Measurement, Temporality, Abstraction

Come nearer, and you may hear the clangor and the whirl still going on, and note the steady beat of the huge engine, that, like the heart of a giant, puts all in motion . . . .
—William Harrison Ainsworth, *Mervyn Clitheroe* (1858)

Musical rhythm is the recurrence of an accent or beat at successive regular intervals. . . . But even without music there may be rhythm: as in the ding-dong of a bell, the plash of a water-wheel, the pulsation of a heart, or the uniform march of machinery. A railway train often runs with a rhythm to which you can easily adapt a tune, of which the engine will mark the time.
—"Phenomena of Music," *All the Year Round* (1868)

Below are two documents about meter. Both are from 1857, and both appeared in widely circulating periodicals.

March–May. Not quite 6 years after the industrial "spectacle" of the Great Exhibition had galvanized public fascination with "things" of all kinds, and machinery in particular,[1] a series of short articles entitled "A Chapter or Two on Meters" appeared in a new magazine called the *Friendly Companion and Illustrated Instructor*. These "meters" were not the iambic or dactylic variety that many of us associate with the cognate subjects of prosody and versification, but an alphabetically arranged catalog of measurement apparatuses. The first of three monthly installments

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contains three entries: actinometer ("for measuring the intensity of solar or terrestrial radiation"), aërometer ("for correctly ascertaining the mean bulk of gases"), and barometer ("for ascertaining the weight of the atmosphere"). The next "chapter" begins with a lengthy entry on the chronometer ("for the correct measuring of time"), before going on to define such strange-sounding instruments as electrometers, eudiometers, galactometers, and gasometers. The concluding number explains goniometers, hydrometers, manometers, pedometers, pluviometers, pyrometers, and saccharometers, before closing with a long entry on the thermometer.[2]

August. In the respectable *North British Review*, Coventry Patmore published his major contribution to nineteenth-century verse theory: a review essay with the title "English Metrical Critics." Partly a response to recent accentual theories, such as the one advanced by Edwin Guest in his 1838 *A History of English Rhythms*, and partly an elaboration of temporal, quasi-musical theories, such as those of Joshua Steele and E. S. Dallas, Patmore's treatise—more often referred to by its later title "Essay on English Metrical Law"—asserts that meter is properly a measurement of "the time occupied in the delivery of a series of words." At the heart of Patmore's synthesizing and supplementing of existing temporal theory is a "law" based on the division of lines into units of equal time or "isochronous intervals," which are marked by an "imaginary" time-keeping beat, the ictus. Patmore's "Essay" underscores the ideal nature of what he terms the "modulus" (the regular pattern of meter) and its difference from, as well as its potential for interaction with, the "real" (i.e., voiced) rhythms of language. This abstracting of meter, in conjunction with Patmore's attempt to set out a systematic temporal metrics based on isochrony, played a significant role in the articulation of English versification not only in the second half of the nineteenth century but also well into the twentieth.[3]

At first glance, these two examples of "meter" might not appear to have very much in common. The meters cataloged by the *Friendly Companion* are quite literally mechanisms, machines with gauges, dials, and moving parts. Patmore's meter, "the mechanism of English verse,"[4] is arguably more *techne* than *technology*—that is, an example of the art, skill, or craft of metrical composition, or the study of that art, as in *ars poetica*. As Carl Mitcham and Timothy Casey have observed, historically *techne* has "include[d] making crafts and art as well as the skills of sport and argument," while *technology* has been used to denote "the study of

industrial arts or industrial technics, and in its original restricted meaning indicated only scientific or science-based making."[5] In the middle decades of the nineteenth century, however, these categories were not obviously discrete. A reader who struggled with terms such as those listed in the *Friendly Companion* might well have turned to one of several popular pronouncing dictionaries, where he or she would have found "terms of art [and] science" placed side by side,[6] words obtaining to manufactures and technology mingling with those belonging to the study of grammar, prosody, and poetics. For example, in R. Harrison Black's *The Student's Manual: Being an Etymological and Explanatory Vocabulary of Words Derived from the Greek* (1838), readers would have seen the terms "Aræo-meter," "Baro-meter," "Chrono-meter," and "Eudio-meter" listed under the heading "MĔTRŎN, μέτρον, *a measure*.—MĔTRĔŌ, μετρέω, *I measure*," along with a definition of *meter* in the sense of versification: "[s]peech confined to a certain number of harmonical syllables . . . [and the study of] time and the order of syllables . . . ."[7]

There is more than just an etymological connection worth pursuing here. Both "A Chapter or Two on Meters" and Patmore's "Essay on English Metrical Law" are framed by and exhibit signs of the standardizing impulses associated generally with the machine age. Specifically, they construe measurement as a systematic process where standardization and uniformity of proportion are not only desirable but essential. Whether the object of study is a physical property (atmospheric pressure, sugar content) or an abstraction (time, the mental spacing of beats), one cannot possess an accurate understanding of it (indeed, one may not even be able to verify its existence) without mechanisms of measurement that establish "proper units and standards" as insurance against what Graeme Gooday calls "material contingency" or "cultural subjectivity." At its most technologically ambitious, what the machine age promised was nothing less than "an objective universal knowledge [obtained] through measurement," where quantities were uniform and "the regular working of machines," which historians of modern technology have read as a defining feature of nineteenth-century industrial modernity, was a prerequisite.[8] As we will see, the "industrial principle of standardization," an offshoot of the "inherent logic of mechanization,"[9] subtended not only the factory system and the railway—two emblematic machine conglomerations of the Victorian period—but also the defining theoretical principles of a metrics that was beginning to establish itself at the mid-century. Alongside the systematic development of the "practical arts" and the concomitant rise

and disciplinary consolidation of the natural and physical sciences, where the *Friendly Companion*'s "meters" were transforming working practices and underwriting laboratory experiments, nineteenth-century metrical discourse was asserting a "science" and applying technologically informed methods (and in some cases actual machine technologies) of its own, often working out its calculations in explicit dialogue with the knowledge economies of engineering, industry, and science.

In his 1921 book *English Metrists*, T. S. Omond credits Patmore's "Essay" with "inaugurating" this more scientific, systematic, and decidedly modern approach to English versification—he terms it the "new prosody."[10] It is, therefore, a good place to begin an investigation of the conjunctions between nineteenth-century meters and machines. One thing this book claims is that the "more rational and real methods" that for Omond characterize the New Prosody's approach to the study of English meter and versification[11] did not stand aloof from but were active participants in the "age of machinery," depicted so memorably by Thomas Carlyle in "Signs of the Times" (1829), as well as in a variety of generalist and specialist texts about machines, manufactures, sciences, and industries that I will discuss throughout this book. By examining this "new" phase of metrical enquiry in relation to three iconic technologies of the age—the railway, the telegraph, and the steam thresher—I hope not only to present a case for considering the defining elements of the New Prosody (including the abstraction of meter and the regular, isochronous spacing of the ictus) as belonging to the "complex social and institutional matrix" that Leo Marx has described in relation to modernity's machines[12] but also to provide a framework for the other meshings between meter and machinery (both conceptual and material) that the chapters below scrutinize. These instances of what we might call "tooth contact" will help set *Nineteenth-Century Verse and Technology* in motion.

Networking the New Prosody

"The modern world of the nineteenth century," observes Marita Sturken, "prized synchronization, standardization, efficiency, and the predictability that this produced."[13] These hallmarks of that century's networked world—which, as Laura Otis and Friedrich Kittler, among others, have shown, radically changed the way people thought (of themselves, of others, and of their place on a linked-up globe)—were

"facilitated by new modern technologies" that, in turn, became enduring material expressions of what Richard Menke has termed "the world-as-network."[14] Menke has in mind, among other things, aspects of what Wolfgang Schivelbusch called the "machine ensemble," and his attention to the interplay between "imaginative writing" and new communication technologies gives us a good sense of what it meant to write and read prose fiction in a world increasingly defined in interactions with machines—whether they were designed to convey messages or people and freight.[15] The machine-defined standards of linearity and spatio-temporal homogeneity, so frequently associated with the communication revolution effected by the railway and electric telegraphy in particular, had, I argue, a significant exchange with the period's verse and related metrical theorizations as well. If the nineteenth-century novel, with its multiple plot lines, gave literary form to a world increasingly characterized by its networked relations, as Menke observes, then the articulation of the New Prosody, with its abstracting and standardizing of metrical values, constituted another expression of the regulation of information in networked modernity.

To see how a networked world and the standards on which it was predicated intersect with mid-century metrics, let's begin by returning to Patmore's description of the ictus, which he asks us to imagine as "like a post in a chain railing."[16] Yopie Prins—whose work on Patmore and abstraction has set the tone for a reinvigorated examination of his poetic theory—suggests that the "spatial terms" of Patmore's simile are significant. For Prins it is particularly the "spaces between" the marks of the ictus that matter; the "mark itself" effectively stands outside of time and space.[17] After all, it is, as Patmore himself asserts, "imaginary."[18] Yet for Patmore's mid-century readers, the image very likely brought to mind familiar *material* objects: ordinary wooden or iron posts and chain railings, such as those cordoning the entrances of buildings or lining busy pavements, but also the seemingly endless chains of wire-topped telegraph posts that stretched alongside an expanding network of railway lines. According to contemporary accounts, the proliferation of these posts was hard to ignore. Across Britain, Europe, and North America, the "continual rising of [telegraph] poles" was a phenomenon still worth remarking in 1869, when R. W. O'Brien composed his poem "Telegraph Lines."[19] Further, to persons traveling by railway, telegraph poles were not just ubiquitous; they were useful as well. As material markers of "spacetime," they enabled passengers to reckon railway velocity. A short piece

entitled "Telegraph Posts as Indicators of Time and Speed," from *The London Anecdotes Reader* (1848), explains what Schivebusch has called the "poetic perception of telegraph poles":

> To calculate the speed at which you are traveling on a telegraphed railway, multiply by two the number of telegraph posts you pass in a minute, by four those you pass in half a minute or by eight those you pass in a quarter of a minute; and the result, in each case, will be the number of miles you are then travelling per hour; the posts being arranged thirty to a mile.[20]

Here we have a veritable exercise in railway "scansion," in which telegraph poles divide the railway's linear movement into equal units of space and time. To "mark" the posts as they appear is to establish the line's "meter" (or, more precisely, the meter of the train that travels on it)—that is, to perform the function of the *speedometer*. Given the widespread awareness of this pastime, it may be more than a coincidence that Patmore, seeking to explain the isochronous spacing of a fundamentally "imaginary" ictus, should offer readers an objective correlative that "[e]very railway traveller knows."[21]

If telegraph posts provided a "metrical" index against which the railway line could be measured, then the line itself, which relied on viaducts and tunnels to impose desired smoothness where nature failed to offer it, became an emblem of perfect measurement: an ideal "ruler" or abstract "grid" superimposed upon the unruliness of topographical inflections. However the land might rise and fall, the railroad would enforce upon it the uniformity of mechanical propulsion, providing what Dionysius Lardner would regard as "the optimal approximation of [the] ideal road." Nicholas Wood's illustration, from *A Practical Treatise on Rail-Roads* (1838), offers a graphic representation of this interplay of line and land (Fig. 1). The two lines—an unflinchingly straight one representing track and a wavy one denoting terrain—demonstrate the subordination of problematic "natural irregularity" to reliable "mechanical regularity." This drive toward a regular, idealized linearity, conceived in remarkably similar spatial terms, also underpinned, as Prins has shown, the New Prosody's thinking about "meter as a formal grid," a perfect, abstract rule against which the poet or prosodist could measure the rise and fall of speech rhythms.[22] Patmore asserted the importance of "a perpetual conflict between the law of the verse and the freedom of the language"—the one a fixed ruler modulating and "giving effect to the other." This

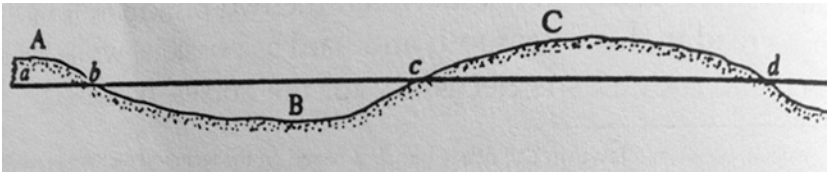

Fig. 1 Plate from Nicholas Wood's *A Practical Treatise on Rail-Roads, and Interior Communication in General. Containing Numerous Experiments on the Powers of the Improved Locomotive Engines and Tables of the Comparative Costs of Conveyance on Canals, Railways, and Turnpike Roads* (London: Longman, Orme, Brown, Green & Longmans, 1838)

metrical axiom, though not exactly new, would gain momentum over the course of the century as proponents of the New Prosody, following Patmore's lead, reinforced the division between the abstraction of meter and the materiality of rhythm. In his theory of counterpoint, for example, Gerard Manley Hopkins (a correspondent with Patmore on the subject of meter) relies on this tension between (regular) meter and (irregular) speech rhythm. In an 1874 essay, he even offers a line drawing to illustrate the contrapuntal movement of the two (Fig. 2). Hazel Hutchison makes a compelling case for reading Hopkins's "mapping" of meter in relation to work on light waves conducted by scientists such as James Clerk Maxwell and Hermann von Helmholtz.[23] The spatial awareness of Hopkins's graph resonates also, I suggest, with Wood's illustration of the contrast between railway line and topography.[24]

While "the prescribed pattern of meter," at least as Hopkins represents it, seems fluid and wavy by comparison with the perfect smoothness of railway linearity, one legacy of the New Prosody was that meter was increasingly construed in abstract, ruler-like terms. Patmore himself, though he shared Hopkins's appreciation of counterpoint, nevertheless imagined meter as an unbending course from which speech inflections deviate. Unmitigated meter, as we will see in more detail below, is analogous to the monotonous ticking of a clock—on its own mechanically "over-smooth" and perfectly isochronous. But a line comes to life when we speak it so as to introduce "departures from the modulus" of meter. Even the dips and bumps of voice, however, remain effectively subordinated to the straight-and-narrow path of the metrical roadbed, which, maintains Patmore, "should continually make its existence recognized."

