ABSTRACT

The longest remarks in the section of the Tractatus devoted to science (6.3 ff.) introduce the net metaphor in a discussion of Newtonian mechanics. These sections of the Tractatus are generally believed to be inconsistent with the rest of the book. After a brief description of these difficulties and some relevant historical background I suggest a re-interpretation of the net metaphor in terms of contemporary debates about mechanics. This interpretation shows that the account of science in the Tractatus is an application of the picture theory and eliminates a long standing inconsistency in the reading of Wittgenstein.
Untangling the Net Metaphor

The sections of Wittgenstein's Tractatus which begin with the numbers 6.3 present an intriguing problem for the historian and philosopher of science. Having dealt with logic and mathematics in the remarks numbered 6.1 and 6.2, the author of the Tractatus here gives an account of science in the light of the discussion of language and philosophy earlier in the book. The longest remark in this section introduces the metaphor of the net in an account of Newtonian mechanics. Modern commentators generally agree that the discussion of science in these sections is unsuccessful and indeed inconsistent with the rest of the book.

Wittgenstein's debt to the sciences has recently begun to receive attention. It is now accepted that Wittgenstein was greatly influenced by the scientist Hertz and particularly by the ideas present in his book The Principles of Mechanics, in which Hertz himself presented a philosophical discussion of Newtonian mechanics. Wittgenstein seems to have taken the basic idea of the picture theory, that propositions are logical pictures of the world, from the work of Hertz. The usual evaluation of the 6.3's is therefore doubly problematic. Although Wittgenstein developed the picture theory out of a view of language specifically proposed by Hertz to deal with science, it is suggested that Wittgenstein's theory of language fails dramatically when he deals with science, and that Wittgenstein ignored or overlooked this failure when he himself examined Newtonian mechanics, the very same theory discussed in Hertz's book.

In this paper I want to re-examine the Tractarian account of science and the net metaphor. I will begin by indicating the difficulties raised by the 6.3's in two

1All references to the Tractatus are indicated according to Wittgenstein's decimal numbering system. The edition referred to is that of D. F. Pears and B. F. McGuinness (London: Routledge and Kegan Paul, 1961). I have followed their translation of the German text, except where otherwise indicated.

typical accounts, those of Black\(^3\) and Griffin\(^4\). I hope to resolve these problems by re-examining the 6.3's, and particularly the net metaphor, from the viewpoint of the work of Hertz. After a brief description of Hertz' ideas I present a reinterpretation of the net metaphor. The test of this new reading is its ability to illuminate the surrounding remarks and to answer the most important question: Is the account of science in the Tractatus consistent with the rest of the book?

I choose Black's discussion as a starting point because it seems to be typical of what is said about this section of the Tractatus; it might almost be called the standard reading. Black's discussion of the 6.3's raises a number of difficulties, but the most important is clearly that, on his reading, the account of science given there is incompatible with the rest of the Tractatus. This grows out of a specific comment on the net metaphor. Black suggests that the net represents "a suitable language . . . , complete with syntactical and semantical rules for its use."\(^5\) "The syntactical rules of the theoretical sub-language are the literal correlate of what Wittgenstein called the 'form' of the network; the semantical rules answer to the procedure for placing the net over the figure [i.e., the black and white surface] and obtaining a determinate verdict."\(^6\) He goes on, ". . . it is hard to see how, within the framework of the Tractatus, [Wittgenstein] could have accepted the idea, taken for granted above, that semantical as well as syntactical rules are needed."\(^7\) Semantical rules cannot be accommodated within language proper, that is within a language which conforms to the picture theory. Black concludes, "Once it has been conceded that scientific theory escapes the jurisdiction of the principle of extensionality, so that its formulas have empirical significance without being 'logical pictures', Wittgenstein's philosophy of lan-


\(^5\)Companion, p. 349.

\(^6\)Companion, p. 350.

\(^7\)Companion, p. 351.
language is ripe for reform." So, according to Black, scientific language is a recalcitrant case which cannot be made to conform to the picture theory.

