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W.V. QUINE AND DAVID LEWIS: STRUCTURAL (EPISTEMOLOGICAL) HUMILITY

FREDERIQUE JANSSEN-LAURET AND FRASER MACBRIDE

1. INTRODUCTION

Our knowledge of the external world is never singular knowledge that some given object is endowed with such-and-such a nature.¹ Our knowledge is general knowledge, knowledge that the law-like roles for objects described by our best theories are occupied. Is singular reference possible? No. Just because our knowledge is inevitably general, we can never succeed in singling out an object to talk about it; objects are only ever known qua fulfillers of the law-like roles of our best theories. But the loss of an impossible ideal, singular reference, is nothing to regret. The estimable success of our discourse consists in trafficking with the world in terms of generalities. Such was the epistemic-cum-semantic perspective which became pre-eminent in Quine's late philosophy, that flowering which found expression in *Pursuit of Truth* (1990/2), *From Stimulus to Science* (1995) and the papers from the 90s collected in his *Confessions of a Confirmed Extensionalist* (2008).

Two doctrines that Quine interwove in his late philosophy can be distinguished: an epistemological doctrine, global epistemological structuralism, and a semantic doctrine, inscrutability of reference. According to global epistemological structuralism, we can only have knowledge of the external world insofar as its denizens collectively exhibit the structure of our best theories, i.e. fulfil together the package of law-like roles articulated by our best theories. According to the inscrutability of reference, singular reference is a myth because our discourse fails to pick out objects in a singular fashion and our discourse could not in this respect have been otherwise. In this paper we explore Quine's reasons for embracing and intertwining these two doctrines in his late philosophy and explain how this approach to epistemology-cum-semantics arose out of the already mature philosophy of *Word & Object* (1960) and Quine's subsequent landmark papers in the 1970s and 80s.

Is global epistemological structuralism an idiosyncratic feature of Quine's late philosophy? We argue that so far from it being so, it's a feature shared by the mature philosophy

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of one of his most illustrious students, David Lewis. Here's what's well known about the relationship between Quine's philosophy and the philosophy of David Lewis. Quine had long-standing doubts about the intelligibility of quantified modal logic but Lewis sought to allay these doubts by translating a quantified modal language into a language of the very kind that Quine expressly recognized as intelligible, a first order non-modal language. The language in question was one of worlds and world-bound individuals that Lewis conceived in non-modal terms, as self-contained cosmoi such that something in a cosmos is spatiotemporally related to every other thing in it but nothing else. Lewis argued for the existence of worlds, so conceived, on the grounds that the hypothesis offered an improvement in ideology paid for in the coin of ontology. Lewis thereby sought to surpass Quine but without giving up his teacher's methods—he continued to embrace Quine's ideology-ontology distinction and Quine's standards for intelligibility. So his teacher's imprint remained even though Lewis's conclusions differed. All this is well known—accurate and plausible so far as it goes. But it's an account of their relationship that doesn't go nearly far enough. We argue, drawing upon their unpublished correspondence, that Lewis wasn't only influenced by Quine's methods but that Lewis came around to conclusions close to Quine's because Lewis came to adopt a global epistemological structuralism, the view Lewis dubbed 'ramseyan humility', and therefore embraced a doctrine akin to inscrutability of reference himself.²

Our paper proceeds according to the following plan. In section 2 we expound the doctrines of global epistemological structuralism and inscrutability of reference as they took shape in Quine's late philosophy and Quine's arguments for them. In section 3 we explain how Quine proceeded from the more familiar philosophy of *Word & Object* to the epistemic-cum-semantic perspective of his late philosophy. In section 4 we describe Quine's appreciation of Lewis's structuralism about mathematics in particular and in section 5 we argue that Lewis subsequently came around to structuralism in general, i.e. a global epistemological structuralism akin to Quine's own, and that Lewis thereby embraced a kind of inscrutability of reference too.

2. QUINE'S GLOBAL EPISTEMOLOGICAL STRUCTURALISM

Quine's global epistemological structuralism came out of his naturalism, his conviction that reality will only yield its secrets to us if we forsake first philosophy and its pretensions, fortifying ourselves instead with the findings of established science. Epistemological structuralism out of naturalism was a recurrent feature of Quine's late philosophy. From naturalism as a starting point, Quine arrived at his sweeping structuralism in a few daring step as follows.

(1) Science tells that us that our epistemic access to the external world is limited to the stimulation of our sensory receptors. (2) There is a class of sentences keyed directly to the stimulation of our sensory receptors by virtue of being associated affirmatively with some range of stimulations and negatively with another; because these sentences are keyed

²For further explorations of the relationship between other aspects of the philosophies of Quine and Lewis, see Janssen-Lauret (2017), Janssen-Lauret and F. MacBride (2015), (2018).

directly to sensory stimulations they serve the epistemologically privileged role of observation sentences. The unit of association with ranges of sensory stimulations is holophrastic, i.e. nothing short of an observation sentence is keyed to sensory inputs. (3) Recurrent patterns of sensory stimulation give rise to general expectations that we will be affirmatively stimulated to assent to one observation sentence T after another S . The conditional form $S \rightarrow T$ ('Whenever this, that') enables us to string together observation sentences to express these conditional expectations. Quine's term of art for these conditional sentences: free observational categoricals. (4) Now science is born because observational categoricals are law-like statements that make prediction and testing possible. On the basis of $S \rightarrow T$ we can predict T if S . We can test $S \rightarrow T$ by checking whether S in the absence of T (5) Because the association of observation sentences with sensory stimulation is holophrastic, free observational categoricals can only be used to report the concomitance of phenomena characterized at the level of whole sentences—a free observational categorical can only be used to report the law-like recurrence of one self-sufficient feature after another. But the concomitance of some phenomena requires something short of a sentence to characterize, when the concomitance in question requires part of one observation sentence to bear upon part of another. Anaphora, embodied in the use of pronouns or bound variables, is what enables us to capture this law-like intersection of observation sentences. To capture those more tightly woven laws, we employ the conditional form $\forall x(Fx \rightarrow Gx)$. Quine's term of art for them: focal observational categoricals. (6) The laws expressed by focal observational categoricals are the laws of embodied phenomena because they tell us that if something or other satisfies one predicate then it—the very same body—satisfies another too. It's not that the very same body is presented repeatedly in experience; it's that to explain the law-like intersections between observation sentences, which receive confirmation as self-standing units, we posit bodies. So bodies become known to us via the laws whose expression rely upon anaphoric terms, pronouns or bound variables and predicates.

(7) Only observation sentences have unalloyed empirical significance because only they are keyed directly to sensory stimuli. But they are keyed to sensory stimuli only as holophrastic units, so regardless of the interpretation of their parts, i.e. their terms and predicates. So qua bearers of unalloyed empirical significance, observation sentences are silent about the existence and nature of objects because it is only relative to the interpretation of their parts that they say anything about objects. Of course relative to the interpretation of its parts, an observation sentence can tell us about the existence and nature of objects. But there need be no privileged interpretation of the parts themselves, i.e. no privileged reference for the terms of an observation sentence or extension for its predicate, so no privileged range of objects (referred to by its terms) of a certain privileged kind (captured by the extension of its predicate) that the observation sentence is really about. Why? Because the empirical support that an observation sentence receives is indifferent to the interpretation of its parts insofar as the interpretation of its parts leaves undisturbed the empirical support that the sentence receives as a holophrastic unit keyed to sensory stimulation. So whilst we are compelled to admit objects by the law-like intersection of observation sentences, the fact that only observation sentences have unalloyed empirical

support means that evidence inevitably falls short of guaranteeing that the parts of an observation sentence have a unique interpretation. (8) So the evidence that comes down from observation sentences isn't exceptional evidence for the existence of some specific range of objects of some particular kind but generic evidence for the existence of some range of objects of some kind or other. This makes the notion of an object multiply and ineluctably general: an x that φ s, where there's no saying absolutely what a given x is or what it means for it to φ .

From his naturalistic starting point (1) Quine thus arrived at his epistemological destination (8). Objects are introduced to account for the intersection of observation sentences keyed to sensory inputs—epistemological structuralism because objects are known to us only as some range of objects of some kind or other which answer to the pattern of intersecting observation sentences—sweeping structuralism because the doctrine applies to objects (bodies) regardless of whether they are abstract or concrete.

As Quine emphasised in his late philosophy, inscrutability of reference is closely bound up with epistemological structuralism, so inscrutability of reference is ultimately a consequence of our natural epistemological predicament as he saw it too. Why so? Epistemological structuralism tells us that objects (bodies) are only known to us as some things of some kind or other that taken together account for the pattern of our intersecting observation sentences, the pattern captured by the collection of focal observational categoricals. So we're not acquainted with objects but only know them remotely via a description of extreme generality. But then by epistemic necessity their individuality must elude us because what has empirical significance isn't the intrinsic nature or the identity of the objects but a profoundly etiolated relationship between them: the mere fact that they occur and recur as the repetition of cross referring terms through the body of our theory requires. Thinking along these lines, we can make ready sense of Quine's impressive but otherwise elusive remark, 'what matters for any objects, concrete or abstract, is not what they are but what they contribute to our overall theory of the world as neutral nodes in its logical structure' (1995: 74-5). Because they contribute only their occurrence and recurrence, any other collection of objects, even a permutation of the same objects, that occur and recur as the repetition of pronouns or bound variables requires will serve as well. Since naturalism tells us that we only know about objects remotely, we lack the capacity to discriminate between one collection of objects that makes this contribution and another. Hence reference is inscrutable: there is no fact of the matter about whether a word we use refers to an object drawn from one such collection or another.

