



BETWEEN SOUND AND SCRIPT: HENRY SWEET'S PHONETICS IN LATE VICTORIAN BRITAIN

*Qi Hong*¹

¹*University of Toronto, Canada
qi.hong@mail.utoronto.ca*

Abstract: This paper reexamines Henry Sweet's "living philology" within the broader context of late Victorian language sciences, approaching his work through the lens of the history of science. This paper argues that Sweet's work exemplifies how language cannot be fully abstracted from its material supports, nor reduced to a purely physiological or physical phenomenon. The first section focuses on Sweet's proposal of phonetics being the first requisite for studying the living philology. It examines the philologist's attention to the synchronicity and the diachronic history of language. With the "living philology" explained, the second section dwells on Sweet's insistence on the primacy of the observer. In this section, I contextualize Sweet's techniques of observing in relation to the epistemic virtue of mechanical objectivity. Sweet's negativism against using inscriptive instruments in phonetic experiments indicates an attempt to redefine objectivity. The third section launches an analysis of Sweet's engagement with the technological condition of the production of linguistic knowledge. Although Sweet was explicitly critical of instrumental phonetics, his development of a universal phonetic transcription system nonetheless relied on print technologies, revealing a more ambivalent relationship to technological mediation than his rhetoric might suggest. The transformation of linguistic knowledge, it concludes, entails not only theoretical innovation but also the reconfiguration of representational systems, technological apparatuses, and their interrelations.

1 Introduction

In 1884, British philologist Henry Sweet wrote, "[T]he living form of every language should be made the foundation of its study... for the spoken is the only form of the language which is regular and definitely limited in the range of its grammar and vocabulary" [1]. Sweet's view that the study of language should begin with its spoken form was not monstrously unique among European physiologists, physicists, and phoneticians in the late nineteenth century. Instead, already in the eighteenth century, the understanding of human speech as an acoustic phenomenon was already flourishing, mostly fashioned by European architects, musicians, and engineers [2]. In the nineteenth century, emerging fields of physiology and acoustic science further transformed the study of speech with not only new devices for observation and measurement but also new analytical tools such as the analysis of waveforms and signals [3]. Clearly, physiological and physical research on human speech was hardly anything revolutionary in late nineteenth-century Europe.

However, what makes Henry Sweet and his proposal for philologists to focus on the "living form of language" noticeable to historians of language and historians of science is his own positionality as a British philologist. While Sweet was calling for a turn from studying grammar and vocabulary to studying speech phenomena, Sweet was also aware of the "antagonism between practical linguistic phonetics and instrumental phonetics," and publicly stood against the latter [4]. Sweet's knowledge of and criticism of phoneticians who rely on mechanical devices was by no means a total rejection of phonetic studies. Instead, formed in the late nine-

teenth century, his proposal that “phonetics should be the first requisite to study language” [5] was made at a time when disciplinary boundaries between linguistic sciences were being formed. As a philologist interested in studying speech, Sweet became a thorny figure for scholars to categorize—not only for phoneticians who wanted to write their own history of the discipline [6] but also for historians of science who wanted to understand epistemological transformations through tracing the formation of modern scientific disciplines [7].

This paper, written from the perspective of a historian of language sciences, historicizes Henry Sweet and his “living philology” in late Victorian Britain. By taking Henry Sweet as an epitome of the paradigm shift in language sciences, the first two sections of this paper situate Sweet in relation to his predecessors and contemporaries. The first section focuses on Sweet’s proposal of phonetics being the first requisite for studying the living philology. It examines the philologist’s attention to the synchronicity and the diachronic history of language. With the “living philology” explained, the second section dwells on Sweet’s insistence on the primacy of the observer. In this section, I contextualize Sweet’s techniques of observing in relation to the nineteenth century’s “epistemic virtue of mechanical objectivity,” identified by Lorraine Daston and Peter Galison in their work *Objectivity* [24]. The persona of an ideal phonetician leads to a critical reflection on Sweet’s negativism against instrumental phonetics, which is not merely an irrational rejection of modern experimental science. The third section launches an analysis of Sweet’s engagement with the technological condition of the production of linguistic knowledge. Although Sweet was explicitly critical of instrumental phonetics, his development of a universal phonetic transcription system nonetheless relied on print technologies, revealing a more ambivalent relationship to technological mediation than his rhetoric might suggest. The transformation of linguistic knowledge, as this paper argues, entails not only theoretical innovation but also the reconfiguration of representational systems, technological apparatuses, and their interrelations.