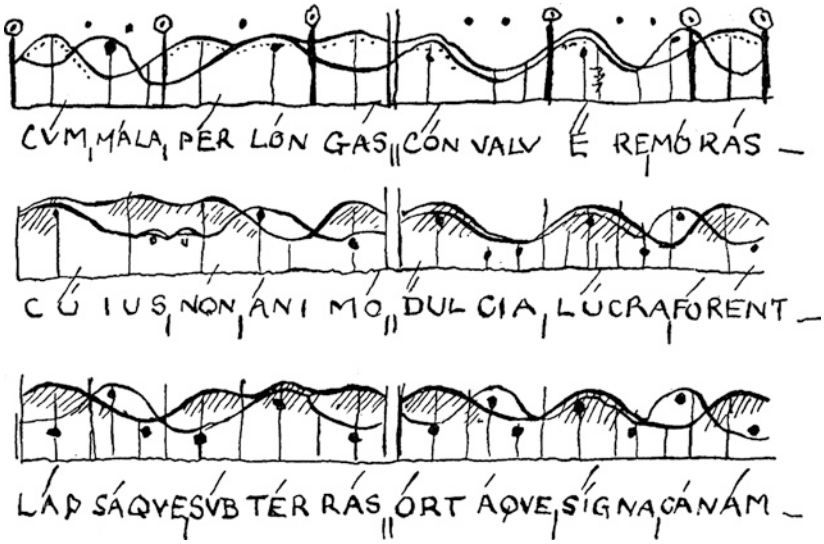

Fig. 2 Diagram of counterpoint from Gerard Manley Hopkins's *The Journals and Papers of Gerard Manley Hopkins*, ed. Humphry House and Graham Storey (London: Oxford University Press, 1959), 282. By permission of Oxford University Press on behalf of the British Province of The Society of Jesus

If we read verses as we ought, then there should be no mistaking the presence of the modulus informing our vocalization, even if word accents do not always keep time with the mental beating of the ictus. This is what Patmore understands as "law" directing "life," meter regulating how we voice verse.[25] As Prins notes, one corollary of Patmore's theory of meter in the mind, and of the nineteenth-century emphasis on metrical abstraction more generally, is that "voice," like recalcitrant landscape, is made to "follow meter," even "reinscrib[e]" it. For Patmore in particular, a dedication to meter as a grid or ruler manifests itself not only in theory but also in practice: his poem *The Angel in the House* (1854–6), as Jason Rudy has shown, is an exaggeration of metrical restraint in which the perfectly even modulus regulates the "free play" of rhythm. The detailed close readings that Rudy offers in *Electric Meters* (2009) exhibit how *The Angel* "privileges metrical structure over rhythmic experience" in ways that he will go on to elaborate theoretically in his 1857 "Essay."[26] The cultural embeddedness of Patmore's metrics, as explicated by Rudy, is

further foregrounded by attending to how it maps onto the mechanics of abstraction focused upon the burgeoning British railway network. At this point in his career, then, by which time the railway had been asserting a mechanically regulated, abstract linearity for over two decades, Patmore's meter—itself a symbol of order, measure, and abstraction—can look rather like a locomotive that "railroads" speech rhythm into conformity to its homogeneous mechanical movement.[27]

The growth of the railway network resulted in a homogenizing of time as well as space, and the correlations between Patmore's metrical "law" and the ordering of telegraph beats, examined below, are themselves framed by this larger narrative of temporal reorientation. The speed of telegraphic transmissions, which enabled more or less simultaneous communication between people in opposite parts of the country, and the introduction in the 1840s of "railway time," which began with the synchronizing of clocks at stations on the Great Western Railway's network and culminated with the standardizing of time across Britain, are examples of a general coordination of time associated with the regularizing impetus of industrial culture and machine efficiency. Just as the smooth iron of the railway line asserted its standardizing influence over the peculiarities of the land, so railway time organized a variety of local times into a universal "clocktime." With the introduction of railway time, isochrony (understood generally as the principle of equalized or uniform time) became the temporal cornerstone of machine modernity, and like its spatial complement isotropy (homogeneous space), it structured Victorians' everyday lives, both on and off the railway, suggesting applications for a range of "social and natural phenomena."[28] Patmore and his contemporaries could not have failed to notice the systematizing force of machine-regulated homogenous time, which governed the setting of clocks in homes and public spaces, controlled factory production, enabled the transmission of telegrams, and coordinated travel by omnibus, canal barge, and train. Planning a railway journey, in particular, involved consulting a compendious document—the railway timetable—that rendered in book form the standardizing impulses of machine temporality. "If contemporaries had to choose one item that epitomized nineteenth-century life," writes Mike Esbeter, "they might have chosen the timetable. It appeared to mesh with the tightly regulated industrial discipline of time, while signifying in print what was taken by many to be the symbol of the age: the steam locomotive and the railway system."[29]

Produced in great numbers, sold at a comparatively low price, and studied by many thousands of passengers, railway timetables—such as *Bradshaw's Monthly Railway and Steam Navigation Guide*—were available from a variety of publishers from approximately the late 1830s.[30] With their tabular organization of information, where "only quantities existed," railway timetables appeared to many a "literary puzzle," a "conglomeration of little figures, lines, and letters"—the antithesis of a fictional narrative that one might read cover-to-cover. In their presentation of material, then, and in the method of "functional reading" they demanded, timetables were not unlike the *Gradus ad Parnassum*, that infamous compendium of classical quantities, and related textbooks on Latin and Greek grammar and versification used widely in England's public schools. As we will see in "Meter Manufactories," these books demanded a skill set different from the one used in what Esbester terms "narrative reading." Using the Gradus to find a word with the requisite "long" and "short" quantities was like using the railway timetable to locate a particular "up" or "down" train. In both cases, reading is "not for leisure": rather, it is "goal-driven" and necessarily "fragmentary."[31] (Few people are likely to read a railway timetable in its entirety, just as few people—apart from prosody historians, perhaps—read a Gradus from Ā, *ăb* to *zȳthum*, *i*.)

This resemblance between the railway timetable and a schoolboy's classical exercises did not go unremarked by the Victorians themselves. In fact, it became something of a running joke. To understand a timetable, according to an 1850 article in *Punch*, one must have "learnt it in his early youth, for to us it is one of the dead languages . . . ."[32] Another piece in *Punch*, from 1865, depicts the railway guide as a textbook whose metrical lessons refuse to be "exhausted": "You may have tired of your favourite poet in a fortnight; but how many of BRADSHAW'S grandest lines remain unscanned?" Members of Parliament are imagined as grown-up prosody swots, eager to supplement their studies: "LORD DERBY examining [*Bradshaw's*] for opportunities for classic meter. LORD HOUGHTON making all the stations rhyme."[33] For other passengers, timetables offered more drudgery than delight, their "lessons" recalling difficult learning scenarios—for which exercises in classical prosody were a well-known byword. In his 1858 collection of poems *Belgium and Up and Down the Rhine: Metrical Memorials*, Henry Bateman, a physician and founder of the New Church College in Islington, classes *Bradshaw's* with the "Grammar, French, Latin, Algebra,

and stuff" that he remembers from "early school." In the end, he finds "this popular guide and instructor" even more daunting than these philological and mathematical subjects: "'Bradshaw' beats me, out and out, at last!"[34] The "careful study of 'Bradshaw'"—as Bateman and many of his contemporaries opined—did not always leave the student of railway scheduling better equipped to navigate the "Ups and Downs of Life, from the Express to the Parliamentary."[35] Many young men, despite years of study with a Gradus, could have said much the same thing about their comprehension of the rules of Latin versification. Using either text to ascertain correct "quantities" often had as much to do with luck as with diligent study.

Because railway timetables such as *Bradshaw's* were instrumental in accustoming the Victorian popular imagination to the temporal logic of the railway and machine-ordered modernity more generally, we should consider them not only for what they have in common with elements of classical prosodic pedagogy but also as a significant point of orientation for emerging ideas about English poetics and the metrical "discipline of time" associated with Patmore and the New Prosody. As documents where synchronization and durational precision were paramount, timetables were paper instantiations of the railway's smooth, perfectly measured lines. Here the ideal "grid" of the "machine ensemble" asserted itself in its purest, most abstract form. Displaying information in rows upon rows of figures, the timetable offered readers what Barbara Adam describes as "time that is abstracted from its natural source; an independent, decontextualized, rationalized time. It is a time that is almost infinitely divisible into equal spatial units . . . ."[36] The timetable, of course, presents an "ideal," rather than a "real," image of railway movement, magnifying the logic of isotropy and isochrony. However late a train might actually start from Paddington, for example, and however much real time it may lose (or gain) before arriving at its destination (say, Exeter or Plymouth), the timetable reflects departures and arrivals only as they are scheduled. The grid may offer a standard of temporal organization to which actual journeys *should* conform, but it is not always the case that real movement is modulated in time with the regulations of *Bradshaw's* or a similar measurement index. Just as delays, those "departures" from the timetable's modulus, demonstrated that the grid's abstract timings were, like Patmore's meter, only "imaginary," so too did the abstract time-spacing of *Bradshaw's* demand a degree of compliance from real railway traffic. "Trains had to be scheduled," notes Herbert Sussman, "to move along

the tracks at regular intervals so as not to collide."[37] Similarly, the driver of an "early" train may be encouraged, by a railway representative or a signalman (that enforcer of the timetable's "law"), to reduce his speed—that is, to modulate the time of his train, bringing its (real) motion back into line with the (imaginary) timings printed in the schedule.[38] As we have seen, such an exercise in spacing was also, for Patmore and several of his New Prosody successors, a theoretical concern. One element in particular of their adherence to the dialectic of rhythm and meter was a method of moderating the pacing of the former so that it aligned with the latter. To achieve a good correspondence between meter and delivery time, one might "fill up" a measure with the voice or with silence. For Patmore pauses are crucial as a means of harmonizing spoken cadences and the abstract, isochronous timing of metrical intervals.[39] In his 1880 *Elements of English Prosody*, John Ruskin endorses this theory, asserting that a reader may, "with his voice" or by observing "measured rests" in his delivery of a line, "[fill] up the time required" by the count of meter.[40]

As a machine medley that mobilized Victorian modernity in the direction of "isotropic, coordinate space and time," the railway brought the bodies and minds of millions of Victorians—some of them poets and metrists—into contact with new regimes of measurement, temporality, and abstraction. Whether gazing out of the window to count telegraph posts or checking elapsed journey times against their copy of *Bradshaw's*, railway passengers were increasingly experiencing their comings and goings in ways that encouraged a kind of spatio-temporal double-consciousness. Not only did the timetable's "matrix format" ask passengers "to work in two dimensions at the same time," reading information in horizontal rows and vertical columns to determine the timings for a given route.[41] Timetables were also part of Victorians' phenomenology of time, at the foundation of which was an experiential polyrhythmia: to move by modern machine was to possess at once an awareness of the regular, periodic spacing of guide-time and the quite possibly messy pacing of lived-time—and, of course, the slippages between the two. Such slippages were visible also in the railway's movement across the land, which rose and fell in syncopation with the engineered smoothness of the track. It is hardly surprising, then, that a new metrics, just beginning to coalesce as the age of railway travel was itself getting up to speed, should incorporate elements of this widespread spatio-temporal experience of machine culture. In February of 1857, an anonymous writer

in the *Railway Record* pleaded for the introduction of a "uniformity of gauge" to resolve the practical problem of incompatible "narrow" and "wide" lines. Of course, his was not that year's only periodical contribution to the very timely question of standard measurement.[42]