The logical form of focal observational categoricals performs a critical supporting role in this argument, drawn from Quine's late philosophy, from global epistemological structuralism to inscrutability of reference. Remember that objects (bodies) are first introduced into our discourse by focal observational categoricals. Focal observational categoricals perform this function because, unlike free observational categoricals, pronouns and bound variables occur essentially in them (Quine 1995: 26-9). A pronoun or bound variable occurs essentially in a sentence if it cannot be supplanted by an occurrence of its grammatical antecedent without changing the sense of the original. The grammatical antecedents of pronouns and bound variables in focal observational categoricals are indefinite noun phrases,

whether indefinite singular terms or quantifiers. Now the result of supplanting pronouns or bound variables with their grammatical antecedents in a focal observational categorical invariably changes the sense of the original because their grammatical antecedents are indefinite. Witness the fact that a focal observational categorical of the form $\forall x(Fx \rightarrow Gx)$ doesn't say the same as a statement of the form $\forall xFx \rightarrow \forall xGx$. So pronouns and bound variables do occur essentially in observational categoricals. Of course the role of a pronoun or bound variable in a focal observational categorical is to express co-reference—to enable us to express the fact that whatever object satisfies one condition (F), the very same object also satisfies another (G). But because the grammatical antecedent of a pronoun or a bound variable in a focal observational categorical is indefinite, the indefinite singular term or quantifier in question doesn't introduce a unique object for the rest of the sentence to be about. So it's in the nature of the case where pronouns or bound variables occur essentially that there is no definite object to be targeted by them. So inscrutability already lurks in the focal observational categoricals whereby objects (bodies) are introduced to us because whilst their pronouns or bound variables are the bearers of reference 'they only mark sameness thereof' (Quine 1995: 73). Ironically bodies are given to us only because we talk about them indefinitely—because if our talk were definite we wouldn't have had to rely upon essentially occurring pronouns or bound variables.

3. FROM *Word & Object* (1960) TO *Pursuit of Truth* (1990)

Quine's later argument, from global epistemological structuralism to inscrutability of reference, has a crucially different orientation from Quine's earlier, more celebrated argument from chapter two of *Word & Object* (1960). The latter argument was so to speak, from the outside looking in—from the orientation of a radical translator seeking to understand the speech behaviour of a hitherto untouched linguistic community. The argument was that a radical translator could not fix upon a unique interpretation of an utterance of 'Gavagai' made by a speaker belonging to this community because divergent translations, in terms of enduring rabbits, temporal stages of rabbits, undetached rabbit parts etc., could always be reconciled with the speaker's verbal behaviour if they were offset by compensating adjustments to the interpretation of the language elsewhere (1960: 51-4). But the former argument is, so to speak, from the inside looking out—from the orientation of a subject seeking to understand his or her knowledge of the external world, albeit not the orientation of a Cartesian subject but one described by science.

Ultimately the two arguments complement one another. The evidence available to the radical translator, as conceived by Quine in *Word & Object*, about what a speaker means, is ultimately evidence of the sensory stimulations that prompt assent and dissent to an utterance, the source of a subject's knowledge of the external world. There's a certain tension here with Quine's own retrospective reflection that in *Word & Object*, 'I sketched the field linguist's actual procedure in terms purely of observation of behaviour [...] the linguist was never meant to know about stimulus meaning', where the stimulus meaning of a sentence such as 'Gavagai' is the set of sensory stimulations that prompt assent and the set of sensory stimulations that prompt dissent (Quine 1995b: 29). But the later

Quine wasn't an especially reliable guide to his own writings, at least not on this point. True enough, *Word & Object* includes the acknowledgment that stimulus meaning involves 'a fineness of detail beyond anything that our linguist can be called upon to check for'; but, as the text then continued, 'this is all right. He can reasonably conjecture that the native would be prompted to assent to "Gavagai" by the microscopically same irradiations that would prompt him, the linguist, to assent to "Rabbit"' (Quine 1960: 31). So the linguist seeks to exploit the assent-dissent behaviour of a native speaker as evidence of the sensory stimulations that elicit that behaviour from within. Hence, as Quine concluded a few pages later, 'stimulus meaning, by whatever name, may be properly looked upon still as the objective reality that the linguist has to probe when he undertakes radical translation' (Quine 1960: 39, 1969a: 89). Of course Quine was later to drop the idea that one observation sentence translates another when the same or similar stimulations elicit assent from both native speaker and linguist—because he later found it implausible that facts of translation should be hostage to facts about neurological minutiae (Quine 1990/2: 41). And Quine hadn't yet explicitly embraced epistemological structuralism when he wrote *Word & Object*. But if we look closely, we can already see signs that the author of that earlier work would one day transform into the author of *Pursuit of Truth* and *From Stimulus to Science*.

In chapter six of *Word & Object* Quine laid out his favoured conception of philosophical method (1960: 258-9). Doing so, Quine staked out his own claim to authority in an already burgeoning movement within analytic philosophy, a movement within which Quine and Carnap stood to Frege and Russell as Trotsky and Lenin to Marx and Engels. Both Frege and Russell had realized that to dispel the mystery surrounding our understanding of number words it isn't necessary to grasp anything as ephemeral as the ideas of an ordinary speaker who takes these words for granted or as hidden as what an ordinary speaker had unconsciously in mind all along. To dispel the mystery of number words, Frege and Russell introduced novel expressions, more precise and better understood than the old ones, but expressions that can still serve the same important uses as the old ones. Frege developed his *Begriffsschrift* 'to break the domination of the word over the human spirit [...] by freeing thought from that with which only the means of expression of ordinary language, constituted as they are, saddle it' (1897: 7), and he proposed two prima facie different explications of arithmetic in his *Grundlagen* (1884) and *Grundgesetze* (1893/1903), in terms of the extensions of second level concepts and extensions of first level concepts respectively. Frege was also explicit that he relied upon arbitrary stipulations that might have been made differently, for example the identification of the True with an arbitrary course-of-values (1893: §10). Russell was forthright about his methodology in *Our Knowledge of the External World* (1914): '[T]he real desideratum about such a definition as that of numbers is not that it should represent as nearly as possible the ideas of those who have not gone through the analysis required in order to reach a definition, but that it should give us objects having the requisite properties [...] the question whether the objects to which the definition applies are like or unlike the vague ideas of numbers entertained by those who cannot give a definition is one of very little importance' (1914: 209-210). He wrote along similar lines in *Introduction to Mathematical Philosophy*, 'A complex number

may be regarded and defined as simply an ordered couple of real numbers. Here, as elsewhere, many definitions are possible. All that is necessary is that the definition adopted should lead to certain properties' (1919: 75). In Carnap's terminology, indeed as Carnap understood them, Frege and Russell had provided an 'explication' of number words in terms of expressions for classes. Explicitly drawing inspiration from Frege's and Russell's shared methodological approach to the philosophy of arithmetic, Carnap proposed explication as a method for philosophy in general, 'Generally speaking, it is not required that an explicatum have, as nearly as possible, the same meaning as the explicandum; it should, however, correspond to the explicandum in such a way that it can be used instead of the latter' (Carnap 1947: 7-8, 1950: 3-15). So whilst Frege may not have had the method of explication fully in mind from the very beginning it began to take shape with him, Russell got clearer and Carnap pulled it all together to make a philosophy out of it.

In *Word & Object*, Quine announced his party membership—following Carnap following Frege and Russell. Like them, Quine rubbished the notion that it's the job of philosophers to expose hidden meanings grasped by unconscious processes or that a philosophical analysis should be read as a synonymy claim, because this way led straight into the jaws of the paradox of analysis (Quine 1960: 259). Instead, Quine proposed, we should 'fix on the particular functions of the unclear expression that make it worth troubling about, and then devise a substitute, clear and couched in terms to our liking, that fills those functions' (Quine 1960: 258-9). Saying so, Quine set himself against the ordinary language approach to philosophy because, he argued, the subtleties of ordinary usage are often irrelevant to the fulfilment of the functions of the expression in which we are interested—as Frege, Russell and Carnap had argued before him.

By contrast to the interpretation proposed here, Hylton has suggested that Quine's methodology, despite points of technical contact, 'is about as different as it could be' from Russell's methodology. Hylton says so because, according to Hylton, Russell was wedded to old-fashioned analysis (Hylton 1996: 215-6). But Hylton's interpretation fails to do justice to the manner in which Russell's methodology in *Our Knowledge of the External World, Introduction to Mathematical Philosophy*, and other, later writings anticipates, as we have seen, Carnap's and Quine's later emphasis upon explication, rather than analysis, as a method for capturing the important function of an ill-understood expression whilst discarding the rest. In his 'Replies and Systematic Expositions', Carnap praised 'Bertrand Russell, from whom most of us have learned the use of a symbolic language for the clarification and solution of philosophical problems'. So he expressed indebtedness not merely to Russell for his technical innovations but for his methodological insights too. Carnap recommended to his readers a paper in which Russell 'has recently shown in a delightful way the futility of the tendency to stick to the customary language at any price' (Carnap 1963: 939). In this paper, 'Logic and Ontology', Russell parodied contemporary philosophers who supposed that 'in order to be a competent philosopher, it is only necessary to study Fowler's *Modern English Usage*; post-graduates may advance to *The King's English*' and recommended instead as a benchmark for philosophy, 'the language of mathematical logic [which] surpasses common language both in precision and in generality' (Russell 1957: 225-6). So far from Quine's methodology being 'about as different as it could be'

from Russell's, as Hylton claims, Quine continued the philosophical tradition, to which Russell was party, of regimentation and disambiguation in a canonical language (Quine 1960: 157-161). So here we side with Carnap in our understanding of Russell and this enables us to understand the continuity between Russell (at least from 1914), Carnap and Quine.

So focusing upon Quine's explicatory method we see connections from Quine's philosophy running back. But we can also see connections running forward. Commentators have often emphasised the negative aspect of the method of explication, the license it provided Quine for dismissing what he conceived as the obsession of some Oxford philosophers with the irregularities of ordinary language use. But the positive aspect is even more significant, the necessity to identify the true function of an expression, however embroidered by ordinary use, and then to demonstrate that the favoured explicata fulfil the identified function. As Quine later expressed the point in *Set Theory and its Logic* (Quine 1963: 81), 'Any objects will serve as numbers so long as the arithmetical operations are defined for them and the laws of arithmetic are preserved'. In *Word & Object* Quine distilled this down to a single condition upon all acceptable explications of arithmetic, 'any progression i.e. any infinite series each of whose members have only finitely many precursors will do nicely', and added there are indefinitely many such progressions, citing the alternative progressions of classes identified by Frege, von Neumann and Zermelo (Quine 1960: 262-3).