Two further points in Black's discussion deserve special mention. He treats the various nets described in 6.341 as different co-ordinate systems and treats Newtonian mechanics as a single theory which from a philosophical viewpoint can be regarded as an interpreted formal system from which the defects of ordinary language have been eliminated. The different nets or co-ordinate systems are taken to be the analogical counterparts of different scientific theories, of which Newtonian mechanics is a typical example.

The basis of the almost universal tendency to treat the nets in the net metaphor as co-ordinate systems is explained in detail by Griffin. He suggests a direct connection between the net metaphor and Wittgenstein's recurrent talk about 'logical space'. The 'logical space' metaphor is to be understood according to the following analogy: an atomic sentence corresponds to the co-ordinates of a point, a name corresponds to a single co-ordinate number. If we accept the suggestion of 6.341 and think in terms of a two dimensional surface, then, taking Cartesian co-ordinates a point will be identified by an ordered pair of numbers, and a single number will tell us nothing about a single point, a pleasing parallel to Wittgenstein's insistence that an isolated name has no meaning. Similarly, the specification of a single point (a single sentence) brings into play the whole machinery of the co-ordinate system, requiring a definite choice to be made of point of origin of co-ordinates, definite choices for the scales employed in giving any particular co-ordinate, rules specifying that the ordered pair (1, 2) will be read as specifying the x-co-ordinate first, the y-co-ordinate second, and so on. Hence the specification of a single point simultaneously 'specifies' the logical scaffolding: the form of description of all other points

\[\text{Companion, p. 352.}\]

\[\text{Companion, p. 347.}\]

\[\text{Companion, p. 354.}\]

\[\text{Companion, p. 347 ff.}\]

\[\text{Atomism, p. 103 ff.}\]

\[\text{Atomism, p. 103.}\]
(3.42). Any combination of names (set of co-ordinates) defines a unique position in logical space. He concludes, "There is a logical place corresponding to every state of affairs. And facts, i.e., existent states of affairs, when put together, constitute the world, just as all points in a plane which are occupied, when put together, constitute a geometrical figure, the sort which in 6.341 stands for the world which is to be described."14

Griffin goes on to argue that the chief point of the net metaphor is that many general statements in science are not strictly propositions but recommendations for a method of representing a certain class of phenomena uniformly and concisely. Hence they are about the net and not about the world.

While I agree with what Griffin says about the 'logical space' metaphor, I think he goes astray in attempting to apply it directly to understanding the net metaphor and I cannot agree with the assimilation of the nets in 6.341 to co-ordinate systems. There seem to me to be two objections to this idea.

The first objection is a plausibility argument. Wittgenstein was not talking about co-ordinate systems because the alternative networks he suggests are not the obvious alternatives to the Cartesian co-ordinate system which the square network suggests. The obvious alternatives to a Cartesian co-ordinate system are polar co-ordinates and things like elliptical or hyperbolic co-ordinates. None of these fit the pattern of comparison suggested, that of square elements against triangles and hexagons. The suggestion (6.342) that triangles and hexagons could both be used makes no sense at all if each net is supposed to be a different co-ordinate system.

The second objection is more substantial. The different networks are supposed to be comparable with respect to the fineness of their mesh, which Black and Griffin understand as the margin of error with which a point on the two dimensional surface can be specified. But with any standard co-ordinate system any point can be specified with arbitrary precision and with equal precision in all systems. The point of comparison therefore vanishes. I conclude that whatever the nets are they are not co-ordinate systems.

The points of comparison between nets form a useful starting point for a re-examination of the whole net

14Atomism, p. 104.
metaphor. The standard reading of the metaphor takes the different nets to be different scientific theories. The situation in physics from the time of Wittgenstein's education to this writing of the Tractatus and particularly the work of Hertz suggest another possibility. On the alternative reading I want to suggest the various nets are not different theories but different formulations of the same theory, Newtonian mechanics.

