'Human understanding' in imagining and organising sound: some implications of John Locke's Essay for ecological, cognitive and embodied approaches to composition

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We discuss John Locke's ideas in his essay of 1690 on sound and its cognition and relation to bodily motion. The ideas have interesting implications for the construction of organised sound. We argue that our ecological and statistical experience of sounds in our natural (and man-made) environment is in several respects critical for our choices as soundsmiths and our impressions as listeners. Sonic repetition, both sensory and imag(in)ed, contributes to that environment. Input sounds may be 'coupled' to output sounds; and in some cases the physical processes generating sound and the cognitive processes of receiving them are joined. As music technologists we may think of the computer, our sonic vehicle, as a joined bodily sonic-prosthesis. 'Simple' sonic ideas may associate with each other through shared biological bases, and become tools for creation of 'complex' ideas, as Locke cogitates. Furthermore, we now have new routes towards such complex sounds, including our computer prostheses.

1. INTRODUCTION

While John Locke wrote 'An Essay Concerning Human Understanding' over three hundred years ago (in 1690; abbreviated as HU hereafter), his philosophy remains pertinent, and provides a fascinating point of comparison with contemporary views, particularly on the relationship of sound composition and cognitive science. For instance, his work begins with an extensive assertion that 'Neither Principles nor Ideas Are Innate' (Book 1). Indeed, Locke is focused on the origin 'Of Ideas' (Book 2), and on the phenomenon of signification in language and 'Of Words' (Book 3). He concludes his essay ('Of Knowledge and Probability', Book 4) by considering how the perception and association of ideas shape human understanding. Locke is broad in his reflection on human experience and agency in a multifaceted environment, including the world of sound.

No doubt most composers or improvisers have an interpretation of their own sonic creation, whether or not they anticipate its affective impact on others. But do we consider sufficiently what is likely to be cognitively accessible to a listener to our organised soundwork? To what degree is accessibility dependent on each person's ecological exposure to environmental sound and its association with stimuli of varied biological significance? John Locke's thoughts focus initially on the relationship between words and sounds, but his ideas have broad relevance to human interpretation of organised sound.

In Locke's widely shared view, a word is only significant by association, and hence so is its sound: 'a man who reads or hears with attention and understanding, takes little notice of the characters or sounds, but of the ideas that are excited in him by them' (HU, Book 2, ch. IX, paragraph 9). In this description, the sound of a word in a non-existent or unfamiliar language is not significant (or rather, does not signify) to us. 'For words being but empty sounds, any further than they are signs of our ideas, we cannot but assent to them as they correspond to those ideas we have, but no further than that' (Book 1, ch. I, paragraph 23). Sounds may be associated with specific objects, yet have no name (or associated word): 'The particular ringing sound there is in gold, distinct from the sound of other bodies, has no particular name annexed to it, no more than the particular yellow that belongs to that metal' (Book 3, ch. XI, paragraph 21). This historical notion can be compared to more contemporary work (Godøy 2001) which emphasises the ecological association of perceived and imagined sound with sound-producing objects.

Contemporary organised sound suggests in addition that speech prosody, or more broadly, the sonic organisation of unfamiliar or constructed words and sounds may be affective, even if it does not signify 'thoughts' in Locke's sense. Arguably, Locke has foreshadowed this too, for sounds generally: 'sounds and some tangible qualities fail not to solicit their proper senses, and force an entrance to the mind' (Book 2, ch. I, paragraph 6); and for sounded but not necessarily known or shared words: 'For since sounds are voluntary and indifferent signs of any ideas, a man may use what words he pleases to signify his own ideas to himself: and there will be no imperfection in them, if he constantly use the same sign for the same idea: for then he cannot fail of having his meaning understood, wherein consists the right use and perfection of

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language' (Book 3, ch. IX, paragraph 2). Such an implicit (or deconstructed) distinction between transmitting affect and expressing thoughts and meaning is apparent throughout Locke's essay.

