The emergence of Russell's logical construction of physical objects

by Sajahan Miah

I. INTRODUCTION

IN THE PREFACE to *Our Knowledge of the External World* (1914), Russell states that

> The central problem by which I have sought to illustrate method is the problem of the relation between the crude data of sense and the space, time, and matter of mathematical physics. I have been made aware of the importance of this problem by my friend and collaborator Dr. Whitehead, to whom are due almost all the differences between the views advocated here and those suggested in *The Problems of Philosophy* [1912]. I owe to him the definition of points, the suggestion for the treatment of instants and "things," and the whole conception of the world of physics as a *construction* rather than an inference.[1]

This passage conveys several impressions: that Russell became a constructionist, for the first time, in *Our Knowledge*; that the constructionist theory emerged directly out of *The Problems of Philosophy*; and that Whitehead deserves full credit for Russell's becoming a constructionist. The received view accepts all of these impressions. In this paper, I dispute them all.

My aim is to establish the following theses:

[1] *Our Knowledge of the External World*, 2nd ed. (London: Allen and Unwin, 1926), pp. 7–8.

(a) Russell considered logical constructions in general epistemology as early as the unpublished paper "On Matter", which he read at Cardiff on 17 May 1912;
(b) the emergence of logical constructionism is a shift not directly from the *Problems*, but from a transitional, unpublished sceptical position which he held for a short time in early 1912;
(c) it was probably Wittgenstein who led Russell to the intermediate sceptical position;
(d) Russell's acknowledgement in *Our Knowledge* attributes to Whitehead much more than he deserves in the case at hand.

The text I shall concentrate on is "On Matter", supplemented by Russell's private correspondence with Lady Ottoline Morrell. "On Matter" is of special interest both for identifying the weaknesses of the *Problems* and for the emergence of the constructionist theory. Before proceeding, I wish to stipulate that, in this paper, I take logical constructionism to be an epistemological theory which is confined to the construction of physical objects out of actual and possible sense-data; and I hold that Russell considered this, for the first time, in 1912.[2]

II. RUSSELL'S PRE-CONSTRUCTIONIST VIEW OF PHYSICAL OBJECTS

In the *Problems* Russell's approach to the problem of the external world is similar to that of the classical British empiricists. There relying on perceptual relativity, he concludes that we perceive not physical objects but sense-data: such things as colours, smells, sounds, hardnesses, etc.[3]

[2] Russell first developed logical constructions in 1903 (although he did not use the term "logical construction") in the philosophy of mathematics. He applies the method in *The Principles of Mathematics* in the definitions of cardinal, ordinal and real numbers. Instead of defining the cardinal number of any given class as the property common and peculiar to all the members of that class, Russell shows how it could be regarded as a logical construction out of equivalence classes. See *The Principles of Mathematics* (Cambridge U.P., 1903), pp. 114–16. See also *Principia Mathematica*, 2nd ed. (Cambridge U.P., 1925, 1927), Vol. II (1st published in 1912), p. 4; "The Relation of Sense-data to Physics" (1914; reprinted in *Mysticism and Logic*, Penguin, 1953), p. 149; *Introduction to Mathematical Philosophy* (London: Allen and Unwin, 1919), p. 18; "Reply to Criticisms", in *The Philosophy of Bertrand Russell*, ed. P.A. Schilpp (Evanston and Chicago: Northwestern U., 1944), p. 692. In *Principia Mathematica* Russell and Whitehead jointly apply the method of logical constructions to more mathematico-logical problems.

[3] *The Problems of Philosophy* (London: Oxford, 1946; New York: Oxford [Galaxy], 1959), p. 12.

He points to the fact that the appearances of a physical object, say a table, vary under different conditions, which he interprets as showing that none of them can be identified with the real properties of the table.

