

Bee-ing Human Collective Diary

The Bee-ing Human team met regularly throughout the project, usually every month or two, and we wrote a collective diary in the first two years. Below we share some of our entries, starting with the first meeting. Writing a diary together proved a helpful tool to get started. Being so open and so direct also helped us bond as a group; it created trust and understanding, and it made it easier for us to negotiate differences. Our discussions also gave us some good ideas to follow up, as well as being very enjoyable.

Below is the instruction we agreed on at the start of the project:

Each of us will take 5-10 mins to reflect on what felt significant in our discussion. We are recording the process of collaborating and building our hive.

YEAR 1

15th September 2022

Tiago

It felt just like the first meeting we ever had. Lots of ideas, lots of possible points of contact, and a few practical outputs. I am really excited about this. But I am also a little fearful about losing the sense of possibility as we go through the ups and downs of research. I'm beginning to think about the practicalities of the project from my side: how do I record and transmit our excitement to an audience digitally? I am conscious that a lot of my contributions today asked each of you to expose aspects of your research and working methods that you might not be comfortable with, but to me that's a very interesting prospect (and I don't plan on being a passive observer of such sharing).

Magnus

This was a fascinatingly diverse group of scholars, creating possibilities for new kinds of conversation. With the team in place it felt timely for us to get stuck in and start looking at actual stuff but without foreclosing the outcomes by ploughing the usual furrows. Hopefully we'll get the time to step back from the specifics of the material so we can think openly about how the threads might all connect together. One also becomes very bee-aware, especially in terms of spotting bee stories in the news, thanks to this project.

Balu

We definitely had a great discussion. From Butler's madrigal and his observations on bees to how we will test the emotion-like states of bees in the laboratory. One idea that was shaped during the discussion is how the sounds (vibrations) made by bees affect their interactions. This idea needs further refinement and some observational data before it can be tested out in the lab. Also, I got an idea about the types of data that

should be collected during the experiments which could potentially contribute towards the goal of the project.

Vivek

- Breadth of the project and all the new learning
- The ballooning almost unwieldy form of the project that we need to revel in
- Ideas of presentation and communication: moving beyond blogs to find new ways
- Styles of talking, ways of engaging each other
- Shared worlds
- Types of data and how each of us use them
- Getting to know each other beyond the project

Bennett

What do I feel? A certain excitement combined with some anxiety about my role in the project. It was quite a relief to find that I could understand what others were saying! I'm particularly interested (beyond my role as composer) in emotion, and its various philosophical and cognitive and physiological aspects. This builds on much of my work on the 'Emotional Improvisation' fellowship I had in Graz for six months back in 2014.

The different kinds of experiments that were discussed give me a sense of collective tool-building with expertise from different directions and perspectives. Other things I am interested in: (i) materials to be creative with, both in terms of scientific, verifiable knowledge but also in terms of processes that can inform and be informed by a thing like sound recording, composition, even a sense that there is the potential that we do some practical sound or music or improvisation-based workshops at some point. (ii) The way that different perspectives act like multiple centres of gravity, holding the questions in a force field rather than closing them down, or siphoning knowledge into disciplinary silos.

I have a strong sense that this first meeting stands as the *start* of something and that it's not just a set of pre-givens that we're going to then work through - not 'work packages' in other words. I actually don't have a clear idea, as yet, what my eventual role will be, or the kinds of work I'll be doing, but I have a strong sense that I'll be able to work inside this group. I'm also really pleased to have the opportunity to work in a concrete and focused way in this extended case-study on things I've been interested in now for many years.

Jenny

What do I feel? Wonder. I can't believe this has come together and we have this diverse group of people, connecting expertise on 16th century madrigals to scientific work on bees. I often feel like this at the start of the project, but that feeling is different this time: I feel I know less but there is more to explore. I think my whole way of thinking is about to be challenged, and that I have a lot to learn. I also feel that there is huge depth to the thinking we have just done; it's humbling. What is the magic in the room? Generosity?

Olivia

What an interesting group this is; the temperaments in the room fit together in an exciting way. I thought of the missing presence of the bees. We're talking about them and about recording their 'voices', and I am imagining them. I'm aware others are imagining them differently. Our various expertise use precision tools to create different types of attention and focus. I want to listen to some madrigals and have sound in the room. And the sound of the queen's buzz and the growl/hum noises. There are different languages in the room: different animal languages, technical languages. What were early modern bees like? I want to know. We were talking about 'telling the bees', and I thought about the approach to the hive, before you can hear the bees yet, and what kind of emotional space it is.