So what major themes about organised sound does Locke, viewed through a prism of three hundred years of musical change, invite us to consider and apply? And what can we learn from them today? There are 189 references in HU to sound*, 127 to hear*, 24 to danc* but only 3 to music* (where the asterisk indicates a wildcard). Most references to sound* are about the 'soundness' of arguments, which reminds us that perhaps to be able to express something in sound is to convey conviction. How can one indeed organise sound and music so that it takes on such conviction? We should note that the word 'sound' has at least two different etymological roots, 'sonus' (Latin) meaning sound, and 'sund' (from German words such as gesund) meaning healthy. 'Convincing' sound may be in some sense 'healthy'.

We will consider Locke's thoughts on sound, its perception and cognition, its relation to bodily motion, and their possible implications for how we organise sound. We note first the influence of context on the perception of environmental sounds. That context may include the sounds we make ourselves, and it leads to the view that our ecological and statistical experience of sounds in our natural (and man-made) environment may be very important for our choices as soundsmiths, be it unconsciously, and equally, important for the degree of cognitive impact the sounds have on listeners. Sonic repetition is important for recognition, amongst other components of cognition, and imag(in)ing sounds contributes to the occurrence of their impact, and hence their apprehension. More broadly, input sounds may be tightly or more loosely 'coupled' to output sounds; for example, bodily movements may be invited by a rhythmic input, and in turn contribute sound (as with dancers or musicians in some circumstances). In such embodiment of sound the physical processes generating sound and the cognitive processes are joined. In this light, as music technologists we may find it useful on occasion to consider the computer, our sonic vehicle, as a bodily sonic-prosthesis. 'Simple' sonic ideas may become associated with each other through shared biological bases, and then be tools for the creation of 'complex' ideas, but we may now have new and additional routes towards such complex sounds, including our computer prostheses.

In order to complement the emphasis of the journal on composition and aesthetics, we particularly outline aspects of the recent literature on cognition of sound, but we give some pointers to key literature in acoustic ecology, notably the diverse review book by Augoyard and Torgue (2006). This book, from the CRESSON research group in Grenoble, provides a valuable entry into the world of acoustic communication and the ideas of R. Murray Schafer, Barry Truax and the Canadian soundscape artists, and equally to the French sound object and sonic effect tradition stemming from Pierre Schaeffer. We quote liberally from Locke, to conjure some of the flavour and sound(ness) of his thought. We hope it is obvious that our commentary is by no means intended to be exhaustive, rather gently provocative.

2. PERCEIVING THE ORGANISATION OF SOUND

'As the bodies that surround us do diversely affect our organs, the mind is forced to receive the impressions; and cannot avoid the perception of those ideas that are annexed to them' (Book 2, ch. I, paragraph 25). Here Locke is emphasising what he terms the 'passive' understanding of 'simple ideas'. In contemporary terms, he outlines an ecological approach to perception, whereby 'what is important is to consider what is *directly specified* by environmental information – not what a perceiving organism can interpret in, or construct from, a stimulus' (Clarke 2005: 20–1). In a complementary vein, Windsor is interested in ecological approaches to the perception of electroacoustic music, and emphasises that even in the absence of an identifiable sound source, 'it is hard to escape the human propensity to search for meaning in relation to the known environment' (Windsor 1997: 81). However, arguably no sound is directly 'specified' by environmental information, though it may be directly determined by it. Few sounds are absolutely specific to a particular environment, since multiple components of ambiguous origins contribute to most sounds. Furthermore, sounds may now be synthesised by our own efforts, sometimes with the aid of our computer prostheses as well as our potentially noisy body parts.

