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## The 'Sound Figures' and *Naturphilosophie* in A.W. Schlegel's Lectures on Art History and Aesthetics

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### ABSTRACT

In his 1798 Jena lectures on art history and aesthetics, A. W. Schlegel declares that beauty objectively exists. But it is not enough simply to affirm this fact; Schlegel must draw out its implications. This means changing one's stance towards natural science. Rather than passively reacting to scientific prescriptions, Schlegel will insist that science accommodate beauty. And this requires neither the abolition of science nor its aestheticization. Schlegel will instead reinterpret science such that beauty's existence becomes possible. To reconstruct Schlegel's provocative intervention, I highlight a specific example from his lectures. The 'sound figures' were an acoustical phenomenon discovered by Ernst Chladni in 1787. For the Jena circle, this phenomenon harboured the possibility that sound was irreducible to mechanical physics and moreover contained traces of magnetism: the dynamic force upon which the Romantics' new vision of nature was constructed. Schlegel will utilise the sound figures to imagine "tone" as objectively existing.

*Keywords:* Sound figures, music, Jena Romanticism, nature, science

### RÉSUMÉ

Dans ses leçons sur l'histoire de l'art et l'esthétique professées à Iéna en 1798, A. W. Schlegel déclare que la beauté existe objectivement. Mais il ne suffit pas d'affirmer ce fait : Schlegel doit en tirer les conséquences. Ce qui signifie changer de position par rapport aux sciences naturelles. Plutôt que de réagir passivement aux prescriptions scientifiques, Schlegel insiste pour que la science tienne compte de la beauté. Et cela ne requiert ni d'abolir ni d'esthétiser la science. Schlegel va au contraire réinterpréter la science de telle sorte que l'existence de la beauté devienne possible. En vue de reconstruire le geste provocateur de Schlegel, je mets en lumière un exemple spécifique tiré de ses leçons. Les « figures sonores » sont un phénomène acoustique découvert par Ernst Chladni en 1787. Pour le cénacle d'Iéna, il recèle la possibilité que le son soit irréductible à la physique mécanique et qu'il contienne en outre des traces de magnétisme : la force dynamique sur laquelle se construit la vision nouvelle que les romantiques ont développée de la nature. Schlegel utilisera les figures sonores pour se représenter l'idée d'une existence objective du « ton » musical.

*Mots-clés :* figures sonores, musique, romantisme d'Iéna, nature, science

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Developments in mechanical physics over the eighteenth century laid the foundation for European industrialisation, secularisation, and enlightenment.<sup>1</sup> Yet by the century's end, mechanism's discoveries were petering out and biology was concretising into an independent discipline.<sup>2</sup> By offering more elegant solutions for longstanding problems – such as an account of organic life – biology cast doubt upon mechanism's totalising ambitions.<sup>3</sup> At the same time, biology's distance from the sanctuary of mathematical certainty was keenly felt. The ascendance of biology accordingly re-ignited controversies that had remained dormant since 1700.<sup>4</sup> How could two incommensurate systems purport to represent nature? This incompatibility might not concern the pragmatist; but there were practical reasons for answering this most impractical of questions. Determining the common principle between inorganic matter and organic life could reinvigorate mechanical physics, break new ground in biology, and compatibilise human freedom with the deterministic universe. Herein the centrality of the dynamic phenomena of magnetism, electricity, and galvanism. It was not just that these phenomena proved exceptional within the mechanical universe; these discoveries modelled the re-interpretation of pillars like sound and light, which became a “limit of the actual bodily world;”<sup>5</sup> and this “limit” was not only perceptual, as Immanuel Kant had insisted, but rather the juncture where matter came into being.

Herein *Goethezeit* fascination with Ernst Chladni's ‘sound figures:’ geometrical shapes in sand that emerged when audial frequency was run through metal plate.<sup>6</sup> Chladni discovered this phenomenon while “testing” (1787, 77) theoretical formulae for oscillation, which Leonhard Euler and others had distilled from ground-breaking research in differential calculus.<sup>7</sup>

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<sup>1</sup> Frederick C. Beiser, *The Fate of Reason: German Philosophy from Kant to Fichte* (Cambridge, MA: Harvard University Press, 1987), 11.

<sup>2</sup> John H. Zammito, *The Gestation of German Biology Philosophy and Physiology: from Stahl to Schelling* (Chicago: University of Chicago Press, 2018), 8.

<sup>3</sup> Robert J. Richards, *The Romantic Conception of Life* (Chicago: University of Chicago Press, 2004), 114.

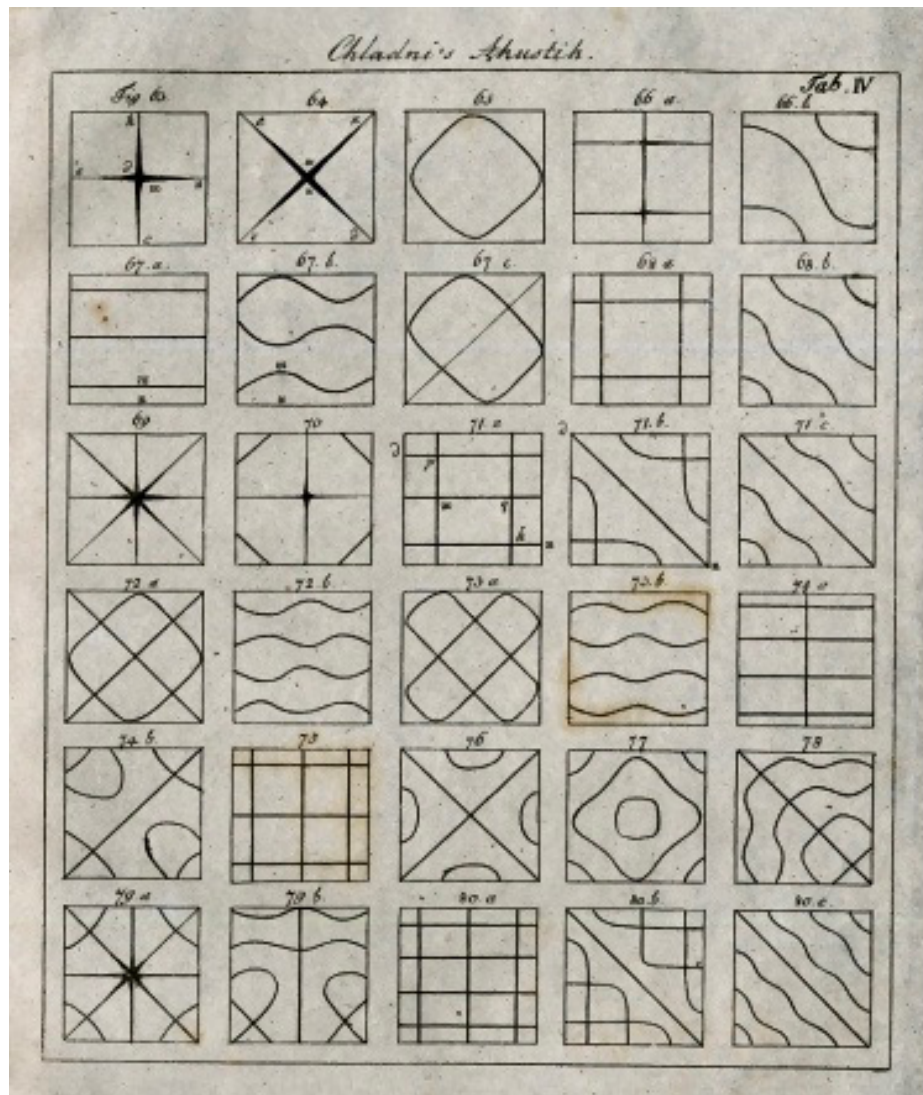
<sup>4</sup> Early in the eighteenth-century G. E. Stahl underlined “[n]ot the matter of the body – anatomy, chemistry, the ‘mix’ of fluids – but rather their interdependence.” See *Theorie der Heilkunde*, trans. Karl Wilhelm Ideler, 3 vols. (Berlin: Enslin, 1831 -32), 1: 50. Cited in Zammito 2018, 25.

