KIMA: Noise Map -
Participatory online art exploring the effect of noise on health

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Figure 1: KIMA Noise at Tate Modern, 2019

KIMA: Noise is a participatory art work by the Analema Group originally exhibited as a site-specific installation at Tate Modern: The artwork invites audiences to explore the impact of urban noises interactively through 360 sound installation, via drawing an ambisonic sound trajectory - a virtual sound walk. Using specific urban sound sources, the audience experiences urban noise as spatial soundscapes, responding to it, and physically engaging and interacting with it. Intended to raise awareness of the phenomenon of noise pollution, the project was reimagined as part of the AHRC-funded p_ART_icipate research project on the effect of participatory online art on health and wellbeing. In this sense, KIMA: Noise not only raises awareness of the effect of noise on health, but also interrogates the effect of participatory art on wellbeing, and social connectedness.

The KIMA: Noise Map forms part of this research goal exploring the function of digital, online art interventions in fostering social connectedness. The KIMA: Noise Map is an online interface for global users to concurrently interconnect and stream their noise-scapes from all around the globe. Participatory and playfully, any participant can draw their own sound-walks, interactive sound trajectories created as digital drawing, while listening to ambisonic sound streams that are responding in real-time. Within the context of the p_ART_icipate project, led by the University of Greenwich, CNWL NHS Foundation Trust and Brunel University, KIMA: Noise case study looks at design, facilitation strategies of participatory art online, while highlighting the awareness building and impact generating potential of community based art forms. This paper looks at preeminent research in the field of noise, social sculpture, and arts participation, as well as introducing the KIMA: Noise project technically and conceptually.

Keywords: Participatory Art. Social Connectedness. Noise. Public Health. Art and Health.

Figure 2: *Evgenia Emets, David Negrao at Tate Modern, 2019*

1. INTRODUCTION

Devised by the Analema Group in 2019, KIMA: Noise was first exhibited at Maxilla Space in North Kensington, London as a site specific installation. Located directly under the Westway, the art and studio space, is affected directly by noise pollution in one of London's noisiest urban areas. Daytime pollution from the car traffic often exceeds 80db, affecting local residents and visitors alike.

The artwork was designed as a participatory experience, whereby interactants playfully design their own soundscapes consisting of real-time sound inputs from their direct environment. Building on research that shows the effect of perceived control over noise over mid- and long-term physiological consequences, participants maintain a degree of control over the soundscapes, by selecting different sources and then using a touchpad to draw their own soundwalks:

These lines are then sonified as a 360 soundscape that can be explored in real-time. The sound moves across the space following the drawn lines, surrounding participants in what can be seen as a sound sculpture (Leitner). After piloting at Maxilla space following a residency in September 2019, the project was then shown at Tate Modern in November 2019, accompanied by large scale projection works projected onto the windows of the Tate Exchange. Seen by almost 2,000 people across 4 days, the artwork stimulated a discourse on noise and health among community members, public stakeholders including representatives of the Department for Environment, Food and Rural Affairs (DEFRA) and the public. The Head of Tate Exchange acknowledges that Analema Group's KIMA: "Noise at Tate Modern addressed local, national and international audiences by focussing on noise pollution across Southwark Council." (Courage 2020).

The Department for Environment, Food & Rural Affairs (DEFRA), who have "overall lead responsibility for policy on noise management in England" acknowledge the important role of this research in raising awareness of the health effects associated with noise amongst the general public. They state that, "participatory art such as KIMA: Noise is so important […] as it communicates through a different medium to those traditionally employed by Government, and can therefore broaden the scope of public debate and help to inform policy decisions related to impacts of sound and noise".
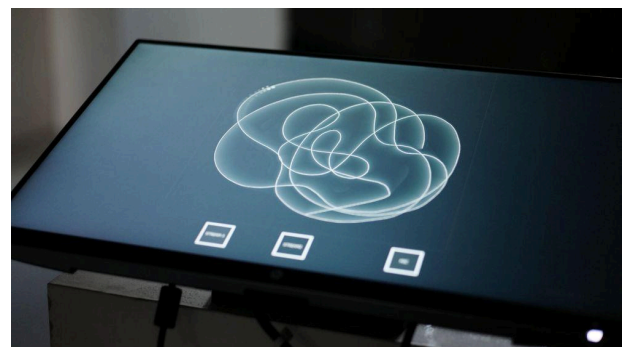
Figure 3: *KIMA: Noise at Tate Modern, 2019*

