

The Necessity of Vagueness and Ambiguity to the Imagining of Sound

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as you look at finer and subtler things, as you leave the practical purpose for which the method exists, the element of error increases. Every species is vague, every term goes cloudy at its edges; and so in my way of thinking, relentless logic is only another name for a stupidity—for a sort of intellectual pigheadedness. If you push a philosophical or metaphysical inquiry through a series of valid syllogisms—never committing any generally recognised fallacy—you nevertheless leave behind you at each step a certain rubbing and marginal loss of objective truth, and you get deflections that are difficult to trace at each phase in the process. Every species waggles about in its definition, every tool is a little loose in its handle, every scale has its individual error (H.G. Wells, *First and Last Things: A Confession of Faith and a Rule of Life*).

<1>Introduction

In this chapter, I champion those twin *bête-noires* of the natural sciences: vagueness and ambiguity. It is my contention that vagueness and ambiguity are necessary and motivating to the imagining of sound and, because the perception of sound (that is, the formation of auditory imagery replete with function and meaning) plays a fundamental role in presence, vagueness and ambiguity, rather than being exorcised as the natural sciences would have it, should be welcomed as vital factors in the making sense of the sensory world and our place in it.

My own motivating factor for fighting what could be viewed as an already lost battle is the apparent triumph of scientific reason in the modern age, a triumph that has perversely led to the death

of, indeed has been the root cause of the killing off of, imagination. The evidence for this is everywhere but is particularly apparent in the western world's educational sector where the traditional humanities subjects – art, literature, music, and others that do yet care to imagine – are being sidelined and allowed to wither in favor of the short-term, utilitarian, and unimaginative subjects of the natural sciences.

Before I am accused of luddite tendencies, I will freely admit that there is a certain benefit to be had from the fruits of the industrial and digital revolutions if these are balanced against the multiple and long-term deleterious consequences that are quite apparent. Thus, I certainly do not intend this essay to be a luddite call to arms. I too enjoy what the natural sciences have given us, for example, in terms of improved health and longevity, the technology that allows me to write late into the night, and the unequal wealth distribution of the modern world that affords me greater leisure time than either my ancestors or those outside of the economic siloes of the West. But the development of this luxurious (for me and a small proportion of the world's population) state of affairs has constructed a system in which there is little room for imagination and what is perhaps its most important product, the creativity that leads to the production of creative artifacts.

And this brings me to sound as the focal point of the chapter. Sound provides the perfect exemplar for my thesis regarding the tragedy of imagination in the West. Limiting oneself to sound, one may trace the start of the decline of imagination to the latter half of the nineteenth century with the beginnings of the serious quantification of the phenomenon of sound waves by the likes of von Helmholtz and Lord Rayleigh – although one could go further back to seventeenth-century attempts to find the speed of those waves in air (Marin Mersenne in 1630 and Pierre Gassendi in 1635, for example [Bohn 1988]) – and the start of the commodification of audio by Edison in his phonograph of 1877. It might well be that the ideas contained in this essay can be applied to other areas but I have chosen to focus on sound as the exemplar.

Before I begin, I should explain that I have a conception of sound that was first extensively expressed in the book *Sonic Virtuality* (Grimshaw and Garner 2015) co-authored with Tom Garner. In this case, sound is an emergent perception that is formed multi-modally and that does not necessarily rely on the presence of sound waves: imagined sound is just as much sound as that perception instigated by any sound wave. Physicists and acousticians view sound waves themselves as sounds although a strict cleaving to that definition all too easily founders and becomes lax and blurred in their literature (see Grimshaw 2015, for example).

<1>Vagueness and Ambiguity

Both vagueness and ambiguity are generally pejorative concepts, as Sorensen (1997) points out, and, indeed, it is the aim of many technical languages, such as computer programming, to eliminate both of them. My aim here, though, is to both defend and point to the necessity of vagueness and ambiguity, in particular to the process of imagination and especially in the context of sound and the function and meaning we derive from it. The two terms are often mistakenly conflated. However, where vagueness resists resolution, ambiguity can be resolved.

<2>Vagueness

The H.G. Wells quotation at the start of this chapter is a fractal-like argument in favor of vagueness and against the precision and all too easy pigeon-holing that the natural sciences attempt to impose on us. Vagueness, as the property of an adjective or other form of descriptor, requires the possession of borderline cases that are resistant to enquiry. It can never be determined which side of a border a particular instance lies, and, indeed, the border itself is a borderline case as it is often arbitrary and subject to shifting conditions (for more on this, see Sorensen 1997). The question of whether a piece of string is long or short is an example of vagueness; it can never successfully be argued one way or

the other. One could indeed compare the string in question to another piece of string but is that second piece of string (which could certainly be successfully be argued to be *longer* or *shorter* than the first) itself long or short? The answer to this is consequential to the answer that might be proposed to the first question. Equally, it would be a Sisyphean task to attempt to find the average length of a piece of string from all the pieces of string in the world.