Locke goes on to argue that some ideas are more readily retained than others, and that repeated exposure to one idea rather than another will tend to fix it in the mind. He introduces the notion that multiple and different ways of receiving information will help in its retention: 'Concerning the ideas themselves, it is easy to remark, that those that are oftenest refreshed (amongst which are those that are conveyed into the mind by more ways than one) by a frequent return of the objects of actions that produce them, fix themselves best in the memory, and remain clearest and longest there' (Book 2, ch. X, paragraph 6). By extension, the information specified by our sonic environment, and to which we are most frequently exposed and via multiple senses, is the most readily perceived and retained.

Conversely, clearly we can habituate to continuous environmental sounds, such that we notice only a drastic change in them (wind, noise, humming water systems, light bulb sounds, etc.), such as the 'cut-out', 'a sudden drop in intensity associated with an abrupt change in spectral envelope … or … moving

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from reverberant to dull spaces …' (Augoyard and Torgue 2006).

> How often may a man observe in himself, that whilst his mind is intently employed in the contemplation of some objects, and curiously surveying some ideas that are there, it takes no notice of impressions of sounding bodies made upon the organ of hearing, with the same alteration that uses to be for the producing the idea of sound (*sic*)? A sufficient impulse there may be on the organ; but it not reaching the observation of the mind, there follows no perception: and though the motion that uses to produce the idea of sound be made in the ear, yet no sound is heard. Want of sensation, in this case, is not through any defect in the organ, or that the man's ears are less affected than at other times when he does hear: but that which uses to produce the idea, though conveyed in by the usual organ, not being taken notice of in the understanding, and so imprinting no idea in the mind, there follows no sensation. So that wherever there is sense or perception, there some idea is actually produced, and present in the understanding. (Book 2, ch. IX, paragraph 4)

Thus Locke acknowledges the active nature of perception insofar as we listen for and attend to those sound events that are pertinent to us. In extension of Locke, perhaps we habituate most readily to those sounds whose physical sources we are not aware of through any additional sensory modality. This proposition arises from the argument that we are more likely to attend to a physical presence within our visual range, and conversely to habituate to a source which poses a less immediate threat. However, research on intersensory redundancy suggests that three-month-old infants show no difference in their rate of habituation to bimodal (audio-visual) or unimodal (audio or visual) stimuli, even though they discriminate tempo better under bimodal conditions (Bahrick *et al.* 2002). Adult propensities may differ, and further investigation is required. So, are sounds divorced from an obvious physical source potentially powerful in new organised sound contexts? The practice of laptop sound improvisation (Reddell 2003), based heavily on complex noise sources and their manipulation, and a core topic of this journal (Fell 2001), would suggest so.

This raises again the question whether environmental sounds in particular are inevitably heard as part of an attempt to identify a source, and/or to explain a process or action which constitutes their origin. As Locke argues, 'What I have said concerning colours and smells may be understood also of tastes and sounds, and other the like sensible qualities; which, whatever reality we by mistake attribute to them, are in truth nothing in the objects themselves, but powers to produce various sensations in us; and depend on those primary qualities, viz., bulk, figure, texture, and motion of parts as I have said' (Book 2, ch. VIII, paragraph 14). And again: 'We are so far from knowing what figure, size, or motion of parts produce a yellow colour, a sweet taste, or a sharp sound, that we can by no means conceive how any size, figure, or motion of any particles, can possibly produce in us the idea of any colour, taste, or sound whatsoever: there is no conceivable connexion between the one and the other' (Book 4, ch. III, paragraph 13). Biological considerations suggest that if a sound can both be heard and readily explained, it can be identified as with or without danger to the perceiving organism. A sound which cannot be readily explained might well be dangerous, and initially demands enhanced attention. 'Take away the sensation of them; let not the eyes see light or colours, nor the ears hear sounds; let the palate not taste, nor the nose smell; and all colours, tastes, odours, and sounds, as they are such particular ideas, vanish and cease, and are reduced to their causes, i.e., bulk, figure, and motion of parts' (Book 2, ch. VIII, paragraph 17). 'It is evident that the bulk, figure, and motion of several bodies about us produce in us several sensations, as of colours, sounds, tastes, smells, pleasure, and pain, etc. These mechanical affections of bodies having no affinity at all with those ideas they produce in us, (there being no conceivable connexion between any impulse of any sort of body and any perception of a colour or smell which we find in our minds,) we can have no distinct knowledge of such operations beyond our experience' (Book 4, ch. III, paragraph 28).