In *Word & Object*, Quine offered as a 'paradigm' of his favoured philosophical procedure successfully accomplished, the explication of ordered pairs in terms of classes. Expressions for ordered pairs ($\langle x, y \rangle$) are introduced by mathematicians subject to the law, (1) If $\langle x, y \rangle = \langle z, w \rangle$ then $x=z$ and $y=w$. This law captures everything mathematically significant about the notion of ordered pairs. So, according to Quine's simplified version of what Wiener (1914) had laid out more elaborately in *Principia* notation, Wiener successfully explicated the notion of ordered pair in terms of classes because Wiener demonstrated that (1) is satisfied if $\langle x, y \rangle$ is identified with $\{\{x\}, \{y, \Lambda\}\}$. But, as Quine also emphasised, there isn't guaranteed to be a unique explication in the case of ordered pairs anymore than in the case of arithmetic, because, as Kuratowski demonstrated, (1) is also satisfied if $\langle x, y \rangle$ is identified with $\{\{x\}, \{x, y\}\}$. Which of these explications is the right one? Quine's answer: 'All are', because all of them satisfy (1). Ordered pairs provided Quine his philosophical paradigm because it's obvious upon reflection that there are many different ways of successfully explicating talk about ordered pairs. This shows that comprehending the use of a baffling expression needn't be hostage to the identification of a unique subject matter for it, whilst 'Any air of paradox comes only of supposing that there is a unique right analysis' (1960: 260).

Realising that an expression needn't have a unique right analysis—that supposing otherwise was a philosophical prejudice infected with the psychologism Frege, Russell and Carnap had wanted us to get over—and appreciating the abundance of provably adequate explicata for number words and expressions for ordered pairs, it's wasn't difficult for Quine to argue that inscrutability of reference begins at home, i.e. to shift the focus away from radical translation and think that our number words and expressions for ordered pairs

are inscrutable. Once he'd taken this step, Quine was already headed down the path to epistemological structuralism.

To see this point, concentrate upon the positive side of explication—specifically, in the case of number words, the identification of the laws of arithmetic that control their use. Now that Quine had forsaken the idea of a unique right analysis, he could envisage nothing more to know or understand about number words than these laws. He concluded that the understanding of number words is exhausted by grasp of these laws. Since the laws of arithmetic are satisfied by many different progressions of classes, there is no fact of the matter about which one of these progressions number words pick out. A grasp of the relevant laws doesn't select in favour of our really thinking about one progression at the expense of the other because all the progressions satisfy the laws of arithmetic and there is no more to grasping number words than grasping these laws. In 'Ontological Relativity', Quine made this step from the explication of number words to their referential inscrutability explicit: 'Numbers in turn are known only by their laws, the laws of arithmetic, so that any constructs obeying these laws—certain sets, for instance—are eligible in turn as explications of numbers [...] The subtle point is that any progression will serve as a version of number so long and only so long as we stick to one and the same progression. Arithmetic is, in this sense, all there is to number: there is no saying absolutely what the numbers are; there is only arithmetic' (Quine 1968: 197-8). But the lesson Quine drew was more general because expressions are known only by the laws of concatenation theory, sets are known only by the laws of set theory, and likewise for other abstract things. Quine concluded he didn't need to undertake foreign travel to be confronted by inscrutability of reference because he had found 'a certain dimness of reference pervading the home language itself', i.e. whenever we use words for abstract things because abstract things are only known by their laws and these laws may be variously satisfied.

This was only one of the lines of argument sketched by Quine in 'Ontological Relativity' for inscrutability of reference in the home language (1968: 198-200). But it was to prove a strategically significant one for Quine as he subsequently reflected upon what recent developments in physics had done to undermine the distinction between it and mathematics. Since 'Designation and Existence' (1939) Quine had explicitly adopted a four dimensional conception of bodies, for example, Bucephalus as a filament of space-time having horse-shaped cross sections, and Quine had continued to maintain this view in *Word & Object* (Quine 1939: 701; 1960: 171) But then he reflected upon the fact that as physics advanced, macroscopic bodies had given way to atoms, atoms to elementary particles. In 'Whither Physical Objects?' (1976a) and 'Facts of the Matter' (1977), Quine heralded the dissolution of matter altogether because of what physics had done to these particles—because, in contemporary physics, particles cannot invariably be identified over time or even distinguished at a time. He speculated that physicists might abandon particles in favour of field theories instead, theories in which states are ascribed directly to space-time points or regions of space-time. 'Matter', Quine wrote, 'is quitting the field and field theories are the order of the day' (1976a: 499). But field theories are ripe for explication in purely abstract terms—explicating space-time points by quadruple of real numbers, space-time regions by sets of quadruples of real numbers, real numbers by pure sets. So what is the ontology of

the brave new physics once matter has quit the scene? Quine's answer, 'The brave new ontology is [...] the purely abstract ontology of pure set theory, pure mathematics' (1977: 281). So contemporary physics is really in the same boat vis-à-vis inscrutability as pure set theory or pure mathematics.

Reflection upon the downfall of matter in physics provided the intellectual spur for Quine to take the decisive step to epistemological structuralism. Because from this particular example Quine took away the general lesson that not only abstract objects but objects generally are known only by their laws. In 'Facts of the Matter', Quine gave the reason: 'all entities are theoretical' (1977: 281). There are no objects that impinge upon us in any immediate sense, we aren't acquainted with anything as Russell supposed; we only know objects via a network of descriptive hypotheses about them. This is because units of evidence have the logical size and shape of sentences and don't come any smaller. But entities correspond to something smaller than a sentence; entities are the referents of terms to which predicates apply. So there is only evidence for entities insofar as they contribute to an account of something larger than themselves, viz. the observation sentences of a theory. F.P. Ramsey had argued in 'Theories' (1929) that to understand a scientific theory about, for example, electrons, it isn't necessary to know anything about the nature of the property of being an electron or uniquely identify it. We need only know that there is a property which stands in the relationship described by the theory with the other properties it posits, being a proton, being a neutron etc., from which higher-level propositions certain lower-level propositions follow which are empirically testable. So what the confirmation of the empirical testable consequences of a theory gives us warrant to believe is that there exists a property which stands in the relationship described by the theory to its other posits, but nothing more about the nature or identity of whatever property it is that stands in that relationship. Quine took Ramsey's epistemological point and writ it large. In 'Things and Their Place in Theories' Quine wrote, 'Structure is what matters to a theory, and not the choice of its objects. F.P. Ramsey urged this point fifty years ago' (1981: 20; 1985: 169-71). Because all objects are theoretical, they stand, for Quine, in the same evidential relation to the empirically testable outputs of a theory, its observation sentences, as the property of being an electron did for Ramsey. The confirmation of the observation sentences of a theory gives us warrant to believe that there exist some objects or other which stand in the relationship described by the theory to the other objects the theory posits but nothing more about them. We can know nothing more about objects because the net of knowledge has too large a mesh to catch finer distinctions; the unit of confirmation is sentence sized.

If Quine was right, then we can know nothing about objects except qua posits of a theory and we can know nothing more about the objects a theory posits, nothing about their nature or identity, that isn't already captured by the description the theory gives of their relationship; we are inevitably ignorant about their nature or identity. Inspired as Quine was by Ramsey's treatment of theoretical terms, Quine might have called his view 'Ramseyan Humility'. As Quine expressed the point in 'Facts of the Matter', 'ontology is not what mainly matters' (1977: 281). Ontology isn't what mainly matters because the confirmation of the observational consequences of a theory delivers information about the relationship between the posits of the theory but not their identity or nature, so we can

hold the observation sentences of a theory fixed whilst varying its ontology. In ‘Things and Their Place in Theories’ (1981: 19-20) and afterwards, Quine favoured making this point in terms of proxy functions.³ A proxy function is a 1-1 mapping, f , that enables us to explicitly specify for every object x we thought we were talking about, a unique alternative, its proxy, the f of x . The simplest case of a proxy function is a ‘mere permutation’, where the ontology is redistributed rather than supplanted (1995: 72). Using a proxy function f we can reinterpret terms and predicates that we thought referred and applied to an object x as referring and applying instead to something else, the f of x . Reinterpreting using a proxy function doesn’t disturb the truth-value of a sentence or its empirical significance because the shift of interpretation on the term side is matched by a complementary shift of interpretation on the predicate side. Proxy functions work for Quine because the reinterpretations they supply are structure preserving. In whatever relativistic fashion the objects we thought we were talking about are distinguished from one another, i.e. in terms of their roles, their proxies are distinguished from one another too; ‘they are distinguished in a relativistic way, by their roles relative to one another and to the rest of the ontology’ (1990/2: 33-4). Did Quine conceive of his argument from proxy functions as a source of independent support for his epistemological structuralism—to justify his conviction that only structure matters? It is questionable whether Quine should have thought this or ever really did. Why? A reinterpretation based upon a proxy function preserves the structure of a theory from the original interpretation. So if we’re not already convinced that preserving the structure of the theory is all that matters, i.e. that objects are only ever distinguished by the relative roles they play in a theory, then we won’t be convinced that a reinterpretation of a theory using a proxy function preserves everything that matters. But Quine’s appeal to proxy functions does enable us to dramatically present his doctrine. If global epistemological structuralism were true then our world would merit no different a description—it would look no different, speaking figuratively, from the inside—if everything was swapped around or replaced with something else.