2. THEORETICAL GROUNDING

Noise is rather unique in so far as it exists at the nexus of subjectivity and objectivity, a seemingly indescribable, unknowable, disagreeable material that sits between the individual and the Other. It is shared only, perhaps, by our sense of smell - a direct transgression of the boundaries of the body - a phenomenon produced outside of our self that literally vibrates within us. By this token, we find in noise an inescapable connection with others, even as its very presence highlights our separation from them. On the one hand, noise is subjective - one person's perceived symphony is another one's subjective experience of a scratching chalkboard. The delineation of definition between what constitutes sound, noise, and music, remains indeterminate and murky at best. On the other hand, noise is an entirely concrete, objective concern, and physiologically measurable: However much you may personally cherish the sound of a jet engine, it is capable of producing lasting and measurable damage to those who witness it at close range (Haines, Stansfeld et al 2002). We might even consider noise as a case for an ontological rebuke to the philosophy of the individual so central to modern thought. Noise can be seen as critical evidence that the notion of a fully autonomous individual, detached from the confines of their community, is demonstrably impossible and false.

The primacy of subjectivity - your love of jet engines versus my love of silence, and the social battle that ensues - collapses upon the reality that, as with the physiological response to noise, objectivity reigns and gives way to a primacy of inter-subjectivity (Passerini 2017). As Garret Kiezer points out, the notion that noise is subjective suggests 'it is all in your head', that we, as individuals, construct our own realities. Subjectivity, however, as Kiezer so succinctly points out, 'does not make you go deaf' (Kiezer, 2012, p.31).

Noise might even be considered as a bridge between objectivity and subjectivity, the world brought into the subject, beyond the will of the individual. As such, it is perhaps not simply a sonic phenomena, but shared viscerally as an objective measurable soundscape. The fact that one cannot shut out another one's noise, that it breaches one's boundaries, that it might damage us, re-enforces the reality of social responsibility:

"Noise brings a heightened awareness of your connection to other people. Your happiness and wellbeing are seemingly at odds with their happiness and wellbeing, but only because, on the deepest social level, your happiness and wellbeing are connected to theirs. You may not be interested in neighbourhood, but neighbourhood is interested in you." (Kiezer, 2012, p.20).

Building upon the work of the World Soundscape Project, noise is framed as a vital social issue due to its impact on well-being, especially within urban environments. The domination of a small number of intrusive or loud sounds results in what R. Murray Schafer termed a 'lo-fi' soundscape (Schafer 1994): whilst noise itself is not an implicitly negative phenomenon, prolonged noise exposure often is. The European Environment Agency estimates that 67 million people in the EU are regularly exposed to decibel levels that exceed safe guidelines for both our hearing and our cardiovascular health (Prochinik 2010), with traffic being the biggest culprit. Though we may mentally adapt to such an omnipotent sound environment (Lyle 1997), our physiology is somewhat less flexible in the face or urban noise, resulting in a situation where "our behaviour, unconsciously or no, reflects the bodily failure to adjust" (Prochinik 2010).

Excessive noise exposure can have a pronounced physiological effect, interrupting everything from sleep patterns and immune systems (Ermolaev & Katalinic 2017), to educational outcomes (Kiezer 2012), and causing a range of negative health outcomes including raised blood pressure and myocardial infarction (Basner et al. 2014), and cardiometabolic morbidity and mortality (Elmenhorst et al. 2019). Despite this, our conscious experience of noise is highly culturally mediated. Numerous studies have shown that physiological disturbance and perceived annoyance do not closely correlate: a 2016 study exploring the effect of urban noise on sleep found participants were more likely to cite aircraft noise as a disturbance than car traffic, despite the latter being both more frequent and louder: suggesting that "objective sleep quality and noise annoyance are not related" (Elmenhorst et a.l 2019).
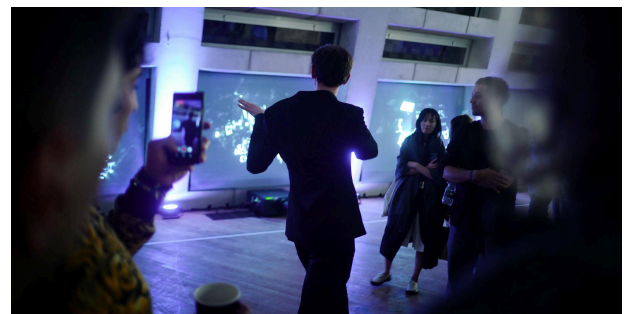

