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**THE SUBJECTIVE
PERCEPTION OF MUSIC:
STANISLAV VOMELA AND
SUBJECTIVE RESEARCH IN
PSYCHOPHYSIOLOGY IN 1930S
CZECHOSLOVAKIA**

Abstract: *This paper explores the subjective psychophysiological research of the so-called subjective audition conducted by the Czech physician and endocrinologist Stanislav Vomela in the 1930s. It examines Vomela's attempts to analyze his own peculiar experience of hearing what he called subjective music (music heard only by the subject) and introduces the concept of acousmatics Vomela developed to study this kind of auditory perception. Vomela's methodology is studied against the background of J. E. Purkyně's understanding of the subjective empiricist methodology of self-knowing in the physiology of the senses and in the context of research into eidetic imagery by E. R. Jaensch and Victor Urbantschitsch.*

Keywords: *psychophysiology; Jan Purkyně; self-knowing; hearing; subjectivity*

**Subjektivní vnímání hudby:
Stanislav Vomela a subjektivní
výzkum v psychofyziologii
v Československu 30. let 20. století**


Abstrakt: *Tento článek se zabývá subjektivním, psychofyziologickým výzkumem tak zvaného subjektivního slyšení hudby prováděného českým lékařem a endokrinologem Stanislavem Vomelou ve 30. letech 20. st. Zkoumá Vomelovy snahy analyzovat vlastní podivuhodné zkušenosti slyšení toho, co nazývá subjektivní hudbou (hudbou, kterou slyší pouze subjekt) a představuje pojem akusmatika, který Vomela zavedl pro studium sluchového vnímání tohoto druhu. Vomelova metodologie je prozkoumána na pozadí Purkyněova chápání metodologie subjektivní empirie ve fyziologii smyslu, a v kontextu výzkumu eidetických jevů E. R. Jaensch a Victora Urbantschitsche.*

Klíčová slova: *psychofyziologie; Jan Purkyně; seznání; sluch; subjektivita*

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1. Introduction

Stanislav Vomela (1892–1958), a Czech endocrinologist quite unknown to the general public, published several highly interesting papers in the 1930s in which he systematically explored subjective methodology – he examined subjective audition, the subjective study of visual and auditory phenomena in dreams, and the subjective effects of psychotropic medication. He was inspired by Jan Evangelista Purkyně’s subjective methodology, showcased most famously in Purkyně’s studies of subjective vision, particularly in his dissertation *Beiträge zur Kenntniss des Sehens in subjektiver Hinsicht*. Another inspiration for Vomela was eidetics, the science of eidetic imagery, which was a fairly popular field of inquiry at the time. Comparing his subjective audition to eidetic imagery, Vomela applied the term *acousma* to name the phenomenon he perceived and coined the term acousmatics to talk about the field devoted to studying these acousmata.

After introducing Stanislav Vomela, I will discuss his work on subjective audition. Then, I will examine his theoretical inspirations from the “music of the spheres” to eidetics and subjective methodology. How exactly did Vomela’s research methodology compare with that of J. E. Purkyně? What is Vomela’s place in the history of eidetics? What are the characteristics of a person that Vomela considered necessary to engage in subjective research?

2. Stanislav Vomela¹

Stanislav Vomela was Czech physician and endocrinologist. He was best known for his fieldwork on iodine deficiency and the consequent occurrence of endemic goitre in lowlands and mountainous areas.² After studying in Brno under František Karel Studnička and Carl Sternberg, participating in both Balkan wars (1912–1913) as a combat healthcare specialist, and working as an assistant in several medical institutes in Prague, Krakow and Brno, he then settled in 1922 in his birth town, Holešov, where he spent the rest of his life working as a general practitioner.

In the 1930s, Vomela started working on what he called the “subjective perception of music.” What he meant by the label “subjective” was not

¹ For the overview of Vomela’s life and career see P., “MUDr Stanislav Vomela,” *Časopis lékařů českých* 81, no. 38 (1942): 1058–59; J. K., “MUDr. Stanislav Vomela – in Memoriam,” *Časopis lékařů českých* 97, no. 19 (1958): 609.

² Stanislav Vomela, “L’hypothyroïdisme Endémique: Répartition, Symptomes, Diagnostic,” *La Presse Médicale* 43 (1935): 2090–93.

a denomination of quality; his studies were not an inquiry into the way in which different people perceive music or the question of individual taste. Vomela was trying to understand and explain scientifically his own experience of auditory hallucinations. Inspired by the subjective empiricism of Jan Evangelista Purkyně he conducted several experiments both while awake and asleep. As pointed out by the author of Vomela's obituary "the impossibility of laboratory work in Holešov deflected Vomela's inquisitive spirit towards introspection."³

Vomela published most of his research papers in Czech scientific journals – *Časopis lékařů českých* (*Journal of Czech Physicians*, the oldest and still existent Czech medical journal, published since 1862) and *Věstník Československých lékařů* (*Bulletin of Czechoslovakian Physicians*, originally a supplement of the abovementioned journal, published independently in years 1921–1951).