'Telling the Bees' by Charles Napier Hemy - Tate Gallery, London, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=55891690> 'Telling the Bees'

25th October 2022

Bennett

It was very useful to hear about the finer grain of detail of the 'madrigal' from Magnus, and the accompanying hermeneutics on the text and music, and that it is the *bees* who have a song. Also the archaic dance forms etc. in the music, the galliard as a courtly dance around the queen, maybe? I need to get a better sense of the actual sounds, both of the music and also the field recordings of bees. The rehearsals and concert Magnus is planning as part of the Newcastle Early Music Festival will provide a good opportunity to collect both performances, but also to workshop material connected to the 'madrigal'. There's also the contemporary knowledge about the waggle-dance of bees, which was unknown (as far as we can tell) to Butler, but which is a rather iconic phenomenon for present-day knowledge about honey bees. Might the bees' madrigal be a dance? Use of black notes and (in modern terms) compound metre also; this *looks like* early editions of Playford's English Dancing Master (1651). Combined with the galliard rhythm of the sung text this suggests some kind of meta-dance for the bees: something to think about and experiment with. Are there maybe several 'ghosts' of dances here to be explored?

I found discussions on anthropomorphism, prompted by Vivek and Balu, stimulating; they give us rich, multidirectional series of influences on the general topic of 'emotion'.

Butler seems to have used a recorder to determine the pitches of the queen's piping. Is there a chance that the singers would have played recorders, or other instruments, rather than singing vowels? It might explain the differences in clefs used for the black note and white note sections.

Interesting that there's a typo in the third edition version of the music that looks like a treble clef C# typographic-block turned upside down - suggests recycling of blocks originally designed for a different piece - this is not the case in the second edition music.

Magnus

It's encouraging to be getting under way, with opportunities to re-meet colleagues in a conversationally congenial space. The discussion revealed meaningful points of connection between the various cells, inviting us to think both creatively and practically about how our various methodologies and mindsets interact and can inform each other. Hearing about the practicalities of how bee research is undertaken quickened the appetite to see Vivek and Balu at work in the lab. I think we're finding a way to balance the quest for concrete, measurable (and often discipline-specific) 'outputs' with the countervailing need for time to think openly and laterally about how we think. Making a transcription of *Melissomelos*, and being given the opportunity to discuss it, was (for me) a really valuable opportunity to get inside the materials - and, as usual when you transcribe, you find questions. And, yes, the word for the instrument 'recorder' apparently derives from the Latin *recordare*, to call to mind, remember or relate (a story); the first instance in English is in 1388.

Balu

It was exciting to listen to Magnus explain the madrigal and explain how it was expanded in the subsequent editions of the book. It begs the question whether the madrigal written in 1609 in the first edition was expanded with further observation from different colonies or modified versions of the original. Another interesting idea was thinking about the stories of beekeeping and bees, disconnected from scientific enthusiasm, that beekeepers across the world tell and how it connects to the common man. I am excited to see where this 'meaningful uncertainty' will take us.

Vivek

I really appreciated the immersion in a different intellectual world. It would be interesting to think of a way of capturing ideas. Some ideas that stayed with me: Magnus saying 'If you can change an opinion into algebra, it becomes science'; Bennett talking about a black market in unwanted Queen bees. I also appreciated learning more about rhetoric - as the combination of pronunciation and elocution, uniting delivery and figures of speech/ emotion. This made a connection for me with the different accents we have and the emotions they might evoke. What scientists do is a different question from asking what science is. It is interesting to think about what is lost through quantification - does it lead to a dryness in language and thought? Could we think of hypotheses as stories and of stories as models of the world? It was also interesting to think about the relationship between madrigals and the worship of queens and how the death of the queen led to madrigals fading out. There were resonances both for our current era and the death of the queen bee in the lab.