Having stated that whenever we look at the table we directly see only sense-data, Russell tells us that we cannot see the table. It is not that sometimes we see sense-data and sometimes we see the table, rather we invariably see sense-data. However, as soon as Russell brings sense-data onto the scene, not only does he cut himself off from any possibility of viewing physical objects, but a fundamental problem arises for him: what is the relationship of sense-data to physical objects? In Hume's terms, since the senses "convey to us nothing but a single perception, and never give us the least intimation of anything beyond", the impressions (sense-data) which we receive from physical objects cannot be representations of anything "*distinct* or *independent* and external".[4] Now since our direct perception is restricted to sense-data, any claim to know physical objects involves passing beyond our private sense-data. It appears that any attempt to pass from sense-data to physical objects would logically lead to scepticism. The sceptic *rightly* claims that there is an epistemological *gap* between sense-data and physical objects. And any claim to justify our inferential knowledge of physical objects is to find a way of bridging or abolishing this gap which, the sceptic claims, it is not possible to bridge.

Thus in the sceptic's position there are the following steps:

(1) Our knowledge of physical objects, if any, is based on sense-experience.
(2) Sense-experience gives knowledge only of sense-data.
(3) There is no valid deductive or inductive inference from sense-data to physical objects.
(4) So we have no knowledge of physical objects.

In the *Problems*, Russell happily accepts (1) and (2) but rejects (3) and (4). While admitting the gap between sense-data and physical objects, Russell steps aside from scepticism and tries to bridge the epistemological gap by a process of inductive reasoning (not induction by simple enumeration). By assuming an inductive principle, we are able to infer, from the existence of sense-data, physical objects that transcend and are causes of these data. The application of the inductive principle in this process of inference rests partly on the simplicity hypothesis and

[4] David Hume, *A Treatise of Human Nature*, ed. L.A. Selby-Bigge, 2nd ed. rev. by P.H. Nidditch (Oxford: Clarendon Press, 1978), p. 189.

partly on instinctive belief.

It is a simple hypothesis that "there really are objects independent of us, whose action on us causes our sensations" (*Problems*, p. 23). Russell both appeals to and supports the simplicity hypothesis with an example of a moving cat. I see a cat at the corner of the room at one moment. At another moment it goes into another room out of my sight. After a while, when it returns, I see it again. But if I say that the cat is nothing more than a series of sense-data, we cannot admit that it existed during the interval when I did not see it, because at such time the cat was not sense-data to me. This view seems absurd. It seems absurd to say that the cat ceased to exist when I did not see it and then "suddenly sprang into being in a new place" (*Problems*, p. 23). To avoid such absurdity, Russell contends, we take the natural view dictated by the principle of simplicity that "there really are objects other than ourselves and our sense-data which have an existence not dependent upon our perceiving them" (*Problems*, p. 24). Such a belief helps us to fill certain gaps in our sense-experience. The moving cat example suggests that between my separate sets of cat sense-data, the real cat moved from one part of the room to the other.

Russell further strengthens his simplicity hypothesis by pointing out that we instinctively believe that we see, touch and smell physical objects. "We find this belief ready in ourselves as soon as we begin to reflect" (*Problems*, p. 24). However, Russell certainly realizes that this instinctive belief cannot stand up to the argument from relativity of perception. So he shifts the defence to the view that sense-data are caused by and correspond to physical objects (*Problems*, p. 24). He finds it more reasonable to suppose that since we are never acquainted with physical objects but always with sense-data, these sense-data are the results of something external to ourselves and acting on our sense-organs. Russell admits that there is no logical impossibility that our instinctive beliefs are false, but still they are worthy of acceptance, since the contrary hypothesis does not seem to be warranted by the facts. But, just three months after the publication of the *Problems*, Russell changed his view about physical objects. This change arose from his coming to take a complete sceptical attitude towards beliefs which do not follow with deductive validity from any facts we perceive to be true. Russell's sceptical attitude is evident in his unpublished paper "On Matter". Before he started writing "On Matter"[5] Russell explained to