Absolute Beat

Of course the railway was not the only technology that transformed Victorians' experience of time. Other nineteenth-century machines—such as the electric telegraph, itself a component of the railway "machine ensemble"—insisted upon temporal precision. The telegraph proved useful to the long-distance communication operator not least because it measured out its beats clearly. In his *Telegraph Manual*, published in 1859, Taliaferro Preston Shaffner—sometime lawyer, inventor, and collaborator with fellow American telegraphy pioneer Samuel F. B. Morse—offers the following remarks on an apparatus known as the Bright Telegraph, named after its designers, the British engineers Charles and Edward Bright:

> The needles beat against the pins, and a sound is produced sufficiently distinct to be read by the operator. . . . The operator need not depend upon the eye to see the movement of the needles. The pins may be made to produce different sounds, and those sounds can be as distinct as the beats or movements of other systems producing intelligible sounds.[43]

The "intelligible sounds" of beating telegraph needles appealed first to the operator's ear. As Rudy demonstrates in *Electric Meters*, the telegraph asserted its rhythms physiologically: "telegraphic language," as registered by operators or clerks, was a "bodily experience" that produced its own forms of "physical stress."[44] But there is a slightly different way of explicating the meters of telegraphy that I want to explore here. By giving the abstract "system" of Morse code material form, the telegraph effected what amounted to the *reification* of meter, lending material expression to the otherwise immaterial ictus, that "all-important . . . time-beater" that is among the central features of Coventry Patmore's "law" of meter. The technologies of telegraphy—like those of the coordinated communication network to which they belonged—provided a mechanical impetus not only for a "physiological poetics" but also for its contrapuntal counterpart: a burgeoning metrics of abstraction.

As many readers will know from experience, there are times when the beat of metered verse seems to force itself upon the mind's ear. In her essay "Meter and Meaning," from the 2011 compilation *Meter Matters*, Isobel Armstrong offers an anecdote about hearing a line of verse as what we might call "pure" or "absolute" beat. What plays "in [her] head" as

de de dum de de dum de dum de, de dum de de dum de dum

turns out to be the metrical "pulse" (somatic and fittingly telegraphic) of Alfred Tennyson's 1842 poem "Break, Break, Break." Armstrong's beat-memory allows her to stress a point. Meter and words do not always assert themselves as an indivisible unit: they "are not tied together." On occasion meter can exert a "somatic pressure" that is distinct from—"breaking" with and quite possibly irreducible to—what she terms the "semantic meaning" or "cognitive content" of the poem.[45] The possibility of dissociating the beat signature of meter from words is, in large part, what underpins many modern theories of versification, especially those in the New Prosody tradition that emphasize a distinction between *meter* as fixed (and abstract) pattern and *rhythm* as variable (and material) interpretation of that pattern. Patmore's metrical theory relies on this distinction, where the regular pacing of meter in the mind distinguishes itself from any possible (and possibly irregular) performance of the line, thus allowing for syncopation—an interplay between the rhythms of spoken sound and what Patmore understands as the "imaginary" spacing of beats. If meter and words are bound together tightly, then there can be no such counterpointing. "Indeed it is no small part of the poet's art," as M. A. Bayfield would declare in *The Measures of the Poets* (1919), "to see that his units of rhythm shall not correspond too frequently with the metrical feet."[46] In these elaborations of meter, we are told that there can be no threading of patterns, no possibility of "polyrhythmia"[47] where such a correspondence dominates a line, where the ideal pattern of meter and the material vocalization move as one, rising and falling, and spacing themselves, in unison. Moreover, as Patmore, Bayfield, and later historians of their metrics, such as Armstrong, assert, too much correspondence of this kind not only precludes syncopation but also produces its antithesis: programmatic, monorhythmic verse. If meter and words (or simply their phonemic values) map onto one another perfectly—for example, if a reader overemphasizes meter, subordinating speech

rhythms to its regular pacing—then the "imagined variety" produced by rhythms crisscrossing is nullified; one is left with only metronomic meter: the "ticking of a clock," which, according to Patmore, is "truly monotonous."[48] This particular, though by no means universally accepted, understanding of meter has been embedded in many nineteenth- and twentieth-century theories.[49]

This one-dimensional beating can be heard in exaggerated form in the measures of telegraphy, where clicks are an example of unmitigated meter. This is, in effect, what Armstrong hears: the metronomic beat of meter, unmitigated not because the poem's words fall in line with its meter too neatly but because they have disappeared altogether. Thus beats the telegraph. Like the meter Armstrong describes, it "ask[s] for words" yet remains "independent of them and of semantic meaning."[50] And for good reason. As Victorian telegraph operators well knew, a contrapuntal dialectic between code and word is a liability, to say the least, and trustworthy devices were designed so as to preclude such confusion by prioritizing the code. Working with deliberately sounded beats, an experienced telegraph clerk counted, quite literally, on one of two phenomena: a total equation of words and beats (where the coded beat is the precise sonic surrogate for the letter or word it symbolically represents) or, for a very practiced operator, a near-erasure of words, which fall away as the code of beats accrues meaning in and of itself. Words, in this scenario, are all but superfluous. As the American linguist Edward Sapir observed in 1921, "certain [telegraph] operators may have learned to think directly . . . in terms of the tick-auditory symbolism . . . developed in sending telegraphic messages."[51] That is, they may have thought *only in beats*, so fluent in their trade that one sign system (telegraphic code registered as audible pulses) completely replaced the other (the words those pulses denote). The result is a "metrical" pulse more or less without cognitive content, or code as exact symbolic proxy for cognitive content. Either way, what distinguishes the rhythmic beating of telegraphy is the prominence of the beat: code foregrounded as code, which can stand in for words or allow operators to dispense with them entirely. Thus, in the "metrical" index of Morse—the most widely adopted telegraphic code, given material form by a panoply of electrified machines—the clerk was confronted with what might be termed absolute beat, a hyperbolic example of the metrical phenomenon that Armstrong describes in relation to Tennyson's poem.

The respective beats of meter and telegraphy keep time in some other noteworthy ways. Not only was nineteenth-century telegraphic communication essentially a technology based on "a measured rhythmic movement"[52] of clicks or beats, as a variety of contemporary sources observed; its conventional means of distinguishing among units of electrically transmitted data also had much in common with the existing conventions for prosodic notation and scansion. Morse code, invented in 1836 and by the 1840s the standard telegraphic vocabulary in use in both America and Britain, was effectively a binary system that enabled devices to send and receive messages by transmitting short and long pulses of electrical current. These "shorts" and "longs"—terms well-established in the study of classical verse as denoting the quantity (i.e., pronounced duration) of syllables—could be combined to represent the twenty-six letters of the Roman alphabet, as well as the Arabic numerals 1–10 and certain marks of punctuation. Their combinations were remarkably foot-like. One short beat followed by one long one, for example, signified the letter "A"; a long beat followed by three short ones was equivalent to "B," and so on. While telegraph machines registered long and short electrical pulses as a variety of different sounds (e.g., needle clicks, pipe tones, bell strikes), they all shared the same basic sign system. As Robert Sabine describes in *The History and Progress of the Electric Telegraph* (1869), "[t]he elementary signs of the Morse telegraph are two, a dot and a dash, produced by the recording instrument according to the time which the key at the transmitting station is held down."[53] In its graphic form (as seen in telegraphy manuals and also on the transcriptions of some so-called copying or recording telegraphs), the dot-dash chains of Morse code were similar to the groupings of macrons and breves that schoolboys, classics masters, poets, and verse theorists (among others) used to mark the quantities of Greek and Latin verse. No doubt many of those exposed to both systems of notation would have heard and seen in Morse code an echo of classical scansion. Indeed, the American Unitarian minister Edward Everett Hale, in his humorous 1858 essay "The Dot and Line Alphabet," conflates the two forms of notation when he imagines how Morse's system of longs and shorts could be used to make bells "sound intelligibly": "D$\bar{a}\bar{u}$ng dĭng dĭng, — dĭng, — dĭng d$\bar{a}\bar{u}$ng, — d$\bar{a}\bar{u}$ng d$\bar{a}\bar{u}$ng d$\bar{a}\bar{u}$ng, and so on, will tell you as you wake in the night that it is Mr. B.'s store which is on fire, and not yours, or that it is yours and not his."[54] Eventually, Morse code's dots and dashes came to be expressed as the words *dit* and *dah*, respectively. A line of

telegraphic code displayed with this notation (e.g., *dit dit dah*—Morse for the letter "U") would look and sound very much like Armstrong's representation of Tennyson's meter as a series of *des* and *dums*.[55]

In addition to its metrically resonant notation, telegraphic code relied on a temporal logic—at once in line with and moving beyond the prosody suggested by its quasi-quantitative classical terminology. It was time (not of syllable or word but of beats and dead-beats) that determined how operators read telegraphic patterns and divided a line of code into its constituent parts. Essential for the effective and unambiguous relay of messages in the Morse symbolic system was not only agreement about what dashes and dots and their corresponding long and short beats meant but also rules determining proportionate relationships between dots and dashes and among discrete groupings of them. First and foremost, a principle of equivalence was needed to help telegraph clerks identify letters, words, and spaces. As in classical prosody, where two short syllables are nominally "equivalent" in duration to one long one,[56] telegraphic code depended on an equation of short pulses of electrical current (dots) to long ones (dashes). "Each dot," notes George B. Prescott in his *History, Theory, and Practice of the Electric Telegraph* (1860), "requires only a single interval of time, while the dash requires two."[57] Here we begin to discern a "metrics" more in line with the temporal theory advanced by Patmore in his "Essay on English Metrical Law" than with the rules of classical quantity. Where quantitative verse takes the syllable (or simply the vowel sound) as its unit of measurement, Patmore's temporal metrics divorces time-keeping from linguistic units and links it with the abstract beating of the ictus. "The time occupied in the actual articulation of a syllable," he claims, "is not necessarily its metrical value."[58] So with telegraphy: beat-time, which is not connected to (much less coterminous with) syllable duration, is what counts. Further, the basic measurement units of Morse code—the integers of its "metrical" index—are not only temporal in organization ("the theory of *time* [is] the basis of this [telegraphic] alphabet"[59]) but also predicated, like Patmore's meter, on the principle of isochrony, or the equal spacing of beats in time. Because "any great variation in time would introduce confusion into the signals," as Schaffner observes, timings were standardized not only for code components specifically, as we have noted, but for the signaling process more generally. "We see," writes Prescott, "that intervals of equal time elapse between two dots, from one dot to the following dash, from the commencement of the dash to the first following

sign." Operating a telegraph, then, was an exercise that in notation resembled the scanning of Greco-Roman verse; in practice, however, the time marked was not linguistically but electrically determined: just as only "isochronous intervals" measured by a time-beating mental ictus registered as meter to Patmore, so only the even spacing of beats and pauses mattered to the telegraph clerk. "All that is necessary to a perfect understanding of the theory of this unique and simple alphabet," one telegraph commentator remarked, "is to appreciate the difference in *time* between a dot and a dash, and a short and a long space."[60] Telegraphy's measurement logic is one that Patmore would have appreciated.

