Writing as Discovery: Investigating a Hidden Component of Scholarly Method

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ABSTRACT

Numerous artists have commented that they are only partially aware of what shape their work will take, prior to creating it. This paper asks whether scholars and scientists are all that different in this regard. Is writing an academic paper or book really just a matter of "writing up" a set of pre-established results? Reporting on a pilot study towards a large-scale, interview-based exploration of the investigative dimensions of scholarly and scientific composition, the paper analyses its author's interviews with three leading academic authors: literary scholars Derek Attridge and Hannah Sullivan, and linguist Michael Hoey. All three confirm that the act of writing articles and monographs serves to generate ideas they had not realized they were working on, whether through the internal pressure of their concepts as they unfold, the happy finds of revision, or the influence of external agencies in the inherently social process of publication. A coda points to related findings in the sciences, suggesting that, far from ancillary, the act of writing papers constitutes a key plank of method in those disciplines as well.

KEYWORDS: *poetics, discovery, scholarly composition, literary studies, linguistics*

> There are some twelve extant drafts of the letter, written between 1957 and his death in 1962. This is typical of how Bohr wrote and approached physics problems as well. He would go over and

INTERDISCIPLINARY LITERARY STUDIES, Vol. 21, No. 3, 2019

DOI: 10.5325/intelitestud.21.3.0297

> over the same ground looking at things from different angles. The drafts are different attempts to get to the heart of what he wanted to say.
>
> —KAREN BARAD

A HYPOTHESIS FROM THE CREATIVE ARTS

"If you have a good idea for a poem, it isn't."

I am quoting from Don Paterson, who spoke to my colleague Kevin Brophy in St. Andrews in 2013. I worked with Kevin, Jen Webb, and Michael A. R. Biggs on the research project that sparked that encounter. Funded by the Australian Research Council over the years 2013–16, *Understanding Creative Excellence: A Case Study in Poetry* saw us interviewing 75 Anglophone poets from a variety of countries North and South, on a wide range of topics touching upon the broad theme of poetic judgment. Paterson's stark statement might, at first blush, sound like it was intended to discourage new beginners. Actually, Paterson was not speaking in discouragement at all. His repudiation of the notion that one might have "a good idea for a poem" was simply indicative of what he thinks a poem is: an improvised and provisional response to whatever is coming to light at that very moment. As Paterson put it to Kevin, later in the interview:

> A poem is almost a documentary record of an epiphany that has taken place in the course of its own making. . . . You have to come to the page with nothing, an urge to speak without really knowing why.

Paterson expresses it with uncommon panache, but the stance is in fact a typical one among poets, as the archive of 75 interviews to which I have just referred makes clear. I heard similar comments in a pilot study I conducted a decade earlier to that as well. Here, for instance, is how Australian poet and novelist Alison Croggon responded to a question I asked her in 2007, on the research that goes into her poetry:

> I usually have no idea what it [*my poetry*] will be and what shape it will have until I get to the end. It's very hard to research for something when you don't know what it's going to be. To take a broader view, and to think in terms of reading, writing, walking round, I'm

> researching all the time. Only I wouldn't think of it as research. I don't know what I think it is.

These comments are evocative of Paterson's "If you have a good idea for a poem, it isn't." Croggon, however, adds the interesting qualification that, even if the thinking in her poems only emerges in the moment, any such extemporizing will be informed by a background of prior cognitions. To put it axiomatically, you might say that we discover new ideas in the act of writing poetry because some other part of us has already been thinking on them.

Nor are poets alone in perceiving a close relationship between the act of articulating it and the discovery of just what it is one has to say on a topic. One might, for instance, recall novelist E. M. Forster's approving quotation of that curious critic of logic who insisted, "How can I know what I think till I see what I say" (Forster 1962, 101). There are cases from the plastic arts as well. Consider Francis Bacon, on the aleatory way his works emerge:

> You know in my case all painting—and the older I get, the more it becomes so—is accident. So I foresee it in my mind, I foresee it, and yet I hardly ever carry it out as I foresee it. It transforms itself by the actual paint. I use very large brushes, and in the way I work I don't in fact know very often what the paint will do, and it does many things which are very much better than I could make it do. Is that an accident? Perhaps one could say it's not an accident, because it becomes a selective process which part of this accident one chooses to preserve. (Bacon in Sylvester 1987, 16–17)

One could easily multiply instances of artforms where practitioners insist—like Paterson, Croggon, Forster, and Bacon above—that they uncover whatever knowledge or experience their artwork embodies in the very act of creating it.

The research project at the heart of this article was inspired by consideration of the sorts of materials I have just tabled. It takes the form of a question: If artists so commonly gain their first real sense of whatever knowledge or meaning their work has to convey in the very act of creating it, could something similar pertain to other areas of knowledge production? Might the act of writing one's findings down serve a similarly creative function for scientists and scholars?