Figure 4: *Oliver Gingrich and David Negrao with KIMA Noise at Tate Modern, 2019*

3. Line-making as a process of social and ecological engagement

With KIMA: Noise, our aim is to re-establish a sense of control over noise, both by raising awareness of its effects, and through direct interaction with the art installation and active engagement. Echoing Murray Schafer's credo that 'Noise pollution results when man does not listen carefully', the project seeks to deconstruct the "noises" around us, in order to create new awareness and engagement with urban sounds. Such a movement towards ecological awareness as a form of creative practice has a rich history, not least in the social sculpture work of Joseph Beuys. Beuys suggested that a deliberate engagement with one's environment amounted not to observing objects or 'things' but rather lifecycles, a position in which perception merely abstracts moments from a longer process. What is more, for Beuys there was little difference between creative practices and social practices, since art-making is an 'evolutionary force' geared towards reimaging the individual's engagement with their ecology, a practice that 'relates to the social organism's capacity for life" (Beuys, 2007, p.22).

Operating at the nexus of soundwalking and land-art, KIMA: Noise reimagines the process of aurally traversing one's environment through the medium of line-making. Drawing upon the historical precedent of line-making as a means of creatively documenting movement, ecological engagement, and process - an approach exemplified by Richard Long's 'A Line Made By Walking' (1967) - the project imagines the production of lines as the production of potentiality. Participants are not only encouraged to physically explore their environment, but to make connections between their own walked environments and those of other users in other locations. In contrast to traditional map-reading - in which 'lines, drawn across the surface of the cartographic map signify occupation, not habitation' (Ingold, 2007, p.85), the lines drawn in KIMA: Noise do not lead to destinations, but reveal new potentialities as the participants digitally share the sound of their lived environments. The map is not a surface by which participants can make their way expediently to a predetermined destination, but a canvas to be explored. Such an articulation allows for new forms of digital presence, with participants sharing and collaborating on imagined journeys through their landscape. By doing so, the geo-dislocation that typically acts as a barrier in such technologically-mediated communication becomes a font of creativity - the distance between collaborators acting as a space of resonance, the method by which, as the philosopher Jean-Luc Nancy suggested, sound can extend and re-sound, taking on new meaning as it grows with the resonance of others (Nancy, 2007).
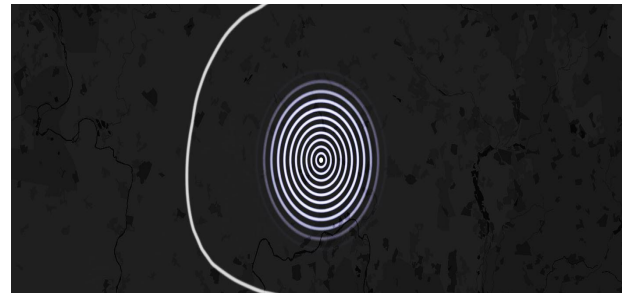
Figure 5: KIMA: Noise Map - 2023 by the Analema Group

4. Methodology and development

Building on the success of the original installation, in 2023, the Analema Group's initial application was redesigned for a participatory, online context, as per the remit of broader p_ART_icipate project. Within its design there was a balance between ease of use and aesthetic appeal. The KIMA: Noise map is by no means the first application to use a digital map to highlight or navigate environmental sound - where it deviates, however, is in its focus on liveness. Whilst precursors such as soundaroundyou.com allow users to listen to, and upload their own recordings of their real-world location, soundaroundyou is not a real-time process. There is no interaction with other participants, save for the after-the-fact audition of their recordings and notes. Such an approach necessitates a pragmatic and utilitarian aesthetic - users can identify specific locations on a traditional map, zooming in to reveal specific countries, cities, streets and other such geographical specificities. In contrast, KIMA: Noise prioritises a more creative, if less specific form of geographic engagement. Rendered in black, blue and grey, and without common identifiers (city names, street markings), the landscape is more akin to semi-abstract shapes and shadings, with the lines of nature - its shores and rivers - providing the strongest definition. Rather than serving as a map in the traditional sense - a tool for arriving at predetermined destinations - the KIMA: Noise aesthetic encourages exploration. It is a surface to be both traversed and written by the participants, a surface defined by the vectorisation of the lines laid upon it, as is the manner of a canvas that only becomes meaningful through creative interaction (Klee, in Ingold 2007). Designed by the Analema Group, and developed with its visual coders Marc S. David and Gaelle Berton, its design invites participants to deprioritise the traditional boundaries and borders of a map, and in doing so to draw new, impossible and imagined pathways between other living participants in real-time. Initial development stages considered the transience of such connections - should lines disappear after they have been made? Or fade over time? Experimenting with different