The extraordinarily talented and creative scientific mind of Stanislav Vomela did not let him focus solely on medical practice. Even without access to a proper laboratory or regular discussions with other researchers, he stimulated his scientific curiosity with things he actually could work on – endocrinological fieldwork and introspective studies of the psychology and physiology of human senses. He seems to have been very ambitious in his goals, even though for the most part he did not present his findings to an international audience. He called for the creation of several new disciplines, like acousmatics or hypneidetics, and he tried to "lay the foundations of using subjective methods to explore the sensory physiology of dreaming."⁴ Meanwhile, outside of his subjective research, Vomela described the occurrences of endemic goitre in lowlands as "lowland disease" and called for the creation of the nationwide program of hormonal hygiene.⁵

3. Subjective Perception of Music

In 1931, Vomela published a paper on the subjective audition of music, in which he described a phenomenon he had experienced several times from

³ J. K., "MUDr. Stanislav Vomela – in Memoriam." Author's translation.

⁴ Stanislav Vomela, "Příspěvky k subjektivnímu výzkumu snového dění. VII. Výsledky," *Časopis lékařů českých* 72, no. 12 (1933): 366–69. Author's translation.

⁵ Stanislav Vomela, "Nástin hormonální hygieny," *Časopis lékařů českých* 54, no. 5–6 (1942): 62–63; Stanislav Vomela, "Vybudování soustavné léčby a prevence hyperthyreos," *Věstník československých lékařů* 50, no. 36 (1938): 1261–63.

1912.⁶ Randomly and involuntarily, while walking down the street or riding in a car in the centre of Belgrade or Prague, he had heard an orchestra playing music for several minutes, both pieces he knew and liked, such as Dvořák's Humoresque *Humorseques*, op. 101, and improvisations.⁷ While he was not able to control the beginning or the end of this subjective music, he wrote that he was in complete control of the way the music sounded – he could change the tempo, pitch, and accents as well as the volume and presence of any particular musical instrument, including voices.⁸ At times, he could even choose the pieces his invisible orchestra played.⁹ He described his own role within this experience as being both conductor (Kapellmeister) and listener simultaneously.¹⁰

First, I chose the andante from Tchaikovsky's *Capriccio Italien*, which, in the case of a full orchestra, gives the listener a grandiose impression. As if upon the command of a conductor's baton, thousands of invisible bows begin to play a familiar motif. Violins lead and the tone produced by them is as clear and immediate as if a real orchestra is playing. There is no single chord but many chords accompanying the original melody: as if every chord was the source of newer and newer ones, coming in various combinations. In a fraction of a second, I can change the pitch of the melody and its quality; I can command any other instrument to take over the main motif.¹¹

Interestingly, Vomela did not try to “cure” his condition but rather focused exclusively on his own subjective experience of it. Moreover, he distinguished his subjective audition from mere hallucination by saying that in contrast to the latter, what he perceived did not emerge from an underlying pathology.¹² Yet it is not clear why he did not consider his experience pathological. He also distinguished his experience from akoasmata (or acousmata), which he defined as hallucinatory sounds of an inharmonious character.¹³ His view was in line with the definition introduced by German neurologist Carl Wernicke in 1900, who viewed akoasmatic noise as a simple

⁶ Stanislav Vomela, “O subjektivním slyšení hudby,” *Časopis lékařů českých* 70, no. 13 (1931): 458–61.

⁷ *Ibid.*, 458. Vomela does not mention a number, but it can be humoresque no. 7

⁸ *Ibid.*, 458–59.

⁹ *Ibid.*, 458.

¹⁰ *Ibid.*

¹¹ *Ibid.*

¹² *Ibid.*, 459.

¹³ *Ibid.*

nonvocal acoustic hallucination.¹⁴ Later, Vomela borrowed the term *acousmata* to apply it to his polyharmonic subjective audition.¹⁵ His understanding of *acousmata* thus shifted closer to the definition of the term “acousmatic” or “*acousmatique*” from *Dictionnaire* of the Académie Française and the Larousse dictionary that acted as inspiration for Guillaume Apollinaire and later Jérôme Peignot – “pertaining to a noise that one hears without seeing the instruments, persons, or real causes behind it.”¹⁶ According to the Czech psychiatrist Vladimír Vondráček, Vomela’s experience was a pseudohallucination, as he hallucinates but still knows that what he hears is not real.¹⁷ He also referred to this experience as “inner hearing.”¹⁸

Vomela called the perceived phenomenon *subjective audition* or *l’audition subjective*, in line with the terminology of *l’audation colorée*, or colored audition, a phenomenon usually referred to as *synesthesia*, while also maintaining that his *subjective audition* was something completely different.¹⁹ He also considered it analogous to Purkyně’s *subjective vision*.²⁰ In his theoretical investigations Vomela followed not only Purkyně’s but also Viktor Urbantschitsch’s and Erich Rudolf Jaensch’s studies on eidetic phenomena, which Vomela believed were analogous to the phenomena of subjective audition.²¹ Therefore, to parallel the use of the term eidetics to

¹⁴ Carl Wernicke, *Grundriss der Psychiatrie in klinischen Vorlesungen* (Leipzig: Georg Thieme, 1894), 189.