[5] Unpublished ms., 1912 (RA 220.011360). Russell started writing "On Matter" on 27 April 1912 and finished on 13 May 1912 (Russell to Morrell, #[427] attached to #426, pmk. 28 April; #449, pmk. 13 May 1912). Russell read this paper to the Department of Philosophy at the University of Wales, Cardiff, on 17 May 1912 (#457, pmk. 19 May 1912). He revised the paper heavily on 16 Oct. 1912 (#606, pmk. 16 Oct. 1912). "On Matter" is scheduled for publication in *The Collected Papers of Bertrand Russell*, Vol. 6: *1909–13*, ed. John G. Slater (forthcoming 1989?).

Ottoline Morrell what he was hoping to accomplish in it: "I haven't had enough courage hitherto about matter, I haven't been sceptical enough. I want to write a paper which my enemies will call the bankruptcy of realism" (#423, pmk. 24 April 1912). Three days later, while reporting to Ottoline Morrell that he had started writing "On Matter" and had reached page 9, Russell reiterated the position he had in mind: "I will shock people, especially those who would like to agree with me—it ['On Matter'] is altogether too sceptical" (#[427] enclosed with #426, pmk. 28 April 1912).

III. INFLUENCE OF WHITEHEAD AND WITTGENSTEIN UPON "ON MATTER"

Before considering Russell's sceptical arguments in "On Matter", let us look for any external influence behind his change of position from the *Problems*. I shall examine Whitehead's pre-publication criticisms of the *Problems* manuscript and Wittgenstein's earliest criticisms of Russell's philosophical position in the *Problems*. In the middle of August 1911, Russell sent a typescript of the *Problems* to Whitehead. On 23 August Whitehead wrote to Russell:

> Thanks for the typed copy of your book. May I keep it for a week or two? It is really excellent. As I read it, the extreme difficulty of condensing such a disputable subject as philosophy and the lucidity of your exposition strike me more and more.
>
> There are some arguments in it which do not convince me.... [I]n a few days I will write at length.

Three days later Whitehead sent a letter along with fourteen pages of critical comment on the *Problems*. It is not known what Russell wrote to Whitehead just before or after receiving the comment, for Russell then did not make copies of such letters and Whitehead was not a preserver of letters. But it seems evident that there is no passage in the *Problems* which looks like a response to an objection raised by Whitehead. As Victor Lowe has noted, in the published *Problems* "all the passages that Whitehead quoted from the typescript as targets of his

criticism appear unchanged."[6] Whitehead's major objection to the *Problems* does concern the topic of my inquiry, physical objects as entities inferred from sense-data:

> Here in pages 5 [*Problems*, p. 8], 6 [p. 9] and 10 [p. 12] you seem by a sleight of hand to take away the table which I (= the plain man) perceive. I see a "yellow *table*" and I feel a "hard *table*" and I infer that I feel what I see. You (rather obscurely) tell me that I see yellowness and feel hardness, and *infer* a real table. Such inferences are quite beyond plain people like myself. I perceive *objects*, and want to know about the reality of the objects I perceive. You ignore this object (or rather smuggle it away) and proceed to talk about sensations of yellowness and hardness and of an *inferred* object which causes them. This criticism naturally affects later chapters also.

Russell's letters to Ottoline Morrell show that by November 1911 he had finished with the final proofs of the *Problems* (see #245, 5 Nov. 1911). The book was published on 24 January 1912. He had had time to change his position in the light of Whitehead's comments, but he did not do so. The possible reasons include not wanting to delay the publication of the *Problems*, then in its final stage; finding it difficult to deal with Whitehead's comments, since they required major changes; and thinking that Whitehead was just wrong. At any rate, for whatever reason, Russell did not take Whitehead's comments into account in the *Problems*.[7]

