial theory, a shared thesis of two comprehensive theories.)

The Regularist’s naysaying issues from the same Empiricist sentiments that so effectively challenged the doctrines of substance and spirit. Like substance and spirit, the presumed causal nexus was radically unobservable. Hume argued that the causal nexus (if understood to be a species of necessary connection) was not to be observed either in external events or in internal ones, for example, in willing one’s limbs to move (1955, pp. 74-9).<sup>2</sup>

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<sup>2</sup> Traditional Humean exegesis has long taken Hume to have argued that necessary connections in Nature are unobservable because they are nonexistent. But recent research has questioned this traditional interpretation. Some modern writers are now suggesting that Hume’s challenge was only epistemological, not ontological. (See Beauchamp and Rosenberg 1981; Wright 1983, especially pp. 143-4.)

By the turn of the twentieth century, it seemed that there was nearly universal agreement that the (supposed) causal nexus is unobservable. Indeed, an even stronger position began to be championed by a few prominent philosophers. In the first quarter of that century, Russell and Wittgenstein each undertook to argue that the concept of a necessary causal connectedness was dispensable as a theoretical construct. The concept no longer, it was alleged, had any role to play within science and ought to be expunged from philosophical thinking.

All philosophers, of every school, imagine that causation is one of the fundamental axioms or postulates of science, yet, oddly enough, in advanced sciences such as gravitational astronomy, the word “cause” never occurs... The reason why physics has ceased to look for causes is that, in fact, there are no such things. The law of causality, I believe, like much that passes muster among philosophers, is a relic of a bygone age, surviving, like the monarchy, only because it is erroneously supposed to do no harm. (Russell 1965, p. 163)

Belief in the causal nexus is *superstition*. (Wittgenstein 1961, section 5.1361)

There is no compulsion making one thing happen because another has happened. The only necessity that exists is *logical* necessity. (Wittgenstein 1961, section 6.37)

Thus, in the early 1920s it may well have looked to a disinterested observer as if the Necessitarian Theory was on the same path as the passenger pigeon: if not already extinct, then soon to be.

It turned out, however, that the Necessitarian Theory had remarkable staying power. Beginning in the mid-1920s, Ducasse kept the theory alive, even though his own peculiar views, particularly about the observability of the causal nexus (1969), have never won many adherents. He argued that he could observe the causal nexus in every event he witnessed; practically no one else has been able to duplicate the feat.

The true renaissance of the Necessitarian position has come about more recently, through the efforts of several philosophers, including Kneale, Molnar, and von Wright, who have produced arguments that have seemed to positively require the adopting of some sort of Necessitarian position. They argue in effect that the implications of a Regularist position – if not demonstrably false – are so much at variance with our ordinary thinking about physical laws and causality as to constitute a virtual *reductio ad absurdum* of the Regularist position.

One feature that has been thought to give Necessitarianism a considerable edge over its nearest rival is that Necessitarianism seems to be favored in our ordinary manner of describing events; that is, this theory is presupposed by our language.

In what sense can a language have a metaphysical theory built into it? Not in asserting any propositions, for a language does not consist of a set of propositions. (See Scheffler 1967, ch. 2, especially pp. 37-44.) A language consists of a vocabulary, a syntax, and a semantics. However, these latter may well sanction certain sorts of constructions that serve to promote particular metaphysical views.<sup>3</sup> For example, ordinary English constructions treat “space” substantively; for instance, “There is space between the chair and the wall” (which is perfectly analogous to “There is air (/a hassock) between the chair and the wall”), and thus tend to support the uncritical view that space is a “thing” not unlike other things that can occupy space. Such confusions are revealed when persons find themselves being baffled as to whether or not, and if so how, space could have an end.<sup>4</sup> Or, to cite another example: Our ordinary language is dualistic in its manner of constructing sentences pertaining to self-knowledge, memory, pain-reports, etc. We say such things as “I saw that my hand was cut,” which is grammatically parallel to “I saw that my car was dented,” and this has the effect of suggesting to us that we stand in the same relation to our hands as we do to our cars, that is, as owners to possessions. Or further: Our language favors relational, over adverbial, constructions to describe many mental events. Although we may be as likely to say “My knee hurts a great deal” as we are to say “There is a severe pain in my knee,” we are not so likely to adopt the adverbial form in reporting visual sense data or in reporting memories. We say “I see a red patch” rather than “I am seeing redly”; and “I recollect John’s face” rather than “I recollect John-facely.” In these latter cases, the English language would seem

