

“Experience Itself Must Be Taught to Read and Write”: Scientific Practice and Berkeley’s Language of Nature¹

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I. Introduction: Two Puzzles in Berkeley’s Writings

According to George Berkeley’s *divine language model*, which has seen a recent resurgence of scholarly interest, the natural world has a linguistic structure. Relations between natural phenomena, including ostensible causal relations, should be understood as semiotic, syntactic, or semantic relations instituted and sustained by God’s linguistic practices. Corollary to the language model is what Jonathan Dancy calls a *hermeneutic philosophy of science*, “one which understands the activity of scientific explanation as exactly analogous to semantic interpretation.”² To date, Kenneth Pearce’s *Language and the Structure of Berkeley’s World* provides the closest approximation we have to such a hermeneutic philosophy of science. The purpose of this essay is to bring us another step closer by solving two outstanding puzzles in Berkeley’s writings. Doing so will also shed light on the divine language argument in *Alciphron* IV and on the relationship between common-sense and scientific discourse. The two puzzles are:

1. Why does Berkeley oscillate, seemingly indiscriminately, between the analogies of written language and spoken language in describing the divine language of nature?
2. Why does Berkeley describe scientists as *grammarians* of nature in the 1710 edition of PHK (§§108-110) but remove this terminology in the 1734 edition?³

These puzzles admit of a common solution: between the publication of *Alciphron* in 1732 and the revision of PHK in 1734, Berkeley at least tentatively adopted the view (possibly borrowed from Francis Bacon) that scientists are distinguished by their *literacy* in the language of nature from laymen who are merely *fluent*. Beyond the textual support I provide, I take the ability of my interpretation to solve these seemingly disparate puzzles at one stroke to be a strong argument in its favor.

¹ This essay—along with Keota Fields’ “Berkeley on the Meaning of General Terms” in this issue of *Berkeley Studies*—is a winner of the 2020 Colin and Alisa Turbayne International Berkeley Essay Prize Competition.

² Forthcoming.

³ Cf. *The Works of George Berkeley, Bishop of Cloyne* [W], ed. A. A. Luce and T. E. Jessop (9 vols.; London: Nelson, 1948-1957), 2: 88-90. Other abbreviations: NB=Notebooks, NTV=*An Essay towards a New Theory of Vision*, PHK= *Principles of Human Knowledge*, DHP=*Dialogues between Hylas and Philonous*, PO=*Passive Obedience*, Alc=*Alciphron*, TVV=*Theory of Vision Vindicated*, S=*Siris*.

II. Written and Spoken Language

There is widespread disagreement as to whether Berkeley thinks of the language of nature as a written or spoken language. Turbayne includes the claim that it is a written language in his list of *axioms* about the divine language model,⁴ but this does not represent any consensus. For example, Creery and Hooker hold that it is spoken only,⁵ while Dancy and Printz appear ambivalent.⁶ Pearce and Fasko, meanwhile, have signaled openness to it having both written and spoken aspects but have not developed this possibility in a systematic way.

This lack of consensus is understandable as the textual evidence is ambiguous. Little if anything, for example, can be inferred from the terms “author” and “discourse,” both of which appear to be neutral with respect to the written–spoken distinction. In the Draft Introduction to PHK, Berkeley twice contrasts the hearing of discourses to the reading of texts, but this usage does not survive in his published works. In fact, the Introduction of PHK §20 (W 2: 37) and the TVV §48 (W 1: 268) both indicate that a discourse can be either read or heard. Likewise, Berkeley normally uses “author” in a non-literary sense having to do with origination or cause.⁷ Nor are the linguistic analogies which illustrate mediate perception or the bundling of ideas into objects conclusive,⁸ since his point is simply about how words come to suggest sensible things through arbitrary association.