<sup>5</sup> “Gränze der eigentlich körperlichen Welt.” A. W. Schlegel, *Kritische Ausgabe der Vorlesungen I*, eds. Ernst Behler and Frank Jolles (Paderborn, Munich: F. Schöningh, 1989), 307. Hereafter: *Vorlesungen* (1989). All English translations are my own.

<sup>6</sup> Ernst Chladni, *Entdeckungen über die Theorie des Klanges* (Leipzig: Weidmanns Erben und Reich, 1787), 33.

<sup>7</sup> Clifford Truesdell, "Introduction" in *Euleri Opera Omnia. Vol. XI seriei secundae* (Turici: Orell Füssli, 1960), 335.

But although these formulae effectively calculated two-dimensional oscillation, Chladni wrote that three-dimensional oscillation was “still shrouded in deepest darkness” (1787, 1).



Ernst Chladni, *Entdeckungen über die Theorie des Klanges* (1787), 93

This heightened the sense of mystery enveloping the sound figures, which Chladni had been exhibiting to the public around Europe.<sup>8</sup> By 1809, the sound figures' fame had earned Chladni an audience with Napoleon Bonaparte, who had maintained an amateur interest in mathematics since

<sup>8</sup> Dieter Ullmann, *Chladni und die Entwicklung der Akustik von 1750-1860* (Basel; Boston: Birkhäuser Verlag, 1996), 7.

childhood.<sup>9</sup> Impressed, Napoleon inaugurated a national competition at the *Institut de France*, which was only partially resolved after Sophie Germain's three submissions.<sup>10</sup> Observing this result from the judging committee, Joseph-Louis Lagrange suspected the sound figures might require an "entirely new type of mathematical analysis."<sup>11</sup> Thus did the sound figures' popularity exacerbate the perception that mechanical physics was in decline. Jena interlocutors took this opportunity to speculate upon the sound figures' magnetic basis, which inspired analogous experiments with electricity and colour.<sup>12</sup>

In some respects, Jena's embrace of magnetism, electricity, and galvanism accelerated the eighteenth-century's withdrawal into subjectivity. At the culmination of his *Metaphysical Foundations of Natural Science* (1786), Kant had fatefully written that there "seems no way out, but to turn away from the objects themselves and return to the mind."<sup>13</sup> Kant's programme for the sciences meant retracing from nature itself to the sensible conditions of its possibility. And the sciences did their utmost to adopt Kant's prescription. Seeing in objects nothing but the provisional harmony of underlying dynamic forces, the physicist Johann Wilhelm Ritter agreed that mind could only receive the world via Kantian "appearances" i.e. the sensible impression of an otherwise-unknowable thing. And while these forces held out the tempting prospect of an objective world, Ritter dared not reach behind the veil. Because electricity was also the medium of thought and sensation, Ritter cautioned, there was no reliable way objectively to measure or quantify these mysterious forces; and so the Kantian quagmire remained

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<sup>9</sup> H. J. Stöckmann, "Chladni meets Napoleon." *European Physics Journal Special Topics* 145 (2007): 15–23, 21.

<sup>10</sup> L. L. Bucciarelli and N. Dworsky, *Sophie Germain: An Essay in the History of the Theory of Elasticity* (Dordrecht, Holland; Boston: D. Reidel, 1980), 41.

<sup>11</sup> Cited in Bucciarelli and Dworsky, 41.

<sup>12</sup> Ritter and Ørsted made galvanic interpretations of Lichtenberg and Chladni patterns. Whereas Chladni wrote of "Schallwellen" ("sound waves"), Ritter wrote of "Schallstrahlen" ("sound rays"). Ørsted used lycopodium, which was finer than Chladni's sand. This produced heaps of negatively charged dust distributed positively onto charged parts of plate. Strong vibrations became negative electricity and vice versa. Dan Christensen, "The Ørsted-Ritter Partnership and the Birth of Romantic Natural Philosophy," *Annals of Science*, 52 (1995): 153–185, 169. J. W. Goethe also used the sound figures as template for his "entoptic colours" in the *Farbenlehre*.

<sup>13</sup> Cited in Christensen 172. I use Christensen's English translation but one should be aware that Kant's original text uses "Ding" rather than "object" and "Vermögen" rather than "mind." The full original line: "nichts übrig bleibt, als von den Gegenständen auf sich selbst zurückzuführen, um, anstatt der letzten Grenze der Dinge, die letzte Grenze ihres eigenen sich selbst überlassenen Vermögens zu erforschen und zu bestimmen." Immanuel Kant, *Kritik der Urteilskraft und naturphilosophische Schriften I* (Frankfurt: Weischedel, Wilhelm 1968), footnote 6, 135.

unbridged. Thus did Ritter's work give rise to what Dan Christensen called the "terrifying abyss of the qualitative epistemology of dynamical philosophy" (Christensen, 172).

And yet hope remained. Although dynamic physics could lead to abyssal nihilism by denying altogether the reality of external objects, it could also stimulate new possibilities: including an overhaul of the notion of objectivity itself. But this new objectivity was not easily won. One would have to relinquish familiar preconceptions about the object; not least its familiar attributes in space, time, and causation.<sup>14</sup> And this meant exposing oneself to a nature that might diverge radically from expectations. In this sense, objectivity required facing the most radical scepticism possible and then overcoming it. These two eventualities hinged around one and the same insight. Elaborating his colleague Ritter's claim that mind and world were both subject to electrical forces, H. C. Ørsted drew the conclusion that "the principles of acoustics and sense and mind are identical."<sup>15</sup> Ørsted made this announcement during his 1809 lecture to the Copenhagen Academy of Sciences, where he argued that the sound figures were elicited by magnetic forces (Christensen, 170). These were the same forces that F. W. J. Schelling had situated as foundational within his dynamical re-organisation of the natural world, which he undertook from 1796 onwards. August W. Schlegel drew on Schelling and Ritter during his 1798 Jena and 1801 Berlin lectures on art history and aesthetics – otherwise known as the *Kunstlehre* – where he utilised the sound figures to imagine "tone" as an objectively-existing thing.

A. W. Schlegel's *Kunstlehre* merits our attention not only because it stands among Jena's earliest sound figure references. The lectures also vivify an important development within recent scholarship. In 2006, Iain Hamilton Grant compellingly argued that Schelling's philosophy of nature deserved a contemporary exposition. For Grant, Schelling diagnosed a conspicuous blind spot in modern philosophy (since René Descartes): "that nature does

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<sup>14</sup> "Die Materie hat für die wahre Physik ebenso wenig Realität an sich, als für die wahre Philosophie. Sie ist nur das sinnliche Symbol der beiden Kräfte, und selbst nur Vermittlungsglied eines bestimmten Verhältnis beider, das in der Natur notwendig ist und nur insofern ist sie selbst notwendig." F. W. J. Schelling, "Allgemeine Deduction des dynamischen Prozesses" in *Zeitschrift für spekulative Physik, Erstes Band zweites Heft* (Jena und Leipzig: Christian Ernst Gabler, 1800), 15.

