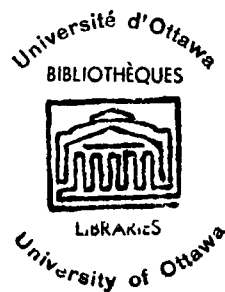


THE EPISTEMOLOGICAL FOUNDATIONS
OF BERTRAND RUSSELL'S
PHILOSOPHY OF SCIENCE

by Kenneth G. Butler

Thesis presented to the
Faculty of Philosophy of
the University of Ottawa
as partial fulfillment of
the requirements for the
degree of Master of Arts



Ottawa, Ontario, 1970

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ACKNOWLEDGMENTS

This thesis was prepared under the supervision of professor William Carlo, Ph.D., of the Graduate Faculty of Philosophy, of the University of Ottawa.

CURRICULUM STUDIORUM

Kenneth G. Butler was born August 19, 1941, in Ottawa, Ontario. He received his Bachelor of Arts degree in History and Philosophy from Saint Patrick's College, Ottawa, Ontario.

TABLE OF CONTENTS

Chapter	Page
INTRODUCTION	vi
I.- RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS.	1
1. The Problem	1
2. Substance and Event	3
3. Russell's Notion of Event	9
4. Event Particular and Simple	13
5. Common Sense and Physical Event	16
6. Three Historical Views on the Construction of Events	21
7. The Patch Theory	23
8. Percept and Psychology	26
9. Introspection, Percept and Solipsism	29
10. Russell's Causal Theory of Perception	29
11. Summary	32
II.- MENTAL EVENTS.	34
1. Russell's Modified Empiricism	34
2. Russell's Acceptance of the Cartesian Doubt	36
3. Sensation, Percept and Belief	40
4. Habit, Memory and Ideas	42
5. Knowledge and Belief	44
6. Common Sense and Science	48
7. Neutral Monism	53
8. Summary	55
III.- PERCEPTION, INDUCTION AND NON-DEMONSTRATIVE INFERENCE.	57
1. Inference and the Connection Between Sensations	57
2. Russell's View of Causality	61
3. Modes of Inference and Induction	63
4. Natural Kinds and Induction	67
5. Degrees of Credibility, Natural Kinds and Inference	68
6. Natural Kinds and Structure	75
7. Physical Space and Perceptual Space	78
8. The Scientific Method and Physical Space	83
9. Russell's Notion of Verification	92
10. Verification and Inference	96
11. Russell's Theory of Non-Demonstrative Inference	100
12. Russell's Justification for Non-Demonstra- tive Inference	111
13. Summary and Conclusion	113

TABLE OF CONTENTS

v

IV.- A CRITIQUE OF RUSSELL'S EPISTEMOLOGY	116
1. Russell's Metaphysics of Logical Form	116
2. Russell's Implicit Cogito	118
3. Simplicity and Substance	120
4. Inference	122
5. Degrees of Credibility	123
6. Conclusion	124
BIBLIOGRAPHY	125

Appendix

1. THE PROBLEM CONCERNING THE DERIVATION OF RUSSELL'S NOTION OF EVENT	130
2. FURTHER REMARKS ON NEUTRAL MONISM	132
3. THE EPISTEMOLOGICAL STATUS OF THE HIERARCHY OF BELIEF	134
4. COHERENCE THEORY OF PROBABILITY	135

INTRODUCTION

Bertrand Russell has exerted one of the major influences on philosophy over the course of the last fifty years and what he has to say about the philosophy of science is surely as interesting as that which he has to say on a variety of other philosophical topics. Curiously enough, however, while there has been a great deal written on specific issues in his philosophy of science, for example his notion of causality, most of this work has been done by persons working from within what might be called the empiricist tradition, and this at the expense of the general frame of reference or context which gives Russell's specific problems their meaning.

This thesis then attempts to reconstitute over the course of three chapters the most important components of Russell's philosophy of science. This kind of approach is fraught with many difficulties, not the least of which involves the various weights to be attached to the different elements. The task is made doubly difficult by the fact that Russell shifted and changed his opinions on many issues throughout the course of his works. For largely pragmatic reasons then, this study has been concentrated on Russell's last major attempt to come to grips with those problems in the philosophy of science he felt most important. This

INTRODUCTION

vii

effort he presents in his work Human Knowledge. The historical development or change in Russell's position where it has been looked at at all has been relegated then mainly to footnotes. Certain issues as well, such as Russell's notion of non-demonstrative inference, are viewed and reviewed in several different places. This procedure seems to be justified by the fact that Russell's method makes it extremely difficult to separate what he calls his ontology from his general epistemology, and his general epistemology from the special questions involved in the epistemology of the philosophy of science.

The motion of this thesis then follows or attempts to follow the way in which Russell develops his own thought. This entails starting from the discrepancy or apparent discrepancy which exists between common sense and the theoretical constructs of science. It must be stated that Russell throughout his works, accepts scientific theory as a given at the expense of common sense knowledge and that this is due to the fact that his fundamental epistemological starting point is the same as Hume's, that is, with sensations not extramental things. This thesis then tries to show how Russell formulates his problematic, given his epistemological foundations and how he tries to provide a solution for it. Russell's central difficulty stated briefly is that

INTRODUCTION

viii

since verification must take place on the sensory level how is it possible to justify the data of the senses as truly related to the extramental world, considering the fact that the only thing directly experienced is sensation itself? This question breaks down further into two parts. The first concerns the verity of sensation; the second concerns the verity of the connections between sensation. This thesis is then mostly concerned with Russell's attempt to provide epistemological foundations for scientific theorizing.

However, it is also concerned with the fact that Russell's attempted solution has met with very little acceptance either inside or outside the empiricist tradition. Some of the reasons for this lack of acceptance are explored in the critique which constitutes the final chapter. In this chapter the criticism is advanced that Russell starts metaphysically from abstract logical forms and epistemologically from a form of cogito. It is for these reasons this thesis asserts that Russell cannot and does not provide a viable epistemology for his philosophy of science.

CHAPTER 1

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

While as it was stated in the introduction, Russell changed his position many times on many different problems, there is a common thread, a common problem which concerns him from at least the time of his very early work Our Knowledge of the External World to his much later work Human Knowledge.¹

1. The Problem

Russell believed the major problem of the philosophy of science to be this, He says,

The laws of physics are believed to be at least approximately true though they are not logically necessary; the evidence for them is empirical. All empirical evidence consists in the last analysis of perceptions; thus the world of physics must be in some sense concatenous with the world of perceptions since it is the latter which supplies the evidence for the laws of physics.²

and he says elsewhere,

If physics is to be verifiable we are faced with the following problems: physics exhibits sense data as functions of physical objects but verification

1. Bertrand Russell says "It is necessary to find some way of bridging the gulf between the world of physics and the world of sense". Bertrand Russell, Our Knowledge of the External World, London, Allen & Unwin 1914 (1926) p. 106.

2. Bertrand Russell, The Analysis of Matter, London, Allen & Unwin, 1927 (Ed. 1954) p. 6.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

2

is only possible if physical objects can be exhibited as functions of sense data. We have therefore to solve the equations giving sense data in terms of physical objects so as to make them give physical objects in terms of sense data.³

He says as well,

The passage from what physics asserts to the expected perception is left vague and casual, it has none of the mathematical precision belonging to physics itself. We must therefore find an interpretation of physics which gives a due place to perceptions; if not we have no right to appeal to the empirical world.⁴

Russell's problematic is then, as he states it, dual. First he must attempt to show how the homogeneous and regular structures and processes of theoretical physics, which can be described in concise mathematical terms, may be related to the data of common sense which "imagines when it sees a table it sees a table"⁵, that is, the quality filled world of the immediately given which can, according to him only be expressed in ordinary language. The second aspect of Russell's problem is to justify the truth value or certainty of the claims of physics along with the method or methods by which this certainty is attained considering the fact that all verification must occur on the level of the

3. Bertrand Russell, Mysticism and Logic, London, Longmans, Green and Co., 1921, p. 146.

4. Bertrand Russell, (The Analysis of Matter), p. 6.

5. Bertrand Russell, The A.B.C. of Relativity, London, Allen & Unwin, 1925 (1958), p. 129.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

3

senses. It is evident that these two problems are inextricably bound together. It is also evident that the very way in which Russell formulates the problem enlarges the area from the rather restricted questions of philosophy of science to basic epistemological considerations and ultimately to metaphysical ones.

2. Substance and Event

It is perhaps an exaggeration to claim that twentieth century physics provides Russell with an epistemological as well as metaphysical foundation for his philosophy of science. On the other hand, he never seems to seriously question the verity of physical theories at least as approximately true nor the methods by which these theories are reached. Russell's whole programme entails strengthening the truth claims of science at the expense of common sense not a radical questioning of them. In fact he says, that modern science must be believed "on pain of death".⁶ The physical theory that Russell mainly talks about is Einsteinian not Newtonian for while Newtonian physics is filled with such theoretical constructs as instantaneous velocities and perfectly rigid bodies which cannot be found anywhere in the world of common sense, it is with Einstein that the

6. Bertrand Russell, My Philosophical Development, London, Allen & Unwin, 1959, p. 17.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

4

notion of event, so important to Russell, came into theoretical physics. Russell says on this,

Philosophy and physics developed the notion of thing into that of material substances and thought of material substance as consisting of particles each persisting throughout all time. Einstein substituted events for particles, each event had to each other a relation called interval which could be analysed in various ways into a time element and a space element. The choice between these various ways was arbitrary and no one of them was preferable to any other.⁷

It is extremely difficult to assess the exact correlation which exists between Einstein's notion of event and Russell's,⁸ however, there are certain characteristics and attitudes concerning the nature of the world which are common to both. It is evident that Russell wishes to eliminate the notion of substance and analogously Einstein hoped to reduce the dichotomy which exists between matter and field in the physical description of the universe. Einstein says for example,

From relativity theory we know that matter represents vast stores of energy and that energy represents matter. We cannot in this way distinguish qualitatively between matter and field, since the distinction between mass of energy is not a qualitative one. By far the greatest part of energy is concentrated in matter, but the field

7. Bertrand Russell, History of Western Philosophy, London, Allen & Unwin, 1946 (Ed. 1961), p. 786.

8. See Appendix 1.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

5

surrounding the particles also represents energy, though in an incomparably smaller quantity. We could therefore say: Matter is where the concentration of energy is great, field where the concentration of energy small. But if this is the case, then the difference between matter and field is quantitative rather than a qualitative one.⁹

He continues;

Could we not reject the concept of matter and build a pure field physics? What impresses our senses as matter is really a great concentration of energy into a comparatively smaller space. We could regard matter as the regions in space where the field is extremely strong. In this way a new philosophical background could be created.¹⁰

It seems evident that Einstein is making epistemological assertions here as well as physical ones. He pictures reality as static events superimposed on a space-time continuum. His main reason for asserting that a pure field physics is desirable, seems to be that since electromagnetic and gravitational phenomena, in the absence of "very great concentrations of energy"¹¹ are describable in terms of Maxwell's laws, that is to say large areas of extramental

9. Albert Einstein and Leopold Infeld, The Evolution of Physics, New York, Simon & Shuster, 1938. As found in Robert W. Marks (Editor) Space, Time and The New Mathematics under heading Relativity, New York, Bantam Books, 1964, p. 161.

10. Ibid., p. 161.

11. Ibid., p. 161.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

6

reality can be subsumed under a few general concepts,¹² that this process in itself of describing and controlling the multiplicity of diverse phenomena through the generalizing power of concepts is itself an epistemological justification. Russell too holds an epistemological notion of simplicity. However, more important than this as it will become evident, the world for Russell as for Einstein can only be described in terms of laws not explained through final or formal causes, as is the case with certain philosophers such as Aristotle.

Russell asserts time and time again that the world as we see it and the world as it actually is, are structurally quite different. He says for example in The ABC of Relativity,

We naturally interpret the world pictorially; that is to say we imagine what goes on; is more or less like what we see. But in fact this likeness can only extend to certain formal logical properties expressing structure so that all we can know is certain general characteristics of its change.¹³

He does not radically modify this view up to the time of

12. Einstein says, The strength of this new theory lies in the consistency and simplicity with which it solves all these difficulties, using only a few very convincing assumptions. (Ibid., p. 127)

13. Bertrand Russell, The ABC of Relativity, p. 137.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

7

Human Knowledge¹⁴ and beyond. Science and specifically physics is the paradigm for all knowledge and the ultimate source for what he has to say about the structure of the world. Two aspects of his philosophy are clear; the first is that Russell accepts the data of relativistic physics completely even though he adds by way of interpretation certain postulates which are uniquely his own. This provides the basis from which he makes his statements about the universe. Secondly, and perhaps as an implication, the place that Russell accords physics in his hierarchy of knowledge means that physical statements become nearly identical to metaphysical propositions. It will become more evident as this thesis progresses that here Russell is not just talking about a certain theory belonging to the physical sciences but what is for him the constitution of the extra-mental world. Even though it is beyond the scope of this thesis to attempt to develop the many parallels and differences which exist between Einstein's notion of event and

14. Here he says,

In the last analysis, since mass is a form of energy it would seem that energy, electron charge and space-time co-ordinates are all that physics needs; and owing to the absence of the geographical elements the co-ordinates can remain purely hypothetical. Bertrand Russell, Human Knowledge, its scope and limits, New York, Simon and Shuster, 1948 (Ed. 1962), p. 247.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

8

Russell's, some important similarities stand out. These are: (a) both accept mathematical physics as that mode of knowledge which reveals the fundamental structures of the world and for Russell the most significant part of mathematical physics is relativity theory. Einstein's picture of the world therefore comprises at least part of Russell's ontology. (b) Again, this acceptance itself entails certain epistemological premises which are held in common by both these men. These premises include a belief that the scientific method is superior to and giving a truer delineation of the fundamental structures and processes of the universe than does common-sense knowledge. This in turn implies the belief that qualities and objects or "particulars"¹⁵ or 'matter' is somehow illusory or a secondary reality while the space-time structure is primary. This being the case and in light of the fact that what is perceived on the sensory level are things and their qualities, the possibility of an explanatory metaphysics is automatically ruled out of court. In this context the result is a description and interpretation of description attained through analysis and postulation of that which appears.

15. Bertrand Russell, Human Knowledge, p. 293. Particular as it will be seen takes the place of matter, however ultimately he rejects the notion of particular for that of structure.

3. Russell's Notion of Event

It is as been previously maintained extremely difficult to decide, as with other such entities, just what function, that is epistemological, metaphysical, or methodological, Russell's notion of event fulfills in his philosophy of science. This is due to the fact that Russell's ultimate starting point is from sensations not from things so that the distinction between what is known concerning extramental realities and how what is known can be known to be true, becomes extremely blurred. Metaphysical and epistemological propositions are often virtually synonymous. This being the case and without discussion at this point about the deeper epistemological reasons for Russell's acceptance of the notion of event, the question still remains as to what constitutes an event for Russell. This question can only be answered or understood against the background of what Russell rejects epistemologically as well as what he accepts. Russell says for example on the former point,

We all start from "naive realism" i.e., the doctrine that things are what they seem. We think that grass is green, that stones are hard and that snow is cold. But physics assures us that the greenness of grass, the hardness of stones, and the coldness of snow are not the greenness, hardness, and coldness that we know in our experience but something very different.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

10

Naive realism leads to physics and physics if true shows that naive realism is false.¹⁶

Russell as it was previously stated accepts the data of physics at the expense of common sense knowledge, that is, he rejects the possibility there can be any full or direct correspondence between the knower and the thing known but he does not reject the possibility of their being some kind of adequation. Nevertheless, there is one kind of experience that cannot be doubted. He says of this in The Problems of Philosophy for example,

Before we embark upon doubtful matters let us try to find some more or less fixed point from which to start. Although we are doubting the physical existence of the table, we are not doubting the existence of the sense data which made us think there was a table. In fact whatever else may seem doubtful some at least of our immediate experiences seem absolutely certain.¹⁷

Russell maintains this position throughout all his writing, for instance, he says in Human Knowledge "only sensations and memory are truly data for our knowledge of the external world."¹⁸ On the other hand as Russell accepts the data of

16. Bertrand Russell, An Inquiry Into Meaning and Truth, London, Allen and Unwin, 1940 (1943), p. 15.

17. Bertrand Russell, The Problems of Philosophy, New York, Galaxy Book, 1912 (1965), p. 17.

18. Bertrand Russell, Human Knowledge, p. 170.

science and at least part of the data of common sense he needs epistemological justification for more than just that which can be directly experienced.

This need to find a justification for inferred data contrasts sharply with the program the philosopher set himself in an early work. Here, he says, that he wishes to reduce physics to a "solipsistic basis".¹⁹ Inferences are to be done away with and even "the sense data of others cannot be known without some element of inference".²⁰ Russell believed at this point that by a rigorous application of his method, he could substitute "construction for inferences".²¹ This would allow him to discuss "matter wholly in terms of sense data and even we may add, of the sense data of a single person".²² By means of such constructions the thinker could get rid of all elements of inference which he considers at this point in time not legitimate.

Although a detailed description of the reasons for Russell's shift in position cannot be dealt with here, part of the explanation for the change is undoubtedly given when Russell says "I find myself constitutionally incapable of believing that the sun would not exist on a day where he

19. Bertrand Russell, Mysticism and Logic, p. 158.

20. Ibid., p. 157.

21. Ibid., p. 157.

22. Ibid., p. 157.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

12

was everywhere hidden by the clouds or that the meat in a meat pie springs into existence at the moment when the pie is opened".²³ The sense of what Russell is maintaining would seem to be this. While constructions may contain a minimum of that which can only be indirectly experienced and a maximum of systematized concepts readily open to logical analysis, the logical certainty is gained at the expense of a large part of the data of experience which Russell does not wish to exclude. The above interpretation is borne out to a degree by what Russell has to say about his later view of physics. He asserts,

There are those who would deny that physics need say anything about what cannot be observed; at times I have been one of them. But I have become persuaded that such an interpretation of Physics is at best an intellectual game and that an honest acceptance of physics demands recognition of unobserved occurrences.²⁴

Russell then needs some way of coming to grips with occurrences that are in the world and that happen without anyone being there to perceive them. The function of the event is to allow him to do this. Russell says,

23. Bertrand Russell, Philosophy, New York, Norton and Co., 1927, p. 290.

24. Bertrand Russell, Reply to Criticism, as found in The Philosophy of Bertrand Russell (Paul Arthur Schilpp, Editor) Evanston, Illinois, Vol. 5, Ed. 2, 1946, p. 701.