These terms and passages aside, we still find little consistency in NTV and PHK. At most, we can say that PHK tends to employ written–language analogies while NTV runs analogies of both kinds together. In PHK, Berkeley frequently states that our ideas are “imprinted” on the senses, which is suggestive of written language. As Turbayne argues, citing PHK §§108-109 (W 2: 88-89), “further confirmation is provided by such metaphors as: ‘well-read in the language of nature,’ ‘perusing the volume of nature,’ and ‘reading other books’” (“Metaphysical Grammar,” 15). In NTV (§§142-143), Berkeley also uses an analogy with written words to explain how a visible square is more apt than a visible circle to represent a tangible square (W 1: 228-29). In both works, however, Berkeley routinely uses *marks* and *signs* interchangeably [see PHK §§65-66 (W 2: 69-70), NTV §147 (W I: 231)]. “Mark,” whatever its technical usage, connotes inscription while “sign” does not—as will become evident when I discuss Alc 7.12 (W 3: 304). Moreover, Berkeley states that “the voice of [the Author of] nature ... speaks to our eyes”

⁴ See Colin Turbayne, “Berkeley’s Metaphysical Grammar,” in *Berkeley: Principles of Human Knowledge, Text and Critical Essays*, ed. Colin Turbayne (Indianapolis: Bobbs-Merrill, 1970), 14.

⁵ See Walter Creery, “Berkeley’s Argument for a Divine Visual Language,” *International Journal for Philosophy of Religion* 3 (1972), 219; and Michael Hooker, “Berkeley’s Argument from Design,” in *Berkeley: Critical and Interpretive Essays*, ed. Colin Turbayne (Minneapolis: University of Minnesota Press, 1982), 269.

⁶ Jonathan Dancy, *Berkeley: An Introduction* (Oxford: Basil Blackwell, 1987), 109, 122; Dancy, “Berkeley, Descartes and the Science of Nature,” *Harvard Review of Philosophy* 20 (2014), 13; and Amanda Printz, “The Scope and Significance of George Berkeley’s Language Model,” Ph.D. Diss. (University of Southern California, 2007), 43, 65, 78, and 91 state that the world is a divine *text* and that perception is “identical to reading,” but often deviate to talk of *phonemes* and divine *utterances*.

⁷ For example, PHK §81 (W 2: 75); DHP (W 2: 124); Alc 3.10 (W 3: 129); S §320 (W 5: 147).

⁸ For example, TVV §48 (W I: 267-68); DHP (W 2: 174); Alc 4.11 (W 3: 155).

[NTV §152 (W 1: 233)],⁹ and our perceptual ideas are compared to *pronounced* words [NTV §73 (W 1: 198)]. At this point in his career (1709-1710), little hangs on the distinction, and Berkeley is happy to elide it.

If Berkeley's natural theology had only conventional aims, eliding the written–spoken language distinction would be reasonable. As he states, instances of written and spoken language both seem to indicate intelligent agency: “no matter whether these signs are pronounced or written, whether they enter by the eye or the ear: they have the same use, and are equally proofs of an intelligent, thinking, designing cause” (Alc 4.7; W 3: 149). However, the Berkeley of 1732 is not content to prove God's mere existence, or even that God designed the natural world. Instead, he attempts to prove “not a Creator merely, but a provident Governor, actually and intimately present” (Alc 4.14; W 3: 160). It appears that in Alc 4, Berkeley suddenly realized that he could not infer a provident or intimately present Governor if the language of nature were conceived on the model of written language, or at least *only* on the model of written language. This is because written books, while perfectly good evidence of one or more intelligent authors, are hardly evidence that these authors are intimately present with us (or even still alive and active in the world).¹⁰ Thus, everything changes in the fourth dialogue: Berkeley carefully avoids any use of the term “mark” (reserving it for the seventh dialogue), and the spoken language analogy entirely dominates. Berkeley's express goal is to show that God “speaks to man in the same clear and sensible manner as one man doth to another” (Alc 4.6; W 3: 148). We then learn that God “constantly speaks to the eyes of all mankind” (Alc 4.11; W 3: 155), that we “have as much reason to think [God] speaks to [our] eyes, as for thinking any particular person speaks to [our] ears” (Alc 4.12; W 3: 157), and that “he daily speaks to our senses in a manifest and clear dialect” (Alc 4.14; W 3: 159).

Some have tried to draw the written–spoken distinction in terms of the sense–modality in which the language is encoded,¹¹ which could let us explain Alc 4's focus on spoken

⁹ W 1: 233. The brackets mark a later insertion in the third edition of NTV. Given that “author” has no significance for the written vs. spoken distinction, Berkeley likely made this insertion because the expression “voice of nature” was more typically used in the 18th century to refer to the innate moral conscience belonging to human beings independent of Christian revelation. Berkeley himself uses it in this moral sense at PO §25 (W 6: 31) and Alc 1.16 (W 3: 62).

