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The grammars of the system: Thomas Pynchon at Boeing

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ABSTRACT

The present essay sketches, on the basis of new archival research, the general contours of Pynchon's contributions to the *Bomarc Service News*, asking, especially, how his work for that publication might have intersected with his literary work in the sixties. Looking at Pynchon's prose quantitatively helps us to see the author's grammatical tendencies, an economy of prose, so to speak, that allowed him to function within the Boeing-USAF communications system while maintaining an original style that his contemporaries at Boeing remember well. Pynchon's work for Boeing evidences in greater frequency than his peers' several grammatical features we might consider to be hallmarks of prose fiction – most notably the use of personal pronouns and active verbs. One of Pynchon's contributions to the *Bomarc Service News*, in other words, was a narrative voice that inculcated confidence and engagement in readers amidst the complex and exacting work of maintaining a continental defence system. This synthesis of personnel and technological apparatuses was key to Boeing's innovation in large-scale systems integration, but it also factored importantly Pynchon's narrative development, and in closing I look briefly at how the grammatical economies of *V.* (1963) and *Gravity's Rainbow* (1973) might have been influenced by Pynchon's work for Boeing.

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A tiny blurb in the bottom left column of Boeing's internal newsletter *Boeing News* announced, on 6 February 1964, that 'ex-Boeing writer' Thomas Pynchon had won the William Faulkner Award for his first novel *V.* (1963).[1] About a month later, editor Kenneth Calkins published the following letter from a structural engineer working on the Saturn V S-IC rocket at NASA's Michoud Assembly Facility in New Orleans:

> *To the Editor:*
>
> Psst! The best antidote for Thomas Pynchon's best smelling 'V' that I've found is 'Anthem' by Ayn Rand. No doubt other readers of your Mr. Pynchon's migraine bait would be grateful for the relief.

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> It's not hard to guess that those Faulkner Award judges thought 'V's' merits transcend those of Caligula's first novel. But for the life of me I can't guess how they translated Mr. Pynchon's last sentence on page 94 of 'V': 'At rest the body is assumed exactly into the space of this vantage'.
>
> Can you tell me, Mr. Editor? The consensus in our office is that the type-setter forgot a whole line of type between the 'the' and 'space'.
>
> Profanely speaking, of course,
>
> Alan E. Green, 5-7510
>
> New Orleans, La.[2]

Calkins replied briefly that the sentence in question was either indeed a typographical error or an instance of 'mysticism', which he called 'an acceptable writing ploy'. 'When Mr. Pynchon wrote for the *Bomarc Service News*', Calkins continued, 'he used the language of the trade. I suspect he still does. But it is a different trade –'.

A different trade, indeed. That Pynchon worked for Boeing from 22 February 1960 to 13 September 1962 earns frequent but passing mention in assessments of the novels.[3] It is commonplace to note that the *nonpareil* creative expositor of the military industrial complex in the postwar era had first-hand knowledge of the very system he so brilliantly over the course of a long and successful career has continued to deconstruct.[4] But how much do we really know about Pynchon's work for Boeing? The answer, as with many details of Pynchon's personal life, is not much. The purpose of this article, then, is to unpack some of the details of that work, to consider how that work fit into a burgeoning defence-contracting empire, and to re-evaluate how Pynchon's work for Boeing might have inflected his fiction writing, for the relation between the two is not so straightforward as one might at first suppose.

Already Green's letter – pitching Rand's ultra-conservative novella against Pynchon's subversive quest and casting the novelist himself as degenerate and, worse, a grammatical incompetent – begins to reveal a complicated engagement with *V.* and with the company that employed its author as a staff writer. Green underwrites his authority as a critic by playfully prescribing the 'antidote' parodied by the novel's fascistic Mafia Winsome, and by citing a sentence – 'At rest the body is assumed exactly into the space of this vantage' – that is in fact hard to parse on the level of grammar and figure.[5] Green knows how to build a more or less consistent metaphor, from 'antidote' to 'migraine' to 'relief'. The Saturn V engineer demonstrates through literary detail his competence as a moral and aesthetic judge. More notably, perhaps, the editor responds in kind. He demonstrates familiarity with Pynchon's prose, literary and technical, and he points out that the conventions of each follow different 'trade' rules. In recognising writing – be it

avant-garde imaginative writing or technical prose – as trade labour, Calkins distances Pynchon's experimental fiction from his work for the contractor, defending the author's right to express himself while ironically deferring to Green's Randian bootstrap capitalism.

This brief exchange in the *Boeing News* gestures toward the uneasy relationship between literary writing and technical work in the postwar period. That Pynchon's award should have been announced modestly in a corner of Boeing's newsletter comes as no surprise. But the fact that a *Boeing News* editor defended Pynchon's fiction – while distancing it from his writing for the company – exposes an ambivalence at the heart of writerly work in a period where many would-be authors paid their dues in the professional realms of business writing, advertising, public relations work, technical writing, and coding. Just as Boeing employees wondered at the ambitions and abilities of a young staff writer turned avant-garde novelist, so literary writers expressed anxiety about, as Gore Vidal once put it, being forced to 'turn to the fantasy world of business and get a job' lest they perish.[6]

In fact, the Whole Sick Crew in *V.* fictionalises just such an ambiguously aspirational creative class. 'Raoul wrote for television', Pynchon tells us, 'keeping carefully in mind, and complaining bitterly about, all the sponsor-fetishes of that industry' (52). Slab paints expressionistic cheese Danishes tinged with nihilism. Like Pynchon's Cornell friend Richard Fariña, Melvin wants to be a folk-singer.[7] 'The pattern', Pynchon continues:

> […] would have been familiar – bohemian, creative, arty – except that it was even further removed from reality, Romanticism in its furthest decadence; being only an exhausted impersonation of poverty, rebellion and artistic 'soul'. For it was the unhappy fact that most of them worked for a living and obtained the substance of their conversation from the pages of Time [*sic*] magazine and like publications. (*V.* 52).

Pynchon's characters, like his friends and literary contemporaries, balance artistic aspirations with mundane work, some of it on the borders of useless aestheticism, here of course spoofed by the general uselessness of the Whole Sick Crew but compromised nonetheless by the boring necessities of labour. Those boring necessities, utilitarian and task-oriented, entail for Pynchon working within the confines of increasingly fantastical apparatuses of destruction and control.