Jenny

It's really useful to hear about the work happening in different 'cells'. I want to elevate the practice parts of the project because it allows us to connect, and also because I can see Butler is learning from his own practice. There are implicit questions about the language we use - i.e. how do we describe the bumble bees we saw today (I said they looked depressed; why did I not just say they were moving slowly?). This makes me wonder about the relationship between description and analysis/ interpretation. It is really important to me that we try to understand Butler's thinking and how it evolves, and how he develops new forms for it to evolve, even as we keep track of our own evolving, thinking. The bee book we build will be the new form we develop for this project.

Tiago

Here are a few things I never thought I'd think about: a) what happens to bees who are experimental subjects when their queen dies, and what happens to the research, and most of all, I never expected to feel anything at all about it; b) how music was printed in the 17th century, the intricacies of madrigals and other forms of music, what they tell us about Butler, and how he sees his own composition; c) that there was a black market for queen bees. A couple of things that I am thinking about: can we show the different forms alluded to in the bee song? Can we use computation to compare bee notation and bee music?

Olivia

I thought about bees and error, printing errors, and error in music. In literary studies we talk about error affecting meaning in interesting ways. What are the scientific equivalents of this? Error in experiment? Linked to this I thought about the process of revision. Butler revises his text between the printed versions in ways that we are studying. What were his more local processes of revision (many of which will be – or seem to be – invisible to us now)? There are types of revision whereby you retrace the same pattern with minor variations. We find this in musical performance, in ‘repeatable experiments,’ in dance.

I also thought about proximity. The proximity of the bees for ‘emotional contagion’ in the lab. The proximity between the singers (or imagined singers) of the music in the bee book. Holding the four corners of the page. Polyphonic proximity/distance/dialogue.

Joy of complexity, and the deep-dive into the expertise of others. How do we hold the interdisciplinary space but also retain the integrity of this complexity?

22nd November 2022

Magnus

It was great to see the two editions of 1609 and 1623 side by side in colour images (so much easier on the eye than EEBO images). Also very encouraging to hear about Olivia’s and Tiago’s work on the editing, marking-up and presentation of the texts (happy echoes of ATNU).

There are so many different affordances opening up here, and the transcription looks like a real engine room for this, and a great way to bring Vivek’s and Balu’s data and methods to bear upon what we do collectively (and how we present it). Feelings of gratitude to Olivia and Tiago for doing the detailed, arduous work preparing the base text.

prolation] The relation between the time values of a semibreve and a minim, determining the rhythm of a piece of music. Cf. [measure](#) *n.* [III.17a](#). (OED2a)

Interesting discussions around Butler’s use of *prolatio* for rhetoric, from the multi-meaninged Latin *profero* (to bring forth, reveal, produce, proffer, pronounce, advance, enlarge, extend, lengthen, amplify). Paradoxically, Butler doesn’t use *prolatio* in its particular music-theoretical sense in the 1636 *Principles of Musick*. There, he describes the equivalent of compound time as, simply, ‘Tripla’ or ‘Triple Proportion’ (unlike Thomas Morley who in 1597 *does* use the vernacular term ‘prolation’). Butler read Morley, but conspicuously makes no mention of the Vitrian sense of ‘prolatio’.

I wonder how much it cost Charles Butler to get his bespoke font made for 1634.

Are Butler's initials on the 1623 frontispiece, below the image of the beehive, a pun? (i.e., 'see bee').

Jenny

When asked to pick a word or phrase from Butler, I chose 'triple time', and I recalled a conversation with a music colleague in 2022, who made the connection between 'triple time' and *prolatio* - the term that Butler chooses as a substitute for pronuntiatio (delivery) in *Rhetorica*. I also appreciated our interesting conversation about how scientists sometimes use pronouns to refer to bees. Imitation is an interesting concept in debates about anthropomorphism. Imitation was a crucial means to learn in early modernity; it's central to the school curriculum Butler knew. [Animals imitate to learn too.](#)

Vivek

The freedom to follow what catches your eye and add annotations. We use annotations in drafts to talk to all the authors as we finalize a draft and also as when reviewing papers. Comments on published papers (which is often now possible) could be considered annotations. What formats of science papers can we have that allow for this more actively? Readcube?

Are bees and Amazons still seen in male terms? Animal behaviour used as allegories for human systems, esp political systems- equally how do political systems influence the study of animal behaviour. The use of pronouns in scientific writing - why not use 'she'? Perhaps because scientists discuss results in the aggregate and use 'they'?