¹⁰ Costica Bradatan, “George Berkeley and the *Liber Mundi* Tradition,” in *The Other Bishop Berkeley: An Exercise in Reenchantment* (New York: Fordham University Press, 2006), 75; and Manuel Fasko, “God's Language: George Berkeley's Conception of Nature,” Ph.D. Diss. (University of Zürich, 2020): §4.1, §4.6 are cognizant of this difficulty.

¹¹ Turbayne (“Metaphysical Grammar,” 12) and Lawrence Mirarchi [“Dynamical Implications of Berkeley's Doctrine of Heterogeneity: A Note on the Language Model of Nature,” in *Berkeley: Critical and Interpretive Essays*, ed. Colin Turbayne (Minneapolis: University of Minnesota Press, 1982), 250-52] try to equate written *letters* and spoken *phonemes* with *visibilia* and *tangibilia*, respectively. Whether this can be done has no significance for whether sensible bodies (the *words*) are instances of spoken or written language in the technical sense I discuss in this paragraph. *Visibilia* may indeed *stand for tangibilia* in the way letters stand for phonemes, while *meaning* a far wider range of things once appropriately compounded into objects and scenes. Barnouw may have something like this in mind when he writes: “the semiotic linking of visual and tactile sensations is transferred or transposed to a different level, moving from the construction of objects in space to anticipation of the results of events in the world.” See Jeffrey Barnouw, “The Two Motives Behind

language in terms of its focus on *visual* language. This is a mistake. An audio–recording of someone’s voice, after all, is no better evidence of providence or intimate presence than a book is, while a real–time exchange of epistles very much is. Moreover, Braille shows that a written language need not be visual, while sign–language shows that a visual language need not be written. The distinction is best understood metaphorically and should be drawn in terms of contextually appropriate responsiveness to our own actions and utterances. Written language, in my technical sense, is *monologic*—what we might call “mere transmission.” Spoken language, in contrast, is *dialogic* and corresponds to reciprocal communication. Only if nature is supposed to contain the latter is Berkeley’s divine language argument intelligible as an argument for divine providence and intimate presence. Written words exhibit contextual variation in the limited sense that their meanings partially depend upon the context of surrounding words and sometimes where they are inscribed (e.g. “STOP” inscribed on a street sign vs. in a telegram), but not with respect to our own subsequent actions and utterances. A copy of the *Iliad* expresses the same sentences no matter where I take it or what I yell at it; a living person does not. This is why Berkeley writes that it is “the instantaneous production and reproduction of so many signs combined, dissolved, transposed, diversified, and adapted to such an endless variety of purposes, ever shifting with the occasions and suited to them, [that] doth set forth and testify the immediate operation of a provident Spirit” (Alc 4.14; W 3: 159-60).

If the model of spoken language is uniquely sufficient for his purposes, then why does Berkeley not replace the “volume of nature” and other written language analogies in PHK with spoken language analogies? He easily could have done so while making the various other changes to the 1734 edition, leading me to believe that his failure to do so is no accident. Like Kenneth Winkler, I see in Berkeley’s system a dichotomy of empirical regularities that mirrors Wilfrid Sellars’ manifest and scientific images: “the simultaneous existence of two sets of useful regularities—one available to the common man and viable within the realm of ordinary life, the other apparent only to the curious eye of the philosopher and in the end more useful than the other, even from the point of view of common sense.”¹² On my interpretation, God’s spoken discourse corresponds to the former while God’s written discourse corresponds to the latter.

At Alc 7.12, we receive the first hint that this is what Berkeley has in mind. He asserts that arithmetic, because it is one of the sciences, requires not only that we establish a set of conventional names but that we “devise proper marks of a permanent nature” (W 3: 304). The connection between the *permanence* of a mark and its status as a written sign is simple: static signs are monologic. It is because the book and the audio–recording are both static transmissions that both exhibit no variation in response to our own actions and utterances. Accordingly, what is expressed in the divine language *qua* scientific image should be the same always and everywhere, or at least, depend in no way on our own actions. In contrast, what is expressed in the divine language *qua* manifest image should

Berkeley’s Expressly Unmotivated Signs: Sure Perception and Personal Providence,” in *New Interpretations of Berkeley’s Thought*, ed. Stephen H. Daniel (Amherst, NY: Humanity Books, 2008), 169.