Throughout the last decades of the nineteenth century and the first decades of the twentieth, the relative merits of different formulations of Newtonian mechanics were a subject of active controversy. Different formulations of mechanics were discussed by Hertz and Boltzmann, both of whom influenced Wittgenstein. The work of these scientists is connected with one side of the debates around the turn of the century on the physical reality of atoms. Both Hertz and Boltzmann accepted the existence of atoms, while one opposing faction argued that not atoms but energy would be taken as the real basis of physics (Ostwald was prominent in this group) and another faction argued for the complete elimination of theoretical entities in favor of 'phenomenological' theories. (Two scientists who supported this last view for very different reasons were Kirchoff and Mach.) All of these groups argued that a formulation of Newtonian mechanics consistent with their particular prejudices should supersede the traditional presentation of mechanics.

Hertz discussed the relative merits of three different versions of mechanics in the Introduction to his Principles of Mechanics. The first of these was the traditional version of mechanics, of which Newton's own formulation and later formulation of Lagrange are examples. The second and third versions were the contemporary Energeticist's formulation and Hertz' own. As well as differing in mathematical formulation, these three versions selected different concepts as fundamental. The traditional version employed the concepts of space, time, mass and force. The Energeticists suggested replacing mass and force with the concept of energy. Hertz himself proposed to eliminate the concept of force from the traditional account but to introduce no new concepts.


In the formulation of Hertz forces were eliminated by coupling visible masses with invisible ones. Wittgenstein refers to these invisible masses in his Notebooks. If the idea of invisible masses seems strange to the modern reader it should be remembered that Hertz was writing in the heyday of Aether theory. He regarded it as a merit of his formulation that it was consistent with Aether physics. Hence, he did not regard mechanics as the final stage in physical explanation, rather he thought the theory was correct and would be compatible with any fundamental theory of matter which emerged later.

The new formulation of Hertz is intended as a representation of mechanics in which "all indistinctness and uncertainty can be avoided by suitable arrangement of definitions and notations, and by due care in the mode of expression." This formulation is to eliminate any danger of logical imperfections concealed by the traditional formulations of mechanics "by a representation so perfect there should no longer be any possibility of doubting it." It is interesting to note the parallel between Hertz' preoccupation with clarity and Wittgenstein's insistence that anything that can be said can be said clearly. Although Hertz' concerns are restricted, while Wittgenstein's concerns are global, both attempt to achieve clarity by "linguistic reform", but this raises issues beyond the scope of the present paper. To return to the subject at hand, Hertz does not think that the traditional presentation of Mechanics is clear, and neither, I want to suggest does Wittgenstein. In the Tractatus Wittgenstein outlines a Begriffsschrift (literally a 'conceptual notation', called by some people an 'ideal language'). Much of ordinary language and most of the propositions of traditional philosophy are judged against this standard and found wanting (3.23 - 3.325). The traditional presentation of mechanics was constructed in ignorance of the Begriffsschrift. The theory of mechanics must therefore be regarded as just as ripe for linguistic reform as any other set of pre-Tractarian propositions. If we distinguish the ideal theory of mechanics, con-


19 Principles, p. 9.

20 Principles, p. 9.
structured in a language which conforms to the principles of Begriffschrift, from its extant counterparts, then the traditional formulation of mechanics, the Energeticist formulation and the formulation provided by Hertz can all be seen as attempts to construct this ideal mechanics which failed through ignorance of the principles of the Begriffschrift.

Hertz criticizes the traditional version of mechanics on the grounds that it fails to distinguish thoroughly and sharply between the elements in the representation which arise from the necessities of thought (in other words, logic), from experience and from arbitrary choice.

Again the parallel with Wittgenstein's critique of language is obvious. For the author of the Tractatus ordinary language conceals logical structure and even contains elements which are strictly meaningless. Wittgenstein suggests this in a striking passage (4.002) in which he compares the way in which language disguises thought (and thus logical structure) to the way in which clothing conceals the form of the body. It was Hertz who in discussing the proliferation of different versions of Maxwell's Electro-Magnetic Theory said: "... Scientific accuracy requires that we should in no wise confuse the simple and homely figure, as it is presented to us by nature, with the gay garment which we use to cloth it."21