approaches, it was conceived that lines would last only until a new line was drawn by the participant, but that they could easily be saved and downloaded if desired, thereby resulting in lasting legacy of the otherwise transient experience of a sound-walk.

5. User testing and facilitation

The Kima: Noise map was user-tested in several contexts. Working with student groups at both Greenwich and Brunel University, the project's aims were presented to cohorts of between 5 and 20 studying animation and graphic design (Greenwich) and arts therapy (Brunel). Two sessions were held at each site, run to a similar format. The project aims were discussed and the preliminary work presented, before participants were invited to try out the application for themselves. The user tests had two main aims: to discover how participants engaged with the phenomenon of urban noise, and to discover how the application might encourage deeper or more nuanced engagement on the subject. Additionally, the sessions allowed us to gather technical feedback to improve the overall user experience. Engaging in a process of limited co-design, testers were encouraged to suggest direct improvements to the usability of the application, with a particular focus on minimising any technical frustrations that may occur, and improving accessibility for the widest range of possible participants. This co-design extended to the aesthetic aspects of the application, with researchers seeking to explore how the existing aesthetic contributed to both the enjoyment of the experience, and the fostering of creative potential (in terms of the lines and connections participants are inclined to produce).

Through the utility of pre- and post questionnaires, alongside structured discussions, the researchers sought to determine the degree to which the conceptual and philosophical presumptions that underpinned the research were borne out by participants' real-world experiences. As the wider p_ART_icipate research project is concerned with the relationship between digital art interventions and social-connectedness, the research team sought to uncover how a focus on communal line-making in this context might develop such connectedness. From a research perspective, social connection was framed as a multifaceted and complex phenomenon involving both an embodied relationship to one's local community or what might more accurately be described as their social ecology, as conceptualised in the systems theory of Niklas Luhmann (2000), and the digitally-mediated connection to other participants within the app. By overlapping these two forms of connectedness, researchers anticipated the

emergence of resonate questions emerge regarding the nature of physical vs. digital communities, (tele)presence, conceptual and physical distance, and the affordance of prioritising walking and line-making as a means of re-imagining the social in contemporary contexts. As such, the pre-intervention framing drew upon these terminologies, and the post-intervention discussion sought to further unpick their meaning in regard to users' own unique experiences. Such discussions innately risked positioning noise as a negative phenomenon, and effort was made to consider any positive affordances of noise. The pre- and post questionnaires were worded to frame the experience of noise as both potentially comforting and discomforting, whilst simultaneously highlighting the concept of 'lo-fi' sound environments via a focus on both dominant sounds and expected but ultimately absent sounds.
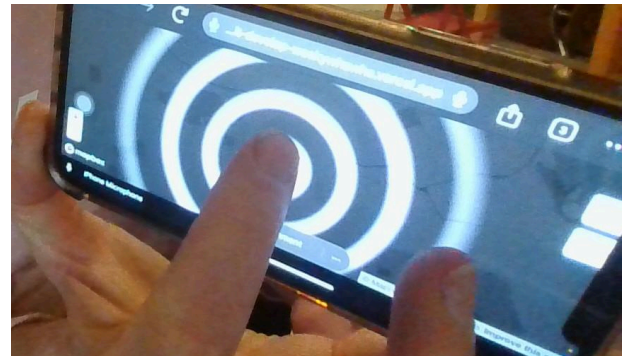
Figure 6: *iPhone user testing of KIMA Noise by the Analema Group*

Lastly, and by extension of its remit of social-connectivity, user-testing explored how engagement with the application affected the health and well-being of its participants. Whereas prior p_ART_icipate projects have explored the capacity for art to improve health and well-being through increased social connectedness, KIMA: Noise extended this investigation. Through our discussions we sought to determine how urban noise impacts upon the lives of participants, and how the application might provide them with a framework by which to better engage with the issue. By asking participants to describe their existing relationship to noise - and to avoid an explicitly negative framing of the phenomena - we were able to develop a thematic analysis of their experiences.