The group of writers for which Pynchon is but one emblematic figure – William Gaddis, Don DeLillo, Robert Coover, Richard Powers, William T. Vollmann, to name a few – gathered writing experience in forums other than the literary and in languages other than the highly aestheticised prose of the now-canonical postmodern novel. These 'technomoderns', as Mark McGurl calls them in *The Program Era* (2009), engage postwar media and

technologies not just through imagination but also from within the systems about which they write: Gaddis at IBM; DeLillo at Ogilvy and Mather; Coover in the CAVE Simulator; Powers as a freelance programmer, Vollmann in a rising Silicon Valley.[8] But the importance of business writing, technical writing, and other technical work like programming to the formation of the postwar 'systems novel' has not been explored to the full extent of its promise.[9]

We regard the systems novel, in most instances of its appearance, as a cultural symptom and an abstraction. The systems novel is corollary to postwar communications infrastructure and theory; to post-Fordist economic development and financialisation; to the burgeoning 'cognitive capitalism' of the neoliberal contemporary. Tom LeClair describes systems theory in the abstract as 'a source of ideas and language' for novelists like John Barth, Gaddis, Pynchon, Coover, and of course DeLillo.[10] But LeClair's characterisation, influential as it has been, underemphasises the empirically demonstrable connections between the postwar systems novel and the technical apparatuses of postwar systems themselves. In leaping to worldviews and theories, we skip over the minute, but indefatigable ways writers negotiated the systems in which they worked every day. The traces of those negotiations inevitably affect postwar writing in ways that go beyond the thematic or the abstract. In the case of Pynchon, I argue that working for Boeing impacted his writing at the level of the sentence. That is to say that working at the heart of the system may have systemically altered the grammars of Pynchon's subsequent creative expression.

In what follows, I will explore the nature of Pynchon's work for Boeing. Methodologically, this essay is somewhat unconventional in that I track the grammars of Pynchon's technical writing through computational analysis, depending on authorship attribution software to discover the most telling features of Pynchon's technical prose. But this is not, in the end, a data mining project, and I also describe here how the publications for which Pynchon wrote fit into the complex logistics of the Bomarc missile system. At Boeing, Pynchon developed a fairly particular style, marked by elegant plain language explication, by narrative voice, and by a clear understanding of the human labour upon which the frighteningly impersonal military industrial complex was built. The practices Pynchon honed at Boeing fostered, in turn, reflection in *V.* on the technics of narration and on the power of empathy. In *Gravity's Rainbow* (1973), he redeploys those practices in devastating critique of the defence industry writ large. To conclude this essay, I describe how the grammars of the system give us new insight into the systems novel not as mere symptom or abstraction but as a concrete engagement with the languages and styles of Boeing's house organ prose.

1. Paranoid biography

No one knows for sure what Pynchon did at Boeing.[11] In 1976 David Cowart interviewed Walter Bailey, one of Pynchon's colleagues at Boeing, who reported that he had worked with Pynchon in the 'Minuteman Logistics Support Program' and that Pynchon 'would shroud himself in the enormous stiff sheets of paper used for engineering drawings and work within this cocoon, like an aerospace Bartleby'.[12] Cowart codes Pynchon's technical-writing career as a cypher, two and a half years shrouded, like Pynchon himself, in privacy. Richard Lane, even as he published 'for the first time' Pynchon's listing in the 1961 Boeing telephone directory on his (no longer live) website *The Pynchon Files*, emphasised secrecy and obfuscation: 'Boeing have denied that Pynchon was ever an employee, since they can find no records'.[13] And Larry Daw, on the also defunct *Spermatikos Logos*, describes Pynchon as 'a high-tech monk in a Boeing Corporation scriptorium, composing technical documents and performing the writing thereof'.[14] The mysteriousness of Pynchon's Boeing work becomes fodder for all manner of speculation about what the author may have contributed to the defence contractor, and what he may have taken away.[15]

Steven Weisenburger, whose *Companion* to *Gravity's Rainbow* remains one of the most essential resources for readers curious about the technical and cultural materials of Pynchon's *oeuvre*, provides perhaps best example of a critical analysis that makes Boeing central to the story we tell about Pynchon's work. 'The ethical and critical implications of Pynchon's Boeing writings were, and are, significant', Weisenburger writes, suggesting that the writer's understanding of the 'ordinary bureaucrats' charged with building and maintaining weapons of mass destruction produces the 'conscience' of his relentless interrogation of the military state.[16] Weisenburger directly identifies Pynchon's experience at Boeing with the 'middling men' of his novels (p. 46). At Boeing, Pynchon had been 'a cog in the US war machine'; he had '"interfaced" with guided missile engineers and technicians'; he had 'translate[d] their top secret "work-product" for ordinary usage'; and he had thus become 'inescapably complicit with the bureaucracy of mass destruction and terror'. Weisenburger's assessment of how Pynchon's own 'humdrum labors' at Boeing might have inflected the themes and figurative registers of his fiction challenges us to discover in more detail the precise nature of that work.

It is hard to argue with Weisenburger's assertion that Pynchon might have first encountered the V–2 in the Boeing 'scriptorium' (to borrow Daw's evocative phrase), or that the Bomarc missile itself was 'eerily similar to the A–9 that Nazi engineers built to bomb New York' (p. 45). Still, in paying closer attention to the kind of writing Pynchon produced at Boeing – specifically its stylistic characteristics and grammatical markers – we deepen our

understanding of at least one of the ways extra-literary work informed the fiction of the postwar era. Pynchon's work for Boeing should be considered not only as thematic source material for his critique of the real world Cold War rocket state. It should be read, too, as a window onto how technical writing within military-industrial systems developed to accommodate increasingly layered complexity as systems integration became the defence industry's most pressing logistical problem.[17] Ironically, Pynchon turns the grammar of systems integration in on itself, redeploying the deadpan prose of the company man to critique twentieth-century genocide and impending total war.

While at Boeing, Pynchon is listed as having worked on two publications, the *Bomarc Service News* (*BSN*) and the *Minuteman Service News* (*MSN*), and he likely wrote as well a handful of articles for other trade publications like *Aerospace Safety*, *Approach: The Naval Aviation Safety Review*, and the *Aerospace Accident and Maintenance Review*.[18] Most of his writing, as Adrian Wisnicki has suggested, probably appeared in the *Bomarc Service News*, and there is scant evidence that he actually produced anything for the *Minuteman Service News*, though company records show that he was briefly assigned to that unit. In what follows, I will focus on the Bomarc writing, in part because it comprises the most robust archive and in part because access to the Bomarc archive is less restricted, since the missile was decommissioned in 1972 (Minuteman will remain in service until at least 2030). So what was the *Bomarc Service News*?

2. The *Bomarc Service News*

The *Bomarc Service News* was the informational publication supporting the Bomarc Service Program administered at first by Boeing's Pilotless Aircraft Division and, later, by the Aero-Space Division in support of the IM-99A/B Bomarc missile jointly developed by Boeing and the Michigan Aeronautical Research Center (MARC) for the United States Air Force. The first Bomarc went into operational service on 19 September 1959 with the 46th Air Defense Missile Squadron (ADMS) at McGuire Air Force Base in New Jersey, and Bomarc became Boeing's first mass-produced missile and the company's first foray into large-scale systems integration.[19] In April 1959, following the assignment and activation of the ADMS in March, Boeing published and distributed the first issue of the *Bomarc Service News*.