Just perhaps, after the publication of the *Problems*, Russell took Whitehead's comments into account in writing "On Matter". I suggest that this is not the case. Firstly, there is no sign of this influence in any of his extant correspondence with anybody when he was thinking of "On Matter". Secondly, and more importantly, if Whitehead influenced Russell, then "On Matter" should either be in line with Whitehead's own position, which he identified as that of the plain man (presumably a common-sense realist), or it should show Russell establishing his *Problems* position more securely so as to avoid Whitehead's charges. In neither case would Russell have declared "On Matter" to be "too sceptical". In fact, Whitehead argues in exactly the *opposite direction* to the one Russell takes in "On Matter". Whitehead's comments on the *Problems* therefore can have had nothing directly to do with Russell's coming to take a sceptical attitude in "On Matter".

[6] "Whitehead's 1911 Criticisms of *The Problems of Philosophy*", *Russell*, no. 13 (1974): 8.

[7] Even in the original Preface to the *Problems* (which he never changed) Russell acknowledges debts to G.E. Moore, J.M. Keynes and Gilbert Murray, but he does not mention Whitehead.

Wittgenstein's influence is a different matter. There is no explicit sign of such influence in Russell's published works, but I suggest that around late 1911 and early 1912 Russell was influenced by the sceptical views of Wittgenstein. My main source of support for this suggestion is Russell's private correspondence, especially with Ottoline Morrell. It shows that from the time Russell met Wittgenstein, the latter became an important part of Russell's life and thought; and his criticisms affected Russell's post-*Problems* works on epistemology.

Russell met Wittgenstein for the first time on 18 October 1911. Wittgenstein had come to hear Russell's lecture on logic and the philosophy of mathematics. In this first meeting Wittgenstein certainly drew Russell's full attention. That evening Russell wrote to Morrell that while he was talking to Ogden:

> ... an unknown German appeared, speaking very little English but refusing to speak German. He turned out to be a man who had learned engineering at Charlottenburg, but during his course had acquired, by himself, a passion for the philosophy of math'cs. and has now come to Cambridge on purpose to hear me.... I am much interested in my German, & shall hope to see a lot of him. (#225)

As Clark has rightly pointed out,[8] Russell was up against something exceptional. Next day Russell reported: "My German friend threatens to be an infliction—he came back with me after my lecture and argued till dinner-time—obstinate and perverse, but I think not stupid" (#227, pmk. 19 Oct. 1911). Within a week or two Russell had pinned down Wittgenstein's philosophical position as denying the possibility of empirical knowledge. Russell's 2 November letter to Morrell gives his reaction: "My German engineer, I think, is a fool. He thinks nothing empirical is knowable—I asked him to admit that there was not a rhinoceros in the room, but he wouldn't." Initially Russell was offended by Wittgenstein's sceptical attitude. On 15 November Russell reported: "My ferocious German (who is an Austrian I find) came and argued at me after my lecture. He is armour-plated against all assaults of reasoning—it is really rather a waste of time talking with him." Around the turn of 1912, when Russell received some written work from Wittgenstein, he began to be impressed by Wittgenstein's inge-

[8] R.W. Clark, *The Life of Bertrand Russell* (London: Cape and Weidenfeld & Nicolson, 1975), p. 170.

nuity (#320, pmk. 23 Jan. 1912).

As soon as Russell was impressed by Wittgenstein's ingenuity, he began to be infected by Wittgenstein's sceptical attitude. How much so is explained in his 1 March 1912 letter:

> In my lecture yesterday I changed my mind in the middle. I had gone to prove that there probably is an external world, but the argument seemed to me fallacious when I began to give it, so I proved to my class that there was no reason to think anything existed except myself.... This was very sad, but it doesn't seem to matter much. It made a better lecture than if it had been more pat. (#363)

As soon as Russell came to appreciate his student's sceptical attitude, he began to like Wittgenstein very much, although he was a "severe critic" of Russell's lectures: "I like Wittgenstein more and more. He has the theoretical passion *very* strongly—it is a very rare passion and one is glad to find it.... There is very much more in him than in any of my other pupils" (#373, pmk. 8 March 1912).