The idea that academics across the disciplines might not know what they have to say until they have said it could sound curious. In fact, it would be downright crazy, were we imagining their knowledge to proceed from thin air. But what if we were to ponder the possibility that Croggon describes: that what comes unexpectedly to one in the compositional moment is the new thinking that one has on some level already been doing, about material already in some way familiar? Could it not also be the case that scholars and scientists come to know what they think, by seeing what they say, in relation to that pre-accumulated store of words and things? Might it even be, to bring Francis Bacon back into the equation, that the scholarly and scientific sentences and paragraphs in which we paint our descriptions of the world induce new understandings in us, even as we attempt to convey what we think we have to say through them? *I don't in fact know very often what the paint will do.*

With questions like these in mind I and my colleagues—novelist and creative writing academic, Lucy Neave, installation artist, film maker, and film studies academic, Ross Gibson, literary historian and playwright, Will Christie, and biomedical scientist and vaccine inventor, Yvonne Paterson—decided to generate some data on the heuristic dimensions of scientific and scholarly compositional practices. For while Richardson and St. Pierre's (2005) claim that such practices have a far more investigative component than a common wisdom would allow seemed to us intuitively correct, we felt the want of methodically generated material to show that this was so, how and to what extent. To this end we have drawn up a schedule of the questions we would like to ask a large group of scholars and scientists, in relation to their compositional practices. Our plan is to generate hour-long interviews with celebrated individuals from the six disciplinary silos of literary studies, critical theory, linguistics, business studies, physics, and biomedical science. We will ensure a gender balance and include both early career researchers and under-represented minorities among the numbers in each silo, our point in all these regards being to treat the technical and the social as modalities of one and the same field of practice, an enduring and important theme of science studies more generally (Peirce 1998; Latour and Woolgar 1979; Galison 1999; Barad 2007). The completed project will see us gather a corpus of 56 interviews, plus other supporting materials, the whole available online for others to explore and learn from. I leave undiscussed here the various measures we will take to triangulate the interviews, so as to avoid the problems reliance upon subjective self-report entails (Nisbett and Wilson, 1977; but cf. Petitmengin et al. 2013). Triangulation

is clearly necessary here, though it is worth adding that even just to learn in some methodical way what scholars and scientists *think* they are doing when they write will be an advance on current knowledge, given how "significantly undertheorized" (Aitchison and Lee, 2006, 265) the practices of professional academic writers actually are.[1]

This paper constitutes a small step toward that larger project. It reports on a pilot study which, though too small and specific in scope to provide any conclusive answers to our questions, nonetheless suggests a great deal, I believe, about where those answers might lie. But the value of the responses I will explore here is not solely a matter of whether the three distinguished professors I put questions to over February and March of 2018 stand as representative of myriad others (I suspect they are broadly so), or not. There is also the fact that all three of these authors have made profound contributions to our understanding of literary composition and language. In truth, they were less interview subjects than active theorists in these exchanges. What is more, they each confirmed what we set out to test, concurring that—at least as far as their own practice is concerned—scholarly composition is less the "writing up" of a set of pre-established results than an active mode of discovery.

WRITING AS DISCOVERY

The three scholars I interviewed were Derek Attridge, who is Emeritus Professor of English at the University of York, Michael Hoey, the Former Baines Professor of English Language at the University of Liverpool, and Hannah Sullivan, Associate Professor of English at New College, University of Oxford. Among their key works, as regards our theme of discovery, are *The Rhythms of English Poetry* (Attridge 1982), *Lexical Priming: A New Theory of Words and Language* (Hoey 2005) and *The Work of Revision* (Sullivan 2013). What emerged with strikingly clarity from all three interviews was the broad confirmation of our hypothesis that academic composition is a means of generating discovery in its own right.

I spoke to Derek Attridge in York on March 12, 2018. Attridge has written highly influential work on the philosophy of literature, is a world authority on both James Joyce and J. M. Coetzee, and a prosodist whose system of "beat prosody" dispenses with the concept of the foot, in the process dispelling some five hundred years of confusion on the workings of English meter. An initial question as to how much time he spends

writing each day (about five hours, if in a writing phase) led to a discussion of whether Attridge finds the practice of writing very intense. He showed me a watch his wife had recently purchased him, which has a timer function connected to a movement sensor. This mechanism serves to remind Attridge to get up and stretch, whenever he sits for more than 50 minutes in a row.

> I am always amazed. I think, "No, it's got it wrong, I can't have been sitting here for 50 minutes."
> I look at the time and it's true.
> Very few of the other things I do create this feeling of time just zooming by.

Responding affirmatively to my question as to whether this sort of immersive experience was a form of pleasure, Attridge replied that it is, but that he has more pleasure in revising than in coming up with the initial draft. I then asked about how he found the act of planning that initial draft. As one who aspires to achieving the clarity and logic of Attridge's prose, I confess to being quite astonished by what he said next:

> I am not one of the people who make a detailed plan in advance. It depends, of course, on the kind of project I am engaged in. But if there is a spectrum—which I suspect there is—between knowing what you are going to say beforehand, and discovering what you want to say while you are writing it, I would be very much on the discovering-while-writing-it end.