For both Hertz and Wittgenstein our conceptions of things are pictures or models which we manufacture ourselves.22 But for Hertz, though not for Wittgenstein, different pictures of the same phenomena are possible, so some standards are required for choosing between them. In the case of mechanics, "By varying the choice of propositions we take as fundamental, we can give various representations of the principles of mechanics,"23 where the principles of mechanics are any selection of propositions "which satisfies the requirement that the whole of mechanics can be developed ... by purely deductive reasoning without any further appeal to experience."24

22 Principles, p. 1.
23 Principles, p. 4
24 Principles, p. 4.
These different formulations of mechanics may be compared by three different standards called by Hertz permissibility, correctness and appropriateness. These correspond roughly to the requirements of logical adequacy, empirical adequacy and perspicuity. I will deal with each of these briefly, as they shed some light on Wittgenstein's treatment of mechanics.

By 'permissibility' Hertz means logical permissibility or freedom from contradiction. For Hertz logic corresponds to the laws of thought, from which it seems to follow tautologically that it is impossible to think anything illogical. This important claim, which appears explicitly in Wittgenstein, is a useful indication of some of their differences. Hertz offers no philosophical basis for the claim, although what he says elsewhere suggests that he would turn to Kant for support. Wittgenstein's picture theory, however, provides grounds for the claim. Elementary propositions have sense because they stand in a unique relation to atomic facts. They are logical pictures in that they share the logical form of such facts and are capable of being combined logically with other such propositions. The elementary propositions themselves, however, lack any logical structure and can neither contradict themselves nor one another. Granted that a thought is a picture of a fact (3.0) in the same sense in which a proposition is a picture, at the fundamental level anything that can be thought is logically possible (3.02) while anything lacking a logical form cannot be pictured or thought. Neither Hertz nor, apparently, Wittgenstein expect to uncover any gross logical defect in any formulation of a theory as successful as Newtonian mechanics.

The second respect in which different formulations of mechanics may differ is described by Hertz as the fundamental requirement for any representation. This is the requirement that the logical picture provided by a particular formulation of the theory should enable us to deduce logical pictures of things as they actually come about in the course of nature. In Hertz' succinct phrase: "... the consequents of the pictures must be the pictures of the consequents." Hertz emphasizes that we are in principle excluded from knowing whether our conceptions of things conform to reality in any other than this one

25 *Principles*, p. 2
26 *Principles*, p. 2.
respect. Representations which satisfy this condition are termed "correct."

Permissible and correct formulations may differ in a third respect termed 'appropriateness' (Zweckmässigkeit). Under this heading two sorts of considerations are combined. A formulation which pictures more of the essential relations of its object is more distinct. Equally distinct images may differ in the number of "superfluous or empty" relations they contain. The formulation with the fewer is the simpler of the two. Under 'appropriateness' then Hertz combines both the idea that a good representation should not exclude anything essential, and the idea that it should not include anything inessential.

Some trade-off is possible between considerations of 'correctness' and 'appropriateness', and perhaps both should be seen as affecting the empirical adequacy of a formulation. Hertz criticizes the Energeticist proposal on the grounds that it seems to exclude some observed cases of motion. This situation could be dealt with in two ways. If the accuracy of the observations is accepted the formulation may be criticized on grounds of diminished 'correctness'. Alternatively the recalcitrant observations may simply be classified as cases that the formulation cannot accommodate, thereby reducing its 'appropriateness' in Hertz' technical sense of 'distinctness'.

The second sort of consideration under 'appropriateness', that of 'simplicity' achieved through the elimination of empty relations, is particularly important. Hertz saw these relations as introduced for purposes of convenience and ease of calculation. They were to be identified by comparing different formulations of mechanics. Equally 'permissible', 'correct' and 'distinct' formulations which do not contain a given relation show it to be superfluous. This is the status accorded to 'force' in the traditional formulation of mechanics, which conceals the difference in status between this concept and the concepts of mass, space and time, and for this reason Hertz eliminates it in his own formulation. I suspect this served Wittgenstein as a model for the elimination of signs from ordinary language which turn out to have no counterparts in the Begriffschrift. Lastly, it is worth noticing that when Hertz talks about comparing formulations with respect to 'simplicity' this presupposes that

they have already shown themselves acceptable under the 
headings of 'permissibility', 'correctness' and 'distinct-
ness'.