<sup>15</sup> H. C. Ørsted: "this important part of physics would leap forward as... the principles of acoustics and sense and mind are identical..." "Forsøg over Klangfigurerne" (Copenhagen, 1807-1808), *Naturvidenskabelige Skrifter II* (Copenhagen: A. F. Host and son, 1920), 11-34. Cited in and translated by Dan Christensen, "The Ørsted-Ritter Partnership and the Birth of Romantic Natural Philosophy," *Annals of Science*, 52 (1995): 153-185, 170.

not exist for it.”<sup>16</sup> In 2013, Daniel Whistler extrapolated this stance via Schelling’s theory of symbolic language and – critically for my purposes – drew Schlegel into Schelling’s developmental arc. For Whistler, Schelling neither imitated nor simply incorporated Schlegel into his theory of the symbol. Schelling rather performed his signature “speculative operation” upon the *Kunstlehre*.<sup>17</sup> In other words, Schelling utilised Schlegel’s lectures as the “empirical” substrate for his “intellectual” explorations of art. Schlegel “kept [Schelling] oriented,” “spared [him] much inquiry,” and ultimately enabled his “formulation of the speculative.”<sup>18</sup> Thus did Schlegel play a key role in the nature-philosophical division of labour; referring sympathetically in the *Kunstlehre* to Schelling’s *System of Transcendental Idealism* (1800), which had given art paramount importance. So there is good reason to think Schlegel could help us to elaborate art’s role for “the new Schelling”<sup>19</sup> and indeed reveal the extent to which Schellingian views permeated the Jena milieu.<sup>20</sup>

Schlegel declares as his founding gesture that beautiful artworks objectively exist. But it is not enough simply to affirm this fact. Schlegel must draw out its manifold implications, which means changing one’s stance towards natural science. Rather than passively reacting to scientific prescriptions, Schlegel will insist that science accommodate beauty. This requires neither the abolition of science nor its aestheticization. Schlegel will rather diagnose those scientific theories which fall short of nature’s grandeur. And this is not destructive by intent. Schlegel believes that criticism will purify science of *qualitates occultae* and facilitate its progress. In this sense, Schlegel’s critical passages are propaedeutic to his constructive end goal: to reinterpret science such that beauty becomes possible. To convey this neglected positive dimension of *Naturphilosophie*,<sup>21</sup> I reconstruct Schlegel’s sound figure interpretation. This detailed focus mimics Joan Steigerwald’s

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<sup>16</sup> “[D]aß die Natur für sie nicht vorhanden ist.” Iain Hamilton Grant, *Philosophies of Nature after Schelling* (London, New York, NY: Continuum International Pub. Group, 2006), 170.

<sup>17</sup> Daniel Whistler, *Schelling’s Theory of Symbolic Language* (Oxford: Oxford University Press, 2013), 166.

<sup>18</sup> Schelling to A. W. Schlegel, cited in Whistler 2013, 62.

<sup>19</sup> The title of an influential edited volume in which Grant’s contribution originally appeared. *The New Schelling*, eds. Judith Norman, Alistair Welchman (Continuum: London, New York 2004).

<sup>20</sup> This has already been initiated by Jeremy Adler, “The Aesthetics of Magnetism: Science, Philosophy and Poetry in the Dialogue Between Goethe and Schelling” in *The Third Culture: Literature and Science*, ed. Elinor S. Shaffer (Berlin, New York: De Gruyter, 1997).

<sup>21</sup> Adrian Johnston has been the most vocal advocate for the re-evaluation of Marxist *Naturphilosophie*. See for example *A New German Idealism: Hegel, Žižek, and Dialectical Materialism* (New York: Columbia University Press, 2018). See also Helena Sheehan’s magisterial *Marxism and the Philosophy of Science: a Critical History* (London: Verso, 2017).

outstanding close readings of Ritter's experiments<sup>22</sup> (hopefully addressing Robert Pippin's objection that treatments of *Naturphilosophie* have been insufficiently granular).<sup>23</sup> Myles Jackson and others have meanwhile provided an indispensable foundation for Chladni and the sound figures.<sup>24</sup> In the broader view, my contribution might be situated amidst the reassessment of *Naturphilosophie* within German studies.<sup>25</sup> One wonders if other artefacts from the history of science might further illuminate Jena's speculative operations.

In German literary studies, this discussion could help draw A. W. Schlegel towards the centre of the Jena canon.<sup>26</sup> Whereas Friedrich Schlegel delighted in rhetorical play and linguistic ambiguity, the story goes,<sup>27</sup> August W. Schlegel was the stuffy older brother. The encyclopaedic August sought in the words of an early editor to defuse "those expressions of the Romantic school that seem paradoxical when taken by themselves."<sup>28</sup> This was not an inaccurate description of August's approach. Yet one must appreciate the

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<sup>22</sup> Joan Steigerwald, "Figuring Nature: Ritter's Galvanic Inscriptions," *European Romantic Review*, 18:2 (2007): 255-263.

<sup>23</sup> Robert Pippin attributes to Adrian Johnston the view that G. W. F. Hegel's philosophy of nature is "out of date." Johnston does not actually say this but Pippin's remark nevertheless brings into focus the interpretation of empirical science in *Naturphilosophie*. See Robert Pippin, "Review of *A New German Idealism: Hegel, Žižek, and Dialectical Materialism*." *Notre Dame Philosophical Reviews*, published 05/08/2018 [<https://ndpr.nd.edu/reviews/a-new-german-idealism-hegel-zizek-and-dialectical-materialism/>].

<sup>24</sup> Myles W. Jackson, *Harmonious Triads: Physicists, Musicians, and Instruments Makers in Nineteenth-Century Germany* (Boston: MIT Press, 2006); Benjamin Steege, "Review of Myles Jackson's *Harmonious Triads* and Matthias Rieger's *Helmholtz Musicus: Die Objektivierung der Musik*," *Journal of Music Theory* 50:2 (Fall 2006); Viktoria Tkaczyk, "The Making of Acoustics around 1800, or How to Do Science with Words" in *Performing Knowledge, 1750 - 1850*. Eds. Mary Helen Dupree and Sean B. Frenzel (Berlin: De Gruyter, 2015).

<sup>25</sup> Jocelyn Holland, "The Silence of Ritter's Symbol," *The Germanic Review: Literature, Culture, Theory*, 92:4 (2017): 340-354; Antje Pfannkuchen & Leif Weatherby, "Writing Polarities: Romanticism and the Dynamic Unity of Poetry and Science," *The Germanic Review: Literature, Culture, Theory*, 92:4 (2017): 335-339; Leif Weatherby, *Transplanting the Metaphysical Organ: German Romanticism between Leibniz and Marx* (New York: Fordham University Press, 2016); Gabriel Trop, "The Aesthetics of Schelling's *Naturphilosophie*," *Symposium*, 19: 1 (2015); David Wood, "The Mathematical *Wissenschaftslehre*: On a Late Fichtean Reflection of Novalis" in *The Relevance of Romanticism*, ed. Dalia Nassar (Oxford, New York: Oxford University Press, 2014); Jocelyn Holland, *German Romanticism and Science: the Procreative Poetics of Goethe, Novalis and Ritter* (Routledge, 2009).

<sup>26</sup> It is worth noting that Jan Oliver Jost-Fritz and Christian Weber are editing a special issue of *Colloquia Germanica* on A. W. Schlegel that is forthcoming in spring 2022.

<sup>27</sup> See Paul de Man, "The Concept of Irony" in *Aesthetic Ideology*, ed. Andrzej Warminski (Minneapolis: University of Minnesota Press, 1996), 182; J. Hillis-Miller, *Revenge of the Aesthetic: The Place of Literature in Theory Today* (Berkeley: University of California Press, 2000), 58.

<sup>28</sup> "[D]ie einzeln für sich paradox erscheinenden Äußerungen der romantischen Schule." August W. Schlegel, *Kritische Schriften und Briefe*, ed. Edgar Lohnen (Stuttgart: W. Kohlhammer, 1963), lxiv.

motive behind this attempted consolidation of Romantic fragments. August did not attempt to stifle literary creativity or subordinate art to philosophy; he rather sought to foster Romanticism within science and thereby to realise provocative new conceptions of nature. So while the deductive form was indeed the provenance of J. G. Fichte and Schelling, its underlying motive was hardly to be distinguished from J. G. Herder and J. W. Goethe. Notwithstanding the real and substantive disputes to which this formal divergence gave rise, the cleft between Jena literature and philosophy should not be unduly absolutized.<sup>29</sup> In my view, August's systematic impetus reflected his effort to drive the principle of sufficient reason into the crevices of "dead" worldviews (1989, 184); to continue questioning when others "took refuge" in scientific or religious jargon (1989, 219). In that sense, August represented the intermediary between Jena's literary and philosophical genres. But whereas Fichte posited the "I" to forestall the regress into nihilism i.e. that indubitable first principle that laid the foundation for all subsequent knowledge,<sup>30</sup> August ventured the unprecedented and indeed quintessentially Romantic claim that any valid *Weltanschauung* must accommodate the "self-evidence of the beautiful" (1989, 186). In other words, August took as "principle" (*Grundsatz*) the notion that "art should exist" (my italics; 1989, 186). And this required nothing less than re-interpreting science and philosophy in light of the fact of beauty's objective existence.