My surprise at this was, however, attenuated by the fact that Attridge always has a deep fund of research to draw on. His response to that opening question as to how much time a day he spends writing reflected this imperative to gather material, prior to any act of "discovering-while-writing-it." Often he will not be writing at all, but reading. The previous year he had, for instance, "spent several months at a research centre in the United States . . . just taking notes." The aleatory way whereby Attridge's researches settle into an argumentative sequence in the act of composition was nonetheless striking:

> I will certainly start a shorter project like an article with some ideas, and a few sketched notes. They will be about whatever reading I've

> done toward the piece. It might be new reading, or it might be reading that I did a long time ago. But I won't have the various stages of the argument mapped out. I will start writing, and as I do —if I'm lucky— where I want to go will become clearer.

Attridge discovers the various stages of his argument as he writes it.

I spoke with linguist Michael Hoey in the town of Faversham, county Kent, on March 9, 2018. Hoey's work is very different to Attridge's. Where the latter's work is outrightly qualitative, Hoey's has increasingly come to focus upon statistical analysis of very large data sets. One of his key corpora comprises 95 million words of news and features texts from the *Guardian* newspaper. Drawing centrally upon that corpus, Hoey invented a concept, lexical priming, that elegantly explains a mounting body of evidence (e.g., Hopper 1987, Wray 2002) that our linguistic choices are much more to do with the repetition of formulaic phrasings than with the exercise of grammatical rules. Hoey's theory has the added advantage of explaining the often-startling differences in language use between speakers of one and the same language, if there is indeed any such thing.[2]

It was intriguing, given the quantitative nature of the data he works with, to find Hoey confirming our hypothesis as to writing's generative function as well. One of the exchanges where that confirmation emerged was as follows. Hoey had been describing how his texts could get out of hand in the act of writing, to the point where he finds it preferable to rewrite whole paragraphs, rather than "simply fidgeting" with the sentences. I pressed him on this point:

> INTERVIEWER
> Does this imply that there are discoveries happening in the process of writing, things emerging that no longer fit into the frame you settled upon?
>
> HOEY
> Absolutely. That is happening all the time.

Asked to elaborate, Hoey replied

> Sometimes I will write something and think, "Yes, that seems true. Do I have the evidence to support it?" I will then go away and perform an analysis of some data, to see whether I'm right. Often too, in the act of drafting a writing, I will see a weakness there and think, "No, that's not getting it right, there's a circularity there, a sleight of hand." I will

> sense that something is missing. So I rewrite to see whether I can get the text to the point where the problem has dissolved.
> But usually it takes the form of thinking, "Wow, I hadn't actually seen that this line of thought was going to lead in that direction. Let's write and see where it goes from here, if I follow the argument through."
> Quite often, it will be that an analogy strikes me. I will use that analogy, and the more I explore it, the more it will open insights for me, which I then incorporate.

Writing's capacity to expose weak or missing links serves, on the one hand ("No, that's not getting it right"), to reveal insufficiencies in Hoey's understanding of the phenomena. On the other hand ("Wow I hadn't actually seen that this line of thought. . ."), the act of writing casts up ideas Hoey simply did not realize he had, and these serve to generate further understandings in turn. However quantitative the data he works with, writing for Hoey is far more than simply a matter of "writing up" what he has already found out. In his case too, composition is an active vehicle for discovery.

Allow me to point out two further features of this last quote. Firstly, note the curious agency embodied in Hoey's indication that when his writing surprises him with a new "line of thought" he will "write and see where it goes [*my bold*]." I am intrigued by the "it" here. In the run of Hoey's syntax, "it" could refer back to "the line of thought" mentioned in the previous sentence. But given the sentence boundary, the preposition might just as well refer forward, to "the argument" that forms the object of the subsequent clause ("and see where it goes, if I follow the argument through"). Alternately, a third possibility, one might hear something of an impersonal usage in this "it," as when one says "it's dark outside" or "it snows there." In his discussion of "the stream of thought," William James remarks that "If we could say in English 'it thinks,' as we say 'it rains' or 'it blows,' we should be stating the fact most simply" (James 1968, 22). I detect a hint of that impersonal usage in Hoey's formulation here. Secondly, note Hoey's reference to the way the act of writing will serve to cast up productive analogies. The wealth of literature on analogy's role in facilitating discovery will likely be familiar to the reader (e.g., Poincaré 1913, Koestler 1964, Ricoueur 1977) and ranges back, of course, to Aristotle (1984, 2252–56). The link between metaphor's heuristic dimensions and the act of unpremeditatedly generating metaphor in writing seems rather less established. Perhaps it is not merely that "it thinks" when one is writing intellectually, but that "it metaphors" as well. Obviously, I am speculating here.

I turn to Hoey's comments on planning. In one of the latter chapters of *Lexical priming: A New Theory of Words and Language*, he observes that "no one . . . ever composes, still less utters, a text, knowing in advance what the whole text will look like" (Hoey 2005, 115). Actually, this *obiter dicta* statement was one of the triggers for my requesting an interview. It was clear from that interview, all the same, that Hoey tends to have a fairly good idea of the broad outlines of his papers and chapters, prior to composing them. "I quite often write things in my head before I write them down," Hoey noted, explaining,

> I am not talking about the sentence structure. But I will have each of the propositions in my head, and know the way in which they are going to fit together. The job, when I sit down, is to turn those propositions in my head into something that reads fluently.