¹⁵ Stanislav Vomela, “Příspěvky k subjektivnímu výzkumu snového dění. V. Subjektivní slyšení ve snu,” *Časopis lékařů českých* 72, no. 6 (1933): 171–72.

¹⁶ Quote from Pierre Larousse, *Grand Dictionnaire Universel Du XIXe Siècle. Tome Premier* (Paris: Administration du Grand dictionnaire universel, 1866), 76. Peignot used the term *acousmatic* to describe Pierre Shaffer’s music in his article in *Esprit* in 1960. Jérôme Peignot, “De La Musique Concrète à l’acousmatique,” *Esprit* 280, no. 1 (1960): 111–20. For the history of the term *acousmatic* in the context of 20th century music theory, see Brian Kane, *Sound Unseen: Acousmatic Sound in Theory and Practice* (Oxford: Oxford University Press, 2014), especially pages 75–77.

¹⁷ Vladimír Vondráček and František Holub, *Fantastické a magické z hlediska psychiatrie* (Praha: Státní zdravotnické nakladatelství, 1968), 55–56.

¹⁸ *Ibid.*, 57

¹⁹ Vomela, “O subjektivním slyšení hudby,” 460. For the history of the concept of *synesthesia*, see Jörg Jewanski et al., “The Evolution of the Concept of Synesthesia in the Nineteenth Century as Revealed through the History of Its Name,” *Journal of the History of the Neurosciences* 29, no. 3 (2020): 259–85.

²⁰ Vomela, “O subjektivním slyšení hudby,” 460.

²¹ *Ibid.*, 461.

define the science of eidetic phenomena, he coined the term *acousmatics* to stand for the science of acousmata.²²

Subjectivity in subjective audition indicates the independence of the heard phenomenon from the surrounding environment – “this music emerges, lasts, and ends in us as a subject.”²³ Vomela continued by comparing the human brain to a music box producing sounds of unprecedented beauty, which he then called *la musique cérébrale*.²⁴ As the main difference from objective music, besides the abovementioned independence, Vomela identified the subtlety and daintiness of subjective music and the effortless control that he as a subject had over it and its qualities.²⁵

According to Vomela, the beauty of subjective music stemmed from the fact that the listener heard it as if they were placed in the centre of an infinite sphere on whose radii were placed hidden musical instruments participating in the performance whenever required to.²⁶ This “spaciousness” differentiated subjective from objective hearing in the same way two-dimensional vision differs from stereopsis.²⁷ He compared it to the *music of the spheres*, which is discussed more thoroughly in the next chapter.²⁸

For Vomela, the timbral vividness of subjective music stemmed from the fact that every transition between tones occurred via quarter-tones.²⁹ He saw evidence for this assertion in the tendency of contemporary music theorists and composers to work on instruments capable of producing such intervals, i.e., Alois Hába and his quarter-tone piano.³⁰ Although in his theoretical publication on the quarter-tone music system Hába indeed writes that there is inherent dissonance between tones that cannot melodically move closer to each other (e.g. C and C#), he considers it a result of the chosen tone system.³¹ Thus, the quarter-tone system, indeed, allows for a quarter-tone between C and C# which makes them less dissonant. Nevertheless, he does not believe in a natural form of dissonance independent of a chosen tone

²² Vomela, “Příspěvky k subjektivnímu výzkumu snového dění. V. Subjektivní slyšení ve snu,” 172

²³ Vomela, “O subjektivním slyšení hudby,” 460.

²⁴ *Ibid.*, 460. It seems to be a reference to something well-known at the time.

²⁵ *Ibid.*, 459.

²⁶ *Ibid.*

²⁷ *Ibid.*

²⁸ Vomela, “O subjektivním slyšení hudby,” 459.

²⁹ *Ibid.*

³⁰ *Ibid.*

³¹ Alois Hába, *Harmonické základy čtvrttónové soustavy* (Praha: Hudební matice Umělecké besedy, 1922), 19.

system.³² So, from the musical standpoint, it is unclear what Vomela means, as a quarter-tone piano broadens the range of possible tones that can be played by a musician but does not change the way transition works – for Hába, a melody composed in the half-tone system would still contain inherent dissonance between C and C# and, acoustically, the transition from C to C# would not contain any quarter-tones played between them (while in the sense of simply “containing,” the interval of a minor second contains two quarter-tones regardless of whether played in a quarter-tone system or not). Another curious detail is that Vomela mentioned that when he was not experiencing a subjective audition, he could only evoke the sound of a simple melody.³³

According to Vomela, the subjective audition of music had already been described in fiction literature.³⁴ He quotes Leo Tolstoy’s *War and Peace* where Petya experiences a similar phenomenon as the one Vomela did:

“*Ozheg-zheg, Ozheg-zheg ...*” hissed the sabre against the whetstone, and suddenly Petya heard a harmonious orchestra playing some unknown, sweetly solemn hymn. Petya was as musical as Natasha and more so than Nikolai, but had never learnt music or thought about it, and so the melody that unexpectedly came to his mind seemed to him particularly fresh and attractive. The music became more and more audible. The melody grew and passed from one instrument to another. And what was played was a fugue – though Petya had not the least conception of what a fugue is. Each instrument – now resembling a violin and now a horn, but better and clearer than violin or horn – played its own part, and before it had finished the melody merged with another instrument that began almost the same air, and then with a third and a fourth; and they all blended into one, and again became separate and again blended, now into solemn church music, now into something dazzlingly brilliant and triumphant.³⁵

Petya also had the same control over the process:

“Now softly, softly die away!” and the sounds obeyed him. “Now fuller, more joyful. Still more and more joyful!” And from an unknown depth rose increasingly triumphant sounds. “Now voices join in!” ordered Petya. And at first from afar he heard men’s voices and then women’s. The voices grew in harmo-

³² Ibid.

³³ Vomela, “O subjektivním slyšení hudby,” 458.

³⁴ Ibid., 459–60.

³⁵ Leo Tolstoy, *War and Peace* (Oxford: Oxford University Press, 2010), 1135.

nious triumphant strength, and Petya listened to their surpassing beauty in awe and joy.³⁶

So, according to Vomela, what was the cause of such an extraordinary condition? He noted that both his and Petya's bursts of imagination happened in very special acoustic environments.³⁷ Both heard rough unpitched sounds, Vomela, the sound of a motor running, the rattle of tram windows etc., Petya, sounds of someone snoring, a sabre being whetted, and falling water drops.³⁸ This did not explain the whole phenomenon completely, but such noisy soundscapes were considered by Vomela a catalyzing factor for its occurrence.

Later, Vomela's study of the subjective perception of auditory and visual stimuli built up to the analysis of hypnagogic hallucinations and perception in dreams. According to him, eidetic phenomena were observable in dreams, and he called these hypneidetic phenomena.³⁹ He added that hypneidetics, the new science of such phenomena, will become highly important for the whole field of psychophysiology, as it "leads us to the centre of the problem [...] of the objectivization of the subjective."⁴⁰ Later, he would argue that hypneidetic phenomena were ontogenically primal – the observation of eidetic phenomena, both spontaneous and deliberate, in the state of wakefulness was a projection of hypneidetic phenomena.⁴¹ The same went for auditory phenomena of the same nature. Vomela also named acousmatic phenomena in dreams hypnacousmatic phenomena.⁴²

In his book, *Musicophilia*, Oliver Sacks described several more recent cases of people experiencing musical hallucinations that can be likened to Vomela's subjective audition.⁴³ Subjects decisively distinguished between musical imagery (imagined music) and hallucinations (acousmata in

³⁶ Ibid.

³⁷ Vomela, "O subjektivním slyšení hudby," 460.

³⁸ Ibid.

³⁹ Stanislav Vomela, "Příspěvky k subjektivnímu výzkumu snového dění," *Časopis lékařů českých* 71, no. 50 (1932): 1593–96.

⁴⁰ Ibid., 1596. Author's translation.

⁴¹ Stanislav Vomela, "Příspěvky k subjektivnímu výzkumu snového dění. IV. Spánek a sen ve světle subjektivního vidění," *Časopis lékařů českých* 72, no. 4 (1933): 104–6.

⁴² Stanislav Vomela, "O jevech hypneidických a hypnakusmatických při usínání a procitání," *Praktický lékař* 24, no. 23 (1944): 449–52.

⁴³ Oliver Sacks, *Musicophilia* (New York: Alfred A. Knopf, 2007), 59–86.

Vomela's sense).⁴⁴ Sacks listed the main characteristics of these hallucinations – apparent exteriority, incessancy, and intrusiveness.⁴⁵

They tended to have little control over the onset, but some could change the music they heard to different compositions and, at times, even heard new, improvised music.⁴⁶ Several of them also mentioned that hallucinations started in noisy environment similar to those described by Vomela and Tolstoy.⁴⁷ Many subjects compared the hallucinations to some kind of machine they had inside their heads, like radio, “intracranial jukebox” or iPod.⁴⁸

4. Music of the Spheres

As mentioned above, Vomela compared his experience to the *music of the spheres*, also known as *musica universalis*.⁴⁹ He referenced Plato, who described Sirens emitting sounds on each celestial body in his *Republic*.⁵⁰ Vomela fails to mention any other scholars, whether Boethius, Athanasius Kircher, or Johannes Kepler. It seems that Vomela was not interested in the sound of celestial spheres. Nor does it seem that he would seek absolute harmony in nature, as did Max Planck, for example. The main reason he recognized the music of the spheres in his experience was because of its beauty.⁵¹ Most importantly, Vomela also shifted the meaning of the term from celestial sphere to a sphere where he, as a listener, is placed in the centre.