We perceive events, not substances; that is to say what we may perceive occupies a volume of space time which is small in all four dimensions, not indefinitely extended in one dimension (time) and what we can primarily infer from precepts assuming the validity of physics, are groups of events again not substances.....

By defining a "thing" as a group of what would formerly have been its "states" we alter nothing in the detail of physics and avoid inference as precarious as it is useless.²⁵

Thus the event for Russell includes both something of what is directly sensed and something of what may be inferred from sensation although not everything.²⁶ Percepts become a species of event among other events.

4. Event Particular and Simple

The precise relationship which exists between event particular and simple is difficult to pinpoint exactly. However, it seems certain that if not all events are particulars for Russell, all particulars are events. This does not mean that the notions of particular and event have the same epistemological status. In fact he substitutes the

25. Op. Cit. (The Analysis of Matter), p. 284.

26. As it will be seen, not every part of mental life constitutes an event. Some aspects are parts of an event.

notion of event²⁷ for that of particular for the following reason.

In science, we have evidence of structure down to a certain point, ... beyond that point we have no evidence. There can never be evidence that the point we have reached is the one beyond which there is no structure i.e., that we have arrived at simple units totally devoid of parts; therefore analysis is essentially incapable of reaching a term KNOWN to be final even if it has in fact reached a final term.²⁸

There is then no 'simple' which can be known as such and a 'particular' becomes "a word relative to our knowledge not an absolute metaphysical term".²⁹ Nevertheless, there is a continuity of function that carries over from the particular to the event. Each is known or defined in the same way. In his Analysis of Matter Russell maintains that, "a particular... is concerned in the physical world merely through... its relations to other things never through its own structure

27. Russell describes the relationship which holds between event and particular in this way

It has been assumed, in our constructions that a single event may occupy a finite amount of space time, that two events may overlap both in space and in time and that no event can recur. That is to say if A wholly precedes B, A and B are not identical. We assumed also that if A wholly precedes B, and B wholly precedes C then A wholly precedes C. Events were provisionally taken as particulars. Bertrand Russell, Human Knowledge, p. 293.

28. Ibid., p. 276.

29. Ibid., p. 278.

if any".³⁰ An event is also known according to what might be called its relational properties. This is quite explicitly stated when Russell states,

There are occurrences that I experience and I believe there are others that I do not experience. The occurrences that I experience are all complex and can be analysed into qualities with spacial and temporal relations. The most important of these are compresence, contiguity and succession.³¹

Russell does however maintain a difference between those occurrences which are directly experienced and those which are simply inferred. The only events whose qualities "can be known without inference"³² are mental events. Physical events on the other hand are only known "as regards their space-time structure".³³ The way in which Russell means 'know' here, is of course knowing by inference, not by direct experience. He maintains that the qualities which make up such events, are "so completely unknown"³⁴ that "we cannot say either that they are or are not different from

30. Bertrand Russell, The Analysis of Matter, p. 277.

31. Bertrand Russell, Human Knowledge, p. 82.

32. Ibid., p. 231.

33. Ibid., p. 229. According to this philosopher, physical events "must not TOTALLY unknown, like Kant's things - in themselves", if physics is to have any empirical base. Human Knowledge, p. 227.

34. Ibid., p. 231.

the qualities that we know as belonging to mental events".³⁵ There are as well two distinct ways of constructing events and this distinction is based partly on the thinker's separation of events into the two sub-classes, mental and physical.

5. Common Sense and Physical Event

The first way of collecting events to be described here, is that which entails scientific methodology, which is to say, the manner of grouping involves the use of physical laws.³⁶ These co-ordinate and connect the various perceptual elements experienced by several people into single bundles.³⁷ The laws themselves are the result of previous experiences, inferences, and confirmation of experiences and inferences. The second manner concerns the collection of "all events which are the appearance of one thing....at one physical place".³⁸ "This second way of

35. Bertrand Russell, Human Knowledge, p. 231.

36. This would include such things as the laws of optics, the speed of light and the rules governing the accuracy of measuring apparatus.

37. Bertrand Russell, My Philosophical Development, p. 106-107.

38. Ibid., p. 107.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

17

making bundles is especially appropriate in psychology".³⁹ Both ways of constructing events have to do with the grouping of qualities "about a centre"⁴⁰ or situating events in space; the space in the second instance is psychological or perceptual space. The construction of physical space entails considerably more inference by way of the utilization of scientific methods and scientific propositions than the construction of perceptual space which is fundamentally that of the individual's mental life. The problem of the two spaces will be developed in greater detail throughout subsequent sections. However, the question still remains as to how the two sorts of events which make up the spaces are to be connected. Before attempting to make Russell's solution clear something more must be seen of the relation which exists between Einstein's Theory of Relativity and Russell's notion of event. Russell held in The Analysis of Matter that the fusion of space and time makes it much easier "to conceive a piece of matter as a group of events"⁴¹ and this is because "Physics starts, nowadays, from a four-

39. Bertrand Russell, My Philosophical Development, pp. 106-107.

40. Bertrand Russell, Human Knowledge, p. 463.

41. Bertrand Russell, The Analysis of Matter, p. 244.

dimensional manifold of events, not, as formerly, from a temporal series of three-dimensional manifolds, connected with each other by the conception of matter in motion."⁴² The substitution of event for matter does not dispense entirely with the notion of identity, what it does do, is dissolve an apparent unity into a number of: 'smaller' unities which are connected and subsumed under theoretical or inferred scientific laws. Russell states, for instance,

What is peculiar about a string of events which physics takes as belonging to one electron is a character which is present approximately in the common-sense "thing," a character which I should define as the existence of a first-order differential law connecting successive events along a linear route.⁴³

Here, he is not merely speaking of electrons, but all physical processes. Consider what he has to say about matter in general.

Instead of a permanent piece of matter, we have now the conception of a "world-line," which is a series of events connected with each other in a certain way. The parts of one light-ray are connected with each other in a manner which enables us to consider them as forming, together, one light-ray; but we do not conceive a light-ray as a substance moving with the velocity of light.⁴⁴

As it was seen earlier, for Russell, there are three

42. Bertrand Russell, The Analysis of Matter, p. 244.

43. Ibid., p. 245.

44. Ibid., p. 244.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

19

spacio-temporal relations. Of these, the most important is the relation of compresence, for allowing the connection of qualities that make up an event. Compresence according to Russell incorporates the concept of simultaneity, but it means more than it. If events and the parts of events can be collected into bundles, it follows that these must be present to each other in some way. Russell says on this "Just as many things happen simultaneously in my mind, so we must suppose, many things happen simultaneously in every place in space-time."⁴⁵ Russell needs this supposition, otherwise, there could not be any entities in physics at all, nothing to analyse or enumerate. According to him 'several things' are compresent as the "subjects of spatio-temporal relations in physical space-time."⁴⁶ An event is then defined in this way,

An event may be defined as a complete bundle of compresent qualities, i.e. a bundle having the two properties (a) that all qualities in the bundle are compresent, (b) that nothing outside the bundle is compresent with every member of the bundle.⁴⁷

An event is not necessarily "a complete complex of compresence"⁴⁸ which "counts as a space-time point-instant."⁴⁹

45. Bertrand Russell, Human Knowledge, p. 304.

46. Bertrand Russell, Human Knowledge, p. 304.

47. Ibid., p. 83.

48. Ibid., p. 304.

49. Ibid., p. 304.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

20

It may also be a term descriptive of an incomplete complex providing this complex fulfills certain conditions. It must have the property of "non-recurrence".⁵⁰ It must also "given any two space-time points of which it is a part",⁵¹ have a continuity which runs between any given "two space-time points" in a "continuous region in space-time".⁵² What separates the complete from incomplete complex is that the latter does not "occupy only^{one} space-time point."⁵³ Given the present state of knowledge all events may be considered incomplete. What Russell seems to be saying is that an event is made up of two components. First, one instance of a particular set of properties happens once at a particular place in a particular time as part of a group of other qualities. Colour for example is never found by itself but along with shape, weight and dimensions. It is the singularity of time which makes every event one of a kind. The second component concerns the fact that while each may be unique there are similar events. This in itself would indicate for Russell that the space-time structure which

50. Ibid., p. 305.

51. Ibid., p. 305.

52. Ibid., p. 305.

53. Ibid., p. 305.

underlies these unique happenings contains in itself similar structural elements which allow both the unique appearances and a comparison between them. Russell states on this point

Total momentary experiences as opposed to qualities, have time relations possessing the desired characteristics. I can see blue yesterday, red today, and blue again tomorrow. Therefore, so far as qualities are concerned, blue is before red and red is before blue, while blue since it occurs yesterday and tomorrow is before itself. We cannot therefore construct, out of qualities alone such a relation as will generate a series. But out of total momentary experiences we can do this, provided no total momentary experience ever exactly recurs.⁵⁴

There is another reason as well, more purely epistemological, why Russell does not wish to consider particulars as unanalyzable. This has to do with his position on what might be called nominalism.

6. Three Historical Views on the Construction of Events

He maintains there have been three influential historical views on the nature of particulars or events.

First: a particular is constituted by qualities when all its qualities have been enumerated. It is fully defined. This is the view of Leibniz. Second: a particular is defined by its spatio-temporal position. This is the view of Thomas Aquinas as regards material substances. Third: numerical diversity is ultimate and indefinable. This, I think, would be the view of most modern empiricists if they took the trouble to have a definite view.⁵⁵

54. Bertrand Russell, Human Knowledge, p. 297.

55. Ibid., p. 292.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

22

Russell feels that the view of Aquinas can be reduced to the first or third position. He rejects the third, his former position, because he maintains it holds the view that the "particular cannot be defined or recognized or known; it is something serving the merely grammatical purpose of providing the subject in a subject-predicate sentence..."⁵⁶ he adds, "to allow grammar to dictate our metaphysic is now generally recognized to be dangerous."⁵⁷ Russell then proposes to accept in a qualified way the formulation of Leibniz, according to which, "in theory every complex of compresence can be defined by enumerating its component qualities."⁵⁸ However, what actually happens is that only some of the component qualities may be known at a given time and to this a proper name is assigned, and so, "the need for proper names, therefore, is bound up with our way of acquiring knowledge, and would cease if our knowledge were complete."⁵⁹ The preceding attempts to evaluate Russell's notion of event is brief and very incomplete. It leaves many important questions unanswered. Whether or not this conception can be dealt with as

56. Bertrand Russell, Human Knowledge, p. 293.

57. Ibid., p. 293.

58. Ibid., p. 308.

59. Ibid., p. 308.

an epistemological tenet or simply as what Russell has to say about the ultimate constituents of the world cannot be given more than a tentative answer. It is suggested here that the use Russell makes of physics, that is, in his acceptance of the methods as well as the contents of physics holds epistemological as well as metaphysical elements. It is hoped that this will become even clearer when the notion of event is returned to in subsequent sections.

7. The Patch Theory

It is not however in whatever epistemology underlies Relativistic Physics that Russell's starting point must be sought but in Humean empiricism. Hume stated for example,

We have no idea of substance of any kind since we have no idea but what is derived from some impression and we have no impression of any substance either material or spiritual. We know nothing but particular qualities and perceptions as our idea of any body, a peach for instance is only that of a particular taste, colour, figure, size, consistancy, etc., so our idea of any mind is only that of particular perceptions without the notion of anything we call substance, either simple or compound.⁶⁰

Russell, in a way, takes this even farther because while the human knower perceives "in the last analyses, colour

60. David Hume, An Abstract of a Treatise of Human Nature as found in Essays in Philosophy (Houston Peterson (Editor)), New York, Pocket Books, 1959, p. 23.

patches",⁶¹ the data of physical theory informs him "molecules have no colour, atoms make no noise, electrons and corpuscles do not even smell".⁶² Now the supposition here of course^{is} that the data of the sciences is in some way more true than the immediate experience of perceptual knowledge. Now on this he maintains that if someone were to object to the truth of physics and physiology is doubted, nothing "as to the outer world"⁶³ can be known at all. Russell by accepting at least parts of the contemporary sciences of physiology and psychology develops Hume's notion of sensation. Nevertheless he acknowledges his debt to Hume when he says "Hume alone among the great philosophers denied substance altogether, and thus paved the way for a modern discussion between the mental and the physical."⁶⁴ Russell further says on this point..... "If we are to avoid a perfectly gratuitous assumption, we must dispense with the subject as one of the actual ingredients of the world."⁶⁵ Russell unlike Hume, however, is much more aware of the consequences of eliminating the subject, for he says "when we do this, the

61. Bertrand Russell, Human Knowledge, p. 202.

62. Bertrand Russell, Mysticism and Logic, p. 145.

63. Bertrand Russell, Human Knowledge, p. 171.

64. Ibid., p. 43.

65. Bertrand Russell, My Philosophical Development, p. 136.

possibility of distinguishing the sensation from the sense data, vanishes."⁶⁶ However he continues,

I see no way of preserving the distinction. Accordingly the sensation that we have when we see a patch of colour simply is that patch of colour, an actual constituent of the physical world, and part of what physics is concerned with. A patch of colour is certainly not knowledge, and therefore we cannot say that pure sensation is cognitive. Through its psychological effects, it is the cause of cognitions, partly by being itself a sign of thing that are correlated with it, as e.g. sensations of sight and touch are correlated, and partly giving rise to images and memories after the sensation is faded. But in itself the pure sensation is not cognitive.⁶⁷

In fact, the problem of separating sensation from sense data is really secondary to another problem and that is to show that "our habits of association"⁶⁸ which are involved in perception "run parallel to processes in the external world."⁶⁹ The solution to this problem occupies the greatest part of Russell's efforts in Human Knowledge, as such, it is better dealt with in conjunction with other questions. However, the contribution which Russell's acceptance of psychological data makes towards the solution of the way in which Russell conjoins mental and physical events, may be readily explored at this point. This is because while

66. Bertrand Russell, My Philosophical Development, p. 136.

67. Ibid., p. 136.

68. Bertrand Russell, Human Knowledge, p. 170.

69. Ibid., p. 170.

"every physical datum is derived from a system of psychological data, the converse is not the case,"⁷⁰ and as it will be seen the way in which psychological data are connected also serve as the basis for the correlation of physical data.

8. Percept and Psychology

In his discussion of the formation of percepts Russell incorporates two forms of psychological insight. The first is generally known as behaviouristic, the second the introspective. It is this use of psychology which makes it more difficult to separate Russell's epistemology from psychology, nevertheless when Russell speaks of perception he speaks of the way in which percepts originate rather than their epistemological status. He says for example "Psychology is the science which deals with private data, and with the private aspects of data which common sense regards as public."⁷¹ Russell uses behaviourism to describe the way in which perceptions come about.

70. Bertrand Russell, Human Knowledge, p. 45. The definition he gives for a "physical datum is this, it is 'something abstracted from a system of correlated psychological data' (Ibid. p. 71) Data are in general 'those matters of fact of which, independently of inference, we have a right to feel most nearly certain'. Ibid., p. 171. It is interesting to note that the definition he gives for data is almost identical to the one he gives for "mental event".

71. Bertrand Russell, Human Knowledge, p. 45.

He asserts,

...When I wrote the Analysis of Mind I was not fully aware of the need for re-interpreting what common sense calls 'the evidence of the senses'.

A part of the problem can be dealt with by behaviourist methods. One of the differences between dead matter and a living body is that the response of the living body to a frequently applied stimulus changes with repetitions of the stimulus, whereas the response of dead matter in general shows no such change.... Habit, which is one of the most fundamental characteristics of living matter, and especially of the higher forms of life, consists essentially in the 'conditioned reflex'. The essence of the 'conditioned reflex' is this: Given that an animal responds to a stimulus A is frequently presented to it along with another stimulus B, the animal tends in time to react to B as it formerly reacted to A.⁷²

According to Russell then, sensations are filled out to become percepts and percepts themselves are connected and associated by a process of habit⁷³ as it is described by J.B. Watson and other behaviourists. However, Russell is not satisfied with a strict behaviourism. He says,

A fundamental objection is raised by a certain school of psychologists, who maintain that introspection is not a valid scientific method and that nothing

72. Bertrand Russell, My Philosophical Development, p. 137.

73. He asserts.... Perception as opposed to 'sensation' involves habit based upon past experience. We may distinguish sensation as that part of total experience which is due to the stimulus alone, independently of past history. This is a theoretical core in the total occurrence. The total occurrence is always an interpretation in which the sensational core has accretions embodying habits.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

28

can be scientifically known except what is derived from public data. This view seems to me so absurd that if it were not so widely held I would ignore it.⁷⁴

Russell is not entirely clear as to what he means by introspection. He says for example "I think it will be found that the essential characteristics of introspective data.... has to do with localization."⁷⁵ He says also "Consciousness is a complex and far from universal characteristic of mental phenomena."⁷⁶ It is to be 'aware of an awareness'.⁷⁷ Whatever might constitute introspection for Russell it plays a very important part in his philosophy of science. It is with introspection that he is able to make the distinction between private and public data. He says for example,

All the data of physics are also data of psychology but not vice versa; data belonging to both are made the basis of quite different inferences in the two sciences. Introspection is valid as a source of data and is to a considerable extent amenable to scientific controls.⁷⁸

74. Bertrand Russell, The Analysis of Mind, London, Allen and Undwin, 1921 (1961), p. 142.

75. Ibid., p. 120.

76. Ibid., p. 308.

77. Or rather it is "awareness" which sometimes becomes "A thought whose object is a conscious experience" (Ibid., p. 112).

78. Bertrand Russell, Human Knowledge, p. 51.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

29

9. Introspection, Percept and Solipsism

It seems useful at this point to note the solipsistic tendencies in Russell's notion of percept or data. This will be observed again in the subsequent section on neutral monism. Russell states,

For the present I am content to say that the distinction between public and private data is one of degree, that it depends upon testimony which bears witness to the results of introspection, that physiology would lead to the expectation that sensations caused by a stimulus inside a human body would be private and finally, that many of the facts of which each of us is most certain are known to us by means private to ourselves.⁷⁹

He says as well,

If we were to speak with pedantic accuracy we should have to say, that everything that can be observed is private to one person. There is often however such a close similarity between the simultaneous percepts of different people that the minute differences can for many purposes be ignored.⁸⁰

This tendency towards a philosophical solipsism is one which Russell tries to escape through his causal theory of perception.

10. Russell's Causal Theory of Perception

The causal theory of perception is one of Russell's postulates of non-demonstrative inference. Setting aside

79. Ibid., pp. 47-48.

80. Ibid., p. 44.

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

30

whatever deeper epistemological reason that Russell has for accepting this postulate, until a further section, it seems sufficient at this point to state that he accepts it for the same reasons that he accepts the notion of event, viz.

it is necessary for scientific theorizing. It is on the basis of this theory that Russell is able to justify his belief in the external world and it is also on this basis that Russell is able to make the distinction between sensation and image; a problem which plagues him at least to the time in which he wrote An Inquiry Into Meaning and Truth.