Exploring the text as if it was a forest, wandering through excerpts, foraging for words like a bee. Slow process leading to deep thinking. Walking through the text rather than skimming through might lead to something similar. Perhaps the readers could leave notes too.

YEAR 2

20th October 2023

Jenny

Vivek caught my attention when, in response to Magnus's comments about bees making a decision - which was itself a response to Balu's description of how bees respond to the waggle dance - he suggested that perhaps it is not a decision that bees are making, but just how they have evolved. From this followed the observation that the same can be said of humans, and for a moment we glimpsed the real difficulty of trying to describe agency and biological / evolutionary impulses. Evolution is likely going to be

this year's buzz word, and I think it might be worth starting by looking at its etymology in the OED (a movement or change of position; a wheeling, twisting, or turning movement; the action or process of opening out, unfolding, or unrolling etc.). We need to understand its precise biological meaning too of course.

Decision-making / behaviour is at the heart of this project, but running against a mechanistic way of thinking about how decisions are made is our (humanist) interest in Butler's decision-making: i.e. the evolution of his thinking across 3 editions. At every stage of his work we see him changing his mind, adapting, growing, making changes. This applies also to his music theory, which no doubt grows out of his practice, but in turn grows away from it (Magnus's challenge). Lots of things are starting to connect for me, and we might want to equate the evolution of Butler's thinking with knowledge-making. Butler is very interested in how we know - in the study, out in the field - through observing and listening. I was really taken with Balu's description of how bees share knowledge (e.g. of where the nectar is). Can they make decisions or is this 'evolution'. Then Bennett reminds us that what he is describing often is embodied knowledge – a good word for our conundrum: we are learning/ understanding and evolving as we are doing/making, and this is thinking too.

Balu and Vivek use language in really precise ways, and although the humanists among us find polysemy productive to think with, including for this project, we need to understand what our science colleagues mean by the precise ways they use words.

Magnus

A very productive and collegial encounter, animated by our shared focus on the 1623 text.

How far to go down the rabbit hole of citation: on B1r, Butler cites Ambrosius, *Hexaameron*: the same quotation is also found in medieval sources such as the *Aberdeen Breviary* (f. 64v), and the *Liber de diversitate naturae*. We can't retrace all of his readings (or the ones that lay behind them), but there are lots of interesting threads. We somehow need to replicate the classically well-stocked minds of Butler's Jacobean readers (who were...?).

Butler's long antecedence:

- His acknowledged sources and his unacknowledged (and perhaps, by him, unrecognised) ones: e.g., Pliny in place of Aristotle's *De animalibus*.
- The story of the consecrated host has resonances of old medieval miracle stories (e.g., Golden Legend or *Speculum Historiale*), with exemplary narratives around earthly manifestations of saintly powers;
- A quick search for the source of the Latin version of the consecrated host story turns up a book of homilies, and there's a short piece on this in [Notes and Queries](#), 1854, around p. 499. This article also alludes to a story about Luis Vives going to Corpus Christi College, Oxford and being welcomed by a swarm of

bees, so perhaps the association between bees and the consecrated host (i.e., the corpus Christi) was well established.

- There's another salutary story ('There was a certain woman...' etc etc) at New Years-tide.

Reading the book reminded me of Butler the rhetor, schoolteacher and preacher in equal measure. His use of repetition 'some one grain, some another', on the one hand this and on the one hand that, sounds just like a preacher trained in rhetoric (as was done at Magdalen after 1559).

Lots of questions to enjoy: Smith of Nottingham, blackberry swarms, Orythia, Vindemie (honey-taking), pine-apple (as fruit or pine-cone?), gawnes, schadon, Cepheus.