The sound figures arise during A. W. Schlegel's discussion of "tone," which he frames as the basic prerequisite for music. Now, we have seen that tone had been represented by the quantitative oscillation model developed by Euler. But what grabs Schlegel's attention are recent efforts to explain beauty as mental phenomenon via oscillation within "certain fibres of the brain" (1989, 219). This had been undertaken by the mathematicians Denis Diderot and Jean le Rond d'Alembert, who had edited the *Encyclopédie* (1751–1766): a defining document of the French Enlightenment. To contest d'Alembert's ostensible reduction of beauty to an illusory after-effect of mechanical patterns, Schlegel aims to re-imagine tone as an objectively-existing thing. To do so, Schlegel indeed makes reference to Kant, who had utilised oscillation when defining the "pleasant" in his *Critique of the Power of Judgement* (1790).<sup>31</sup> But my real interest lies in how Schlegel attempts to get

<sup>29</sup> One might ask to what extent Schelling may be considered Romantic. See Dalia Nassar, "Introduction," *The Relevance of Romanticism*, 10, footnote 7; see also Dalia Nassar, "The Human Vocation and the Question of the Earth: Karoline von Günderrode's Philosophy of Nature," *Archiv für Geschichte der Philosophie* (2021): 304–321, 3, footnote 5.

<sup>30</sup> Beiser 1987, 5; Manfred Frank, "What is Early German Romantic Philosophy" in Nassar 2014, 25.

<sup>31</sup> Immanuel Kant, *Kritik der Urteilskraft* (Hamburg: Meiner Verlag 2009), §51.



beyond the transcendental paradigm in order to capture tone's "existence" (1989, 186). Here the sound figures play their key role as an exemplar of the most promising scientific research. Section one sketches Schlegel's general intellectual project, and especially the meaning of beauty, around his engagement with d'Alembert. Section two narrows focus upon Schlegel's treatment of music and establishes the axes of tone, rhythm, harmony. Section three reconstructs Schlegel's sound figure interpretation and draws some tentative conclusions.

### 1. Oscillation: Beyond Kant and Into the World

Schlegel takes as his object the "theory, history, and criticism of the fine arts" (1989, 181). The sound figures are peripheral to Schlegel's main topic, which is advantageous for the present discussion insofar as it enables us to refine our conception of the aesthetic and its relationship to empirical science in general. At the same time, Schlegel's critical treatment of various aesthetic theories, and his own positive theory of beauty, rely more heavily on the sound figures than one might expect. That owes to the convergence of acoustical science and the notion of sensible pleasure. In the early lectures, Schlegel identifies the French Encyclopaedists as an archetype of mechanical aesthetics. According to Denis Diderot and Jean le Rond d'Alembert, sensible pleasure was an expression of oscillation in "certain fibres of the brain" (1989, 219). In his primary work as mathematician, d'Alembert had refined Leonhard Euler's equations for oscillation. This was the same research nexus that Ernst Chladni "tested" in his experimental work in the *Entdeckungen über die Theorie des Klanges* (1787, 77) and which the sound figures threatened to cast into disarray. So eight years before Napoleon Bonaparte formalised this crisis and marshalled France's mathematical acumen towards a solution, the concept of beauty had already been embroiled in competing visions of nature. Schlegel looks sceptically upon d'Alembert's "experimental physics of the soul" (1989, 219) and maintains that beauty will forever elude the grasp of mechanism.

Schlegel's criticism of d'Alembert has theoretical and practical components. Not infrequently, theoretical objections to empiricism in Jena were undertaken from the Kantian standpoint (Christensen, 172). If an empiricist sought to derive consciousness from the brain, the Kantian would object that this mechanical schema was merely the projection of mind; and mind could not establish any "necessary" relationship to the external world. Any such attempt would require consciousness to step outside itself, as it were, in order to explain its own internal operations. Thus does Schlegel accuse "empirical

psychology” of an “impossible and nonsensical beginning” (1989, 219). But regardless of this tautology, Schlegel could easily have guessed why such transgressions kept recurring twenty years after Kant’s intervention. Undeniably, mechanism satisfactorily accounted for the vast majority of phenomena in everyday experience. Combined with its great strides forward over the previous century, mechanists could assume with reasonable confidence that any barriers would inevitably be overcome; and moreover, without philosophical interference. Herein lay the perception that no mystery in the universe could withstand arithmetical penetration, which stripped from nature the aura of fascination. This was the situation Friedrich Schiller had narrated mythologically in “Die Götter Griechenlandes” (1788). With the advent of dynamic physics and physiology, however, the frontiers of mechanics became increasingly well defined and sentiment shifted accordingly. How could mechanists assume that time, space, and causality existed for nature in the same way they did for human beings? Surely this was the greatest anthropomorphism of all. Now, we have seen that Kant did not resolve this situation for the Jena circle; but he did determine its co-ordinates with unprecedented accuracy. The Jena circle accordingly realised they would have to go through – and not merely around – Kant in search of the principle of identity between mind and nature.

In its haste to colonise ever more exhaustively the natural universe, the Jena circle began to feel that mechanism was reaching beyond its own certainty. Schlegel accordingly identified how this overreach was facilitated by certain rhetorical strategies, which created the illusion of concreteness and precision where none truly obtained:

Since [the French encyclopaedists] now derived the most general from the most specialised appearances, albeit without wishing to leave them unexplained, they naturally took their refuge in groundless hypotheses; in this way did philosophy as a whole end in certain fibres of the brain (that no person had in fact ever seen, making the territory all the easier to govern), whose vibrations were capable of conjuring up every arbitrary thing possible.<sup>32</sup>

D’Alembert posits “vibrations” in the “brain” as the root of consciousness. Schlegel could not accept this claim because vibrations in the brain had never been observed. Even from d’Alembert’s own experimentalist standpoint, this would leave oscillation theory little more than a “groundless hypothesis.” Of

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<sup>32</sup> “an den sonoren Körpern bey ihrer Hervorbringung vorgeht: das sind nämlich die Vibrationen. In dieser Berechnung hat besonders Euler viel gethan...” A.W. Schlegel, *Vorlesungen* (1989, 379).

course, d'Alembert was not simply being careless here. Schlegel rather attributes the inconsistency to d'Alembert's unwillingness to be "consequential" (1989, 219) in his thinking. Schlegel complains that knowledge and "morality" are nothing more than "habits" and "prejudices" for d'Alembert (1989, 219). In other words, d'Alembert derives knowledge from the contingent and haphazard collection of sensible impressions. There is no possibility of d'Alembert attaining what Schlegel calls the "convictions of reason" (1989, 219) i.e. the necessary and timeless laws of nature. Schlegel does not yet need to possess such laws to posit reason as "conviction;" and this enables Schlegel practically to apply the principle of sufficient reason i.e. to reject any phenomena that lack adequate causal explanation. "Vibration" accordingly becomes intolerable for Schlegel. D'Alembert has failed to spell out the relationship between arithmetical models (vibration) and empirical objects (the brain), not to speak of the relationship between brain vibrations and consciousness. Schlegel therefore accuses d'Alembert of ignoring sensible evidence and taking "refuge" (1989, 219) in the arithmetical formula of vibration. Protected from the scrutiny of reason, this territory is "all the easier to govern" (1989, 219). Thus does d'Alembert cultivate an artificial and untrue vision of nature, which obfuscates with false concreteness the world that underlies our representations.

