

# Coming to Terms with Sound: Carl Stumpf's Discourse on Hearing Music and Language

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## ABSTRACT

This article examines the use of a concept—*Einstellung*, that is, technical setting or mental attitude—in Carl Stumpf's study *Die Sprachlaute*. More specifically, it looks at a textual strategy of avoiding an explicit definition of the term, while building on it in the explanation for failure in his experiments. Three strands of negotiation are present in this discussion: (a) Stumpf's positioning against Wilhelm Wundt and with respect to the emerging schools of phenomenology and Gestalt psychology in a transforming academic landscape; (b) his methodological approach, which is identified as a comparison of judgments, asking how judgments relate to various conditions such as predisposition, previous exposure, or simply previous information on the matter to be judged; (c) the epistemological question of how Stumpf relates the concrete materiality of the experimental setup to the functions and processes in the mind of the judging subject and how this mirrors the problem of relating empirical findings to conceptual consideration. The overall frame for this is construed along the term *Einstellung*, which provides a central theme throughout this article.

In 1926 the book *Die Sprachlaute: Experimentell-phonetische Untersuchungen nebst einem Anhang über Instrumentalklänge* (Speech sounds: Experimental phonetic investigations with an appendix on instrumental sounds) was published with the renowned Springer publishing house in Berlin.<sup>1</sup> The author, Carl Stumpf, then age 78, reported on more than a decade of research on speech sounds. This was the fourth area of research he had embarked upon, each resulting in a book. The first, *On the Psychological Origins of Spatial Representation* (1873), was to qualify him as philosopher specialized in perception, who continued to elaborate the school of the influential philosopher

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1. Carl Stumpf, *Die Sprachlaute: Experimentell-phonetische Untersuchungen nebst einem Anhang über Instrumentalklänge* (Berlin: Springer, 1926).

Franz Brentano. The second, *Tone Psychology* (2 vols., 1883, 1890), introduced a new paradigm of psychological research that secured him chairs, after Würzburg and Prague, at Halle, Munich and eventually Berlin. The third, *The Origins of Music* (1911) counts today as one of the founding texts in the study of non-European music.

*Die Sprachlaute*, the fourth in the sequence, is not so easily merged into the developing landscape of disciplines that deal with the mind and its products. To be sure, the technology he had introduced in 1913 as cutting edge was outdated when the book appeared in print. Although Stumpf had always been eager to include the latest technical developments in his experimental setup, the electrification of both acoustics and psychology had surpassed him by 1926, giving the book an even stronger touch of retrospection. The notion of acoustic phonetics that Stumpf used to indicate the object of his research, while being utterly new when he began, had not resulted in a new paradigm at the time. It was only with the systematic use of spectrograms after WWII that the field of acoustic phonetics took off.<sup>2</sup> More importantly, while contributing to phonetics by clarifying the nature of vowel formants, Stumpf's book is also characterized by the author's voice, which has other plans than to further the knowledge of physical acoustics as applied to speech sounds.

For example, he commented on one experiment: "In living speech, we constantly deal with directive mindsets [*richtungsweisende Einstellungen*]. Simply by setting our mind to the German, French, or Italian language, we exclude a great number of possibilities, and include others." The experiment exposed subjects to synthetic vowel sounds. Although he had asked them to describe what they heard in the first instance, they also tried to identify the sounds, and for this, they resorted to the patterns of their own native language. Rather than producing data about the artificial sounds, Stumpf thus obtained replications of his subjects' bias in judging speech sounds in accordance with the system of sounds with which they were most familiar. In this respect, his observation on the effect of the subject's native language reports a failure rather than a result, a moment when the outcome of an experiment did not match his intentions. At least, this is what the reader gathers when Stumpf goes on to caution about leaving too much space for "random subjective mindsets" that persevere and thereby "damage an entire series of experiments."<sup>3</sup>

There are plenty of such moments in *Die Sprachlaute*, when the book seems to con-  
vert its own aims. Stumpf recounts his subjects' quirky answers, his own failures, and the problems of imprecision in his apparatus. This results in an account that evades easy categorization. On the one hand, the text bears a strong mark of authorship, while, on the other hand, it seems to avoid a decision about the field in which the discussion is

2. See, e.g., Kenneth N. Stevens, *Acoustic Phonetics* (Cambridge, MA: MIT Press, 1999).

3. Stumpf, *Die Sprachlaute*, 50. Unless otherwise indicated, all translations are my own.

meant to be situated.<sup>4</sup> The text becomes a site where analysis, doing, and describing are brought together, while putting on hold the decision of which scientific or scholarly discipline the book belongs to. The present article proposes to anchor this mode of writing in the process of experimentation. Support for this approach comes from the recent history of philosophy. Riccardo Martinelli, for instance, has argued that Stumpf did not deploy his experimental activity at the cost of his philosophical interests. On the contrary, his “lifelong work in experimental psychology is part of an interesting epistemological program” that aimed at integrating sciences, humanities (*Geisteswissenschaften*), and his own take on phenomenology in original ways.<sup>5</sup>

The analysis I propose is based on the assumptions that experimentation also provides the grounds on which to analyze Stumpf’s text.<sup>6</sup> A characteristic feature in nineteenth-century experimental life sciences is that the phenomena to be investigated were only produced *during* the process of experimentation. Experimenters thus needed to develop new strategies for producing *and* observing them. This problem has been addressed in the history and philosophy of experimentation and knowledge variously in Gaston Bachelard’s concept of “phenomenotechnics,” which points to the co-emergence of the

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4. Stumpf has variously been assigned a place in the histories of philosophy, experimental psychology, ethnomusicology, phonetics, and of archives and their media. See, for instance, Gretel Schwörer-Kohl, “Die Musikethnologie Carl Stumpfs am Beispiel der siamesischen Musik,” in *Die Sinne und die Erkenntnis*, ed. Martin Ebeling and Margret Kaiser-el-Safti (Frankfurt a.M.: Lang, 2011), 175–84; Gretel Schwörer-Kohl, “Carl Stumpf und die Anfänge der Musikethnologie in Halle,” in *Musikwissenschaft 1900–1930: Zur Institutionalisierung und Legitimierung einer jungen akademischen Disziplin*, ed. Wolfgang Auhagen, Wolfgang Hirschmann, and Tomi Mäkelä (Hildesheim: Olms, 2017), 66–73 on ethnomusicology; Frauke Fitzner, “Die zergliederte Einheit: Aufschreibesystem und gestalt-theoretischer Anspruch bei Carl Stumpf und Erich M. von Hornbostel,” in *Gestalt und Gestaltung in interdisziplinärer Perspektive*, ed. Ellen Aschermann and Margret Kaiser-el-Safti (Frankfurt a.M.: Lang, 2014), 191–203; Julia Kursell, “Experimental Cylinders: Experiments in Music Psychology around 1900,” *Journal of Sonic Studies* 13 (2017), <https://www.researchcatalogue.net/view/324247/324248> on questions of media history and archiving.