With its prosody of proportionate time-spaces in which intervals are clearly marked by a beat, telegraphy is an apt machine counterpart to the New Prosody, which began to assemble its own theoretical apparatus, as most historians of Victorian metrics have suggested, from the 1850s. By then, the "more rational and real methods" that Omond identified as defining characteristics of this "new" approach to meter had already established themselves, in principle, as the logic that made telegraphy tick: a general abstracting of measurement from semantic and syllabic values, an assertion of time as the basic measurement index, and a congruence with what Omond termed "musical structure." The "duration-related code"[61] that Morse operators listened to on a daily basis was, in keeping with meter as described by Patmore's contemporary E. S. Dallas in his *Poetics* (1852), simply "*time heard*." Similarly, though their units of measurement and their modes of delivery may not have corresponded exactly, "the thing measured" by both the telegraph and Patmore's meter "is the time occupied in the delivery of a series of words." And while he may make much of his allegiance to Hegelian idealism, Patmore's insistence on the essentially isochronous spacing of the ictus in English poetry is also in tune (and time) with telegraphy's well-established conventions of isochronously spaced bursts of electric current. Even the associations that Patmore makes between intervals of time in metered verse and bars of music—linkages that would be pursued as part of a full-blown musical metrics later in the century—had their telegraphic complement in what Dionysius Lardner, in *The Electric Telegraph Popularised* (1855), described as a diverting corollary of the Morse system's time-patterning. Lardner relates a story about a musical "experiment at New York," where clerks prevail upon one of their opposite numbers in Boston to use his machine to beat out music—to send

songs such as "Yankee Doodle" and "Hail Columbia!" "by means of [their] rhythm[s]": "The instrument commenced drumming the notes of the tune as perfectly and distinctly as a skilled drummer could have made them . . . ." What the operator sends, as musically minded metrists such as Patmore would have known, was "the *time* of music"[62]—its bars rendered as audible pulses of electric current, marked on telegraph tape as uniformly spaced dots and dashes.

Jason Rudy has argued persuasively that Patmore's "insistence on meter's immateriality" is, in part, a response to the somatic shocks associated with the spread of electric telegraphy—particularly as relayed rhythmically by "the profound physicality" of Spasmodic poets such as Sydney Dobell and Alexander Smith.[63] Patmore's "imaginary" meter, he suggests, provides the poet-prosodist with a means of resisting the dangerous, embodied rhythms that the telegraph made manifest: the evenly spaced beats of his ideal ictus impose their order as a safeguard against telegraphic communication's unruly, spasmodic pulses. Yet telegraphy's measures, as we have seen, were characterized not just by a "sensational" transmission of beats but, signally, by a rule-bound, even musical and harmonious organization of them—an organization premised on temporal and specifically isochronous measurement. When Omond notes that "Patmore voiced ideas that were in the air,"[64] he may not exactly have overhead telegraph lines in mind, but he nonetheless invites us to detect a somewhat different impedance between Patmore's temporal theories and contemporary technologies of communication from the one that Rudy records. For the "new" generation of poets and prosodists—Patmore, Dallas, and their immediate successors—the "metrics" of electric telegraphs were virtually unavoidable, the everyday measures of an increasingly standardized and thoroughly mechanized modernity. If their externalized beating "initiated new ways of experiencing time and space that found their ways into the fabric of everyday life," as historians of Victorian telegraphy have asserted, then it is worth considering the New Prosody's abstracted, "imaginary" meter as another instance of how the telegraph's "new rhythms" were being "internalized" by millions of people across Europe and North America.[65] It was not only telegraph clerks who heard meaning in the messages of Morse. By the sound of it, Patmore may well have had telegraphy on the brain.

Thump and Thresh

Not all machine provocations were as easy to reconcile with the principles of meter that we typically associate with the New Prosody, specifically those we have observed in relation to the railway and telegraphy: namely, abstraction, spacing, and the contrapuntal interplay of meter and rhythm. Some mechanisms, in fact, seemed antithetical to the logic of even spacing and the clear marking of beats in time. The rhythms of telegraphs were reassuringly regular, their ictus-like beating slow and evenly spaced enough to count with the unaided ear. However, the steam thresher—another emblematic "machine in the garden"[66]—appeared to defy measurement altogether, its mechanized mastication producing a din that seemed "alien" to ears accustomed to the cadences of manual grain separation, and markedly at odds with a metric such as Patmore's. Its capacity for standardizing aspects of the harvest notwithstanding, the threshing machine suggests an alternative way of construing the effects of mechanization on prevailing understandings of metrical abstraction, as well as meter's relationship to speech rhythms and methods for describing forms of machine-generated rhythmical movement. If we can read the railway and telegraph as material counterparts to several of the abstractions that the New Prosody promoted, then we can see the steam thresher as a disruption of the isochronous, recurring beat signature associated with Patmore's imaginary ictus. The distinctive sound it generates overrides the possibility of mental marking, demanding a reconsideration of both *what* we understand meter to be and *how* we perceive its movement. Where the railway line offered up to travelers an image of perfect smoothness, the machinery of threshing presented workers with its converse: a burring roughness. As I will show, the coercive rhythms of this mechanical voice were hard to resist.

Before the invention of the threshing machine in the 1780s, grain separation was a task that had changed little for millennia. In eighteenth-century Britain, threshers were strong-armed men who used articulated wooden sticks called flails to beat the husk away from harvested grain in preparation for winnowing. As John Goodridge observes in his examination of rural occupations, this labor-intensive, noisy, and rhythmically idiosyncratic process was performed throughout the year, and as a result its beats became lodged in not only the farmer's but also the poet's imagination.[67] In two popular threshing poems, Stephen Duck's "The Thresher's Labour" (1730) and William Cowper's "The Task"

(1785), there is an attempt to mime in meter the singular sound of flailing. Duck's description emphasizes the synchronized movement of the bending and rising workers—"Down one, one up, so well they keep the Time"—while Cowper's onomatopoeia stresses the relentless sound of the beating hand-tool—"Thump after thump resounds the constant flail."[68] For both poets the description involves a small but noteworthy deviation from the lines' prevailing metrical structure. The flailing motion is signaled by what at first appears to be a trochaic substitution at the start of an otherwise regular iambic line. On closer inspection, however, it becomes clear that the mimetic element of the lines, where the movement of the threshers (in Duck's poem) or the sound produced by their flails (in Cowper's), constitutes a deliberate arc of stress that goes beyond the opening trochaic foot, falling and rising across the first *four* syllables in a marked pattern: "Dówn ŏne, ŏne úp" and "Thúmp ăftĕr thúmp." These unusual line openings—what we might read as a single foot, the Latin-derived choriambus, which comprises two stressed (or "long") syllables enveloping two unstressed (or "short") ones—begin with dactylic downbeats before rising again at the completion of the flail's "swing." In both cases, the remainder of the line, which merely comments or elaborates on the initial metrical enactment of threshing, relaxes into more conventional Augustan iambs. By the sound of it, both poets delighted not only in the "the rhythmic pleasures" of threshing but also in the distinctive distribution of beats and off-beats that gives character to the "prosody" of the threshing floor.[69]

Clearly marked periods between beats, a signature feature of the New Prosody, were also the hallmark of conventional threshing. The "charm" of premechanized threshing, as Duck's and Cowper's poems assert and as several nineteenth-century observers would concur, was linked to its rhythmical assertiveness, its symmetrically recurring beats. In 1857, the same year that Patmore was theorizing the "equal or proportionate spac[ing]" of the ictus, that "all-important . . . time-beater" of metered verse,[70] C. J. Merz was using almost identical terms to assess beats in music and, by analogy, threshing. In an essay entitled "Melody and Rhythm," printed in the *New-York Musical Review and Gazette*, Merz argues that "*the symmetrical return of certain proportions of time*," as marked by "the rise and fall of the accent," is what constitutes beauty in sounds. He goes on to posit a "fondness for measured time" as the basis of our attraction to melody in music.[71] This predisposition to "measured time" is also essentially what informs an appreciation of threshing's old rhythms.[72] As Merz writes,

> In former times, within my own recollection, before threshing-machines had superseded the primitive flail, we could hear the threshers use their instruments in a regular, symmetrical succession of strokes, so as to establish a peculiar measure of time; thus they would be able to bear the monotony of their occupation, and even turn it into an amusement, and find in it an object for ambition . . . .[73]

With the introduction of threshing machines, which derived no "amusement" from their labor and had no "ambition" to perform it more harmoniously, the hand-flail's slow "symmetrical succession of strokes" gave way to a mechanical efficiency whose rhythms were sufficiently different from the cadences of the older activity as to appear meterless—at least insofar as contemporary ears could tell.

By the early decades of the nineteenth century, threshing machines were in use across the country. From the 1830s, in the wake of the so-called Swing Riots, they became the emblems of agricultural unrest and resentment among farm workers, who worried that the machine was making their labor redundant. In this context, the unmistakable "swing" of the flail, its tell-tale beating (beating now focused not on grain but on the machines themselves, which were frequently smashed and burned in protest), was regarded by many as a radical rhythm, the calling card of "Captain Swing." But not everyone, it must be said, resisted the introduction of agricultural machinery and its new rhythms. In 1860 J. D. Bell, a Methodist minister from Weedsport, New York, advised "Literary men" to familiarize themselves "with the makers of threshing machines, locomotives, and reapers."[74] Bell's enthusiasm was shared by the English reverend and poet Charles Tennyson Turner, elder brother of Alfred Tennyson. Turner's double-sonnet "The Steam Threshing Machine" (1868) is an encomium to mechanized agriculture:

> THE STEAM THRESHING MACHINE
>
> *With the Straw Carrier.*
> Flush with the pond the lurid furnace burned
> At eve, while smoke and vapour filled the yard;
> The gloomy winter sky was dimly starred,
> The fly-wheel with a mellow murmur turned;

While, ever rising on its mystic stair
In the dim light, from secret chambers borne,
The straw of harvest, severed from the corn,
Climbed, and fell over, in the murky air.
I thought of mind and matter, will and law,
And then of him, who set his stately seal
Of Roman words on all the forms he saw
Of old-world husbandry: *I* could but feel
With what a rich precision *he* would draw
The endless ladder, and the booming wheel!

Did any seer of ancient time forebode
This mighty engine, which we daily see
Accepting our full harvests, like a god,
With clouds about his shoulders,—it might be
Some poet-husbandman, some lord of verse,
Old Hesiod, or the wizard Mantuan
Who catalogued in rich hexameters
The Rake, the Roller, and the mystic Van:
Or else some priest of Ceres, it might seem,
Who witnessed, as he trod the silent fane,
The notes and auguries of coming change,
Of other ministrants in shrine and grange,
The sweating statue,—and her sacred wain
Low-booming with the prophecy of steam![75]

His admiration for "the prophecy of steam" notwithstanding, Turner records the difficulty of assimilating what Bell had described as the "stentorian utterances which come from throats of wood, of iron, of brass, and of steel"[76] to conventional, especially classically inherited, meters. The sounds of mechanized threshing, as Turner's two sonnets represent them, are indeterminate: on the one hand, the machine grumbles with inarticulate cadences ("a mellow murmur"), while on the other it enunciates its periods declaratively ("booming"); it also produces a "Low-booming," an ominous, muffled sound that suggests distant cannon fire. Considering how to give metrical form to the still comparatively new soundscape of the corn harvest—no longer heard as the steady systolic plosives "up" and "keep" and "thump"—Turner implies, in the second sonnet, that the "rich hexameters" of classical antiquity may not be adequate conveyances for the "notes and auguries of the coming change"

to farming practices. While the dactylic downbeat that we noticed in Duck's and Cowper's poems may have approximated the rhythm of the hand-flail (both the instrument and the meter tracing their heritage back to the classical world), did it correspond to this new technology and its loud, though somewhat indistinct, mutterings?