Interestingly, he feels no need to write those propositions down, prior to composing.

There is a second way in which Hoey's writings are premeditated, or rather, tried in advance. I am referring to the fact that he composes them, both orally and in writing, multiple times prior to publication. That is to say, he will often give chapters and articles their first run as seminar or conference papers. These might themselves be fully composed prior to delivery. But he will never read them out loud if they are, preferring to extemporize from notes, on the grounds that the speaker's need to interest a live audience will serve to test the interest and engagement of "the story" (his word, in relation to all those statistical facts) he has to tell. As he told me of the four chapters of *Lexical Priming* he composed in this manner, "The point of giving those chapters as papers was that it was a way to find the narrative." A further iteration of the compositional process is provided by the fact that when Hoey comes to write the publication version he will not actually directly transpose any sentences from earlier versions, preferring to compose from scratch, albeit with the experience of having recently delivered the same material high in mind. Though I cannot say more on the topic in this paper, the pertinence of oral modes of composition to what we will come to read as scholarly and scientific *writing* emerged as a strong theme in all three interviews.[3]

Though still active in their fields, Hoey and Attridge are both retired. Hannah Sullivan is much earlier in her career. That said, she already has

book publications with Harvard University Press (2013) and Faber (2018). We spoke in London, on February 26, 2018.

Sullivan has theorized that the radical newness of modernist fiction has less to do with innovations in the ways people like James Joyce or Ezra Pound wrote, than with innovations in how they revised their writing. She makes this claim on the basis of her investigations of the writers' drafts, and a closely linked study of changes in the technology of book production that, for instance, now gave authors the chance to review many more stages of proofs, and so revise further (2013). This emphasis on a significantly altered practice of revision offers us a far richer picture of the differences in literary style which modernism brought about. Sullivan has also won acclaim for a volume of three long poems, published just months before we spoke (2018). Though she clearly distinguishes these two modes of writing in her interview, on the grounds of the greater intensity verse composition demands, her description of how she composes the scholarly work was still strikingly redolent of how we have heard poets speak of such matters:

> I really do not plan what I am going to write at all. I do not even seem to be able to plan, actually, and it's not for want of trying. I am just not able to plan. Even if I do plan, I am not able to stick to the plan that I generate. I have found this with the free verse book I am writing. I tell myself that I am going to have a chapter on Whitman, a chapter on Wordsworth, that this chapter will do this thing, and that chapter will do that. As soon as I start to write it becomes clear that this chapter is not going to do what it is meant to do, it is going to do some other thing.

When I asked Sullivan later if she often finds new topics emerging in the course of a writing—topics she might want to put aside and deal with later—she replied that she does, but that much of the reason her chapters escape from her plans for them is that she can never resist incorporating those new ideas there and then. Again, the link between writing and discovering was clear.

Another interesting theme to emerge from my discussion with Sullivan concerned how institutions can act to inform one's research reports—in her case, by incentivizing a bolder set of claims. *The Work of Revision* began as a PhD thesis at Harvard but did not end there. Its introduction was, for instance, repeatedly vetted by her mentors, during her post-PhD work as an assistant professor on tenure track at Stanford. The book's second chapter,

on the other hand, was researched and written at the behest of the press. In fact, the book's larger thetic claims were arrived at in the process of performing these and other revisions in the years following its actual submission and passing *as a thesis*. Which is to say, once again, that the process of writing—in this case, rewriting—generated discoveries.

I asked Sullivan if she was happy with what had resulted from the various directives and prompts she received over that time.

> That is really hard for me to say. The whole book is so much a product of what other people thought it should be. That was not just because it was a first-academic-book. Even more specifically, it was a first-academic-book by an assistant professor at a very prestigious university where it is hard to get tenure.

Later in the interview Sullivan described how such expectations worked in practice. Her mentors at Stanford made it clear that the book had to be published by half-way through the pre-tenure period, to give it time to secure reviews, and at the same time

> they made it clear that the only thing they were looking for in reviews was that the work was "field-changing." That phrase constantly recurred. Clearly the only way for such a book to be field-changing would be for it to mount some very large claims about the field.

Ideally, this would not be a matter of being told what to do, so much as being pushed to make a more striking intervention. Actually, there were elements of being told what to do in Sullivan's experience of getting the book into print—hence the ambivalence above.

The multiply-authorial aspects of scholarly and scientific writing is another topic that will clearly bear much future investigation. I will simply note here that as far as the humanities goes the phenomenon would seem to be attenuated, but by no means at an end, from the point one attains one's first book, or for that matter tenure. Attridge pointed to just this fact, when I asked him how big a role feedback played in his compositional process. Stating that it depended on the topic, and that on certain issues, such as prosody, he will often "just have the confidence to write it and send it off," Attridge added, "There will always be an editor, at any rate. If it is a book, there are obviously publishers' readers as well. It will never appear exactly as I wrote it." The fact that the publication process turns one's research report

into a platform for interlocutors, authorities, and agents to meet, exchange ideas, and make judgments may well emerge as another key part of writing's role in fomenting discovery (at least when things are working productively). That would be to suggest that the publication end of writing facilitates discovery by turning the text into the site of a kind of mini-conference.