Although occultism played an important role in early 20th century intellectual life in Europe in general, and in Czechoslovakia in particular, with many supporters amongst composers and music theorists,⁵² Vomela's interest in *musica universalis* is not openly connected to the occult. On the

⁴⁴ Ibid., 50, 58, 62.

⁴⁵ Ibid., 63.

⁴⁶ Ibid., 54, 66, 75, 85.

⁴⁷ Ibid., 56–57, 65, 76, 84.

⁴⁸ Ibid., 58, 62.

⁴⁹ Vomela, “O subjektivním slyšení hudby,” 459.

⁵⁰ “The spindle revolved on the lap of Necessity. On top of each of its circles stood a Siren, who was carried around by its rotation, emitting a single sound, one single note. And from all eight in concord, a single harmony was produced.” Plato, *Republic* (Indianapolis: Hackett Publishing Company, 2004), 322.

⁵¹ Vomela, “O subjektivním slyšení hudby,” 459.

⁵² Joscelyn Godwin, *Music and the Occult: French Musical Philosophies, 1750–1950 Eastman Studies in Music* (Rochester, NY: University of Rochester Press, 1995), 199–224. Boris Voigt, “Kosmologie und Okkultismus im musikalischen Diskurs der Weimarer Republik,” *Beiträge zur Populärmusikforschung* 15/16 (1995): 20–31.

other hand, he did believe in the possibility of the existence of the music of the spheres and even in its unprecedented beauty.

However, Vomela's approach echoes the tradition of looking for ethereal music. According to him, there had not yet been created a musical instrument capable of producing the music of the spheres, though we can hear hints of it, he believed, in some of the works of Brahms, Schubert, Beethoven, and Liszt.⁵³ Previously, the first three of these composers had been appreciated by (German) liberal professionals for producing harmony and beauty that could be discovered via attentive and structural listening, while Franz Liszt (along with other members of the New German School) was scorned for his virtuosity and showmanship.⁵⁴ By placing Liszt among the others, it is clear that Vomela did not believe in such a distinction, at least not to the degree of considering one of the approaches less beautiful. Without knowing more about Vomela's ideas on (musical) aesthetics it is hard to come up with any conclusive explanation of why Vomela selected these names, beyond the fact that they were united by their German origin, no longer alive, and considered classical composers. Elsewhere in his texts, when Vomela discusses the music of other composers, he mentions Tchaikovsky and Dvořák, etc. – all of them again classical/romantic orchestral composers. This is rather curious, as he claims to have attended most of the big concerts in Prague in the period of 1912–1916, and was thus probably familiar with contemporary music too, not to mention Hába's piano.

Since the 18th century, discussion of ethereal music was a part of the technological innovations of musical instruments – from Aeolian harp to accordions.⁵⁵ Similarly, in their work, many composers (like Justin Heinrich Knecht or Hector Berlioz) aimed for the ethereal properties of *musica universalis*.⁵⁶

While not actively pursuing the same goals, Vomela is clearly a product of debates about ether and ethereal music in neurophysiology. For him, subjectively perceived music became an ideal platonic abstraction. Besides Vomela, many other scientists and artists approached the concept/metaphor of the music of the spheres, although mostly in terms of the overall harmony

⁵³ Ibid.

⁵⁴ This was discussed in the context of psychophysics of Hermann von Helmholtz in Alexandra Hui, *The Psychophysical Ear* (Cambridge, MA: MIT Press, 2013), 74–81.

⁵⁵ Carmel Raz, "The Expressive Organ within Us,' Ether, Ethereality, and Early Romantic Ideas about Music and the Nerves," *19th-Century Music* 38, no. 2 (2014): 115–44.

⁵⁶ Ibid.

in nature.⁵⁷ The German theoretical physicist Arnold Sommerfeld used it to describe the harmonious state of the atom:

[W]hat we are nowadays hearing of the language of spectra is a true “music of the spheres” within the atom, chords of integral relationships, an order and harmony that becomes ever more perfect in spite of the manifold variety.⁵⁸

According to Peter Pesic, such thinking was made possible by earlier attempts of physicists, most notably Max Planck, to find order and harmony in the universe.⁵⁹ The Danish composer Rued Langgaard presented his now most famous piece, *Music of the Spheres*, in 1921. Later, in 1957, the German composer Paul Hindemith wrote an opera called *Die Harmonie der Welt* (*The Harmony of the World*) inspired by the eponymous book by Johannes Kepler.

5. Subjective Empiricist Methodology and Eidetics

In his paper on subjective hearing, Vomela first describes the phenomenon he experienced, then performs a scientific analysis of it.⁶⁰ He thoroughly examines his experiences, trying to describe and understand them. He then asks readers to send him their own observations in order for him to acquire more material to assess.⁶¹ Notably, he did not conduct empirical experiments on others to test what sets off such phenomena or to determine how many people experienced them, unlike his contemporaries working on eidetics, such as Jaensch or Kratina. Vomela considered his introspections sufficiently valid to theorize about subjective audition, seeing it as a part of his theory of the psychophysiology of dreams, which he gradually developed in the articles mentioned here. So, while exploring subjective audition as a kind of aural eidetic imagery he also drew from Purkyně’s emphasis on self-knowing. On the other hand, via his self-knowing research, Vomela’s tried to answer some of the key questions of eidetics of the time, such as its ontogenic origins.