Hertz' discussion of mechanics presents a number of 
new possibilities for the interpretation of Wittgenstein's 
net metaphor. The standard reading of the metaphor takes 
the different nets to be different theories, although 
Wittgenstein talks not about theories but about a Welt-
beschreibung, rendered in English as 'a description of 
the world' and a number of other phrases. The 6.3's have 
a coherence through the recurrence of this single word 
which is obscured in the English version. Towards the 
end of the passage introducing the net metaphor Wittgen-
stein distinguishes different systems for describing the 
world from different forms for describing the world.

"The different nets correspond to different systems 
for describing the world. Mechanics determines one form 
of description of the world by saying that all proposi-
tions used in the description of the world must be 
obtained in a given way from a given set of propositions, 
the axioms of mechanics." (6.34) (Emphasis added.)

What is the difference between a form and a system? 
Equating the three formulations of mechanics distinguished 
by Hertz (the traditional version, the Energeticist 
version and Hertz' own) with what Wittgenstein calls 
different systems, each formulation corresponds to a 
different net. Now, there must be something about these 
three formulations that makes them all formulations of 
mechanics despite their use of different concepts, in 
the same way that there must be something about the 
different nets which makes them all nets despite their 
different meshes. 6.341 begins: "Die Newtonsche Mechanik 
z.B. bringt die Weltbeschreibung auf eine einheitliche 
Form,"--"Newtonian mechanics, for example, brings the 
world-description to a unified form," (my translation) 
--and ends, "Mechanics determines one form of description 
of the world." The contrast between forms, then, may be 
between unified forms (nets) and non-unified forms (patch-
works). Thus in establishing a world description we first 
choose a unified or non-unified type (choice of form) and 
than, if a unified type is chosen, specify the elements 
which will be universally employed (choice of system). 
Going back to the net metaphor, the business of describing 
a surface by means of a net is the choice of a form; the 
choice of a mesh is the choice of a system.

The subordination of systems to forms is further sup-
ported by the next paragraph (6.342). Here the informa-
tion which can be obtained about the world from a comparison of various systems of mechanics is clearly subordinated to the information which can be obtained about the world from the limitations imposed on the description of the world by mechanics itself, regarded as a form of description.

To decide what the differences between the nets are supposed to represent, it need only be asked what the characteristic difference between the competing systems of mechanics was, for example, in Hertz. The answer that emerges is clear—the rival systems differ not with respect to logical features (Hertz regards all the systems he discusses as equally 'permissible') but in choice of basic concepts. The square network is supposed to represent a system of mechanics which employs different basic concepts, and hence different axioms, from those of the triangular or hexagonal networks.

It is important not to overlook the philosophical differences between Hertz and Wittgenstein. As I have already indicated, Hertz does not regard Newtonian mechanics as a fundamental theory, he expects an Aether theory to be the final word. For Wittgenstein, however, mechanics provides not some but all the true propositions that we need for the description of the world. This disagreement reflects the difference between their theories of representation. For Hertz concepts and theories 'picture' a world which is ultimately ineffable. For Wittgenstein, as McGuinness puts it, "... in our grasp of the essential pictorality of language we have a trivial but important variety of infallible knowledge." While ordinary language slurs over details and conceals ambiguities, the fact that propositions have sense guarantees certain features of the world. "... (T)he propositions of our everyday language are in perfect logical order. ..." (5.5563) just to the extent that they embody the features which guarantee their connection with the world. The situation in mechanics is like the situation in ordinary language; there are several different natural languages and likewise in mechanics there are several different formulations with different choices of concepts. In the end there can be only one language and only one correct

formulation of mechanics, that formulation which satisfies all the requirements of the picture theory. At present the various formulations of mechanics give the appearance of diversity because they fail to conform to this ideal, but, to the extent that they work at all, they reflect or show indistinctly the logical structure of the final formulation of mechanics.