He says on these two points

Images are just as truly a part of the actual world as sensations are. All that we really mean by calling an image unreal is that it does not have the concomitants which it would have if it were a sensation.An image is occasioned, through association by sensation or another image, in other words that it has mnemonic cause--which does not prevent it from also having a physical cause.... Sensations, on the other hand will only have physical causes.⁸⁰

Only on the basis of the causal theory, is Russell able to distinguish between certain components of his mental life,⁸¹

80. Bertrand Russell, The Analysis of Mind, p. 148. Then the difference between a memory image and a 'sensation' image would be the latter has a physical cause which the former does not have.

81. As he says "sensations if regarded as spontaneous.... seem unaccountable". Bertrand Russell, Human Knowledge, p. 226. This would imply that there are some parts of the mental experience which can be accounted for within the context of mental processes as such.

but more importantly "if percepts are to allow inferences to objects, the physical world must contain more or less separable causal chains."⁸² Russell again accepts from science that such is the case. He says,

If the separateness of....things in my visual field is to correspond to a physical separateness, each of them must start its own causal chain, arriving at my eye without much interference from the others. The theory of light assures us that is the case... Light waves emanating from a source will, in suitable circumstances, pursue their course practically unaffected by other light waves in the same region.⁸³

The preceding quotation might be said to concern Russell's metaphysics as well as his epistemology, however, it is as an epistemological postulate that this theory has its greatest importance. For example Russell states,

A percept, we have agreed, comes at the end of a causal chain which starts at the object. (Of course no causal chain really has either a beginning or an end. From another point of view the percept is the beginning; it begins the reaction to a stimulus.) If the percept is to be a source of knowledge of the object, it must be possible to infer the cause from the effect, or at least to infer some characteristics of the cause. In this backward inference from effect to cause, I shall for the present assume the laws of physics.⁸⁴

82. Bertrand Russell, Human Knowledge, p. 206.

83. Ibid., p. 206.

84. Ibid., p. 206. Strictly speaking, the ability to infer to characteristic is the function of the causality postulate along with another the 'structural postulate'. What is interesting to note at this point is that Russell states "Structure is defined" by "relations involving spatio-temporal contiguity". Ibid., p. 467 .

The full import of this theory concerning Russell's general epistemology as well as his philosophy of science can only be appreciated when taken in conjunction with other elements such as perceptual space and Russell's notion of the status of scientific causality.

11. Summary

While it was not made clear in the preceding treatment of what might be called the epistemological foundations or better still the epistemological sources of Bertrand Russell's philosophy of science, it is hoped that several things concerning Russell's epistemology have emerged. First, Russell adopts the unusual procedure of, on the whole, accepting the truth of scientific theory while trying to establish that this acceptance is justifiable. Second, in this belief Russell assumed several fundamental epistemological premises. For instance, when Russell accepts Einstein's conceptualization of the structure of space-time, he assumes that this necessitates a rejection of the common-sense view of what constitutes the world. He furthermore assumes that the descriptive method of physics should apply equally to metaphysics. Thus an event is known through the description, isolation and enumeration of its properties. Russell introduces behaviourist psychology to explain how a sensation becomes a perception. He also introduces

RUSSELL'S EPISTEMOLOGICAL FOUNDATIONS

33

introspection in order that the distinction between these two be made. However it was said that despite Russell's use of physics and psychology his main epistemological ground is Humean empiricism, that is to say, according to Russell human knowledge begins from sensation, not from things. It is for the difficulties that this position implies that Russell introduces his causal theory of perception; first to show, that it can be known there is an external world, second, to show, that events in the external world may be separated so as to be intelligible. It is with the question of the origin and connections which join sensations as well as the distinction between common sense and scientific knowledge that the second chapter must deal.

CHAPTER II

MENTAL EVENTS

Russell is not completely unaware of the philosophical dangers involved in accepting sensations as an epistemological starting point and, in a way, what he does to try and overcome the problems involved can be subsumed under the general title of mental event. It seems natural then to begin this chapter by giving the reasons why he feels that he must modify his empiricism.

1. Russell's Modified Empiricism

Russell says in An Inquiry Into Meaning and Truth,

.....I will observe....., that empiricism, as a theory of knowledge, is self refuting. For, however it may be formulated, it must involve some general proposition about the dependence of knowledge upon experience; and any such proposition, if true, must have as a consequence that itself cannot be known. While, therefore, empiricism may be true it cannot if true, be known to be so.....¹

It has already been pointed out that Russell felt there must be some way to show that sensations and the connections between sensations do give some valid knowledge of the external world. This still leaves the double problem of the way in which sensations can correspond to events or the

1. Bertrand Russell, An Inquiry Into Meaning and Truth, Middlesex, UK, Pelican Books, 1940 (1962 ed.), p. 165.

qualities that make up events and how the connections between sensations may be known to reflect relations in the external world as well.

Hume had his twin criteria of vividness and liveliness to distinguish between impressions which he felt to come from the external world and ideas or images which he believed to be products of mental activity. Russell rejects these criteria. He says,

The difference between an impression and an idea should be that the former but not the latter, has a proximate cause which is external. Hume it is true, professes to find an intrinsic difference; impressions are distinguished from ideas by their greater "liveliness". But this won't do, some impressions are faint and some ideas are lively. For my part, I should define an impression or a sensation, as a mental occurrence of which the proximate cause is physical, while an idea has a proximate cause which is mental.²

Russell also suggests that if Hume's position is accepted or pushed to its logical consequence, then the only proper philosophical stance tenable would be what he calls "a solipsism of the moment."³ However he rejects this position. Russell, and this point will be reemphasized in a subsequent section, has no means of logically denying solipsism, he just

2. Bertrand Russell, Human Knowledge, p. 456.

3. Ibid., p. 181. This however is not tenable because he remarks "As against solipsism it is to be said, in the first place that it is psychologically impossible to believe, and it is rejected in fact even by those who seem to accept it. Ibid., p. 180.

does not see how anyone could hold this position from a psychological standpoint. The alternative then demands that he go outside the bounds of Hume's empiricism. He says

Inferred particular facts, such as those of history always demand experienced particular facts among their premises. But since in deductive logic, one fact or collection of facts cannot imply any other fact, the inferences from facts to other facts can only be valid if the world has certain characteristics which are not logically necessary.⁴

If there has to be such a principle or principles, upon which inferences from one fact to another can be justified and as Humean empiricism does not consider such inferences to be legitimate, empiricism itself must be modified. This modification takes Russell in certain respects, in the direction of the Cartesian doubt.

2. Russell's Acceptance of the Cartesian Doubt

Russell makes some extremely significant statements about Descartes in Human Knowledge. He maintains that while Empiricism has definitely shown that Descartes' belief in the clear and distinct idea as the criterion of truth, from which it is possible, "to derive not only logic and metaphysics but also matters of fact"⁵, is definitely false, there is a sense in which Descartes' arguments are correct.

4. Bertrand Russell, Human Knowledge, p. 506.

5. Ibid., p. 153.

MENTAL EVENTS

37

On this he writes,

What I am saying--and in this I am propounding part of Descartes' argument--is that there are some occurrences that I cannot make myself doubt, and that these are all of the kind that if we admit a not-self, are part of the life of myself. Not all of them are sensations; some are abstract thoughts, some are memories, some are wishes, some are pleasures or pains. But all are what we should commonly describe as mental events in me.⁶

There is a concept of self-evidence involved here which this philosopher holds "cannot be entirely dispensed with".⁷

Furthermore, the concept of self-evidence applies not only "to conceptual evidence but also to perceptual evidence by which we come to know matters of fact".⁸

The difference between Russell's position and that of Descartes' concerns the way in which these matters of fact are to be interpreted.⁹ While Descartes believed the clear and distinct idea truthfully reflected some aspect of the structure of the external world, Russell holds that something more is needed, such as his causal theory of

6. Bertrand Russell, Human Knowledge, p. 153.

7. Ibid., p. 153.

8. Ibid., p. 153.

9. That is to say in the manner in which Russell interprets Descartes, he asserts, while, "Descartes holds that whatever I can conceive clearly and distinctly is true" (Ibid., p. 153). We do not think even the utmost clarity in our thoughts would enable us to demonstrate the existence of Cape Horn". Ibid., p. 153.

perception, to justify an occurrence as in some extramental as well as intramental. Nevertheless, of the existence of the occurrence itself, there can be no doubt.¹⁰

In accepting this much of the Cartesian doubt Russell indicates that he is also to a degree paralleling the Cartesian method, that is, beginning from what is vague and doubtful and through a process of analysis arriving at what is clearer and more certain. He states,

I....shall pass....to a....line of argument which is related to the method of Cartesian doubt. This method consists in searching for data by provisionally rejecting everything that it is possible to call in question.¹¹

It is not perhaps the best procedure to talk about method, doubt and self-evidence as synonymous. His method certainly involves establishing reasons for doubtfulness and here are to be found his notions of verification as

10. The evidence Russell cites for this is of the following kind.

When I see a flash of lightning, I may, it is maintained, be uncertain as to the physical character and even as to whether anything external to myself has happened, but I cannot make myself doubt that there has been the occurrences which is called "seeing a flash of lightning", though there may have been flash outside my seeing. Ibid., p. 173.

11. Ibid., p. 173. Concerning relations he says "We must whenever possible translate the causal transitions of primitive thinking into logical thinking and only accept the derived beliefs to the extent the character of the transitions seems to justify. Ibid., p. 166.

well as consistency.¹² Thus there is an empiricist conceptual structure present which is completely foreign to the thought of Descartes. As for the concept of doubtfulness itself this would seem to necessitate some sort of notion of certainty or self-evidence. At least it does in Russell's context. These ideas then interpenetrate. A relative certainty is arrived at through the application of the method but this certainty would seem to be implicit in the concept of doubtfulness itself. However this may be Russell uses the Cartesian doubt in several ways. He uses it to order percepts and he uses it to order the connections between parts of a percept and between the percepts themselves. In this way he wishes to build up a hierarchy of belief. This task is made easier for him because he maintains that each sensation brings with it a concomitant belief and belief of course can be considered the opposite of doubt. Associated beliefs become stronger and stronger each time a particular correlation of sensations with expectations occur.

Russell states,

Perception as opposed to sensation, involves habit based upon past experience. We may distinguish

12. It is interesting to note here that Russell's description of the scientific method is identical to his description of his own philosophical method. He says "Scientific method consists mainly in eliminating those beliefs which there is positive reason to think sources of shock while entertaining those against which no positive argument can be brought. Ibid., p. 185.

sensation as that part of our total experience which is due to stimulus alone independently of past history. This is a theoretical core in the total occurrence. The total occurrence is always an interpretation in which the sensational core has accretions embodying habits. When you see a dog, the sensational core is a patch of colour stripped of all the adjuncts involved as recognizing it as a dog. You expect the patch of colour to move in the way that is a characteristic of dogs.¹³

The habits involved then are at least in part habits of expectation or belief. Strictly speaking there is no way of separating that which is connected to a sensation and the way that connections are made between sensations themselves, both are a product of animal inference. It seems however better to take Russell's conceptualization of the connection between sensations with the general topic of induction. The following discussion then is restricted to the way in which a sensation becomes a percept. Although much of what will be said applies equally to the connections between sensations and percepts.

3. Sensation, Percept and Belief

Russell states,

The filling out of the sensational core by means of animal influence until it becomes what is called perception is analogous to the filling out of telegraphic messages in newspaper offices.

13. Bertrand Russell, My Philosophical Development, p. 143.

MENTAL EVENTS

41

The reporter telegraphs the one word "King" and the newspaper prints "His Gracious Majesty King George VI".¹⁴

Russell, to repeat what was said in a previous section, draws on behaviour of psychology and contemporary, observational, biological theory to account for this process. He gives the example of a dog who smells the scent of a fox. He maintains the dog becomes excited because previous experience has conditioned the animal to associate the smell of fox with the presence of fox "in the neighbourhood".¹⁵ The dog then expects or believes that it is true there is a fox now present. This philosopher maintains that while this might appear to be a process of conscious reasoning, in actuality, "this reasoning is performed by the body, through habit or the "conditioned reflex" as it is called".¹⁶ Russell clearly asserts that the relationship between A and B is at least partly one of belief. He says, "when the sensible presence of A causes acts appropriate to B, we may say the animal "believes" B to be in the environment."¹⁷

14. Bertrand Russell, Human Knowledge, p. 169.

15. Ibid., p. 183.

16. Ibid., p. 183. He remarks further, that "There is no conscious connection of A and B; there is, we may say, A-perception and B-behaviour. In old-fashioned language, it would be said that the "impression" of A causes the "idea" of B. But the newer phraseology, in terms of bodily behaviour and observable habit, is more precise and covers a wider field. Ibid., p. 183.

17. Ibid., p. 183.

Perception then is the product of sensation plus expectations which are added by the perceiver to sensations because of previous similar conjunctions between sensations and their associations. Why the original associations or conjunctions occur Russell does not say except that for some animals it happens "because of an innate disposition"¹⁸ and that 'animals would not have survived without the correct responses to the environment.'¹⁹ Before pursuing the question of belief or doubt further it is necessary to consider some other elements which are conjoined to sensations.

4. Habit, Memory and Ideas

It is obvious that when Russell speaks of habit he is assuming it because to know that something occurs by habit, it is necessary to be aware that something reoccurs. One of the components of this awareness is memory. Russell feels that the veridicity of memory cannot be established but must be accepted as an 'independent postulate'.²⁰

Nevertheless, Russell asserts "sensation and

18. Bertrand Russell, Human Knowledge, p. 218. Russell's words are "innate constitution".

19. Ibid., p. 430.

20. He says, "That memory is in the main veridical, is in my opinion, one of the premises of knowledge". Ibid., p. 212.

memory"²¹ are the two sources of human knowledge. This is because images occur either by way of sensations or by way of memory. Russell says as well "Images occur in two ways, as imagination and as recollection".²² Russell uses the concept of belief to distinguish pure imagination from ideas which refer to something beyond themselves,

If A is a recollection of B, something more is involved. For in this case A is felt or believed to be pointing to something other than itself, and this something is in fact, B. We should like to say that A is felt to be pointing to B, but this we have no right to say, since B is not itself present to the person recollecting; what is present is only A, as B's representative. We must say therefore, that in memory as opposed to pure imagination, there is the belief; A is related to something as an idea to prototype.²³

Russell has then a picture theory²⁴ of the way in which ideas or concepts are formed. This in a sense represents an independent part of his theory of knowledge. As with his notion of the formation of idea, his notion of introspection can be seen as a support axiom.

21. Bertrand Russell, Human Knowledge, p. 422.

22. Ibid., p. 108.

23. Ibid., p. 109.

24. That this is the case may be seen when Russell says "What is involved in saying that A is an image or idea of B? First, there must be resemblance;....Second, B must play a certain definite part in the causation of A. Third, A and B must have certain effects in common; for example, they can cause the same words to occur to a person who experiences them. When these three relations exist, I shall say that B is the "prototype" of A. Ibid., p. 109.

He leaves the question open as to why a particular idea should arise out of a particular sensation or set of sensations and he also does not say why an idea should necessarily be some sort of an image or picture. He does say though "Habit, memory and thought are all developments of mnemic causation; and it is probable, that mnemic causation is derivative from ordinary physical causation in nervous and other tissues."²⁵

5. Knowledge and Belief

It must be remembered in this discussion that Russell is not talking about external events, as external events but merely trying to find a way of ordering and connecting mental occurrences. As he says himself on this point, "What we are concerned with is a reference of one part of my mental life to another."²⁶ Nevertheless when this thinker comes to discuss the relationships which hold between mental events he cannot avoid making reference to the external world. For example, when he talks about knowledge, he maintains,

25. Bertrand Russell, The Analysis of Mind, p. 307.

26. Bertrand Russell, Human Knowledge, p. 107.

MENTAL EVENTS

45

Knowledge in the sense which it does not merely register present sensible impressions, consists essentially of preparations for such delayed reactions. Such preparations may be called "beliefs", but they are only to be called "knowledge" when they prompt successful reactions, or at any rate show themselves related to the facts with which they are concerned in some way which distinguishes them from preparations that would be called "errors".²⁷

This apparent weakness must be returned to at a later point.

The question remains as to how Russell can assign degrees of doubt to specific beliefs or the images which accompany beliefs. This he feels is possible on two grounds.

First, the human knower through his power to introspect can reflect on the elements of his knowledge. Russell says on this

We thus find ourselves when we begin to reflect expecting all sorts of things to happen that in fact happen, although it would be logically possible for them not to happen in spite of the occurrence of the sensations which give rise to the expectations. Thus, reflection upon animal inference gives us the initial store of scientific laws, such as "dogs bark". These initial laws are

27. Bertrand Russell, Human Knowledge, p. 4. 'Belief' and 'Idea' are interchangeable concepts since both are defined the same way, an idea is "a state of an organism appropriate to something not sensibly present". Ibid., p. 95.

28. 'Ideas' or images would seem to be a sub-class of 'belief' as belief is defined as "A state of mind or body or both, in which animal acts with reference to something not sensibly present". Bertrand Russell, Human Knowledge, p. 113. Knowledge then entails those ideas which have extramental prototypes although conceivably the relationship could hold as well between idea and idea.

MENTAL EVENTS

46

usually somewhat unreliable, but they help us take the first step towards scientific evidence.^{29a}

The second thing about perception which Russell finds helpful in establishing a hierarchy of belief, is that some of the adjuncts connected to the sensation or the memory image have logical as well as psychological aspects. If, for him, animal inference is the "process of spontaneous interpretation of sensation"^{29b} and some of these interpretations are correct, that is, they allow the animal to function in his environment, reflection upon them by a human knower reveals the logical reason why this is the case. The way this occurs is described by him in the following manner,

There is....a distinction between beliefs that arise spontaneously and beliefs for which no further reason can be given. It is the latter class of beliefs that are most important for theory of knowledge since they are the indispensable minimum of premises for our knowledge of matters of fact. Such beliefs I shall call "data." In ordinary thinking they are the causes of other beliefs rather than the premises from which other beliefs are inferred; but in a critical scrutiny of our beliefs as to matters of fact we must whenever possible translate the causal transitions of primitive thinking into logical transitions, and only accept the derived beliefs to the extent that the character of the transitions seems to justify.³⁰

29a. Bertrand Russell, Human Knowledge, p. 168.