2 The Living Philology

In 1875, Henry Sweet read a paper to the London Philological Society. This paper, titled “Words, Logic, and Grammar,” begins with a statement on the philologist’s responsibility to observe the living phenomena of language:

“Philologists forget... that the history of language is not one of decay only, but also of reconstruction and regeneration. ... [These processes] have further the great advantage of being perfectly accessible to the observer. ... But before history must come a knowledge of what now exists. We must learn to observe things as they are, without regard to their origin, just as a zoologist must learn to describe accurately a horse, or any other animal” [9].

About a year before he read this paper, Sweet had finished his research on the sound-changes of Middle English by comparing it with Scandinavian languages. This work, *History of English Sounds* (1874), along with Sweet’s previous publications on Old Icelandic grammar and vocabulary, is very much still based on textual materials to trace changes in linguistic sound since antiquity. But Sweet did not conform to the general expectation of a philologist who only builds one’s theories of a linguistic past solely on a textual corpus. In another 1874 report on the recent trends in Teutonic languages philology, Sweet exhibited a clear favor for the physiology of vocalization over antiquarian philology, positively hoping for a “general revolution in philological method,” which he saw in the German trend [10]. Sweet was particularly interested in works by German physicians Ernst Wilhelm von Brücke (1819–1892) and Carl Ludwig Merkel (1812–1876). He also showed some sufficient knowledge of physiology as he stated that Merkel’s work was more advanced than Brücke’s, although Sweet did not offer any rationale behind his opinion [10].

By the time Sweet reoriented the focus of philology to “what now exists” in “Words, Logic, and Grammar,” phonetics had yet to become what it is now understood as: a branch of linguistics that studies human production and perception of linguistic sounds. Contrastingly, before Sweet, a “phonetician” in mid-to-late Victorian scholarly discourse referred to a scholar working on the categorization of speech sounds using notational symbols, who oftentimes was the inventor of the system of symbols. Two predecessors whom Sweet frequently referred to in his works are Alexander J. Ellis (1814–1890) and Alexander Melville Bell (1819–1905), both of whom Sweet praised for being attentive to details of speech sounds. Both Ellis’s and Bell’s works share two preoccupations: on the one hand, an accurate classification of vowels and consonants based on pronunciation; on the other hand, a writing system that efficiently represents acoustic differences in speech [11]. Ellis and Bell relied heavily on acoustic and physiological knowledge. For instance, in *The Essentials of Phonetics* (1847), Ellis quoted Robert Willis (1800–1875) at length to define phonetics as a branch of acoustic studies, while he also borrowed from Karl Moritz Rapp’s (1803–1883) work on the physiology of speech and language [12]. Bell, in his seminal work *Visible Speech* (1867), based his classification of vowels on the modification of the guttural passage, the buccal cavities, and the lips (also known as “rounding”), as well as the position of the tongue during vocalization [13]. Nevertheless, it remains unclear to what extent the early British phoneticians were fully acquainted with the experimental methods and instruments used by acousticians and physiologists, and whether early phoneticians like Ellis were able to apply these approaches and equipment to their own analyses of speech [14]. Hence, it must be noted that, despite the reliance on acoustics and physiology, early British phonetic research was still largely about bridging the gap between the writing system and the spoken language. For Ellis and Bell (and to some extent, also Sweet), the analysis of human speech always rests upon a practical concern: How should one efficiently transcribe what one hears? New symbolic systems—alphabets in these cases—were invented as a result, be it Ellis and Pitman’s phonotypy, or Pitman’s own phonography, or Bell’s vowel chart. Overall, studies of speech sound in mid-to-late Victorian Britain, as J. A. Kemp perceptively concludes, developed within the context of language studies, with strong emphasis on phonetic scripts, language pedagogy, and philology [15].