Almost 50 years later, questions about the mechanical thresher's metrics continued to preoccupy poets, particularly in relation to the theory of beat-spacing associated with the New Prosody. A one-time interlocutor with Patmore, whose "law" of meter she in many ways admired, Alice Meynell begins her poem "The Threshing Machine" (c. 1914) by acknowledging the gulf between the bygone world of manual husbandry and the newer (by then well-established) one of mechanized farming:

> No "fan is in his hand" for these
> Young villagers beneath the trees,
> Watching the wheels. But I recall
> The rhythm of rods that rise and fall,
> Purging the harvest, over-seas.
> No fan, no flail, no threshing-floor!
> And all their symbols evermore
> Forgone in England now—the sign,
> The visible pledge, the threat divine,
> The chaff dispersed, the wheat in store. (lines 1–10)[77]

Meditating on a nation changing utterly with the deaths of so many soldiers in the Great War (1914–18), this poem marks absences, not only absent persons but also discontinued work practices and the familiar rhythms associated with them. Gone are not only the material "sign[s]" of hand-flailing—"No fan, no flail, no threshing-floor!"—but also the rhythms they generated. But what has replaced them? Where Turner's poem looks backwards to classical meters, which may or may not resonate with the rhythms of modern threshing, Meynell's harbors doubts about whether these sounds (and some of her descriptions are reminiscent of Turner's) can be understood as metrical at all:

> The unbreathing engine marks no tune,
> Steady at sunrise, steady at noon,
> Inhuman, perfect, saving time,
> And saving measure, and saving rhyme—[.] (lines 11–14)

Meter and rhyme, these lines suggest, are unnecessary adornments for the quotidian task of grinding grain. Yet line 12, which is anything but "steady," carries what amounts to a metrical memory of the now-fading rhythms of the hand-flail, though it is unable to reproduce those cadences perfectly: "Stéadў ăt súnrĭse, stéadў ăt nóon . . . ." Here, mid-line and final pauses—those in-built mechanisms for promoting a correlation between metrical spacing and the voicing of a line—function as reminders of metrical absences, effectively standing in for omitted slack syllables, which, if present, would complete the line's dactylic pattern and so "fill up" its metrical time. If the distribution of stresses at the start of the line and immediately following the caesura are any indication of the abstract timing of its meter, then a short pause (one slack syllable) would be needed after "sunrise" and a longer pause (two slack syllables) after "noon."[78] The mechanical operations that this and the immediately following lines describe seem equally at odds with the even beating of meter, dactylic or otherwise, that machines such as the telegraph exhibit. It is not absence of sound or rhythm that characterizes the threshing machine, however, only its "tuneless," "measureless" workings. The thresher's "rhythm of rods that rise and fall" is presumably visible enough to an onlooker's (or at least to an operative's) eye, but its sounds refuse to organize themselves into a regular, clearly discernible pattern that the ear can identify as its meter. The definite beating of the flail has been replaced by a "steady" machine noise. For "steady" we might be tempted to read "regular" or "uniform," but given the lines' insistence on the thresher's "saving" (that is, *obviating*) at once "time," "measure," and "rhyme," it seems more likely that "steady" does not describe a succession of beats but rather a continuous, uninflected, and incessant sound.

To those new, or at least not habituated, to the sounds of steam threshing, such a machine noise would have seemed metrically unremarkable precisely because it would have sounded *unmarked*—because it would have lacked perceivably marked periods. Though the threshing machine does have a "beat," its pulses occur too quickly to be heard distinctly. As Hermann von Helmholtz, a pioneer of nineteenth-century empirical acoustics, observes in his 1863 treatise on the physiology of musical sound, "the ear is . . . unable to follow [rapid beats] sufficiently well for counting." Instead of the familiar "thumping" beat, then, persons exposed to a threshing machine heard what Helmholtz refers

to as a "rough," "unpleasant," "jarring tone."[79] This noise, as Arnold Pacey explains in *Meaning in Technology* (1999), is the rhythmic signature of engines that vibrate at a high frequency, as opposed to the easily countable "throbs" of an engine that vibrates at a low frequency. "With vibrations of higher frequency," he states, "we are no longer aware of either rhythm or throb, but instead we hear a buzz, hum, or continuous note"— what in Turner's and Meynell's poems gets expressed as the steam thresher's "murmuring" or "steady" sound.[80] The comparatively slow beats of the human thresher's flail, like the telegraph, have a frequency that human ears can hear, whereas the much quicker succession of beats accomplished by the machine's metal apparatus blends into a sound beyond humans' physiological—and therefore metrical—threshold of perception.[81] Many of those who listened to the steam thresher's hummings and buzzings may not have been familiar enough with its beat signature to hear distinctly and so count or "measure" them. Thus, especially for a poet such as Meynell—who, like Patmore, understood meter as a clearly marked timing of beats—the "rapidly beating tones"[82] produced by the threshing machine's sundry moving parts (gudgeons, beaters, pitch-chains, feeding-rollers) could not be said to mark the ictus. Furthermore, not only were the thresher's beat periods effectively indistinguishable from one another; the stentorian buzzing noise that machines such as the thresher emitted—their insistent drone—presented another problem: it did "*not admit*," to borrow Patmore's words, "*of an imagined variation*."[83] So overbearing was the steam thresher's noise that it very likely made marking the regular beats of an imaginary ictus (creating a mental melody to mitigate the job's monotony) almost impossible, its hum reverberating distractingly even inside one's head. Even as the abstract recurrence of regularly marked periods was finding expression in the machinery of telegraphy and the railway, here was a machine that seemed bent on obliterating altogether the steady pulse of the ictus.

While steam threshers did not always seem easy to reconcile with the discrete percussive beats of the metrical ictus, that is not to say they did not have an undeniable (indeed unavoidable) rhythmical energy—a voice of their own with raspy, burring rhythms. In fact, machines such as the steam thresher could assert their distinctive monotone buzz to the point of coercion, at once prohibiting other rhythms and forcibly asserting their own. What Roger Ebbatson has read, in relation to Turner's sonnet, as the threshing machine's "imposition of mechanical will-power"[84]

is, in many contemporary accounts of threshing, directly linked with the device's distinctive high frequency vibrations. In both his 1891 novel *Tess of the d'Urbervilles* and an earlier essay on agricultural labor in Dorset, Thomas Hardy—who, as a poet, "realized the implications" of the New Prosody's innovations in temporality and abstraction[85]—offers a vivid account of how the threshing machine enforces its rhythmical *will* on the workers whose livelihoods demand close contact with it. We learn in *Tess*, for example, that the "inexorable," "penetrating hum" generated by the "despotic" threshing machine causes workers' bodies to vibrate in terrifying sympathy, "thrill[ing] to the very marrow all who were near the revolving wire-cage."[86] In his 1883 essay "The Dorsetshire Labourer," Hardy details an even more drastic effect of the thresher's rhythms on the body. Once the hum got into workers' bones, its vibrations could very well influence their locomotive rhythms:

> A thin saucer-eyed woman of fifty-five, who had been feeding the machine all day, declared that on one occasion in crossing a field on her way home in the fog after dusk, she was so dizzy from the work as to be unable to find the opposite gate, and there she walked round and round the field, bewildered and terrified, till three o'clock in the morning, before she could get out. The farmer said that the ale had got into her head, but she maintained that it was the spinning of the machine.[87]

Spinning involuntarily around the field, unable to control her own body, this wide-eyed woman has succumbed to the magnetic power of heavy metal, its disorienting rhythms rendering her what Karl Marx called a "living appendage of the machine."[88] In the end, it seems, the mechanized meters of the steam thresher would find their feet—however much they might appear to be out of step with the New Prosody's law.

They would find a voice as well. The same ineluctable noise that caused workers' bodies to quiver—the thresher's mesmeric murmuring—also regulated the communication of anyone working within the ambit of the engine's rapid revolutions. In *Tess* we hear that "[t]he hum of the thresher, which prevented [workers'] speech, increased to a raving whenever the supply of corn fell short of the regular quantity."[89] It turns out that the machine does, in fact, have quite determined periods of motion, whether hearers recognize them as metered or not, and its motorized "ravings" admonish workers whose bodies struggle to keep pace with its

insatiable appetite for corn. In addition to these demands that a "regular quantity" be observed, the constant humming drone, as I noted above, is enough on its own to override at once mental time-marking and competing speech rhythms. The machine effectively buzzes Tess and her fellow laborers into voiceless submission to its metallic muttering. What is more, long periods of exposure to such determinative rhythms not only impose machine-measured intervals of speech and silence but also threaten to force-feed the machine's modulations into men's mouths. Standing beside the threshing machine "in a sort of trance," the engineman has a more immediate physiological connection with the engine he serves than the other workers: he is bound to it by a "long strap which [runs] from the driving-wheel of his engine to the red thresher." This material link places his body at the direct command of the machine's motive power—making him a vocal conduit for its vibrating rhythms. Like an automaton or ventriloquist's dummy, the engineman—who "holds only strictly necessary intercourse with the natives"—carries, Hardy implies, a trace of his engine in his speech. His "strange northern accent" serves as shorthand for the industrial world from which threshing machines were introduced, marking him as "alien" to the South-West world of the novel.[90] Given Hardy's awareness of prosody generally and of the ways that a machine's "meters" could find somatic expression, I like to think that the strangeness of the engineman's accent applies not only to his regional dialect but also to his voice's rhythmical inflections, which are marked by the "course kind of roughness" that Helmholtz associates with quick beats.[91] Perhaps what the workers hear when he opens his mouth is a sound modulated to the thresher's distinctive buzzing.

An Easy Flow of Language?

What does it mean to sound like a machine?[92] The threshing machine's vibratory pattern—the buzzing drone that appeared, to some auditors, to be without rhythmical periods—had itself a correlate in the physiology of human speech, which is produced by the vibration of the vocal folds or glottis. In their *Practical Phonetics and Phonology* (2003), Beverley Collins and Inger M. Mees gloss *voice* thus: "A glottal setting involving rapid vibration of the vocal folds, producing a 'buzz' which accompanies almost all vowel sounds and voiced consonants."[93] But it was not simply a case of the sounds produced in the human throat—what the

physiologist Oliver Wendell Holmes called "the human *bleat*"—being *like* the distinctive buzzing of a threshing machine; rather, the human vocal apparatus itself was conceived of, by many nineteenth-century speech scientists and pioneers of sound technology, as a mechanical instrument, whose inflectionless hum, if not necessarily its complex cadences and modulations, might be successfully synthesized, by surgical or other means.[94] The inventor of the telephone, Alexander Graham Bell, for example, entitled his series of lectures on speech and vowel theory *The Mechanism of Speech*.[95] Here he describes "an artificial substitute for the larynx, made . . . of dentist's rubber," shown to him by John Gray McKendrick, Regius Professor of Physiology at the University of Glasgow. A prosthesis with "a metal reed, taken from a harmonium or small parlor organ," enabled the patient, whose own "larynx had been excised," to speak in a comparatively "natural voice," the abiding "peculiarity" of which was the tell-tale machine buzz that resulted from introducing a simple machine that replaced the organic glottis with only its most basic "voicing" function. Thus the man's voice "was monotonous and without inflection," and to achieve any vocal variety, he had to manually substitute one reed for another. As fortune would have it, the man "was a machinist by trade" and so able to spend "his spare time manufacturing reeds for himself."[96]

One obstacle frequently encountered in relation to machine-generated speech, whether produced by a prosthetic implant or by a self-contained apparatus, was the difficulty of producing sounds that more convincingly imitated human vocalizations, going beyond the mechanistic, monochromatic vowel drone. Not only the steam thresher's infectious, buzzing vernacular but machine "speech" generally, especially as embodied by the synthetic voice technologies of the eighteenth and nineteenth centuries, had a tendency to exaggerate the drone, creating vibrations that approximated spoken vowel sounds but that failed to simulate joined-up or *articulate* speech and, by extension, the prosodic modulation of phonemes and syllables. For example, Wolfgang von Kempelen's 1791 talking machine, which produced vowel sounds when the operator manipulated "a pair of organ-bellows," was unable to link the sounds of letters "into syllabic combinations and words": "the sounds of the letters would not flow into each other without a clatter or pause. If too slowly enunciated, they would seem like a child repeating his alphabet . . . ."[97] Later improvements on the device, undertaken in the 1830s by the British telegraph inventor Charles Wheatstone, would inspire Bell to

investigate the possibility of a "musical telegraph," which in turn underpinned his contribution to telephony technologies. Though producing a vowel drone similar in certain ways to the rapidly vibrating buzz of the steam thresher, early speech synthesizers, in keeping with the segmented beating of the telegraph, tended to break up a message into its component parts—speech did not *flow* continuously as it would via the means of later voice recording and transmission devices such as the phonograph and telephone. The "vowel synthesizer" created by Helmholtz in the 1850s offered a modicum of flow from "one composite sound to another,"[98] using electromagnets to control the vibrations of tuning forks in order to produce vowel sounds. Yet even this device, while a sophisticated mechanizing of speech-sound harmonics, tended toward a breaking up of sounds, not emphasizing a "uniform phonetic flow" but instead "replacing the singular stream [of voice sound] with a pointillistic sound-world of discrete vibrational patterns."[99] "To make a machine that *articulates*," as Oliver Wendell Holmes would remark in 1863, "is not so easy."[100]

From "the dots and dashes of telegraphic communication" to the discrete, albeit rapid, vibrations of talking machines (a category that includes not only automatons but also the phonograph and telephone), the "modern telecommunications" of the nineteenth century, as Brian Murray has noted, were analogous with disarticulated and, at times, unintelligible speech. Murray's remark relates to the "savage-telegraphy" described by the Victorian explorer Henry Morton Stanley in his account of Congolese singing,[101] as opposed to, for example, the "distinct or intelligible syllabification" that, in Edgar Allan Poe's short story "The Murders in the Rue Morgue" (1841), distinguishes rational, educated speech from vocalizations that are "absolutely alien from humanity" (foreign voices, the raving of madmen, animal cries).[102] By contrast, another of Poe's stories, "The Man That Was Used Up" (1839), imagines how the "rapid march of mechanical invention"—namely in the field of human prosthetics—may not simply serve to reduce speech to discrete tonal values but might enable astoundingly clear and powerful articulation. Against the story's background noise of disarticulated and in places halting, telegraphic speech, exemplified aptly by Mr. Theodore Sinivate's "peculiar way of drawling out his syllables," is the eponymous used up man's "rich melody and strength" of voice. With the aid of a mechanical palate, Brevet Brigadier General John A. B. C. Smith finds a means of improving upon his impaired speech, which is described by the story's

narrator as being "between a squeak and a whistle."[103] In contrast to the reality of voice-box prosthesis, as described by Bell, Poe's proto-cyborg fantasy represents technology as an aid, rather than obstacle, to melodious vocal modulation.