In Schlegel's criticism of d'Alembert, both the strength and weakness of the Kantian position is on display. Transcendental philosophy could neutralise any materialism that strayed beyond its sensible limits. But could this principled objection hold back the tide of empirical science, which was steadily rising in 1801? One recalls the heroic programme that transcendental philosophy announced upon its inception in 1781: to disengage from obscure scholastic disputes and to embrace Newtonian science despite its well-known inconsistencies. Leibniz had famously objected to Newton's gravity – the first cause without cause – as *qualitas occulta*.<sup>33</sup> Kant embraced Newton by quarantining the inexplicable "noumenon," rescuing objectivity in qualified and delimited form. Of course, Kant did not straightforwardly abandon the rationalist cause; he simply recognised how Newtonian science had outpaced and marginalised its competitors. Yet just twenty years after the first critique, the epistemological situation had changed once more. It was now Kant himself who looked into the abyss. On the one hand, Kant stared down the hordes of mechanical vulgarians that placed utilitarian goals above truth and were deaf to philosophy. On the other hand, even Kant's sympathisers

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<sup>33</sup> G. W. Leibniz critically frames Isaac Newton's conception of gravity as "qualitas occulta" in the Samuel Clarke correspondence. See *Hauptschriften zur Grundlegung der Philosophie*, ed. Ernst Cassirer, trans. Artur Buchenau (Hamburg: Felix Meiner, 1966).

struggled to mobilise his transcendental criteria for science (Zammito 2018, 323). The sensible phenomena of biology and dynamic physics called sirenically for the observer to grant “objective reality” yet Kant could only deign “regulative validity.” Ørsted’s doctoral dissertation of 1799, for example, focused exclusively on Kant’s rejoinder to Newtonian corpuscular theory; and then wrestled with transcendental epistemology for the duration of his career (Christensen, 159). Did these phenomena really exist or were they just illusory projections of consciousness? One can easily imagine how this uncertainty plagued empirical researchers.

Having read widely in physics, chemistry, and physiology during his years as tutor, Schelling keenly perceived this bottleneck between Kant and the empirical sciences. Without dramatic intervention, Kant would meet the same fate as his scholastic predecessors; owing not to some fatal flaw – though Kant’s system was not without flaws – but to the evolving scientific landscape, which threatened to leave Newtonian physics behind. Unlike Kant, Schelling could not wait decades for the tectonic plates to re-align. Philosophy would have to respond more quickly to, and even foresee, emerging scientific developments. Thus was Schelling an early advocate of the dynamic physics, which did not earn widespread acknowledgement until around 1820 (Christensen, 177). Already in 1796, Schelling was pro-actively seeking to inoculate and compatibilise transcendental philosophy with the new sciences. And this meant developing an authentic and useful scientific *praxis* to counter-act its theoretical overweight. Viewing Schlegel’s encounter with d’Alembert through this lens, it is clearer why the Jena circle were so amenable to Chladni’s research, and moreover willing to overlook his commitment to mechanism. Chladni possessed two traits that Jena had in short supply: the mathematical acumen to interpret advanced theoretical physics on the one hand; and the experimental skill to demonstrate the chasm between these formulae and empirical reality on the other. For the Jena interpreters, Chladni was mobilising Kant’s theoretical argument in the practical sphere and moreover without compromised doctrinal affiliation (Chladni had no use for philosophy). Schiller might well have numbered Chladni with Goethe among those “naïve” few who were unencumbered by modern hyper-awareness or “reflection.”<sup>34</sup> Indeed, naivete might also be defined as the curiously-productive imperviousness to Kant.

It is this deficiency in the Kantian programme that pushes us beyond Schlegel’s criticism of d’Alembert into the evolving, practical sphere that

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<sup>34</sup> Friedrich Schiller, “Über naive und sentimentalische Dichtung” in *Werke und Briefe VIII* (Frankfurt am Main: Deutscher Klassiker Verlag, 1992), 746.

*Naturphilosophie* laid such great emphasis upon. The sound figures arrive some time after Schlegel's critical discussion of previous aesthetic theories; well into his positive accounts of art and in particular his lecture on music. Now although Schlegel has opportunistically played Kant off against d'Alembert, Schlegel remained ambivalent about transcendental aesthetics writ large. Kant's aesthetic autonomy was undoubtedly an achievement. So great an achievement, in fact, that Kant himself could not live up to it. For Schlegel calls beauty "the infinite exhibited (*dargestellt*) finitely," otherwise known as the "symbol." And this "connects" in turn with "the highest principle of philosophy" (1989, 186) i.e. the principle of identity, which was to overcome Kant's fundamental division between mind and nature. One perceives how Kant's "indeterminate" converges with Schlegel's "infinite" and yet how its wings were clipped with "*subjective* universality" (my italics) i.e. the proviso that beauty transpire within consciousness alone. In Schlegel's view, Kant was ultimately interchangeable with any other empiricist who took "the *existence* of beautiful objects as contingent and the way in which the brain was affected by them a *psychological* phenomenon" (my italics; 1989, 219). This echoes the "principle" that Schlegel announced in his first lecture, which stated that "art should exist" (1989, 186). Schlegel's first step was to posit the "existence" of art, and then subsequently to demand that philosophy account for it. This inverts (and retrieves the mantle of humility) from the Cartesian paradigm, which doubted everything except the cogito. Did not the subject also exist within some world, which made the act of doubting possible? So rather than positing the mechanical universe and then accounting for beauty within it, Schlegel asks how the mechanical universe must shift and give way to accommodate the objective existence of beauty.

Let us now consider how Schlegel's treatment of music refracts these broader philosophical concerns. Schlegel will focus his attention on the formal categories of "tone," "rhythm" and "harmony," which are supposed to delineate the possibilities of music per se. Now, this tableau may seem inimical to the private intensity of aesthetic experience. Yet by framing particular examples as relative distributions of sensation, this tableau permits Schlegel to represent art's historical development objectively. Thus does antiquity become associated with "the sense for the free movement of external life" and "energetic rhythm" (1989, 381). Meanwhile, Christian modernity – where "the mind turns back on itself in order to seek out a higher life" – is the historical moment that prioritises harmony, which according to Schlegel "does not lay its claims to powerful effect on the passage of time but rather seeks infinity within indivisible moments" (1989, 381). So rhythm is associated with action, exteriority, and space; whereas harmony is associated

with the domain of interiority, time, and the revelation of infinity within the finite. Now, the question of how form manifests whole historical epochs deserves to be discussed at greater length but the present account must limit its focus to determining the specific utility of the sound figures for Schlegel's analysis.

## 2. Music and its Existence: Tone, Rhythm, Harmony

Nestled inconspicuously amidst one short paragraph, the sound figures could easily be viewed as decorative artifice; a stray scientific metaphor in the discourse of aesthetics. And yet we have seen how Schlegel criticised d'Alembert and Kant, who had utilised art to ornament science, for excising beauty from nature. To interpret Schlegel's sound figure reference as scientific ornament in aesthetics would, conversely therefore, exclude nature from beauty. To avoid this outcome we must determine what purpose the sound figures play in Schlegel's overall project. And here one must guard against over-correction. The sound figures do not themselves exhibit beauty i.e. manifest some artistic quality in their own right. This would defeat the purpose of Schlegel's lecture, which was to determine in principle whether beauty is objectively possible. In actuality the sound figures play quite another role: namely, to imagine tone as objectively existing and thus to bridge the gap between mind and nature.

We have seen that Schlegel's lecture hinges around two formal-historical moments: antique rhythm and modern harmony. Tone is introduced as the interstice between rhythm and harmony; and this does not only have narrative utility. The purpose of tone is to represent the shared genetic locus from which rhythm (tone inflected by time) and harmony (tone inflected by space) both emerge. It is therefore imperative for Schlegel to determine "the *nature* of tone" (my italics; 1989, 269). For if tone is reducible to the quantity of mechanical vibrations then music would be the ephemeral product of an underlying mechanical universe. In other words, music would become precisely that illusion of consciousness that Kant/d'Alembert had described and Schlegel's world-historical vision would never get off the ground. Schlegel thus describes tone as that which

precedes the sonorous bodies upon their emergence; the vibrations. In this calculation, Euler has achieved much.<sup>35</sup>

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<sup>35</sup> "an den sonoren Körpern bey ihrer Hervorbringung vorgeht: das sind nämlich die Vibrationen. In dieser Berechnung hat besonders Euler viel gethan..." A.W. Schlegel, *Vorlesungen* (1989, 379).