Indeed, despite his frequent references to early phoneticians’ works, Sweet did not fully agree with them on the goal of having an effective shorthand system—not to mention his bitterness toward Pitman phonography, referring to it as “the popular ‘Pitfall’ system” [16]. Unsatisfied by the unhealthy favoring of brevity over accuracy in existing shorthand systems, Sweet invented his own system, the “Current Shorthand,” in 1892. While Sweet’s rationale for improving sound notation systems will be discussed in detail in the following section, it is important for now to emphasize that, for Sweet, the necessity of having an efficient transcribing system goes far beyond the everyday need for speech transcription. Shorthand systems were invented to register linguistic changes by dissecting speech sounds into phonetic units, which can offer more accurate data on changes in pronunciation than the written language. In other words, whilst the living form of language refers to speech and pronunciation, the ultimate mission of the living philology is still to understand how languages have changed throughout the historical course. But this change, for Sweet, is not merely diachronic; it also has a synchronic dimension. As he elaborated in the quoted paragraph at the beginning of this section, the history of language is not just about decay but also about “reconstruction and regeneration” [9]. The living form of language, that is, various pronunciations of the same word across different regions, is a crucial clue to capturing linguistic changes. According to the same passage, the synchronic aspect of language conditions access to the knowledge of its history. Under this logic, there would be no a priori structure of language that transcends the current time-space. The observable data, or in Sweet’s terms, the “actual facts of language,” are what deserve the philologist’s attention [17].

In conclusion, unlike the practical phoneticians, Sweet believed that the shorthand system serves a scholarly pursuit. The living philology values the synchronic aspect of language as much as it is concerned with the shared origin of language families [18]. In this sense, the living philology prioritizes the spoken sound as the primary source of analysis. Hence, instead of relying solely on the written texts, living philology entails an efficient transcription system for obtaining data. How would the living philology differ from experimental phonetics? Why would Sweet believe that the symbolic system of transcription is better than the inscriptive and recording machines—such as the kymograph and the X-ray—widely used by the experimentalists? By tracing Sweet’s rationale behind his invention of the “Current Shorthand,” the following section discusses the role of the observer and the techniques of observing in Sweet’s philological-phonetic research.

3 Techniques of the Observer

In 1877, Sweet took presidency of the Philological Society. In the same year, one of Sweet’s most famous works *A Handbook of Phonetics* (hereafter, the handbook) came out. In his presidential address as well as in the preface of the handbook, Sweet accounted for a history of practical phonetics in Britain beginning from Max Müller to A. J. Ellis, and then to A. M. Bell. With their interest in the spoken languages shared, Sweet acknowledged that he inherited Ellis’s notation system at large, and Bell’s “clear and concise” terminologies. He also highlighted his alterations of former phonetic research—for instance, he proved that Bell’s “wide” and “primary” distinction can also be applied to consonants—and also stated that he corrected some misleading conclusions [19].

Nonetheless, Sweet carefully distanced himself from Ellis, Bell, and other phoneticians and grammarians. Most noticeably, he not only emphasized the practicality of phonetics not only in foreign language pedagogy but also implied that the acquisition of a foreign language or dialect should be a prerequisite for phoneticians. Sweet even identified the native language as one of the phonetician’s biggest burdens in acquiring accurate description of linguistic sounds, stating:

“A great deal depends on the character of the native language, the learner [of phonetics] naturally grafting the peculiarities of his own language on his pronunciation of foreign ones, as when an Englishman diphthongises the long vowels in French and German; and, again, finding those sounds difficult which do not occur, or have no analogues, in his own pronunciation. It is a great mistake to suppose that any one nation has a special gift for acquiring sounds or foreign languages generally. Each nation has its special defects or advantages” [20].