As Poe himself was aware, the machine age did not always produce such salutary technologies for rendering melodious speech or, moreover, for systematizing the study of verse, of which delivery intonation was only a part. When Poe examined the state of modern versification in his essay "The Rationale of Verse" (1848), which he published not long before figures such as Patmore and Dallas began to articulate aspects of the New Prosody, he lamented the absence of a "system of rhythm" and a "system of scansion"—something that Patmore's "Essay on English Metrical Law," in its attempt to promote meter as a rule-bound abstraction, would attempt to redress. Unlike Patmore, however, for whom meter was only marginally about speaking verse and more about measuring imaginary intervals, Poe proposed that versification needed to offer clear guidance not only on the principles that inform metrical measurement generally—and here he inclined toward Patmore in downplaying accent in favor of an analogy with musical temporality—but also on the practices of *enunciation* through which those principles are mediated. These two halves of the prosodic equation had become decoupled, argued Poe, to the extent that a "learned prosodist" from the future looking back on nineteenth-century metrics might draw curious conclusions about the relationship between contemporary scansions, on the one hand, and pronunciation, on the other: "because we lived a thousand years before his time, and made use of steam engines . . ., we must therefore have had a *very* singular fashion of mouthing our vowels . . ." In particular, the orthodoxies of "scholastic scansion,"[104] which were at the core of nineteenth-century liberal education, tended to mitigate against smooth articulation and a rhythmically nuanced modulation of metrical "law," to borrow Patmore's term, and expressive verse-reading. Just as the telegraphic syllabification heard by Stanley sounded to him like so much inarticulate—literally not joined-up—"stammering,"[105] so did the application of meter to speech, particularly in nineteenth-century education scenarios, result in a form of exaggerated syllabification that did not merely counterpoint but frequently countermanded what Poe called "the rhythmical, musical, or reading flow" of verse.[106] The regular, monotonous flow of meter, in other words, might overwhelm expressive flow of speech.

Patmore himself understood a "perpetual conflict" between metrical language and linguistic expression to be essential to "the finest expressions of versification."[107] As a technology for regulating the movement of poetry—whether in the abstract, on the page, or with the voice—meter, as we have seen, was another means of controlling flow that Richard Menke has read as a hallmark of Victorian industrial society and that we have seen in operation with technologies such as the railway and telegraph.[108] Whether verses are scanned for the eye "with perpendicular lines [drawn] between the feet" or for the ear by reading in sing-song and metrically overdetermined, "the distinct marking of rhythmical flow,"[109] Poe opined, problematically disrupts the natural rhythmical (i.e., musical) flow of verse—resulting in verse-speaking where the meter, discernible in the delivery, may be, as Patmore remarked, "over-smooth and 'accurate,'" while the delivery itself is made to "*suffer from* the bonds of verse."[110] At best, "[p]ractice in scansion," as the authors of *The Art of Interpretative Speech* observed in 1927, "tends to monotonous, droning reading of poetry"[111]—as though it were voiced by a machine incapable of varying accent, pitch, or timbre. As we will see below, such a delivery style was associated not only with speaking machines but also with one of the century's most renowned poets. At worst, scholastic scansion might not only exaggerate syllabification and nullify modulation—the interplay of rhythms central to New Prosody, elements of which persisted in twentieth-century theories of counterpoint and metrical abstraction—but also render the verse unintelligible, to the point that an exercise designed to improve a pupil's understanding of prosody in fact served to further obfuscated it, leaving him trained to do little but write nonsense verses.

An irony here is that what Poe saw as a dearth of systematic prosody was, in fact, a corollary of the nineteenth century's principal prosodic systems, which, as I have been suggesting in the present chapter and as the rest of the book will examine in some detail, were at once coalescing and reconfiguring across a variety of disciplinary lines and in relation to an array of questions about bodies, minds, modes of speech, and methods of counting, computing, and expressing the rules and material instantiations of versification. That prosodic discourse was riddled for Poe, as well as many of his contemporaries, with "contradiction and perplexity,"[112] is, in part, due to the uneven practices in what was an expansive system of elementary prosodic instruction, but, moreover, a consequence of the rules on which the system itself was founded. Not

unlike electric telegraphy, which rendered language as a series of discrete proxy values (dots and dashes), the pre-eminent system of versification—that which anchored nineteenth-century classical education—was predicated upon syllabic exercises, in some cases inherited from the burgeoning factory system itself. These exercises commenced with a disarticulation of the line into its component parts, and it is this system—where the conventional patterns of meter as produced in the practice of scanning determine the voice—that was largely responsible for the sing-song, robotic prosody that Poe and many of his contemporaries saw as anathema. Enshrined in pedagogical orthodoxy, the practices of scansion made their impact felt on theories of English-language versification as well, and provoked Poe and metrists to assert alternative systems that promised a less clumsy subordination of speech to scansion.

But "scholastic prosody" was not the only culprit. Under certain conditions, as I will explain in "The Automatic Flow of Verse," the body and mind could assert their own mechanistic rhythms: stammering speech where measures stick in the throat or, on the other hand, forms of metrical automatism, whereby somatic rhythms or mental aberrations resulted in meters not consciously willed by the persons uttering them—frequently these meters, too, were programmatic and unmodulated, similar to those discussed above. Whether and how meter flowed became a question, which I have begun to assess here, about the extent to which human metrical ability or proficiency was the product of living in a time of steam engines and corresponding prosodic apparatuses, as Poe jibed, or, going further, whether it was more fundamentally related to the inherently mechanistic workings of the human body and mind. The sciences that posed questions about the "human machine"—of which we will encounter various examples in the pages below—and that offered more or less tentative answers would also be responsible for initiating a return to questions of flow in the later decades of the century, when machines offered new perspectives on what measurement was and how it might be represented. But to appreciate why the tension between the idea of meter as an abstract and artificial system for marking beats and segmenting syllables, on the one hand, and its ostensible opposition to the "real" flow of speech, on the other, subtended the experimental sciences of the turn of the century, we must first explore how mainstream metrics was informed by the systems of the machine age. That exploration begins in the classroom, where processes of metrical instruction are considerably indebted to the workaday world of manufacturing and procedures of serial assembly.

Notes

1. See Thomas Richards, *The Commodity Culture of Victorian England: Advertising and Spectacle, 1851–1914* (Stanford: Stanford University Press, 1990), 17–72; Herbert L. Sussman, *Victorian Technology: Invention, Innovation, and the Rise of the Machine* (Santa Barbara: Praeger, 2009), 54–73; and James Buzzard, Joseph W. Childers, and Eileen Gillooly, eds., *Victorian Prism: Refractions of the Crystal Palace* (Charlottesville: University of Virginia Press, 2007).
2. "A Chapter or Two on Meters," *Friendly Companion and Illustrated Instructor* (Mar.–May 1857), 80+ . Some of these "meters" would have been familiar (if not perfectly understood) to Victorian readers. Thermometers and barometers had been around for well over a century, and examples of both had been on display at the Crystal Palace in 1851. John Phillips, the celebrated Oxford geologist and inventor, exhibited one of each. Gasometers—another name for large, cylindrical gas-holders—were a recognizable, if also somewhat worrying, emblem of urban modernity, their iron ribs no doubt suggesting to many observers an architectural echo of Joseph Paxton's Hyde Park structure. Electrometers (for measuring electric charge) and eudiometers (for measuring the amount of oxygen in air) had been in existence since the eighteenth century, with galvanometers (for measuring galvanic current) appearing in the early decades of the nineteenth. Such instruments had been much in circulation among Victorian readers, especially since the late 1830s when electricity—in the form of the electric telegraph—began to revolutionize communication. All three devices are mentioned in Henry Minchin Noad's popular *Lectures on Electricity* (1844), one of many texts that attempted to make that science and its developing technologies accessible to a largely non-specialist audience. Chronometers, by no means new instruments, had also been very much at the fore of the popular imagination from 1840, with the introduction of "railway time" (discussed at length below). Only two of these "meters"—the galactometer (for measuring a liquid's sugar content) and actinometer—were comparatively new inventions, dating from approximately the 1820s. Though perhaps not as recognizable to the *Friendly Companion's* target market ("children and youth," as well as "those of riper years"), these instruments, nevertheless, featured regularly in contemporary debates: the galactometer was used in the study of food adulteration (much discussed in the 1850s and 1860s); the actinometer, invented by John Herschel in 1825, belonged to the sciences of meteorology and astronomy.

3. Coventry Patmore, *Coventry Patmore's "Essay on English Metrical Law": A Critical Edition with a Commentary*, ed. Mary Augustine Roth (Washington, DC: Catholic University of America Press, 1961), 15. Unless otherwise indicated, all citations are to this version of Patmore's "Essay." I am indebted to the historical prosodists who came before me; their analyses of the role of abstraction in Patmore's verse are the modulus against which I measure my present reading. See Dennis Taylor, *Hardy's Metres and Victorian Prosody* (Oxford: Clarendon Press, 1988); Yopie Prins, "Victorian Meters," *The Cambridge Companion to Victorian Poetry*, ed. Joseph Bristow (Cambridge: Cambridge University Press, 2000), 89–113; Jason R. Rudy, *Electric Meters: Victorian Physiological Poetics* (Athens, OH: Ohio University Press, 2009); Adela Pinch, "Love Thinking," *Victorian Studies*, 50, 3 (2008), 379–397; Meredith Martin, *The Rise and Fall of Meter: Poetry and English National Culture, 1860–1930* (Princeton: Princeton University Press, 2012); and Ewan Jones, "Coventry Patmore's Corpus," *ELH,* 83, 3 (2016), 839–872.
4. Patmore, "Essay on English Metrical Law," 3.
5. Carl Mitcham and Timothy Casey, "Toward an Archeology of the Philosophy of Technology and Relations with Imaginative Literature," *Literature and Technology*, ed. Mark L. Greenberg and Lance Schachterle (Cranbury, NJ: Associated University Presses, 1992), 36–37.
6. R. Harrison Black, *The Student's Manual: Being an Etymological and Explanatory Vocabulary of Words Derived from the Greek* (London: Longman, Orme, Brown, Green, and Longmans, 1838), v.
7. The "meters" described in the *Friendly Companion* have been selected in terms of not only semantic but also lexical likeness: all are machines that measure something *and* all share a common stem word, *meter*. Alike, then, in general function and sharing a linguistic base, these "meters" are distinguished from one another by their unusual, foreign prefixes. In spite of its name, however, "A Chapter or Two on Meters" gives no guidance on how one might pronounce or correctly "measure" this terminology. Aiming to rectify this problem, a variety of etymological and pronouncing dictionaries endeavored to present in simple, accessible form the rules and conventions of syllabification and quantity, as well as related prosodical matters—offering to improve both the factual and the linguistic knowledge of not only "scholars [with] . . . only a tincture of classical learning," but also "ladies, who were not likely to pursue the study of [the Greek] language," and "the Working Class, on whose mental culture so much of our national prosperity depends." In addition to Black's text, see Joseph Worcester, *A Universal Critical and Pronouncing Dictionary of the English Language* (London: Henry G. Bohn, 1863), 843; and John Craig, *A New Universal, Technological, Etymological, and Pronouncing*

Dictionary of the English Language, Embracing All the Terms Used in Art, Science and Literature, vol. 1 (London: Henry George Collins, 1848), [iv]. In Alexander Jamieson's *A Dictionary of Mechanical Science, Arts, Manufactures, and Miscellaneous Knowledge* (1829), a reader will find entries for "metre," "prosody," "quantity," and "scanning" arranged alphabetically alongside such machines as the "steam engine," "telegraph," and "threshing machine"—three technologies that I examine below.