29b. Ibid., p. 167.

30. Ibid., p. 166. All true beliefs are not knowledge as in the case where the relationship of prototype to ideas is true but only accidentally.

Concerning sensation itself, the fact that the human mind has the power to discern these logical connections means that the true nature of sensation can be approached to with a greater and greater degree of accuracy. Thus by means of analysis or his previously mentioned method, it is possible to approach "asymptotically"^{31a} to the sensational core. Those connections which are merely psychological are the most dubious and as such may be eliminated. On the other hand, those connections which are reasonable to some degree, may be retained. By reasonable, Russell means any proposition to which rational belief may be attached and which "can in theory be placed in a scale between certain truth and falsehood."^{31b} As he asserts,

But although every part of what we should like to consider "knowledge" may be in some degree doubtful, it is clear that some things are almost certain, while others are matters of hazardous conjecture. For a rational man, there is a scale of doubtfulness, from simple logical and arithmetical propositions and perceptive judgments, at one end, to such questions as what language the Mycenaeans spoke or "what song the Sirens sang" at the other.³²

According to him, most perceptive judgments "according to their vividness and recentness"³³ have "the highest degree

31a. Bertrand Russell, An Inquiry Into Meaning and Truth, p. 124.

31b. Bertrand Russell, Human Knowledge, p. 381.

32. Ibid., p. 381.

33. Ibid., p. 344.

of credibility to which we can obtain".³⁴ This still leaves three great difficulties. The first concerns the way in which Russell connects percepts to whatever exists in the extramental world. The second concerns the way in which he connects sensations or percepts to each other. The third deals with Russell's justification of the connection between mental events as a reflection of the structures and processes of events in the external world. However, before attempting to elucidate this philosopher's treatment of these problems in greater detail, two other aspects of Russell's epistemology should be looked at. This entails an exposure of what he considers the relationship of common sense to science to be and his doctrine of neutral monism.

6. Common Sense and Science

It may be observed that Russell's view of the relationship which exists between common sense and science is in accord with his method. That is to say, common-sense knowledge is considered to be vague and uncertain while

34. Bertrand Russell, Human Knowledge, p. 344. Russell says elsewhere that he is not "contending that data are ever completely certain nor is this contention necessary for their importance in theory of knowledge". Ibid., p. 167. Furthermore while 'a degree of credibility' may be assigned to perceptive judgment on the grounds of 'vividness' different criteria such as those of coherence and consistency apply to logical or arithmetical propositions.

scientific theory is considered to be much clearer and much more certain. However, it should be noted at the same time that common-sense knowledge is not strictly synonymous with naive realism. Nor does Russell strictly accept the truth of physics as being certain. In his discussion of the difference between common sense and science Russell's opinion might be summarized this way. Common sense when it speaks about mental events is generally right but in a crude way. On the other hand, common sense when it speaks about extra-mental events is generally wrong. In this belief Russell is perfectly consistent with his acceptance of degrees of credibility or self-evidence. As it was said before the hierarchy of belief has to do with the ordering of mental events. Russell clearly demarcates what is the domain of common sense from what is not when he says,

Mind....so common sense might say....is exhibited by persons who do and suffer various things. Cognitively, they perceive, remember, imagine, abstract, and infer.... All these occurrences can be perceived by the persons to whom they happen, and all are to be classified together as "mental events"....But in addition to perceiving "thoughts"--so common-sense holds--we also perceive "things" and events which are outside ourselves.... This common-sense view, while on the whole acceptable as regards mental events, requires radical alterations where physical events are concerned. What I know without inference when I have the experience called "seeing the sun" is not the sun but a mental event in me. I am not immediately aware of tables and chairs but only of certain effects that they have on me.³⁵

35. Bertrand Russell, *Human Knowledge*, p. 224-224.

Russell's decision to regard the common-sense view of mental events as acceptable while regarding the common-sense view of physical events as synonymous with naive realism comes first, of course, with his acceptance of sensation as a starting point for knowledge. However he feels that this view is further supported by the sciences of physics, psychology and physiology. These sciences according to Russell would indicate that knowledge of the extramental world is mediate not immediate. In other words, for Russell there is no direct apprehension of anything in the extramental world. All knowledge is knowledge by inference concerning those things which are outside the mind. As with Descartes what is known directly is various forms of mental activity. In fact, he defines a mental event as that which is known without inference. He says,

So long as naive realism remains tenable, perception was knowledge of a physical object, obtained through the senses not by inference. But in accepting the causal theory of perception we have committed ourselves to the view that perception gives no immediate knowledge of a physical object but at best a datum for inference.³⁶

How then does physiology support Russell's causal theory of perception? He says,

....There are two sorts of nerve fibres, those that carry messages into the brain and those that carry messages out of it. The former alone are

36. Bertrand Russell, The Analysis of Mind, p. 218.

MENTAL EVENTS

51

are concerned in the physiology of sensation. Isolated nerves can be stimulated by an electric current, and there is good reason to believe that the processes thus set up are essentially similar to those set up naturally in nerves that are still in place in a living body. When an isolated nerve is thus stimulated in an adequate manner, a disturbance is set up which travels along the nerve at a speed of about 220 miles an hour....Owing to the discontinuous nature of the response to a stimulus, the response will be exactly the same to a constant stimulus as to one which is intermittent with the frequency adapted to the period of recovery in the nerve. It would seem to follow that there can be no means of knowing whether the stimulus is constant or intermittent.³⁷

Russell is arguing here implicitly that since there is a process or a media through which knowledge is transmitted from the thing known to the knower, there can be no justification for asserting that the known is as the knower knows it, since what he knows is the thing plus the processes through which the knowledge is brought to him. This could be stated more simply by the question 'Do you know the thing or the media, and how is it possible to know truly'? Russell also argues that physics shows the same sort of causal mediation. He says common sense maintains,

....There is an object which is round and bright and hot; the kind of event called "seeing the sun" consists in a relation between me and this object, and when this relation occurs I am "perceiving" the object.

But at this point physics intervenes in a very awkward way. It assures us that the sun is not "bright" in the sense in which we usually

37. Bertrand Russell, Human Knowledge, pp. 37-38.

understand the word; it is a source of light rays which have a certain effect upon eyes and nerves and brains, but when this effect is absent because the light rays do not encounter a living organism, there is nothing that can properly be called "brightness".³⁸

Russell continues his argument through stating a fact about the nature of light. Since light has a finite speed, and since this amounts to an eight minute difference between emission from the sun and reception on earth, in that interim the sun could have gone out. Therefore, "we cannot....identify the physical sun with what we see".³⁹ As well as the fact that Russell is arguing that the presences of a media may radically alter the act of knowing, there is another argument implicit in the quotations just presented; the old and familiar argument of illusion.⁴⁰ This is that the same set of stimuli could be promoted through a different causation than the one the perceiver thinks the stimuli have. There can be then no exclusively logical justification for any act of knowing. A further development of the

38. Bertrand Russell, Human Knowledge, p. 203.

39. Ibid., p. 204.

40. He states for example, "Much psychology is involved in connecting sensory stimuli with the beliefs to which they give rise. I am thinking of such elementary occurrences as thinking "there's a cat", when certain coloured patches in motion pass across your field of vision. It is obvious that the same sensory stimulus could be caused otherwise than by a cat, and your belief would then be false...." Bertrand Russell, Human Knowledge, p. 51.

relationship of science to common sense is better considered along with certain specific topics, one of these is Russell's doctrine of neutral monism.

7. Neutral Monism

Russell does not use the term neutral monism in Human Knowledge but this doctrine is still very much present. Basically Russell derives his thesis from the same sources as the rest of his epistemology, that is, Humean empiricism and the sciences. He says in the preface of The Analysis of Mind

On the one hand many psychologists, especially those of the behaviouristic school, tend to adopt what is essentially a materialistic position, as a matter of method if not of metaphysics. They make psychology increasingly dependent on physiology and external observation, and tend to think of matter as something much more solid and indubitable than mind. Meanwhile the physicists, especially Einstein, have been making "matter" less and less material. Their world consists of "events", from which "matter" is derived by a logical construction.⁴¹

This program is of course Russell's as well. It may be that it is solely his, or at least merely his interpretation of Einstein and behaviourism. As it has been seen, Russell only allows mental events to be known without inference. All physical events on the other hand are known through inference, that is, they are constructions out of mental

41. Bertrand Russell, The Analysis of Mind, p. 5.

MENTAL EVENTS

54

events. These constructions identify certain causal laws concerning structure and process. On the other hand, psychologists according to Russell indicate that mental events more or less behave as do physical events. Something concerning this has already been seen in the discussion of Russell's arguments about the mediacy of the act of knowing. He puts this notion of the possibility of describing all mental events in the same way as physical events even more clearly when he says....

We suggested, as a probable hypothesis, the view that all bodily behaviour is theoretically explicable in physical terms without taking any account of the mental concomitants of physiological occurrences... If A and B are two events in the brain, and if A causes B, then if a is a mental concomitant of A, and b of B, it will follow that a causes b, which is purely mental causal law. In fact, causal laws are not of the simple for "A causes B," but in their true form the principle remains the same.⁴²

According to Russell the only thing which distinguishes physics from psychology is that psychology includes as part of itself introspection while physics does not. Thus he says,

Psychology is a science distinct from physics and physiology, and in part independent of them. All the data of physics are also data of psychology, but not vice versa; data belonging to both are made the basis of quite different inferences in the two sciences. Introspection is valid as a source of data, and is to a considerable extent amenable to scientific controls.⁴³

42. Bertrand Russell, Human Knowledge, p. 50.

43. Ibid., p. 51.

Neutral monism is neutral for Russell in the sense that as mental events are the only ones which can be known without inference and as physical events can only be known according to their space-time structure and what is more are constructions out of mental events, the question cannot be answered definitely as to whether or not mental events are like or unlike physical events.⁴⁴

8. Summary

In this chapter the relationship between mental events and physical events were considered. It was seen that according to Russell mental events can be dealt with according to a rational principle somewhat analogous to the Cartesian principle of the methodic doubt, that is to say, mental events can be classified according to their degree of credibility based on the presence or absence of logical as well as psychological connections. On the same basis it is possible according to Russell to discern pure datum, that which is not directly apprehended but known through inference. The next section deals with some of Russell's reasons for rejecting what he calls naive realism. This rejection is based on the fact that according to Russell all knowledge of the extramental world comes through media

44. See Appendix 2.

and as such there is a possibility of things not really being what they appear to be. Russell supports this position by arguments from psychology, physiology and physics. As an extension of these arguments, later on Neutral Monism was considered. This is Russell's argument that it is not possible at least at this point to decide whether mind and matter are truly distinct things, but only physical events are made by inference from mental events and as psychology seems to indicate that the same sort of laws hold for both physical and mental events. In the following chapter all these topics must be considered further; sensation along with the connections between sensations as inductive inferences, physical and perceptual space and the mediacy of knowledge along with Russell's five postulates of non-demonstrative inference.

CHAPTER III

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

This chapter deals with sensation or data and the connections between sensations. In considering these connections Russell introduces the topic of induction as he thinks induction is fundamental to scientific theorizing. This chapter also introduces Russell's distinction between perceptual space and physical space. This is considered along with Russell's solutions to the problems posed in the first chapter. The solution itself involves Keynes' theory of natural kinds and Russell's five postulates of non-demonstrative inference. These theories together with Russell's analytic method provide him with a solution to the fundamental problems of the philosophy of science as Russell interprets these problems.

1. Inference and the Connection between Sensations

Russell states,

The passage from sensation to perception....involves connections between facts, not only facts. It involves these, however, only if perception is to be regarded as a form of knowledge; as a psychological occurrence, perception is a mere fact, but one which might not be veridical as regards what it adds to sensation. It is only veridical if there are certain

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

58

connections among facts, e.g., between the visual appearance of iron and hardness.¹

What Russell seems to be saying is this, a connection is made between one sensation and another when two or more sensations are frequently found together. This association leads to an expectation so that whenever one particular sensation is experienced, another sensation, the one that has been frequently experienced in the past, is expected to follow. This is the basis of all induction.

What Russell is saying about inference and why he is saying it in the way that he says it becomes somewhat clearer when the definition he gives in An Inquiry Into Meaning and Truth is considered. He says "An epistemological premiss....must have three characteristics. It must be (a) a logical premiss, (b) a psychological premiss, and (c) true so far as we can ascertain."²

According to this thinker the reasoned inferences of common sense have developed out of the habitual unreasoned processes of animal inference and the kind of induction used in the sciences comes in turn from common sense reasoning, so ultimately all reasoning is derived

1. Bertrand Russell, Human Knowledge, p. 422.

2. Bertrand Russell, An Inquiry Into Meaning and Truth, p. 131.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

59

from animal inference.³ Now according to Russell, animal inference does not only concern the construction of events but the way in which events are bound together, that is to say not merely the relationship of image to image and 'memory picture' to 'memory picture' but also the relationship which binds image to prototype and prototype to prototype.⁴ The prototype is of course the physical event. In a general way it can be seen that Russell bridges the gap which exists between physical events in much the same manner as he relates mental events and the parts which make up mental events. As with the construction of percept from sensation where he accepts the data of psychological theory, he utilizes ~~to repeat~~ the data of contemporary physical theory as a basis from which to construct physical events.

To return for the moment to the subject of the mental event, by the time of Human Knowledge this philosopher has expanded his base from behaviouristic psychology

3. The process happens in this way. There are three states in the development of expectation. In the most primitive stage, the presence of A cause expectation of B, but without any awareness of the connection; in the second stage, we believe "A is present, therefore B will be"; in the third, we rise to the general hypothetical "if A is present, B will be." Bertrand Russell, Human Knowledge, p. 426.

4. The 'prototype' referred to is of the sort which produces "an image felt as a memory, not as mere imagination". Bertrand Russell, Human Knowledge, p. 424.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

60

to contemporary biological theory. In Human Knowledge, he talks about the formation of habit in this way,

We have been throughout this book, assuming the substantial truth of science, and asking ourselves what are the processes by which we come to know science. We are therefore justified in assuming that animals have become adapted to their environment more or less as biologists say they have. Now animals have, on the one hand, certain congenital propensities, and on the other, an aptitude for the acquisition of habits. Both of these, in a species which succeeds in surviving, must have a certain conformity with the facts of the environment.... The habits which it acquires would not be useful unless there were certain causal uniformities in the world.⁵

What is more, these habits which involve expectation, also implicitly "involve a belief in causal laws".⁶ Russell in speaking of animal inference and biological adaptation is speaking about the psychological aspect of the epistemological premise. Of course as it has been seen, Russell does justify the extramental world through his causal theory of perception. This however, even according to the way he sees it simply asserts the world is there, not what it consists of and hence there is no guarantee that the human knower can truly know what is there but merely that there is something causing sensation, nor has Russell to this point supplied the ultimate justification for believing in

5. Bertrand Russell, Human Knowledge, p. 424.

6. Ibid., p. 426.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

61

his causal theory. His other postulates and the reasons for them must be seen in order that his final justification be known. In regard to the inside, that is, the logical or rational epistemological justification, something of this was seen in the second chapter. Both aspects of his problematic are not easily separated. For methodological reasons Russell's use of the Keynesian theory of natural kinds will be considered in the following section.

2. Russell's View of Causality

If for Russell animal inference involves causation, the question remains what is a cause for Russell. He says,

When we assume causation, do we assume a specific relation, cause-and-effect, or do we merely assume invariable sequence? That is to say, when I assert "Every event of class A causes an event of class B," do I mean merely, "Every event of class A is followed by an event of class B," or do I mean something more? Before Hume, the latter view was always taken; since Hume, most empiricists have taken the former.⁷

What is interesting about this quotation is that in Human Knowledge Russell himself does not accept the empiricists position. As he says "it seems clear that invariable concomitance or succession is not what we mean by causation: it is implied by causation but not vice versa."⁸ Russell

7. Bertrand Russell, Human Knowledge, p. 454.

8. Ibid., p. 455.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

62

never states the "more" involved yet he does provide examples to illustrate the reasons he rejects a strict empiricism. He speaks of a billiard ball whose "shape and colour"⁹ is preserved while it is in motion, and of the fact that a foetus develops "into an animal of the appropriate species."¹⁰ In these examples according to Russell, there must be intrinsic determining factors which account for the continuity as well as extrinsic influences which are "also causal....of the environment on the causal line".¹¹ Whatever causality may mean to Russell, he does maintain that causality alone is not sufficient to show the truth of induction where scientific or common-sense, general laws are employed. He asserts, "we must seek to discover what are the synthetic principles of inference by the knowledge of which our scientific and common-sense beliefs are to be justified...".¹² However before exploring in greater depth his notion of what constitutes these synthetic principles, it seems useful at this point to describe some of the reasons Russell gives for his belief in the inadequacy of induction alone.