IMMERSIVENESS OF WRITING

For the remainder of this article, I will focus on one specific theme that emerged from the three interviews, to do with the immersiveness of the writing process. I hope it will be clear that I could have chosen many another theme from these three rich interviews. I focus on what the interviewees implied or told me about immersiveness of their process because of the fascinating way it refigures a familiar theme from the philosophy of science, to do with the way new insights are often achieved.

Recall Michael Hoey's indication that he frequently rewrites whole paragraphs, rather than "simply fidgeting" with the text. Recall too his tendency to write and speak multiple versions of a paper, rather than carry over bits of text from one to the next. Both these indications suggest to me a very involved compositional practice. The text cannot be fixed through the surgical strike of a well-chosen edit, or cobbled from multiple sources, because, I am presuming, those paragraphs come as part of a cognitive flow, that on some level has to be live if it is to perform as Hoey would like it to. Whereas Sullivan was explicit on the live, performative requirement of (one key aspect of) literary scholarship. Her explanation for why she finds planning problematic was personal, as we have seen above ("I simply do not seem able to plan"). But it was also crucially disciplinary. The wide-spread practice in Literary Studies of producing "close readings" of short passages of text is, she observed, inherently immersive and aleatory. We were discussing the way new ideas can arrive, even as you try to describe the ones you have already acquired.

> SULLIVAN
> I think that is because when you are doing literary criticism, so much happens in the act of close reading. You just don't know what will happen until you start writing. You find yourself focusing on a word. You look it up, and then you remember that it is in another poem. You end up writing half a paragraph on Donne. Which is not what you had in

mind when you started writing about a passage in Wordsworth. But then it might lead somewhere. . .

INTERVIEWER
You have just equated close reading with close writing. That intrigues me.

SULLIVAN
By "close writing," you mean. . .

INTERVIEWER
That when one is performing a close reading on say *The Prelude*, it's not a matter of writing down the thoughts you've long had on this passage, but much more a present-tense engagement with the lines.

SULLIVAN
I feel that is true. In a way, it is because you are engaging with someone else's material. You cannot decide that *The Prelude* should be about some particular thing ahead of engaging with it. All you can do—in some real-time sense—is to respond to that other writer's sophisticated, complex, and somewhat alien message.

Derek Attridge referred to the same phenomenon, though, interestingly, it was in his case connected with a sort of planning. However much he finds himself on the "discovering-it-while-writing-it end" of the spectrum, he actually does, he offered later in the interview, practice a sort of planning. It will involve arranging on his computer a set of the excerpts he would like to comment on. The sequencing will amount to a rough idea of how he sees an argument proceeding through them, and will typically be altered in the writing as well: either the sequence will change, or initially promising excerpts will drop out and new ones be added, all in response to what emerges in the writing. This form of "plan" serves, effectively, to platform and provide overall direction to a series of data-driven improvisations.

(Actually, I have used a similar process to compose this article, though in my cases the passages splayed out on the page with brief notes linking them were interview excerpts, plus the Forster quote, plus a note to self to find something apt from David Sylvester's interviews with Bacon, which I knew from passages I had read years ago in an article on repetition in a psychoanalytic journal (Pereira 2012) would have something likely to do the trick. I settled on the right quote after skimming through the first interview in the Sylvester volume, taking 20 minutes out at that point in the writing

to do so. Since typing it out above I have been more and more struck by a potential analogy between the agential power the very paint itself has over the images Bacon produces and these complex, scholarly languages we have forged over the years, with their occult power to demand new meanings of us, even as we simply try to put what we have found into coherent-sounding sentences, that might equally strike us as true. *I don't in fact know very often what the paint will do*. Consider too, at this juncture, Karen Barad: "writing is not a unidirectional process of creation that flows from author to page, but rather the practice of writing is an iterative and mutually constituting working out, and reworking, of 'book' and 'author'" (2007, x). I am tempted, in Bacon and Barad's light, to modify Schopenhauer's intriguing comment on the reason it is possible, as everyone knows it is, to read only a few pages of a volume and more or less to grasp the quality of the thinking to come. For him, this is because a writer's style, far from ancillary, provides an "exact impression" of "how he [*sic*] has thought" (1970, 203). A few paragraphs is often enough. The modification would hold that Schopenhauer is correct, style provides an "exact impression" of how writers have thought—but also of how they have allowed the ideas to be thought through them.)

My topic is the immersiveness of the writing process, as revealed by our three interviewees, and I want to push farther into that matter now. I hasten to underline, as I do so, that it was clear that all three of our subjects simply could not produce the writing they do without a background of massive prior and concurrent research. Croggon's quote on the prior work that goes into an albeit extemporized poem is again to the point. As Michael Hoey put it, when asked about whether writing constitutes a pleasure for him,

> That is true. I have never found writing to be punishing. The punishing thing has been the research that goes into the writing. One particular piece of research for *Lexical Priming* took me four days to complete. The outcome was one sentence. It was one sentence because the result could be reported in a sentence. I did not always enjoy that sort of work. Doing calculations on the number of lines displaying a particular phenomenon could sometimes take a very long time and be very tedious. But I always had pleasure in the writing. I found it interesting.