Working in collaboration with the Royal Borough of Greenwich, our research sought to discover whether participatory art can contribute to a public discourse, how local and technologically-mediated collaboration can make participants feel closer to one another and their communities. The application draws upon the specific health and well-being attributes of noise as a social, economical and

perceptual phenomenon. Given the ongoing research around noise pollution, the user tests attempted to determine how such a tool might assist participants to both better engage with their lived soundscape, and to take on a more active and autonomous role in both contributing and improving the sound world in which they live. Working in collaboration with scientist Prof Stephen Stansfeld and the Royal Borough of Greenwich, participants were invited to follow up the user testings by contributing to an urban noise awareness campaign, to be presented at local galleries.

Given that the ultimate aim is for KIMA: Noise to be a free-standing online application, user testing was equally a means of exploring the nature of the facilitation required to ensure productive utility of the application. The purpose of such facilitation is two-fold: in the first instance to work out what aspect of the user-experience can be streamlined so as to negate the requirement of facilitation in the long-term, and in the second to assess how it meets its goals of addressing primary concerns regarding social connectedness, ecological awareness, and improved health and well-being.

As part of the project framing, students at Greenwich were introduced to the work of both the research teams and the local council's noise abatement team, as well as experts from the field of urban noise. Following this, a short 10 question pre-questionnaire was used to ascertain participants' current experiences of noise, as well as their existing sense of connection to their environment and ecological awareness. Participants were asked to express their perceived connection to the local community, as well as to other participants using the application at the same time as them. Similarly, they were asked to reflect on their own current relationship to noise - are there dominant sounds that disturb them, or which they enjoy? What do they expect to hear within the local community? How aware are they of their lived sound environment?

After the KIMA: Noise intervention, participants were asked to further reflect on these topics, including whether, having focussed on the environment, their expectations were met. Equally, students were encouraged to consider if using the application, and as such taking some control of their sonic experiences, changed their general sense of autonomy and power concerning urban noise in general. Given the subjective component of noise, it was important to provide the conditions for meaningful self-reflection. Participants were asked to self-report (via the questionnaires), and their observations were contextualised through the specific prism of their experience. Our research was conducted that though many of their experiences would correlate with the broader

population, there would nonetheless be aspects of their experience - residing in London, shared student accommodation, an existing interest in health and wellbeing - that may result in the requirement for a more nuanced reading in light of our chosen demographic.

6. ANALYSIS

The thematic analysis was conducted on two levels across a cohort of n=14 at University of Greenwich and n=5 at Brunel University: firstly to determine the emergence of common themes; secondly, to determine the mood or context relating to those themes. As expected - in part due to the negative cultural connotation of noise - pre- survey responses frame noise as an overwhelmingly negative affair, with twice as many (10) participants describing it in negative terms than positive (5). However, respondents were more likely to be indifferent (6) to the phenomena than to view it positively. Interestingly, post- surveys painted a rather different picture: asked to consider levels of comfort or discomfort relating to noise, negative responses were halved (5) after using the app, whilst both indifference and positive readings marginally increased (8, 6). Although working with a limited number of participants, these results nonetheless suggest that using the application might provide users with a sense of control or autonomy over their soundworld, thus reducing overtly negative connotations - a finding that would correlate with much of our initial research (Kiezer, 2012). Notably, traffic noise was alone in bucking this trend, with self-reporting of negative experiences increasing by a third after using the app.

Likewise, the noise of other people was raised as a significant cause of discomfort prior to the intervention (5), but afterwards was mentioned only by one participant in these terms. What was initially a mostly negative reading of the sound of others - articulated by 'shouting', 'partying', and 'waking', alongside 'soothing' and 'reassuring' - took on a more neutral character afterwards. Participants offered a nuanced reading on the affordances of the app to foster social connection, suggesting that the technology involved hindered natural communication, and resulted in them feeling both 'distracted and connected' in equal measure. It was noted that the app succeeded in heightening awareness of urban noise, even whilst it reduced the number of negative responses.

Participants were asked to reflect on their anticipation of noise and their actual experience of it within the app. Eschewing negative/positive connotations, participants considered instead what sounds were most prevalent. Unsurprisingly, traffic was both most anticipated and most experienced

during the application (11, 11), closely followed by people (9, 5). It was interesting to note the anticipation here was greater than the experience, as well as the descriptors more passive ('talking' rather than 'shouting'). Likewise, there was a significant anticipation of industrial or construction sounds (8), yet only 2 participants mentioned actually hearing any during the length of the intervention. In contrast, several sound sources were not anticipated, but experienced - notably nature sounds, architecture (in the form of reflection and reverberation), and the noise of the app itself.