4. QUINE ON LEWIS’S MATHEMATICAL STRUCTURALISM

Although Quine might have aptly called his doctrine of global structural epistemology ‘Ramseyan Humility’, it was David Lewis that famously came up with the title and applied it to his own structural epistemology, likewise inspired by Ramsey’s treatment of theoretical terms. Lewis’s paper came too late for Quine himself to give us his reaction. It only appeared in preprint in 2001 and wasn’t published until 2009. But we can give one on Quine’s behalf. We are not left in the dark. David Lewis’s *Parts of Classes*, which appeared in 1991, provides the prequel to his ‘Ramseyan Humility’—because it relies upon

³Kemp (2012: 42) suggests that Quine already favoured using proxy functions to establish inscrutability of reference as early as 1968. But although Quine had certainly appealed to proxy functions in ‘Ontological Reduction and the World of Numbers’ (1964: 214-6) and ‘Ontological Relativity’ (1968: 205-8) in neither case did Quine make use of proxy functions to make the radical epistemological point that observation sentences keyed to sensory stimulations can remain fixed whilst supplanting the ontology as radically as you like. Rather Quine dwelt upon more familiar uses of proxy functions to reduce one abstract ontology to another, e.g. protosyntax to number theory via Gödel numbering.

the application of Lewis's Ramsey inspired approach to mathematical discourse. And we have both Quine's reaction to *Parts of Classes*, from his 'Structure and Nature' (1992), and their unpublished correspondence concerning *Parts of Classes*.

The backstory is that Lewis had sent Quine a draft of his *Parts of Classes* in 1989 and they wrote back and forth over the course of the summer. In that draft Lewis argued that set theory is reducible to the theory of singleton functions using the resources of mereology and the apparatus of plural quantification. Lewis called the system of mereology and plural quantification 'megethology'. In the main body of *Parts of Classes* Lewis proceeded upon the working assumption that the member-singleton relation is primitive (1990: 54). So Lewis's reduction of set theory in the main body of that work proceeds no deeper than the member-singleton relation itself. Call this Lewis's 'shallow' reduction, 'shallow' because it takes the set-theoretic notion of singleton as primitive— which is not to belittle the ingenious means whereby Lewis showed that classes can be reduced to fusions of their singletons, only that the reduction goes no deeper than the singleton function. But Lewis also held that whilst we know nothing about the nature of singletons we do know that singleton functions satisfy certain structural conditions embodied in the axioms of set theory. So Lewis also entertained (tentatively) a form of structuralism about mathematics: that set theory, hence mathematics, reduces to a theory consisting of generalisations about all functions that satisfy these structural conditions—plus, to avoid vacuity, the assumption that there is at least one such function (1990: 46, 1993: 203). Call this Lewis's 'intermediate' reduction. But Lewis didn't outright embrace this intermediate form of reduction, because he doubted that structuralism about set-theory fits mathematical practice since mathematicians don't know how to express these structural conditions in full generality. So his 'official' position in *Parts of Classes* was his shallow reduction of set theory to the theory of the singleton function plus megethology. Lewis was subsequently to renounce this surface reduction in his 'Mathematics is Megethology' (1993). In that paper Lewis drew upon the Appendix to *Parts of Classes* to provide for an even deeper structuralist reduction than the 'intermediate' one entertained in the main text of *Parts of Classes*. Call this Lewis's 'deep' reduction, a form of structuralism according to which, roughly speaking, singular quantification over sets is a mere *façon de parler* to be understood in terms of plural quantification over individuals and their fusions. This meant that by 1993 Lewis had embraced a version of set-theoretic structuralism which, two years before, he had dismissed as contravening mathematical practice. He had not changed his mind about structuralism being at odds with mathematical practice, but thought, in 1993, that there were no other viable options except some kind of set-theoretic structuralism.

Whilst Lewis wasn't fully clear about the significance of his deep reduction, we will argue that Quine was. From the beginning of their correspondence, Quine certainly appreciated the intellectual ingenuity on display in *Parts of Classes*. He wrote, 'your theory tickles me. In taking the singleton of a thing, we shine it, applying a glaze, so as to make it nice' (Quine-to-Lewis c. June 1989). But there was a fly in the glaze. Lewis's intermediate reduction of set theory presupposed quantification over relations, but Lewis, as well as Quine, conceived of relations as sets of ordered pairs and ordered pairs themselves as set-theoretic objects.

So Lewis's intermediate reduction, which didn't just take the member-singleton function to be primitive, threatened to be circular.

What got things moving again was a suggestion Allen Hazen made to Lewis to avoid this circularity, a remedy that would provide the basis for a more thoroughgoing structuralism. Here's the basic idea. Take the fusion (mereological) of atoms $b+c$ and some other things O (plural quantification) that overlap b or c . By contrast to the ordered pair $\langle b, c \rangle$, the fusion lacks an ordering in any absolute sense; there is no fact of the matter concerning $b+c$ by itself whether b comes before c or c before b . But under certain conditions we can allow a relative sense in which $b+c$ has an order. Suppose that every one of O that overlaps b also overlaps c , but not vice versa. Then we can say that b comes before c relative to O . So the unordered fusion $b+c$ can after all encode the order in $\langle b, c \rangle$, i.e. relative to O . Hazen's suggestion was to simulate quantification over relations in terms of quantification over fusions of atoms even though they are unordered in themselves, a simulation which works because, under the right circumstances, the fusions nevertheless have a relative order, explicable, as we have just seen, in terms of plural quantification and mereology. Quine then showed how to extend Hazen's result to ordered tuples of fusions of atoms (Lewis-to-Quine 10/11/89; Lewis 1991: 132). This cleared the way, along with further contributions from John Burgess, for a form of structuralism that wouldn't circle back to set-theoretic ontology but provide for a genuine reduction of set theory. The reduction in question relied upon mereology and plural quantification plus the assumption of an inaccessible infinity of atoms.

By this point Quine had started to identify with Lewis's enterprise himself. Quine enthusiastically declared, 'Mereology and plurals prove to be a formidable battery. We are the new and true Pluralists' (Quine-to-Lewis 16/11/89). Grateful for Quine's contribution, Lewis suggested that Quine appear as one of the co-authors, alongside Burgess, Hazen and Lewis, of an Appendix to *Parts of Classes* in which the results that made for this deeper reduction, a thoroughgoing structuralism about set theory, would be written up. Lewis even went to the lengths of procuring a contract for Quine from Blackwell. In the event, it was Quine that decided that he hadn't made enough of a contribution to be appropriately titled a co-author. In early 1990 Quine sent the contract back to Lewis: 'Proceeding with the appendix as I am now able to do, I find it increasingly impressive. Crediting me with co-authorship is misleading' (Quine-to-Lewis 13/1/90).

The decision not to co-author didn't mean that Quine's respect for Lewis's structuralism had anyway diminished. Indeed, we will argue, Quine appreciated more clearly than Lewis the consequences of his reduction of set theory. In 'Structure and Nature' Quine wrote, 'For Lewis, as for most of us, I should like to think, there are only classes and concrete individuals. So his structuralism is indeed ontologically significant. It professes a reduction of classes to individuals—hence out and out nominalism' (Quine 1992: 5). Of course Quine had once contemplated out and out nominalism himself. Remember he really was a co-author of 'Steps Towards A Constructive Nominalism', a manifesto in which he and Goodman had renounced classes, properties and relations altogether (Goodman & Quine 1947: 105). But finding out and out nominalism of the kind he and Goodman had entertained in the late 40s unworkable, Quine soon adopted platonism about classes instead. As

Quine recounted his views ‘early and late’ in ‘Soft Impeachment Disowned’, ‘we have to quantify over numbers of all sorts, functions, and much else. I have argued that there is no blinking these ontological assumptions’ (Quine 1981: 450). The surface reduction which is Lewis’s official position in *Parts of Classes* might have tickled Quine but it couldn’t really have upset Quine’s thinking or come as news to him with respect to fundamental questions of ontology, because Lewis’s surface reduction takes for granted the existence of a function, namely the singleton function. By contrast it isn’t surprising that Quine was excited by Lewis’s ‘deep’ reduction which is only developed in the Appendix. Lewis (in collaboration with Hazen and Burgess) had opened up the possibility of dispensing with these ontological assumptions after all, a possibility Quine had discounted for decades.

Strangely, Lewis didn’t agree with Quine’s assessment of his set-theoretic structuralism as out and out nominalism. In other correspondence Lewis wrote, ‘it surprised me when Quine said in the $J\varphi$ paper that my structuralism professes a reduction of classes to individuals’ (Lewis-to-Elgin 17/4/92). It surprised Lewis because he still believed that there are countless singleton functions and membership relations, ‘Or rather’, as Lewis immediately added, he believed the Hazen-Burgess translations of these claims into megethology. ‘In that sense’, Lewis concluded, ‘I do not believe that individuals are the only entities’. In ‘Mathematics is megethology’, Lewis expressed his structuralism thus, ‘For now it turns out that if the size of Reality is right’, i.e. if there is an inaccessible infinity of atoms, ‘there must exist a singleton function’ (Lewis 1993: 3).

When Lewis set out upon the line of investigation that led him to *Parts of Classes* he was interested in a kind of ‘nominalism (in the Harvard sense)’, i.e. a kind of nominalism which disclaims commitment to sets and classes, what Quine called ‘out and out nominalism’ (Lewis-to-Field 29/3/83). Lewis’s initial idea was this, ‘apparent singular talk about classes is abbreviated plural talk, usually infinitely, about individuals (Lewis-to-Field 29/3/83). He’d been inspired to think this way by a suggestion of Adam Morton’s that singular quantification over complex individuals is abbreviated plural talk about atoms (Morton 1975). Now Morton had combined the suggestion that statements ostensibly about complex individuals are to be analysed in terms of plural quantifiers which only have atoms in their range with the claim that there really are complex individuals. Morton claimed that this was just an ‘unmystifying way of saying that there are wholes and that all that is required for the wholes to exist is the existence of the parts’ (1975: 317). But, we argue, this is not unmystifying, just confused. If Morton is right that ‘quantifiers’ which appear to range over complex individuals are really just shorthand for quantifiers that only have atoms in their range, then really there is no quantification over complex individuals. Since in that case it hasn’t been said, and cannot be said, that wholes exist, because there is no quantification over them but only over atoms, Morton can hardly be right that what is required for the existence of wholes is the existence of their parts; we cannot, by Morton’s own lights, even say what Morton takes to be unmystifying. By contrast Lewis, in 1983, was not confused in this way but, in this respect at least, had a stable position. He combined the claim that apparent singular talk about classes is abbreviated (infinitary) plural talk about individuals with nominalism (in the Harvard sense) which denies that the language of set theory is committed to anything more than individuals. He didn’t make the error of combining the

claim that apparent quantification over sets is merely an abbreviation for quantification over something else whilst also claiming that there are sets.