Schlegel posits some relationship between tone and vibration. But Schlegel's formulation is potentially confusing as it blurs the distinction – so critical for his account – between mechanical and dynamic explanatory paradigms.<sup>36</sup> The mechanical paradigm is represented by the “calculation” in which “Euler has achieved much.” These were the same formulae d'Alembert had refined and Chladni “tested.” According to mechanism, vibrations provide the source of activity whereas tone represents the passive effect or product (and music becomes the secondary and even illusory echo of primary quantitative matter). Conversely, the dynamic standpoint is identifiable in Schlegel's prolix formulation: “precedes the sonorous bodies upon their emergence.” This sentence grammatically strains to avoid the vocabulary of causation, which is associated with the mechanical paradigm. Instead of cause, the term “emergence” imagines vibration through conditional factors. This stems from the dynamic postulate that all bodies in nature harbour latent forces i.e. bodies are not inherently passive but are rather activated (the German *Hervorbringung* more literally approximates “drawn forth” in English) by external factors. In this case, Schlegel's remark that sound figures emerge “under certain conditions” (1989, 379) is again deceptively casual relative to its import. With this, Schlegel conveys that no truly “dead” matter inheres within the universe;<sup>37</sup> all bodies are awaiting their moment to sing.

Schlegel now goes on to invoke Chladni's “curious attempts in certain ways to project arithmetic into the domain of geometry.”<sup>38</sup> To interpret this puzzling remark, we must appeal to earlier lectures. By “arithmetic” Schlegel means quantitative mechanical explanation. Arithmetic had been the “older theory” that calculated vibration “merely according to degrees of rapidity,” which Schlegel contrasted with an as-yet unnamed method “whose whole nature appears to be different” (1989, 269). Schlegel now lifts the veil: this new method reflects “the domain of geometry.” Of course, Euler *et al* were no strangers to geometry. Why then does Schlegel so emphatically distinguish between arithmetic and geometry? In an earlier lecture, Schlegel had explained that “geometrical figures” can be interpreted in different ways. Commonly, geometrical figures were utilised by mathematicians as “mere

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<sup>36</sup> Here the 1798 lectures are clearer though less detailed. After referring to Pythagoras and his theory of universal harmony, Schlegel takes Euler as an instance of sceptical modernity. Chladni's sound figures are introduced as example of continuing possibility that “mathematische Beziehungen and Verhältnisse mit der Harmonie [stattfinden]” (1989, 120).

<sup>37</sup> F. W. J. Schelling, *Ideen zu einer Philosophie der Natur* (Landshut: Philip Krüll, 1803), 15. Hereafter *Ideen*.

<sup>38</sup> “[M]erkwürdigen Versuchen gewissermaßen aus der Arithmetik in das Gebiet der Geometrie [hinüberzuspiegeln].” A.W. Schlegel, *Vorlesungen* (1989, 379)

formula to relieve our conceptual burden” (1989, 307); in other words, conceptual shortcuts that prevented us from having to redo past logical judgements. Yet for Schlegel, these shortcuts skipped over the deductive steps that had originally generated mathematical formulae, pushing their internal mechanism further into the unconscious.<sup>39</sup> Schlegel therefore set out to excavate this sediment of custom and habit. In the long term, this seemingly-impractical approach would orient science more assuredly towards progress and prevent wasteful digression (which Schlegel calls “blind tapping;” 1989, 219). Now, Euler could interject: does it really matter if knowledge is arbitrary once the object has been described for all intents and purposes? Moreover, does this insistence upon necessity not amount to some vain metaphysical crusade? And Schlegel could respond: Euler here takes into account only the theoretical implications of the term “contingent” (1989, 219); its practical implications are much more serious. For against the background of an objective and independent world, illegitimate or “contingent” knowledge would distort and misrepresent; compressing the unfathomed richness of nature into sterile conformity with some haphazard theory of consciousness.

It is worth considering how unusual it is that Schlegel felt emboldened to intervene within theoretical mathematics, especially after Kant’s choppy reception in experimental science. Schlegel’s remark only makes sense when contextualised amidst the perceived decline of mechanical physics. In this developing situation, Schlegel may have imagined Euler’s formulae as an esoteric private script, whose purchase on reality was beginning to loosen. In his paragraph on the sound figures, Schlegel goes on to say that

Regarding the further refinement of these observations for the explanation of the relationship of tones to our hearing and hence to the whole organisation [in the sense of organic body], the mathematical path will prove difficult; for this relationship is a living one and mathematics can only supply constructions of the phenomenon

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<sup>39</sup> Schlegel likely has in mind the debates surrounding differential calculus, which were presented by its inventor G. W. Leibniz as “Mittel zur Entlastung der Einbildungskraft” (Leibniz, 78); and therefore as pathway to grander intellectual feats. With ordinary algebra, it had proved “schwierig, die Eigenschaften der Figur auf einen Ausdruck der Rechnung zu bringen” (Leibniz, 77). Leibniz’s new calculus would “dem Geiste die Objekte der sinnlichen Anschauung genau und ihrer Natur gemäß, wengleich ohne Figuren, [darstellen]” (Leibniz, 77).



subsequent to the subtraction of what is living within them. Here, further discoveries are to be expected from dynamic physics.<sup>40</sup>

Given the aforementioned rejection of Euler's arithmetic, it is potentially confusing that Schlegel interchangeably uses the term "mathematical" for critical and positive reasons. The context usually makes clear Schlegel's intended meaning. In this case, "mathematical" refers to the arithmetical standpoint of Euler *et al.* And Schlegel was confident that mechanical solutions for the sound figures would not be forthcoming. It was still eight years before Napoleon announced his national competition for the mechanical solution of the sound figures at the *Institut de France* in 1809. That is why Schlegel says – regarding the relation of tones "to our hearing and hence to the whole organization" – that "*further* refinement" [my italics] of the mechanical approach will "prove difficult." The term "further" acknowledges the breakthroughs of physics yet situates them firmly in the past. So by 1801, the limits of mechanism were evidently on the horizon and Schlegel drew his battle lines accordingly.

One might now begin to wonder: how does Schlegel develop his positive theory of nature from these predominantly critical statements? At the conclusion of his paragraph, it is enigmatically announced that "further discoveries are to be expected from dynamic physics." And these developments shall express the "living relationship" between "tones, hearing, and the whole organization" which the "mathematical" (now meaning arithmetical) approach of Euler *et al.* have "[subtracted]" (1989, 379). Euler has failed to account for the living relationship between tone, hearing, and organism. But for his part Schlegel has neglected to explain what life is. Thankfully, the critical term "subtraction" can point us in the right direction. Nature is by definition whole for Schlegel. Any worthy philosophy of nature would therefore set out from this basic premise. Now, Schlegel does not claim to possess some God-like intuition of nature against which the sciences can be measured. The principle of the whole rather furnishes Schlegel with an eminently practical imperative: that each science accord with other sciences. How else could science claim to represent nature? Euler may perfectly well develop a self-contained arithmetical system; but this system carries unspoken implications. When pressed, Euler would reduce organic

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<sup>40</sup> "Auf dem mathematischen Wege möchte man bey noch so großer Vervollkommung dieser Beobachtungen für die Erklärung des Verhältnisses der Töne zu unserm Gehör und dadurch zu ganzen Organisation schwerlich etwas weiter gewinnen, denn dieß Verhältniß ist ein lebendiges und die Mathematik kann nur Constructionen der Phänomene nach Abzug des Lebendigen in ihnen liefern. Hier sind also höhere Aufschlüsse erst von der dynamischen Physik zu erwarten." A.W. Schlegel, *Vorlesungen* (1989, 379).

beings to mechanical automata. And the point here is not that Euler violates the sanctity of human spirit. Schlegel would refer instead to physiology, which had been incorporating teleological paradigms over the past fifty years. Thus does Euler's system reveal itself for Schlegel as an incomplete and artificial image of nature, which must subtract organic life to remain consistent. From this perspective, the whole does not represent some unrealistic demand but rather articulates a tectonic shift within science.