¹² Kenneth Winkler, “Berkeley, Newton, and the Stars.” *Studies in History and Philosophy of Science* 17 (1986), 35.

change in response to our own actions in systematic ways indicative (according to Berkeley) of divine providence. For example, while we cannot choose what we perceive, given that our eyes are open, we do have the power to choose how to act—including whether and where to look—and the regularities that obtain in our perceptions can be affected in myriad ways by these actions.

To make the distinction clearer, and to begin to see its significance, we should consider the *content* proper to each discourse. The content proper to the spoken discourse should vary in response to human activity and be scrutable to common-sense, as many derivations from simple induction do and are: “that food nourishes, sleep refreshes, and fire warms us; that to sow in the seed-time is the way to reap in the harvest, and, in general, that to obtain such or such ends, such or such means are conducive” (PHK §31; W 2: 54).¹³ Human actions can bring it about that any of these facts fail to obtain (and are either modified or replaced) in a particular context. In contrast, the content proper to the written discourse should not be contingent upon human activity and there should be no plausible induction to it from common-sense mechanics. *That Neptune exists* and *that Earth has a dense inner core* both satisfy these criteria. At least for all practical purposes, whether these facts continue to obtain is not contingent on human activity and they are inscrutable without the antecedent formulation of Newtonian mechanics.¹⁴

As we will see shortly, Newtonian mechanics are best understood as the *syntax* of the language of nature. Normally, the content of a sentence is contingent even given the full syntax of the language (just as Neptune’s existence is contingent even given Newton’s laws of motion and gravitation). It is possible, however, for a discourse in a language—whether written or spoken—to express information about its own grammar, and in so doing enable us to better understand other parts of that very discourse. In some cases, as with the syntactic rules governing the use of punctuation, these rules are in no way implicit in ordinary speech behaviors (unlike many other syntactic rules).¹⁵ Analogously, while Newtonian mechanics (or at least approximations thereof) seem to be implicit in common-sense mechanics, not even approximations of non-classical (e.g., quantum) mechanics seem to be implicit in common-sense mechanics. This is significant because it shows that my interpretation of Berkeley’s language model is consistent with scientific developments that transcend Newtonianism. As we are about to see, although scientists are to be distinguished from laymen by their literacy, there is no reason to suppose that their investigative (rather than merely interpretive) work is complete simply because they have mastered their ABCs.

¹³ Cf. NTV §147 (W 1: 321).

¹⁴ There may also be some content which finds expression in both discourses, non-propositional content, or propositional content unrelated to any specific empirical regularities (e.g. information expressed about God through “indirect reference”). So long as there is importantly different content proper to each discourse, my purposes do not require us to explore these additional possibilities.

¹⁵ For detailed argument that punctuation has syntactic functions distinct from any found in spoken language (even from those functions performed by intonation and other prosodic phenomena), see Geoffrey Nunberg, *The Linguistics of Punctuation* (Stanford, CA: Center for the Study of Language and Information, 1990), 3–7.

III. The Grammarian Analogy

The second puzzle contains two (presumably related) components: what did Berkeley *mean* by characterizing scientists as grammarians, and why did he *remove* this characterization from PHK? Of these components, the first has received the most scholarly attention.

Some, like Downing and Brook,¹⁶ see scientists as grammarians primarily in the sense that they discover empirical regularities with especially great generality (and therefore usefulness). This interpretation takes seriously Berkeley's various assertions that the knowledge possessed by scientists is different mainly in *degree* and not *kind* from that which laymen possess,¹⁷ and it makes it relatively clear why this additional knowledge is useful. However, it does not take the term "grammar" itself seriously enough. Grammatical rules are not mere empirical regularities, however general, in how a language is used. Rather, they have a prescriptive as well as descriptive dimension,¹⁸ and they govern how the meanings of complex expressions relate to the meanings of the simple expressions of which they are composed.

Others, like Pearce and Turbayne,¹⁹ see scientists as grammarians in the sense that the laws they discover are the *syntax* of the divine language—the rules for how lexical items (i.e., sensible bodies)²⁰ can be combined and ordered in experience. Interpretations of this sort take the term "grammar" seriously but make it more difficult to explain why the additional knowledge that science provides is useful. This is Dancy's main criticism ("Berkeley, Descartes," 6); seemingly, if we already speak a language, there is little that a grammarian can add to our understanding or competence.²¹

Dancy's own interpretation is that non-scientists are at an early stage of language acquisition while scientists are fluent enough to make use of the compositional grammar.