Wittgenstein also attended Moore's lectures. Once Russell asked Moore about what he thought of Wittgenstein. Moore replied that he had a high opinion of him. Russell was delighted to let Ottoline Morrell know this (#368, pmk. 5 March 1912).

By the time Russell came to write "On Matter" Wittgenstein had become a friend and a valued colleague. On 26 March 1912, Russell wrote to Lucy M. Donnelly:

> I have now an Austrian pupil who is after my own heart—he never believes what I say, & always has admirable reasons for his dissent; it is not *barren* dissent, but that of a man who has absorbed what one has to teach and gone farther.

Russell even came to think of Wittgenstein as his own successor.

> He [Wittgenstein] is a treasure. I have got a number of new technical ideas from him, which I think are quite sound and important. I shan't feel the subject neglected by my abandoning it, as long as he takes it up. (Russell to Morrell, #422, 23 April 1912)[9]

Moreover, Russell himself confessed that it was Wittgenstein who

[9] It is interesting to note that Russell expressed this view the day before he planned to write "On Matter" (#423, pmk. 24 April 1912).

had made him "more of a sceptic" (#459, pmk. 21 May 1912). And again, the day he started writing "On Matter" Russell wrote to Morrell that "Wittgenstein (who has just been here) is delighted [to know that the paper is going to be 'too sceptical'] but no one else will be" (#[427], enclosed with 426, pmk. 28 April 1912). It seems evident that Russell must have discussed with Wittgenstein the possible sceptical outcome of "On Matter". Even when Russell had finished a substantial part of "On Matter" he was encouraged by Wittgenstein who, in Russell's judgment, "is the only man I have ever met with a real bias for philosophical scepticism; he is glad when it is *proved* that something can't be known" (#435, pmk. 2 May 1912).[10] And it was Wittgenstein who "thinks my paper on Matter the best thing I have done" although he read only the beginning and end of it (#460, pmk. 22 May 1912). Russell's correspondence with Lady Ottoline Morrell and Lucy M. Donnelly give clear indication that Wittgenstein was a great influence on his developing a sceptical view in "On Matter".

IV. SCEPTICISM IN "ON MATTER"

"On Matter" is intended to upset any defence of our knowledge of physical objects. In the *Problems*, the argument by which Russell tries to bridge the gap between perception and physical objects is based on an inductive principle or on what some would call "inference to the best explanation". By supposing that there are physical objects, physical science is able to frame theories which fit the facts in all verifiable respects, and thus form a simple system. Otherwise many facts would remain isolated and chaotic. Our sense-data are all fleeting and perishing. But by supposing them caused by physical objects all of these isolated and fleeting sense-data can be brought under general laws which are simple and allow sense-data, to some extent, to be predictable. In the *Problems* Russell employs this inductive principle to strengthen the inference from sense-data to physical objects. But he was not happy in doing this. He agreed with Hume that such a principle cannot be logically proved to be true. However in the *Problems*, instead of becoming a sceptic, Russell embraces the simplicity argument by accepting the principle on the ground of its intrinsic plausibility (*Problems*, p. 68).

In "On Matter", Russell finds no satisfactory reason for inferring

[10] In his *Tractatus Logico-Philosophicus* (trans. D.F. Pears and B.F. McGuinness, with an Introduction by Russell, London: Routledge, 1961), what Wittgenstein says from proposition 6.3 to 6.372 (where he deals with scientific theory and natural laws) clearly reflects this sceptical attitude.

physical objects from sense-data. He comes to accept the futility of using the inductive principle to support the hypothesis that sense-data are signs of physical objects. The simplicity argument, he now thinks, "has absolutely no weight whatever" ("On Matter", fol. 16). Russell agrees that in some situations when we have nothing to choose between two hypotheses, there may be a practical reason to accept the simpler of the two. "But this affords no reason whatever for supposing that the simpler theory is actually true" (*ibid.*). Elsewhere Russell expresses the same view that "there is no very good ground for supposing that a simple law is more likely to be true than a complicated law" (*The Analysis of Mind* [London: Allen and Unwin, 1921], p. 132).