Vivek

- The balance between knowledge skepticism and credulity in the text was interesting for me to think about
- Butler's highlighting of and interpretation of the Importance of senses and acoustics
- Thinking of the text as a proto-hyperlinked text
- A Quarto - a manual - for beekeeping? Resembles 'A pocket guide to...'
- When does he use Latin? Tradition of citation and authentication by using Latin
- I was struck by the mention of the phrase 'The Aberdeen Bestiary'. It was very evocative and the text when I looked it up was fascinating. Also looked up The Luttrell Psalter which was beautiful.
- It is significant that the text is described as 'Written out of experience' - suggests a culture of empiricism.
- I wondered how Butler concludes that the bees are female?
- Bee - smith of nottingham. Notts history riddle:
- <https://www.medievalists.net/2015/06/medieval-beekeeping/>
- Charles Butler as a 'Renaissance man' (pun intended) - so many different fields
- Stigmergy of beehive building
- Stress vs harshness of environment. More here: [https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347\(22\)00329-9](https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347(22)00329-9)
- What are natural stressors?
- Emotion as a group phenomenon? -Swarming - Alarm response - Bee dances
- This paper might be of interest: <https://academic.oup.com/pnasnexus/article/2/9/pgad275/7251052>
- Dawkin's 'River out of Eden' describes the possible trajectory of bee dance evolution
- How do we know if a bee is 'deciding' or following 'evolved instincts'?
- 'The inward qualities of their minds are farre more excellent. The curious art and workmanship to be admired rather than imitated of men'

Olivia

This was a very satisfying meeting with people bringing their disciplinary expertise into dialogue. We were all very engaged and I could feel real intellectual ground at stake.

Different types of storytelling -- evasive or semi-fictional. We talked about the distancing techniques that writers use when dealing with material that might be spurious or unattributed. We talked about credulity. Jenny: 'how you *know* and how you *don't know*.'

The image of the bees building on a substrate was very vivid for me. This is a bit like what Butler does with his subsequent editions.

I thought afterwards about how we read the text as a group. We were more closely aligned than I thought we would be: I thought everyone would read from a very different angle and not necessarily meet. I thought about the way Butler had written the text and how it felt, now, like it had a middle place, the substrate perhaps. I liked the feeling of our group testing out Butler's style, his references, his science, together. It felt like a natural way of reading this book.

I also thought about the 'alarm response' from the bees. I was very interested in what Balu and Vivek said about the swarm operating as one, reacting as one, and about the dancing in the hive. We were all struck by the *feel* of that image, the bee in the dark moving about and vibrating. It made the connections between bees and music very vivid too. I like thinking about how we pick up on each other's emotional states, or not. What happens when bees fail to get the message? Are there ever scrambled messages? Missed communications? Bees who can't 'read' the signals? I know pesticides interrupt their ability to do this.

Bennett

Like others I also found Butler's issuing of instructions as to how to use his book - cross references, etc. interesting. I'd need to go back and be more thorough, but I sensed that he only translates the Latin when it's something practical, and doesn't bother translating the more philosophical material, which rather suggests he envisages two kinds of reader: the practical beekeeper or farmer, and the more scholarly reader. Interestingly, when he is writing about the bees making a chapel out of the sanctified host, he gives us 'my Author's own words', in Latin, which has been translated into English in the preceding account of the event: it suggests a position in which the 'original' language carries greater truth-content than its translation, maybe?

Is the verse ending to Chapter 1 a resonance of theatrical writing where often the conclusion to an act might be in rhyming couplets? Or is this a more widespread ending convention?

In terms of his references to sound and noise there are some fascinating references to sound throughout - being within earshot of the hives to be alerted by the noise of the swarming, ringing a bell to bring the bees down ('his tinging of swarms to make them

come down') - which I have a vague recollection of hearing about as 'an old wives' tale' when I was a teenage beekeeper - tapping the hive and ascertaining the state of the population within by the noise produced by the bees, etc.

Bee communication through vibrations, dance, etc - anything we might read into this about sympathetic vibration (lute strings) as a poetic image in early modern writing and thought?

8th December 2023

Jenny

So at this meeting we discussed the papers that Vivek had shared with us, one of which comes from one of the students in his lab (Olga). The broad question this paper is exploring is whether we can find emotions in other animals. We focused on the meaning of emotion in the paper for a bit: we are aware of the different valence that words we are familiar with have for our science colleagues. Tiago, Olivia, and Jenny discussed this before arriving, and we recognise that we need to avoid having the same, centuries-old, unsolvable discussion about scientific language (and emotions) again. Tiago urged us to embrace our linguistic differences by creating a glossary for the project. Vivek suggests we call this an anti-dictionary. We do need to discuss how we will do this, but we might start with the **buzzwords** idea that Tiago will set up for us. We did recognise the apparent linguistic challenges for each of us - for humanities, language is forever multivalent, and we want to keep multiple meanings in play, for the sciences, the meaning of particular terms needs to be fixed, even if temporarily to enable measuring, analysis, and discussion of commensurate things. But the difference is perhaps not as great as it might seem, not least because the questions that Balu, Vivek, and their colleagues are asking - do bees (and other insects) have emotion-like states? - are difficult/impossible to answer but essential, we think, to ask. (We cannot know the interiority of animals). Bennett asked the final question, which we will take forward next time: why are we focusing on emotions not reason (when some of the 'choices' the bees make could be - or seem to us - more rational than emotional? And how this has been traditionally gendered. There ensued a discussion in the corridor, a recognition that there is now an understanding that emotions and reason relate to each other: e.g. that emotions can catalyst for rational decision-making.