The publication was designed as what Vice President and General Manager of the Pilotless Aircraft Division Lysle Wood called a 'semi-technical' support manual to facilitate easier liaising between Boeing's trained Technical Representatives and the Air Force servicemen tasked with operating and maintaining the Bomarc missile.[20] Wood described the publication as an essential component of Boeing's support programme to the Air Force, emphasising

its supplementary role in relation to official USAF and Boeing technical manuals. 'The primary objective', he wrote, 'is to furnish advance technical information and general information not covered by official publications' (p. 3). In a comprehensive introductory pamphlet to the Bomarc Service Program, the *BSN* staff writers gesture toward the 'small library of books' attendant to a 'modern weapon system', establishing Boeing as the key manager of the 'thousands of pages of technical information' necessary to the effective and reliable operation of the Bomarc missile.[21] The *Service Program* brochure emphasises the Bomarc system's logistical delicacy, underscoring the entire weapon system's dependence on intricate 'relationships among men, machines, and operating environment' (p. 19). The *BSN* was an essential communications conduit, then, linking contractor and military operators in the collaborative administration of a defensive weapon system that demanded increasingly complex logistical coordination.

We should see the *Bomarc Service News* as an organ self-consciously situated within the communications networks linking Boeing as a service provider (not just the manufacturer of a product) with the United States Air Force and, more broadly, with the defensive strategists of the democratic west. It was produced collaboratively, though writers were given a fair amount of individual agency.[22] It demanded close attention to the ways technical details impacted larger systems. And it carried behind its imperatives to reliability, maintainability, and cooperation – some of that publication's most important keywords – the possibility of nuclear war and of total annihilation. This threat, in the pages of the publication itself, is always downplayed, always second to the practical measures necessary to ensure the defensive system's effective operation. Rather than looking to the ways in which a thematic of mass destruction finds expression in Pynchon's novelistic work, then, I suggest that we might also explore Pynchon's local writing practices at Boeing, practices designed to make complex logistical dynamics legible to the service personnel who were among his earliest readers. For those practices, too, find expression in his novels.

3. Pynchon's *Service News*

Thomas Pynchon, having followed Cornell friends Mary Ann Tharaldsen and David Seidler to the west coast on a $500 Lippincott advance for *V.*, was hired at Boeing on 22 February 1960, after a brief and unsatisfying stint loading goods in a warehouse (Kachka). Pynchon finished *V.* eighteen months after securing his contract, quit Boeing a few short months later, and took the remaining $1000 of his advance to Mexico.[23] Tharaldsen, an illustrator for Boeing research and development at the time who helped to secure Pynchon's job in the writing department, recalls him being 'tired and depressed' during his tenure there.[24] Neither of the publications to which Pynchon was assigned

includes article by-lines, and Boeing did not maintain detailed records of drafting and editing, so the question, again, of what precisely Pynchon wrote for the publications has been a matter of speculation and debate.

In his survey of Pynchon's possible contributions to the *Bomarc Service News*, Adrian Wisnicki confidently attributes 22 articles to Pynchon and identifies another ten that seem to be good candidates. Wisnicki draws his criteria for authorship attribution from the single unquestioned example of Pynchon's technical writing 'Togetherness', which appeared in the December 1960 issue of *Aerospace Safety*. The by-lined article exhibits a number of features Wisnicki identifies as hallmarks of a style 'characterized by free use of the second person, by frequent shifts of narrative register, by surprising connections among arcane facts, by occasional literary references […], and by a conversational/instructive tone' as well as by 'bullet-point arrows', em-dashes, ellipses, scare quotes, semantic argument, etymologies, beer jokes, and cheeky reference to Air Force Technical Orders as 'the bible' or 'the Book' (20, 22).[25] Wisnicki also notices that articles bearing some or all of these features tend to focus on the themes most intimately tied to the publication's mission. Taking Wisnicki's scholarship as a starting point, we can now with the help of computational analysis ascertain in finer detail the most identifiable features of Pynchon's non-fiction prose, 'reading' tens of thousands of low-level features (a) to determine authorship more confidently and (b) to describe with greater certainty the most telling features of Pynchon's technical writing.[26]

Using an authorship attribution algorithm, I analysed the *Bomarc Service News* to construct a less thematic and more structural description of Pynchon's writing style in these documents.[27] Authorship attribution software uses supervised learning to construct stylistic profiles on the basis of a training corpus comprising documents of known authorship. In this case, I transcribed six articles published in the *BSN* prior to Pynchon's employment at Boeing and five nonfiction prose essays known to have been authored by Pynchon to define two sets of stylistic characteristics, one that could not have been Pynchon and one that definitely is (Appendix 1).[28] I then tested twelve *BSN* articles of unknown authorship against my training set (Appendix 2). Eight articles out of the twelve are closely correlated with Pynchon's other nonfiction prose. They are: 'Environmental Protection', 'Hydrazine Tank Cartridge Replacement', 'The Mad Hatter and the Mercury Wetted Relays', 'MIU Plug Problems', 'Soldering', 'Torquing' [*sic*], 'The Trouble with Safety is … People!' and 'Vibration Testing'.[29] Two articles Wisnicki strongly identified with Pynchon for thematic reasons – 'Maintainability, Part 2' and '"Teflon" in Depth' – did not strongly correlate with the authorial signature of his other non-fiction prose according to the algorithm, nor did two weakly identified articles – 'Analog Simulations' and 'Telemetering: Recovery, Recording, Reduction'.

Computational attribution algorithms mine low-level stylistic characteristics – letter distribution, part-of-speech (POS) distribution, word frequencies, n-grams, and so forth. Typographical features like em-dashes, bullet points, and even quotation marks – are scrubbed from the text in pre-processing, so they are not among the features used to distinguish authors in computational stylometry. Neither does the algorithm recognise high-level features like anecdotes, etymologies, figurative language, or literary allusions. Themes – like the general topic of 'Maintainability, Part 2' or like the history of Imipolex G's real-life antecedent, DuPont's Teflon – only become significant insofar as they determine the lower-level frequencies under analysis. What computational stylometrics give us instead is an authorial signature defined by details that are difficult for human readers to discern. But they are not entirely illegible.