A variant of the inductive argument, argument from confirmation, holds that if a certain hypothesis fits all relevant known facts it is at least probable that the hypothesis is true. But Russell insists that such "a contention is only valid if it is known that there are not likely to be other hypotheses which also fit the facts. In our case this knowledge is absent" ("On Matter", fos. 17–18).

The argument from continuity states that if a cat appears at different places at different times it is quite reasonable to suppose that over and above the various cat sense-data there is a real cat which changes its position and exists when it is not seen. "But I doubt", Russell now contends, "if there is any real force in considerations of this kind" (fol. 18j). Russell does not give any further explanation of this objection; but he seems to think that since the principle of continuity (a variant of the simplicity hypothesis) depends on inductive argument and since inductive argument has been shown to be invalid, the continuity principle loses any real force.

No defensible reason is found in favour of the existence of physical objects. Can we then have any satisfactory account of the nature of physical objects? The answer is: we can't. In the *Problems*, Russell argues that physical objects exist in physical space. Now he realizes that this view gives rise to a difficult question as to what is meant by "space". "Real" space is not present to the senses. The one space in which common sense believes is obtained by a rough correlation of different spaces (i.e., those of sight, touch, feeling, etc.). This space is an inference. Moreover, it cannot contain the immediate data of the senses but only the "things" which common sense infers from sense-data and regards as the sources of correlated sensations of sight, touch, feeling, etc. So it appears that the space of common sense is to be identified as the space in which the physical object is; other than that, the physical object is to be defined as that which is in common-sense space. "Hence the attempt to define matter [the collection of physical objects] as that which is in space breaks down" (fol. 6).

In the *Problems*, Russell says that he cannot tell us about the qualities of physical objects. The most he can do is to offer the suggestion that there is in the physical object some quality which corresponds to brown when we see brown, some quality which corresponds to red when we see red, and so on. In "On Matter" Russell claims that even if we assume that some of our sense-data correspond to qualities independent of perception "we could know nothing as to [their] intrinsic nature" (fol. 29). This is also the conclusion in the *Problems* (see p. 34), but now Russell is taking his argument one step further: we cannot even know the structural properties of things. Even if in two cases where everything we can directly observe is exactly similar, it does not follow that there is no unobserved difference. We can always cast doubt as to whether even in some cases sense-data correspond structurally to the reality behind them.

Since we have no means of identifying physical objects, we have no reason to believe that they play any role in the production of our sense-data or even that they exist at all. Considering Russell's initial announcement to Lady Ottoline, this could be the final conclusion of "On Matter". But the story is quite different. Having realized that the defence of physical objects in the *Problems* cannot stand up to sceptical arguments, he does not join the sceptic; rather he goes in a new direction to defend physical objects from the threat of scepticism.

V. CONSTRUCTIONISM AND RUSSELL'S CREDIT TO WHITEHEAD

Russell proposes that in order to escape a sceptical conclusion we should assume "that all that could be a sense-datum to any possible observer actually exists, and that collections of such actual and possible sense-data are bound together in ways which enable us to regard them as one 'thing'" (fol. 35). This provides him with two advantages, *viz.* "(1) that it avoids an unknown noumenon, since matter will consist entirely of things of the kind with which we are acquainted, (2) that it avoids rejecting our instinctive belief in the independent reality of qualities, without which it is hard to find any conclusive ground for retaining our belief in matter or the external world" (fol. 32). This marks the beginning of Russell's constructionist theory of the external world. Even the term "logical construction" appears here for the first time (fos. 12, 19), and although he has not yet fully developed the theory, he is well aware of its possible uses: "... *to those who rebel against the sceptical conclusions to which we seem otherwise driven*, I commend this hypothesis [that physical objects are constructed from actual and pos-

sible sense-data] as at least not obviously untrue, and as more in consonance with our instinctive beliefs than any other hypothesis which the facts permit" (fol. 35; my italics). Thus it is in "On Matter" that the constructionist theory emerges which Russell fully develops in *Our Knowledge* and "The Relation of Sense-data to Physics".