I underline the deeply researched aspect of Attridge, Hoey, and Sullivan's work, palpable throughout the interviews and, of course, their books, and I

remind the reader of their status as highly celebrated path-breaking thinkers as well, for the following reason. The material I want to adduce now simply does not fit into our hegemonic models of how reason proceeds (see Damasio 1994, 170–73, for a brief overview).[4] I am referring to something Derek Attridge told me in particular, but it felt broadly consonant with trends in Hoey and Sullivan's interviews as well.

I have in mind Attridge's acute response to a question Kevin Brophy composed five years ago for our work with the poets. It struck us as an important question to ask the scholars and scientists as well.

> INTERVIEWER
> What are the differences between you in the act of writing and you in the times between writing?
>
> ATTRIDGE
> I feel less present as a person, in a way, because of the feeling of giving myself over to the writing and the thinking. It has to do with that sense that time passes so quickly I don't realize it. I can't be the person that I usually am then, because I am usually very aware of the passing of time. I tend to wake up two minutes before an alarm goes off. If you were to ask me what the time is, I would usually know. But when I am writing, that person is gone. I am a different subject, someone who is only partially inhabiting this mental frame. The other parts are somewhere between me and whatever is happening in the writing.

Note this extraordinary idea of "only partially inhabiting this mental frame." Far from the familiar reference to the supposedly disembodied nature of writing, Attridge's phrase refers to the mind itself being somehow altered or even extracted from its everyday environments. What is this subjective state? I was intrigued by the idea that one might be "only partially inhabiting this mental frame" when writing and wanted to probe further:

> INTERVIEWER
> Could that be because one has to become so supple to the material, to allow it to speak?
>
> ATTRIDGE
> I don't know.
> I think, for me, it is bound up with getting the style right. Which is odd. It's not just the ideas. It is actually the language. Once I am

> inside the sentence, the rest of the world ceases to exist. I am in there. I am trying to make it work the way it wants to work. I was going to say "the way I want it to work." But it's not even like that. It is not me wanting it to—it is that the sentence is developing itself, and I want to make sure it gets exactly what it wants. It's a strange thing.

This almost makes composition sound like a form of witnessing. It is probably not clear from these specific comments, but elsewhere in the interview Attridge describes getting the words down as quite difficult and painful for him. He loves revising. My point is that whatever state Attridge is referring to, it is not quite trance.

His is not quite a description of witnessing, nor of trance, and yet it does make me want to go back to some of those famous cases in the history and philosophy of science, where great discoverers describe an insight coming to them in some sort of reverie, or altered state.

Some of these seem legendary, such as the idea that Descartes invented Cartesian co-ordinates when daydreaming about the location of a fly in his room. I have no source for that. More convincingly, there is mathematician Henri Poincaré's account (1913, 387) of how he drunk too much black coffee one night and in that heightened state discovered a class of Fuchsian functions. Poincaré also describes how a discovery about quadratic forms came to him after he had relinquished his researches on the topic in frustration, gone to the beach, and then, "with brevity, suddenness and immediate certainty," the solution popped into his mind while distractedly walking the bluff (1913, 388). More generally, Poincaré refers to his experience of "ideas coming to me in the morning and evening in bed while in a semi-hypnagogic state (1913, 390). Most famous of all, though, is chemist August Kekulé's report of the way the structure of carbon compounds came to him. The first time, it was during a reverie in his passage home on an omnibus in the 1860s. In that transient state, looking out at the passing town at dusk, Kekulé had a vision of atoms joining together and forming in "a giddy dance. I saw how the larger ones formed a chain." So, he then reasoned, must the compounds (Goldstein and Goldstein 1984, 281). Even more celebrated is Kekulé's report of how while dozing by a fire he dreamed of atoms "twining and twisting in snakelike motion" till one actually proceeded to seize its own tail. The atoms had taken the form of the *ouroboros*, the figure of the snake eating its own tail that appears gloriously embossed in the gold surface on Tutankhamun's tomb. On awakening, Kekulé realized that he had dreamt up an analogy for the benzene molecule, which he at that point gathered must take the form of a ring (Goldstein and Goldstein 1984, 282).

To take on board Poincaré's specific definition of mathematical invention —"the mathematical facts worthy of being studied are those which by their analogy with other facts, are capable of leading us to the knowledge of a mathematical law" (1913, 386)—is to realize that his stories of discoveries proceeding from altered states are, just like Descartes and Kekulé's, stories that concern the "semi-hypnagogic" generation of illuminating analogy. Here I return to Michael Hoey's observation that one of the key things that comes to him in aleatory fashion while composing his research reports are felicitous analogies. Our other two interviewees did not speak in terms of analogy. But as we have seen, they certainly described instances of immersion in a process of writing that can lead to happy finds. Could it be, thinking the parallels between their and Poincaré and Kekulé's comments through, that there is something "semi-hypnagogic" and imaginatively generative about writing itself?

What is this state of mind, "only partially inhabiting this mental frame," the better to get to the truth of where one's sentence wants to go?