As another example, one could take human resting heart rates. In a number of online sources,¹ this is generally given as (the suspiciously neat figure of) 100,000 beats per day. Would it be fair, or even worthwhile, to say, then, that a person whose heart beats at the rate of 100,001 beats per day has a speeding heart? Clearly not as that decision depends on a number of other factors themselves subject to vagueness (for example, human age) not to mention the arbitrariness of the setting of boundaries. Furthermore, 'average' is not the same as that other vague adjective 'normal.' 100,000 beats per day is 69.4 beats per minute, which is within the Mayo Clinic's boundaries of a *normal* heart rate (60–100 beats per minute).² What is 'normal' is itself subject to a range of factors not least of which are politics and marketing and human susceptibility to fear: a website that just happens to sell heart rate apps and monitors informs us that 'normal' in this case is 40–100 beats per minute while also claiming that a 'poor' heart rate is one above around 80 beats per minute.³

Vagueness in sound is to be found in our quantifiers and descriptors for it regardless of the domains those terms belong to. For example, the ANSI acoustic definitions of 'reverberation room' and 'live room' are respectively: "Room having a long reverberation time, especially designed to make the sound field therein as diffuse as possible" and "Room characterized by a relatively small amount of sound absorption" (American National Standard 2013). There are a number of vague terms here characterized by borderline cases. For example, how long is 'long,' what are the conditions required for the sound to be "as diffuse as possible," to what reference level does 'relatively' refer to, and how small is 'small?' The ANSI standards are silent on this. Similarly, vagueness can be found in everyday

descriptors of sound regardless of whether it is a modally direct descriptor such as 'loud' or 'soft' or whether it is a metaphorical descriptor borrowed from another perceptual modality: a sound might be described as 'sharp' or 'dull' but at what point does a dull sound become a sharp sound and might there be the sound that is neither too little or too much dull-sharp but, being just right, is in the goldilocks zone between the two (and how would we then describe this perfect sound)?

Vagueness could be viewed as an unfortunate condition of life despite the best efforts of the natural sciences to eradicate it through the introduction of standards, standardized responses (see below), and ever more precise measurement techniques. I would, however, argue that vagueness is fundamental and necessary to engaging with the world. For what is the relevance of the use of everyday metaphors (themselves vague) such as 'warm,' 'cold,' 'soft,' 'harsh,' and so forth to describe subjective qualities of sound other than as a demonstration of the natural and necessary human tendency to imagine (in this case, imagining the qualities of sound through another perceptual modality) and thereby bring the external world into experiential and utilitarian being? This form of imagination (for more on sound metaphors and imagination, see Walther-Hansen, this volume, chapter 23) is, I claim, fundamental to our relationship to, and sense-making of, the physical world not least when it comes to sound. I argue this further below.

The importance of vagueness to the imagination of sounds described in graphic and written fiction should also be noted (for further accounts of the uses of sound descriptors in both forms of literature, see Pellitteri, this volume, chapter 26, and Yasar, this volume, chapter 22). In *The Beasts of Tarzan* can be found the following:

From the dense jungles upon either side came the weird night cries of the carnivora—the maniacal voice of the hyena, the coughing grunt of the panther, the deep and awful roar of the lion. And with them strange, uncanny notes that the girl

could not ascribe to any particular night prowler—more terrible because of their mystery (Burroughs [1916] 2008, chapter 9).

The vagueness is apparent in the sound descriptors applied to the creatures' sounds. The imprecision is important because the author's imagination thus engages the reader's imagination, forcing us to attempt to conjure up the sounds themselves with varying degrees of success. It might not be possible to judge what a 'maniacal' sound is solely from the reading let alone to attempt to so anthropomorphize the hyena (but Disney successfully do this in, for example, *The Lion King* [Allers and Minkoff 1994]) but, from personal experience, 'maniacal' is an apt description of the 'laughter' of hyenas and so, for me, the hyenas become very present in the reading of the story. Here is an example where what might be vague given lack of experience, is actually ambiguous in allowing the resolution through experience of the words 'maniacal voice' into a sound.

Burroughs seems very fond of the adjective 'uncanny' when applied to sound and it appears several times in the same book – "From the lips of the ape-man came a weird, uncanny sound" ([1916] 2008, chapter 8) and "He was afraid of the jungle; uncanny noises that were indeed frightful came forth from its recesses" (chapter 20) – as well as other publications such as *Tarzan and the Jewels of Opar* ([1918] 2008) – "Again came the uncanny sound from the thick verdure beyond the camp" (chapter 23). Those sounds that are strange and mysterious (possessing what Jentsch describes as a 'psychical uncertainty' [Jentsch [1906] 1997]) have a further aura of vagueness about them because of their unfamiliarity and lack of referential anchor; the sound that is deep or loud, while vague, is less so than the uncanny sound because 'uncanny' cannot be related by the reader directly to parameters of sound (however, for suggestions on how to design uncanny sound, see Grimshaw 2009).