By identifying a few key features – those ranked as significant by the algorithm itself – we can start to pin down an authorial signature that goes beyond letter frequencies and n-grams and that begins to tell us how the grammar of Pynchon's technical prose differs from that of his Boeing colleagues.[30] Some of the more significant features for our purposes are average number of characters per word and POS-tags identifying verb tense and personal pronoun use. Once we've identified a few significant grammatical features, we can examine the texts one by one to see how they relate to one another. What we notice here is illuminating (Table 1). Pynchon's words average significantly fewer characters than do words in staff articles: 4.55 to 4.71 characters per word versus 5.38 characters per word. And, while the typical staff writer at Boeing uses past participles in almost 33 per cent of all verb constructions, Pynchon uses participles only 17–19 per cent of the time. Conversely, Pynchon uses simple past tense in about 9 per cent of verb constructions (in the *BSN*; this number is doubled in his other non-fiction prose), while staff writers use simple past tense only about 5 per cent of the time. These statistics signal a propensity for passive verb constructions in staff writers and for active constructions in Pynchon. We also observe a marked difference in the use of personal pronouns. Pynchon uses personal or possessive pronouns at a rate of about 56 per 1000 words in his general non-fiction prose, 44 per 1000 in his writing for Boeing. Staff writers, on the other hand, tend to avoid

Table 1. Significant lexical and grammatical features.

Author	Average word length (characters)	Past participles (per cent verbs)	Simple past tense (per cent verbs)	Personal pronouns (per 1000 words)
Pynchon, non-fiction prose	4.55	0.17	0.18	56.1
Pynchon, *BSN*	4.71	0.19	0.09	43.6
Staff, *BSN*	5.38	0.33	0.05	11.7

personal pronouns and possessives, which only appear 12 or so times in every 1000 words.

In short, what these numbers tell us is that Pynchon tends, in contrast to his Boeing colleagues, to use shorter words, simple verb constructions, and personal pronouns. We could break this down further and notice that Pynchon uses a wider variety of pronouns and thus that his texts more significantly feature the words 'I', 'we', and 'you'.[31] These are the hallmarks, in part, of plain style English, of which Pynchon's likely Boeing articles seem to be better examples than those of his peers. 'Never use a long word', wrote George Orwell, 'where a short one will do'.[32] Or Strunk and White remind us always to 'use the active voice'.[33] The United States federal plain language guidelines now current demand that writers 'use pronouns to speak directly to readers'.[34] Pynchon's technical prose does all of these, and it is no wonder that Ken Calkins recalls his work as especially successful. 'My gosh', he said about a piece on electrical soldering (presumably 'Soldering'), 'how can a guy make a story about this so interesting?'[35] Pynchon well understood how to communicate technical information concisely, clearly, and with interest to a wide readership of servicemen and maintenance personnel.

The other thing we should notice about these documents is that they grammatically resemble prose fiction more closely than they do non-fiction prose. Different modes of writing and speech tend toward different grammatical structures and lexical distributions, as has been demonstrated by computational linguistics and descriptive English grammars.[36] If we focus on pronoun use, for example, the *Longman Grammar of Spoken and Written English* tells us that in conversational discourse, personal pronouns appear with a frequency of about 135 per 1000 words (p. 333). Frequencies for fiction, newswriting, and academic prose are about 90, about 30, and about 18 per 1000 words, respectively. Pynchon's 44 to 56 pronouns per 1000 words falls, then, somewhere between frequencies we might expect to find in fiction prose and newswriting, while other Boeing staff writers are more in line with the frequencies we expect to see in academic prose. Pynchon's likely technical writing is more narrative and more conversational than the writing of his colleagues.

When we compare pronoun use in samples from his fiction, we begin, further, to see a pattern in which the earlier novels *V.* and *The Crying of Lot 49* (1966) follow a much more typical pronoun distribution for fiction than does *Gravity's Rainbow*, often considered both more technical and more difficult than either of the early books (Table 2).[37] Though *V.*, drafted in eighteen divided months, and *Lot 49*, the 'potboiler' dashed off to escape his contract with 'Lippinfink', follow the general rules of pronoun distribution for fiction, *Gravity's Rainbow* does not.[38] The grammar of *Gravity's Rainbow* more closely resembles the grammar of his technical writing. So we might say, on the one hand, that Pynchon brought to Boeing the language of his

Table 2. Pronoun frequency comparison.

Pynchon text	Personal pronouns (per 1000 words)
V.	92.4
The Crying of Lot 49	92.5
Gravity's Rainbow	62.5
Non-fiction prose	56.1
Bomarc Service News	43.6

novelistic trade, that his technical writing impressed his colleagues and editor precisely because it looked less like technical prose and more like fictional narrative. On the other hand, Pynchon also seems to have brought to his fiction not only the themes but the lexis and grammar of his work for Boeing.

4. The grammars of the system

Let's return, then, to *V.* and *Gravity's Rainbow* to look specifically at how Pynchon's novelistic style might have been influenced by his experience at Boeing. Though *V.* is more grammatically conventional in some respects that *Gravity's Rainbow*, the novel explicitly reflects on the varieties and uses of the nominative, and it puts pronouns to meaningful work. When, for example, Rachel Owlglass comes home to find a note from her roommate Paola Maijstral directing her to a 'PARTY with the Whole Sick Crew', she thinks, 'Nothing but proper nouns. The girl lived proper nouns. Persons, places' (p. 46). Or Herbert Stencil tells us that, 'like small children at a certain stage and Henry Adams in the *Education*, as well as assorted autocrats since time out of mind, [he] always referred to himself in the third person' (p. 58). The use of nouns – proper or otherwise – becomes in the novel another layer of argument about the function of narrative, the possibility of empathy, and the question of whether history, as Pynchon would put it in the introduction to *Slow Learner*, is 'personal or statistical'.[39]

Pynchon's reflection on nouns in *V.* cuts, as do most things in the novel, in two directions. On the one hand, Stencil can be read as a figure for history as impersonal system.[40] In Tony Tanner's influential early analysis, Stencil, like Callisto in 'Entropy', lives in a hermetically sealed 'hothouse', is obsessed with a 'structure of inferences', is 'not a self, but in truth a stencil' (p. 29). Stencil's compulsive third person, his 'forcible dislocation of personality', works to 'keep Stencil in his place' and becomes a form of control through impersonal narration (*V.*, p. 58). Third person narration was a distinguishing feature of Boeing staff writing, often accompanied by subordination that obscures agency, as in the sentence, 'In one, pencil marks made on a combustion chamber surface resulted in excessive heat concentrations which damaged a ramjet engine during engine test; in another instance, solder particles which

had separated from a solder seal, caused intermittent shorts in the gyro electrical system'.[41] Indeed, the author of a *Bomarc Service News* article we have good reason to identify as Pynchon cautions against just such diffusions of responsibility when he writes:

> Judging from the stories people tell about industrial accidents, one would think that the tools and equipment we use are alive; that they are aggressive and sinister objects that are ever ready to pounce on us and inflict injury. […] 'Hot slag fell inside my collar and down my body … A sharp corner of the metal punctured my finger […]' Such statements are in themselves are a hazard.[42]

We might well draw a parallel between the hazardous statements in which things come alive to harm us and the third person narration that keeps Stencil in his place. The structural obsessiveness of Stencilisation voids the personal, emphasising systemic and dispersed agencies and restricting individual responsibility.