So Locke suggests we may be unable to identify such 'bodies' from their sounds unless we have already experienced the relation. The question is how often such environmental 'inexplicable' sounds exist and how well we apply our relational knowledge to their perception. Seminal research by Warren and Verbrugge (Warren 1984) demonstrates that listeners accurately distinguish bouncing from breaking sounds even when using 'inexplicable' stimuli with minimal spectral information. Another question is whether 'inexplicable' sounds too are objects of habituation once familiar. Little empirical data is available on this (though many studies on habituation in the auditory modality do use artificial stimuli, such as computer-generated tones, which are biologically 'inexplicable'). The implications for organised sound remain to be understood and fully exploited.

A creative and empirical challenge here concerns the relation between environmental sound exposure and, as Locke puts it, 'refreshing' (renewing) sonic ideas which may also be used within music. The relationship between the statistics of exposure to simple musical tone sequences and our ability to organise them in memory and recognise them has been studied by Saffran (Saffran 1996, 1999) and others. But similar studies using more complex tones remain to be undertaken, though the ability to identify complex environmental sounds (or simplified auditory icons) does seem also to depend on frequencies of prior exposure (Ballas 1993), as well as their salience to events of biological

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importance. The corollary that environmental sonic structures might have much broader relevance to the construction of organised sound than solely to works of acoustic ecology invites much further attention (Gaver 1993; Coward 2004).

3. IMAG(IN)ING SOUND WITHOUT HEARING IT (BUT AFTER HEARING A RELATIVE)

If one can (re)cognise a sound, then one can usually imagine it again. Locke's concern with perception as fundamental to human understanding leads him to reflect upon whether it is necessary to first perceive environmental events through the senses before being able to form mental impressions of them. He states that 'only the qualities that affect the senses are imaginable' (Book 2, ch. II, paragraph 3), and that 'to imprint anything on the mind without the mind's perceiving it, seems to me hardly intelligible' (Book 1, ch. I, paragraph 5). 'I would have any one try to fancy any taste which had never affected his palate (…) and when he can do this, I will also conclude that a blind man hath ideas of colours, and a deaf man true distinct notions of sounds' (Book 2, ch. II, paragraph 2). This sequential relationship implied from the experience of perception to a subsequent mental image of it has implications for the mental representation of sound for those who have either very little or extensive exposure to sound. Locke himself observes that children (and illiterate people) 'have received least impression from foreign opinions'.

The relatively recently discovered phenomenon of blindsight (see discussion in Humphrey (2006)) is in no way inconsistent with the idea that sounds can be imagined once they have been heard, but it may provide a counter to the argument of a temporal succession between conscious perception and creation of a mental image. Blindsight is the phenomenon observed in monkeys and humans lacking a visual cortex in which they are conventionally blind, yet able to detect the position of objects around them without sound or other non-visual modalities. In his book *Seeing Red*, Nicholas Humphrey goes as far as to suggest that 'sensation' (the creation of a mental image of a particular sensory input) may be a separate pathway from perceiving that input, and to present an evolutionary scenario which might generate this situation. This might well explain why imag(in)ing sound seems to be so common (Bailes, in press), and presumably, biologically important. It suggests a range of empirical questions, notably some to do with sonic imagery in deaf people, about which Locke expressed some serious doubt: 'any more than a man who, not being blind or deaf, has distinct ideas of the colour of scarlet and the sound of a trumpet, could discourse concerning scarlet colour with the blind man I mentioned in another place, who fancied that the idea of scarlet was like the sound of a trumpet' (Book II, ch. IV, paragraph 4).