5. Riccardo Martinelli, “A Philosopher in the Lab: Carl Stumpf on Philosophy and Experimental Sciences,” *Philosophia Scientiæ* 19, no. 3 (2015): 24. See also, among others, Margret Kaiser-el-Safti, “Der Witz (in) der Tonpsychologie Carl Stumpfs,” *Gestalt Theory: An International Multidisciplinary Journal*, 31, no. 2 (2009): 143–74.

6. The notion that the actual textual presentation of scientific and scholarly text must be taken seriously has been strong in German language literary studies during the past two decades. For pioneering publications in the field see, e.g., Joseph Vogl, ed., *Poetologien des Wissens* (Munich: Fink, 1999); Bettine Menke, *Prosopopöia: Stimme und Text bei Brentano, Hoffmann, Kleist und Kafka* (Munich: Fink, 2000); Jutta Müller-Tamm, *Abstraktion als Einfühlung: Zur Denkfigur der Projektion in Psychophysiologie, Kulturtheorie, Ästhetik und Literatur der frühen Moderne* (Freiburg: Rombach, 2005). For further accounts of Stumpf’s writing strategies in this context see, e.g., Frauke Fitzner, *Der hörende Mensch in der Moderne: Medialität des Musikhörens um 1900*, PhD dissertation, Eberhardt Karls University Tübingen, 2019; Julia Kursell, *Schallkunst: Eine Literaturgeschichte der Musik in der frühen russischen Avantgarde* (Munich, Vienna: Sagner, 2003).

objects of study and the study itself, Michel Foucault's "transcendental-empirical doublet," which describes the function of the subject as both acquiring knowledge and being the object of knowledge, Hans-Jörg Rheinberger's "epistemic thing" as fundamentally reversing the idea that the object of an investigation can be known before the investigation begins, Henning Schmidgen's emphasis on the experimental setup as an "assemblage," or Friedrich Steinle's "exploratory mode of experimentation" as the plea for acknowledging, again, that in the early nineteenth century experimentation no longer posed hypotheses to test for a yes-or-no question, but instead delved into the complex production of studiable phenomena. All these concepts in one way or the other address the processuality of experimentation in that they demonstrate how propositional knowledge about the objects investigated necessitates a hindsight perspective that tends to force the epistemologist of experimentation into history, because research is a process and its objects emerge in time.<sup>7</sup>

When sound brings its fleeting nature into experimentation, the distinction between the agents in the knowledge-making process becomes precarious—whether between textual strategies and their motivations, between different voices represented in the text, or between various levels of semantics in the use of single notions. They are meant to be of a heuristic nature and to admit both indeterminacy and specificity regarding the role of sound in Stumpf's account. The textual presentation of Stumpf's research, this article suggests, keeps these elements in the air as he juggles with sound cognition.

### JUDGING JUDGMENTS

In the early 1890s, Stumpf became embroiled in a controversy with the leading figure in German experimental psychology, Wilhelm Wundt. By then, experimental psychology had begun to detach itself from philosophy, and Wundt, a trained physiologist, had been among the first to institutionalize psychology as a discipline of its own.<sup>8</sup> Wundt advocated collecting data from as many subjects as possible, notwithstanding

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7. Gaston Bachelard's elaborations on this term spread over several works, cf., e.g., Dominique Lecourt (ed.), *Bachelard: Epistémologie* (Paris: PUF, 2001); Hans-Jörg Rheinberger, "Gaston Bachelard: The Concept of 'Phenomenotechnique,'" in *An Epistemology of the Concrete: Twentieth-Century Histories of Life* (Durham, NC: Duke University Press, 2010), 25–36; Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences* (New York: Random House, 1970), 319; Friedrich Steinle, *Exploratory Experiments: Ampère, Faraday and the Origins of Electrodynamics*, trans. Alex Levine (Pittsburgh, PA: University of Pittsburgh Press, 2016); Hans-Jörg Rheinberger, *Toward a History of Epistemic Things: Synthesizing Proteins in the Test Tube* (Stanford, CA: Stanford University Press, 1997); Henning Schmidgen, *Hirn und Zeit: Die Geschichte eines Experiments 1800–1950* (Berlin: Matthes & Seitz, 2014).

8. For the history of psychology in Germany see, e.g., *Geschichte der deutschen Psychologie im 20. Jahrhundert: Ein Überblick*, ed. Mitchell G. Ash and Ulfried Geuter (Opladen: Westdeutscher, 1985); in

their expertise in the questions under scrutiny, whereas Stumpf insisted in expertise as an important aspect in experimentation.<sup>9</sup> Triggered by an article by Wundt's student Carl Lorenz, the debate involved a musical subject. Lorenz had asked test subjects to determine if the middle note of three appeared to them as the midpoint between the two outer notes or closer to the upper or lower note.<sup>10</sup>

At first sight, the method seemed fully in line with psychophysical experimentation, in which the relation between measurable stimuli and estimated sensation was put to the test. In his 1860 treatise *Elements of Psychophysics*,<sup>11</sup> the founder of psychophysics, Gustav Theodor Fechner, had devised experiments in which subjects were, for instance, asked to indicate when the second of two stimuli corresponded to a sensation of doubling the value of the first on a gradient of, for instance, weight, pressure, or heat. The estimate was then compared to physical measurement. For Fechner, the interest was in finding out whether there was a predictable relation between an increase in the sensation and the growth in the stimulus. He discovered what came to be known as the Weber-Fechner law, namely that an exponential growth in the stimulus produced a sensation of linear rise. Musical tones seemed a case in point for testing the Weber-Fechner law. As had long been known, raising pitch by an octave meant doubling the frequency and thus involved an exponential growth for steps that were considered equal.<sup>12</sup>

Wundt and his student Lorenz proceeded from the assumption that all human informants react in the same way to given stimuli, whether heard or sensed otherwise. In agreement with Wundt's "physiological psychology," they sought to explore whether the laws of psychophysics, such as the Weber-Fechner law, applied to all humans and

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Berlin, more specifically, *Zur Geschichte der Psychologie in Berlin*, ed. Lothar Sprung and Wolfgang Schönplüg (Frankfurt a.M.: Lang, 1992); and in the context of the history of humanities, Jeroen Bouterse and Bart Karstens, "A Diversity of Divisions: Tracing the History of the Demarcation between the Sciences and the Humanities," *Isis* 106, no. 2 (2015): 341–52.

9. In this summary of the debate, I follow Alexandra E. Hui, "The Wundt-Stumpf Debate," in *The Psychophysical Ear: Musical Experiments—Experimental Sounds, 1840–1910* (Cambridge, MA: MIT Press, 2013), 127–34.

10. Carl Lorenz, "Untersuchungen über die Auffassung von Tondistanzen," *Philosophische Studien* 6 (1891): 26–103. Reviewed by Stumpf in "C. Lorenz: Untersuchungen über die Auffassung von Tondistanzen. Wundts Philos. Studien, VI. Band, 1. Heft, S. 26–103," *Zeitschrift für Psychologie und Physiologie der Sinnesorgane* 1 (1890): 140–41.