Evidently, we still have not yet left the critical dimension of Schlegel's account behind. But without qualification by the term "subtraction," Schlegel's organic vocabulary could easily be mistaken for an ill-fated attempt to subordinate arithmetic to organism. In light of the foregoing, we appreciate why such an effort would be no less deficient. Schlegel must establish the link or common principle between inorganic matter and organic life. Only with some concept of the inorganic could we determine how life emerges; simply positing the ubiquity of life would overstep the problem. That is why Schlegel invokes the "*living* relationship" (my italics) between "tones" and "hearing." The sound figures are not themselves living and yet must have some compatibility with organism. Now, we cannot expect Schlegel to attain this goal in one single paragraph. Schelling had already dedicated his major published works to determining the relationship between inorganic matter and organic life; and even these works had been qualified with the titles of "draft" or "idea." No less cautiously, Schlegel reminds his audience that key results from the sound figures are still "to be expected." But notwithstanding these provisos, one should not take the prognostic and quasi-millenarian language of *Naturphilosophie* too literally. The culmination of the system would provide no final revelation. It would simply crown what had come before; and what came before would be nothing other than empirical science dynamically interpreted. Schlegel was no scientist and yet had seriously engaged with experimentalists in Jena. Schlegel's sound figure reception accordingly provides greater insight into the cultural implications of dynamic physics, and its expected future trajectory, than the brevity of his paragraph might otherwise indicate.

### 3. The Sound Figures

It is one thing to say that mind is an expression of nature and quite another to cash it out. Let us now hone in on Schlegel's positive interpretation of the sound figures. We have seen that Euler's geometry had been criticised as "contingent," which characterised it as an artificial projection of consciousness. But with its canon of Pythagoras, Plato, Bruno, and Johannes Kepler,

*Naturphilosophie* saw geometry as an especially pure and self-contained science, which could generate principles without reference to experience i.e. independently of time (understood as pure form of intuition) and thus with complete necessity.<sup>41</sup> Now, this had profound implications for the Kantian milieu because, as Schlegel put it, “the mathematical designates that domain where we recognise the laws of nature as identical with the laws of mind” (1989, 306) (and here “mathematics” refers to geometry). Since geometry legislated for nature and consciousness in an “identical” fashion, the problem of transcendental philosophy – namely the correspondence between internal mind and external body – could potentially be overcome. Of course, this outcome depended upon rendering the phenomena of sensation “geometrically constructible” (1989, 329) i.e. deducing physical phenomena like light and sound from geometrical principles. This was what Schelling had been undertaking since 1796. And “sound” and “light” had pride of place for Schelling, since they represented nature in its most primitive “level” (*Ideen*, 257). Herein Schlegel’s claim that “sound” and “light” stood “on the limit of the actual bodily world” (1989, 307). This “limit” indeed corresponded with Kant’s imperceptible noumenon but for Schlegel “limit” also expressed matter in its primordial and unending process of self-determination; and specifically the point where becoming crystallised into being.

How do the sound figures fit into this schema? Schlegel said that Chladni “makes visible the purity of musical tones in the regularity of geometrical figures” (1989, 379). This could be interpreted in various ways. The Kantian might say that Chladni translates one sensation (sound) into another (vision).<sup>42</sup> But Schlegel wanted to get beyond sensation and into the external world. This did not mean flouting Kant’s proviso that knowledge must be tethered to sensible experience. Schlegel rather posited that some common principle linked sensation to the external world. The route to nature must accordingly pass through the subject, “who has the capacity to intuit himself directly... this places him in the position of being able to grasp his

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<sup>41</sup> Benjamin Berger and Daniel Whistler, *The Schelling-Eschenmayer Controversy, 1801* (Edinburgh: Edinburgh University Press, 2020), 106.

<sup>42</sup> Friedrich Nietzsche famously wrote: “Ein Nervenreiz, zuerst übertragen in ein Bild! Erste Metapher. Das Bild wieder nachgeformt in einem Laut! Zweite Metapher. Und jedesmal vollständiges Überspringen der Sphäre, mitten hinein in eine ganz andre und neue. Man kann sich einen Menschen denken, der ganz taub ist und nie eine Empfindung des Tones und der Musik gehabt hat: wie dieser etwa die chladnischen Klangfiguren im Sande anstaunt, ihre Ursachen im Erzittern der Saite findet und nun darauf schwören wird, jetzt müsse er wissen, was die Menschen den ‘Ton’ nennen, so geht es uns allen mit der Sprache.” *Werke: Kritische Gesamtausgabe III.2*, eds. Giorgio Colli and Mazzino Montinari (Berlin: Walter de Gruyter, 1967–), 373.

being at its root, which is otherwise known as speculation.”<sup>43</sup> It is worth focusing on the term “root.” In a tree, the root is imperceptible and yet grounds the trunk and branches. Kant had used the term “root” to signify the reciprocity between sensibility and the understanding (the domain of thought).<sup>44</sup> To access this root, Kant “abstracted” i.e. removed the determinations from sensible representations in order to access the “pure” forms of intuition i.e. space and time. Of course, Kant would never have agreed that this enabled the subject “to grasp his *being* at its root” (my italics). The noumenon ruled out any connection between knowledge and being. “Being” was an extrapolation that derived from Schelling, who had insisted that “the system of nature is at the same time the system of our mind.”<sup>45</sup> Schlegel’s modified Kantianism thus explains why terms like “purity” are preserved yet re-oriented towards “musical tones” i.e. things in the world as opposed to transcendental vocabulary like “representation” [*Vorstellung*].

This lays out the basic coordinates of Schlegel’s argument. Kant supplied the ideal mental forms whereas Schlegel pursued the real natural forms; and both vectors are indispensable. Now, it might seem contradictory that although we proceed in different directions i.e. towards mind and from nature respectively, we are nevertheless drilling towards one shared generative “root.” According to the principle of identity, natural and mental forms emerge from the same source. This paradox is explained by Schelling’s dual-aspect approach. For the ideal perspective, nature will always be something external. It will accordingly “appear” that mind and nature are getting further apart during these investigations. But for the real aspect, mind and external nature simply “express” the same underlying principle so these categories represent “poles” that are to be integrated during future inquiries.

It is from this standpoint that Schlegel pursues the “regularity of geometrical figures” (1989, 379). The German *Regelmäßigkeit* does not equate directly to the English term “regularity,” which has empiricist connotations of convention or habit. Schlegel’s “Regel” instead manifests the rationalist concept of necessity, which is liable to estrange the contemporary reader. Necessity might be possible to entertain in the mental sphere of transcendental philosophy; but Schlegel’s application of necessity to the real world might be asking too much. Here certain qualifications deserve to be

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<sup>43</sup> “Dieser hat die Fähigkeit selbst unmittelbar anzuschauen... dadurch wird er in den Stand gesetzt sein Dasein an der Wurzel zu ergreifen, welches Speculation heißt.” A.W. Schlegel, *Vorlesungen* (1989, 219)

<sup>44</sup> Immanuel Kant, “Einleitung,” §VII, *Kritik der reinen Vernunft* (Hamburg: Meiner Verlag, 2009). Hereafter *KrV*.

<sup>45</sup> “Das System der Natur ist zugleich das System unseres Geistes.” Schelling, *Ideen*, 41.

borne in mind. We recall that Kant and Schlegel both acknowledged the limits of sensation. In neither case did necessity manifest itself tangibly. It is exclusively the vector of analysis that distinguishes Schlegel from Kant. Whereas Kant abstracted intuition into cognitive forms, Schlegel constructed intuition from natural forms. In this sense, Schlegel did not entirely throw transcendental caution to the wind. When Schlegel describes the sound figures as “dust scattered upon sonorous plains... that points to [*anzeigen*] the stasis (*Ruhe*) next to the oscillations,”<sup>46</sup> he did not directly perceive nature itself. Schlegel rather noted the “dust” that “points to” the moment when force had been present. And these temporal indicators had their spatial parallel insofar as they lay upon “nodes” i.e. the locations where “oscillations” were not active. The sound figures could only ever be perceived in the “stasis” next to their activity.

