

AURAL MAPS. NEURAL FUTURES.

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ABSTRACT

If the mental objects of philosophy, art, and science ... have a place it will be in the deepest synaptic fissures, in the hiatuses, intervals, and mean-times of the non-objectifiable brain, in a place where to go in search of them will be to create.¹

It would be fair to assume that developing the sonification of neurological data would add to our knowledge of the mind. Taking the above quote seriously, however, implies that this addition would also be a creation.

This paper is concerned with the relation of scientific and artistic processes in an effort to aurally map the mind. In particular, it is concerned with the affect of this relation on the design processes needed to develop such a method. It will suggest that the mind listening to itself is productively scientific and creative.

1. INTRODUCTION

To look at the way science and design practices may work together to create an aural map it is necessary to briefly look at the relation of mind to brain. It is taken for granted that the brain's ability is to think: The brain provides the functioning material substrate for thought. At present, the functioning of this material is scientifically mapped in predominantly visual and textual form. These textual and visual maps claim to represent the given functioning of the brain's capacity for thought, which includes its neural plasticity, or ability to form and create new connections and pathways. On this model, a change in mapping parameters should *extend* these maps. Sonification should usefully reveal what can't be accessed by visual and textual method alone. This is true. To a certain extent. There is also certain reflexivity that resonates with the mind listening to itself, or in fact the mind mapping itself at all, that limits its claim to self-revelation. To map the mind sets up a reflexive process where the map itself is arguably an act of the thought. To explore this idea, this paper will first examine the way in which a map of the brain can be said to be an activity of thought. It will then look at the implications of this notion through a change to mapping techniques such as proposed by sonification. From these resulting implications,

attention will then be turned to the role of creative processes as they affect the method of designing aural maps for scientific purposes.

2. THOUGHT

Embedded in the idea of a map mind mapped to itself, is the idea that there can be no way of going beyond this process to access the brain beyond the reaches of thought. The first point to be made simply, if still a little cryptically, from this idea is that there is no brain listening behind the mind.² What this means is that there is no map of the brain outside of thought. *Any model that we develop is an act of thought rather than a place beyond our minds to which we can refer.* We can never leave our own thinking: There is no mental exit: No place from which stand back and listen to ourselves: No distance between our ideas of the brain and our mind. To make this idea more concrete let's take the example of "a subject" listening to a piece of music. A piece of music is played to a subject and a range of neural processes takes place in response. Someway then has to be developed to code the processes that occur. We use sound. As yet, no comprehensive aural map of the mind exists. It is something that we must develop. We set about designing a map. And a map is produced. (If only it was so easy) Simply, and provisionally put, this resulting map is new thought by virtue of having been developed. And by consequence of having been newly thought it can be said not to be revealing what already exists.³ What is an aural map that has not been previously developed if not a new form of thought?

The related point to be made here is that not being able to go beyond the listening mind to the brain is not just a problem of the researcher not being able to subject themselves. Even in the standard scientific approach when someone else is the subject, the development of an aural map results in new thought. Once developed, a new map of the brain is new thought for us all, whether "the subject" contributed anything more than listening. But this is about developing an aural means of mapping and doesn't address the obvious argument that all it would be doing is extending those maps already in existence. And what's more extending those maps indicating there is *a brain*: We have the visual and textual templates to prove it. This is also

true. To a certain extent. Obviously the development of an aural method would entail utilising and developing existing information. But these models of the brain are themselves a result of thought, not a result of a methodological place beyond it. Once again, they are thoughts of the brain. When developed they, like the aural maps being proposed, were thoughts that had not occurred before. There was a point when no neurological maps of this kind existed. And through painstaking and careful laboratory procedure, they were developed giving us an opportunity to think what had not been previously possible. Nevertheless, even if we concede that a map of the brain is developed through thought, it can be argued that it must occur from the material basis of our brain. To address this idea then, let's take the discussion down to the material components of the brain.

A neuron *must be* something we know apart from the models of the brain developed.⁴ Its existence is evidenced through a microscope. And a microscope allows us to see the neuron as it is, apart from our mapping techniques. In relation to the idea that thought arises from the neuron philosopher of science Isabelle Stengers says: "neurons cannot be referred to without thinking."⁵ What is the thought of a neuron? It is at once a microscopic image facilitated by staining techniques and standards, a diagram, and a word detailed by textual description. Again, what this means is that there is no access to mind beyond the procedures of thought. Even at its molecular level. It is important to note, however, that asserting that the function of the brain can only be known through the processes of the mind is not to suggest that the mind is just a cultural overlay of the brain preventing access to its material function. *It is to say that the very material function of the brain can only be known through processes of thought.* To reiterate, the upshot as far as developing neurological maps is concerned is that there is no access to the brain beyond the methods which we develop. On this account, a sound map would be the brain's idea. Of itself.