⁵⁷ See Jamie James, *The Music of the Spheres: Music, Science, and the Natural Order of the Universe* (New York: Springer, 1993).

⁵⁸ Arnold Sommerfeld, *Atomic Structure and Spectral Lines* (London: Methuen & Co., 1919).

⁵⁹ Peter Pesic, *Music and the Making of Modern Science* (Cambridge, MA: MIT Press, 2014).

⁶⁰ Vomela, “O subjektivním slyšení hudby.”

⁶¹ *Ibid.*, 461.

Purkyně's well known experiments on vision were inspired by Goethe's thoughts about the perception of color.⁶² Although Goethe himself was not fond of Newtonian experimental methodology and used experiments mainly to illustrate his concepts, Purkyně's self-experimentation fits in with a tradition of self-experimentation which was well established under the Newtonian paradigm.⁶³ Self-experiments and experiments in general can serve different purposes, so we should identify the rationale behind conducting them. For Purkyně, understanding oneself in terms of *heautognosis* or self-knowing was a first step to understanding others, so his self-experiments should be understood as a part of his view of knowledge production.⁶⁴ As far as we can gather from Vomela's texts, he was inspired mostly by Purkyně's outline of subjective methodology found in his dissertation:

We can study, through observations and experiments, each sense independently as well as in its specific responses to the external environment. Each sense, in a way, is an individual [...]. The only way to pursue research in this field is by rigorous sensory observation and experimentation on *one's own* organism [...].⁶⁵

Apparently, Vomela did not know about Purkyně's experiments with sound.⁶⁶ He followed the tradition of eidetics, which was too built upon Purkyně's legacy. Although always quoting Urbantschitsch pro forma as a historical account of pre-eidetic research of after-images, Vomela did

⁶² See Nicholas J. Wade and Josef Brožek, *Purkinje's Vision: The Dawning of Neuroscience* (Mahwah, NJ: Lawrence Erlbaum Associates Publishers, 2001).

⁶³ Goethe viewed his *Theory of Colors* as an attack on Newtonian physicalism and an argument in favor of phenomenological subjective research while Purkyně's subjective research aimed to study underlying objective phenomena. See Wade and Brožek, *Purkinje's Vision*, 1–4.

⁶⁴ Jan Evangelista Purkyně, "Individuální duševní ústroj člověka," *Krok: Listy vědecké, se zvláštním zřetelem k potřebám gymnasií a reálék* 1 (1865): 7–12. For a thorough examination of Purkyně's understanding of heautognosis see K. Aterman and Eliana Trávníčková, "Purkyně's Heautognosis," *Journal of Medical Biography* 9, no. 2 (2001): 87–96. Its place in the history of psychophysiology is discussed recently in Anna Kvičalová, "Purkyně's *Opisthophone*: The Hearing 'Deaf,' Auditory Attention and Organic Subjectivity in Prague Psychophysical Experiments, ca 1850s," *Annals of Science* 79, no. 1 (2021): 1–21.

⁶⁵ Jan Evangelista Purkyně, *Beiträge zur Kenntniss des Sehens in subjektiver Hinsicht* (Prague: Calve, 1819), 7–8. Changes were made by the author to the English translation of the dissertation found in Wade and Brožek, *Purkyně's Vision*, 64. "Jeder ist gewissermassen ein Individuum" was originally translated as "individual sense," here "individual," and "eigenen Organismus" as "individual organism," here "*one's own* organism." Author's emphasis.

⁶⁶ Overviewed by Purkyně in Jan Evangelista Purkyně, "Zkoušky o sluchu," *Živa* 7, no. 4 (1859): 261–67. For the study of Purkyně's sound experiments in the context of self-knowing, see Kvičalová, "Purkyně's *Opisthophone*."

not include his works in bibliographies.⁶⁷ He mostly followed the research of E. R. Jaensch and his disciples (the so-called Marburg school). Jaensch was the founder of eidetics as a discipline. Inspired both by Purkyně and Urbantschitsch, he studied the ability to recall images of objects that were no longer present; i.e., the objects remained sources of visual stimulation *as if they were present*.⁶⁸ Urbantschitsch called such images *Anschauungsbilder* (perceptual images) and stressed that they were different from ordinary “simple” imagination; that is, in the latter case, the object is imagined, while in the former case it is subjectively seen.⁶⁹ Purkyně performed initial research into such afterimages on himself; Urbantschitsch, who was also interested in this phenomenon, performed experiments both on himself and some of his patients. Jaensch saw such perception as worthy of its own field of study and tried to understand its role in human ontogeny. In fact, members of his Marburg school performed many empirical studies on a wide range of subjects.⁷⁰ Soon, they were followed by researchers around the world, including the Czech psychologist Ferdinand Kratina, whose study of the eidetic abilities of young people from 1930 was inspirational for Stanislav Vomela.⁷¹