Talking about foreign language acquisition, however, Sweet ultimately aimed to train sensitive and acute observers of unwritten dialects and spoken languages [21]. The educated observer, in the ideal case, is both a native of the dialect to be investigated and a trained phonetician who could dissect the individual unit of their speech accurately. Moreover, the spoken dialects and the literary language have a dialectical relationship, in the sense that “literary English will soon efface all the still existing remains of our dialects” [21]. The ideal observer, therefore, bears two primary burdens. On the one hand, one has to know their native pronunciation patterns, so that one can register phonetic differences accurately [20]. On the other hand, the observer must be able to perform the “unrestrained, natural dialect” as to be free from the “forced, unidiomatic sentences, full of words and forms taken from the literary language” [21]. This makes it extremely hard for one to become a qualified observer, as Sweet also acknowledged, because even with thorough training and practice, it is still impossible to avoid making any mistakes in hearing and interpretation.

Given his instances on the precision of observation, it would be reasonable for Sweet to switch to experimental phonetics, with which the phenomenon of speech has been equated to

acoustic and/or aerodynamic mechanisms, conveniently becoming observable through the mechanical instrument. Yet, instead of replacing the naturally inaccurate human observer with the more objective inscriptive device, Sweet resorted to several non-experimental approaches to make up for the unavoidable errors. Immediately, Sweet proposed the method of “direct questioning,” which asks the observer to examine educated dialect speakers who can discern literary expression and natural colloquial usage. The difficulty of this method is to find such speakers, as to master the dialect, one needs to pay more efforts than merely acquiring several sounds or intonations, or some isolated expressions [22].

Hence, the knowledge of practical phonetics comes back to Sweet as an important technique for the phonetician to acquire the features of any spoken language. The notation system is a helpful tool not only for transcribing speech sounds but also for understanding one’s own native speech. Such a system must also be applicable to different systems of pronunciation. Based on the roman letters, Sweet created the “Romic alphabet,” which seeks to represent phonetic variations without exhausting the innumerable possible combinations of segments into syllables. Consisting of two sub-systems, “Broad Romic” and “Narrow Romic,” the Romic alphabet is adaptive to suit the requirement of each specific language. The Broad Romic system marks all necessary distinctions of sound in one single language in the simplest and most direct manner. It is used to register distinctions of sound which correspond to distinctions of meaning in the target language [23]. Unlike the broad system, the narrow system does not register the phonemic unit. Instead, symbols in the narrow system reference the physicality and acoustics of the spoken sounds. It aims to characterize each sound as minutely accurate as possible, thus operating on a comparatively more universal level of representation. For instance, the short and narrow /i/ and the short and wide /i/ (italicized letter “i”) signify different meanings in Danish and Icelandic, while in French, there is no such distinction, and in British English, the difference between narrowness and wideness only occur between the short /i/ and the longer /i:/ . In this sense, using the broad system for the English language, the letter “i” would be enough for representing both the short, wide /i/ and the short, narrow /i/ [23]. Similarly, to transcribe British English with the broad system, one does not need to italicize the letter “i” in the /i:/ , as wideness comes naturally when the vowel is prolonged. But if one wants to compare the British sound with that of Danish and/or Icelandic, the narrow system is of great use, because the formal difference between “i” and “i” must be registered as they refer to different degrees of roundness and positions of the tongue. The narrow system, in this sense, records the physiological and articulative aspects of speech that transcends linguistic barriers, while the broad system notes the phonological difference within each specific language.

Counterintuitively, Sweet believed that the Romic Alphabet is more accurate than the instruments for measurement and inscription. Sweet’s negativism against instrumental phonetics is well known, but the rationale behind is likely dismissed as being subjective or unscientific. This current paper, however, aims to contextualize Sweet’s persistence on the human observer in phonetic research in what Lorraine Daston and Peter Galison call “the epistemic virtue of objectivity,” which emerged in mid-nineteenth century [24]. According to Daston and Galison, “mechanical objectivity” originally characterizes the repression of the artist-author of the atlas from intervening in the making of the drawings and diagrams in mid-to-late nineteenth century scientific publications [25]. It indicates the emergence of a scientist persona, who would rely on mechanical devices to obtain data, and would refrain from imposing their own interpretation extensively. Indeed, Daston and Galison never suggest that mechanical objectivity would completely replace, and be replaced by, previous and succeeding epistemic virtues. They also never assert that scientists in the era of mechanical objectivity must subjugate themselves to machines and protocols. This leaves historians with the possibility to ponder whether the scientific persona characterized by Daston and Galison is, once and for all, absolute [26].