If this all still sounds as if it prohibits any possibility of knowing anything about the mind, consider the alternative. If the mind already existed, the sonification of thought would just be a case of accessing the recesses of the mind not available to the textual or visual. In other words, the map would already exist. But if it already existed, why would we have to design and develop it? We should just be able to do nothing more than find it. Its autochthonous presence would simply and completely assert itself upon our scrutiny.

If we are not just finding the map to the mind then it seems reasonable to assert that we are creating it. But this runs counter to scientific method. Science *discovers*, not creates. To say there is no access to the brain beyond the methods we create in no way threatens the empirical validity of these techniques. It just posits creative thought firmly, if not coincidentally, in its own procedures.

Simply asserting the veracity of scientific models while plonking creativity in their midst doesn't address why they maintain their empirical claim, however. Even worse, it raises a spate of disconcerting questions concerning the creative

mind and scientific practice. As a way of addressing some of these concerns, I want to look at the implications to mapping the mind by changing the technique to sound.

3. FUTURE.

What's valuable about exploring mapping the mind through sonification is that it provides another means by which thought can occur. Returning to the idea of neural plasticity will help to explain in more detail how a shift in modal technique could potentially achieve new thought. As mentioned earlier, neural plasticity is the mind's ability to create new pathways and connection. From the quote framing this paper it could be understood that neural plasticity will be the means through which potential thought occurs. This is also true. To a certain extent. Neural-plasticity is a means of explaining the way in which thought occurs. However, it is a development of thought made possible through its particular modal approach. As with the mind map to which it belongs its synaptic fissures and hiatuses are textual and visual thoughts. That is neural plasticity is a *particular* means expressing the mind's potential for thought. While it articulates the ability of the mind to think, neural plasticity should not collapse the terms through which thought may arise. To do so allocates it the role of defining the mode *through which all potential thought occurs.* Instead of the synaptic fissures and hiatuses of neural plasticity defining the potential for thought within its own terms they are more productively understood as articulating the potential to think the neurological *differently*: In this case the potential to think the neurological aurally, which is at the same time the potential to think aurally.

No claim is being made here, however, that any existing mapping techniques should be disregarded. It would be naïve to suggest that the development of aural mapping techniques would not work with existing information. It will obviously draw on and develop valuable thought of the functioning mind that we are already able to think. To underscore the point, what is being said is more than reflexive coincidence with existing methods of thought. The visual and aural won't necessarily coincide. In fact, to tap into the full potential aural of thought, it is preferable that they didn't. At its most productive aural mapping will not simply facilitate existing thought to find expression in a new mode. If that were all it did, it would be something more like a translation faithfully representing what is said in one language in to another. Except in this case, that "language" hasn't been developed yet. However, it should be noted that even the limiting of aural mapping to this type of translative activity makes no contradiction to the idea of the new: Despite the limits, an auditory map would still be new thought to the extent that it is thought occurring sonically rather than by another mode. What's more, this is the case, regardless of the stimulus provided to the mind. Even if the stimulus is visual and the method of coding the data aural, new thought can be said to occur, as this method has not yet been developed in

any comprehensive way. Working in the lab at SymbioticA, (The Art and Science Collaborative Research laboratory), this was the very means, following David Hubel's precedent that we used to ascertain what neurons were firing when we visually stimulated a subject. While simple sonic output does not make an aural map it does indicate sound can function with existing visual data. So, while the listening mind might be explicitly concerned with what it is to hear, mind function generally can be developed aurally and *listened to*. Consequently, as we design and develop new techniques it can be said that we enhance and draw on existing technique while pushing thought beyond our present limits

Acknowledging this potential push beyond present techniques allows us to futuristically ask: What does the sound of a neuron think like? The answer of course is that: We won't know until we develop the thought. And if these thoughts are not just of a neuron – itself a complex little entity – but a complex sonic architecture we can ask what the polyphonous mind thinks like. Not knowing what the sounds of the mind think like until we develop the thought indicates that aural mapping has a future.

Placing thought in the future might sound like a claim to science fiction. But it's an idea. And it can be tested. Which brings us back to empirical veracity. If there is no brain behind the listening mind, *how do we test* the validity of the aural maps we might develop? What is it that we test it against if there is no access to a *foundational*, materiality beyond our thoughts? (As distinct from no materiality.) What is the relation of scientific method and creativity, to return to the question raised earlier, if there is nothing to base our thoughts on? Aren't we just creating our own minds? And if so where's the empirical validity in that? For science, empirical validity is tested through the repeatability of results, ruling out error and imagination. Recognising that mapping techniques are not separate from our minds, and the development of new techniques gives rise to new thoughts in no way threatens this method. Why should it? Science *effectively* does it all the time. That scientific method has already developed these maps for its own highly functional use – for example brain surgery and the development of neural prosthesis – is more than enough evidence of its accurate functionality. What's more, that the functioning materiality of the brain is a process of thought that can be scientifically detailed and applied is an index of its particular success as an empirical method. If science can develop empirical results while acknowledging that there is no brain beyond the listening mind what has creativity go to do with it? Earlier, I said that creativity was firmly placed within science's own procedures?