¹⁶ See Lisa Downing, "Berkeley's Natural Philosophy and Philosophy of Science," in *The Cambridge Companion to Berkeley*, ed. Kenneth Winkler (Cambridge: Cambridge University Press, 2005), 249–52; and Richard Brook, *Berkeley's Philosophy of Science* (The Hague: Martinus Nijhoff, 1973), 20.

¹⁷ For example, PHK §105 (W 2: 87) and S §254 (W 5: 121).

¹⁸ See Turbayne, "Metaphysical Grammar," 31; and Printz, "Berkeley's Language Model," 124 on the prescriptive aspects of laws of nature in Berkeley.

¹⁹ See Kenneth Pearce, *Language and the Structure of Berkeley's World* (Oxford: Oxford University Press, 2017), 192, 204; and Turbayne, "Metaphysical Grammar," 7.

²⁰ Not all interpreters agree that sensible bodies are the words, but this is the prevailing interpretation and I accept it because of Berkeley's remarks in PHK §65 (W 2: 69) about ideas being combined into bodies for the same reason that letters are combined into words. Like Pearce, I also "follow Turbayne in taking visual ideas to signify tangible stimuli in the way written words signify spoken words, rather than in the way words signify their referents" (*Language and Structure*, 181). Sensible bodies are words in the language of nature, for the same word can be represented using letters or sounds just as the same table can be seen or touched.

²¹ For a discussion of how the technical grammar of physics is supposed to differ from the common-sense grammar of ordinary body-talk, see Pearce, *Language and Structure*, 188–96. He argues that grammarians can add precision and generality to normal linguistic competence, and that on the syntactic approach, "Berkeley preserves the ability of natural science to teach us things we didn't know before"—which is no doubt true but does not suffice as an explanation of science's tremendous usefulness. Not all knowledge is particularly useful knowledge.

Thus, “the scientist is distinguished by his ability to decompose whole utterances into their component words,” which is a crucial step towards fluency (Dancy, *Berkeley*, 114). It is only by acquiring this ability, for example, that we begin to be able to form novel utterances of our own. This interpretation takes the term “grammar” seriously, and points to the usefulness of grammatical understanding, but it has major problems. Berkeley makes clear that we have all been learning the divine language almost constantly from birth [see NTV §144 (W 1: 229) and Alc 4.11 (W 3: 155-56)]. If, moreover, fluency is a matter of automatically attending to the senses of words rather than to the words themselves (Pearce, *Language and Structure*, 72), and if distance (for example) is suggested to us by visible qualities so automatically that we can mistakenly think we perceive it immediately [NTV §51 (W 1: 190)], then it seems that we must already be fluent in the divine language. Since ordinary speakers of a language obviously have a grasp, if only implicitly, of its compositional grammar, such a grasp cannot be what distinguishes scientists *qua* grammarians.

I accept the syntactic approach because, as I will discuss shortly, Dancy’s criticism is solvable. However, I do not think this approach—in and of itself—can explain Berkeley’s subsequent removal of the grammarian analogy. Why, as Berkeley embraces the language model ever more and more,²² would he suddenly return to PHK and deliberately excise one of its potentially important aspects? To date, the only candidate explanation is that the grammarian analogy—while apt with respect to syntax—suggests the wrong *goals* for natural science. “Grammar manuals are useful,” Pearce tells us, “but the purpose of literature is nonetheless not to be analysed grammatically, but to be read for its content.”²³ Studying nature’s grammar is indeed *part* of the job of the scientist, but it would be myopic to analyze the grammar of a text rather than attend to its meaning. Thus, although Berkeley’s view does not change, he still opts to revise PHK.

This is indeed one possible explanation of the removal. However, it does not explain *why* the study of grammar is useful and should even be *part* of the scientist’s job description. Does explicitly formulating already implicit grammar rules enable us to understand or generate any new utterances? Usually not—but it does serve to enhance our literacy.²⁴ The utility of literacy in human languages needs no explanation, nor does that of grammar for acquiring (and improving) one’s literacy. On my interpretation, the grammarian is literally a grammarian (insofar as she renders explicit the rules we already implicitly follow), but *pace* Dancy this is useful beyond measure. Berkeley does not abandon the view that laws of nature are rules of syntax (and that it is *part* of the job of scientists to articulate and formalize them), but he removes the grammarian analogy because his mature view is that scientists are distinguished by their literacy in the divine

²² Many note this progression, but Printz (“Berkeley’s Language Model,” 24–36) has done an especially admirable job tracing it in detail.