11. Gustav Theodor Fechner, *Elemente der Psychophysik*, 2 vols. (Leipzig: Breitkopf & Härtel, 1860).

12. The problem that a scale of equal steps had to be calculated by assuming a logarithmic growth in frequency for the pitches in, for instance, instruments with frets or keys, was well known by the 19th century. Yet, this scale, even though its steps were equidistant, was meant in the first instance to be usable for musical intervals to which the idea of equidistance was alien.

all senses alike, and irrespective of the degree of expertise in a subject. Stumpf, however, argued that when exposed to musical notes as a stimulus, subjects would, in the first instance, react to the tones as representing music, not to measurable values. They would judge what they heard in terms of music theory, rather than trying to make their minds operate as measuring devices. He eventually denied the validity of the results, on the grounds that they did not distinguish between informants with and without musical expertise.<sup>13</sup>

More importantly, Stumpf's own research was driven by a different interest. He compared judgments rather than averaging values. For this he needed groups of subjects with the same expertise, whether high or low, who showed consistent patterns in their judgments; these could then be compared to the judgments of other subjects with a different, but again homogeneous, degree of expertise. As Stumpf wrote in the foreword to the first volume of his *Tonpsychologie* (Tone psychology) of 1883, the lack of expertise in "unmusical natures" was particularly helpful in this endeavor.<sup>14</sup> In fact, he declared that it was the unmusical subjects—with neither talent nor expertise in music—who had opened up the domain of music for his inquiry: any musical phenomenon could be subjected to a comparison between judgments of expert as opposed to unmusical subjects.<sup>15</sup>

Shortly before the debate ignited, this method had come to fruition in the second volume of Stumpf's *Tone Psychology* of 1890. The detection of a new gradient, which he called "fusion"—in other words, the tendency of two notes to melt into one—contributed to his renown as an experimental psychologist. For this research, he had made

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13. Carl Stumpf, "Über Vergleichen von Tondistanzen," *Zeitschrift für Psychologie und Physiologie der Sinnesorgane* 1 (1890): 419–62, "Wundts Antikritik," *Zeitschrift für Psychologie und Physiologie der Sinnesorgane* 2 (1891): 266–93, and "Mein Schlußwort gegen Wundt," *Zeitschrift für Psychologie und Physiologie der Sinnesorgane* 2 (1891): 438–43.

14. Carl Stumpf, *Tone Psychology*, vol. 1, *The Sensation of Successive Single Tones*, ed. and trans. Robin D. Rollinger (London: Routledge, 2020); for the German, see Carl Stumpf, *Tonpsychologie*, vol. 1 (Leipzig: Hirzel, 1883), vi.

15. Both approaches could be considered to anticipate later developments in psychological methodology, as the historian of psychology Edwin G. Boring pointed out in the mid-twentieth century; see *A History of Experimental Psychology* (New York: Appleton-Century, 1929), and *Sensation and Perception in the History of Experimental Psychology* (New York: Appleton-Century-Crofts, 1942); and, on Boring, see Hui, *Psychophysical Ear*. Boring, however, writes at a moment when methodology undergoes a shift toward psychoacoustics. Starting in the late 1920s, psychology laboratories began to systematically use electrical circuitry. Experimental subjects could now adjust a sound they heard via a headset to some value they were asked to judge. By turning a knob, the subjects expressed their judgments and produced data at the same time. This constellation of knowledge on sound and sound psychology cannot be discussed in the scope of this article. For some preliminary reflections, see Julia Kursell and Armin Schäfer, "Elektronische Musik für Radios von John Cage, Karlheinz Stockhausen und Michael Snow," in *Radiophonic Cultures*, ed. Ute Holl, vol. 1 (Heidelberg: Kehrer, 2018), 135–49.

systematic use of informants with specific degrees of expertise in music. Early on, while still in Würzburg, where he succeeded Franz Brentano as professor of philosophy, he invited colleagues and friends who had claimed to lack musical talent to his home, to test their assertion. He asked them which of two notes he played on a piano was higher. His guests gave random answers, and Stumpf concluded that judgments on tonal relations were not necessarily reliable.<sup>16</sup>

The inability of his unmusical guests not only demonstrated that they were at sea in music, but also undermined some key precepts of psychophysics. Apparently, the subjects did not even share the impression of a gradient of pitch to begin with, if they could not tell which of two notes was higher.<sup>17</sup> How could one then ask them to indicate any distance—between what and what? Stumpf’s own method did not rely on the one-to-one comparison between measured and sensed gradients. Instead, he strove to analyze the judgments he encountered, noting that his first interest in the unmusical subjects had been to verify the reliability of tonal judgments more generally.<sup>18</sup>

For the first volume of *Tone Psychology* (1883), the judgments of the unmusical subjects were compared to those of experts, such as string players like Stumpf himself, as well as conductors and composers.<sup>19</sup> With these two groups—musical experts and unmusical subjects recruited from his surroundings—he later continued testing whether they could discern multiple notes in two simultaneously played musical notes. The musical experts immediately categorized what they heard in terms of consonant or dissonant intervals; the unmusical subjects most often did not hear two notes, but only one sound. In Stumpf’s terms, the experts analyzed the sounds, where the unmusical only sensed them. Yet Stumpf could also demonstrate that even the allegedly knowledgeable subjects were sometimes incapable of hearing several notes, for instance, when they had to judge two notes in the relation of an octave, which in music theory is considered the most strongly consonant interval. This resulted in a gradient, along which the greater the tendency of the two notes to “fuse” into one sound, the more likely it was that all subjects would tend to hear only one sound.

The terminological distinction between subjects who sense and subjects who analyze sounds helps to explain why Stumpf could not agree with Wundt. The musical

16. See Stumpf, *Tonpsychologie* 1:147.

17. For this, Stumpf is credited with having invented the first musicality test by Catharina von Maltzew, a Berlin-born Russian psychologist and Stumpf’s former PhD student, in 1928; see C. von Maltzew and M. Serejsky, “Prüfung der Musikalität nach der Testmethode,” *Psychotechnische Zeitschrift* 3/4 (1928): 103–7.

18. See, e.g., Julia Kursell, “Carl Stumpf and the Beginnings of Research in Musicality,” in *The Origins of Musicality*, ed. Henkjan Honing (Cambridge, MA: MIT Press, 2018), 323–46.

19. For more on the expert group and how Stumpf would count himself among them, see Julia Kursell, “From Tone to Tune: Carl Stumpf and the Violin,” *19th-Century Music* 43 (2019): 121–39.

subjects could be expected to hear tone distance “analytically” in this sense, meaning that they did not judge the mere distance, but instantaneously compared what they heard to mental categories. The mental grid of tonality determined for them what name could be given to an interval and whether that interval was well intoned or perhaps out of tune. Evoking the terminology Stumpf eventually used in *Die Sprachlaute*, one could say that they listened to pitch distance using the “directive mindsets” of European tonal music. The comparison between the two groups—one of them unable even to recognize any distance between the sounds, the other already thinking ahead to interval names—enabled Stumpf to discuss judgments rather than mere reactions to stimuli. Judging judgments on musical matters, in one way or the other, proved to require taking a degree of expertise into account, even if that degree only came to the fore against the background of the judgments made without it.