9. Bertrand Russell, Human Knowledge, p. 490.

10. Ibid., p. 490.

11. Ibid., p. 490.

12. Ibid., p. 181. That is to say, "If solipsism of the moment is rejected". Ibid., p. 181.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

62

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PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

63

3. Modes of Inference and Induction

According to Russell there are two forms of induction, one of these is induction by simple enumeration. The other one a combination of enumeration and properties which constitute a limiting set. The first sort of induction according to Russell while completely applicable in mathematical theories of probability does not help in the attempt to establish the validity of empirical induction. He states

From the time of Laplace onward, various attempts have been made to show that the probable truth of an inductive inference follows from the mathematical theory of probability. It is now generally agreed that these attempts were all unsuccessful, and that, if inductive arguments are to be valid, it must be in virtue of some extra-logical characteristics of the actual world as opposed to the various logically possible worlds that may be contemplated by the logician.¹³

Russell finds that the need for extra-logical principles comes from the problem of establishing an empirical class or series. It is according to him all very well, for the mathematician to assert that given a particular class the chances of A being followed by B will happen with such and such a probability, but how is this class to be constituted, how are its members to be known, what is to be included and what excluded? While the mathematician can arbitrarily postulate a certain class with so many members, it is another thing

13. Bertrand Russell, Human Knowledge, p. 407.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

64

entirely for a scientist to postulate such a class. Russell says for example,

If the universe is finite complete enumeration is theoretically possible, and therefore it has been achieved the ordinary calculus of probability shows that an induction is probably valid. But in practice this consideration has no importance, because of the disproportion between the number of things we can observe and the number of things in the universe.¹⁴

What Russell seems to be saying is this, that in order for induction to be known through frequency or enumeration most instances of a particular event would have to be known and furthermore the limits which bind or contain this class of events would have to be known. This is because the question of how many instances of a particular event constitute a particular probability can only be answered if the limits of the number of instances¹⁵ it takes to establish the degree between absolute certainty and absolute uncertainty have already been established. This is not possible with empirical events. Not only is human knowledge restricted to a limited space but also to a limited time. Consider for example the proposition which is usually taken for an

14. Bertrand Russell, Human Knowledge, p. 405.

15. Russell says that all probabilities are "equally valid from the mathematical standpoint". If probability is to be guide in practice we must have some way of selecting one probability as the probability. If we cannot do this, all the different probabilities remain equally valid and we shall be left without guidance. Ibid., p. 341.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

65

inductive generalization that all water boils at 100°C under standard temperature and pressure. In order to establish the validity of this proposition according to frequency theory most instances of water boiling under standard conditions would have to be known throughout all times past and future and further more these instances would have to be known as representative. Russell throws this problem into even clearer relief when he poses the question of how it is possible to answer by frequency theory alone, such a difficulty as the following,

Suppose we say it is probable that a man who has a plague will die of it. This means that if we could ascertain the whole series of men who from the earliest times to the extinction of the human race, will have suffered from plague, we should find that more than half of them will have died of it. Since the future and much of the past are unrecorded, we assume that the recorded cases are a fair sample. But now we are to remember that all our knowledge is only probable; therefore if, in compiling our statistics we find it recorded that Mr. A had a plague and died of it, we must not regard this item as certain, but only as probable. To find out how probable it is, we must include it in a series, say of official death certificates, and we must find some means of ascertaining what proportion of death certificates are correct....To this process there can be no end, if all our knowledge is only probable, and probability is only statistical.¹⁶

For Russell then, while there seems to be no problem in establishing a mathematical theory of probability there is a great problem in interpreting a mathematical theory so

16. Bertrand Russell, Human Knowledge, p. 368.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

66

that it gives meaningful empirical results. Russell concludes his review of frequency theories in Human Knowledge by saying "there is nothing in the mathematical theory of probability to justify us in regarding either a particular or general induction as probable, however large may be the ascertained number of favourable instances."¹⁷ This is because "if no limitation is placed upon the character of intentional definition....the principle of induction can be shown to be not only doubtful but false".¹⁸ Russell goes even further than this. Because of this, not only is mathematics inadequate to establishing probabilistic inductive inferences but mathematical logic in its present form is as well not adequate. He asserts,

Mathematical logic, as hitherto developed, aims always at being as extensional as possible. This is perhaps a more or less accidental characteristic, resulting from the influence of arithmetic on the thoughts and purposes of mathematical logicians. The problem of induction, on the contrary, demands intensional treatment. The classes a , b that occur in an inductive inference are, it is true, given in extension so far as the observed instances $a_1, a_2, \dots, a_n$ are concerned, but beyond that point it is essential that, as yet, both classes are only known in intension.¹⁹

17. Bertrand Russell, Human Knowledge, p. 417.

18. Ibid., p. 417.

19. Ibid., p. 414.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

67

4. Natural Kinds and Induction

It is with Keynes' theory of natural kinds that Russell finds the intensionality, the qualities on which to base probabilistic induction.²⁰ It is to be remembered that for Russell, perception is formed with the conjunction of elements to a sensation or through the conjunction of sensations themselves. The conjunction or correlation of specific kinds of noises, smells, sights furnish the percept of a natural kind. Russell says that,

The existence of natural kinds underlies most pre-scientific generalizations, such as "dogs bark" or "wood floats." The essence of a "natural kind" is that it is a class of objects all of which possess a number of properties that are not known to be logically interconnected. Dogs bark and growl and wag their tails, while cats mew and purr and lick themselves. We do not know why all the members of an animal species should share so many common qualities, but we observe that they do, and base our expectations on what we observe. We should be amazed if a cat begins to bark.²¹

For Russell, "the bearing of this on induction is of considerable importance."²² Why this is so, can be readily seen.

20. He states, "Keynes has a postulate by which....in his opinion, inductive arguments might be justified; he calls it the principle of limited variety. It is a form of the assumption of natural kinds. This is one of the expedients in the way of a general assumption which, if true, validates scientific method." Bertrand Russell, Human Knowledge, p. 318.

21. Ibid., p. 318.

22. Ibid., p. 318.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

68

Certain properties are associated with specific sets of activity and "after very few instances"²³ it is "fairly safe"²⁴ to make a generalization about the whole kind. He provides an example of this state of affairs by saying, "when you have found that a few pieces of copper are good conductors of electricity, you unhesitatingly assume that this is true of all copper."²⁵ This recognition of certain important characteristics in some conjunction with patterns of activity automatically rule out many alternative conjunctions, for example, cat mew; they do not bark. Hence, the association of certain structures with certain activities may be eliminated antecedently as improbable. What is more, the class under consideration becomes in fact finite not infinite. As Russell states "in such cases a generalization has a finite a priori probability, and induction is less precarious than in other problems."²⁶

5. Degrees of Credibility, Natural Kinds and Inference

Russell, as it has been maintained throughout, starts from sensations not things, so when he talks about natural

23. Bertrand Russell, Human Knowledge, p. 318.

24. Ibid., p. 318.

25. Ibid., p. 318.

26. Ibid., p. 318.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

69

kinds "as a finite group of properties....crowded together close to an intensional centre",²⁷ he is not speaking about the properties of things but of the properties of percepts expressed in a propositional form. He cannot therefore appeal to qualities found in the extramental world for his epistemological justification but must go again to his notion of degrees of credibility which can be assigned to particular propositions. Russell asserts that there are different kinds of certainty.

Subjective certainty is a psychological concept, while credibility is at least in part logical. The question whether there is any connection between them is a form of the question whether we know anything. Such a question cannot be discussed on a basis of complete skepticism; unless we are prepared to assert something, no argument is possible.²⁸

He is then proposing to join these various sorts of certainty together which he cites, are comprised of three types; logical, epistemological and psychological. He says, "a propositional function is certain with respect to another when the class of terms satisfying the second is part of the class of terms satisfying the first".²⁹ This sort of certainty is logical and it belongs to mathematical probability as well as strictly logical propositions. Epistemological certitude is

27. Bertrand Russell, Human Knowledge, p. 443.

28. Ibid., p. 396.

29. Ibid., p. 396.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

70

characteristic of those propositions to which "the highest degree of credibility can be attached whether intrinsically or as a result of argument."³⁰ The thinker remarks on this that "perhaps no proposition is certain in this sense."³¹ However, by this, he does not mean necessarily that any belief may be turned into unbelief but rather "further knowledge might increase its degree of credibility. Psychological certitude is the belief of a person in a proposition, "when he feels no doubt whatever of its truth".³²

In his attempt to bring these certitudes together, the influence of Keynes is very easily seen. When Russell reviews Keynesian arguments he is at the same time making explicit his own problems and the lines along which the solution must be looked for. As an example, he states concerning Keynesian problem with certitude that,

The question that he had to investigate was this: given a number of instances of As which are Bs and no contrary instances, in what circumstances does the probability of the generalization 'all A is B' approach certainty as a limit when the number of As that are Bs is continually increased?³³

The answer Keynes gives to the question entails two

30. Bertrand Russell, Human Knowledge, p. 346.

31. Ibid., p. 346.

32. Ibid., p. 346.

33. Bertrand Russell, My Philosophical Development, p. 201.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

71

conditions; both are very important to Russell's own problematic although as he says "the first and more important of these conditions is that, before we know any instance of As that are Bs, the generalization 'all A is B' should have a finite probability on the basis of the remainder of our knowledge."³⁴ The function of the natural kind as it has been seen provides the finite probability necessary, while the second condition rather more technical may be simply paraphrased by saying that the probability of finding only "favourable instances"³⁵ which are in fact uncharacteristic and so give a false picture, must decrease as the number of instances looked at are 'sufficiently increased'.³⁶ Russell does not of course wish to eliminate mathematical probability. He is simply saying that a mathematical theory of probability needs some sort of empirical limits to which it may be applied. Russell in fact maintains there are two sorts of improbability. The kind used in every day life which is non-mathematical and in talking about the formation

34. Bertrand Russell, My Philosophical Development, p. 201.

35. Ibid., p. 201.

36. On this he says, "The second condition is that the probability of our observing only favourable instances, if the generalization is false, should tend to zero as a limit when the number of inferences is sufficiently increased. Ibid., p. 201.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

72

of 'types' it is the non-mathematical rather than the mathematical which concerns Russell in the formation of 'types' and the truth value of the relationships involved in the formation. This theory of probability taken along with what Keynes or at least what Russell says Keynes says about natural kinds supplies most of the psychological and logical certainty Russell needs for a probabilistic induction. Consider for example Russell's generalizations "Dogs bark" how might Russell analyze this to illustrate what he means. In the first place, a particular sensation called barking has been conjoined with a number of properties called dog. These properties in their conjunction lead to an expectation that when the properties associated under the name 'dog' are again experienced, the property 'bark' will follow.³⁷ The occurrence of each instance of dog which is confirmed will further increase the expectation that dogs bark. It also increases the degree of credibility which might be applied to this proposition. Russell furnishes no clear example of an analyses such as the one given above, but it is clear that this is what he is saying.³⁸ He says for example,

37. As further evidence of the fact Russell is not talking about thing but percepts, he says, "All that is involved in the original activity that looks like classification is a closer similarity in responses to certain stimuli..." Bertrand Russell, Human Knowledge, p. 424.

38. See Appendix 3.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

73

We can more or less distinguish characters distinctive of the species from other which vary from individual to individual. Colour, for example, is known to be very variable among animals, and therefore the stock fallacious induction "All swans are white" was always less reliable than, say, "All swans have long necks". We may call a character "specific" when it belongs to all members of some species, a "species" being a class having a variety of common properties which are found together for no known reason....Induction may be needed to determine whether a given character is, or is not, specific; but if we suppose that specific characters are the finite proportion of all characters, this use of induction will be justified.³⁹

Furthermore, Russell identifies the connection between belief and probability when he states "probability, according to Keynes, is a logical relation which cannot be defined, unless, perhaps in terms of degrees of rational belief."⁴⁰ Russell continues with the assertion that when any argument is analysed to the fullest extent possible, there must be "direct knowledge of the relation of the premises to the conclusion, whether it be that of implication or that of probability in some degree."⁴¹ Russell maintains that it seems that Keynes himself in fact defines degrees of

39. Bertrand Russell, Human Knowledge, p. 443.

40. Ibid., p. 373.

41. Ibid., p. 373.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

74

rational belief "in terms of the probability relation".⁴²

This is not just Keynes' theory, Russell does accept it at least in a general way. He says in My Philosophical Development ,

I came to the conclusion that, wherever probability is definite, the frequency theory is applicable, but that there is another conception, misleadingly called by the same name, to which something more like Keynes's theory is applicable. This other conception I called 'degree of credibility' or 'degree of doubtfulness'. It is obvious that we are much more certain about some things than we are about others, and that our uncertainty often has no statistical aspect.⁴³

He says further,

It seemed to me that, in the problems with which I was concerned, doubtfulness was much more important than mathematical probability. It was not only that, in the inferences with which I was concerned, the premises, even if true, do not make the conclusion certain. What was much more important was that the premises themselves are uncertain. This led me to the conclusion that the mathematical aspects of probability have less to do than might be thought with the problems of scientific inference.⁴⁴

42. Bertrand Russell, Human Knowledge, p. 373. Expressing this technically he says, "Rational belief...is derivative from knowledge: when we have an h and also know $plh=a$. It follows that some propositions of the form " $plh=a$ " must be among our premises. Our knowledge is partly direct, partly by argument; our knowledge by argument proceeds through direct knowledge of propositions of the form " p " implies q or " $qlp=a$ "....knowledge of hand $plh=a$ leads to a "rational belief of the appropriate degree" in p . Ibid., p. 373.

43. Bertrand Russell, My Philosophical Development, p. 192.

44. Ibid., p. 193.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

75

It is not possible to provide a step by step analyses of the way in which Russell would assign a specific degree of rationality to a specific degree of belief, he does not do so himself. However it is certain he envisages such a hierarchy of belief correlated to degrees of credibility.

He says,

In fact, our perceptions of the logical connections between propositions, like our sense perceptions and our memories, can be ordered by their degree of credibility: in some, we see the logical connection so clearly that we cannot be made to doubt it, while in others our perception of the connection is so faint that we are not sure whether we see it or not.⁴⁵

He states as well "Perfect rationality consists not in believing what is true but in attaching to every proposition a degree of belief corresponding to its degree of credibility".⁴⁶

6. Natural Kinds and Structure

It was seen in the first and second chapters that according to Russell all that may be validly known about the external world is space-time structure, so it is not surprising that Russell is not able to accept Keynes' theory of natural types in its entirety. Russell states,

45. Bertrand Russell, Human Knowledge, p. 394.

46. Ibid., p. 397.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

76

In seeking the postulate or postulates required to make inductive probabilities approach certainty as a limit, there are two desiderata. On one hand, the postulate or postulates must be sufficient, from a purely logical point of view, to do the work that is asked of them. On the other hand - and this is the more difficult requirement - they must be such that some inferences which depend upon them for their validity are, to common-sense, more or less unquestionable...⁴⁷

It is not necessary that the general postulate or postulates arrived at have "any degree of self-evidence"⁴⁸ but it is important that some of the logically derived inferences be "so obvious, as to be scarcely worth stating"⁴⁹ for any one except a skeptical philosopher. The other stipulations which Russell for the acceptance of the postulate is that first of all there should be no evidence which contradicts it and that "inductions which assume it should have conclusions consistent with it."⁵⁰ Russell maintains that while Keynes' postulate is adequate as a basis for induction and can as such be confirmed by science, it is not one of those arguments that everyone can accept. He says of this postulate that,

It is closely akin to, if not identical with, an older postulate, that of natural kinds. We shall find that the postulate is adequate logically as

47. Bertrand Russell, Human Knowledge, p. 438.

48. Ibid., p. 439.

49. Ibid., p. 439.

50. Ibid., p. 439.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

77

a basis for induction. I think also, that it can be stated in a form in which science to some degree confirms it. It therefore satisfies two of the three requisites of a postulate. But it does not, in my opinion, satisfy the third, namely, that of being discoverable, by analysis, as implicit in arguments which we all accept.⁵¹

Russell objects to this theory on the one hand from biology. He says that Darwinian evolutionary theory would suggest that species have a much more transitory nature than logic text books assume. However more than this Russell says while "there are still natural kinds--at the moment there are electrons, positrons, neutrons, and protons--....it is hoped that these are not ultimate, and may be reduced to differences of structure."⁵² The doctrine of natural kinds then is useful in establishing some inductions, however it "is only an approximate and transitional assumption on the road towards fundamental laws of a different kind."⁵³ This doctrine has a practical function but it lacks epistemological certitude. Russell,⁵⁴ unlike Keynes does not start from a realist position where certain aspects of the external world are truly known without doubt. He begins from sensations

51. Bertrand Russell, Human Knowledge, p. 439.

52. Ibid., p. 444.

53. Ibid., p. 444.

54. When Russell speaks of Keynes' assumption that, "the number of "things" in the universe is finite", Ibid., p. 440, it is assumed Keynes is an epistemological realist who starts from things not sensations as does Russell himself.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

78

and in order to explore why he hopes to reduce natural kinds to "differences of structure"⁵⁵ which involves 'the fundamental laws of a different kind', it is necessary to return to the subject of the way these sensations and inferences to the external world are connected. This entails a return to his notions of perceptual and physical space.

7. Physical Space and Perceptual Space

In the following discussion of the relationship between physical space and perceptual space some aspects of Russell's solution to the problematic he sets, as it was seen in the first chapter of this thesis, will be considered. This is due to the importance that the whole subject of space time has for Russell. From some of the things that Russell has to say on this topic it would be easy to assume the perceptual space functions in the same way as Kant's form of space. That is to say as a power of the mind which co-ordinates and structures sensations. He says for example... "The unitary space of common sense is a construction, though not a deliberate one. It is part of the business of psychology to make us aware of the steps in this construction."⁵⁶ Besides the fact that Russell explicitly rejects Kant's

55. Bertrand Russell, Human Knowledge, p. 444.

56. Ibid., p. 218.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

79

Theory of Space as a category when he says,

Kant's "infinite given whole," is one which must be abandoned. The crude material available for empirical constructions contains several kinds of relations--more especially those between parts of one visual field or parts of one tactual field--each of which arranges its field in a manifold having the properties that pure mathematicians need for a geometry. By means of correlations--more especially between the visual and tactual place of an object which I simultaneously see and touch--the various spaces generated by relations of parts of single sensational fields can be amalgamated into one space.⁵⁷

To regard Russell's space as a unifying agent would be to be inconsistent with the general temper of his thought which involves, among other things, the rejection of mind as something separate and apart from matter. He says "Perceptual space consists of perceptible relations between parts of percepts, whereas physical space consists of inferred relations between inferred physical things."⁵⁸ He says as well,

....we may say that my percept of anything other than my own body is "outside" the percept of my body in perceptual space and, if the perception is not misleading the physical object is "outside" my physical body in physical space. It does not follow that my percept is outside my physical body. Indeed, such an hypothesis is *prima facie* meaningless.⁵⁹

Psychological space is a construction out of sensations. Further, although Russell does not say it, once this space

57. Bertrand Russell, Human Knowledge, p. 221.

58. Ibid., p. 209.

59. Ibid., p. 203.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

80

is constructed subsequent perceptual experiences are fitted into the perceptual space which alters the perceptual experience of the world, as an ingrained habit. Russell says for instance,

It is clear that experience is what has led us to believe in the existence of spatial relations. Psychology is concerned to examine what experiences are relevant, and by what process of inference or construction we pass from such experiences to the space of common sense. Since a great part of the process occurs in early infancy and is no longer remembered in later years, it is a somewhat difficult matter of observation and inference to discover the character of the original experiences which give rise to the habits that adult common sense takes for granted.⁶⁰

An adult's ability to automatically situate a thing both seen, heard, and touched, in the same space is one illustration he utilizes to demonstrate his point. This he opposes to the fact that babies "under three months"⁶¹ are unable to make such a correlation and only develop the later capacity of bringing together tactile and "visual sensations"⁶² through a process of trial and error. As well as studying this formation of habitual association or inference, it is also necessary through analyses to "separate the crude material of sensation"⁶³ from the supplementations

60. Bertrand Russell, Human Knowledge, p. 217.

61. Ibid., p. 217.

62. Ibid., p. 217.

63. Ibid., p. 218.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

81

that is accrued through habitual associations. Russell uses the familiar example of an orange, he says "you would have a violent shock of surprise if you found it felt like putty..tasted like beefsteak."⁶⁴ Such a surprise shows "that expectations of non-visual sensations are part of what spontaneously happens to you when you have a visual sensation of a familiar kind."⁶⁵ Visual sensations have initially "a certain purity but it acquires "the penumbra of expectations connected with other senses that it has in adult life. And the same is true of the other senses."⁶⁶

The correlation of all sensations through expectations or inference at certain points in a person life supplies the web or 'space' in which subsequent sensations and inferences are situated. Russell, however, does not accept that all aspects of perceptual space truthfully reflects the external world. For while,

The construction of one space in which all our perceptual experiences are located is a triumph of pre-scientific common sense. Its merit lies in its convenience, not in any ultimate truth that it may be supposed to possess. Common sense, in attributing to it a degree of non-conventional truth beyond what it actually has a right to claim, is an error, and this error, uncorrected, adds greatly to the difficulty of a sound philosophy of space.⁶⁷

64. Bertrand Russell, Human Knowledge, p. 218.

65. Ibid., p. 218.

66. Ibid., p. 218.

67. Ibid., p. 220.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

82

Russell, in his insistence that common-sense is in need of refinement, is following the familiar pattern of beginning with what is vague and uncertain and through analysis establishing what is rationally defensible. He starts with common-sense notions of space and as with animal inference through analysis tries to show that which is an acceptable inference from that which is unacceptable. He says for example,

The common-sense world results from a further correlation, combined with an illegitimate identification. There is a correlation between the spatial relations of unperceived physical objects and the identification of such data with certain physical objects. For example; I am sitting in a room, and I see--or at least common-sense thinks I see--spatial relations between the pieces of furniture that it contains.⁶⁸

He rejects the too close identification of perceptual space with physical space for the same sort of reasons that have been seen throughout this thesis. He asserts,

....if physics and physiology are to be believed, I do not "see" the furniture in my room except in a Pickwickian sense. When I am said to "see" a table, what really happens is that I have a complex sensation which is, in certain respects, similar in structure to the physical table.⁶⁹

Physical space is a construction from inferences, perceptual space is a construction from inferences but the way in which the inferences occur are different in each case.