What will the final formulation of mechanics look like? At the risk of extending the chain of interpretation a little further, I think a plausible answer can be constructed from the Tractatus. I have emphasized that the crucial difference between contemporary formulations of mechanics lay in their choice of concepts, and this would seem to be the primary consideration in constructing the ideal version of mechanics in the language of the picture theory.

Wittgenstein tells us at 4.126 (sentence four) that concepts proper can be represented by means of a function. It has already been established at 3.333 that the sign for a function contains a prototype, that is a proposition exemplifying the logical form common to all the arguments of the function. Hence, the universal applicability of a concept, which seems to be required in mechanics, is equivalent to the universal presence in complex objects of a given logical form or forms. For Wittgenstein, objects in the ordinary sense must ultimately be collections of objects in his special technical sense, or to put it another way, collections of atomic facts.

Although Wittgenstein asks us to imagine a white surface with irregular black spots, his black spots cannot be completely irregular. Whatever the objects dealt with by mechanics turn out to be, they must ultimately resolve into collections of simples arranged in patterns with a definite logical form, atomic facts. One thing that cannot happen is the discovery of a complex which contains a collection of simples lacking a logical form. Given that any collection of simples must have such a form this form may, as a logical possibility, be encountered in all collections of atomic facts. Suppose, as Wittgenstein does not, that the black spots were regularly spaced squares that could be perfectly described by the square network. It could then be said that the geometrical form 'square' was the analogue of the logical form exemplified by the prototype of the fundamental concept of mechanics. It may be the case that more than one such concept, more than one such form, is required, hence, "the net might also consist of more than one kind of mesh: e.g. we could use both triangles and hexagons." (6.342)
It should be emphasized that the black spots in Wittgenstein's analogy are not regular; we know in advance that neither the square network nor the triangular one will fit the pattern perfectly; the nets are therefore partially successful formulations of mechanics which are adequate to the extent that they embody in a concealed fashion some or all of the logical forms required in an ideal mechanics.

The points about the relative status of logic and mechanics made in 6.342 can now be simply explained. The possibility of describing the world completely by means of a fixed number of concepts, and thus a fixed number of logical forms, tells us nothing about the world, because in principle any logical form could be encountered universally. But what does tell us something about the world is that we can succeed in producing a complete description with certain specific concepts. Hence: "The possibility of describing a picture like the one mentioned above [the black and white surface] with a net of a given form tells us nothing about the picture (for that is true of all such pictures). But what does characterize the picture is that it can be described completely by a particular net with a particular size of mesh."

What role does the fineness of the mesh play in the analogy? I have been suggesting that the choice of a network corresponds to a choice of concepts and hence to a choice of logical form. In the second paragraph of 6.342 Wittgenstein explains the analogy by talking directly about mechanics. In the section corresponding to the passage about the fineness of the mesh Wittgenstein says that we are also told something about the world by the fact that it can be described more simply with one system of mechanics than with another. Here, recall Hertz' concept of simplicity as a mode of comparison posterior to judgments of logical and empirical adequacy. It would be wrong, I think, to suggest that Wittgenstein is here using 'simplicity' in Hertz' technical sense, however the basic idea behind Hertz' notion, that of eliminating superfluous or empty concepts on the grounds that they do not contribute to the representation, is also fundamental to Wittgenstein; "... unnecessary elements in a sign language mean nothing." (5.47321)

Different systems of mechanics are successful only to the extent that they embody some of the logical forms which would be found in the ideal mechanics. A comparison between systems permits the elimination of elements which do not contribute towards this function, although there
is no guarantee that the conceptual structure of the simplest available system, that with fewest unnecessary elements, does correspond to the ideal.

The same considerations also explain the subordination, noticed earlier, of the information which can be obtained about the world from the comparison of systems of mechanics to the information which can be obtained from the applicability of mechanics itself. The success of actual systems of mechanics requires the universal presence of certain logical forms embodied in some fashion in any system. The comparison of such systems permits us to eliminate as superfluous certain concepts which might be candidates for contributing to this function.