On the other hand, though, Stencil's third person gives voice to the book's historical materials. We first encounter Stencil's 'forcible dislocation' in Chapter Three, 'In which Stencil, a quick-change artist, does eight impersonations', the revision of Pynchon's earlier story 'Under the Rose', which differs perhaps most meaningfully from the original in its narrative perspective. 'Under the Rose' is told mostly in limited third person and mostly, though not exclusively, from the perspective of Porpentine. The spy story unspooled in *V*., however, moves through seven markedly different narrative frames and voices, with the suggestion that Stencil's 'impersonation and dream' hold these variable witnesses together: the waiter P. Aïeul, the servant Yusef, the vagrant Maxwell Rowley-Bugge, the train conductor Waldetar, Gebrail the phaeton driver, Girgis the mountebank and burglar, and Hanne the barmaid. Each of these characters is a minor figure. They are bystanders, labourers, subalterns, and their view on the events preceding Porpentine's murder situates Pynchon's spy story in the context of empire, allowing us to inhabit multiple perspectives of otherness.[43]

Neither should we forget that Chapter Three closes with the sentence our Saturn V engineer struggled to parse in his letter to the *Boeing News*. Fellow spy Eric Bongo-Shaftsbury shoots Porpentine, who falls to the floor of a corridor in the summer theatre in the Ezbekiyeh Garden, and as Porpentine presumably expires, Pynchon writes, 'There must also be a nearly imperceptible line between the eye that reflects and the eye that receives. The half-crouched body collapses. The face and its masses of white skin loom ever closer. At rest the body is assumed exactly into the space of this vantage' (p. 94). Stencil's impersonations break across the 'line' between the quick and the dead, but they also break across the boundaries of narrative frame, allowing the reader to assume multiple vantages. The third person of technical grammar – notably here combined with the passive voice ('there must also be' and

'body is assumed') and ironically redeployed – shifts our vantage from occupier to occupied and back again.

Stencil's third person breaks its narrative frame once again, when in 'Mondaugen's story', the engineer Kurt Mondaugen, descending into a fever dream at Foppl's Siege Party, suffers a surfeit of identification. As we are told that Mondaugen's voyeuristic perspective on Foppl's party develops into 'an increasing inability to distinguish [Hugh] Godolphin from Foppl', so does the narrative voice become entangled with Foppl's racist nostalgia for the Herero and Namaqua genocide, where he served under Lothar von Trotha (p. 270). Pynchon writes, '[Mondaugen] had no idea, for instance, where this had come from: … so much rot spoken about their inferior kultur-position and our herrenschaft' […] Foppl. Perhaps'. These increasingly disturbing interludes are characterised by free movement among pronominal numbers, frequently turning to the second person, as in the sentences, 'One could just as well have been a stonemason. It dawned on you slowly, but the conclusion was irresistible: you were in no sense killing' (p. 277). This colloquial mode of direct address echoes Pynchon's most distinctive likely contributions to the *Bomarc Service News*. In 'Torquing' [*sic*], we learn that 'there was a time when all you had to do to tighten a bolt was slap monkey wrench on it and turn till you couldn't turn any more', before tumbling into a lengthy warning about the dangers of under- or over-torqueing various bolts on the Bomarc.[44] Or, in 'MIU Plug Problems', 'Ask one of these delicate souls what he thinks The User has been doing with the MIU cable plugs lately and most of the answers you get will be unprintable'.[45] Pynchon relays Foppl's recollections of 'operational sympathy' – or 'the delicious lassitude you went into the extermination with' – in just such a conversational tone, and we should consider that at Boeing Pynchon practiced a prose style that in *V.* he casually redeploys to implicate the reader in von Trotha's genocide (p. 277). The pronominal flux that in Chapter Three allows us to inhabit the vantage of an other also asks us to inhabit the vantage of an unrepentant and unselfconscious oppressive power, as Pynchon invokes 'you' in the Herero Wars and in the 'corporative life' of the Shark Island Concentration Camp (p. 286).

The grammar of 'corporative life' and the camps is most fully explored in *Gravity's Rainbow*, the salient grammatical features of which fall most closely in line with the grammatical markers of technical prose. Tellingly, LeClair indicates *Gravity's Rainbow* as a key example of the systems novel as a formal response to late-twentieth-century post-industrial life.[46] I indicated that analyses like LeClair's tend to focus on the abstract thematics of systematisation within the novel at the expense of the grammatical economies within which those thematics circulate. Joseph Tabbi quips that in *Gravity's Rainbow* 'can be found every instance of bad writing'.[47] Pynchon's offenses – 'solipsistic obscurantism', the substitution of "hard words" for common terms', and the

'lavishing of high style on unworthy subjects' – are a Strunkian litany of stylistic sins.[48] But even more markedly than in *V.*, Pynchon's style in *Gravity's Rainbow* demonstrates a devastating facility with the grammatical style of technical writing.

Nominalisations, third person pronouns, and passive verbs proliferate through the novel. Nouns 'flower' in the transcript of Tyrone Slothrop's Sodium Amytal sessions. 'Had he', Valsav Tchitcherine wonders, 'by way of the language caught the German mania for name-giving, […] tacking together established nouns to get new ones, the insanely, endlessly diddling play of a chemist whose molecules are words. … ' (p. 391). The third person pronoun 'They' takes on mythic stature as synecdoche for all things institutionally systemic. So, Pirate Prentice opposes 'they' to the first-person plural 'we' when he says that 'creative paranoia means developing at least as thorough a We-system as a They-system – ' (p. 638). Likewise, the passive becomes a voice of the system when we find inscribed prior to the eleventh episode of 'Beyond the Zero' this quotation from a 'Kryptosam' advertising brochure: 'An activating agent is included which, in the presence of some component of the seminal fluid to date [1934] unidentified, promotes conversion of the tyrosine into melanin, or skin pigment' (p. 71). We might well compare Laszlo Jamf's phrasing to a sentence (certainly by a staff writer other than Pynchon) from the *Bomarc Service News* in which 'sources of power for airborne radar devices have been developed within the last few years which are capable of producing radiation of sufficient intensity to cause damage to human tissue'.[49] Pynchon doesn't much disguise his disdain for technical obfuscation. 'The officers' latrines' in Horst Achtfaden's Toiletship, 'are done in red velvet', he writes. 'The decor is 1930s Safety Manual' (p. 450).