Here is a provocation from Jenny to Balu and Vivek: what is the value of collaborating with arts and humanities. Are we just endlessly/annoyingly confounding things for you?

Vivek

It was interesting that people noticed the attention to methodology. One big focus of reporting scientific work is that someone has to be able to replicate what you did. That explains why every small detail becomes important. Another point was the attention to ethics and animal care. This was more because of the kinds of questions we were asking. Also poor 'welfare' could lead to different results so it's important to attend to that as far as we can.

We talked about the definition of emotions and the difference between the scientific definitions and what we might call the intuitive ones. It's easiest perhaps to let these differences stay on - even highlighting them rather than resolving them. However much we try to fix the meaning of words, other meanings still have echoes. We thought of an (un)dictionary of multiple viewpoints. Could we press a button and the page changes to reflect the other definitions? Using language is so full of meaning. As Bennett asked, do animals choose? We take that for granted and it doesn't mean anything to a scientist until we stop to think. Is there intention? A weather system cannot choose but a bee can?

Jenny's provocation: What value does discussing the experiments with the humanities give us? Some preliminary ideas: Clarifying definitions, seeing our methods/work from a different perspective

Olivia

A key term in Olga's paper was 'decision boundaries'. Decision boundaries and emotional decisions. A language-based equivalent: we talked about the multiplicity of meaning of words, and there might be instances of emotional decision boundaries over the meaning of a word or sentence. This might be a borrowable concept to account for the availability of different meanings in a literary writer like Thomas Nashe -- *emotionally available* writing -- and the way that writing can show or perform or enact the tipping over decision boundaries of meaning. And Balu gave the example of an experiment with two groups, one anxious and one 'normal', who were given an example of a sentence: 'The doctor measured Emily's growth.' The normal group all imagined a girl who had grown tall whereas the anxious group all imagined that she had cancer. This showed (in a science publishing paradigm) the effect of state of mind/mood/emotion on meaning making from texts or utterances. I also think that Relevance Theory would link up interestingly with this: it is a linguistic theory that develops an inference-based model of communication.

We also talked about gender and emotion, and the false opposition of rationality vs emotional decision-making. Now, lots of people are challenging the idea that women are 'emotional' and Vivek mentioned a book he'd been reading called *Bitch* about stereotypes of female animals in science. We talked about how a lot of those stereotypes were a product of Victorian science and how Butler is a pre-history of that, especially that he's writing about the queen bee and emotion; he is an interesting participant in this very 'now' discussion.

Bennett

Jenny's early comments about 'the experiment' in the texts Vivek had given us, being more in the foreground than 'the bee' very much set the agenda for me in ways I was not expecting, and which I didn't feel it was right to raise during the meeting. I want to make it clear, though, that at the same time she mentioned this, Vivek and Balu discussed the degree to which ethics are also accounted for in the experiment, going

beyond the attention required by the ethical guidelines for experimentation with live animals. My comments are more a record of my own affect than anything else, but that, in and of itself, seems significant given the focus of the project as a whole on 'emotions'.

One of the experiments had a great many free-flying bees, and many of them were trying to chew away at the gaffer tape that sealed the Perspex lid on to their space. I had a slight sense of anxiety for them as they were clearly trying to get out of the situation they were in: Vivek pointed out to me that they do this when they are enclosed, and it seems like a fairly normal reaction. But then, when I heard that for every experimental bee that is trained and observed, four bees will die, I have to say I felt a bit sick for them, and their 'instinctive' attempts to find a way out acquired quite a heavy emotional weight for me, that lasted for the rest of the session. Put bluntly, all of those bees flying about in the Perspex box were doomed. I know that sounds rather melodramatic, but the fact that they weren't really having bee-lives, and that what lives they did have would be prematurely terminated got to me. They're dissociated from a world to which millions of years of evolution has adapted them.