68. Bertrand Russell, Human Knowledge, p. 221.

69. Ibid., pp. 221-222.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

83

The inferences of perceptual space arise "spontaneously from perception"⁷⁰ the inferences to physical space, it would seem Russell is saying, come about carefully from the analysis involved in the scientific method. This reintroduces the question of the status of scientific method in Russell's epistemology.

8. The Scientific Method and Physical Space

Russell states that "Scientific method, broadly speaking consists of technique and rules designed to make degrees of belief coincide as nearly as possible with degrees of credibility."⁷¹ The question is then what is science for Russell and how does science bring the state of affairs about? Part of the answer to this lies in the method of science as well as the content. Russell says, 'the progress of science occurs when generalizations that are vague and give way to others that are more precise'.⁷² This progress occurs, Russell states, by science trying "to retain always as much of the common-sense world as possible without intolerable complications; another part is to make such no

70. Bertrand Russell, Human Knowledge, p. 167.

71. Ibid., p. 397.

72. Ibid., p. 194.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

84

refutable assumptions as will lead to simple causal laws."⁷³

It is self-awareness⁷⁴ it would seem, that according to Russell, allows the human knower to establish techniques so that he can sort out those aspects of inference which can be rationally held from those that cannot. Certainly this is what Russell sees himself doing. He says for example,

I found that for lack of analysis, people had admitted blocks of non-demonstrative inference because they had a subjective prejudice in favour of certain kinds of knowledge, and had rejected other blocks in favour of contrary prejudice. It appeared to me that in any particular case of inference which seemed unquestionable one should discover the principle upon which it depended, and accept other inferences depending upon the same principle.⁷⁵

Russell sees scientific methodology involving the same sort of analysis. There is for instance, the way in which he sees psychology involved in the analysis of the components of psychological space which common-sense constructs. This has been seen previously. However, Russell gives an even more concrete example when he says,

73. Bertrand Russell, Human Knowledge, p. 322.

74. On this Russell states, "The distinction between animal inference, and scientific inference,...is this; in animal inference the percept A causes the idea of B, but there is no awareness of the connection; in scientific inference there is a belief involving both A and B....It is the occurrence of a single belief expressing a connection of A and B that distinguishes what is commonly called inference from what I call animal inference. Ibid., p. 186.

75. Bertrand Russell, My Philosophical Development, p. 194.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

85

The justification of our inferences from perception to physical objects depends upon the consistency of the whole system. First from ordinary perceptions we arrive at an elementary kind of physics; this suffices to cause us to put in separate categories dreams, mirages, etc., which contradict our elementary physics. We then set to work to improve our elementary physics so as to include the exceptional phenomena;....there is, for instance, a perfectly good physical theory of mirages. We learn in this way to be critical, and we form the concept of a "trained observer". We are critical of percepts in the name of laws, and of laws in the name of percepts; gradually as physics improves, a closer and closer harmony between percepts and laws is established.⁷⁶

This thinker maintains philosophy should follow the example of science by inventing techniques "which gradually diminish the area of vagueness or uncertainty."⁷⁷ He suggests by analogy that as with the case of measuring lengths "there will always remain some lengths concerning which we are in doubt",⁷⁸ on the other hand there is no known limit to "which such doubtful lengths can be diminished."⁷⁹ Just as with those common-sense estimates of "distances and sizes"⁸⁰ which are "roughly correct"⁸¹ and the laws derived from the original

76. Bertrand Russell, Human Knowledge, p. 324.

77. Ibid., p. 147. He says, "Inferences should be submitted to certain safeguards, such as....Mill's four methods" Ibid., p. 360.

78. Ibid., p. 147.

79. Ibid., p. 147.

80. Ibid., p. 321.

81. Ibid., p. 321.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

86

estimates, a process of adjustment may occur so that "observation and theory interact"⁸² until "inconsistency ceases"⁸³ so may philosophical propositions and observation interact to eliminate a large degree of uncertainty. In other words, while absolute certainty concerning any philosophical proposition may never be attained, such certainty may be approached to with an ever greater degree of refinement. Russell in fact appears to believe that his method of analyses at least in theory is not merely similar to but identical with the methods of science. He asserts,

If the work of analysing scientific inference has been properly performed, it will appear that concrete instances of such inference are (a) such as no one honestly doubts and (b) such as are essential if on the basis of sensible facts, we are to believe things which go beyond this basis.

The outcome of such work is to be regarded rather as science than philosophy. That is to say, the reasons for accepting it are the ordinary reasons applied in scientific work, not remote reasons derived from some metaphysical theory. More especially, there is no claim to certainty as has too often and too uselessly been made by rash philosophers.⁸⁴

Part of these reasons of course as has been previously seen involve simplicity, clarification and greater certainty than is had with common-sense knowledge.

82. Ibid., p. 321.

83. Ibid., p. 321.

84. Bertrand Russell, My Philosophical Development, p. 207.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

87

Russell's view of the differences between perceptual and psychological space are easily understood when his view of the scientific method of analysis is remembered. He says for example,

Physical space time is....an inference from perceptual space and time; it contains all observed occurrences and also all unobserved occurrences. But since it is inferential, the location of an occurrence is also inferential. The locating of events in physical space time is effected by two methods. First there is a correlation between perceptual space and time and physical-space time though this correlation is only rough and approximate. Second, the causal laws of physics assign an order to events concerned, and it is partly by means of them that unobserved events are located in space-time.⁸⁵

All this of course implies an analysis implicit or explicit of perceptual space with a rejection of some aspects of it and the acceptance of others; the tinkering that Russell spoke of. When Russell speaks of the formation of physical space from perceptual space, the process he describes is very similar to that used in the construction of events. There is, for example, the same starting point. Events like space begin with the individual's perception. The individual then records his experience by some means and compares it with the experience of another individual. Laws are then 'invented' to explain or describe these experiences. What is essential to the explanation of the perception is retained;

85. Bertrand Russell, Human Knowledge, p. 326.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

88

what is not essential eliminated. This of course does not have to involve two people at all. It might involve an individual and his memories of cameras⁸⁶ set up at different points to record certain sensations just so long as the experiences can be related and uniformly described.⁸⁷ Thus physical events are defined as compresent "when they overlap in space-time"⁸⁸ while mental events are compresent when "two simultaneous parts of one experience are related".⁸⁹ It is important to notice once more that experience is not simply the realization of sensation but includes "all these percepts, recollections, and expectations that are happening to me now." The way in which the connections between mental events occur, has been discussed if not justified. It has also been said that physical events and physical space are constructed from parts of perceptual space. Russell states on this point "I assume that this relation which I know in my

86. He states...."There is at every moment a vast multiplicity of occurrences corresponding to all the things that could be seen there or recorded by an instrument". Bertrand Russell, My Philosophical Development, p. 106.

87. On this he says, "The appearance of a given object from different places, so long as they are 'regular', are connected by laws of perspective when they are visual and by not wholly dissimilar laws when they are....revealed by other senses". Bertrand Russell, My Philosophical Development, p. 107.

88. Bertrand Russell, Human Knowledge, p. 329.

89. Ibid., p. 329.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

89

own experience, can also hold between events that are not experienced and can be the relation by which space-time order is constructed."⁹⁰ This construction of physical space-time out of perceptual space insofar as it is a construction does not just happen through analyses. The construction of physical space as it was suggested in an earlier section, involves both the methods and the content of scientific theory. Analysis is used to get rid of unnecessary assumptions at many levels of scientific theory from, for example, the status of theoretical entities to the manner in which the 'the reality' of these entities may be confirmed but there is still the need to arrive and relate a number of positive propositions. As an example of what is meant here Russell says,

A number of people sitting near each other can all draw what they see and compare the resulting pictures, there will be similarities and differences.... In the part which is common, there is found to be not identity, but only a greater or less degree of similarity, between the percepts of different people. It is the absence of identity which makes us reject the naive realism of common-sense; it is the similarity which makes us accept the theory of a common origin for similar simultaneous perceptions.⁹¹

Furthermore "we can, without assuming anything that no one perceives establish a common space and time in which we all

90. Bertrand Russell, Human Knowledge, p. 329.

91. Bertrand Russell, The Analysis of Matter, p. 207.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

90

live."⁹² The first part of what Russell has to say here may involve very little more than the recognition of what in percepts can be epistemologically justified along with what cannot, but the second part, that is establishing a physical space, needs more than a mere sorting out of gratuitous assumptions from necessary ones. In order to establish space-time all that is needed initially are "the usual methods of determining latitude and longitude".⁹³ Through such methods "observers can be arranged in a three-dimensional order".⁹⁴ The space which results contains "only so many "points" as there are observers"⁹⁵ and this is three-dimensional not a four-dimensional continuum. The notions of points and a continuum especially, a continuum which is four-dimensional is arrived at in some fashion which Russell does not specify exactly but which is 'ideal and theoretical'. As such more is entailed in the construction of space-time than merely breaking down experience into its constituent parts. This is clearly illustrated when Russell comes to discuss the way the articulated three-dimensional space becomes a continuum. He says,

92. Bertrand Russell, The Analysis of Matter, p. 208.

93. Ibid., p. 208.

94. Ibid., p. 208.

95. Ibid., p. 208.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

91

But the motion of an observer can be sensibly continuous, so that we can construct "ideal" points of view with defined mathematical properties, and thus build up, for mathematical purposes, a continuous space. We can thus arrive at the laws of perspective, taken in a generalized sense; that is to say, we can correlate the differences between correlated perceptions with differences in the situations of the percipients.⁹⁶

For Russell it would seem the only difference between general space-time and physical event is that the event has the further property of centrality while spacetime structure consists of a continuous series of points in which one point has no character to distinguish from another. However both physical space-time and physical event are known through spatial, temporal relations which are established according to the before, the after and the simultaneous. Russell gives a clear example as to how an event is situated in space-time when he says,

For, let A and B be two observers, a and b be their correlated visual percepts, which, being correlated, are described as percepts of one physical object O. If the angular dimensions of a are larger than those of b, we shall say (as a definition) that A is nearer to O than B is. We can thus construct our geometry so that they intersect, and shall define their intersection as the place where O is.⁹⁷

This correlation in itself however does not demonstrate that the thing which is taken to be seen by different observers

96. Bertrand Russell, The Analysis of Matter, p. 208.

97. Ibid., p. 208.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

92

as the same, is in fact similar to the thing in itself. The similarity of perceptions might be due to similarities in perceptual apparatus or the similarity of perceptual apparatus interacting with a similar cause. This does not mean the effect is the same as the cause or at least it does not demonstrate that it is.

Russell answers this objection through his structural postulate, but before considering this solution it seems necessary to consider the subject of verification which is inextricably bound with his notion of structure.

9. Russell's Notion of Verification

Verification according to Russell has a double aspect, the first is concerned with the verification of percepts, the second verification of inference or causal laws. He says,

Physics, assuming it perfected would have two characteristics. In the first place, it would be able to predict percepts; no perception would be contrary to what physics had led us to suspect. In the second place, it would assume unobserved physical occurrences to be governed by causal laws as similar as possible to those that we infer from cases of continuous observation.⁹⁸

Something has already been seen of this first aspect of verification. In the consideration of the differences

98. Bertrand Russell, Human Knowledge, p. 325.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

93

between sensation and perception ~~that~~ it was possible, according to Russell through 'the powers of analysis' to "whittle away the element of interpretation or to invent an artificial language involving a minimum of assumptions".⁹⁹ The implications that this power has for Russell's problem concerning the disparity between common-sense knowledge and the theoretical entities of science would seem clear. First of all in accepting Hume's starting point Russell has immediately rejected the view that there can be any secondary qualities adhering to substances in the external world. On the other hand, as it is possible, at least to a point, to separate the necessary or rationally supportable adjuncts from those that are not rationally supportable it becomes feasible to establish in a particular sensation, the sensation blue for example, what parts of the sensation have really to do with the external world and what parts do not. Now according to physics which has to do with the most public aspects of sensation, colours, for example, are not inherent qualities of things rather they are the result of particular waves lengths of light interacting with particular events. There is then a quantitative aspect to these apparent qualities but it is the qualitative aspect, although constructed by the mind which allows the quantification. Russell says on

⁹⁹. Bertrand Russell, An Inquiry Into Meaning and Truth, p. 124.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

94

this,

Let us....compare the finished physical world with the world of common sense. I see, let us suppose, a buttercup and a bluebell; physics says that electromagnetic waves of many different frequencies start from the sun and reach the two flowers; when they reach them, the buttercup scatters the waves whose frequency produces a yellow sensation, and the bluebell those that produce a blue sensation. This difference in the effect of the two flowers is assumed to be due to some difference in their structure.¹⁰⁰

It is not possible to pursue this topic further without considering Russell's structural postulate except to state that Russell seems to indicate that even though the entities of theoretical science are without secondary qualities and even though sensation contains in itself, as a direct experience no secondary qualities but those added by the mind, asserts perception and theory can be brought closer and closer together, through analysis, and despite the apparent contradictions. In this way the degree or certainty of expectation is increased. The degree of credibility which can be attached to a pure datum that is, one with the unsupportable accretions removed, is much higher than the degree of credibility which can be attached to the unanalysed percept. The basis of verification then is due fundamentally to the self-evidence nature or intrinsic credibility of percepts themselves. This interpretation is partly borne out when

100. Bertrand Russell, Human Knowledge, p. 321.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

95

Russell says,

....Although physics as a self-contained logical system does not need to mention sensations, it is only through sensations that physics is verified. It is an empirical law that light of a certain wave length causes a visual sensation of a certain kind, and it is only when such laws are added to physics that the total becomes a verifiable system..... If we define a shade of color by its wave length we shall have to add that sensations caused by light of the same wave length all have a recognizable similarity.¹⁰¹

and,

We shall have to define "red" or any other vague quality by some such method as the following. When the colors of the spectrum are spread out before us there are some everybody would agree to be not red....¹⁰²

Percepts concerning qualities are refined by a method of comparison and elimination. The qualitative is made quantitative by situating it in a spectrum. Russell says,

....We can never be sure that in any given case, there is an exact color likeness between any two patches any more than we can be sure that a given length is exactly a meter. However, we can invent techniques which approximate more and more closely to what would be needed for establishing exact likeness.¹⁰³

Russell says that we may define "Any shade of color as between two specified extremes in the spectrum."¹⁰⁴ Or as any

101. Bertrand Russell, Human Knowledge, p. 261.

102. Ibid., p. 260.

103. Ibid., p. 262.

104. Ibid., p. 259.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

96

shade of colour caused by wave lengths lying between specified extremes."¹⁰⁵ "Or (in physics) as waves having wave lengths between these extremes."¹⁰⁶ Two colours which are similar in a single perceptual experience may be distinguished according to Russell by "difference of spatio-temporal position".¹⁰⁷ The function of this refinement as it had been said is to insure the accuracy of predictability. Russell does not say this in so blunt a fashion but considering the total context of what he means by science this has to be the conclusion.