Pynchon cannily associates the grammars of technical writing with the rationalising economies of the military-industrial complex. He marks the complicity of language work and late-twentieth-century industrial labour in finer detail than we've been given to notice. Pynchon's 'systems novel' doesn't merely theorise 'we' against 'they' in the abstract; rather it emerged from a utilitarian engagement we can read at the level of the sentence. Here I have demonstrated how Pynchon's work at Boeing, which I also have located concretely within the *Bomarc Service News* archive, might have contributed not only thematically but stylistically to his fictional forms. I have suggested that Pynchon brought to Boeing a compelling novelistic voice with which service personnel could easily engage. I also have argued that he reconfigures the grammars of technical prose to critique the military industrial apparatus within which he worked for a time. As Slothrop says to Tchitcherine in preparing an act of subterfuge, 'I have a great passive vocabulary, I'll know what you're saying' (p. 513).

Notes

1. 'Ex-Boeing Writer Wins Faulkner Award', *Boeing News* 6 February 1964, p. 2.
2. 'To the Editor', *Boeing News* 3 March 1964, p. 3. The organisation number 5-7510 following the letter-writer's name referred, according to Boeing corporate historian Michael J. Lombardi, to the unit 'Structures Engineering for Boeing Launch Systems (Saturn V)', located in Michoud, Louisiana. Email to author, 16 April 2015.
3. Tom Lubbesmeyer, a staff historian at Boeing, kindly shared with me notes taken from Pynchon's employment record and telephone directory entries, which list the following dates and affiliations: 'hired 22 February 1960, Engineering Aide Technical Information'; '23 June 1961, Technical Writer'; from September 1961 Company Telephone Directory, 'organization 2-5245, Bomarc Service Information Unit'; and from the June 1962 Company Telephone Directory, 'organization 2-5265, Minuteman Field Support Unit'. Transcript from company record, 30 March 2015.
4. Boeing has long maintained its position as one of the top contractors for the United States Department of Defense. In fiscal year 1960, for example, Boeing was the third largest contractor for the DoD, winning $1.0087 million in contracts, or 4.8% of the total defense budget for the year (measured in 1960 dollars). In fiscal year 2015, for comparison, Boeing was the second largest defense contractor, winning $16.646 billion, or 3.4% of the total defense budget for the year. See U.S. Department of Defense, *100 Companies: Companies Receiving the Largest Dollar Volume of Prime Contract Awards, Fiscal Year 1960*, Washington, D.C., 1960; and U.S. Department of Defense, *Top 100 Contractors Report, Fiscal Year 2015*, Federal Procurement Data System, https://www.fpds.gov/downloads/top_requests/Top_100_Contractors_Report_Fiscal_Year_2015.xls.
5. Thomas Pynchon, *V.* (New York: Lippincott, 1963; New York: Harper Perennial, 1999), p. 94. Citations are to the Harper Perennial edition. On Mafia Winsome as a parody of Ayn Rand, see Molly Hite, *Ideas of Order in the Novels of Thomas Pynchon* (Columbus: Ohio University Press, 1983), pp. 64–5.
6. Gore Vidal, *Visit to a Small Planet and Other Television Plays* (Boston: Little, Brown, 1956), p. xiv.
7. Pynchon and Fariña met through the *Cornell Writer*, where both published early work. He was best man when Fariña's married Mimi Baez in 1963, and in 1983 Pynchon wrote a new introduction to Fariña's only novel *Been Down So Long Looks Like Up to Me* (New York: Random House, 1966). See also David Hajdu, *Positively 4th Street: The Lives and Times of Joan Baez, Bob Dylan, Mimi Baez Fariña and Richard Fariña* (New York: Farrar, Straus and Giroux, 2001).
8. Mark McGurl, *The Program Era: Postwar Fiction and the Rise of Creative Writing* (Cambridge: Harvard University Press, 2009). This list is not exhaustive. We could add, for example, Toni Morrison's editorial work at Random House, Marshall McLuhan's consulting work for IBM and AT&T, or even J. M. Coetzee's PhD thesis on computational stylometry and Samuel Beckett.
9. Though Ali Chetwynd is in the midst of some fascinating and richly provocative work on Gaddis's corporate archive. Ali Chetwynd, 'William Gaddis' Education-Writing and His Fiction: A Fuller Archival History', preprint manuscript, April 2015.

10. Tom LeClair, *In the Loop: Don DeLillo and the Systems Novel* (Urbana, Ill.: University of Illinois Press, 1987), p. 12.
11. One of the first attempts to document Pynchon's employment at Boeing appears in Mathew Winston, 'The Quest for Pynchon', *Twentieth Century Literature* 21.3 (Oct 1975), pp. 278–87. Adrian Wisnicki dates the first mention of Pynchon's employment at Boeing to two early reviews of *V.* and gives a handy survey of scholarly and journalistic speculation on Pynchon's Boeing stint in 'A Trove of New Work by Thomas Pynchon? *Bomarc Service News* Rediscovered', *Pynchon Notes* 46–49 (2000–2001), pp. 9–34. See also Lewis Nichols, 'In and Out of Books', *New York Times Book Review* 28 April 1963, p. 8; and Dick Schaap, 'No Return Address on the V-Mail', *Book Week* 10 May 1964, p. 6.
12. David Cowart, *Thomas Pynchon: The Art of Allusion* (Carbondale: Southern Illinois University Press, 1980), p. 96.
13. I owe this reference to Adrian Wisnicki, without whom I would never have thought to Wayback-Machine Lane's defunct site. See Richard Lane, 'Boeing, Boeing', *The Pynchon Files*, archived at http://web.archive.org/web/19990505044257/http://www.pynchonfiles.com/Boeing,Boeing.htm.
14. Larry Daw, 'Thomas Ruggles Pynchon, Jr.: A Man Born Through a Sea-Change From Out of An Oyster', *Spermatikos Logos* 21 May 2000, archived at http://web.archive.org/web/20150429093655/http://www.themodernword.com/pynchon/pynchon_biography.html.
15. See, for example, 'Chronology', *Thomas Pynchon*, edited by Harold Bloom (Philadelphia: Chelsea House, 2003), p. 297; John M. Krafft, 'Chronology of Pynchon's Life and Work' and 'Biographical Note' in *The Cambridge Companion to Thomas Pynchon*, pp. x, 13; Paul Royster, 'Thomas Pynchon: A Brief Chronology', *Faculty Publications, UNL Libraries* (2005), http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1001&context=libraryscience; and Boris Kachka, 'On the Thomas Pynchon Trail: From the Long Island of His Boyhood to the "Yupper West Side" of His New Novel', *New York* 25 August 2013, http://www.vulture.com/2013/08/thomas-pynchon-bleeding-edge.html.
16. Steven Weisenburger, '*Gravity's Rainbow*,' *The Cambridge Companion to Thomas Pynchon*, edited by Inger H. Dalsgaard, Luc Herman, and Brian McHale (Cambridge: Cambridge University Press, 2012), pp. 45, 46.
17. See Mike Lombardi, 'Reach for the Sky: How the Bomarc Missile Set the Stage for Boeing to Demonstrate Its Talent in Systems Integration', *Frontiers* (June 2007), pp. 8–9. Lombardi reemphasised Bomarc's role in Boeing's development the systems integration that is now one of its core competencies when I spoke with him on 1 April 2015: he described the Bomarc missile as 'not a product' but as a 'system within a system'. Outlining the relationship between Boeing's defence work on Bomarc and Minuteman and the communications networks developed in service of the Apollo programme, he remarked that Boeing, at the time, 'was really the only company in the world that could do this sort of thing, large-scale systems integration'. Michael J. Lombardi, interview by Katie Muth, 1 April 2015, transcript.
18. The only clearly attributed of these writings is 'Togetherness', printed under the by-line 'Thomas H. [*sic*] Pynchon, Boeing Aero-Space Division'. See Thomas Pynchon, 'Togetherness', *Aerospace Safety* 16.12 (December 1960), pp. 6–8. Several are likely reprints of *Bomarc Service News* articles.
19. Boeing not only manufactured the missile but also produced launching bays, analog computers, and other infrastructure essential to the missile's