What, most mysterious to me, gives articles and even books their coherence through all these micro-acts of successive, sentential composition? Is a book's consistent message simply a matter of an overarching conscious commitment (perhaps via successful revision, perhaps due to a successful plan)? Or does it point to something more deeply consuming in the relation of self and world?

CODA: WRITING IN THE SCIENCES

Attridge referred to the likelihood of a spectrum "between knowing what you are going to say beforehand, and discovering what you want to say while you are writing it," and located himself, as we have seen, "very much on the discovering-while-writing-it end." Other humanities scholars we have spoken to informally have postulated some such spectrum as well, and proceeded to suggest it is most likely to involve scientific authors at the "knowing what you are going to say beforehand" end, humanities scholars there at the other. I hasten to add that Attridge made no such claim of the spectrum he postulated. But others have suggested that things would play out thus. Obviously, we still need to gather the data. But allow me to offer in parting that I think it unlikely to be the case that scientific composition will emerge as a more or less transparent practice of reporting on results the scientist (or more typically, the scientific team) have already discovered.

Certainly the scientists who participated in Larry D. Yore, Brian M. Hand, and Vaughn Prain's study of scientific writing practices adhered to an instrumental, representationalist account of their practice, when it came to filling out a multiple-choice survey on the matter. Yore, Hand, and Prain's 17 subjects overwhelmingly subscribed to the idea of science writing as a form of "knowledge telling" rather than "knowledge building" in that forum (2002, 672). Yet many of these scientists admitted, when pressed on details in subsequent interviews on the topic, that they regularly started writing prior to the end of experimentation to bring clarity to what they were trying to achieve, and that collegial input at the review stage actively changed findings. The reason for their initial reticence on the matter is not hard to find. For a scientific report may be taken as "presenting a creative achievement but is not itself taken as a creative achievement" (Holmes 1987, 220).

I have just cited from medical historian Frederick Holmes. The interesting thing here is that Holmes, having made this convincing observation on how scientific writing tends to be received, proceeds to problematize that common understanding in terms of his archival investigations into the drafting of chemist Antoine Lavoisier's scientific papers. Holmes demonstrates, for instance, that the first three drafts of Lavoisier's "Experiments on the Respiration of Animals and on the Changes which take place in the Air in Passing through the Lungs," which was published in the *Mémoires de l'Académie des Sciences* in 1780, contained a theory fundamentally different to that which the final version espoused, though based on the very same facts. Holding that oxygen is absorbed by the lungs and *replaced* by the carbon dioxide we breathe out, without any necessary passage from one to the other, Lavoisier's third draft ended with the triumphant assertion "I believe that the theory of respiration has been established." The assertion disappeared from the fourth draft, while the fifth and sixth brought forth with increasing prominence a view much closer to the one we hold today, viz. that oxygen is *converted* to the carbon dioxide we breathe out. In Holmes's precis,

> Lavoisier apparently acquired some of his crucial insights in the process of writing out his ideas. . . . [T]he new developments were consequences of the effort to express ideas and marshal supporting information on paper. (Holmes 1987, 225)

Lavoisier is often held up in popular sources as "the father of modern chemistry," among other reasons for the part he played in turning the discipline

from a qualitative to a quantitative science, through his pioneering work in the measurement of chemical reactants and products. Holmes argues that a fair component of the discoveries upon which this reputation is based came about in the act of writing, the sorts of modifications sketched above being discernable in numerous cases through the Lavoisier archive.

It is, of course, the case that scientific writing has changed vastly in the years since Lavoisier, including, among other changes, through the eradication wherever possible of inherently open-ended linguistic features like metaphor, in favor of those "syntactically simple sentences," packed full of abbreviations and "complex noun phrases with multiple modifiers" (e.g., "a DNA-Soluble RNA Hybrid"), that over the twentieth century have come to provide the benchmark of scientific style (Gross et al. 2002, 168, 167, 11). Arthur Gross, Joseph Harmon, and Michael Reidy further qualify the contemporary scientific noun phrase as "rigid enough in denotation to designate consistently an entity that is a permanent part of animate nature" yet—an interesting qualification—"flexible enough to incorporate . . . new meanings" as discoveries arise (26). Though open to new signification in this fashion, such phrases minimize the sort of productive, connotative leakage poets aim for in their metaphors, and in doing so allow scientists "to communicate common patterns well below the surface of the often-misleading impressions of the senses" (3). I note, relatedly, quantum physicist Karen Barad's salutary critique of the pitfalls analogical reasoning can lead to, in favor of more precise attempts to name the "intra-actions" between bodies (2007, 4–6, 23–24, 94).

Actually, Holmes identifies cases of discovery-by-writing among practitioners of this more recent style of scientific writing as well. They include Hans Krebs, who gained the 1953 Nobel for his discovery of the Krebs cycle. Of the papers that communicate those discoveries, Krebs told Holmes,

> I spent a lot of time on writing, but usually while the work was still going on. And I find in general only when one tries to write it up, then do I find the gaps. I cannot complete a piece of work and then sit down and write the paper. (Krebs in Holmes 1987, 226)

It may well be that scientists are far more dependent on "discovering-it-while-writing-it" than we (and in some cases they) at first blush imagine. In fact, and intriguingly, the majority of the scant literature concerning writing's role as a component of method comes from studies of the sciences.