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<sup>3</sup> Penelhum, like Ryle, argues that there are metaphysical theories implicit in the way in which we use language to describe ourselves and the world. Addressing our predisposition to be dualists (as regards mind and body), Penelhum writes:

All language-users, not just philosophers, tend to be dualists... This raises the difficult problem of how to react to a misleading theory that has filtered into ordinary discourse... Common theoretical misconstructions, though inconsistent with our daily use of such concepts, are usually harmless because of the merciful logical dispensation which allows us to make good sense with our concepts while talking nonsense about them. Occasionally, however, the prolonged continuance of the misguided theory can infect the practice... [When this occurs,] it seems legitimate to replace the bad theory by better and to argue against taking this solution for granted. (1967, p. 106; parenthetical gloss added).

<sup>4</sup> Buber was driven to the brink of suicide by his inability to answer this ill-conceived question. (Buber 1959, pp. 135-7).

to sanction an account of a relation between subject and object over an account of the manner of the subject's activity. Although it is by no means clear that the latter gives rise to a leaner ontology (for it might be necessary, if we were to persevere with the latter account, to quantify over 'manners of activity'), there is little doubt that it does give rise to a *different* metaphysical view of the world.

It is essential to recognize, if not the claims, then the metaphysical leanings of our language. Dualism of mind and matter, however much that theory may be presupposed in our language, has been challenged, indeed with much success. So, too, has the subject-object account of mental activity, although perhaps with not quite the success of the challenge to dualism. The point is that only by being aware of and by resisting the powerful call of our language to its in-built metaphysics can we hope to assess the validity of that metaphysics.

Clearly, our language provides a certain stimulus to the Necessitarian Theory. Our sentences are strewn with modal qualifiers (often in the consequents of conditional sentences): "If his head was chopped off, he had to die"; "If this is copper, it must conduct electricity"; "If you plug the toaster and the iron into the same circuit, the circuit breaker will have to trip"; etc. ad libitum. This is a rich diet of examples, and hard to resist. But they are merely suggestive of a theory. They hardly constitute conclusive proof of Necessitarianism; no more so than that Dualism seems to be favored by our language is convincing proof of the possibility, let alone the actuality, of a disembodied life after physical death. Linguistic conventions cannot be totally ignored: they have stood the test of time and must have some communicative function to have so endured. But that they can be successfully used to communicate does not establish that the theory that spawns them is true.

The considerable predilection our language has toward Necessitarianism must (!) not be overestimated in our trying to decide whether that theory should be preferred over a rival. Theories entrenched in our language may well be true; but they also may be false. Because they are so pervasive, however, they merit particularly critical examination, and examination free of the prejudice that entrenchment is a fairly reliable sign of truth. Too great an attachment to the metaphysics of ordinary speech has led to error in judging other philosophical issues. Deciding between Necessitarianism and Regularity must take the entrenchment of the former into account, but must not give it hegemony among competing arguments.

It might be tempting to think that the debate between Necessitarians and Regularists is only superficial; that ultimately there is no real difference; and that once all the metaphorical and anthropomorphic talk (e.g., “power,” “behavior,” “governed by,” “constrained by,” etc.) is cleared away, there will be no controversy left. But any such hope would be misplaced. There is nothing, either in the long history of the controversy or in the recent literature, to support such a reconciliation. Rather, the debate is as real and profound as any to be found within philosophy.

Choosing between these theories will have to depend on examining their competing verdicts on a variety of issues. Neither theory scores above the other on all counts. Thus one’s eventual preference must rest on a weighted assessment of the pros and cons of each. Such assessments are extremely difficult to make, and we may assume that rational persons will disagree in their final decisions and allegiances. Knowing this, my intentions are modest: to defend the competitor I have come to believe is the better theory, namely, the Regularity Theory; but equally, to try to cast into bold relief the differences between the two theories. For whichever side Truth lies on, it has a chance of being discerned only if the important consequences of each theory are clearly seen. I will try to lay bare some of these consequences and to show how much is at stake in each position.