### EXPERIMENTING EXPERTISE

In an appendix to *Die Sprachlaute*, Stumpf reported an experiment he carried out in 1910, before beginning the construction of the apparatus he would need for his main research on speech sounds. This experiment unexpectedly shifted the emphasis in judging judgments to the question of previous exposure. Unlike the two groups—experts and unmusical subjects—in the research on tone psychology, this group of experts was compared among themselves in performing an unfamiliar task. The following subjects were asked to judge the sounds of musical instruments: “H., excellent acoustician and music researcher, F., equally well trained in acoustics and composer, B., piano teacher at the music academy and conductor, Ha., military music director, [and] M., instrument maker and supplier of wind instruments for military music.”<sup>20</sup> Their expertise was evidenced according to the similar criteria to those Stumpf used elsewhere; composers and conductors had featured as experts in *Tone Psychology*, and Stumpf’s collaborators again provided expert observation in the sound analyses that were carried out in the new experimental settings for *Die Sprachlaute*. Yet, the results clearly showed that only two of the experts actually demonstrated expertise for the specific task: the instrument maker almost flawlessly recognized his own instruments, and the composer recognized all but one in a series of twenty-seven instruments; the other experimental subjects had a 50 per cent success rate.<sup>21</sup>

At first sight, this confirmed the impact of expertise. In this case, however, the difference among the experts emerged only during the experiment. Most striking was the

20. Stumpf, *Die Sprachlaute*, 375.

21. On this experiment see also Julia Kursell, “Experiments on Tone Color in Music and Acoustics: Helmholtz, Schoenberg, and Klangfarbenmelodie,” *Osiris* 28 (2013): 191–211.



“unexpected cluelessness” that the task produced in some of the subjects,<sup>22</sup> which Stumpf interpreted as proof that the role of experience had to be differentiated. All the subjects were experienced in identifying the sounds of instruments and did so on a regular basis, as part of their profession. In this sense, they could all be considered experts. Yet, not all had been exposed to the specific listening experience isolated in the experiment.

For the experimental setup, holes were drilled into the walls of two rooms on opposite sides of a hallway. The instruments were played in one room, the experimental subjects positioned in the other. The hallway in between added to the effect of distancing the instruments from the subjects, both acoustically and visually.<sup>23</sup> Thereby, recognition was put on trial by connecting the two ends of a sonic communication and at the same time separating them. Most importantly for this experiment, the holes were covered with a lid that was removed for only a short moment: the lid was opened after the sound reached the moment of sustain and, after two seconds, closed before the sound faded away. That is to say, the lid was used to cut off the characteristic transient features in musical sound production, which are particularly relevant for recognizing a sound. For those who performed poorly in this experiment, the task of recognizing an instrument solely based on the spectrum of its sustained musical sound was obviously less relevant in their daily practice.

The results demonstrated that the task under examination was highly specific. It was constructed by the setup, and it turned out to match previous experience in some subjects, but not all. Most strikingly, the experiment thereby questioned the concept of expertise as such. The notion that a listener’s ability to identify instruments necessarily included each single section of a sound when separated from the others did not apply. In the wider notion of “identifying the sound of musical instruments” there were thus aspects that would apply only to some experts in the field.

It is important to note here that the experiment can be seen to explore Hermann von Helmholtz’s concept of musical timbre. Helmholtz had described his experience of distinguishing the sound of instruments under conditions that allowed for observing only the periodic, sustained sound of musical instruments sufficiently well, when the beginning and end of these sounds were inaudible. He related this as a thought experiment that suggested a listener hiking in the mountains and overhearing distorted sounds of voices and instruments from a valley. Unlike for Stumpf, however, for Helmholtz’s physiological interest in the organ of hearing, this notion of a sufficient distinction was also sufficient to explain that some mechanism of distinguishing had to be

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22. Stumpf, *Die Sprachlaute*, 376.

23. *Ibid.*, 374–75.

assumed, whether it resulted in a clear recognition or not. As he could only experiment with sustained sounds in his own setups, this ability to distinguish sustained sound was crucial to validating the entire setup.

In contrast, Stumpf's interest was in the psychology, rather than the physiology, of hearing. He investigated judgments, and for this, the conditions under which a subject was making judgments were of crucial importance. This held not only for the physiological conditions, but it also potentially included other factors, such as predisposition and experience or training. He sought to disentangle the notion of expertise in timbre analytically, and in so doing, he realized that there was no straightforward correlation between Helmholtz's notion of the sustained musical timbre and the expertise in recognizing instruments.

What Stumpf's experiment also brought to the fore was the category of the default setting. He wrote, "One [of the subjects] had a preference for hearing an English horn, although this was never used, another one heard electrical tuning forks—always according to the individual default settings."<sup>24</sup> The default emerges here as the reverse side of the expertise coin—for one of the subjects, who was also Stumpf's assistant in other acoustic experimentation, the sounds without beginning and end resembled most the sustained sounds of electrically activated tuning forks, which had first been used by Helmholtz.

Stumpf's comment on the default is tucked away in an aside. It remains up to the reader to conclude that this experiment, which preceded the experiments carried out for the main body of the book's text, may present a step toward redefining expertise as malleable. Also, it is interesting to note that this experiment was carried out before the research on speech sounds began. It demonstrated that great care needed to be taken for research on the sound of musical instruments that would systematically employ the judgments of experimental subjects. Choosing subjects whose judgments would yield interesting comparison might not even have been feasible. Yet we do not learn from Stumpf about these questions. What he does mention in his anecdotal way of including findings that were otherwise difficult to place was that some of the alleged experts were disproven as experts. They nevertheless provided valuable insights about what kind of exposure would qualify a judging subject for a specific task and to what extent an experiment could defamiliarize the situation of acoustic recognition.

The setup for this experiment in some respects anticipates Stumpf's later construction of what he called an "interference device" (fig. 1). Here, the idea of distancing listeners from sources was systematized and upscaled. In total, the elements of the device

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24. *Ibid.*, 376.

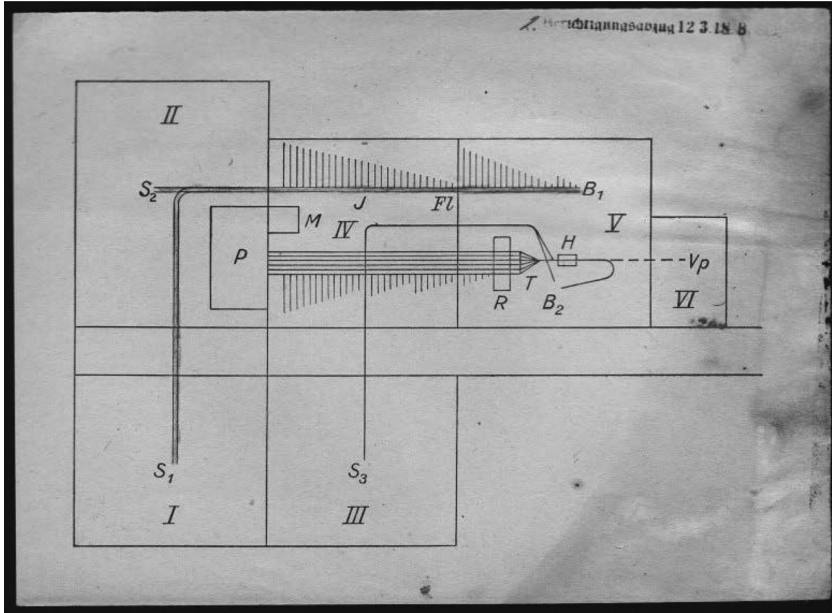


Figure 1. Floor plan of the Institute for Psychology at Berlin University. Blueprint for the Academy report with additional marks by Stumpf. Carl Stumpf Papers, Ethnologisches Museum Berlin SPK, Phonogramm-Archiv, Envelope 1: Vortrag 1919. Digitized by the Virtual Laboratory, <http://vlp.mpiwg-berlin.mpg.de/library/data/lit38857>, available at Sound & Science: Digital Histories, <https://soundandscience.de/node/932>. Color version available as an online enhancement.