Whilst useful on an indicative level, this analysis is limited by several factors (that can be improved upon in future user tests): the relatively small number of participants (<20), the limited time using the app (<10 minutes), and more structured facilitation (particularly around digitally-mediated social connection) would all be hugely beneficial.
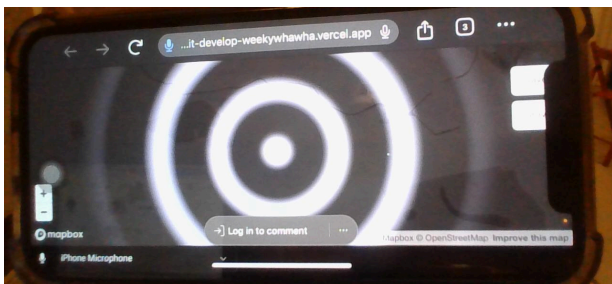
Figure 7: *iPhone user testing of KIMA: Noise by the Analema Group*

3. Conclusion

Just as Beuys argued that art-making can act as preparation for real-world ecological engagement, KIMA: Noise not only opens its participants up to the real-world issues of noise pollution and noise abatement, but draws literally and imagined lines between their bodies and their communities. New communities are created, as meeting points of globally dispersed collaborators within the application; and existing communities are explored with the physical body, their affordances reimagined through a focus on the aural, rather than ocular sense. In this way, interventions of this manner eschew any (already questionable) baggage of 'art for art's sake', and instead engage with the world through an embodied interrogation of the political possibility of sound. As Solome Voeglin (2019) suggests, such a conception of sound making as an affective, change-making practice, is deeply tied to auralities incorporeal roots. For Voeglin, sound invokes imagination - the desire to conjure an often indistinct or obfuscated line

between source and audition, an affordance that enables us to position 'sound and listening as generative and innovative intensities in the space of the political in order to probe their potential for an exploration of politics and to try to imagine and effect its transformation' (Voeglin, 2019, p.17). We might further argue that noise in particular points towards the political. As Kiezer suggests, noise is a 'weak' issue (Kiezer, 2012, p.4), in so far as it disproportionately affects the politically weak - it is a signifier of a greater power imbalance within a given community. Pointing out that the word volume concerns both amplitude and occupation of space, Keizer argues that the production of noise is invariably a manifestation of power - whether that is power stations or powerful cars - and to be affected by noise is to be subject to another's power over your body. Not only do the less powerful have less control over noise - neither owning factories nor harbouring the political clout to constrain them - but they are equally subject to the noise of others with greater intensity. The impoverished are more likely to live with persistent noise issues, with cheaper neighbourhoods located closer to train tracks and flightpaths, and their houses likely to be closer together and built with thinner walls (Kiezer, 2012, p.56).

Against this backdrop, the function of KIMA: Noise might be considered as a means to return power to the weak - to enable those affected by urban noise to both engage ecologically and creatively with their soundscape. Through the creative act of line-making, undertaken across both the digital and the physical realm, and engaging directly with both local and the geo-dispersed communities, includes participants as collaborators within a shared soundworld. In doing so, it seeks to ignite the imagination as agency - by empowering participants to share, extend, manipulate and reframe their sound environment, KIMA: Noise offers new affordances, wherein its users can begin to take on an active role in reshaping urban noise through a new found creative agency.

3. References

Basner, M., Babisch, W., Davis, A., Brink, M., Clark, C., Janssen, S., & Stansfeld, S. (2014). Auditory and non-auditory effects of noise on health. The lancet, 383(9925), 1325-1332.

Beuys, J. & Harlan, V. (2007) What is Art?: Conversation with Joseph Beuys. Tim Ingold. Lines: A Brief History. 2007.

Clark, C., Sbihi, H., Tamburic, L., Brauer, M., Frank, L. D., and Davies, H. W. (2017) Association of long-term exposure to transportation noise and traffic-related air pollution with the incidence of diabetes: A prospective cohort study. Environmental Health Perspectives, 125(8), pp. 087025. DOI: 10.1289/EHP1279

Cohen, S., and Lezak, A. (1977) Noise and inattentiveness to social cues, Environment and Behaviour, 9, pp.559–572.