Contextualized in the era of mechanical objectivity, Sweet's negativism against instrumental phonetics leads to a critical re-examination of mechanical objectivity as something more than a truism. The problem with experimental phonetics, for Sweet, is twofold. First, machines used for collecting phonetic data, such as the phonautograph and the phonograph, are also sources of errors and mistakes. By mediating the process of data collection, these machines prevent the phonetician from directly accessing the facts of languages. Second, the experimental method is but only a help. The phonetician is the final arbiter to note down what is being heard, and one needs to have a trained ear to be qualified for the role of the observer. Human perception was, in other words, not erased by, nor subordinated to, the rapid advancement of transcriptive and inscriptive tools. Sweet's view neither assumes the phonetic structure as a natural ideal (as he frequently emphasized that the living language is always changing), nor does it subjugate human subjectivity under machines. Instead, it is perceptive to foresee the epistemic value of "trained judgement," that is, the following stage after mechanical objectivity, which flourished in the mid-twentieth century, according to Daston and Galison. In other words, the era of mechanical objectivity contains within itself its own antithesis. Henry Sweet's techniques of observing, from learning a foreign language to direct questioning, and to the Romic Alphabet, can thus be read as a critique of mechanical objectivity.

4 The Technological *a priori*

The invention of the Romic Alphabet is more than an intellectual endeavor. The Roman alphabet failed to meet Sweet's demands because of its arbitrary relation to the sound it represents. A relatively better representational system, according to Sweet, is Bell's visible speech. In this alphabet each letter symbolizes the action of the vocal organs by which it is formed, according to certain fixed principles [27]. Yet, other than its incapacity in accurately represent speech sounds across languages, another important reason that kept Sweet from endorsing Bell's visible speech is its complexity. In spite of its imperfections, the Roman alphabet remains to be the optimal choice because it has long been in practical use. Producing new types is costly; also, these types further disturb and complicate the existing founts. But the existing orthography can always be reformed without expense or disturbance of the existing machinery of the printing-offices [28].

Sweet, however, was not the only person who was aware of the practical concern of making a new notation system. A decade earlier, Alexander J. Ellis already wrote, "It appeared to me desirable to have an alphabet consisting entirely of those types which we may expect to find in every printing office and hence consisting only of Roman and Italic letters [...]" [29]. With the "Palaeograph" notation system, Ellis attempted to document every possible speech sound with a unique symbol. Most strikingly, he also self-printed his own *Essentials of Phonetics* (originally titled, ESENSALZ OV FONETICS) at his own printing office [30]. This endeavor, for Sweet, seems to be too much trouble. Acknowledging Ellis's attention to the practical matter and that the Roman alphabet "can only be a temporary compromise," Sweet maintained that what is at stake is to find signs for fundamental distinctions, and the exceptional ones can easily be supplied by simple description [31].

Simplicity and efficiency were key principles for Sweet to propose a new notation system based on the existing Roman alphabet. In *A Handbook of Phonetics*, he proposed four principles to make up for the "imperfections of the Roman alphabet," namely, by casting a few new letter types; by employing diacritics, such as grave and acute accents; by employing digraphs, such as "th" and "kh" by employing turned letters, italics and capitals [32]. For instance, to print "ə", a nineteenth-century typesetter would simply put a linotype "e" upside down on a composition stick. The Roman alphabet, in this sense, is not just a collection of letters. It is both material and symbolic, consisting of a limited number of signs and metal types. But the relation between the metal type and the letter sign ceased to be exclusive in the case of the

Romic alphabet. One type could represent multiple symbols. In other words, while each phonetic symbol represents one phonetic unit (or a set of similar units, or allophones), the process of materializing the representation requires the heavy mediation of a “technological a priori,” where the instrument is no longer just a means to an end, but a fundamental condition of representation [33].