connected six of the institute's eight rooms with tubes.<sup>25</sup> The communication channels between the rooms relied on the mechanical propagation of the sound through these tubes, making the device huge. Tubes were used both for communication *and* for producing the features and functions of interest. The entire device consisted of two structures that served the purpose of synthesizing and analyzing sounds.

As the name of the device indicates, destructive interference was used to cancel out single components in frequency compounds. It exploited the fact that the waves of periodic sound consist of alternating patterns of rarefaction and compression that propagate

25. For a description of the premises at Dorotheenstrasse, which the former "Seminar of Psychology" obtained when it became the "Institute of Psychology" in 1901, see Carl Stumpf, "Das psychologische Institut," in *Geschichte der Königlich Friedrich-Wilhelms-Universität zu Berlin*, ed. Max Lenz (Halle: Verlag der Buchhandlung des Waisenhauses, 1910), 202–7. On the Institute of Psychology more generally, see Helga Sprung and Lothar Sprung, *Carl Stumpf—eine Biografie: Von der Philosophie zur Experimentellen Psychologie* (Munich: Profil, 2006); Mitchell G. Ash, *Gestalt Psychology in German Culture, 1890–1967: Holism and the Quest for Objectivity* (Cambridge: Cambridge University Press, 1995).

through a medium, in this case, the tubes filled with air. In the device, interference worked as follows. The sound was forced through large tubes into which hollow spikes could be placed. Each spike had a specific length, namely one quarter of the wavelength it was supposed to cancel. When the sound wave passed through the tube, the component with this wavelength would also enter the protruding spikes, re-emerging with a phase shift of half a wavelength. Thus, the phase shift made the opposite tendencies in the wave meet: rarefaction met with compression and vice versa. As a result, the frequency component with that wavelength disappeared from the overall sound, its movement having been neutralized. Stumpf admitted that several spikes were necessary to fully cancel one component, but he reported that the device was overall very effective.<sup>26</sup>

The interference mechanism itself had been suggested by earlier scholars. The physicist Georg Hermann Quincke first proposed using destructive interference in acoustic experimentation, and others developed his method to apply it to more than one wavelength.<sup>27</sup> Stumpf's main innovation consisted in devising a new scale for its use. He increased the number of potentially cancelled wavelengths, using spikes of variable length that could be plugged into the main tubes, so as to make the apparatus as flexible as possible. In a footnote to *Die Sprachlaute*, he declared that a device such as the one housed at Berlin's Institute of Psychology was "indispensable for any acoustic institute."<sup>28</sup> Indeed, connections between rooms, synthetically produced test sounds, and spots for listening and observing, all of them ideally situated at a distance, all became standard in psychological experimentation. Yet electrical sound generation would soon make the interference device, and more specifically its mechanical principle of sound propagation, obsolete.<sup>29</sup>

Most importantly, the possibility of separating the listener from the source in Stumpf's device opened up the opportunity to manipulate the subject's knowledge about the sounds to be judged. That is to say, expertise became malleable. The plan for the experimental setup includes a chamber (labeled VI in fig. 1) whose sole purpose

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26. For descriptions of the device, see also Bernd Pompino-Marschall, "Carl Stumpf und die Phonetik," in *Musik und Sprache: Zur Phänomenologie von Carl Stumpf*, ed. Margret Kaiser-El-Safti and Matthias Ballod (Würzburg: Königshausen & Neumann, 2003), 131–50; Julia Kursell, "Musikwissenschaft am Berliner Institut für Psychologie: Carl Stumpf und der Interferenzapparat," in *Musikwissenschaft 1900–1930: Zur Institutionalisierung und Legitimierung einer jungen akademischen Disziplin*, ed. Wolfgang Auhagen, Wolfgang Hirschmann, and Tomi Mäkelä, Studien und Materialien zur Musikwissenschaft 98 (Hildesheim: Georg Olms, 2017), 73–90.

27. See Kursell, "Musikwissenschaft am Berliner Institut für Psychologie."

28. Stumpf, *Die Sprachlaute*, 36.

29. Interference, however, also was used in acoustics research by means of electrical technology. On this research and the actors' scientific politics through invoking Stumpf as their predecessor, see Viktoria Tkaczyk's contribution in this volume.

was to isolate the test subjects from the sound sources so as to potentially also deprive them from any insight into the means and purposes of the experiment and the stimuli it used. This prompts a terminological distinction between test subject, or *Versuchsperson*, and observer, or *Beobachter*. The floor plan indicates a distinction between these two functions also in terms of their positioning. The observers were located in the control room (V in fig. 1), where the manipulation of the sound took place. There is one spot for an observer in the part of the structure that served sound analysis ( $B_1$ ), and a second spot near the switch ( $B_2$ ) that could be used to manipulate the sound from the synthesis structure and that enabled the observer to direct its sound toward the adjacent room. In this respect, the observer was equivalent to an experimenter.<sup>30</sup> The test subjects, in contrast, were removed to a spot that deprived them of any control over the sounds they heard through the tube. They had to rely on the information they were given prior to the experiment.

Stumpf nevertheless still appears reluctant to admit that uninformed subjects could play any role in his experimental design. In a paragraph with the header “Informed and uninformed experiment,” he notes that the apparatus allows both “informed experimentation,” that is to say trained observation, and “uninformed trials.” He begins the paragraph by conceding that “experimental psychologists are accustomed to holding uninformed trials, in which the subject does not even know the purpose of the endeavor, in high esteem”—only to emphasize his own preference for trained observers (“geschulte Beobachter”).<sup>31</sup>

The main purpose of skilled observation, as Stumpf conceived of it in his research on speech sound, was to track the phenomena that the apparatus produced in analyzing and synthesizing vowel sounds. For this, the interference device provided two separate structures. Using the analysis structure, one could observe the effect of a one-by-one cancelling of components in a sound; using the synthesizer structure, one could create synthetic compounds from single frequencies, purified beforehand by the same use of destructive interference. As the phenomena produced during the experiments with both structures were not known beforehand, the observer’s skills in describing them were of crucial importance.