It is clear that while we are exposed to vast amounts of sensory information, this is selectively attended to and retained in memory as a consequence of perceptual and cognitive mechanisms. When it comes to sound (unlike vision), the ear does not close, but may not hear. It is accepted in contemporary science that perception is mediated by our pre-conceptions in the form of cognitive schemata or mental maps based on accumulated knowledge of our environment. In this view, a pre-existing mental image of a particular sound organisation, for example, will guide the subsequent perception of a similar sequence of sounds. Locke was among the first to acknowledge this, by discussing the re-cognition involved in listening (Schneider 2001). Moreover, he emphasised re-cognition even in the absence of listening, as in the generation of a memory for an event. He writes that the 'laying up of ideas in the repository of the memory signifies no more but this, – that the mind has a power in many cases to revive perceptions which it has once had' (Book 2, ch. X, paragraph 2). He expresses a sophisticated notion that 'our ideas are said to be in our memories, when indeed they are actually nowhere; – but only there is an ability in the mind when it will to revive them again, and as it were paint them anew on itself, though some with more, some with less difficulty; some more lively, and others more obscurely' (*ibid.*). He writes that if ideas are not renewed, 'by repeated exercise of the senses or reflection on those kinds of objects which at first occasioned them, the print wears out, and at last there remains nothing to be seen' (Book 2, ch. X, paragraph 5). As we have already suggested, applying this metaphor to memory for sounds, and even auditory imagery, has implications for our grasp of sonic organisation, namely that familiarity and environmental exposure are key to our cognition and consequently our perception of sound. Locke refers to remembering as 'secondary perception' (Book 2, ch. X, paragraph 7), which can be viewed as a notable parallel to the arguments of Humphrey concerning sensation, and comments that there are different means of remembering related to the intention or otherwise (active or passive) to recall. For example, in a 'passive' state, we might recall ideas ('dormant pictures') unintentionally, as in the experience of earworms or having a 'tune on the brain' (Bailes, in press). Alternatively, Locke writes that 'the mind very often sets itself on work in search of some hidden idea' (Book 2, ch. X, paragraph 7), as in deliberately recalling sound in the mental rehearsal of a performing musician, or endogenously creating new sound combinations in the activities of a composer or sound artist.

4. MENTAL ASSOCIATION AND THE FORMATION OF COMPLEX IDEAS

Locke has profound comments about the formation of new ideas in sound or otherwise. Arguing against the

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concept of innate principles, he distinguishes between simple and complex ideas, and suggests that they originate in external stimuli. Complex ideas are composed of simple ideas, and 'it is not in the power of the most exalted wit, or enlarged understanding (…) to invent or frame one new simple idea in the mind, not taken in by the ways before mentioned' (Book 2, ch. II, paragraph 2). Here again the emphasis is on the primordial nature of an individual's experience of their sensory environment in furnishing the ingredients for complex thought. Moreover, the frequency and strength of environmental experience is postulated to impact on the creation of an individual's corresponding mental representation. Locke is writing about 'children, idiots, savages, and the grossly illiterate' when he states that 'their notions are few and narrow, borrowed only from those objects they have had most to do with, and which have made upon their senses the frequentest and strongest impressions' (Book 1, ch. I, paragraph 27).