It is now clear that the seeds of Russell's constructionist theory are contained in "On Matter", that this discussion grew out of his sceptical doubts about physical objects, and that it was probably Wittgenstein who made him sceptical. It is interesting to notice that what Wittgenstein says in the *Tractatus* (esp. 6.363–6.37) is a clear indication of his agreement with Russell in "On Matter" that induction, which consists in accepting as true the *simplest* laws, has no logical justification. I am not claiming that it was Wittgenstein who influenced Russell into becoming a constructionist. What Wittgenstein seems to have done is to make Russell realize that the way he tries to bridge the gap between perception and physical objects in the *Problems* is doomed to failure by the sceptic's arguments. Wittgenstein quickened the emergence of logical constructionism in that he forced Russell to come up with the view that the sceptic's gap could be bridged in a constructionist way.

One might ask why, if Russell had been influenced by Wittgenstein during this time, he does not acknowledge it. The reason, I think, is that Wittgenstein's influence was on Russell's *direction* rather than his doctrine. It should be noted here that Russell's understanding of scepticism is different from Wittgenstein's. One very interesting feature of Wittgenstein's sceptical attitude is that he does not, as does Russell, think that scepticism is a legitimate position which needs to be refuted (see *Tractatus*, 6.51). In the *Problems* Russell clearly sees that there are certain plausible arguments which show that scepticism is logically tenable (p. 22), but he tries to meet scepticism by inferring physical objects from sense-data. However, as soon as Wittgenstein came on the scene he tried to convince Russell that any attempt to pass from sense-data to physical objects in this way is vulnerable to sceptical attack.

Where exactly does Whitehead stand in the emergence of logical constructions in "On Matter"? As the evidence stands, certainly not in the front row, given that he himself had not considered the logical construction of physical objects by 1912,[11] nor did he give Russell any hint of it (if he had the idea in mind) in his fourteen pages of critical comment on the *Problems*. However, one might think that it most likely

[11] Lowe has suggested that so far as the constructions of physical objects are concerned, Whitehead was a constructionist only during the period 1915–17. See "Whitehead's 1911 Criticisms of *The Problems of Philosophy*", p. 9.

that Russell got the idea from the work in progress on *Principia Mathematica*, Vol. IV (on geometry[12]), which was to have been written by Whitehead alone, or from the notes on time (and space) that Whitehead sent to him in late 1911.[13] I suggest that this is not the case. Whitehead's work on geometry and his notes on time contain no hint of the logical construction of physical objects. In fact there are no epistemological issues involved in Whitehead's works prior to 1914.[14] Until then his work deals only with mathematics and mathematical physics and is limited to applying logical techniques to abstract problems of space and time.[15]

How, then, should we evaluate Russell's giving Whitehead full credit for the changes he made from the *Problems* to *Our Knowledge*? By the time Russell came to write *Our Knowledge* he certainly had received help from Whitehead and used certain key ideas in *Our Knowledge* that Whitehead had developed for Vol. IV of *Principia*. This help came not only through various notes that Whitehead sent to Russell in his letters, but also through Russell's reading an important paper by Whitehead

[12] References to works on geometry, before April 1912, are found in the following letters from Whitehead to Russell: 29 April 1905; 30 April 1905; 22 Sept. 1910. It is not known how far the work on Vol. IV of *Principia* was completed by the time Russell came to write "On Matter" (*cf.* Martha Harrell's as yet unpublished paper, "Extension to Geometry of *Principia Mathematica* and Related Systems", read at the Toronto Russell conference in 1984). I presume that not much had been done. Although in the letter of 22 September 1910 Whitehead mentions "the beginning of Geometry", a letter of 1912 to the Provost of University College, London, shows that much of the scheme of work on geometry "remained yet in project" (quoted in Lowe, "A.N. Whitehead on His Mathematical Goals: a Letter of 1912", *Annals of Science*, 32 [1975]: 86).