8. Graeme J. N. Gooday, *The Morals of Measurement: Accuracy, Irony, and Trust in Late Victorian Electrical Practice* (Cambridge: Cambridge University Press, 2004), 9; Geoffrey C. Bowker, "Second Nature Once Removed: Time, Space, and Representations," *Time and Society*, 4, 1 (1995), 49.
9. Sussman, *Victorian Technology*, 20, 19.
10. T. S. Omond, *English Metrists: Being a Sketch of English Prosodical Criticism from Elizabethan Times to the Present Day* (Oxford: Clarendon Press, 1921), 171.
11. Omond, *English Metrists*, 166.
12. Leo Marx, "Technology: The Emergence of a Hazardous Concept," *Technology and the Rest of Culture*, ed. Arien Mack (Columbus, OH: Ohio State University Press, 1997), 37.
13. Marita Sturken, "Mobilities of Time and Space: Technologies of the Modern and Postmodern," *Technological Visions: The Hopes and Fears that Shape New Technologies*, ed. Marita Sturken et al. (Philadelphia: Temple University Press, 2004), 75.
14. See, for example, Laura Otis, *Networking: Communicating with Bodies and Machines in the Nineteenth Century* (Ann Arbor: University of Michigan Press, 2001); and Friedrich A. Kittler, *Discourse Networks 1800/1900*, trans Michael Metteer (Stanford: Stanford University Press, 1990); Sturken, "Mobilities of Time and Space," 75; Richard Menke, *Telegraphic Realism: Victorian Fiction and Other Information Systems* (Stanford: Stanford University Press, 2008), 15.
15. See Wolfgang Schivelbusch, *The Railway Journey: The Industrialization of Time and Space in the Nineteenth Century* (Berkeley and Los Angeles: University of California Press, 1986); Menke, *Telegraphic Realism*, 3.
16. Patmore, "Essay on English Metrical Law," 15.
17. Yopie Prins, *Victorian Sappho* (Princeton: Princeton University Press, 1999), 149.
18. Patmore, "Essay on English Metrical Law," 15.
19. R. W. O'Brien, "Telegraph Lines," *Journal of the Telegraph*, 2, 5 (Feb. 1, 1869), 57.
20. [Anon.], "Telegraph Posts Indicators of Time and Speed," *The London Anecdotes Reader: The Electric Telegraph* (London: David Bogue, 1848),

60. Schivelbusch, who clearly sees a prosodic operation at work, cites a similar example: "[Telegraph poles] are generally erected about sixty yards apart, or thirty in the mile, so that the speed of the train is easily found by counting the number of poles passed in a minute and multiplying by two, which, of course, gives the rate per hour." See *The Railway Journey*, 31. The source he quotes is [Anon.], *Railway Appliances in the Nineteenth Century, or the Rail, Steam, and Electricity, with Illustrative Anecdotes, Engravings, and Diagrams* (London: R. Yorke Clarke and Co., 1848), 32. Anecdotes similar to these can be found in a variety of popular as well as technical texts circulating in the 1840s and 1850s.
21. *Railway Appliances in the Nineteenth Century*, 32. As Patmore himself observed: "Most people find it hard to believe what they cannot easily represent to their senses." See Patmore, "Essay on English Metrical Law," 13.
22. Prins, "Victorian Meters," 90.
23. Hazel Hutchison, "Eye Rhyme: Visual Experience and the Poetics of Gerard Manley Hopkins," *Victorian Poetry*, 49, 2 (2011), 217–233.
24. Whether the metrical correlate is construed in terms of light waves or gradations of landscape, it amounts to much the same thing: the nineteenth century's networked technologies, as Menke suggests, conveyed and paced the "information" they conveyed—so frequently conceived of in terms of a "fluid"—by means of "controlled flow." See Menke, *Telegraphic Realism*, 20.
25. Patmore, "Essay on English Metrical Law," 8, 7.
26. Rudy, *Electric Meters*, 115.
27. As Rudy has so persuasively argued, *Angel*, in its resistance to the ungoverned rhythms of the Spasmodics, reveals a very literal enactment of the regulatory force of the modulus that Patmore sets out in his "Essay." Furthermore, while versification had been conceived of in topographical terms long before the railway began imposing its mechanical will upon the landscape. Pupils embarking upon a classical education in Britain's endowed schools were compelled to scale the mountain of the muses in their daily prosodic exercises, composing and translating Latin meters with the aid of the standard companion to classical quantities, the *Gradus ad Parnassum* or "steps to Parnassus." In this chapter and in "Automaton Versifiers," I discuss the Gradus in some depth, and also the mechanistic education regime in which it was used.
28. Bowker, "Second Nature Once Removed," 48.
29. Mike Esbester, "Nineteenth-Century Timetables and the History of Reading," *Book History*, 12 (2009), 163.

30. Though several companies published railway timetables, Bradshaw's guides were arguably the most widely used, the title becoming shorthand for any such publication. *Bradshaw's* first appeared in 1839 and remained in circulation (in a number of different editions and formats) well into the twentieth century. For many years following its initial publication, *Bradshaw's* remained priced at sixpence.
31. See Esbester, "Nineteenth-Century Timetables and the History of Reading," 160. In his fascinating essay on the spatio-temporal dimensions of Victorian poetry, Herbert Tucker has commented on how the practical world of nineteenth-century commerce, to which the railway timetable belongs, "read time as space." See Herbert F. Tucker, "Of Monuments and Moments: Spacetime in Nineteenth-Century Poetry," *MLQ*, 58, 3 (1997), 269–297.
32. [Anon.], "An Educational Novelty," *Punch*, 18 (1850), 167.
33. [Anon.]. "Guide to Bradshaw," *Punch* (Aug. 5, 1865), 44.
34. Henry Bateman, *Belgium and Up and Down the Rhine. Metrical Memorials* (London: James Nisbet and Co., 1858), 44.
35. [Anon.], "An Educational Novelty," *Punch*, 18 (1850), 167.
36. Barbara Adam, *Timewatch: The Social Analysis of Time* (London: Polity, 1995), 27.
37. Sussman, *Victorian Technology*, 20.
38. In fact, this logic of train speed conforming to the abstraction of the timetable is not restricted to adjustments for comparatively "fast" or "slow" trains. Dionysius Lardner notes a distinction between a train's actual and average movement: "The actual time requisite to travel between any two points of a line of railway, does not depend so much on the speed of the train when in motion as is generally supposed; nor is there so much difference between the velocity of the first class trains and that of the slowest, when in full speed, as may be imagined. The comparative celerity with which the travelling is executed depends more upon the number of stations at which the train stops, than on its actual speed when in motion." On a given journey, a train may achieve its maximum velocity, but it will need to diminish its speed by braking as it nears a station. What the timetable reflects is the average speed that the train travels along its line, the steady pacing that it needs to arrive at its various stations and its destination on time. Though going at different speeds at different times, the train is effectively modulating its movement to this timetabled average throughout the course of its journey. As Lardner writes, "The average speeds from station to station, given in the above table, are taken from the published time-tables of the companies, and are estimated on certain average conditions; but the actual speed which is frequently attained by the express trains in motion, often

greatly exceeds even the highest given in these tables." See Dionysius Lardner, *Railway Economy: A Treatise on the New Art of Transport, Its Management, Prospects, and Relations, Commercial, Financial, and Social* (London: Taylor, Walton, and Maberly, 1850), 193, 196.

39. Periodicity and pauses were central features not only a printed document such as the railway timetable but of nineteenth-century periodical culture more generally. As Mark Turner has stated, "Built into the notion of seriality is necessarily some conceptualization of waiting. The pause is a constitutive feature of periodical-ness, of all periodicities—there must be a break in time." See Mark Turner, "Periodical Time in the Nineteenth Century," *Media History*, 8, 2 (2002), 193.
40. The metrical practice of "filling up" measures was around, albeit in different form, before the New Prosodists began to theorize it. John Carey writes that "[i]n Latin poetry, verses are not usually measured by the number of syllables, as in English, but by the number of feet, or the length of time required to pronounce them. Now, a long syllable being equal in time to two short—the word *tārdīs*, for example, to the word *cĕlĕrĭbŭs*—it becomes, in many cases, indifferent what the number of syllables is, provided that they all together fill up, but do not exceed, the time allotted for the harmonious utterance of the line." Where's Carey differs from Ruskin (or Patmore or Omond) is in his understanding of the foot as unit of measurement essentially based on syllables value ("A foot . . . contains two or more syllables"). See J. Carey, *Latin Prosody Made Easy*, new ed. (London: Longman, Hurst, Rees, and Orme, 1808), 201, 199. As we have seen, the temporal metrics that New Prosodists will develop does not link its measurement index to syllables but instead to abstract units of equal time. It is thus much more in keeping with the temporality on display in the rows and columns of *Bradshaw's*. For a discussion of abstraction, measured "rests" in verse, the New Prosody, and musical settings of meter, see Yopie Prins, "'Break, Break, Break' into Song," *Meter Matters: Verse Cultures of the Long Nineteenth Century*, ed. Jason David Hall (Athens, OH: Ohio University Press, 2011), 105–134.
41. Esbester, "Nineteenth-Century Timetables and the History of Reading," 173.
42. [Anon.], "Great Western Difficulties—And the Way Out of Them," *Railway Record, Mining Register, and Joint-Stock Companies' Reporter* (7 Feb. 1857), 85.
43. Tal[iaferro]. P[reston]. Shaffner, *The Telegraph Manual: A Complete History and Description of the Semaphoric, Electric, and Magnetic Telegraphs of Europe, Asia, Africa, and America, Ancient and Modern* (New York: Pudney and Russell, 1859), 294.

44. Rudy, *Electric Meters*, 62.
45. Isobel Armstrong, "Meter and Meaning," *Meter Matters: Verse Cultures of the Long Nineteenth Century*, ed. Jason David Hall (Athens, OH: Ohio University Press, 2011), 26, 27.
46. M. A. Bayfield, *The Measures of the Poets: A New System of English Prosody* (Cambridge: Cambridge University Press, 1919), 14. Bayfield's "new system," indebted in part to the work of Patmore and musical metrist Sidney Lanier, is based on a rejection of the iambic line as the metrical mainstay of English verse. He instead proposes "the adoption of the trochaic base" as the index of English prosody (vi).
47. Armstrong discusses "polyrhythmia" as part of her examination of "Four Epistemologies of Meter." See "Meter and Meaning," 31–34.
48. Patmore, "Essay on English Metrical Law," 16.
49. Assertions of this sort form part of not only Patmore's and Bayfield's theories, and Armstrong's latterly, but also the theories of abstraction articulated by I. A. Richards in his "practical criticism" and its American counterpart, the New Criticism. See, for example, my remarks on metrical "orientation" in chapter two of Jason David Hall, *Seamus Heaney's Rhythmic Contract* (Basingstoke: Palgrave Macmillan, 2009), 33–41.
50. Armstrong, "Meter and Meaning," 26–27.
51. Edward Sapir, *Language: An Introduction to the Study of Speech*, 1921 (Mineola, NY: Dover, 2004), 15. An 1858 article on "Telegraphic Symbols" reports on a telegraph "operator, who had become so familiar with the sound of the instrument that he could accurately read many of the common words in a message, merely by listening to its [the machine's] talking! and we doubt if it is generally known, even in this day of recorded wonders, that there is not a Morse operator, in the country worthy of the distinction who cannot interpret the sound of the instrument with as much ease as he can construe a sentence printed in bold Roman letters." See [Anon.], "Telegraphic Symbols," *American Merchant*, 1, 6 (Oct. 1858), 370.
52. George B. Prescott, *History, Theory, and Practice of the Electric Telegraph* (Boston: Ticknor and Fields, 1860), 88.
53. Robert Sabine, *The History and Progress of the Electric Telegraph with Descriptions of Some of the Apparatus* (New York: D. Van Nostrand, 1869), 63.
54. Edward E. Hale, If, Yes, and Perhaps: Four Possibilities and Six Exaggerations, with Some Bits of Fact (Boston: Ticknor and Fields, 1868), 120.
55. Alexander and Nicholas Humez remark on the "prosody" of Morse code and its anticipation of computerized binary code as follows: "[The] first message Morse actually sent was something like this: Dit dah dah, dit dit dit dit, dit dah, dah (pause) dit dit dit dit, dit dah, dah, dit dit dit

dit (pause) dah dah dit, dah dah dah, dah dit dit (pause) dit dah dah, dit dah dit, dah dah dah, dit dit dah, dah dah dit, dit dit dit dit, dah (• – – •••• • – – [pause] •••• • – – •••• [pause] – – • – – – – •• [pause] • – – • – • – – – •• – – – • •••• –). This string displays in a nutshell most of what is good and bad about Morse code: The good part is that it consists of just two elements, long and short (as in classical prosody: D, for example, is the metrical equivalent of a dactyl [dah dit dit], while A is an iamb [dit dah], N a trochee [dah dit], U an anapaest [dah dit dit], M a spondee [dah dah], an R an amphibrach [dit dah dit].) As such, Morse code was tailor-made for an electronic age then still very far in the future." See their book *On the Dot: The Speck that Changed the World* (Oxford: Oxford University Press, 2008), 14–15. Confronted initially with only a pattern of beats, Armstrong, not unlike a Victorian telegraph clerk, must decide what words it signifies. Unlike the telegraph clerk, however, she has multiple possibilities among which to choose (many poems, after all, may share the same metrical code); the clerk's "scansion," by contrast, has only one correct semantic value. Over a hundred years before the publication of Marshall McLuhan's *Understanding Media* (1964), telegraphs were exemplifying the importance of attending to the form of communication. In telegraphy, beats insist—their "meter" is the message.