Urbantschitsch was also one of the first researchers to study auditory afterimages. Already in his studies from 1881 he had examined the way people seem to hear some sounds several seconds after the end of the original stimulus.⁷² Sigmund Exner was another scholar who, years later, discussed auditory afterimages in relation to the acoustic properties of concert halls.⁷³ Urbantschitsch even published a study focused on the effects of aural phe-

⁶⁷ Vomela, “O subjektivním slyšení hudby,” 460. It is a secondary citation from Kratina’s *Eidetická vloha u mládeže* (Olomouc: Orbis, 1930), 7.

⁶⁸ Erich Rudolf Jaensch, *Eidetic Imagery and Typological Methods of Investigation* (London: Routledge, 2014).

⁶⁹ Victor Urbantschitsch, *Über subjektive optische Anschauungsbilder* (Leipzig: Franz Deuticke, 1907), 1.

⁷⁰ For the general overview of eidetic research up until 1932, see Heinrich Klüver, “Eidetic Phenomena,” *Psychological Bulletin* 29, no. 3 (1932): 181–203.

⁷¹ Kratina, *Eidetická vloha u mládeže*.

⁷² Victor Urbantschitsch, “Ueber das An- und Abklingen acustischer Empfindungen,” *Pflügers Archiv für die gesamte Physiologie* 25, no. 1 (1881): 332–42; Victor Urbantschitsch, “Zur Lehre von der Schallempfindung,” *Pflügers Archiv für die gesamte Physiologie* 24, no. 1 (1881): 574–95.

⁷³ Sigmund Exner, “Über die Akustik von Hörsälen und ein Instrument, sie zu bestimmen,” *Zeitschrift des Österreichischen Ingenieur- und Architekten-Vereines* 57, no. 10 (1905): 141–50. Urbantschitsch’s experiments and their influence on Exner are further examined in Viktoria Tkaczyk, “The Shot Is Fired Unheard: Sigmund Exner and the Physiology of Reverberation,” *Grey Room*, no. 60 (2015): 66–81.

nomena on the perceptual images described before.⁷⁴ Similarly to his not knowing about Purkyně's sound experiments, it also appears that Vomela was unaware of Urbantschitsch's research on auditory afterimages. Yet, interestingly, we can find similar ideas and methods in Vomela's own research.

In his study of dreams, Vomela also openly draws from Purkyně's works and subjective methodology.⁷⁵ Similarly to Purkyně, for example, he later self-experimented with psychotropic drugs such as cocaine or atropine, simply analyzing the effects of the medication on his perception.⁷⁶ Interestingly Vomela's ideas even echo to some extent those of Purkyně he did not know about. Purkyně was one of the first scientists to describe intracranial sound, which was further investigated by Silvanus Thompson and Victor Urbantschitsch.⁷⁷ Coming from a different perspective, Vomela called the phenomena he described "true cerebral music." Both ideas come from a focus on the subjective individual experience of auditory phenomena.

Although many Czech scientists of the time drew inspiration from Purkyně's research, Vomela was rather unique in his interest in subjective methodology.

⁷⁴ Victor Urbantschitsch, *Über subjektive Hörscheinungen und subjektive optische Anschauungsbilder* (Leipzig: Franz Deuticke, 1908).

⁷⁵ Vomela, "Příspěvky k subjektivnímu výzkumu snového dění," 1593. Jan Evangelista Purkyně, "Auch etwas über die Traumwelt," *Hesperus* 25, no. 7 (1820): 50–55. Jan Evangelista Purkyně, "Wachen, Schlaf, Traum und verwandte Zustände," in *Handwörterbuch der Physiologie Mit Rücksicht auf Physiologische Pathologie, Dritter Band, Zweite Abteilung*, ed. Rudolph Wagner (Braunschweig: Vieweg, 1846). Jan Evangelista Purkyně, "Fysiologie snu," *Časopis musea království českého* 31, no. 4 (1857): 451–63.

⁷⁶ After Vomela's presentation of his initial paper on subjective audition at the meeting of Purkyně's Society for Studying the Soul and Nerves the psychiatrist Vladimír Vondráček suggested that Vomela try to use psychopharmacological substances to induce the conditions he experienced randomly and involuntarily; he recommended mescaline from *Lophophora williamsii*. According to Vondráček, despite being mostly visual, mescaline-induced hallucinations had a strong connection to aural perception, hence the traditional drumming present at indigenous peyote ceremonies. Vomela did not seem to pursue this particular question. For Vomela's self-experiments with atropine and cocaine see Stanislav Vomela, "Účín malých dávek atropinu na lidskou bytost," *Časopis lékařů českých* 83, no. 23 (1944): 687–98. Purkyně's self-experiments with drugs – e.g., Jan Evangelista Purkyně, "Einige Beiträge zur Physiologischen Pharmacologie," in *Neue Breslauer Sammlungen aus dem Gebiete der Heilkunde. Band 1* (Breslau: A. Goschorsky, 1829), 423–44.