<2>Ambiguity

Fundamental to digitalization is the rooting out of ambiguity.⁴ In the context of music, Martin Knakkegaard has alluded to this when discussing the digital material that is the foundation of digitally produced music and sound. Digital bits, as either 1s or 0s, "are organized in arrays that consist solely of the simplest possible difference: something or nothing" (2016, 64). Thus, digital bits preclude ambiguity, and, in their on-off quantization, they are paradoxically unquantized; they can exist only as a 0 or a 1 and this state is not dependent on the conditions and contexts in which they are observed. They are entirely unambiguous and, strung together as nybbles, bytes, kilobytes, megabytes, and so on – ultimately as digital audio files – they retain that unambiguousness until they are sounded. The process of their sounding as sound waves, though, validates the laws of physics in a self-referential framework of thinking because the sound waves are produced by a technology that is itself beholden to those same unambiguous laws. Thus, "the system's description of reality becomes true" (Bowker and Leigh Star 2000, 49).

Knakkegaard references Heidegger by describing the uncovering of nature made possible by technology, this uncovering being a process created and driven by humans: the uncovering is ordered and, in its ordering, "is co-shaping our concept and understanding of what is uncovered and ordered [there is] a formatting that the exercise of any technique applies to what is uncovered and made available" (2016, 65). With digital technique, though, Knakkegaard suggests that the nature of the digital traps what could be uncovered and that only the formatting is made manifest (66). This mirrors H.G. Wells' thinking in that what is there to be uncovered is never actually uncovered. What is hidden remains hidden and thus "[e]very species waggles about in its definition, every tool is loose in its handle, every scale has its individual error." Examples of this are myriad and, indeed, crop up in this handbook. In their chapter on consumer sound, Bech and Francombe (volume 2, chapter 16) describe the constitution of an expert panel for the conducting of listening tests. The initial 60 applicants are

whittled down to just 10 through a process of selection based on the close parity (or not) of sound pressure level sensing between ears and the applicants' abilities to perceive certain manipulations of standard audio material. (Other selection processes include those based on fluency and suitability to work in a team.) Furthermore, the final 10 subjects so selected are trained in the precise use of a vocabulary for the description of audio parameters and changes in those parameters. Thus, the consumer is delivered audio technology designed within a framework that can neither be apprehended nor comprehended by, through extrapolation, 5/6ths of the consuming public. This seems more than a little absurd but is perhaps perfectly understandable given the audio industry's fetishization of audio quality (beyond that quality normally graspable in everyday consumer usage) and the requirements of the modern world for the mass production of one-size-fits-all artifacts. More interesting to my thinking here, though, is the design of the listening test specifications in order to eliminate the listener's imagination through the objectification and quantification of that imagination (see Walther-Hansen, this volume, chapter 23, where these listening tests are discussed further). The purpose of the listening tests is to aid in the design of audio products by "the objectification and quantification of the consumer's imagination with respect to the audio signal."⁵ This is initially manifested in the requirement to straitjacket the panel subjects' vocabularies when describing the quality of the audio and so to limit the use of descriptors and metaphors that, in themselves, precisely display each individual's capacity to imagine different qualities to those required in the listening tests. My contention is that ambiguity that provokes the imagination. The implicit result of the selection of subjects for the listening tests described above is not so much the objectification and quantification of the imagination – thereby neutering it – but to remove ambiguity from the imagination equation in order to ensure that subjects' answers conform to a pre-determined framework.

You are woken in the small hours of the night by a scraping and tapping sound from somewhere within your home. As you struggle to waking consciousness and pull the bedcovers closer

under your chin, the use of imagination to make sense of the mysterious sound is an attempt to resolve several cases of ambiguity that are inherent in the initial apprehension of the sound. Does it presage a threat or not? If the sound is indeed a harbinger of some danger lurking a few rooms away, is it a thief or, worse, an axe-wielding murderer? Such ambiguity in the sounding of sound is, of course, beloved of sound designers working on horror films and survival horror computer games (while I have above already mentioned their use in literary fiction). It is usually stimulated through one modality – the auditory modality in this case – because the use of further modalities leads to a speedier resolution of the ambiguities faced by the listener and thus little time is available for the imaginations of the spectator or player to delve deep into the darker recesses of their fears. Nevertheless, even in multimodal contexts, I would suggest that the resolution of ambiguity plays an important role in allowing the mind to imagine which of several possibilities might be the actuality. A car horn sounds as you stop walking and turn to cross the street. You imagine it could be the driver throwing a friendly greeting to an acquaintance strolling on the pavement beside you or it could be that the driver is warning you not to step onto the street at this present moment. The quick use of the visual modality confirms the former scenario and so you continue safely on your way across the street. (For more on the essential ambiguity of sound, see Seán Street, this volume, chapter 20.)