56. As John Russell, headmaster of Charterhouse School, informed boys, "A TIME is the time of pronouncing a short syllable. A long syllable consists of two Times." See [John Russell], *Rudiments of the Greek Language. For the Use of Charterhouse School* (London, 1826), 94.
57. Prescott, *History, Theory, and Practice of the Electric Telegraph*, 90.
58. Patmore, "Essay on English Metrical Law," 21.
59. "Telegraphic Symbols," 370.
60. "Telegraphic Symbols," 370. For more on the semiotics of spacing in telegraphy, see Winfried Nöth, *Handbook of Semiotics* (Bloomington, IN: Indiana University Press, 1990), 219.
61. Ken Beauchamp describes this innovation of Morse code—its basis in temporal pulsation—as industry changing. See his *History of Telegraphy* (London: Institution of Engineering and Technology, 2008), 48.
62. Dionysius Lardner, *The Electric Telegraph Popularised* (London: Walton and Maberly, 1855), 71. A later handbook expands on the musical features of telegraphy in relation to the Morse organ-pipe sounder (a form of acoustic semaphore): "The method devised by [Morse] was by an organ pipe so connected with a small bellows as to be opened and closed by the pen lever, in the act of writing a dot or a dash. It is at once obvious that in indicating a dot, the pipe would give a short, sharp sound, but in indicating a dash the sound would be correspondingly prolonged. The short and long intervals, therefore, by which the dot

and dash are now distinguished, in the ordinary acoustic instrument, are, by this method, more completely expressed, reducing the code to musical expression, to crotchets and semibreves." See *Examination of the Telegraphic Apparatus and the Processes in Telegraphy* (Washington, DC: Government Printing Office, 1869), 42.

63. Rudy, *Electric Meters*, 115, 122.
64. Omond, *English Metrists*, 171.
65. J. W. Harrington and Barney Warf, *Industrial Location: Principles, Practice, and Policy* (London: Routledge, 1995), 221.
66. The phrase is Leo Marx's, from his *The Machine in the Garden: Technology and the Pastoral Ideal in America* (Oxford: Oxford University Press, 1964).
67. John Goodridge, *Rural Life in Eighteenth-Century English Poetry* (Cambridge: Cambridge University Press, 1995), 45.
68. Stephen Duck, "The Thresher's Labour," *Eighteenth-Century Poetry: An Annotated Anthology*, 2nd edn, ed. David Fairer and Christine Gerrard (Malden, MA: Blackwell, 2004), 261 (line 40); William Cowper, *The Task*, *Eighteenth-Century Poetry: An Annotated Anthology*, 2nd edn, ed. David Fairer and Christine Gerrard (Malden, MA: Blackwell, 2004), 536 (Book I, line 357).
69. Goodridge, *Rural Life in Eighteenth-Century English Poetry*, 48. Years ago E. P. Thompson noted the way Duck's poem in particular offered "an obligatory set piece" about not only farming but also the distinctions between the monotonous labor "commonly ascribed to the factory system" and then "other collective rhythms" of the harvest" (62). For Thompson such texts chart the tension between the rhythms of "task orientation" and the gradual advent of "clock-time." See E. P. Thompson, "Time, Work-Discipline, and Industrial Capitalism," *Past & Present*, 38 (Dec. 1967), 56–97.
70. Patmore, "Essay on English Metrical Law," 15.
71. C. J. Merz, "Melody and Rhythm," *New-York Musical Review and Gazette* (Jun. 13, 1857) 181.
72. Patmore, "Essay on English Metrical Law," 15.
73. Merz, "Melody and Rhythm," 181.
74. J. D. Bell, *A Man* (Philadelphia: James Challen and Son, 1860), 384.
75. See Charles [Tennyson] Turner, *Small Tableaux* (London: Macmillan and Co., 1868), 62–63.
76. Bell, *A Man*, 384.
77. Alice Meynell, "The Threshing Machine," *The Poems of Alice Meynell* (London: Burns, Oates and Washbourne, 1923), 119.
78. Using a caret (^) to denote omitted slack syllables, we could represent the line's missing measures as follows: ´ ˘ ˘ | ´ ˘ ^ || ´ ˘ ˘ | ´ ^ ^ ||. Thus,

there is a ghostly (brachycatalectic) line of dactylic trimeter whose immaterial off-beats show themselves only when we attend to Meynell's pauses—that is, when we attend to the poem's in-built silences, its prosody's means of registering (threshing) sounds that are no more.

79. Hermann von Helmholtz, *On the Sensations of Tone as a Physiological Basis for the Theory of Music*, trans. Alexander J. Ellis, 2nd ed. (London, 1885), 168.
80. For details of the threshing machine's frequency, horsepower, component parts, and general mode of operation (on its own and in relation to other farm implements), see Henry Stephens, *The Book of the Farm*, vol. 2 (Edinburgh and London: William Blackwood and Sons, 1844).
81. As Helmholtz notes, "We actually [can] hear a series of pulses of tone, and are able to recognize it as such, although no longer capable of following each singly or separating one from the other." See *On the Sensations of Tone*, 168.
82. Helmholtz, *On the Sensations of Tone*, 168.
83. Patmore, "Essay on English Metrical Law," 17.
84. J. R. Ebbatson, "The Lonely Garden: The Sonnets of Charles Tennyson Turner," *Victorian Poetry*, 15, 4 (1977), 318.
85. Dennis Taylor, *Hardy's Metres and Victorian Prosody*, 59.
86. Thomas Hardy, *Tess of the d'Urbervilles* (New York: Nelson Doubleday, 1913), 301–302.
87. Thomas Hardy, "The Dorsetshire Labourer," *Longman's Magazine*, 2, 9 (1883), 268.
88. Karl Marx, *Capital: A Critique of Political Economy, Vol. I. The Process of Capitalist Production*, ed. Frederick Engels and Ernest Untermann, trans. Samuel Moore and Edwards Aveling (Chicago: Charles H. Kerr and Co., 1906), Library of Economics and Liberty, 17 Feb. 2012 http://www.econlib.org/library/YPDBooks/Marx/mrxCpA15.html.
89. Hardy, *Tess of the d'Urbervilles*, 303.
90. Hardy, *Tess of the d'Urbervilles*, 301. Raymond Williams describes the mechanical thresher as an "alien machine." See "Literature and Rural Society," *The Raymond Williams Reader*, ed. John Higgins (Malden, MA: Blackwell, 2001), 116. Zena Meadowsong recognizes the link between speech and a Northern industrial space. See her article "Thomas Hardy and the Machine: The Mechanical Deformation of Narrative Realism in Tess of the d'Urbervilles," *Nineteenth-Century Literature*, 64, 2 (2009), 236. And as Stuart Macdonald observes, there is historical evidence associating the North of England with "the first major revolution in mechanized farming" (76), as well as an initial reluctance among farmers in Southern England to accept the threshing machine. For a discussion of the introduction and use of threshing

machines in both Southern and Northern England, see Macdonald's article, "The Progress of the Early Threshing Machine," *Agricultural History Review*, 23, 1 (1975), 63–77.

91. Helmholtz, *On the Sensations of Tone*, 171.
92. There are real-life examples of industry-influenced prosody, where a person's speech patterns "incarnate," as Simon J. Charlesworth puts it, "a sonorous field of expression." One worker, for example, whose story Charlesworth records, explains "how the rhythms of the dialect he spoke were affected by the time [he] spent at work around the thresh-thresh of a mill." The threshing machine, then, might have been a formidable prosody tutor—a true grinder that offered on-the-job training, à la the schoolmasters whose scanning and reciting regimes are the subject of "Meter Manufactories." See Charlesworth, *A Phenomenology of Working Class Experience* (Cambridge: Cambridge University Press, 2000), 236–237.
93. Beverley Collins and Inger M. Mees, *Practical Phonetics and Phonology: A Resource Book for Students* (London: Routledge, 2003), 250.
94. Oliver Wendell Holmes, "The Human Wheel, Its Spokes and Felloes," *Atlantic Monthly*, 11, 67 (1863), 568; J. D. Bell, *A Man*, 384.
95. The same name was given to the chair he held at the School of Oratory at Boston University. Indeed, Bell's pioneering work in telephony—a technology predicated on rendering the vibrations of the human voice, as uttered on one end of the line, as mechanical "tremors" that can be reproduced, on the other end, by the apparatus's "diaphragm"—was, in many ways, an apt legacy of the nineteenth-century advances in the sciences of vocal mechanics that Graham Bell's father, Alexander Melville Bell, had played a central role in defining. See George M. Shaw, "The Telephone and How It Works," *Popular Science Monthly* (Mar. 1878), 561.
96. Alexander Graham Bell, *The Mechanism of Speech*, 8th ed. (New York and London: Funk and Wagnalls, 1916), 8–9.
97. See the entry for "automaton" in *The London Encyclopaedia or Universal Dictionary of Science, Art, Literature, and Practical Mechanics* (London: Thomas Egg, 1839), 314.
98. [Anon.], "The Voice, the Ear, and Music," *Dwight's Journal of Music*, 28, 22 (1869), 377.
99. Benjamin Steege, *Helmholtz and the Modern Listener* (Cambridge: Cambridge University Press, 2012), 184.
100. Holmes, "The Human Wheel, Its Spokes and Felloes," 568.
101. Brian H. Murray, "'Primitive Man' and Media Time in H. M. Stanley's *Through the Dark Continent*," *Victorian Time: Technologies,*

Standardizations, Catastrophes, ed. Trish Ferguson (Basingstoke: Palgrave Macmillan, 2013), 121.

102. Edgar Allan Poe, "The Murders in the Rue Morgue," *Selected Writings of Edgar Allan Poe*, ed. G. R. Thompson (New York and London: Norton, 2004), 260.
103. Poe, "The Man That Was Used Up," *The Selected Writings of Edgar Allan Poe*, ed. G. R. Thompson (New York and London: Norton, 2004), 193, 196, 198.
104. Edgar Allan Poe, "The Rationale of Verse," *The Works of the Late Edgar Allan Poe*, 4 vols. ed. Rufus Wilmot Griswold (New York: Redfield, 1857), 2:251, 250.
105. Murray, "'Primitive Man' and Media Time in H. M. Stanley's *Through the Dark Continent*," 121.
106. Poe, "The Rationale of Verse," 249. Poe was, of course, not the first to point out this fault of readers remaining "mechanically" faithful to scansion in their delivery of poems. Fifty years earlier, an anonymous contributor to the *Monthly Magazine* expressed the point thus: "The measure may be mechanically true, but the flow and cadence, the harmony, accent, and emphasis, so defective, that it will be verse only to the scanning, and neither verse nor prose to the ear." See [Anon.], "To the Editor of the *Monthly Magazine*," *Monthly Magazine*, 3, 16 (Apr. 1797), 258.
107. Patmore, "Essay on English Metrical Law," 9.
108. See Menke, *Telegraphic Realism*, 20.
109. Poe, "The Rationale of Verse," 249.
110. Patmore, "Essay on English Metrical Law," 9, 8.
111. Charles Henry Woolbert and Severina Elaine Nelson, *The Art of Interpretative Speech: Principles and Practices of Effective Reading* (New York: F. S. Crofts, 1927), 218.
112. Poe, "Rationale of Verse," 215.

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