²³ Kenneth Pearce, “The Semantics of Sense Perception in Berkeley,” *Religious Studies* 44 (2008), 258; cf. PHK §109 (W 2: 89).

²⁴ In principle, it is possible to read and write merely by learning phonetics. One can, for example, learn to sound-out a text, listen to one’s own voice, and interpret the sounds accordingly (as was sometimes the normal method in the ancient world for texts written in *scriptio continua*). This method, however, is incredibly inefficient and error-prone.

language (for which an explicit understanding of its grammar is merely one important aspect).

My interpretation also does justice to Berkeley's assertions that scientific knowledge is not fundamentally different from lay knowledge. Both are a matter of linguistic competence, and at least in principle any deliverance of natural science is expressible in common—sense terms (just as facts expressible in written English are expressible in spoken English). Science can lend clarity and exactness to our understanding, as Berkeley states at TVV §35 (W 1: 263), but it remains that “one who can neither write nor read, in common use understands the meaning of numeral words as well as the best philosopher or mathematician” (Alc 7.11; W 3: 304). Scientists may indeed have privileged access to information that is encoded only in the divine language's written form (such as the information that Neptune exists), but this information is not different in kind.

Scientists may also have the unique ability to *write*. My tentative theory, which I cannot here defend in detail, is that humans writing in the language of nature corresponds to technological innovation.²⁵ I find support for this view in two remarks by Berkeley: “general laws ... are by men applied as well to the framing artificial things for the use and ornament of life as to the explaining the various phenomena” (PHK §62; W 2: 67), and “by considering this doctrine of force, men are taught to frame engines, by means of which things difficult and otherwise impossible may be performed” (Alc 7.7; W 3: 295). Again, though science may vastly expand upon ordinary human capabilities, these capabilities are not different in kind.

Admittedly, Berkeley writes in TVV §7 (published in 1733) that “the characters of divinity are large and legible throughout the whole creation to men of plain sense and common understanding” (W 1: 255)—which seems to indicate that laymen are (or can be) literate in the divine language. My reply is twofold. First, although Berkeley knew that nature must contain a spoken discourse for the inference to divine providence to have any chance to succeed, he would have been under pressure to include written—language analogies given the extensive use of the book—of—nature trope in the theological background.²⁶ If and when he can do so without directly contradicting his purposes, it is unsurprising that he would—and at TVV §7, he is simply making introductory remarks about the need to address secular sophists as well as common folk. Second, there are additional aspects of the 1734 revisions to PHK which corroborate my interpretation and should overrule a single turn of phrase used in the interim. To these I now turn.

²⁵ For a related discussion, including discussion of humans *speaking* in the language of nature, see Mirarchi, “Berkeley's Doctrine,” 249–54; Turbayne, “Metaphysical Grammar,” 29; Dancy, “Berkeley, Descartes,” 14, and Pearce, “Semantics,” 256.

²⁶ For discussion of this background, see Bradatan, “*Liber Mundi*,” 68; Dana Matthiessen, “The Rise of Cryptographic Metaphors in Boyle and Their Use for the Mechanical Philosophy,” *Studies in History and Philosophy of Science* 73 (2019), 8; and Carla Rita Palmerino, “Reading the Book of Nature: The Ontological and Epistemological Underpinnings of Galileo's Mathematical Realism,” in *The Language of Nature*, eds. Geoffrey Gorham et al. (Minneapolis: Minnesota Center for Philosophy of Science, 2016), 34.

In the 1710 edition, §108 states that “a man may be well–read in the language of nature, without understanding the grammar of it,” and §110 states that “the best grammar of the kind we are speaking of [is Newton’s *Principia*].” In the 1734 edition, both lines are replaced. §108 now states that “a man may well *understand* natural signs without ... being able to say by what rule a thing is so or so,” while §110 states that “the best *key* for natural science [is Newton’s *Principia*]” (both emphases mine). At one stroke, Berkeley has done two things: he has replaced the only intimation outside of TVV §7 that laymen are literate (“well–read”) with one that they are merely fluent (“understanding”), and he has introduced a cryptographic term (“key”). I will address the significance of this term after looking at the changes to §66.