10. Verification and Inference

Strictly speaking, as it was noted, inference¹⁰⁸ is involved in the passage from sensation to percept as in the passage or connection of sensation to sensation. Nevertheless since sensation itself as it was seen is the most certain of all human experience and the basis of all knowledge,

105. Bertrand Russell, Human Knowledge, p. 259.

106. Ibid., p. 259.

107. Ibid., p. 263.

108. Although the point has not been stressed, in the connection which holds between facts the inference spoken of implies inductive inference not deductive inference which consists "wholly of tautologies". Bertrand Russell, My Philosophical Development, p. 119 (1959 ed.). However, inductive inference is not all that is entailed, there is the more basic non-demonstrative inference.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

97

and since general laws according to Russell can only be verified through sensation, it seemed wise to consider sensation itself apart from the question of connection. However, it should again be stressed that what has been said about sensation applies as well to inference. It was stated before that according to Russell the connections between sensations could be justified by assuming the presence in experienced of natural kinds. These acted as limiting conditions which established antecedent probabilities that a certain process would follow a certain structure or group of properties even before mathematical theories of probability were applied or connected to them. This means in effect that for Russell the meaning of verification is found in the degree of credibility which is antecedently attached to a datum be it sensation or law, and not the act of verification itself. Russell maintains that the "practical utility"¹⁰⁹ of scientific inference lies in the fact that such inference gives grounds "for anticipating the future".¹¹⁰ Since this is the case, reasons must be found for believing scientific inference before the anticipated event takes place, that is to say, before verification. So Russell states, "I defy the world to find any such grounds for trusting inferences which

109. Bertrand Russell, Human Knowledge, p. 451.

110. Ibid., p. 451.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

98

will be verified, which are not equally grounds for trusting certain inferences which will be neither verified nor falsified."¹¹¹ Here, this philosopher unequivocally rejects a verificationist's theory of meaning. The main thrust of his argument against this type of theory hinges on his objection that "you cannot....seek the significance of a proposition in its consequences which must be other propositions."¹¹² These propositions will need verification as well and so "an endless regress"¹¹³ is incurred. Russell makes another point concerning the fact that it is not possible to know whether or not a proposition is absolutely verifiable, "since this would involve knowledge of an indefinitely long future."¹¹⁴ It is only possible to state that a proposition has been verified in a limited way. His rejection of a verificationist's criterion of truth is perfectly consistent with his notion of 'fact or a datum'. A datum, is a "proposition which has some degree of rational credibility on its own account, independently of any argument derived from other propositions".¹¹⁵ Now the thinker asserts that the

111. Bertrand Russell, Human Knowledge, p. 451.

112. Ibid., p. 449.

113. Ibid., p. 449.

114. Ibid., p. 447.

115. Ibid., p. 451.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

99

conclusion of an argument cannot have "a higher degree of credibility than that belonging to the premises".¹¹⁶ Since this is the case the premises must contain a certain degree of intrinsic factual validity before its consequences are derived or verified. As Russell says,

We cannot explain what is the significance of a belief or what makes it true or false, without bringing in the concept of a "fact" and when this is brought in the part played by verification is seen to be subsidiary and derivative.¹¹⁷

A fact is another way of speaking about percepts, but,

It is to be observed that, without the introduction of principles, no suggested collection of facts, or supposed facts, is either coherent or inconsistent, since no two facts can either imply or contradict each other except in virtue of some extralogical principle.¹¹⁸

This reintroduces the topic of the relationships which hold between percepts, but more than this, it introduces Russell's notion of those inferences which justify all other inference. One of these 'the causality postulate' has already been briefly seen but this together with his four other postulates of 'non-demonstrative inference'.

116. Bertrand Russell, *Human Knowledge*, p. 451.

117. *Ibid.*, p. 449.

118. Bertrand Russell, *My Philosophical Development*, p. 204. It is for this reason as well Russell excepts a 'coherence theory of probability but not a coherence of truth. See appendix 4 for an amplification of this.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

100

11. Russell's Theory of Non-Demonstrative
Inference

Science for Russell is not merely a system of logic, it has to do with the external world.¹¹⁹ Up to this point, many questions concerning the relation of sensations or percepts have gone unanswered. Russell's postulates are, according to him supposed to make up for this deficiency. He remarks,

I believe....that the five principles, or something as analogous to them, can form the basis for the kind of coherence which gives rise to the increased probability with which we have been concerned. Something vaguely called 'causality' or 'the uniformity of nature' appears in many discussions of scientific method. The purpose of my postulates is to substitute something more precise and more effective in place of such rather vague principles. I feel no great confidence in the precise postulates above enumerated, but I feel considerable confidence that something of the same sort is necessary if we are to justify the non-demonstrative inferences concerning which none of us, in fact, can feel any doubt.¹²⁰

The fullest description of the postulates may be found in Human Knowledge and My Philosophical Development. Here he considers for example 'the problem of other minds'. It is obvious that this is in fact a problem for Russell as well

119. He remarks, "No empirical science is intended as a coherent fairy-tale. It is intended to consist of statements having application to the real world and believed because of their relation to that world." Bertrand Russell, My Philosophical Development, p. 206.

120. Ibid., p. 204.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

101

as other philosophers coming out of the same philosophical tradition. It is obvious when Russell speaks about co-ordinating private spaces and the subject of verification, he is assuming the fact of other minds but he needs a justification for this assumption. Thus, one of his postulates, 'the postulate of analogy' main function is "to justify the belief in other minds.¹²¹ Russell describes his postulate in this way,

Given two classes of events A and B, and given that, whenever both A and B can be observed, there is reason to believe that A causes B, then if, in a given case, A is observed, but there is no way of observing whether B occurs or not, it is probable that B occurs; and similarly if B is observed, but the presence or absence of A cannot be observed.¹²²

This could be regarded as a special case of his more general causality postulate. It is evident from the examples he employs, for instance believing in other "bodily sensations",¹²³ that he does not wish to extend the function of the analogy postulate very far. As direct evidences of this, he states quite clearly concerning the belief in the reality of another man's toothache that "It is only in cases where some such reasoning for non-observability exists that

121. Bertrand Russell, My Philosophical Development, p. 204.

122. Ibid., p. 204.

123. Bertrand Russell, Human Knowledge, p. 493.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

102

our postulate can legitimately be applied."¹²⁴ On the other hand, the inclusion of this postulate is quite comprehensible. It is difficult to see how Russell could come to a knowledge of the characteristics of mental events, other than his own, from his causality postulate alone. Both the analogy postulate and the causality postulate depend for their full meaning on a third postulate; this is 'the structural postulate'.¹²⁵ It would seem that Russell wishes to reduce the theory of natural kinds to a description of structure. It was also seen that structure entails spatio-temporal position. When Russell speaks about the likeness which exists between "a piece of orchestral music as played, and the same piece of music in the score"¹²⁶ being a likeness of only shared "formal logical properties",¹²⁷ this example he provides is somewhat misleading, if deductive logic alone is thought to be implied. The logical properties he speaks of here are those arrived at by inference and

124. Bertrand Russell, Human Knowledge, p. 493. Analogy like memory must be accepted as "an independent premise of scientific knowledge". Bertrand Russell, Human Knowledge, p. 193.

125. This he calls in full, "the postulate of common causal origin of similar structures". Bertrand Russell, Human Knowledge, p. 487. The abbreviation to 'the structural postulate' is his own.

126. Bertrand Russell, The ABC of Relativity, p. 137.

127. Ibid., p. 137.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

103

this inference includes induction. It comes out of the context of scientific methodology. This is made quite clear.

The importance of spacetime structure....is very great. It explains how one complex event can be causally connected with another complex event, although they are not in any way qualitatively similar. They need only resemble each other in the abstract properties of their space-time structure. It is obvious that the electro-magnetic waves used in broadcasting cause the sensations of the hearers, but do not resemble them except in structural respects. It is because of the importance of structure that theoretical physics is able to content itself with formulas that are about unexperienced occurrences which need not, except in structure, resemble any of the occurrences that we experience.¹²⁸

This postulate allows the extramental world to be known according to forms. While the causality postulate entails the proposition that there is something out there, the structural postulate allows that something to be specified. It is on this basis that Russell is able to say, "there is a rough correspondence between....The table that I see is outside my body as I see it in perceptual space, and the physical table is outside my physical body in physical space."¹²⁹

If Keynes' theory furnishes the basis of induction, it follows that the structural postulate must do the same

128. Bertrand Russell, My Philosophical Development, pp. 203-204.

129. Bertrand Russell, Human Knowledge, p. 202.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

104

thing. He does not elaborate this¹³⁰ in any detail but he does say,

From the standpoint of theory of knowledge, the most important application of our principle is to the relation between perception and physical objects. Our principle implies that in circumstances which occur frequently but not invariably, the structure of a percept is the same as that of each of a series of occurrences leading backward in time to an original occurrence, before which there were not spatio-temporally connected events having the structure in question. This original occurrence is what we are said to "perceive" when it is held that different people can "perceive" the same object.¹³¹

Not only does the structural postulate show how percepts can give a valid if incomplete knowledge of the external world, but as it has been said, it justifies inference in general. However, it cannot do this alone. Inferences have to do

130. Other than suggesting that if a series of events which have an identical structure can be grouped about a common centre, it is probable that these events may be traced to a common source. Probability means here, something like the number of instances, that is 'sightings' from various points of view, through time, using different methods, these similar events have been accorded the same causal origin. It follows from this that the similarity of structure added to the identity of neighborhood provide the limit, or finite number of instance from which samples may be taken or frequencies established. Russell is therefore able to say of certain implications of the structural postulate that these, if accepted will....afford a sufficient a priori basis for most of the inferences that physics base on observation". Bertrand Russell, Human Knowledge, p. 472.

131. Ibid., p. 473.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

105

with causal laws and of these there are "two sorts"¹³² those "concerned with persistence and those concerned with change".¹³³ Those concerned with persistence, Russell calls 'intrinsic'. They tell "what a piece of matter will do when it is not influenced by environment".¹³⁴ Persistence is subsumed under what Russell calls "the principle of constancy of structure"¹³⁵ or "the postulate of quasi-permanence".¹³⁶ He describes it this way "given any event A, it happens very frequently that, at any neighbouring time, there is at some neighbouring place an event very similar to A".¹³⁷ This Russell says is meant 'to replace the concept of persons and things'.¹³⁸ It is analogous 'to Newton's First Law of Motion.'¹³⁹ While Russell does not say exactly how this postulate is to be used as part of the basis for induction. He does say for example "It applies to every step

132. Bertrand Russell, Human Knowledge, p. 310.

133. Ibid., p. 310.

134. Ibid., p. 473.

135. Ibid., p. 473.

136. Ibid., p. 487.

137. Bertrand Russell, My Philosophical Development, p. 202. This seems to be an implication of the more general structural postulate.

138. Ibid., p. 202.

139. Ibid., p. 202.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

106

from an author's thoughts to the printed book".¹⁴⁰ However it seems clear that he needs such a postulate for both percept and inference. In the former case without such a postulate there could be no guarantee that even given a transmission of structure from the source to the receiver that the structure was transmitted unchanged, and in the case of the latter without something that change could be predicated to the whole notion of change would be meaningless and the notion of law inapplicable in a world which was completely chaotic. The second kind of law has to do "with synthesis and dissolution",¹⁴¹ here structure changes.

It also has to do with interaction and concerns extrinsic causality, for instance, "the collisions between billiard balls",¹⁴² While certain events in the world can be considered due to intrinsic properties of things connected to the fact that they persist, others cannot. What happens for example to a light ray between its source and the time it reaches the earth. Russell says,

The essential laws of change in modern physics are those of quantum theory, which govern transitions from one form of energy to another. An atom can emit energy in the form of light, which then travels

140. Bertrand Russell, Human Knowledge, p. 473. (A continuity of likeness).

141. Ibid., p. 473.

142. Ibid., p. 476.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

107

on unchanged until it meets another atom, which may absorb the energy of light. Such interchanges are governed by certain rules, which do not suffice to say what will happen on a given occasion, but can predict, with a high degree of probability, the statistical distribution of possible happenings among a very large number of interchanges.¹⁴³

Just as the postulate of quasi-permanence may be considered as corollary to the structural postulate, so may the postulate of "spatio-temporal continuity"¹⁴⁴ be held as a corollary or an extension to the causality postulate. This postulate maintains that each link in a causal chain is "contiguous"¹⁴⁵ to the next or "continuous in a mathematical sense".¹⁴⁶ Its primary function is "to deny action at a distance".¹⁴⁷ It also serves "to allow us to believe that physical objects exist when unperceived".¹⁴⁸ However it is in a sense a secondary though fundamental inference because it can only be applied in cases "in which a causal connection is considered to be established".¹⁴⁹ This postulate

143. Bertrand Russell, Human Knowledge, p. 310.

144. Bertrand Russell, My Philosophical Development, p. 203.

145. Ibid., p. 203.

146. Bertrand Russell, Human Knowledge, p. 491.

147. Ibid., p. 490.

148. Ibid., p. 491.

149. Ibid., p. 491.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

108

has to do with extrinsic causality in the sense that it connects structure to structure. In the case of perception according to Russell's arguments the presence of a medium brings about the alteration between what is and what is perceived.¹⁵⁰ While the structural postulate and that of quasi-permanence have to do more with intrinsic causality than extrinsic, 'spatio-temporal continuity' would seem to have more to do with 'the laws of change' than 'the laws of persistence', what might be called action through a distance. This is by no means clear however as structure itself is subject to change and media are made up of structures. Russell does not seem clear on this point although what might be said is that the postulate in question includes the idea of motion, in a more direct sense than does the concept of structure.

All four postulates rely on a fifth which Russell calls in full, "the postulate of separable Causal Lines"¹⁵¹ and what has been referred to throughout this thesis 'the Causality Postulate'. This in Russell's words "the most

150. Perhaps this is only implicit in what Russell says. This postulate could also be held to be intrinsic in that while it concerns change, i.e. of place or motion, this is directed motion, a motion in a line, therefore a continuity in change.

151. Ibid., p. 487.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

109

important of all"¹⁵² because...

....It enables us, from partial knowledge, to make a partial probable inference. We believe that everything in the universe has, or may have some effect upon everything else, and since we do not know everything in the universe, we cannot tell exactly and certainly what will happen to anything; but we can tell approximately and with probability; and if we could not, knowledge and scientific laws could never get started. The postulate is as follows.

It is frequently possible to form a series of events such that, from one or two members of the series, something can be inferred as to all other members.¹⁵³

As it was seen without this postulate, this philosopher could not justify his belief in an external world. What this postulate would seem to say is that where there is a mental event or effect there sometimes at least must be an extramental cause. Causal changes have the qualification that they are separate, and it is obvious without such a qualification Russell could not make inferences to physical events or any other entities whatsoever.¹⁵⁴ He states "If the separateness of....things in my visual field is to correspond to a physical separateness, each....must start its own causal change,

152. Bertrand Russell, My Philosophical Development, p. 202.

153. Ibid., p. 202. Its bearing and induction is obvious in that it allows inference from part to whole.

154. He asserts, "This postulate has many uses, but perhaps the most important is in connect with perception - for example, in attributing the multiplicity of our visual sensations in looking at the night sky to a multitude of stars as their causes". Bertrand Russell, Human Knowledge, p. 489.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

110

arriving at my eye without much interference...;"¹⁵⁵ so then he describes the complete process of perception in this way,

Percepts, considered causally are between events in afferent nerves....and events in efferent nerves.... their location in causal change is the same as that of certain events in the brain. Percepts as a source of knowledge of physical objects can only serve their purpose in so far as there are separable, more or less, independent causal change in the physical world. This only happens approximately....Science consists largely of devices for overcoming the initial lack of precision....¹⁵⁶

Through these postulates Russell supplies the foundation from which he is able to make inductive inferences to, and probabilistic statements about the extramental world. By means of these he has an epistemological basis for his particular view of science and scientific methodology. However these principles themselves need epistemological justification. While certain of his arguments which he proposes to supply such a justification are foreshadowed in what he has to say about the topics of self-evidence and perception, Russell himself summarizes and compresses his arguments in his book, My Philosophical Development.

155. Bertrand Russell, Human Knowledge, p. 206.

156. Ibid., p. 209.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

111

12. Russell's Justification for Non-Demonstrative
Inference

In this work he restates his position to the effect that in the end a philosopher is restricted to one of two possible alternatives, "a skeptical solipsism"¹⁵⁷ or something like his own principles of non-demonstrative inference. In arriving at such inferences he maintains that analyses cannot be carried too far beyond a point. Because if this should happen, philosophizing "becomes a mere technical game in which philosophy loses seriousness."¹⁵⁸ Analysis then becomes "a means of articulating our knowledge and showing what depends on what"¹⁵⁹ but the analytic approach such as Descartes' method of doubt can only logically terminate in a 'solipsism of the moment' if at some point some other method or principles other than those of analysis, are not utilized. Concerning the way in which he used his own method, he asserts "Broadly speaking I did not reject common-sense, except where there was some very cogent scientific argument against it."¹⁶⁰ What he means here by common-sense,

157. Bertrand Russell, Human Knowledge, p. 179.

158. Ibid., p. 180.

159. Ibid., p. 180.

160. Bertrand Russell, My Philosophical Development, p. 193.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

112

he illustrates by the example of seeing your own shadow. He says that although "it is not logically impossible that there should be a dark patch going through movements not unlike the movements of your body...."¹⁶¹ Nevertheless that there is a causal connection between body and shadow entails an inference "which no sane man would question".¹⁶² In other words this event has such a high intrinsic degree of credibility that even if it has no logically demonstrative validation, the logical considerations in such a case carry no weight. Russell states that while he realizes that this sort of argument would not carry very much weight against a confirmed Cartesian,¹⁶³ and it is to be expected here that he means empirist as well, that the intrinsic psychological certainty together with the derived and verifiable consequences of non-demonstrative inferences as opposed to the alternative solipsism with its psychological incredibility provides the necessary justification. This then is Russell's meaning for the phrase non-demonstrative inference. These postulates are non-demonstrative in the sense that it is not possible to show

161. Bertrand Russell, My Philosophical Development, p. 193.

162. Ibid., p. 193.

163. He states, "This would be a poor argument if employed against Cartesian skepticism. But I do not think it is possible to get anywhere if we start from skepticism. We must start from a broad acceptance of whatever seems to be knowledge". Bertrand Russell, Ibid., p. 200.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

113

them as logically necessary, that is, there is an alternative solipsism. They are inferences because they are inferred from psychologically primitive beliefs concerning the existence of the external world and these beliefs, though not logically necessary, are psychologically necessary. They cannot be doubted by any 'sane' or rational man. This interpretation is supported by the fact that Russell says that,

These canons are valid if the world has certain characteristics which we all believe it to have. The inferences made in accordance with these canons are self-confirmatory and are not found to contradict experience. Moreover they lead us to think it probable that we shall have mental habits such as these canons will on the whole justify, since such mental habits will be biologically advantageous.

I think therefore, that we may be said to "know" what is necessary for scientific inference, given that it fulfills the following conditions: (1) it is true, (2) we believe it, (3) it leads to no conclusions which experience confutes, (4) it is logically necessary if any occurrence or set of occurrences is ever to afford evidence in favor of any other occurrences. I maintain that these conditions are satisfied. If, however, anyone chooses to maintain solipsism of the moment, I shall admit that he cannot be refuted, but shall be profoundly skeptical of his sincerity.¹⁶⁴

13. Summary and Conclusion

In this chapter it was seen that Russell justifies the theoretical entities of physics by eliminating through analysis those parts of perception which could not be rationally held to belong to the external world. Positively he

164. Bertrand Russell, *Human Knowledge*, p. 496.

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

114

made the connection between the external world and sensation by postulating an identity of structure which passes from the external world to the human knower. Inference received epistemological validation first, through Keynes' theory of probability which entails the notion of natural kinds and then the structural postulate. According to Russell the presence of independent causal lines, constancy of structure and change furnish the basis for scientific inference and those parts of common-sense inference he feels to be justified. The whole concept of the hierarchy going from non-demonstrative inference to the most complicated laws of physics is supported by Russell's notion of the degrees of credibility. It is on this basis he supports his principles of non-demonstrative inference as those principles which cannot be doubted and from which all other inference is derived.