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30. In later psychoacoustic experimentation with electrically generated stimuli, this distinction tends to disappear. Leading figures in the field speak of “observers” when they indicate the place of the tested subjects in their circuitry; see, for instance, Stanley Smith Stevens, “A Scale for the Measurement of a Psychological Magnitude: Loudness,” *Psychological Review* 43, no. 5 (1936): 405–16; Harvey Fletcher and Wilden A. Munson, “Loudness, Its Definition, Measurement and Calculation,” *Journal of the Acoustical Society of America* 5 (1933): 82–108. The task of the observers, however, was to adjust a knob in order to reproduce their own sensory perception and thereby make it traceable. They did not describe what they heard.

31. Stumpf, *Die Sprachlaute*, 49.

Stumpf's preference for skilled observers accords with the notion of "trained judgment" as described by Lorraine Daston and Peter Galison.<sup>32</sup> In the early twentieth century, the idea that scholars needed skills that only individual experience could grant them began to become established, especially in the life sciences. Yet, rather than explaining his preference for skilled observers by the obvious distinction between the two functions in the experiment—that of his colleagues who supported him in observation and that of test subjects who were not supposed to gain insights into what they would judge—he seems to have preferred to keep this distinction in suspense. Using inserted polemics, digressions, and asides, he did not, however, decide whether the two functions of listening were pointing to one problem of judging sound or not.

The moments when lack of knowledge and expertise about the experiments came to bear upon the results keep surfacing in the text. In fact, such moments, rather than disproving the usefulness of expertise, reveal an interest in their own right. They point to questions that go beyond the main subject of experimental phonetics.<sup>33</sup> In the text, they are inserted in a way that both conceals and exposes their importance. If the descriptions by the skilled observers, including Stumpf himself, result in lengthy passages about who found what to be present in a sound, the problematics of unskilled observation trigger Stumpf's own skills of description, as will be seen in the next section.

### SETTING THE MIND TO SOUND

A peculiar feature of the digressions in *Die Sprachlaute* is that they bring in the knowledge that resulted from the moments when the process of experimentation went amiss. In a striking example, Stumpf relates how a whole group of subjects came to base their judgments on spurious information. During a demonstration of the interference device for a group of visitors from the department of modern languages, one participant insisted that she heard the vowel *Ö*, whatever sounds she was presented with. The other members of the group overheard her statement and adopted it. All of them only heard *Ö*: "Her judgment influenced all successive observers who overheard it. I almost mistrusted my own ear, until an experienced observer was called upon, Dr. Wertheimer, to judge without prior knowledge (uninformed) and recognized *O* at the first attempt." In this anecdote that is added in small print to the text, Stumpf expresses his amazement in a chain of negations: "The extent to which untrained people are unable to observe unbiasedly is surprising and sometimes even inapprehensible." In other words, normal people, understandably, use bias when communicating, and this is indeed what Stumpf

32. Lorraine Daston and Peter Galison, *Objectivity* (New York: Zone Books, 2007), 309–61.

33. See also Viktoria Tkaczyk's article in this collection for Stumpf's research with respect to its applicability.

argues further in the text. People without training in observation, or “beginners,” adopt “the everyday habit of guessing the sound that the speaker or singer intends.”<sup>34</sup> We then apply secondary criteria to judge sound, as he continued to explain, especially when the sound deviates from the habitual impressions.

At the other end of the spectrum of expertise, Stumpf also identified an alleged failure. He noted a “psychological factor of influence”—this time in the “most highly trained observers.” In the experiments that deconstructed and then reconstructed the frequency composition of vowels, the observer also had to note the point at which a sound that disappeared component by component could no longer be recognized, and in reverse, the point at which it became recognizable again when the vowel was reconstructed. As it turned out, the points of losing and regaining recognition were not the same in both directions of the analysis. Instead, the observer was inadvertently alerted to noting the smallest trace of the expected phenomenon. They would always anticipate it in the process of recognition, and thus hear the expected change in the sound as early as possible: “There is a point when even the most trained observer is exposed to a continuously operating psychological factor of influence: the results of deconstructing and reconstructing regularly differ. All stages of the transformation are situated a little lower [i.e., earlier] in the reconstruction than in the deconstruction.”<sup>35</sup> As Stumpf continued to explain, it was impossible to overcome this effect through training. He also notes the opposite effect, namely that the situation of observation in the same experiment allows the trained observers to hear analytically. When recomposing the sound, the single frequency components that came back in for a moment would not fuse, but remain distinct for the listener.<sup>36</sup> This analytical listening, while being “valuable,” was just as subjective as the equally involuntary action of the default.

Finally, a factor that hampered the process of observation was context. Stumpf occasionally challenged his expert observers by presenting them with sounds he did not announce beforehand, such as an *Ö* in a series testing *A*, or a sibilant *S* in a series of vowels. As was to be expected, the observers failed to recognize the unannounced change. Even the “best observer” declared that at that moment he “simply did not think about the possibility that consonants might be presented as well. As soon as he was told about this, the sound seemed as if metamorphosed and was recognized as a good *S*.”<sup>37</sup>

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34. Stumpf, *Die Sprachlaute*, 51.

35. *Ibid.*

36. This phenomenon was later used as a demonstration experiment for the presence and fusion of frequency components in periodic sound in Ernst Terhardt, *Akustische Kommunikation: Grundlagen mit Hörbeispielen* (Berlin: Springer, 1998).

37. Stumpf, *Die Sprachlaute*, 50.

As was the case with the patterns of one's own native language, the observers fitted the unfamiliar sound into its apparently comprehensible context. That context, though, only existed in their minds. Citing an earlier study by the physiologist and founder of phoniatrics Hermann Gutzmann, Stumpf emphasized that sounds heard in distortion were often granted some kind of meaning, so as to make sense to the listener. Gutzmann's work not only backed up that observation, but also contained the central term, *Einstellung*:

The auditory perception is then related to the most fitting sonic representations in memory, that is to say, it is combined with a familiar verbal concept more or less correctly. The perceived sound is apprehended and understood in accordance with this eclectic combination. If the words presented have a specific meaning for the hearer, then they cannot switch that off, and it even helps them to understand. On the other hand, this also can hamper understanding, and the setting (*Einstellung*) of the eclectic combinations in a specific direction, in other words, preconceived opinions, can lead to complete incomprehension in rapid speech, simply because there are resemblances in sound, but not in meaning.<sup>38</sup>

Stumpf's own long-term research on how judgments are based on preconceived notions of all kinds—from predispositions to training to information—resonates with this notion of context as an eclectic combination of bits of knowledge. *Die Sprachlaute* gathers all those meanings under one term: *Einstellung* denotes interfering contexts and the default in inadequate situations of listening, as well as the analytical setting in the minds of those observers who hear partial frequencies. Also, it is directly correlated to the device settings (*Einstellungen*), with these technical settings conditioning the mental settings. Nevertheless, the entire discussion of these settings appears to hover above the preference for an observation that could be considered “scientific” and in which the “role of haphazard and subjectivity could be reduced to a minimum,” as Stumpf remarked in conclusion.<sup>39</sup> He never published any paper in which these findings are discussed in their own right. The next section looks at what he did instead.

### COMING AND NOT COMING TO TERMS

The word *Einstellung* is notoriously difficult to translate. This is perhaps most obvious in one of its best-known occurrences, namely Edmund Husserl's *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy* (1913). Husserl coins his

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38. Hermann Gutzmann, “Untersuchungen über die Grenzen der sprachlichen Perzeptionen,” *Zeitschrift für klinische Medizin* 60 (1906): 238.