In the 1710 edition, §66 states that “to understand this language of the Author of Nature ought to be the employment of the natural philosopher.” The 1734 edition, in contrast, states that “to understand those signs instituted by the Author of Nature ought to be the employment of the natural philosopher.” Berkeley did not intend these changes to *water down* the language model, as Dancy suggests (“Berkeley, Descartes,” 17). Instead, consistently with the changes to §§108–110, he is carefully removing a turn of phrase that suggests that laymen do not understand God’s language. That scientists alone should be able to understand certain *signs* instituted by God is perfectly consistent with laymen being able to understand God’s language.

That Berkeley chooses to re-describe the *Principia* as a *key* is significant because it suggests he has been reading the alchemists in the interim.²⁷ Alongside the book–of–nature trope, cryptographical analogies pervade the writings of the alchemists—and in Francis Bacon we find the claim that “the results of investigation need to be written down, that ‘experience itself has to be taught how to read and write,’ that is, to become literate.”²⁸ Bacon is the lone alchemist (to my knowledge) to analogize scientific acumen to literacy, and although there is no definitive proof that Berkeley was reading Bacon in particular, it would hardly be surprising given how well–versed Berkeley was in the science of his day.²⁹

It is unclear how literally Bacon would have meant such claims. Jalobeanu states that it is “extremely tempting to give such claims a quasiliteral interpretation, transforming [the] experimental investigation of nature into a form of literary pursuit” (41), but he remains justifiably wary because Bacon has nothing to say about rules of grammar and syntax (63). Berkeley, however, does—and given the divine language model, he would have had

²⁷ Lest it be thought I hang too much on one changed word, note that Berkeley’s only other uses of “key” in a similar scientific context are at Alc 7.7 (W 3: 295–96), *The Analyst* §3 (W 4: 66), and S §245 (W 5: 117)—all of which are temporally consistent with a new development beginning with *Alciphron*.

²⁸ See Dana Jalobeanu, “The Marriage of Physics with Mathematics: Francis Bacon on Measurement, Mathematics, and the Construction of a Mathematical Physics,” in *The Language of Nature*, eds. Geoffrey Gorham et al. (Minneapolis: Minnesota Center for Philosophy of Science, 2016), 54.

²⁹ Apart from the occasional quotation, the only explicit mentions of Bacon are at NB 564 (W 1: 70) and Alc 6.22 (W 3: 264).

no compunction giving Bacon's analogies a perfectly literal interpretation. If he did, it explains these otherwise mysterious 1734 revisions in a parsimonious way.

IV. Conclusion: Reconciling the Two Discourses

Having accepted that Berkeley's language model contains two discourses, one written and one spoken, we may still wonder about the manner of their co-instantiation. Given that Berkeley is an immaterialist who denies that science describes any mind-independent reality underlying the world of manifest sense—experience—how could he consistently maintain that separately coherent discourses with distinct content are encoded in one and the same stream of sensible ideas produced in the minds of finite spirits by God?

The answer is unlikely to be found in Berkeley's own work, but I believe he has two main options: cryptography and steganography. On the one hand, a coherent message could contain additional encrypted messages revealed only upon the application of one or more appropriate keys. On the other hand, a coherent message could contain additional messages revealed only upon the application of a microscope. The former could be supported by Berkeley's 1734 conception of Newton's *Principia* as a key, while the latter could be supported by NTV §85: "a microscope brings us as it were into a new world [and] presents us with a new scene of visible objects, quite different from what we behold with the naked eye" (W 1: 206).

These possibilities must await further exploration, but they are not mutually exclusive—and both would be agreeable to Robert Boyle's analogizing of nature to "an excellent letter about several subjects, and to different purposes, whereof some parts were written in plain characters, others in cyphers, besides a third sort wherein both kinds of writing were variously mix'd."³⁰

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³⁰ Robert Boyle, "A Free Enquiry into the Vulgarly Receiv'd Notion of Nature" (1686), in *The Works of Robert Boyle*, eds. Michael Hunter and Edward B. Davis (14 vols.; New York: Routledge, 2000), 10: 569.