The materiality of the Roman alphabet embodied by printing later became the backbone of the Roman alphabet as the primary source for making notation systems. In 1886, Paul Passey founded “Dhi Fonètik Títcer’z Asóciécon” (F.T.A.) in Paris, France, which later on turned into l’Association Phonétique Internationale, or the International Association of Phonetics, which is known for inventing a universal system of notation, the International Phonetic Alphabet (IPA) [34]. In the first issue of the association’s journal, *Le Maître Phonétique*, was printed in the phonetic alphabet adopted from Pitman and Ellis’s 1847 alphabet [35]. Modifications were made, such as “c” and “j” were used in place of “f” and “z” because the French printing house which typeset the journal did not have a full set of fonts for all letters [36]. But still, the Roman alphabet sustained its dominant position because of its connection to printing technology, in particular the types. Or in other words, for any phonetic alphabet based on the roman letters, adding new symbols to the existing alphabet is only possible when the printing technology permits. As Robert Brain points out, “Linguistic values... had to be arbitrary in order to remain robust, but natural in order to remain valid. ... [S]tandards were semiotic and semiotics were standards” [37]. The basic principle of aligning all symbols according to the Roman alphabet has not been changed throughout the century after. In 1989, the IPA’s principle states, “The non-roman symbols of the IPA have, as far as possible, been made to harmonize with the roman letters” [38].

5 Conclusion

Despite the popular experiments on speech reproduction and the pioneering works in phonetic notations, in late Victorian Britain, phonetics was yet to become a well-defined discipline. Also, it was not widely accepted by the British academia of language sciences, where philology was dominant. Henry Sweet, in spite of being elected as the president of several associations, such as the Philological Society in 1878 and the IPA from 1897 to 1912, never got a chair in any British university. “In future ages, it will seem incredible that in the latter half of the nineteenth century there was not a single authorized teacher of phonetics ... in England, the natural home of phonetics [...]” [39]. Sweet criticized his concurrent British philologists’ lack of interest in the study of the “living language,” while he also rejected the instrumental approach that would reduce speech sounds to mere physical or physiological phenomena. Sweet’s insistence on the skillful observer foreshadows a scientific persona that was yet to come, while his major invention, the Romic Alphabet, hints at a lurking contradiction between phonetics and phonology. While experimental phonetics soon became a major trend worldwide in the 20th century, the Roman alphabet as the primary notational system soon also encountered various challenges and failures in orthographic systems where letterpress printing was alien. As a conclusion, the history of linguistics is not only a history of experimental science but also one of symbolic systems and information technologies.

References

- [1] SWEET, H.: *The practical study of language*. In: H. C. WYLD (ed.): *Collected Papers of Henry Sweet*, p. 35, THE CLARENDON PRESS, 1913. Italicized by this author.
- [2] GILLIN, E. J.: *Science and Sound in Nineteenth-Century Britain: Sounds Experimental and Entertaining*, p. 20, 2023.
- [3] ASHBY, M.: *Experimental phonetics in Britain, 1890-1940*, p. 117, 2016.
- [4] ASHBY, M.: *Experimental phonetics in Britain, 1890-1940*, pp. 146–147, 2016.
- [5] SWEET, H.: *Presidential Address (1877)*. In: H. C. WYLD (ed.): *Collected Papers of Henry*