39. Stumpf, *Die Sprachlaute*, 53.



notion of *Einstellung* when he describes how the “natural attitude” (*natürliche Einstellung*) can be transformed into a “phenomenological attitude” (*phänomenologische Einstellung*), which, in turn, makes it possible to investigate how the objects that are taken for granted in the natural attitude constitute themselves. The choice of “attitude” for Husserl’s term *Einstellung* has veiled its technological origin to some extent. On introducing the transformation from natural to phenomenological attitude, however, Husserl momentarily does refer to technological vocabulary. Commenting on the Cartesian “attempt to doubt,” he writes, “The positing undergoes a modification: while it in itself remains what it is, we, so to speak, ‘put it out of action,’ we ‘exclude it,’ we ‘parenthesize it.’ It is still there, like the parenthesized in the parentheses, like the excluded outside the context of inclusion.”<sup>40</sup> In the German original, however, “the excluded” was actually *das Ausgeschaltete* (the switched-off) and “inclusion” was *Schaltung* (circuit). In other words: that which is given by the natural “attitude” or setting (*Einstellung*) is “switched off” (*ausgeschaltet*). It remains still there, in the circuitry, and potentially accessible to control, but is temporarily inaccessible and excluded from actual connection (*Zusammenhang der Schaltung*).<sup>41</sup>

By the end of the nineteenth century, *Einstellung*, which had not yet figured in the *Deutsches Wörterbuch* initiated by Jacob and Wilhelm Grimm in 1838,<sup>42</sup> would not have struck a German reader as extravagant or new. It was a common engineering term that quickly spread as a metaphor for organic or mental settings of all kinds. For instance, the first editions of a standard work in nineteenth-century phonetics, Eduard Sievers’s *Grundzüge der Phonetik* (Foundations of Phonetics) spoke of “position” (*Stellung*) and “place” (*Stelle*), where Sievers would later speak of the “settings” (*Einstellungen*) of the organs of speech and their parts. The 1901 edition of Sievers’s treatise, referred to in *Die Sprachlaute*, abundantly used *Einstellung*, describing articulation as if it were pneumatic machinery.<sup>43</sup>

40. Edmund Husserl, *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy*, trans. Frederik Kersten (The Hague: Nijhoff, 1982), 59.

41. Edmund Husserl, *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie*, ed. Elisabeth Ströker (Hamburg: Meiner, 1992), 63.

42. The *Deutsches Wörterbuch*, a nineteenth-century endeavor to create a complete survey of the German language initiated by the brothers Jacob and Wilhelm Grimm, has an entry for *einstellen*, which means to place herd animals in a stall, but not yet for the noun *Einstellung*, let alone its engineering connotation. For this article, the online version of Trier University has been used: *Deutsches Wörterbuch von Jakob Grimm und Wilhelm Grimm*, vol. 3 (Leipzig: Hirzel, 1862), <http://dwb.uni-trier.de/de>.

43. Eduard Sievers, *Grundzüge der Phonetik zur Einführung in das Studium der Lautlehre der indogermanischen Sprachen: Fünfte verbesserte Auflage* (Leipzig: Breitkopf & Härtel, 1901).

As a term in psychology, *Einstellung* first appears in Georg Müller and Friedrich Schumann's paper "Ueber die psychologischen Grundlagen der Vergleichung gehobener Gewichte" (On the psychological foundations of comparing lifted weights, 1889). After subjects had lifted heavier weights in psychophysical experiments, they explained, very light weights seemed particularly light to the subjects, who could be observed almost throwing them. As further study demonstrated, the subjects had already "calibrated" (eingestellt) their minds to the task.<sup>44</sup> In the fifth edition of his treatise *Grundzüge der physiologischen Psychologie* of 1902, Wundt referred to this notion of *Einstellung* as a "common" term in his field.<sup>45</sup>

It can be taken for granted that Stumpf was aware of the uses of the term both in phenomenology and psychology. Schumann had been an assistant to Stumpf after having written his dissertation with Müller. Stumpf also was the dedicatee of Husserl's *Logical Investigations* (1901), and the two philosophers stayed in contact after Stumpf had supervised Husserl's habilitation in Halle in 1887.<sup>46</sup> Yet, *Die Sprachlaute* makes no mention of either Husserl's or Schumann and Müller's notion of *Einstellung*. A brief look at how Stumpf introduced his ideas about and his work with the interference device to various audiences is telling in this respect. An early mention of the interference device appeared in a paper to the congress of experimental psychologists in Göttingen in 1914. On the invitation of Müller, Stumpf reported to the congress on new research in the area of tone psychology.<sup>47</sup> He centered his account on Wolfgang Köhler's dissertation research under his supervision, which concerned the relation of the vowels' sound-qualities and pitch. In the report, Stumpf insisted that research such as Köhler's had to be carried out with pure tones of only one single frequency component.<sup>48</sup> He went on to tell the audience that a new device for this purpose had been installed at his own institute, using interference on an unprecedentedly large scale. No mention

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44. G. E. Müller and Fr. Schumann, "Ueber die psychologischen Grundlagen gehobener Gewichte," *Archiv für die gesammte Physiologie des Menschen und der Thiere* 45 (1889): 37.

45. Wilhelm Wundt, *Grundzüge der physiologischen Psychologie*: 5., völlig umgearbeitete Auflage, vol. 2 (Leipzig: Engelmann, 1902), 39.

46. On the relation between Stumpf and Husserl see, e.g., Robin D. Rollinger, *Husserl's Position in the School of Brentano* (Dordrecht: Kluwer, 1999).

47. Carl Stumpf, "Ueber neuere Untersuchungen zur Tonlehre," in *Bericht über den VI. Kongress für Experimentelle Psychologie in Göttingen vom 15. bis 18. April 1914*, ed. F. Schumann (Leipzig: Barth, 1914), 305–48.

48. For Köhler's vowel studies in relation to Stumpf, see Sebastian Klotz, "Complex Impression and Klangfarbe: Timbre as a Catalyst of Carl Stumpf's Psychological Research," in *The Oxford Handbook of Timbre*, ed. Emily Dolan and Alexander Rehding (New York: Oxford University Press, 2018), <https://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780190637224.001.0001/oxfordhb-9780190637224-e-2>.

is made of speech sounds here. In line with the topic of the paper, the paradigm into which such research was supposed to fall was tone psychology.

In 1918, Stumpf's first major account of his work since 1913 was published under the title "Die Struktur der Vokale" (The structure of vowels) in the reports of the Prussian Academy of Science.<sup>49</sup> The framing for the research he presented there clearly makes reference to phenomenology, to the point of re-baptizing his main field as "tone phenomenology." Referring again to Köhler's dissertation topic, but without initially mentioning his name, he claimed the "vowel quality of tones" to be a basic research question within this field. The need to further explore this question also explained the main aim of the study on which he reported, namely, "the breaking down of vowels into their final acoustic elements and their composition from these elements."<sup>50</sup> In concluding, having finally mentioned Köhler explicitly, Stumpf provides an outlook for further research: "For the phenomenology of tones and for sensory phenomena more generally, further and deeper-reaching tasks result from the tables of elements presented here. The question is how the properties of simple tones merge into those of a compound sound."<sup>51</sup> In other words, at this stage, the phenomenal description of vowel sounds, the burgeoning research in Gestalt psychology, and Stumpf's own main interests seemed to form one common research area under the header of tone phenomenology.