Nevertheless this was exactly the kind of confusion into which the later Lewis fell when he adopted set-theoretic structuralism but continued to avow the existence of a singleton function if the size of Reality is right (in the Appendix to *Parts of Classes* and ‘Mathematics is Megethology’). According to the Burgess-Hazen translations, we ‘simulate’ a singular quantifier over relations by a plural quantifier over ordered pairs, preceded by a string of plural quantifiers over the wherewithal for decoding such pairs in mereological terms (Lewis 1993: 223-4). The translations thus reveal how apparent singular quantification over relations is really just an abbreviation for a string of plural quantifiers over atoms and their fusions. If that wasn’t what it showed us then Lewis could hardly have relied upon the Burgess-Hazen translations to avoid presupposing set theory but only megethology. Now according to Lewis, ‘Once we have simulated quantification over relations, we can define singleton functions; we can quantify over them’ (Lewis 1993: 224). But once it’s clear that simulating singular quantification over relations means (for Lewis) plurally quantifying over something else to avoid presupposing relations it is also clear that he’s wrong to say that there is something singular there, a membership-singleton relation, to quantify over.

In other correspondence during the early 90s Lewis complained about philosophers he called ‘bogus realists’ and ‘fakers’ whom he described in the following terms, ‘Their plan is to speak just as realists do, and then explain sotto voce how they don’t really mean it’ (Lewis to D. Smith, 28th September 1990). Lewis gave as an example of a bogus realist someone who said, ‘There is a God!’ but then added ‘psst, I just say this because saying it is part of a ritual that makes me feel at one with nature and mankind’. Lewis considered it a big problem in contemporary philosophy that ‘many of us tend to take bogus realists at their word, rather than denouncing them as fakers’ but, Lewis continued, ‘The fakers do manifest their fakery in their linguistic behaviour not indeed when they say ‘It’s a true fact that God exists’ or whatever, but after the ‘psst’ when they explain what they take themselves to be doing when they say this’. Unfortunately Lewis was a bogus realist about singleton functions because upon affirming their existence he immediately added in brackets ‘Or rather, I believe various Burgess-Hazen translations of what I just said’ (Lewis-to-Elgin 17/4/92).

We conclude that Quine was being more clear-sighted than Lewis when Quine described him as having proposed out and out nominalism. Lewis hadn’t earned the entitlement to say that there are countless singleton functions and membership relations and mean what he said because if his deep reduction is to be believed, what Lewis meant by saying so was only that the size of Reality is right—accordingly all our mathematical purposes are served by a scheme that admits only individuals and their fusions, albeit very, very many of them. So the sense in which Lewis nevertheless believed that individuals and their fusions aren’t the only entities wasn’t a good sense but a misleading one, namely the sense in which we can represent ourselves as if we believed something exists but without really meaning it. But even though Quine’s construed Lewis’s (deep) structuralism as out and out nominalism and was right to do so, still it wasn’t ambitious enough for Quine. In ‘Structure and Nature’, Quine concluded his discussion of *Parts of Classes* with the reflection, ‘Much

though I admire Lewis's reduction, however, it is not for me. My own line is a yet more sweeping structuralism, applying to concrete and abstract objects indiscriminately' (1992: 6). But whilst Quine's assessment was correct to date, correct about the relative scope of the structuralism espoused by Lewis in *Parts of Classes* compared to his own, this wasn't to be the end of the story. By the end of the decade, as we will see, Lewis was destined himself to develop a yet more sweeping structuralism than any explicitly envisaged in *Parts of Classes*.

5. LEWIS'S GLOBAL EPISTEMOLOGICAL STRUCTURALISM

Quine, or indeed any other reader of Lewis, could be forgiven for not expecting history to have turned out the way it did. As we have already reflected, inscrutability of reference is a close corollary of global epistemological structuralism: if our discourse inevitably trades in generalities then singular reference, at least in the sense of requiring identifying knowledge, is out of reach for us. Lewis had long maintained that local cases of moderate indeterminacy may be tolerated, cases where 'rival interpretations have much in common' (Lewis 1984: 59). Lewis didn't provide a test for rival interpretations having much in common. But he did appear to think that the rival interpretations of 'Gavagai' in Quine's example—rabbit stages, undetached rabbit parts, and the rabbit fusion—did have much in common because he suggested 'Gavagai' as a case of a moderately indeterminate expression (Lewis 1984: 66). But clearly the rival interpretations that Quine envisaged when he made use of proxy functions will fail any reasonable test for having much in common because any expression can stand for anything so long as appropriate adjustments are made elsewhere to the interpretation of the language from which the expression is drawn. For Lewis, for most of his career, it was a non-negotiable fact that the expressions of our language have a fairly determinate interpretation, i.e. that rival interpretations of our expressions do have much in common. (Lewis 1983: 47). Ergo Lewis, so long as he held it non-negotiable that the expressions of our language have a fairly determinate interpretation, could not have endorsed the global epistemological structuralism inspired by Ramsey that led Quine to embrace the radical indeterminacy he expressed using proxy functions.

Whilst in Lewis's earliest writings he had found himself inclined to share in Quine's doubts about singular reference, in 'Radical Interpretation' Lewis set himself 'to hold the line' against such radical indeterminacy as Quine envisaged (1974: 344).⁴ 'Radical Interpretation' was originally presented at a conference on 'Language, Intentionality and Translation-Theory' held at the University of Connecticut in March of 1973, a conference to which Quine, Davidson, Putnam, Sellars and Dummett also contributed; Davidson was Lewis's commentator. Lewis began his paper just as a good student of Quine's should. Quine had long espoused physicalism but appreciated that no plausible form of physicalism could be reductionist, not in any straightforward sense. In 'The Scope and Language

⁴For Lewis's earlier inclination to agree with Quine or at least sit on the fence, see Lewis's *Convention* (1968: 199-200) and 'Languages and Language' (1975: 20-21). Note that whilst the latter paper was published in 1975, it was originally drafted in 1968 and then revised for publication in 1972.

of Science' Quine had maintained that mental vocabulary may be used to describe physical ontology even in the absence of law-like relations between physical events, say, nerve impulses, and the recurrence of such-and-such kinds of mental states (1957: 243). Quine continued to endorse thereafter the view that mental vocabulary imposes groupings upon events that are, so to speak, shapeless from the point of view of physics or even physiology (see, for example, 1995: 87-8). By the time he wrote *Word & Object*, Quine expressed the extent to which his favoured version of physicalism fell short of reductionism by saying that mental vocabulary couldn't even be contextually defined in terms of antecedently significant units of physical terms (1960: 265-6). Quine considered himself indebted on this point to Davidson and Davidson went on to develop a form of physicalism that didn't aspire to reductionism—his doctrine, famously elaborated in 'Mental Events', that the mental supervenes upon the physical (Davidson 1970: 214). In 'Facts of the Matter' Quine even articulated his physicalism in Davidson's terms, viz. 'no mental difference without a physical difference' (1977: 281). In this regard, Lewis was firmly on message in 'Radical Interpretation'. Whilst Lewis denied that it was possible to translate mental vocabulary into physical terms he still maintained that the mental supervenes upon the physical in the following sense: there cannot possibly be two persons exactly alike qua physical systems that nevertheless differ with respect to their beliefs or their desires or what their words mean (Lewis 1974: 334). Quine and Davidson had already suggested that reflection upon how to translate or interpret someone from scratch will throw light upon the nature of mind and meaning, that is, when we know nothing about someone's psychology or language but still want to understand them (Quine 1960: 28-30, Davidson 1967: 312-3). Lewis followed suit, inviting us to reflect upon the imaginary context of radical interpretation to get clear about how the physical facts determine all the rest, i.e. facts about psychology and the meanings of linguistic utterances. So for Lewis, as for Quine and Davidson, the imaginary context was a dramatic device employed to the metaphysical end of enabling us to appreciate the degree to which the totality of physical facts determine all the rest (Lewis 1974: 333-4). And, as Quine and Davidson before him, Lewis insisted that the enterprise of radical interpretation be governed by a Principle of Charity, i.e. that a person should be represented as believing and desiring what she ought, although Lewis made refinements and added a list of other constraints, including a Principle of Rationality requiring that a speaker be represented as having beliefs and desires that provide reasons for her actions (Quine 1960: 59, Davidson 1970: 221-2, Lewis 1974: 336-7).

Despite these points of significant continuity, Davidson, in his reply to Lewis, called Lewis up for going off message. This was because Lewis concluded 'Radical Interpretation' by baldly asserting that if there appears to be any radical indeterminacy of thought or language of the kind that Quine had argued inevitable then that proved that some constraint had been missed whereby the physical facts determine the interpretation of a person's psychological states or utterances. As Lewis later explained in a letter to Jack Smart, the question, so far as Lewis was concerned, wasn't whether radical indeterminacy can be eliminated, because it can. Rather, 'the question is whether it can under the constraints I listed, or only under a list including other constraints I should have mentioned but didn't' (Lewis-to-Smart 23/3/79). But, as Davidson complained in his response to

Lewis's original paper, Lewis took for granted just what had been at issue for Quine, the issue being whether radical indeterminacy can be eliminated in the first place (Davidson 1974: 347). Quine had argued that radical indeterminacy cannot be eliminated because the nature of the physical facts on the one hand and nature of belief and meaning on the other made it impossible for one to determine the other. So, by Quine's lights, Lewis had begged the question against him and ignored his arguments for radical indeterminacy.