These other inferences are confirmed or disconfirmed, that is assigned varying degrees of credibility on the basis of consistency or coherence together with the postulates of non-demonstrative inference. Confirmation entails experiential or experimental verification but according to this philosopher verification is a subsidiary criteria following from the more basic immediate inferential judgments. In stating this, Russell diverges widely from the empirical

PERCEPTION, INDUCTION AND NON-
DEMONSTRATIVE INFERENCE

115

position he occupied at earlier points in his philosophical development. It is then through the interplay of experience, postulates and verification that the path is travelled from the crude inferences of common-sense to the highly refined epistemological, logical, and physical inferences of contemporary science.

CHAPTER IV

A CRITIQUE OF RUSSELL'S EPISTEMOLOGY

The following critique is short but it is hoped adequate to show that Russell's general epistemology is not viable and so neither can be the epistemology underlying his philosophy of science. The first sections of this chapter which deals with Russell's notion of structure or logical property and his implicit cogito provide what is hoped are the most telling arguments against his philosophy of science. The second part deals with more specific criticisms concerning percept, inference, Russell's notion of simplicity and cause.

1. Russell's Metaphysics of Logical Form

Russell's metaphysics is a metaphysics of form. Furthermore, it is descriptive not explanatory. Persistence we have seen is a quality inherent in structure. Structure is fundamental; persistence a quality. What can structure be for Russell if it is not some notion analogous to the traditional notion of essence? The very concept of structure implies limits or bounds. Event is described according to the enumeration of properties grouped around a centre. Persistence is not existence. Russell is perhaps able to explain through his postulates why a particular causal line maintains itself but he is not able to explain its very

presence. Russell makes existence a property or quantifier of form. It is structure which is fundamental. He says for example "I hold....to Leibniz's multiplicity of possible worlds".¹ This means he holds to other worlds than this one as logically possible. This can also only mean what distinguishes this world from any other is simply the fact that it has a single property the others do not have, the property of existence. On the other hand, to speak about a plurality of universes in the way that Russell does, means that they must have some kind of existence of their own otherwise how could this universe be compared with the other logically possible universes? If the logically possible universes do have an existence of their own, what then truly distinguishes them from this one? There are of course a number of absurdities contained in such a position. It could be asked for instance since pure possibility has some sort of existence of its own and what distinguishes this world from the logically possible world is existence, what separates the two sorts of existence? In other words what is the essence of the existence of essence. Russell in fact calls existence a quantifier when he says,

We call " $f(x)$ sometimes" an "existence proposition," because it says that somethings have the property $f(x)$ "exist." For instance, if you wanted to say

1. Bertrand Russell, Human Knowledge, p. 137.

"Unicorns exist", you would first have to define "x is a unicorn" and then assert that there are values of x for which this is true. In ordinary language, the words "some," "a," and "the" (in the singular) indicate existence propositions.²

Thus the essence or logical form unicorns precedes the existence if there is such and it is the property existence added to the essence which makes it true or actual. Again how can an essence be made actual unless it already, in some sense, is. Thus fundamentally for Russell, to be means to be a form. He cannot on this basis account for the universe at all. How can structures persist or change for that matter if they do not first exist?

2. Russell's Implicit Cogito

Russell posits a false opposition when he says that the choice is between a solipsism or his own postulates of non-demonstrative inference. The logical terminus of his own position is a solipsism. This is because his epistemological starting point is with sensation. If sensations in their purest form are 'hypothetical' how can they serve as the foundation for all knowledge? Moreover, even accepting sensation, how is it possible to know anything beyond sensation? Russell's answer of 'self-evidence' is not convincing within the context of the question as he poses it. A

2. Bertrand Russell, Human Knowledge, p. 450.

psychological belief is not an epistemological validation. Russell in fact admits this when he states that there can be no logical refutation of solipsism. In this case his whole assumption of the truth-value or probable truth-value of the sciences is gratuitous. He compromises his whole program from the very beginning by assuming the validity of the sciences while trying to show that science itself is valid. If for example his statement "The nearer our starting point (in the process leading to a certain event in the brain) is to the brain the more accurate becomes the knowledge displayed in our reactions."³ In order to show this we must presuppose that there is a brain, processes and reactions, but starting from sensation how can he know this? The same sort of criticism applies to his causal theory in general. Before talking about cause and effect, there must be known to be an external world in which causal processes take place. The same thing may be said of his analogy postulate. The formation of an analogy presupposes that there are two things to form an analogy about. The best Russell can do is to show that there are mental events and strictly speaking he has no business even talking about mind in any way at all. The only way that Russell can speak about an external world

3. Bertrand Russell, Philosophy, New York, Norton & Co., 1927, p. 132.

at all is to have experienced it as such.⁴ Even if the experience of mental events do bring him as Russell suggests the unalterable conviction that there is an external world, this is no epistemological justification for that belief. His five postulates, therefore, are merely ad hoc assumptions which demonstrate that he cannot go from sensations to an epistemological justification of the external world.

3. Simplicity and Substance

Russell rejects the notion of substance because according to him there are no grounds for accepting it. In other words it is simpler to get along without this notion than to try and maintain it. Why cannot the same sort of argument be applied to his principles of non-demonstrative inference or his concept of space-time structure for that matter. Russell says of space-time laws for example,

There is no logical reason why there should be such causal laws, or known relations establishing such a four-dimensional order among events. The usual argument for the acceptance of physical laws is that they are the simplest hypothesis hitherto devised

4. His statement that the "most rigorous type of solipsist...accepts the premise of Descartes' cogito with some interpretation", (Bertrand Russell, Human Knowledge, p. 178) must be held as self-descriptive until he can produce an epistemological justification for the fact of an external cause of sensations.

A CRITIQUE OF RUSSELL'S EPISTEMOLOGY

121

that are consistent with observation wherever observation is possible.⁵

This according to Russell is what his own epistemological theory is supposed to do. Yet in the end he rejects the notion of simplicity. He says for example, "It is not clear what is meant by "simplicity," and there is no a priori reason for expecting laws to be simple except benevolence on the part of Providence toward the men of science."⁶ On what basis are Russell's postulates preferable to those of 'naive realism'.? Both contain epistemological difficulties and for both, what constitutes a fact, is a question of interpretation and presupposition. Why also should Einstein's notion, so important to Russell's epistemology, be accepted over Aristotle's notion of substance?[?] There seems to be a contradiction in Russell's position. On the one hand he accepts science as a refinement over common-sense, on the other hand he rejects at least one of the major reasons for which scientists, like Einstein, hold science to be a superior form of knowing-simplicity, that is, the assumption of diverse phenomena under a relatively few general concepts.

5. Bertrand Russell, Human Knowledge, p. 327. Observation however presupposes causality, furthermore, granting the fact of an extramental world, why should it be ordered in causal lines? At best, this assumption represents an illegitimate overextension of what may happen between mental events.

6. Ibid., p. 478.

4. Inference

Ernest Nagel says,

Though Russell speaks much of "inferring" things it is not clear in what sense he believes physical objects to be "inferred" from perceptions. He uses the term "inference" in at least the following distinct ways: in the ordinary sense of logically deducing one proposition from another; in the familiar sense of asserting a proposition on evidence which makes that proposition probable; in the sense in which something which is perceived with an "accompanying interpretation" is obtained from something else that is supposed to be perceived directly or without interpretation; and finally in the sense in which something that is a logical construction is obtained from entities out of which it is constructed.⁷

This seems a fair criticism. It is important to know in what sense Russell is using the word inference. It is difficult to know how he is using the word inference because it is difficult to know why animal inference should contain logical inference at all and it is even more difficult to establish epistemologically that animal inference does contain logical inference. Why for example should the mere fact of awareness of animal inference lead to a knowledge of logical inference? This would seem to be more a function of self-awareness, in itself, that is, the human power to abstract and conceptualize than a function of mere psychological habit. It seems to be stretching the meaning of logic completely out of shape to argue as Russell does that the ability to survive in an

7. Ernest Nagel, Russell's "Philosophy of Science" in The Philosophy of Bertrand Russell, p. 337.

environment is identical to acting rationally.

5. Degrees of Credibility

Russell says,

For a given person at a given time there is only one right value for the degree of credibility of a given proposition, whereas in the mathematical theory many values are equally legitimate in relation to many different data, which may be purely hypothetical. It is difficult to see why if the sensational core is itself hypothetical there should be only one degree of credibility attached to it and this even becomes more difficult to see when it is scientific laws which are the data and not sensations.⁸

Russell says himself "Data as well as the results of inference, may be destitute of the highest attainable degree of credibility".⁹ This being the case there can be no such thing as self-evident principles and hence his whole hierarchy of knowledge crumbles for there can be no particular moment when datum is self-evident or if it is argued that one is assigned hypothetically it must be so with others in main that lend to the uncertainty. Furthermore, Russell's conception of a hierarchy becomes a logical dream unless he can show that it has reference to the external world. This he does not do.

8. Bertrand Russell, Human Knowledge, p. 388.

9. Ibid., p. 383.

6. Conclusion

Russell begins metaphysically from a metaphysic of abstract logical form and he is unable to account for the presence and actuality of the world; he begins epistemologically from sensations and he is not able to even justify an extramental universe.

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126

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127

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Albert Einstein, Philosopher-Scientist, (Schilpp, Paul Arthur, Editor) Vol. I-II, New York, Harper and Row, (Copyright 1945, Library of Living Philosophers), 1959, 781 p.

Of special value both for its numerous essays on Einstein's philosophy and science and particularly for Ushenko's essay comparing the events of Einstein, Russell and Whitehead

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128

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APPENDIX I

THE PROBLEM CONCERNING THE DERIVATION OF
RUSSELL'S NOTION OF EVENT

Andrew Paul Ushenko remarks,

Russell tells me in a letter of December 12, 1946, that it was Whitehead who led him around 1914, "to abandon Newtonian absolute time and space, and also particles of matter, substituting systems of events". Russell's conviction that the philosophy of events, "fitted in well with Einstein", as he puts it, confirmed me (i.e., Russell) in the views I got from Whitehead, but Einstein was not their source for me, and I think not Whitehead.¹

The question really concerns the content of the notion of event, not the source, and on this Ushenko remarks further.

"There are....important points, such as the principle that contemporary events are physically independent of each other, where the influence could have hardly been anything but direct."²

This would seem to be correct as Russell constantly makes reference to Einstein and relativity throughout his works. It is hard to see how Russell could have come to such concepts as structure outside the framework of relativity theory. Furthermore, Russell rejects Whitehead's idea of event when he says "There seems to be premisses in his which

1. Andrew Paul Ushenko, "Einstein's Influence on Contemporary Philosophy", as found in Albert Einstein, Philosopher-Scientist (Paul Arthur Schilpp, Editor), Vol. II, New York, Harper Androw, p. 611.

2. Ibid., p. 611.

THE PROBLEM CONCERNING THE DERIVATION OF
RUSSELL'S NOTION OF EVENT

131

are derived rather from a metaphysics than the actual needs of the problem."³

Regarding this problem conversely there are good reasons to suppose Einstein does not accept Russell's event. He states (in translation),

No matter how much one may admire the acute analysis which Russell has given us in his latest book on meaning and truth, it still seems to me that there's the spectre of the metaphysical fear has caused some damage. This....seems to me to be the cause for conceiving the "thing" as a 'bundle of qualities' such that qualities are to be taken from the sensory raw material. Now the fact that two things are said to be one and the same thing if they coincide in all their qualities, forces one to consider the geometrical relations between things as belonging to their qualities. Otherwise one is forced to look upon the Eiffel Tower in Paris and that in New York as the "same thing". Over against that I see no metaphysical danger in taking the thing (the object in the sense of physics) as an independent concept together with the proper spatio-temporal structure.⁴

There would seem no final way then of solving this problem.

3. Bertrand Russell, The Analysis of Matter, p. 138.

4. Albert Einstein, "Remarks on Bertrand Russell's Theory of Knowledge", as found in The Philosophy of Bertrand Russell, Vol. V, pp. 290-291.

APPENDIX 2

FURTHER REMARKS ON NEUTRAL MONISM

Copleston remarks on the shift in Russell's view about Neutral Monism from the time this philosopher wrote The Analysis of Mind to the time of An Inquiry Into Meaning and Truth, that "It is not quite accurate to say that Russell embraced Neutral Monism only to reject it. It is rather that he found himself unable to carry through that requisite programme of reinterpretation, without however being prepared to assert it could not be carried through.¹ Russell relates that when he first adopted the theory of Neutral Monism, the abandonment of 'subject' "made it possible....to regard the traditional problem of the relation of mind and matter as definitively solved."²

In place of this troublesome dichotomy, this theory allowed an "immense simplification"³ because "mind and a piece of matter"⁴ may be regarded "as logical constructions formed out of materials not differing vitally and sometimes

1. Frederick Copleston, A History of Philosophy, Vol. 8, Part II, Garden City, New York, 1967, p. 219.

2. Bertrand Russell, My Philosophical Development, p. 139.

3. Ibid., p. 139.

4. Ibid., p. 139.

actually identical".⁵ This as it has been seen is still very close to Russell's view in Human Knowledge. Both physical and mental events are constructed out of the self.

However, Russell continues, "There were consequences of the new view less convenient"⁶ and these impressed themselves on the philosopher in gradual stages. For instance, the dualism which was overcome in sensation 'reappears' in perception. The perceptual core is distinct from perceptual accretions and there is a further duality between "Imagination and memory"⁷ which introduces the problem of the relation of "an image to its sensational prototype".⁸ There remains then a separation between knower and known which Russell does not seem to be able to overcome within the context of Neutral Monism and so there follows the difficulty of trying to delineate his exact view of the status of this theory.

5. Bertrand Russell, My Philosophical Development, p. 139.

6. Ibid., p. 139.

7. Ibid., p. 143.

8. Ibid., p. 144.

APPENDIX 3

THE EPISTEMOLOGICAL STATUS OF THE
HEIRARCHY OF BELIEF

We said that it is the business of epistemology to arrange the propositions which constitute our knowledge in a certain logical order in which the latter propositions are accepted because of their logical relation to those that come before them. It is not necessary that the latter propositions should be logically deducible from the earlier ones; what is necessary is that the earlier ones should supply whatever grounds exist for thinking it likely that the latter ones are true. When we are considering empirical knowledge, the earliest propositions in the heirarchy, which give grounds for all the others, are not deduced from other propositions, and yet are not mere arbitrary assumptions. They have grounds, though their grounds are not propositions but observed. Such propositions, as observed about, I shall call 'basic' proposition.¹

1. Bertrand Russell, An Inquiry Into Meaning and Truth, p. 20.

APPENDIX 4

COHERENCE THEORY OF PROBABILITY

As a partial defence of his principles of non-demonstrative inference, Russell asserts,

The....postulates....are justified by the fact that they are implied in inferences which we all accept as valid and that, although, they cannot be proved in any formal sense, the whole system of science and everyday knowledge, out of which they have been distilled, is, within limits, self-confirmatory. I do not except the coherence theory of truth, but there is a coherence theory of probability which is important and I think valid. Suppose you have two facts and a causal principle which connects them. The probability of all three may be greater than the probability of any one, and the more numerous and complex the interconnected facts and principles become, the greater is the increase of probability, derived from their mutual coherence.¹

Coherence is a derivative criteria for the same reason verification is subsidiary, both rely, according to Russell, on the more epistemologically primitive notion of fact. Russell holds a correspondence theory of truth. The correspondence is that which holds between image (idea) and prototype. In the case of a physical prototype, the identity entailed in the relationship is the identity of spatio-temporal structure which carries through from physical to mental event. However, Russell actually uses the structural causality and other postulates to explain and justify the correspondence which he begins by accepting; on this he asserts, "Ever since I

1. Bertrand Russell, My Philosophical Development, p. 204.

was engaged on Principia Mathematica, I have had a certain method of which at first I was scarcely conscious, but which has gradually become more explicit in my thinking. I accept both as in broad outline, not to be questioned".² Coherence refers then to the assignation of degrees of credibility, extrinsically and not intrinsically, where credibility is found in the correspondence relation itself to some degree.

2. Bertrand Russell, My Philosophical Development, p. 205.

SUMMARY OF
THE EPISTEMOLOGICAL FOUNDATIONS
OF BERTRAND RUSSELL'S
PHILOSOPHY OF SCIENCE

by Kenneth G. Butler

The first chapter deals with some aspects of the epistemological foundations of Russell's conception of an event and more generally his philosophy of science.. Here it is seen that Russell's notions have roots in contemporary physics and psychology as well as Humean empiricism. An event is known through the description, isolation and enumeration of its properties.. These properties are derived from the data of physics, behaviouristic and introspective psychology and they are to be understood in the case of the sciences as logical accretions to the bare Humean sensation. In this chapter then the elements of Russell's epistemology are related along with certain difficulties.. Russell, himself, partially realizes that these are entailed by his epistemological starting point.. There is given as well a brief description of his causal theory of perception which demarcates the lines along which he attempts to solve his metaphysical and epistemological difficulties.

The second chapter deals with segments of the relationship which exists between mental and physical events. The subject of the formation of an event out of sensation is particularly stressed although the point is made that the formation of the connections between sensation and percept and the formation of the

relationships which hold between percept and percept must be considered as analogous if not identical processes.. The point is made as well, that Russell arrived at those connections which are logical as opposed to merely psychological through a method closely akin to the Cartesian doubt. It is by this method he is able to distinguish epistemologically valid accretions from those which are not. It is by this means that he is able to establish his hierarchy of beliefs..

The third chapter demonstrates Russell's extension of his method to the connections which hold between percepts. It attempts to show how he co-ordinates what he calls perceptual space with physical space.. It also attempts to show the way in which Russell grounds induction, out of which physical and perceptual space come, in something close to a Keynesian theory of "limited variety" which, however, Russell interprets from the empiricist tradition. The qualities implied by a notion of a natural kind are reduced to the limits of spatio temporal structure. This reduction satisfies Russell's conditions for the acceptance of relationships between percepts being both logical and

relatively simple.. The structural postulate along with his four other postulates of non-demonstrative inference, in fact, provide the necessary and sufficient conditions, according to Russell for valid inference to the external world.. These postulates are themselves justified by their psychological necessity, coherence and self consistency.. This then is the way Russell joins the world of physics to the world of common sense..

The fourth chapter provides a brief critique of Russell's system. It maintains that psychological certitude, that in fact, Russell is as much trapped inside his cogito when he presents the solution to his problem as when he posits it.

Furthermore, it is maintained that Russell's metaphysics is totally inadequate to the problem of existence, his metaphysics of a persisting logical form implies a basic contradiction..