Far from being a misdirected musing now demanding retraction and having no bearing on the practicalities of developing an aural map, the reflexivity of the mind and its techniques for thought have consequences for how we think about artistic practices in relation to scientific method and design. It has consequences for how we develop our minds.

4. METHOD

What scientific method may gain from artistic practice is what it's best at: Creativity. Aesthetic practices may be generally referred to – particularly, but not exclusively in the twentieth century – as creatively developing sensory expression. (Bearing in mind of course that art doesn't do this out of nothing, but as a negotiation of the terms of its own practices, and frequently those of others.) This is evidenced in both its visual and aural forms. As the aural is of concern here let's go with sound. Think Blues. Think Jazz. Think Pop. Think Electronic. Think Experimental. Think the Mother-Ship has landed. Think whatever you like. Think what hasn't been thought before: Think something else. It might go without saying but I'm saying it anyway: Until developed none of these forms would exist. Developing them, however, doesn't lead to their immediate or resounding reception. In fact, often it leads to a complete lack of understanding, even disdain. (A response that could be interpreted, particularly in the light of what is being suggested in this paper: as an inability to hear – or see – in the manner created.) And this lack of understanding it is not necessarily restricted to those outside the field. Ornette Coleman says of his developing contribution to the sound of jazz: “... most musicians didn't want to play with me; they said I didn't know the changes and was out of tune.”⁶ Now, Coleman may simply not have been able to play. But the fact that he contributed to jazz by developing it in the terms he created indicates it was not a matter of technical incompetence but a change in the means of creative aural thought preventing the ready acceptance of his sound. Coleman is not the only example of an artist that develops an aesthetic mode not immediately accepted within the terms of its existing practice. Instead, the lag in acceptance seems to typify creative practice. If a lag in the acceptance of practice is the case, it would appear to put a caveat on the earlier assertion that a change in technique is change for all. What is remarkable is that over time a collective ability to hear Coleman's sound occurs. It is not challenging, let alone disturbing, (for most – there are always those who prefer a good old pastoral, but that's not the point) to listen to him play. That his sound was not immediately understood, is a productive aspect of the creative practice (although by no means the only one.) It has the potential to change our ability to think. Creatively.

Creative artistic practice, though, is not science. Art doesn't test or repeat for veracity or necessarily have an interest in functional application. (Apart from those specifically functional fields such as architecture for example, or aural design.) It creates new modes of expression. Rather than being antithetical to science, the ability to create new modes of expression is particularly valuable science. That is, it is particularly valuable to a practice aimed at developing a new thought of mind. Through the creative ability to develop new forms of expression, the reflexive movement between developing aural maps and thought extends to the relation between science and creativity. When science tests for repeatability of results, it risks closing down its

methods into standards of design that don't allow for the productive capability of thought in this process. If the mind's ability is to think, and if it occurs in more than one register, (the scientific, and the artistic in this case), then this potential should be constituent of any map of the mind. The reflexive process of the listening mind listening to itself takes on a particularly productive power on this account. It has the power to develop thought as it listens to the aural developments of its mind. If the mind's ability to think new thought is to productively render itself, then this remarkable ability demands keeping the design process as open as possible: It means keeping it open to artistic practices. It means keeping it open to the thoughts that occur while listening to our own aural creations. It means keeping it open to forms of expression and mapping that may be not readily recognisable or immediately comfortable. In other words, the more open the process is the more we can think, and the more we can think, the more we take account of the brain's remarkable ability for scientific thought and creativity.

5. CONCLUSION.

To effectively map the mind's ability to think, both scientifically and creatively it is necessary to keep the methodological process as open as possible to new thought. Science might not be creative. But the mind is.

6 REFERENCES

- ¹ Gilles Deleuze and Felix Guattari, *What is Philosophy*, Verso, London and New York, 1994, p 209.
- ² This is a modification of Paul Bains' assertion following Paul Ruyer that there is no brain behind the brain. See Paul Bains. "Subjectless Subjectivities," in *A Shock to Thought: Expression After Deleuze and Guattari*, (Ed) B. Massumi, Routledge, London, 2002. (pg. 108)
- ³ Although differing in a number of key ways to what I am presenting here cognitive scientist Andy Clark makes a similar point about the way in which our minds occur through the accumulation of thought and practices, rather than being found in any pre-existent form. See A. Clark, *Being There: Putting, Brain, Body, and World Together Again*. MIT Press, Cambridge, M.A. 1997. (pg. 220)
- ⁴ Also see Bains 2003, on quantum models of the mind that would challenge a stable atomic entity comprising the brain's material substrate. (pg. 112)
- ⁵ I. Stengers. Unpublished presentation, *Biophilosophy and the Politics of Life*, Humanities Research Centre, Australian National University 28th of July 2003.
- ⁶ O. Coleman. Quoted by N. Hentoff, liner notes to *Something Else: The Music of Ornette Coleman*, 1958.