Of course Lewis didn't think that he had begged the question or ignored arguments that needed to be addressed before drawing his conclusion. In an anticipation of later developments in his philosophy during the 1980s, Lewis was more certain that our ordinary discourse has a determinate interpretation, cases of moderate indeterminacy aside, than he was certain of the soundness of Quine's arguments to the contrary. He was more certain of the former because, Lewis believed, the determinacy of discourse is just part and parcel of our entrenched common sense scheme. So, Lewis reasoned, it was far more likely that some answer was available to Quine's arguments than so fundamental an error in our entrenched world scheme. Hence, Lewis concluded—we may surmise because it explains what he didn't write as well as wrote—that it was rational for him to assume that our discourse isn't beset with radical indeterminacy, even if he couldn't say what was wrong with Quine's arguments. As Lewis later expressed himself, it is 'a Moorean fact' that our language has a fairly determinate interpretation (1983: 47).⁵

We can readily envisage one line of response on Quine's behalf that needs to be taken seriously, the response that Lewis had failed to describe a Moorean fact, so Lewis wasn't entitled to take for granted that Quine's arguments didn't work. Here goes. What is deeply entrenched and difficult to deny is the fact that we use words, as Quine put it, 'in sufficient systematic agreement for fair communication', so we are able to catch ourselves when there are failures of communication (Quine 1953: 256, 1987: 27-8). But the possibility of 'fair communication' doesn't presuppose that discourse is determinate or reference ever singular, only that interlocutors in a conversation use their words with comparable degrees of determinacy. So long as everyone agrees that 'rabbits' denotes rabbits, it doesn't matter whether 'rabbit' is determinate so long as dialogue proceeds smoothly and we agree upon our conclusions (Quine 1995: 75). So from the fact that we talk and understand one another well enough it doesn't follow that we communicate through exchanges in singular references.

Can we similarly envisage how Lewis would have responded in turn? Would Lewis have continued to hold the line? We don't have to envisage anything because, we will argue, Lewis gave up on the line—he came around to sharing Quine's doctrine that singular reference isn't meant for creatures like us. Lewis did so because during the 1990s he came to embrace the epistemological doctrine that almost all entities are theoretical.

⁵The terminology of 'Moorean facts' is owed to Armstrong (1980: 440-1) but Lewis's use of this essentially conservative strategy predates Armstrong's use of this terminology since, we have argued, the strategy is to be found in Lewis's 'Radical Interpretation'. Of course Lewis may already have been influenced by cognate reflections in Armstrong 1968: 51-2. We speculate that this shared conservative tendency, despite many other differences, was an important factor in Lewis finding more in common with Armstrong rather than Quine, always a philosophical radical, during the 1980s and 90s.

To set the scene for this development, we must take on board Lewis's adoption of what has been subsequently labelled the doctrine of 'reference magnetism' as elaborated in his 'New Work for a Theory of Universals' (1983) and 'Putnam's Paradox' (1984). According to reference magnetism, the only eligible referents for the non-logical vocabulary of our language are (more or less) natural properties and things whose boundaries are objectively privileged. Lewis had come to advance reference magnetism in order to refute Putnam's charge that settling truth-conditions for whole sentences fails to fix referents for their parts (Janssen-Lauret and MacBride 2019). In 'Putnam's Paradox' Lewis was responding to Quine at one remove, because Putnam's charge was inspired by Quine's arguments for the inscrutability of reference (Putnam 1982: 33). Putnam's idea was, roughly, that for any reference scheme compatible with the truth-conditions we assign to the sentences of our language, we are guaranteed to come up with another scrambled from the first. Putnam continued by arguing that if we try to get out of this situation by attempting to use new words to add further constraints on the referents for old words, our efforts will inevitably be defeated because the new words will also be subject to inscrutability. Putnam's charge was especially worrisome for Lewis because Lewis was also a descriptivist about reference—Lewis held that the reference of a word is what satisfies the descriptions we associate with it. So if we cannot, as Putnam argued, rely upon the interpretation of the descriptions we associate with words, because descriptions are just more words, and we have nothing else to reply upon, it follows that the reference of our words will never be fixed. Lewis's way out of this difficulty was to augment his descriptivism with reference magnetism. To understand him, we need to distinguish between the natural properties and things, which correspond to 'discriminatory classifications not of our making', on the one hand, and the less than natural ones on the other where the less than natural are understood in terms of definability from the natural ones (Lewis 1984: 227-8). The less than natural properties can be arranged along a continuum of more or less natural properties depending upon the simplicity of the definitions involved (Lewis to Teller 16th April 1983). The only eligible referents for our words, according to Lewis, are the most natural properties and things whose assignment are compatible with the other constraints on interpretation (such as the aforementioned Principle of Charity) being fulfilled. This provided Lewis with an answer to Putnam's charge because what, according to Lewis, settles the reference of our words isn't just to do with we say but the relative simplicity of the definitions whereby less than natural things and properties are built up from natural ones and the fact that whether a property or thing is natural, or more or less natural, is an objective matter.

One might be forgiven for thinking that Lewis had hit in the 1980s upon an account of reference that explained how we know what we're talking about—if you're willing, that is, to grant him natural properties and things, and an objective measure of the relative simplicity of less than natural properties and things defined in terms of the natural ones. In other words, Lewis's account of reference appears to uphold the sense that singular reference is a commonplace for us, albeit an account that allows for the possibility of there being more than one eligible referent of a word in circumstances where different less than natural candidates tie for definitional simplicity. But Lewis came to realise in the 1990s that in a significant sense we don't know what we are talking about even if the paraphernalia

of naturalness and simplicity of definition is granted, because we cannot single out natural properties and things. Because we cannot single them out, Lewis argued, we cannot single out the less than natural properties and things defined in terms of them either.

Lewis's argument begins from correlative epistemological, semantic and metaphysical premises. The epistemological premise is that we aren't *acquainted* with natural properties or even with properties defined in terms of them—not in the demanding sense of acquaintance which means having a direct cognitive relation with them. We only know properties or things in a 'lax sense', as Lewis put it, because we only 'know them as role occupants, including both scientific roles and their roles in daily life' (Lewis 2009: 215). In other words, they are only known to us by *description*, i.e. as something or other that performs the role delineated by a theory with respect to the roles of the other entities posited by that theory the fulfilment of which roles together account for the observational consequences of the theory. Lewis didn't only think of the fundamental properties described by physics in these terms. He thought that even the things nearest to us, our own mental states, are only known to us as role-occupants of our native folk-psychological theory (2009: 217-8). The correlative semantic premise Lewis made was that the terms of our theories are, roughly speaking, expressions defined in context as equivalent to descriptions which delineate the interrelated roles which according to the theory are occupied. According to Lewis's metaphysical premise the result of redistributing or permuting the natural properties amongst the roles delineated by a given theory corresponds to a distinct possibility. So if some natural property actually occupies one such role and another property occupies another such role then the result of swapping those properties one for another amongst these roles will constitute a distinct way for the world to be.

We are already in a position to see what the mutual upshot of these three premises will be. Suppose, by way of analogy, that there is archeological evidence of a certain ancient Roman lottery that had a first and a second prize winner, who were awarded 1000 denarii and 500 denarii respectively. Of course we're not acquainted with the winners, and let us suppose they're not named in the surviving papyrus fragment. All we know about them is that they fulfil the roles of being the first and second prize winners of the lottery in question. Now take the statement, 'the actual first prize winner and the actual second prize winner might have won the prizes the other way around'. Clearly this statement describes an alternative scenario different from the actual one. Whoever comes first in the actual scenario comes second in this alternative scenario. But still we don't know who actually won the lottery or who would have won the lottery had the alternative scenario been realised—because our descriptive knowledge doesn't run so far and we lack acquaintance with the lucky Romans in question. So we're not able, on the available evidence, to single one of them out in the sense of knowing who she/he was. Even if we were subsequently to discover another fragment of papyrus which told us that the actual winner was Catullus we would hardly be in a position to say that we had known before the discovery of this additional fragment that he had won the lottery; all we knew beforehand was that the actual winner of the lottery, whoever that was, won 1000 denarii, i.e. we didn't know which individual it was because our knowledge was only general, not specific.

Lewis's view is that this is pretty much our epistemological-cum-semantic-cum-metaphysical predicament when it comes to conceiving our relationship with natural properties. We have observational evidence that the roles delineated by our best scientific theories are occupied but we don't know which natural properties occupy which roles because our only knowledge of them is knowledge of them qua theoretical role-fillers—as the actual occupant of the first role, the actual occupant of the second role, etcetera. The statement 'the actual occupant of the first role and the actual occupant of the second role might have reversed their roles' describes an alternative possibility to the actual one. But we don't know which property actually occupies the first role or which would property would have performed this role had the alternative possibility been realised. The disanalogy is that because we can only know about natural properties qua occupiers of theoretical roles, our ignorance of which properties occupy which roles is irremediable—there's nothing akin to the eventuality of a missing piece of papyrus showing up for us.

Like Quine, Lewis was influenced by Ramsey's treatment of theoretical terms (2009: 205-7). In his 'How to Define Theoretical Terms' (1970) Lewis had already developed his own Ramsey-inspired account of theoretical terms. Suppose we have a complete and final theory T that describes the fundamental workings of nature and that we have a language rich enough to express all possible observations. Lewis assumed that T consists in all the logical consequences of a single closed sentence $T(\dots t_1 \dots, \dots t_2 \dots, \dots, \dots t_n \dots)$, where $t_1 \dots t_n$ are the theoretical terms of T . He called this sentence the postulate of T . By replacing the theoretical terms occurring in the postulate with variables, Lewis arrived at the open formula $T(\dots x_1 \dots, \dots x_2 \dots, \dots, \dots x_n \dots)$. This formula captures the interrelated roles delineated by T . It is satisfied by those fundamental things $a_1, \dots a_n$ that happen to occupy those roles (in that order). Lewis called such a sequence an actual realisation of T . Lewis distinguished the actual realisation from other possible realisations of T : other sequences of properties, b_1, \dots, b_n , that might have occupied those roles (in that order), or even other permutations of the properties which actually occupy those roles that might have occupied them in a different order. By binding the variables of this formula with existential quantifiers, Lewis formed the Ramsey sentence of T : 'For some x_1 , for some x_2 , ..., for some x_n $T(\dots x_1 \dots, \dots x_2 \dots, \dots, \dots x_n \dots)$ '. The Ramsey sentence is true if there is at least one sequence of entities that satisfies the formula $T(\dots x_1 \dots, \dots x_2 \dots, \dots, \dots x_n \dots)$, i.e. fulfils the roles delineated by T . In Lewis's terms: the Ramsey sentence says that T has an actual realisation.