Locke is concerned with how ideas, once received, come to be associated with each other. He uses sound to illustrate how reinforcing an association creates signification. For instance, he argues that 'there comes, by constant use, to be such a connexion between certain sounds and the ideas they stand for, that the names heard, almost as readily excite certain ideas as if the objects themselves, which are apt to produce them, did actually affect the senses. Which is manifestly so in all obvious sensible qualities, and in all substances that frequently and familiarly occur to us' (Book 3, ch. II, paragraph 6). The strength of associations established through habit can be such that conscious attention is no longer required. The example Locke provides is of a musician imagin(in)g or playing a familiar tune: 'A musician used to any tune will find that, let it but once begin in his head, the ideas of the several notes of it will follow one another orderly in his understanding, without any care or attention, as regularly as his fingers move orderly over the keys of the organ to play out the tune he has begun, though his unattentive thoughts be elsewhere a wandering' (Book 2, ch. XXXIII, paragraph 6). The apparent simplicity of this action for the musician belies the repetition or practice required to forge these associations. Of interest in Locke's argument here is the notion that sounds come to be associated in their organisation sufficiently for this to occur involuntarily. Furthermore, he suggests that not only the sensation of the sounds (in Humphrey's sense of the word, distinct from perception), but also the physical actions involved in generating them may be imagined and involuntary. It is important to note that Locke is describing both associations between sound and objects or events, and between groups of sounds themselves. Current theory on statistical learning and its power in guiding our interpretation of the segmental structure of music, even unfamiliar music, is coherent with this (e.g. Pearce and Wiggins 2006).

The contemporary concept of mirror neurons and their possible importance in young children learning to appreciate and reproduce the actions and intentions of others, supports Locke's contention of couplings between sound and physical actions. Mirror neurons are claimed to fire in response to observing someone undertaking an action with which one is familiar, and this process may help embody the action for future use by the observer. By extension, sound may sometimes trigger processes analogous to those the listener has previously experienced when generating a similar sound.

5. SOUND AND CONSEQUENT BODILY ACTION: BIRDS; THE MUSICAL PERFORMER; THE DANCER

Locke also comments on the potentially reciprocal relation between bodily movements and sound. Clearly, body movement can generate sound, and some parts of the body are specialised for sound production. One of Locke's ideas is that certain (informationally significant) sounds may entrain a response in which further sounds are generated.

> For, though I should grant sound may mechanically cause a certain motion of the animal spirits in the brains of those birds, whilst the tune is actually playing; and that motion may be continued on to the muscles of the wings, and so the bird mechanically be driven away by certain noises, because this may tend to the bird's preservation; yet that can never be supposed a reason why it should cause mechanically – either whilst the tune is playing, much less after it has ceased – such a motion of the organs in the bird's voice as should conform it to the notes of a foreign sound, which imitation can be of no use to the bird's preservation. But, which is more, it cannot with any appearance of reason be supposed (much less proved) that birds, without sense and memory, can approach their notes nearer and nearer by degrees to a tune played yesterday; which if they have no idea of in their memory, is now nowhere, nor can be a pattern for them to imitate, or which any repeated essays can bring them nearer to. Since there is no reason why the sound of a pipe should leave traces in their brains, which, not at first, but by their after-endeavours, should produce the like sounds; and why the sounds they make themselves, should not make traces which they should follow, as well as those of the pipe, is impossible to conceive. (Book 2, ch. X, paragraph 10)

Locke thus implies at least tangentially that incoming functional sounds may excite outgoing functional sounds, in some cases with a shared mechanical intermediary, giving examples amongst birds, and other animals. He goes on to imply that humans retain elements of this pathway. Vocalised verbal conversation is an obvious adaptation of such a pathway, albeit

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specialised by use of language. But if mirror neurons constitute a pathway that is shared between perceiving incoming sound and generating outgoing actions, then regardless of the extent to which human sounds are produced in response to an organised sonic input, the input-output pathways nevertheless may be reciprocally engaged. Note that these input and output sounds might not solely be vocalisations, but might also include percussive sounds, such as clapping, or a range of noises based on bodily frictions. Furthermore, such an input-output embodied coupling also might serve to enhance the 'refreshing' of the mind's 'print' concerning the particular sonic idea.