automation. The Boeing Electro-Mechanical Analog Computer (BEMAC) and the Boeing Electronic Analog Computer (BEAC) were both developed for Bomarc, and the latter was briefly marketed commercially. See James S. Small, *The Analogue Alternative: The Electronic Analogue Computer in Britain and the USA, 1930–1955* (London: Routledge, 2001), p. 101.

20. Lysle A. Wood, 'Dear Reader', *Bomarc Service News* 1 (April 1959), p. 3.
21. *Service Program*, Pilotless Aircraft Division, Boeing Airplane Company, no date, p. 16.
22. For details on editorial, research, and drafting practices, see Wisnicki.
23. For more on Pynchon's time in Seattle, see Jeffrey Severs, '"A City of the Future": *Gravity's Rainbow* and the 1962 Seattle World's Fair', *Twentieth-Century Literature* 62.2 (June 2016): pp. 145–69.
24. Mary Ann Tharaldsen, email to author, 8 July 2015.
25. Wisnicki quotes as key examples of Pynchonesque prose the following: 'Soldering', *Bomarc Service News* 25 (Aug 1961), pp. 3–10, 16; '"Teflon" in Depth', *Bomarc Service News* 31 (Feb 1962), pp. 3–4, 13; 'The Mad Hatter and the Mercury Wetted Relays', *Bomarc Service News* 31 (Feb 1962): 16; 'MIU Plug Problems', *Bomarc Service News* 33 (Apr 1962), pp. 4–7; 'Hydrazine Tank Cartridge Replacement', *Bomarc Service News* 38 (Sep 1962), pp. 3–5; and 'Bomarc Reliability and You', *Bomarc Service News* 39 (Oct 1962), pp. 3–8.
26. Computational stylometry has become a persuasive method for identifying the authors of anonymous or contested texts. In 1963, Frederick Mosteller and David L. Wallace first argued that statistical analysis might disentangle the authorship of twelve disputed *Federalist* papers in an essay that has since become a touchstone of computational stylometry. See Frederick Mosteller and David L. Wallace, 'Inference in an Authorship Problem: A Comparative Study of Discrimination Methods Applied to the Authorship of the Disputed *Federalist* Papers', *Journal of the American Statistical Association* 58.302 (June 1963): pp. 275–309. More recently, researchers used computational stylometry to identify, correctly, J. K. Rowling as the author of the pseudonymously published novel *The Cuckoo's Calling* (2013). See Patrick Joula, 'How a Computer Program Helped Show J. K. Rowling write [*sic*] *A Cuckoo's Calling*', *Scientific American* 20 August 2013, https://www.scientificamerican.com/article/how-a-computer-program-helped-show-jk-rowling-write-a-cuckoos-calling/.
27. I used the JStylo authorship attribution tool developed by Rachel Greenstadt's Privacy, Security, and Automation Laboratory (PSAL) at Drexel University. I configured the tool to mine stylistic features according to the Writeprints feature set and to sort text via a WEKA regression classifier (weka.classifiers.meta.ClassificationViaRegression, weka.classifiers.trees.M5P, minimum 4 instances per leaf). I evaluated the classifier's performance on my training corpus by 10-fold cross-validation, and the regression classifier correctly attributed instances from all ten training corpus documents. See Andrew W. E. McDonald, Sadia Afroz, Aylin Caliskan, Ariel Stolerman and Rachel Greenstadt, 'Use Fewer Instances of the Letter "i": Toward Writing Style Anonymization', *Privacy Enhancing Technologies Symposium*, July 2012. For documentation on the Writeprints feature set, see Ahmed Abbasi and Hsinchun Chen, 'Writeprints: A Stylometric Approach to Identity-Level Identification and Similarity Detection in Cyberspace', *ACM Transaction on Information Systems* 26.2 (March 2008), pp. 1–29. For an outline of the WEKA software,

see Mark Hall, Eibe Frank, Geoffrey Holmes, Bernhard Pfahringer Peter Reutemann, Ian H. Witten, 'The WEKA Data Mining Software: An Update', *SIGKDD Explorations* 11.1 (2009), pp. 10–18.

28. Each training corpus totalled approximately 7000 words, which I scrubbed and chunked into 500-word documents (± 25 words), for a total of 14 documents in each training set.
29. For full citations, see Appendix 2. I tested a set of articles Wisnicki identified with Pynchon, as well as a set of articles from the *Minuteman Service News* (not listed). None of the latter was strongly correlated with Pynchon's non-fiction prose.
30. Necessarily, I omit some technical details here in the interest of space, but a quick gloss is in order. Machine learning algorithms like the one I used to sort these texts depend on informational gain to sort data sets. Roughly speaking, information gain measures the reduction of entropy between two events or states. So features with high information gain tend to be more relevant to the sorting algorithm than features with low information gain. The features I identify in what follows produced consistently high information gain across multiples tests. To be clear, stylometry cannot finally and with one hundred percent confidence identify Pynchon as the author of these texts. It allows us, rather, to make a rigorous case for probable authorship.
31. Eighty-seven per cent of pronouns are third person in staff writing. For Pynchon, third person pronouns account for only 67 to 69 per cent of all pronouns.
32. George Orwell, 'Politics and the English Language', *Shooting an Elephant and Other Essays* (New York: Penguin, 2003), p. 374.
33. William Strunk, Jr. and E. B. White, *The Elements of Style* (Boston: Allyn and Bacon, 2000; New York: Macmillan, 1959), p. 18. Pynchon almost certainly would have been familiar with Strunk's original style guide, self-published at Cornell in 1918. The text circulated internally until 1957, when White published his famous 'Letter from the East' in the *New Yorker* and was subsequently contracted to revise and edit the book for Macmillan. See Mark Garvey, *Stylized: A Slightly Obsessive History of Strunk & White's* The Elements of Style (New York: Simon & Schuster, 2009).
34. Federal Plain Language Guidelines, PlainLanguage.gov, March 2011, http://www.plainlanguage.gov/howto/guidelines/FederalPLGuidelines/FederalPLGuidelines.pdf.
35. Qtd. in Donn Fry, 'A Genius Among Us – For A While', *Seattle Times* 14 January 1990, http://community.seattletimes.nwsource.com/archive/?date=19900114&slug=1050692.
36. See, for example, Douglas Biber, Stig Johansson, Geoffrey Leech, Susan Conrad, and Edward Finegan, *Longman Grammar of Spoken and Written English* (Harlow: Pearson, 1999). Biber, et al, used data mining to analyse large corpora in multiple registers to give a descriptive account of discursive differences in English grammar.
37. For brief comparison, I took samples of approximately 12,000 words from each novel.
38. Thomas Pynchon, Letter to Faith and Kirkpatrick Sale, qtd. in Kachka. See also Jeffrey Severs's contribution to this issue.
39. Thomas Pynchon, *Slow Learner: Early Stories* (Boston: Little, Brown, 1984), p. 18.