In 'Ramseyan Humility' Lewis dwelt upon a particular consequence of his earlier account of theoretical terms, reminding us that T and its Ramsey sentence have exactly the same observational consequences (2009: 219). So there is no evidence for T which isn't equally evidence for the Ramsey sentence. But since the Ramsey sentence is true regardless of sequence of properties happens to fulfil the roles delineated by T , there is no possible observation which can tell us that one sequence rather than another is an actual realisation of T rather than a merely possible one. Lewis concluded that we don't have discriminatory knowledge of the theoretical entities posited even by a complete and final theory because we can never know which entities fulfil the roles which the Ramsey sentence of the theory says are occupied. Lewis then added as a corollary that since we don't know what the

fundamental properties are, we don't know what the less-than fundamental properties compounded from the fundamental ones are either (2009: 215). So our ignorance of the fundamental workings of nature spreads outwards.

The resulting outlook is a variety of sweeping structuralism which Quine would have recognised as akin to his own. Lewis's epistemology-cum-semantics-cum-metaphysics leads us to a perspective from which, like Quine's, ontology doesn't mainly matter but structure does. Ontology doesn't mainly matter from this perspective because the truth of the Ramsey sentence of T is indifferent to which entities occupy the roles delineated by T . But structure does mainly matter because what we discover about the workings of nature is that the roles delineated by T are occupied. And Quine would have heard an echo of his own use of proxy functions in Lewis's argument that whatever sequence of properties satisfies the Ramsey sentence of T may be permuted to provide a possible realisation which had it been actual would leave the truth of the Ramsey sentence undisturbed—the structure of T would be realised just as well because the relationships between the posits of T would be preserved under the permutation. Quine and Lewis certainly differed over certain things. Quine, for example, held that there is an identifiable class of observation statements, defined in terms of the firm association between them and ranges of stimulations which respectively prompt outright assent and dissent (1990/2: 2-6); whereas Lewis held that no language is observational per se, but thought that when we postulate the fundamental properties en bloc with a final theory like T we must start from an 'old' language capable of expressing all possible observations (2009: 206). But these differences shouldn't blind us to the fact that for both Quine and Lewis our knowledge of the world is inherently general; we lack discriminatory knowledge of which entities perform the roles delineated by our best theories.

Because of his sweeping epistemological structuralism we argue that Lewis was no longer able to hold the line against radical indeterminacy. If our knowledge of the world, inner and outer, even in the ideal limit, when we have a complete and final theory T , cannot enable us to distinguish which fundamental properties occupy the roles of T then we can hardly have determinate reference to whatever fundamental entities occupy those roles. It's a consequence of Lewis's sweeping structuralism that we don't even know about ourselves which world we're sitting in. So how could we single the fundamental properties out?

In a section of 'Ramseyan Humility' entitled 'ineffable ignorance' Lewis explains why we cannot single out specific fundamental properties. He invites us to consider the question from the point of view of a complete and final theory: which property occupies some role of T , say the seventeenth? Lewis reflects, 'We cannot answer the question: which property occupies that role? But worse: not only can we not answer that question, we can't even ask it' (2009: 215-6). To ask the question posed, Lewis argued, we must be able to ask it as a multiple choice question: is it this fundamental property that occupies the seventeenth role or that fundamental property, etcetera? (As though we could point to them.) But we're not acquainted with the fundamental properties, so we cannot point to them. We only know about the fundamental properties as they lie over the horizon, so to speak, as solutions to the puzzles of science, as somethings or other that fulfil the theoretical roles delineated by T . So we can't frame the multiple choice question in the

first place. Distinguish between answer-sentences, the linguistic vehicles of a potential answer, and answer-propositions, what we use answer-sentences as vehicles to convey. To answer the question Lewis posed, our answer-sentence must be co-ordinated with an answer-proposition—a proposition to the effect that this fundamental property rather than that fundamental property occupies the seventeenth role. But we cannot co-ordinate answer-sentences with answer-propositions because our scientific discourse operates at too high a level of generality, the level of a Ramsey sentence which is indifferent to which fundamental property performs the seventeenth role described by T . It won't help to answer that the occupant of the seventeenth role, whatever that is, occupies that role, because this only tells us that it is occupied by some fundamental property, not which one. It won't help either to answer that the actual occupant of the seventeenth role occupies the seventeenth role because we don't know which fundamental property that actually is, we only know that the seventeenth role is actually occupied by some property.

In the 1980s Lewis introduced, as we have seen, natural properties as reference magnets, properties which are the embodiments of 'discriminatory classifications not of our making' and thereby more eligible to serve as the referents of our non-logical vocabulary than less than natural properties. But in the light of the epistemological structuralism of 'Ramseyan Humility', it should now be evident this was at best a pyrrhic victory for singular reference. From the fact that natural properties are the embodiments of objective discriminatory classifications it doesn't follow that we can discriminate between them, because, as 'Ramseyan Humility' teaches us, we don't know which natural properties occupy which theoretical roles and natural properties are given to us in no other way except as the occupiers of theoretical roles. So even if our words are drawn to natural properties it doesn't follow that we are able to identify what we are talking about. Insofar as singular reference presupposes identifying knowledge it follows that we cannot have singular reference. If it is denied that singular reference presupposes identifying knowledge, as, for example, Kaplan (1978:241) proposed, then we can refer, but only at the cost of never knowing to what our words refer. Either way, no reference or blind reference, the introduction of natural properties fails to deliver an account that renders any way of speaking a diaphanous medium for the singular representation of properties. In this way, Lewis's position in 'Ramsey Humility' supersedes that of 'New Work for a Theory of Universals' and 'Putnam's Paradox', bringing Lewis closer to Quine.

'Ramsey Humility' also supersedes 'How to Define Theoretical Terms' (1970: 433) In the main text of the paper Lewis explicitly relies upon the assumption that there is indeed one unique actual realisation of T in a further respect germane to our discussion. In the main text of 'Ramsey Humility' Lewis assumes that T has a unique actual realisation but offers no more justification than remarking that the implicit definition of the theoretical terms of T demands it (2009: 207). Lewis assumes here, without argument, that the only way to explain how the theoretical terms of T function is to presuppose that there is only one actual realisation of T , so they will be undefined if they lack one. Had Lewis said no more than this then, just as Davidson responded to Lewis in 1974 on Quine's behalf, we would have concluded by asking: isn't that the issue? In fact, closer examination reveals that Lewis had come around to thinking that there is no need to presuppose that T must

be uniquely realised for the terms it introduces to be well-defined. Lewis declares: ‘I once proposed adding that if a theory has no realization, or multiple realizations, its theoretical terms do not refer (Lewis 1970). I’d now say that if it is unrealized but almost realized, its theoretical terms refer to the members of its unique near-realization, if there is one; and that if it has multiple realizations (or near-realizations) its theoretical terms have indeterminate reference’ (2009: 220). Similarly, Lewis writes, ‘The role might be multiply occupied, the improper description ‘the occupant of the role’ might be indeterminate in reference’ (2009: 221). So once again we see Lewis moving closer to the views of Quine.

Is Lewis’s conclusion in ‘Ramseyan Humility’ that our discourse cannot traffic in singular information about fundamental properties just traditional external world scepticism rehearsed in an unfamiliar guise, as, for example, Schaffer (2005) has claimed, i.e. scepticism to be addressed in whatever way external world scepticism should be addressed? Absolutely not we argue and Lewis had already told Schaffer that he didn’t think so either. Lewis’s letter on this point is instructive and provides further evidence for our interpretation of him. Here’s what Lewis wrote: ‘I do want to treat Ramseyan Humility differently from sceptical humility. In the case of sceptical humility, we can distinguish the alternatives in thought or language, which seems to be a prerequisite to attending to some and setting others aside as irrelevant. But if we can’t distinguish the alternatives, as I claim in the section about ineffability, I don’t see how we can avoid treating all of them alike’ (Lewis-to-Schaffer 15/12/2000).

We interpret Lewis in this letter as arguing along the following lines. Traditional scepticism presupposes that we are able to distinguish in thought and language between different possible scenarios—for example, the scenario in which we are indeed embodied agents going about our business in the world and the scenario in which we’re really just brains in vats. Drawing upon this distinction, the traditional sceptic cajoles us down a line of reflection which, if we’re drawn, leads us to conclude that we don’t know which scenario is real. But the doctrine of Ramseyan humility is different: it is in a sense more radical than traditional scepticism. It is more radical because it involves the claim that, as Lewis puts the point in this letter, ‘we can’t distinguish’ the singular alternatives ‘in thought or language’ whereby one rather than another fundamental property occupies, say, the seventeenth role in the theory T of our final and complete science—more radical because we can’t avoid treating such singular alternatives as ‘all of them alike’. To distance the doctrine of Ramseyan humility from traditional scepticism in this way, by denying that our sentences can serve as diaphanous vehicles for singular propositions, is for Lewis to join with Quine, because it is to admit that singular thought or reference is out of reach for us.⁶

⁶It is less radical in another sense too, although Lewis doesn’t himself point this out, because the doctrine of Ramseyan humility presupposes that we can in principle have complete structural knowledge of the fundamental workings of nature, i.e. knowledge that the Ramsey sentence of T is satisfied, knowledge which the external world sceptic would deny us.