⁷⁷ Purkyně's findings are overviewed in Kvícalová, "Purkyně's Opisthophone." Silvanus P. Thompson, "The Pseudophone," *London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science* 8, no. 50 (1879): 385–90; Urbantschitsch, "Zur Lehre von der Schallempfindung." See also Gascia Ouzounian, *Stereophonica: Sound and Space in Science, Technology, And the Arts* (Cambridge, MA: MIT Press, 2021), 17–36.

6. Subjective Research and Sensitivity

The distinction of the expert/regular listener, so important for the previous generation of researchers (cf. the conflict between Wilhelm Wundt and Carl Stumpf), did not seem to bother Vomela.⁷⁸ However he himself (to an extent) was an expert listener – he not only loved music and attended “most big concerts” in Prague, but also regularly improvised on piano. According to Vomela, the main criterion for any analysis of hypnoidetic or hypnacusmatic phenomena was sensitivity. Quoting Purkyně, he claimed that “a sensitive woman is better equipped for the job [of subjective research] than any professional physiologist.”⁷⁹ This particular quote is mentioned in Karel Amerling’s biography of J. E. Purkyně from 1918.⁸⁰ Neither Amerling nor Vomela provide any actual reference to the source of the quote, which hints to it being well-known. Purkyně indeed wrote something along these lines while discussing methods of self-knowing in individual psychological research.⁸¹ According to him, there was no need to have much knowledge of human physiology or anatomy to conduct purely psychological research.⁸²

Sensitivity to one’s own psychological processes and the ability to analyze their qualities was for Purkyně the key to understanding psychological processes in other people. He mentions that children, though they may be talented, cannot succeed in such an enterprise due to their inexperience.⁸³ Also, as indicated earlier, it seems he considered women more experienced than men in the performance of such self-examination. Elsewhere, talking about the elements of industrial production in the production of scientific knowledge, Purkyně mentions that a great deal of work that contemporary scientists do, especially involving physical nature, is “just craftsmanship,” which “can be performed by the less talented, by children, or sometimes even by weak but precise and skilful women.”⁸⁴

⁷⁸ Alexandra Hui, *The Psychophysical Ear* (Cambridge, MA: MIT Press, 2013), 134–48.

⁷⁹ Vomela, “Příspěvky k subjektivnímu výzkumu snového dění,” 1594. Author’s translation.

⁸⁰ Karel Amerling, *Jan Evangelista Purkyně* (Praha: F. Topič, 1918), 18.

⁸¹ Jan Evangelista Purkyně, “Individuální duševní ústroj člověka,” *Krok: Listy vědecké, se zvláštním zřetelem k potřebám gymnasií a reálék* 1 (1865): 7–12.

⁸² *Ibid.*, 11.

⁸³ *Ibid.*, 10–11.

⁸⁴ Jan Evangelista Purkyně, “Podrobné zprávy o mojích starších i novějších literárních, zvláště přírodnických pracích,” *Živa* 5, no. 2 (1857): 147–57. Author’s translation.

7. Conclusion

Vomela's work on subjective audition represents the continuation of some of Purkyně's scientific ideas in Czechoslovakia – strikingly, though, not those focused on sound and hearing.⁸⁵ It also provides an insight into the history of eidetics, while presenting the study of quite different auditory impressions to those studied previously by Urbantschitsch and Exner. Vomela considered himself and his research a part of *Purkyně's renaissance*, which he claimed was happening at the time.⁸⁶ Indeed, it is true that Purkyně was highly praised by researchers in interwar Czechoslovakia, many historians and scientists releasing books and articles popularizing his life and scientific legacy. While others, however, such as experimental botanist and politician Bohumil Němec, followed the ethos of Purkyně's scientific, institutional, and political work, Vomela built directly upon Purkyně's research, both methodologically and thematically. On the other hand, he did not work with Purkyně's concept of organic subjectivity, nor did he conduct experiments on other subjects to find out more about subjective audition. To be fair, he considered himself a pioneer in what he called the newly emerging field of acousmatics, and thus hoped others would follow in his footsteps. Vomela himself continued with the study of visual and auditory phenomena in dreams, work which is yet to be thoroughly examined.

Without more material from Vomela himself, it is hard to follow through on all the philosophical ramifications of placing the ability to hear musica universalis inside one's mind while by-passing the senses, with it also being a by-product of the process of dreaming. It will require a subsequent assessment in a more critical way which is outside of the scope of this historical study.

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<https://doi.org/10.1177/096777200100900206>.

⁸⁵ As emphasized by Kvíčalová, Purkyně's sound-based research is to these days neglected by historians. See Kvíčalová, "Purkyně's *Opisthophone*," 20.

⁸⁶ Vomela, "O jevech hypneidetických a hypnakusmatických při usínání a procitání," 452.

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