- Sweet, p. 85, THE CLARENDON PRESS, 1913.
- [6] OHALA, J. J.: *The integration of phonetics and phonology. Proceedings of the XIIIth International Congress of Phonetic Sciences, Aix-en-Provence. Vol. 1*, pp. 1-16, 1991.
This work was later adapted by John J. Ohala into “Phonetics and Phonology then, and then, and now.” In this work, Ohala categorizes Sweet’s works, as well as other IPA-related phonetician’s works as “taxonomic phonetics,” despite that he also noticed the duality of Jean-Pierre Rousselot and Paul Passy.
- [7] CHANG H.: *Inventing Temperature: Measurement and Scientific Progress*. OXFORD UNIVERSITY PRESS, 2007.
For a more elaborated account on the difference between history & philosophy of science (HPS) and scientific research (including its disciplinary history), I find Hasok Chang’s concept of “complementary science” very useful.
- [8] BRAIN, R.: *Standards and Semiotics*. In: T. LENOIR (ed.): *Inscribing Science: Scientific Texts and the Materiality of Communication*, pp. 250–252, STANFORD UNIVERSITY PRESS, 1998.
- [9] SWEET, H.: *Words, logic, and grammar*. In: *Transactions of the Philological Society, 1875–6*, pp. 470–503, reprinted in H. C. WYLD (ed.): *Collected Writings*. Emphases are mine.
- [10] SWEET, H.: *On Germanic and Scandinavian (1874)*. In: H. C. WYLD (ed.): *Collected Papers of Henry Sweet*, p. 75, THE CLARENDON PRESS, 1913.
Sweet also shows a clear favor of Merkel over Brucke, although both physiologists used diagrams to represent the vocal tract in the production of vowel sounds.
- [11] ELLIS, A. J.: *The Essentials of Phonetics*, p. 23, 1848.
In 1845, Alexander J. Ellis (1814–1890) published *The Alphabet of Nature*. Two years later, the second edition of *The Alphabet of Nature* came out under the new title, *The Essentials of Phonetics*. In both works, Ellis explained a shorthand for the English language and a “theory for a universal alphabet.”
- [12] WILLIS, R.: *On the Vowel Sounds, and on Reed Organ-pipes*. In: *Transactions of the Cambridge Philosophical Society*, pp. 1–38, 1829.
Robert Willis (1800–1875), engineer and college fellow at Cambridge, built a machine that imitates vowel sounds using pipes with an adjustable plunger. For more details, see Gillin, *Science and Sound in Nineteenth-Century Britain*, p. 67.
- [13] BELL, A. M.: *Visible Speech*, 1868.
For a more comprehensive review on the development of phonetics in mid-victorian Britain, see Michael Ashby, *Experimental Phonetics in Britain, 1890–1940* (2016); and J. A. Kemp, “The development of phonetics from the late 18th to the late 19th century,” pp. 1475–1479.
- [14] ASHBY, M.: *Experimental phonetics in Britain, 1890-1940*, p. 118, 2016.
On Ellis’s usage of the phonautographic diagrams, Michael Ashby acutely points out that it is “unclear whether this means that Ellis had access to a device and was able to make tracings, or simply that Wheatstone (whom Ellis referenced extensively) had been sent many examples from other workers.”
- [15] KEMP, J. A.: *The development of phonetics from the late 18th to the late 19th century, and The history and development of a universal phonetic alphabet in the 19th century: from the beginnings to the establishment of the IPA*. In: *History of the Language Sciences: An International Handbook on the Evolution of the Study of Language from the Beginnings to the Present*. pp. 1572–1580, 2000.
- [16] SWEET, H.: *A Manual of Current Shorthand Orthographic and Phonetic*, p. 16, 1892.
- [17] SWEET, H.: *Linguistic affinities (1900)*. In: H. C. WYLD (ed.): *Collected Papers of Henry Sweet*, p. 56, THE CLARENDON PRESS, 1913.
- [18] SWEET, H.: *Preface*. In: *A Handbook of Phonetics: Including a Popular Exposition of the*