REFERENCES

- D.M. Armstrong 1968: *A Materialist Theory of Mind*. New York: Humanities Press.
- D.M. Armstrong 1980: 'Against "Ostrich" Nominalism: A Reply to Michael Devitt', *Pacific Philosophical Quarterly*, 61, 440-9.
- R. Carnap 1947: *Meaning and Necessity: A Study in Semantics and Modal Logic*. Chicago: University of Chicago Press.
- R. Carnap 1950: *Logical Foundations of Probability*. Chicago: Chicago University Press.
- R. Carnap 1963: 'Replies and Systematic Expositions: 19. P.F. Strawson on Linguistic naturalism' in P.A. Schilpp (ed.) *The Philosophy of Rudolf Carnap: The Library of Living Philosophers* (La Salle, Illinois: Open Court Publishing), 933-40.
- D. Davidson 1967: 'Truth and Meaning', *Synthese*, 17, 304-23; reprinted in Davidson 1984: 17-36.
- D. Davidson 1970: 'Mental Events' in L. Foster & J.W. Swanson (eds), *Experience and Theory*: 79-101; reprinted in Davidson 1980: 207-225.
- D. Davidson 1974: 'Replies to David Lewis and W.V. Quine', *Synthese*, 27, 345-9.
- D. Davidson 1980: *Essays on Actions and Events*. Oxford: Oxford University Press.
- D. Davidson 1984: *Inquiries into Truth and Interpretation*. Oxford: Oxford University Press.
- W. Demopoulos 2013: *Logicism and its Philosophical Legacy*. Cambridge: Cambridge University Press.
- G. Frege 1879: *Begriffsschrift, eine der arithmetischen nachgebildete Formelsprache des reinen Denkens*, Halle a. S.: Louis Nebert; translated by S. Bauer Mengelberg as *Concept Notation: A formula language of pure thought, modelled upon that of arithmetic*, in J. van Heijenoort, *From Frege to Gödel: A Sourcebook in Mathematical Logic, 1879-1931* (Cambridge, MA: Harvard University Press), 5-82.
- G. Frege 1884: *Die Grundlagen der Arithmetik: eine logisch-mathematische Untersuchung über den Begriff der Zahl*. Breslau: w. Koebner.
- G. Frege 1893: *Grundgesetze der Arithmetik, Band I*. Jena: Verlag Herman Pohle.
- G. Frege 1903: *Grundgesetze der Arithmetik, Band II*. Jena: Verlag Herman Pohle.
- N. Goodman and W.V. Quine 1947: 'Steps Toward a Constructive Nominalism', *Journal of Symbolic Logic* 12,105-122.
- P. Hylton 1996: 'Beginning With Analysis' in R. Monk & A. Palmer (eds.) *Bertrand Russell and the Origins of Analytic Philosophy* (Bristol: Thoemmes Press), 183-216.
- F. Janssen-Lauret 2017: 'The Quinian Roots of Lewis's Humeanism', *Monist*, 100, 249-265.
- F. Janssen-Lauret and F. MacBride 2015: 'Meta-Ontology, Epistemology and Essence', *The Monist*, 98, 290-302.
- F. Janssen-Lauret and F. MacBride 2018: 'David Lewis's Place in the History of Analytic Philosophy: His Conservative and Liberal Methodology', *Philosophical Inquiries*, 5, 1-22.
- F. Janssen-Lauret and F. MacBride 2019: 'Lewis's Global Descriptivism and Reference Magnetism', *Australasian Journal of Philosophy*, <https://doi.org/10.1080/00048402.2019.1619792>.

- D. Kaplan 1978: 'Dthat' in P. Cole (ed.) *Syntax and Semantics*, vol. 9 (New York: Academic Press), 221-43.
- G. Kemp 2012: *Quine versus Davidson: Truth, Reference & Meaning*. Oxford: Oxford University Press.
- D. Lewis 1970: 'How To Define Theoretical Terms', *Journal of Philosophy*, 67, 427-446.
- D. Lewis 1974: 'Radical Interpretation', *Synthese*, 27, 331-44.
- D. Lewis, Letter to J. Smart, 23 March 1979. In David Lewis Papers, Firestone Library, Princeton University.
- D. Lewis 1983: 'New Work for a Theory of Universals', *Australasian Journal of Philosophy*, 61, 343-77.
- D. Lewis, Letter to H. Field, 29th March 1983. In David Lewis Papers, Firestone Library, Princeton University.
- D. Lewis, Letter to P. Teller, 16 April 1983. In David Lewis Papers, Firestone Library, Princeton University.
- D. Lewis 1984: 'Putnam's Paradox', *Australasian Journal of Philosophy*, 62, 221-36.
- D. Lewis, Letter to D. Smith, 28th September 1990. In David Lewis Papers, Firestone Library, Princeton University.
- D. Lewis 1991: *Parts of Classes*. Oxford: Basil Blackwell.
- D. Lewis 1993: 'Mathematics is megethology', *Philosophia Mathematica*, 3, 3-23.
- D. Lewis, Letter to W.V. Quine, 11 November 1989. In David Lewis Papers, Firestone Library, Princeton University.
- D. Lewis, Letter to C. Elgin, 14 April 1992. In David Lewis Papers, Firestone Library, Princeton University.
- D. Lewis, Letter to J. Schaffer, 15 December 2000. In David Lewis Papers, Firestone Library, Princeton University.
- D. Lewis 2009: 'Ramseyan Humility' in D. Braddon-Mitchell & R. Nola (eds.), *Conceptual Analysis and Philosophical Naturalism*. Cambridge, Mass.: MIT Press, 203-22.
- A. Morton 1975: 'Complex Individuals and Multigrade Relations', *Nos*, 9, 309-318.
- H. Putnam 1982: *Reason, Truth and History*. Cambridge: Cambridge University Press.
- W.V. Quine 1939: 'Designation and Existence', *Journal of Philosophy*, 36, 701-9.
- W.V. Quine 1953: 'On Mental Entities', *Proceedings of the American Academy of Arts and Sciences* 80, 198-203; reprinted in Quine 1976b: 220-7.
- W.V. Quine 1957: 'The Scope and Language of Science', *British Journal for the Philosophy of Science*; reprinted in Quine 1976b: 228-45.
- W.V. Quine 1960: *Word & Object*. Cambridge, Mass.: MIT Press.
- W.V. Quine 1963: *Set Theory and Its Logic*. Cambridge, Mass., Harvard University Press.
- W.V. Quine 1964: 'Ontological Reduction and the World of Numbers', *Journal of Philosophy*, 61, 209-16; reprinted in Quine 1976b: 212-20.
- W.V. Quine 1968: 'Ontological Relativity'. *Journal of Philosophy*, 65, 185-212; reprinted in Quine 1969b: 26-68.
- W.V. Quine 1969a: 'Epistemology Naturalized' in Quine 1969b: 69-90.
- W.V. Quine 1969b: *Ontological Relativity & Other Essays*. New York, Columbia University Press, 1969.

- W.V. Quine 1976a: 'Whither Physical Objects?' In R.S. Cohen et al (eds.), *Essays in Memory of Imre Lakatos, Boston Studies in the Philosophy of Science*, 39, 497-504.
- W.V. Quine 1976b: *The Ways of Paradox and Other Essays*. Revised and enlarged edition. Cambridge Mass.: Harvard University Press.
- W.V. Quine 1977: 'Facts of the Matter' in R.W. Shahan & K.R. Merrill (eds.) *American Philosophers from Edwards to Quine*, Norman, OK: University of Oklahoma Press; reprinted in Quine 2008: 271-86.
- W.V. Quine 1980: 'Soft Impeachment Disowned', *Pacific Philosophical Quarterly* 61, 450-451.
- W.V. Quine 1981: 'Things and their place in theories' in his *Theories and Things* (Cambridge, Mass.: Harvard University Press, 1981), 1-23.
- W.V. Quine 1985: 'Events and Reification' in E LePore & B. McLauhlin (eds.) *Actions and Events: Perspectives on the Philosophy of Donald Davidson*, Oxford: Basil Blackwell. 162-171.
- W.V. Quine 1987: *Quiddities: An Intermittently Philosophical Dictionary*. Cambridge, Mass.: Harvard University Press.
- W.V. Quine, Letter to D. Lewis, c. June 1989. In David Lewis Papers, Firestone Library, Princeton University.
- W.V. Quine, Letter to D. Lewis, 16 November 1989. In David Lewis Papers, Firestone Library, Princeton University.
- W.V. Quine, Letter to D. Lewis, 13 January 1990. In David Lewis Papers, Firestone Library, Princeton University.
- W.V. Quine 1990/2: *Pursuit of Truth*. Revised Edition. Cambridge, Mass. Harvard University Press.
- W.V. Quine 1992: 'Structure and Nature', *Journal of Philosophy*, 89, 6-9.
- W.V. Quine 1995: *From Stimulus to Science*. Cambridge Mass.: Harvard University Press.
- W.V. Quine 1995b: 'Preestablished Harmony' in F. Janssen-Lauret & G. Kemp (eds.) *Quine and His Place in History* (Basingstoke: Palgrave Macmillan, 2015), 29-32.
- W.V. Quine 2008: *Confessions of a Confirmed Extensionalist*, ed. D. Føllesdal and D. Quine. Cambridge Mass.: Harvard University Press.
- F.P. Ramsey 1929: 'Theories' in his *Foundations of Mathematics and other essays*, edited by R.B. Braithwaite (London: Kegan Paul, Trench, Turner & Co., Ltd, 1931), 212-36.
- B. Russell 1914: *Our Knowledge of the External World*. Chicago: Open Court Publishing Company.
- B. Russell 1919: *Introduction to Mathematical Philosophy*. London: George Allen & Unwin.
- B. Russell 1957: 'Logic and Ontology', *Journal of Philosophy*, 54, 225-30.
- J. Schaffer 2005: 'Quiddistic knowledge', *Philosophical Studies*, 123, 132.
- N. Wiener 1914: 'A simplification of the logic of relations', *Proceedings of the Cambridge Philosophical Society*, 17, 387-90.