40. Tony Tanner posits, for example, that in *V*. 'History is as "stencillized" as the people who compose it', linking Stencil's compulsive plot-detection with an impulse to understand history in terms of neat, narrative arcs. Tony Tanner, 'V. and V–2' in *Pynchon: A Collection of Critical Essays*, edited by Edward Mendelson (Englewood Cliffs, N.J.: Prentice-Hall, 1978), p. 24. Steven Belletto extends this notion in a convincing contextualisation of the novel in terms of Cold War technocracy; Stencil, he suggests, 'denies the operation of absolute chance in favor of a theory that reads ostensible accidents as evidence of a conspiracy so "all-embracing" that it explains "every accident."' Steven Belletto, 'Aesthetic Responses to Political Fictions: Pynchon and the Violence of Narrative Chance', in *No Accident, Comrade: Chance and Design in Cold War American Narratives* (Oxford: Oxford University Press, 2012), p. 49.
41. 'Missile Cleanliness', *Bomarc Service News* 2 (June 1959), p. 18. As this article was published prior to Pynchon's employment, we can be fairly certain someone else wrote this sentence, the likes of which Pynchon openly parodies (see below).
42. 'The Trouble with Safety is … People!', *Bomarc Service News* 37 (August 1962), p. 12.
43. Arguably, the whole of Chapter Three is 'minor' in a Deleuzian sense, insofar as its fractured narrative is deterritorialised, politicised, collective, and so expresses a way of being a 'stranger in [one's] own language'. Gilles Deleuze and Felix Guattari, 'What is a Minor Literature?', in *Kafka: Toward a Minor Literature*, trans. Dana Polan (Minneapolis: University of Minnesota Press, 1986), p. 26.
44. 'Torquing' [*sic*], *Bomarc Service News* 11 (June 1960), p. 7.
45. 'MIU Plug Problems', *Bomarc Service News* 33 (April 1962), p.6.
46. See *In the Loop*, pp. 16–22. In *The Art of Excess*, LeClair expands his analysis of Pynchon, calling *Gravity's Rainbow* the 'prologue' to the 'systext'. LeClair argues that the novel is emblematic in part because 'it has as its conceptual basis a comprehensive system that both includes and measures identity, business, politics, history, and science' and in part because 'it is about forms of mastery and employs excess for […] three kinds of mastery – over the contemporary world, artistic methods, and the reader'. Tom LeClair, *The Art of Excess: Mastery in Contemporary American Fiction* (Urbana: University of Illinois Press, 1989), p. 36.
47. Joseph Tabbi, *Postmodern Sublime: Technology and American Writing From Mailer to Cyberpunk* (Ithaca, NY: Cornell University Press, 1995), pp. 78–9.
48. Tabbi cites here nineteenth century German critic Samuel Werenfels, and it's worth underscoring that his discussion on Pynchon and the technological sublime focuses on sublimity as a '*stylistic* gambit' (emphasis in original).
49. 'Biological Hazards of Electromagnetic Radiation', *Bomarc Service News* 2 (June 1959), p. 10.

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Appendices

Appendix 1. Training corpus bibliography

'Biological Hazards of Electromagnetic Radiation', *Bomarc Service News* 2 (June 1959), pp. 10–12.

'Bomarc Hydraulic System', *Bomarc Service News* 2 (June 1959), pp. 14–15.

'Bomarc Weapon System, Part 2: Weapon Support Equipment', *Bomarc Service News* 2 (June 1959), pp. 6–8.

'Destructor Arming Tube: YIM–99A', *Bomarc Service News* 2 (June 1959): 9.

'Inspection Requirements', *Bomarc Service News* 2 (June 1959), p. 13.

Pynchon, Thomas, 'Is It O.K. To Be A Luddite?' *New York Times* 28 October 1984, https://www.nytimes.com/books/97/05/18/reviews/pynchon-luddite.html.

_____, 'The Gift', rev. of *Warlock* by Oakley Hall, *Holiday* 38.6 (December 1965), pp. 164–5.

_____, 'A Journey Into the Mind of Watts', *New York Times* 12 June 1966. https://www.nytimes.com/books/97/05/18/reviews/pynchon-watts.html

_____, 'Togetherness', *Aerospace Safety* 16.12 (December 1960), pp. 6–8.

_____, 'Introduction'. In Richard Fariña, *Been Down So Long It Looks Like Up To Me*. New York: Penguin, 1983. Pp. v–xiv.

'A Shield for Air Defense', *Bomarc Service News* 2 (June 1959), pp. 3–5.

Appendix 2. Test corpus bibliography

'Analog Simulations', *Bomarc Service News* 15 (October 1960), pp. 11–13.

'Environmental Protection', *Bomarc Service News* 36 (July 1962), pp. 3–8.

'Hydrazine Tank Cartridge Replacement', *Bomarc Service News* 38 (September 1962), pp. 3–5.

'The Mad Hatter and the Mercury Wetted Relays', *Bomarc Service News* 31 (February 1962), p. 16.

'Maintainability, Part 2', *Bomarc Service News* 21 (April 1961), pp. 8–12.

'MIU Plug Problems', *Bomarc Service News* 33 (April 1962), pp. 4–7.

'Soldering', *Bomarc Service News* 25 (August 1961), pp. 3–10, 16.

'"Teflon" in Depth', *Bomarc Service News* 31 (February 1962), pp. 3–4, 13.

'Telemetering: Recovery, Recording, Reduction', *Bomarc Service News* 16 (November 1960), pp. 13–17.

'Torquing' [*sic*], *Bomarc Service News* 11 (June 1960), pp. 7–9.

'The Trouble with Safety is … People!' *Bomarc Service News* 37 (August 1962), p. 12.

'Vibration Testing', *Bomarc Service News* 8 (March 1960), pp. 3–6.