The term *Einstellung* appears prominently in the Academy report. Stumpf discusses how he tested the quality of the synthesized vowels with experimental subjects who knew nothing about the device but were told that they had to judge vowels—some of which, unbeknownst to the subjects, were artificially produced and some sung by a human singer. These were presented to them only for one second, to prevent the stable, unchanging sound of the synthetic vowels sounds from betraying them as artificial (fig. 2): "A sound so short and without the initial onset is so ambiguous that such a setting [*Einstellung*] is required, if an interpretation shall remain possible at all. In normal life this setting is present in singing and speaking from the outset for the listener, and it is well known that even more specific settings continuously support interpretation and that their lack immediately results in the most curious misunderstandings."<sup>52</sup> What is particularly striking here is how previous information is called *Einstellung* tout court—as if it could be presupposed as an already well-known term.

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49. Carl Stumpf, "Die Struktur der Vokale," *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften* 1 (1918): 333–58.

50. *Ibid.*, 333.

51. *Ibid.*, 358.

52. *Ibid.*, 353.

15/10/17 **A**  
 Manfred Adam, cand. phil. 14  
 (Zogger) Alfred  
 Hasbach  
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k1	a	rein	
n2	a	nicht ganz rein	
n3	}	a deutlich zu erkennen, vermag nur unwesentliche Differenzen herauszubringen	
k4			
n5			
k6			
k7	}	a } sehr klar } weniger klar	
k8			
k9	}	wie 7, 8	
n10			
k11		a ?	
k12		voller, samt Schärfe	
n13		erschüttert	
k14		reiner	
k15		(Lauter)	
n16		(klarer)	
k17		?	
n18		<del>von dem</del> bestimmt, selbst	
n19		klarer, wird in anderer Weise	
k20		klarer	

Figure 2. Notes from an experiment on October 15, 1917. The letters *k* and *n* indicate whether each sample was a synthesized artificial (*künstlich*) or natural (*natürlich*) vowel *A*. Subjects were asked to indicate what vowel they discerned (e.g., *A*, *O*) and to judge the quality of its sound. As can be seen, this subject found the artificial vowels to sound better—*rein* (pure), *klar* (clear), *lauter* (louder), and *voller* (more substantial)—than those produced by the singer—*unrein* (impure), *erschüttert* (shaky),

In the book *Die Sprachlaute*, the research into vowel sounds was ultimately declared to be part of experimental phonetics. As shown earlier, the purpose of observation and experiment therefore changed, turning the observers into experts on the description of sound analysis. Introducing his primary interest in acoustics, Stumpf now also proposed placing the fields of concern into a new hierarchy: “The interest of the psychologist (among whose tasks we also count the description and theory of sensory phenomena as such, i.e., phenomenology) is, in the first instance, an interest in acoustics. The more general problems of sound perception and even more basic questions about so-called ‘complexes’ can be studied using this material [i.e., speech sounds] efficiently.”<sup>53</sup> Phenomenology now became an auxiliary discipline for the psychologist, who, however, was still counted among the philosophers. Gestalt psychology had by now begun to become established. His former students and collaborators included Kurt Koffka, Wolfgang Köhler, and Max Wertheimer, who had become leading figures in the new field. In the quote above, Stumpf alludes to Gestalt psychology’s tenets, using his own notion of “complexes” that epitomized his question of how patterns of frequency components could be perceived as single, distinct vowel sounds. Although this view of a hierarchy of disciplines in cognition has not become the predominant model for the relation between phenomenology and psychology, to Stumpf it had crystallized into this shape.

### CONCLUSION

Poised between philosophy and the various disciplines that claimed Stumpf’s findings for themselves—psychology, musicology, and, in the case at hand, experimental phonetics—*Die Sprachlaute* attempted an endeavor that does not fit into the narratives of any side. Tentatively, the problem of this endeavor could be reformulated here as concerning how the study of human cognition should be positioned in the history of the humanities. The interference installation responded to a long-standing interest of Stumpf’s research, enabling him to inquire into predispositions in human cognition. The complex apparatus provided a structure that allowed the experimenter to work with groups of experimental subjects who differed with regard to the information they

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53. Stumpf, *Die Sprachlaute*, 2.

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and so on. Stumpf explained this by the fact that the artificial vowels were more stable and better suited to propagate through the tube system. Carl Stumpf Papers, Ethnologisches Museum Berlin SPK, Phonogramm-Archiv, Envelope 14: Unwiss[entliche] Versuche Oct 1917. Digitized by the Virtual Laboratory, <http://vlp.mpiwg-berlin.mpg.de/library/data/lit38857>, available at Sound & Science: Digital Histories, <https://soundandscience.de/node/951>. Color version available as an online enhancement.

had about the functioning of the experiment. This setup demonstrated the extent to which their judgment depended on patterns and habits they had brought to the experiment before it even began. The experiment, in turn, was not intended to analyze the patterns and habits it had brought to the fore. As a result, these outcomes did not count as such, and the emerging new research question of how to explain mental default settings was put on hold.

On the level of its textual surface, *Die Sprachlaute* avoids taking a strong position on these matters. The book's full title situated it within the discipline of experimental phonetics. As the book's foreword cautions, if ever a philosopher were to pick it up, they would "quickly put it away again, shaking their heads in disapproval."<sup>54</sup> The remark addresses the gap between acoustic phonetics and philosophy, although with hindsight it appears accurate also with respect to the book's textual strategy. As this analysis has meant to demonstrate, the book presents a struggle with questions that have remained valid. Discernible in reports about failure, in digressions, footnotes, and marginal comments, Stumpf's quest into how sound is judged is perhaps the most interesting contribution to the study of sound and language his book makes for today's readers. Stumpf's research continued to be troubled by the question that such judgment is subjective. And yet, that subjectivity was not random. It appeared to be sometimes so steadfast as to be irradicable, and sometimes, in contrast, unexpectedly malleable.

If both Husserl and Stumpf speak of the way in which the mind is set as an *Einstellung*, the two philosophers move in very different directions from there. Already in the brief quote from Husserl's *Ideen zu einer reinen Phänomenologie*, it is apparent that he quickly reintroduced writing as the metaphorical background in which to embed his notion of *Einstellung*. What is switched off is put in parentheses and thus remains in the text without interfering with the main argument. Stumpf, in contrast, delved into empirical research. There, he was confronted with *Einstellung* as a feature in both the apparatus and the mind. His deliberations on these matters weave through the text without settling down in any one discipline, and circumscribe, in terms that Stumpf shaped elsewhere, a *Sachverhalt*—a state of affairs in which all matters need to be gathered before they can be proven or disproven. The text itself is the site where this happens, in all of its digressive and sometimes verbose state.

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54. *Ibid.*, vii.

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