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NOTES

1. There are, of course, numerous how-to guides, across the disciplines. There is a plethora of prescription. What we lack are methodically produced descriptions, particularly as regards the possibility that academic research writing might generate discoveries in its own right.
2. It seems worthwhile—given readers are likely to be less familiar with Hoey's work than Attridge or Sullivan's—to provide a brief explication of how the argument of his most celebrated work, *Lexical Priming: A New Theory of Words and Language*, proceeds. I offer this summary as backdrop to my article, but I also have in mind the interest these ideas could have for readers engaged in questions concerning poetic diction (see further, on this specifically, Hoey 2007). The term "lexical priming" refers to the fact that the speaker of a given language will tend to associate certain words or phrases with other words or phrases. So, if the topic of our discussion is "the environment," I will be *primed* by my reading, by the media I listen to, and the various conversations I engage in, to have strings like *melting* + *polar* + *ice* + *caps*, *coral* + *reef*, and *mitigating* + *global* + *warming* at my beck and call. Further, I will be primed to feel that a phrase like "mitigating global warming" sounds natural, while a semantically similar phrase like "dropping global warming" seems unnatural. I will certainly understand someone—a foreigner, say—who refers to "the importance of dropping global warming," just as I will understand him or her when they tell me the time is "half-an-hour before five." But the words will sound a little off-kilter all the same. Likewise, I will know that *an* + *eating* + *disorder* go together to make a natural-sounding phrase, but that "an eating disease" sounds wrong. Words that can be shown likely to combine in given contexts are called "collocates," and the phenomenon as a whole is called **collocation**. One is primed by one's reading, education, class, and so forth to collocate particular words and phrases with other particular words and phrases. Whereas strangers to any given field utter shibboleths. Hoey also treats the phenomenon of **colligation**: this refers to the way particular words will tend to be found in the presence of particular grammatical structures. For example, there is a strong colligation for almost all English speakers between verbs of perception like *see*, *hear*, or *notice* + a pronoun / noun + a present tense participle ("I noticed him walking away"; "I heard Pavarotti singing." Whereas a foreigner might say "I noticed him to walk away"). Actually, the analysis goes further: grammatical structures are themselves ultimately just

collocated sets of sounds, from Hoey's perspective. Evidence as to collocation and colligation is drawn from statistical study of the massive corpora of spoken and written language that have become an ever-increasing part of linguistic study since the 1960s. Hoey himself works with a corpus of some 95 million words. The consequence of analysing patterns of usage across such massive data sets has been to undermine the idea that we all carry a more or less fixed set of rules in our heads ("the grammar of the English language"), through which we process the lexis (vocabulary). Rather, according to corpus linguists like Hoey, we process in terms of received patterns of collocation, colligation, and so forth, first and foremost. Effectively, the tradition Hoey is at the forefront of accords vocabulary primacy over grammar. What his psychological concept of lexical priming brings to the table is a simple mechanism for this to occur, with huge philosophical consequences. For if each of us carry around bundles of primings specific to our education, our current reading, our professional practices, and so forth (and grammar itself is really just a more—but never totally—generalized version of this same phenomenon), this is tantamount to suggesting that the English language does not really exist. What we have rather are many, many clusters of natural-sounding phrasings, with differing amounts of mutual intelligibility between them, within the vague zone we refer to as the English language. But actually, your English will never be entirely same as anyone else's, not even within your very own family. Hoey's work tied all this machinery together and connected the individual subject to it to boot, via a single concept. Each of us has a different set of "lexical primings."

3. Another side of this concerns something I will call, for lack of a better phrase, *publicly hearing* one's writing. I have in mind Attridge's comment that "the act of presenting . . . suddenly makes things apparent" that need fixing. Attridge was not speaking of the feedback he receives at seminars and conferences, but rather alluding to the fact that presenting work in public places seems to allow one to hear oneself more critically. Hoey, similarily, noted that even though delivering papers plays for him the key compositional role discussed above, he only rarely receives the sort of feedback that will lead him to make direct changes. Again, it is much more about getting a sense of how the work sounds to him, when he hears it publicly. I was first attuned to this phenomenon in my discussions with poets. Here, for instance, is how the late C. K. Williams described the matter, in an interview we conducted in Manhattan in 2013: "I never consider a poem done until a friend has seen it and put that extra glare of light on it. It's a very strange thing—as soon as you give the poem to someone else, even before they read it, it shifts a little, it becomes slightly something else from what you thought it was, and you begin to look at it in a slightly different way" (Williams 2016, 94). For Williams too, publicly hearing the work was part of the process of composing it.
4. Note too, somewhat to the side of the questions of processing Damasio surveys, our general failure to incorporate the fact that we are almost always assaying the products of *an act of writing*, when estimating the nature of a philosopher's

thinking. The albeit at times dissatisfactory Schopenhauer essay "Books and Writing" cited above provides a rare exception.

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