Via the sound figures, Schlegel therefore makes only negative inferences about nature. This may seem underwhelming but much depends on how these inferences are interpreted. We have seen that Schelling did not flout Kant’s sensible limits but he did re-interpret them via the Spinozist terminology of *natura naturans* (sheer becoming or nature in its active state) and *natura naturata* (being or finite human perception i.e. nature imagined via the phenomenal categories of time, space, and causation). These were not separate worlds but rather different aspects of one and the same nature. It is under this lens we appreciate why Schlegel’s negative inferences are imperceptible but nevertheless real. At the same time, Schelling knew that simply affirming nature’s existence would not hasten the adoption of *Naturphilosophie*; especially following Kant’s troubled scientific reception. This makes clearer why the practical interpretation of emerging science represented an indispensable component of Schelling’s intellectual programme. And this raises difficult questions for any tradition that inherits *Goethezeit* thought and yet discards its scientific dimension,<sup>47</sup> which could render any claim to the real tentative indeed.

We have seen how Schlegel believed that *natura naturans* could negatively be inferred from the “stasis” of the sound figures. One might justifiably wonder: how could one derive something from its opposite? We have also seen that Schlegel’s geometry was supposed to unify the inorganic

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<sup>46</sup> “[S]onoren Fläche aufgestreute Staub...die bey den Schwingungen ruhenden Stellen anzeigen.” A.W. Schlegel, *Vorlesungen* (1989, 379).

<sup>47</sup> One influential source for this within the otherwise positive reception of German Idealism was Theodor W. Adorno, who claimed that Hegel represented the moment when science and philosophy came asunder. See Theodor W. Adorno, *Kants “Kritik der reinen Vernunft”* (1959) (Frankfurt am Main: Suhrkamp, 1995), 65.

and organic. But how could something irreducibly spatial and static possibly account for development and change? In an earlier lecture, Schlegel had at least sketched the outline of an answer:

Thus is the point viewed dynamically the image of absolute intensity of the highest concentration; the circle is the unification of this or attractive force with expansive force... the straight line or length is the schema of magnetism: a power that separates from itself in two opposing directions. The ellipse is the connection of length with the circle.<sup>48</sup>

Schlegel interprets static geometry as the “image” or expression of an underlying, dynamic geometry. The simple point becomes “absolute intensity of the highest concentration;” the circle becomes “the unification of this or attractive force with expansive force;” the line or length becomes “the schema of magnetism: a power that separates from itself in two opposing directions;” which finally becomes the “ellipse” when it is combined with the circle. With this, Schlegel shows how geometry may also be dynamically interpreted. This explains why Schlegel could say in an earlier lecture that geometrical figures are simultaneously “the *expression* and the *appearance* of the way in which nature’s fundamental forces affect.”<sup>49</sup> Geometry legislates for both nature (which it “expresses”) and consciousness (to which it “appears”). And we now understand why Chladni “projects” [*hinüberspiegelt*] (1989, 379), in Schlegel’s words, the results of arithmetic onto geometry. The term “speculation” derives from the Latin *speculum*; a mirror that does not merely duplicate (or “reflect”) what the individual externally projects upon nature but a mirror in which nature – via the individual – finally comes to recognise and know itself.<sup>50</sup>

The sound figures exemplify Schlegel’s dual-aspect approach. But it is not obvious what recommends the dynamic interpretation over the mechanical. Let us therefore recall Schlegel’s practical justification. Necessity would link the ideal subject and real world. Otherwise, geometry would remain an intellectual exercise. To rectify this situation, Schlegel sought to account for the existence of the sound figures. It is not obvious

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<sup>48</sup> “So ist der Punkt dynamisch betrachtet das Bild der absoluten Intensität der höchsten Concentration; der Zirkel ist die Vereinigung dieser oder der Attractivkraft mit der Expansivkraft... Die grade Linie oder die Länge ist das Schema des Magnetismus: einer Kraft, die in zwei entgegengesetzte aus einander tritt. Die Ellipse ist die Verbindung der Länge mit dem Kreise.” A.W. Schlegel, *Vorlesungen* (1989, 307).

<sup>49</sup> “[D]er *Ausdruck* und die *Erscheinung* von der Wirkungsart der Grundkräfte der Natur.” A.W. Schlegel, *Vorlesungen* (1989, 307, my italics).

<sup>50</sup> Glenn Alexander Magee, *Hegel and the Hermetic Tradition* (New York: Cornell University Press 2001), 82.

what existence means here. We have seen that Euler chose to divide the sound figures into lines; and he did so because lines behave in accordance with established arithmetical equations. Euler's arithmetical procedure therefore involved extricating natural law from the messy contingency of the real world. Euler converted the "real" (something that existed in the world) into the "ideal" (something that existed in the mind). But for Schlegel, something that only existed in the mind does not really exist at all; it is an "detour" that would mire the perceiver in "dreams... gloom, and lunacy" (1989, 219). Schlegel therefore attempted to imagine geometrical figures as they really were i.e. messy, tendential, and imperfectly expressed. And to achieve this, Schlegel appealed to "power." If geometrical figures can be said to exist, they only do so as an expression of "power." Thus does the "line" become "schema" for magnetism. Burdened though it is with scholastic terminology, this sentence just means that subtracting "power" from geometry would render it ideal (without the real i.e. "one-sided"). Of course, the positive elaboration of this perspective would require fully deriving the sound figures from natural forces and Schlegel does not undertake this project here.

In my view, Schlegel's justification for rejecting Euler and embracing dynamic physics is convincing even though his positive doctrine remains obscure. But Schlegel never claimed to offer this and explicitly stated that results from the sound figures were still "to be expected" (1989, 379). These results would arrive before long with Ritter's and Ørsted's correspondence about electro-magnetism in 1804.<sup>51</sup> Ørsted would present the results of these discussions to the Copenhagen *Royal Society of Science and Letters* in 1807,<sup>52</sup> which provided the basis for Schelling's 1811 "Bericht über den pasigraphischen Versuch des Professor Schmid in Dillingen." But we are not concerned to address these developments here. For now it suffices to observe the catalytic effect that prospective results had upon Schlegel's philosophy of art and in particular the attempted transition into the real. With magnetism, Kant's vaunted "touchstone of experience" is no longer just an empty phrase or placeholder for the experience it perennially defers; it is an actual thing. The ideal sloughs off its scholastic vocabulary to converge into identity with the real of magnetism.

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<sup>51</sup> H. C. Ørsted, "Schreiben des Hrrn. Dr. Oersted zu Kopenhagen an Hrrn. I. W. Ritter zu Jena, Chladni's Klangfiguren in elektrischer Hinsicht betreffend," *Naturvidenskabelige Skrifter I*, 261. Cited in Christensen, 170.

<sup>52</sup> H. C. Ørsted, "Forsøg over Klangfigureerne" (Copenhagen, 1807-1808), *Naturvidenskabelige Skrifter II* (Copenhagen: A. F. Høst and son, 1920), 11-34.

In Schlegel's *Kunstlehre*, the sound figures made possible the transition from rhythm to harmony by re-imagining tone as geometric figure rather than quantitative oscillation. In this respect, the sound figures were not just an illustrative example but actually grounded – albeit provisionally – Schlegel's philosophy of art in the real. This article has sought to provide a foothold onto this most provocative aspect of Schlegel's thought. If it is indeed true that Schelling is “a contemporary philosopher” (Grant, 19) then Schlegel's *realisation* of the artwork, so to speak, could have implications for contemporary literary and cultural criticism. It is not too early to begin teasing out these implications; even though this tentative foothold on the real demands fortification with additional scientific examples. For it is precisely this transition into the real that remains so opaque and indeed pressing. Every venture that takes German Idealism for its substrate – beginning with G. W. F. Hegel but including Karl Marx and the Frankfurt School – arguably presupposes the real. This elicits a sobering thought: how much of this tradition simply falls away with the disavowal of *Naturphilosophie*? Now that recent scholarship has delineated Schelling's key contributions and recognised his independence from Hegel, it would remain to explore in greater detail precisely *how* the real was won. And this project would not limit its purview to Schelling himself but that whole subcurrent within Jena – literary, philosophical, scientific and otherwise – which insisted upon nature's objective and independent existence.