- Principles of Spelling Reform*, p. 13, 1877.
- [19] SWEET, H.: *Preface*. In: *A Handbook of Phonetics: Including a Popular Exposition of the Principles of Spelling Reform*, pp. 15–16, 1877.
- [20] SWEET, H.: *English and Germanic Philology (1878)*. In: H. C. WYLD (ed.): *Collected Papers of Henry Sweet*, p. 130, THE CLARENDON PRESS, 1913.
Sweet saw a dialectical relation between spoken dialects and literary languages. For instance, contemporary Italian dialects are not “evolved” (or “decayed”) forms of an old spoken Italian, but are “direct decedents of literary Latin,” which “swallowed up all the old Italic dialects long before the rise of the Romance languages.”
- [21] SWEET, H.: *English and Germanic Philology (1878)*. In: H. C. WYLD (ed.): *Collected Papers of Henry Sweet*, p. 128, THE CLARENDON PRESS, 1913.
- [22] SWEET, H.: *A Handbook of Phonetics: Including a Popular Exposition of the Principles of Spelling Reform*, pp. 103–104, 1877.
- [23] SWEET, H.: *A Handbook of Phonetics: Including a Popular Exposition of the Principles of Spelling Reform*, pp. 106–107, 1877.
- [24] DASTON, L. AND GALISON, P.: *Objectivity*. ZONE BOOKS, p. 17, 2010.
- [25] DASTON, L. AND GALISON, P.: *Objectivity*. ZONE BOOKS, p. 121, 2010.
- [26] YEANG, C.: *Mechanization of hearing in Chao Yuan Ren’s dialect research: Senses, Objectivity, and Observation, Chinese Annals of History of Science and Technology*, pp. 94–117, 2019.
Historians of science and technology have shown that the subjugation of the self in scientific research is not always the case. For instance, Chen-Panng Yeang shows that, in the 1920s and 30s, human data collectors, such as Chinese linguist Yuan Ren Chao, continued to play a central part in phonetic research in China. Chao’s usage of his “tone spectral measurers” required delicate operations as well as interventions by the human data collector with a “musical ear,” as it requires the observer’s input to generate results. In this sense, Henry Sweet was not the only one who characterized an alternative scientific persona.
- [27] SWEET, H.: *A Handbook of Phonetics: Including a Popular Exposition of the Principles of Spelling Reform*, p. 171, 1877.
- [28] SWEET, H.: *A Handbook of Phonetics: Including a Popular Exposition of the Principles of Spelling Reform*, p. 174, 1877.
- [29] ELLIS, A. J.: *On Palaeotype; or, the representation of spoken sounds, for philological purposes, by means and the ancient types, Transactions of the Philological Society*, p. 3, 1867.
- [30] ELLIS, A. J.: *Essentials of Phonetics*, 1848.
- [31] SWEET, H.: *A Handbook of Phonetics: Including a Popular Exposition of the Principles of Spelling Reform*, p. 102, 1877.
- [32] SWEET, H.: *A Handbook of Phonetics: Including a Popular Exposition of the Principles of Spelling Reform*, p. 101, 1877.
- [33] KITTLER, F. A.: *Gramophone, Film, Typewriter*. STANFORD UNIVERSITY PRESS, 1999.
- [34] MACMAHON, M. K. C.: *The International Phonetic Association: the first 100 years*. In: *Journal of the International Phonetic Association*, p. 30, 1986.
- [35] N. A.: *Hû Wi Ar*. In: *Le Maître Phonétique*. 1886.
- [36] MACMAHON, M. K. C.: *The International Phonetic Association: the first 100 years*. In: *Journal of the International Phonetic Association*, p. 36, 1986.
- [37] BRAIN, R.: *Standards and Semiotics*. In: T. LENOIR (ed.): *Inscribing Science: Scientific Texts and the Materiality of Communication*, pp. 283–284, STANFORD UNIVERSITY PRESS, 1998.
- [38] INTERNATIONAL PHONETIC ASSOCIATION: *The principles of the International Phonetic Association*. In: *Handbook of the International Phonetic Association: A Guide to the*

- Use of the International Phonetic Alphabet*. CAMBRIDGE UNIVERSITY PRESS, p. 205, 2005. Emphasis mine.
- [39] SWEET, H.: *Practical study of language (1884)*. In: H. C. WYLD (ed.): *Collected Papers of Henry Sweet* pp. 50, 1913.