[13] The notes are found in Whitehead's letters to Russell dated 3 and 20 Sept. [1911].

[14] Lowe has mentioned that it is only in 1914 that Whitehead "insists on beginning with perceptual space" ("A.N. Whitehead on His Mathematical Goals", p. 93).

[15] I don't think that Russell could have got the idea of the logical construction of physical objects from Whitehead during the writing of "On Matter". Russell's appointment diary shows that he had a meeting with Whitehead on 27 April 1912, the day he started writing "On Matter", but if he had taken up the idea then he would not have reiterated his sceptical position to Lady Ottoline in the letter postmarked 28 April. After 27 April, Russell met Whitehead again on 10 May at a dinner (#445, pmk. 11 May 1912). The structure of the paper strongly suggests that Russell did not come up with the idea of the logical construction of physical objects at least until he had finished folio 12 of the essay (where the term "logical construction" appears for the first time). Now since folio 9 was finished on 27 April (#[427]), and since the paper was "nearly finished" on 6 May 1912 (#440, pmk. 7 May 1912), I think folio 12 must have been written long before Russell met Whitehead on 10 May at dinner. I conclude that Whitehead must have made little or no contribution to the construction of physical objects in "On Matter".

on space late in 1913.[16] However, the assistance was only on the application of the theory in the logical construction of the space and time of mathematical physics, not in the construction of physical objects. Since the concern common to the *Problems* and *Our Knowledge* is the problem of physical objects and since a major part of *Our Knowledge* continues the logical construction of physical objects which was undertaken in "On Matter", Whitehead does not deserve the amount of credit he was given.[17] But why should Russell have given credit for his discovery to Whitehead, whose contribution was limited to the areas of space and time? My only suggestion is that he was *already* trying to comfort Whitehead for the use of his ideas, who was shortly to have "the feeling that he had been plagiarized [by Russell] in 1914 [in *Our Knowledge*]",[18] by paying more than he deserved.[19]

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[16] This paper is "La Théorie relationniste de l'espace", *Revue de Métaphysique et de Morale*, 23 (1916): 423–54. (For an English translation, see Patrick J. Hurley, "Whitehead's *Relational Theory of Space*: Text, Translation, and Commentary", *Philosophy Research Archives*, 5 [1979]: 676–739.) On 1 October 1913, Whitehead sent a draft of this paper to Russell for criticism. We have no evidence of what Russell's criticism of the paper was, but on 10 January 1914 Whitehead sent him a rewritten version with the comment: "It has been thoroughly recast, enlarged, and a good many novel views put in. I am pleased with it.... The paper as it stands—provided it survives your criticisms—will go nearly without change into vol. IV" (enclosed with letter to Morrell #963, pmk. 12 Jan. 1912). Russell thought this version "very good" and "full of admirable things" (#963). In this paper Whitehead takes into account, among other things, the definition of enclosure and of point; both items are present in *Our Knowledge*, Lect. IV.

[17] In Russell's later works he attributes to Whitehead only the idea of applying the method of logical construction to reach the space and time of mathematical physics. See "The Relation of Sense-data to Physics", pp. 149–50; "Physics and Perception", *Mind*, 31 (1922): 483; *The Principles of Mathematics*, 2nd ed. (London: Allen and Unwin, 1937), Introduction, p. xi; *My Philosophical Development* (London: Allen and Unwin, 1956), p. 108.

[18] Lowe, *Alfred North Whitehead: the Man and His Work*, Vol. I: *1861–1910* (Baltimore and London: The Johns Hopkins U.P., 1985), p. 229n.

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