These input-output couplings are particularly relevant to dancing, which seems broadly to require musicality and which clearly makes sound based on interaction between parts of the body and the environment, quite separate from the vocal tract. Thus input sound may not only drive bodily action, but also bodily sound output. Of a musician playing, Locke contends, as we noted above: 'the tune he has begun … though his unattentive thoughts be elsewhere a wandering. Whether the natural cause of these ideas, as well as of that regular dancing of his fingers be the motion of his animal spirits, I will not determine, how probable soever, by this instance, it appears to be so: but this may help us a little to conceive of intellectual habits, and of the tying together of ideas' (Book 2, ch. XXXIII, paragraph 6). But Locke hesitates to tie dancing with singing, or 'powers' with each other more generally:

> Powers are relations, not agents. I grant, that this or that actual thought may be the occasion of volition, or exercising the power a man has to choose; or the actual choice of the mind, the cause of actual thinking on this or that thing: as the actual singing of such a tune may be the cause of dancing such a dance, and the actual dancing of such a dance the occasion of singing such a tune. But in all these it is not one power that operates on another: but it is the mind that operates, and exerts these powers; it is the man that does the action; it is the agent that has power, or is able to do. For powers are relations, not agents: and that which has the power or not the power to operate, is that alone which is or is not free, and not the power itself. For freedom, or not freedom, can belong to nothing but what has or has not a power to act. (Book 2, ch. XXI, paragraph 19)

So for Locke, the mind is the articulating site for powers; and for us, a computer-prosthesis may also articulate. Locke leaves open the broader possibility of the body, embodiment, as articulation beyond and not just of the mind. Some contemporary improvisers use the body as their creative site, and many of us use the computer or the instrument as a bodily extension for this purpose of organising sound, at the very least in its realisation, but often also in its creation.

6. CONCLUSION: CREATING AND ORGANISING SOUNDS

We have already mentioned Locke's writings on the association of ideas. He dares to describe the deliberate invention of a new idea, which could be a 'sound' composition, the assembly of a 'complex idea' from constituent parts (or 'simple ideas'). For instance, an invention is the 'voluntary putting together of several simple ideas in our own mind'. 'Sounds also, besides the distinct cries of birds and beasts, are modified by diversity of notes of different length put together, which make that complex idea called a tune, which a musician may have in his mind when he hears or makes no sound at all, by reflecting on the ideas of those sounds, so put together silently in his own fancy' (Book 2, ch. XVIII, paragraph 3).

In comparison with 'good and evil', music is a 'more simple' pleasure (Book 2, ch. XX, paragraph 18). Locke emphasises the arbitrariness of musical 'connexion made by custom. … This strong combination of ideas, not allied by nature, the mind makes in itself either voluntarily or by chance; and hence it comes in different men to be very different, according to their different inclinations, education, interests, etc.' (Book 2, ch. XXXIII, paragraph 6). An encouraging sonic vista, and even better, one within the mind, and one influenced by statistical learning, and the ecology of environmental and imagined sound attributes.

As composers, soundsmiths, and 'organisers of sound', we currently add one complement to this fundamentally optimistic idea of sonic creativity developed by John Locke: that of discovery of sound, in the environment, or by sonic manipulation of instruments such as the computer. Contemporary views of creativity in a post-structuralist intellectual context emphasise that idea and structure can be found, made and most importantly, chosen. Choice may be made by ransacking observed or generated sounds, which may have been made randomly or systematically. This is true for sound, and similarly for language in the long era since Gertrude Stein and the LANGUAGE poets. As Attali (1977) suggests, certain 'composition' of sounds can herald the future of our societies. And in saying this, he focused on novel and humanly generated sounds, not those within pre-existent conventional (and cognitively pre-digested) frameworks. We have argued that NoiseSpeech, a sphere of sound generation in which we operate, and which involves sounds which generate a 'sensation' of deriving from speech (though no words are intelligible) is a recent realisation of such 'composition' (Dean 2005). Contemporary organised sound has unparalleled opportunity for creating 'new' and 'complex' ideas by the application of algorithmic 'simple ideas' in tandem and in collision, to bring out statistical patterns that may not have occurred ecologically. Let us hope

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that Locke would have been drawn to our current efforts as soundsmiths.

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