I have suggested that the different nets in Wittgenstein's metaphor of 6.341 are to be understood as different systems of Newtonian mechanics. The various meshes which distinguish the nets are the analogs of the different conceptual bases of these systems, and the universal applicability of a concept (corresponding to the laying of the mesh of a given net over the entire black and white surface) requires, from the viewpoint of the Tractatus, the universal presence of certain logical forms. If this reading of the metaphor is to be persuasive it must also tell us something useful about the passages preceding and following 6.341.

Between paragraphs 6.321 and 6.34 Wittgenstein mentions minimum principles, such as the law of least action, and also laws of conservation, continuity and least effort. The various formulations of mechanics discussed by Hertz differ in employing or lacking these principles. The law taken as the single fundamental principle of mechanics by Hertz himself is a minimum principle very like the law of least action or the law of least effort. The Energeticist formulation of mechanics attacked by Hertz takes the law of energy conservation as fundamental. Wittgenstein suggests that the significance of these physical principles is to be understood through the recognition that they introduce logical forms, and this is to be expected given our reading of the net metaphor. While formulations of mechanics which employ these principles differ in mathematical form, mathematics is a method of logic (6.2) and hence tells us nothing about the world. It must therefore be the concepts embodied in a law of least action or a law of conservation which are significant. As soon as the logical form correlated
with a given concept is recognized, the a priori possibility of a law which applies the concept universally may also be recognized.

If a scientific law or mechanical principle introduces concepts then the discovery of a law is in effect the discovery of the common logical form which is the basis of the application of the concept (or concepts) to the world. Any given logical form is potentially a "connection subject to law," that is a logical form running through all the complexes which constitute the objects of science. Hence, any thought contains the basis for a law (a logical form which may occur universally) and what does not contain such a basis, because it lacks a logical form, is not a thought. Thus (6.361) "... only connections that are subject to law are thinkable."

That there are laws of nature is just the claim that there are such universally occurring logical forms, but of course this cannot be said, given the usual restriction on talking about or depicting the basis of talk and depiction. However we can see that there are such laws, this is shown by the success of mechanics, it makes itself manifest (6.36). What the law of causality is meant to exclude is a phenomenon which lacks a logical form. As the basis for all description is the possession of a logical form, such a situation could not be described (6.362).

To conclude, let me summarize the results of the paper. I have suggested that the standard reading of the net metaphor goes wrong both in general and in detail.

In general the mistake is to attribute to Wittgenstein the later view that the language of science is in some sense superior to ordinary language, leading to the suggestion that the different nets are different theories. I have suggested that at the time he was writing Wittgenstein quite plausibly saw the situation in science as very like the situation in ordinary language, and that the different nets should be seen as the analogues of actual formulations of a single theory from which the imperfections of ordinary language have yet to be removed.

In detail, the standard interpretation of the net metaphor goes astray by linking it too closely with the 'logical space' metaphor, a connection which would make sense only if the scientific theories which the nets are supposed to represent had already been purged of the imperfections of ordinary language. The root of the problem is the persistent temptation to treat mechanics
as part of the Begriffschrift rather than a part of language in just as great a need of reform as any other. Once this is rejected, the discussion of science in the 6.3's can be seen to be quite consistent with the rest of the book.

My most important conclusion is this. The account of science in the Tractatus is not a brief aberration in which Wittgenstein apparently violates his own strictures against representing or depicting the basis of representation and depiction. When understood correctly, the discussion of science in the 6.3's and the net metaphor in particular can be seen as applications of the picture theory. This eliminates a long standing difficulty in understanding the Tractatus but hardly vindicates Wittgenstein's account of science, which can now be said to suffer from all the defects of the rest of the book.

The length of time during which commentators on Wittgenstein accepted the apparent contradiction between the account of science in the 6.3's and Tractarian principles underlines the importance of taking into account the background to the Tractatus in understanding the book, in the case of the scientific background the work of the atomists Hertz and Boltzmann. Let me close with another example. I have always wondered why logical atomism should have appealed to Russell and Wittgenstein at a point in history when scientific atomism was so controversial. In the case of Wittgenstein, a biographical answer can at least be given. Before he was a philosopher he was a scientist and while he was a scientist he sided with the atomists.

Peter Barker
Department of Philosophy
Memphis State University
Memphis, Tennessee 38152