Cohen, S. (1980) Cognitive Processes as Determinants of Stress. In: I. Sarason and C. Speilberger (eds.), Stress and Anxiety Vol VII, Washington, DC, Hemisphere Press.

Donnerstein, E., & Wilson, D. W. (1976). Effects of noise and perceived control on ongoing and subsequent aggressive behavior. Journal of Personality and Social Psychology, 34(5), 774.

Ermolaev, A., & Katalinic, B. (2017, January). Methods of Evaluating Noise Pollution in the Megalopolis. In Proceedings of the 28th DAAAM International Symposium (Vol. 926, p. 929).

Elmenhorst EM, Griefahn B, Rolny V, Basner M. (2019). Comparing the Effects of Road, Railway, and Aircraft Noise on Sleep: Exposure-Response Relationships from Pooled Data of Three Laboratory Studies. Int J Environ Res Public Health.

Forns, J., Dadvand, P., Foraster, M., Alvarez-Pedrerol, M., Rivas, I., López-Vicente, M., ... & Sunyer, J. (2016). Traffic-related air pollution, noise at school, and behavioral problems in Barcelona schoolchildren: a cross-sectional study. Environmental health perspectives, 124(4), 529-535.

Guski, R., Schreckenberg, D., & Schuemer, R. (2017). WHO environmental noise guidelines for the European region: A systematic review on environmental noise and annoyance. International journal of environmental research and public health, 14(12), 1539.

Nancy, J.-L. (2007). Listening. New York, NY: Fordham University Press.

Keizer, G (1994) The Unwanted Sound of Everything We Want, 2012, Public Affairs

R. Murray Schafer. Soundscape: Our Sonic Environment and the Tuning of the World

1994.

Haines, M. M., Stansfeld, S. A., Head, J., & Job, R. F. S. (2002). Multilevel modelling of aircraft noise on performance tests in schools around Heathrow Airport London. Journal of Epidemiology & Community Health, 56(2), 139-144.

Ingold, T. (2007). Lines. A Brief History. London. Routledge.

Prochnik, G. (2010). In Pursuit of Silence. Anchor Books, New York.

Konecni, V. J. (1975). Annoyance, type and duration of postannoyance activity, and aggression: The" cathartic effect.". Journal of Experimental Psychology: General, 104(1), 76.

Korte, C., and Grant, R. (1980) Traffic Noise, Environmental Awareness, and Pedestrian Behaviour, Environment and Behaviour, 12, pp.408–420.

Lj, K. S. (2017). Noise, sources of noise and its influence on the quality of work and living environment. Vojnotehnički glasnik, 65(4), 1017-1026.

Long, R. (1967) 'A Line Made By Walking'. Installation.

Luhmann, N. (2000). Art as a Social System. [online] Translated by E.M. Knodt. Stanford University Press. Stanford: Stanford University Press.

Lyle, D. (1997). A review of health effects of aircraft noise. Australian and New Zealand Journal of Public Health, vol 21, no.2.

Milgram, S. (1970) The Experience of Living in Cities, Science, 13, pp.1461–1468.

Page, R. A. (1974) Noise and helping behaviour. Environment and Behaviour, 9, pp.311–334.

Passerini, Luisa. Memory and Utopia: the Primacy of Inter-subjectivity. Routledge, 2017.

Sherrod, D. R., and Downs, R. (1974) Environmental determinants of altruism: The effect of stimulus overload and perceived control on helping. Journal of Experimental Social Psychology, 10, pp.468–479.

Stansfeld, S., Haines, M., & Brown, B. (2000). Noise and health in the urban environment. Reviews on environmental health, 15(1-2), 43-82.

Stansfeld, S. A., Berglund B., Clark C., LopezBarrio I., Fischer P., Ohrstrom E., et al. (2005) Aircraft and road traffic noise and children's cognition and health: a cross–national study. Lancet 2005;365(9475), pp.1942–1949.

Stansfeld, S., and Clark, C. (2012) Future environmental noise and health research needs for policy. The Journal of the Acoustical Society of America, 131(4), p.3295.

Voegelin, S. (2019). The Political Possibility of Sound. Bloomsbury.

Wrightson, K. (2000). An introduction to acoustic ecology. Soundscape: The journal of acoustic ecology, 1(1), 10-13.