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The resolution of ambiguity through a process of imagining what the external world might be and then selecting the best-case scenario plays a role in the experience of presence in that world and the conception of self as distinct from that world, no less so than it does in the perception of objects and events from which sound waves emanate. In my other chapter in this handbook, I have suggested that presence arises from an individuation of the self from nonself and that this is contingent on the creation of a perceptual environment that is selected from one of many perceptual hypotheses as to

the provenance and relationship between stimuli sensed from the salient world. One can explain this in terms of the resolution of ambiguity. In this model, and using sound as the exemplar, a hypothesis that is an imagining of the salient world around our selves is assembled as a possible resolution to the ambiguity presented by individual sounds and collections of sounds. This is tested for its potential to aid in the differentiation of self from nonself (i.e., salient world); if found to be insufficient to form the environment (that would result from this differentiation) in which to be present (necessary to our functioning and survival in that world), an alternate hypothesis is assembled in an attempt to resolve the ambiguity in the context of continuing external stimuli. Vagueness comes into play as the unstable substrate that keeps us questing; testing and probing the external world in the quest for resolution and one's place in that world.

And so on until the ambiguity is successfully resolved with the creation of a workable environment as a close and usable perceptual model of the salient world. It is important to note that the speedy resolution of ambiguous sounds is aided by input from other perceptual modalities. And this works for other sensory ambiguities too: the risk posed by the sight of a car moving towards the pedestrian on the street is assessed not only in the context of visual images but with the aid too of the car's engine noise (e.g., speed, acceleration, and so on) and the sound of the tires (often heard above the sound of the engine and with a loudness and quality dependent on factors such as the surface of the road). Furthermore, it is important to note that the auditory modality is, with the visual modality, one of the means by which we locate objects in the world and hence our selves in relation to them. The process of localization of sound, that is, the process of fixing the sound we perceive onto likely sound wave sources, forms part of the disambiguation of sound that is necessary to our sense of presence in the world whether that be the actual world or the virtual world of a computer game.

<1>Concluding Remarks

In 2017, I attended the Audio Mostly conference in London. One of the keynote speakers gave a presentation on her efforts to use Artificial Intelligence (AI) to produce music. When I asked why she thought this would be a worthwhile project to pursue, "well," the answer came back "then everyone can create music like Bach, Mozart, or Beethoven." Leaving aside the obvious rejoinder (duly made to no further comment) that there would then be no value in being a Bach, a Mozart, or a Beethoven, the speaker makes the mistake – all too common to those attempting the production of artistic artifacts through AI – of confusing what it is to create and what it is to be creative. Producing a pastiche of the Große Fuge through the aid of AI is indeed an act of creation in the sense of making something that did not exist before but it is not an act of creativity in that what is produced is not new in form and/or structure and therefore has no potential to be seminal for the future direction of composition. And it certainly does not make one a Beethoven. Computer languages, fundamental to the programming of AI software, are designed to remove vagueness and ambiguity. Indeed, as pointed out above, in being digital, there is an even more fundamental precision and unambiguity to them; they are incapable of being ambiguous, let alone vague, and are thus ultimately incapable of producing ambiguity in the end products they are designed for. A work of art needs a certain vagueness and inherent ambiguity to it in order to provoke the imagination and to resolve it into thoughts, ideas, and new beginnings.

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¹ For example, <http://www.statisticbrain.com/human-body-statistics/>. Accessed October 3, 2017.

² <http://www.mayoclinic.org/healthy-lifestyle/fitness/expert-answers/heart-rate/faq-20057979>.

Accessed October 3, 2017.

³ <http://www.topendsports.com/testing/heart-rate-resting-chart.htm>. Accessed October 3, 2017.

⁴ Ambiguity is fundamental to many forms of humor (cf. Groucho Marx's comment about shooting an elephant in his pajamas) and so one could make the remark that digitalization is not a particularly amusing topic. I trust the reader will indulge me here.

⁵ Here, 'imagination' is used in the sense of to form an auditory image as in an auditory experience. Thus, imagination includes not only the auditory imaging of the original sound wave but the imagining of, for example, the acoustic environment in which that sound wave was propagated. Bech and Francombe describe the Quantitative Descriptive Analysis (QDA) method for experiential research: "QDA is one of the basic methods in sensory analysis of food or sound quality; it addresses and controls the complex influence of an individual listener's expectations, mood, previous experiences, and so on in an experimental context."