On another tack, I started to wonder about the emphasis on 'emotion' and 'emotion-like' states, and the absence of any discussions around 'rationality' in the general text we read. We know that there's a deeply entrenched set of associations in modern European culture where nature is mapped onto the female, which is mapped onto the body and then onto the emotional, and the masculinist episteme in which mind is male is rational. I began to wonder if the scientific discourse was inadvertently rehearsing these mappings, or if placing 'emotion' at the centre was in some sense worrying away at these issues, insofar as 'emotion' *per se* could be read, or at least implies a reading, in which 'emotion' is being unseated from a hegemonic role signifying 'the human', and this trope of distinguishing between nature and culture is being interrogated (again, perhaps unconsciously?). On the other hand, is the ascription of 'emotions' or 'emotion-like' states just repeating the emotion=body=nature trope. Do we end up denying that bees might have reasoning?

This is not the same thing as, but nevertheless connected in my experience, with the earlier point about my anxiety - contagion, perhaps?! - about the inescapable fate of the bees themselves.

7th February 2023

Jenny

We covered a lot of ground in today's meeting, and several ideas have stuck with me. The frame for my thinking is the chapter we had all read beforehand from Terence Cave's *Literary Artefacts*, which comes out of his collaboration with neuroscientists and biologists. Cave is looking for a vocabulary to help us understand cultural forms as forms of cognitive expression – life forms in their own right. He uses and adapts

concepts like autopoiesis, introduced by cellular biologists to describe the capacity of living cells to reproduce and organise themselves, to think with. He is exploring how they cross over to the humanities to enable us to have new conversations – rather like the conversations at the heart of the Bee-ing Human project. We all liked Vivek's suggestion that 'virus' might be a better word – or at least one we might explore. It was also helpful that Balu started the meeting off with an update on what is happening in the lab right now, and the kind of experiments he and Vivek are conducting, exploring whether emotional contagion is applicable to bees. I found this a very provocative idea, and we used it to think about our own collaboration in this terms. It struck me as especially fitting for our project, and it is an idea I would very much like to foreground and explore: what Butler allows me / us to think about how emotional contagion works between bees and humans, as well as, perhaps, bees (the latter for the scientists).

Might emotional contagion be the concept we explore together? And if so, what reading do we start with to understand its history (its origins are in social psychology I think) to develop and explore it?

What form will be right for representing the connecting aspects of our project. This is a key issue for us to think about with Tiago, given that the digital bee book will be organised as a network of interconnected cells. Might sound be one connector? We have just started our conversations about design and organisation, size, longevity, access, interactivity.

Bennett

In the general discussions we were having I remembered Deleuze and Guattari's idea that some animals – rats and ants for them, so some similarity with social bees - are rhizomes. This challenges some of the more standard Western philosophical and scientific thinking which tend more towards what they call 'arborescent' thought, hierarchical 'trees' in which there is a single unifying principle or idea into which variation and difference is subsumed. The rhizome is a more open-form of interaction, acknowledging the non-linear connectivities of what they refer to as 'multiplicities'. It seems worth thinking about this more in terms not only of bees themselves, but also of how Butler's book might work as a rhizome, a web of interconnections between its different versions and the different forms they take, especially with regard to the sonic, with the various authors referred to, and how it might rhizomatically fit with Vivek and Balu's contemporary empirical research.

Not mentioned in the session, but something that came to me thinking about the way Butler understands the interaction of the queen and the new 'princes' - it was mentioned, by Jenny I think, how Butler interprets what is actually a potential battle to the death in a much more conversational and conciliatory way: is his interpretation of this regal social dynamic shadowed by the large number of queens in conflict with one another or subject to royal violence - Anne Boleyn, Catherine Howard, Mary I, Elizabeth, Mary Queen of Scots, Lady Jane Grey?

Do feelings have to be named in order to *be* feelings? In other words, might one of the barriers to thinking of animals as having 'feelings' be because we don't believe they have names for things like we do? A bit of a confused question, but I thought it worth recording anyway! To what extent are our own 'feelings' non-linguistic?

Cave's introduction to his *Live Artefacts* reminded me, in its idea of literature being a emergent property of nature, co-evolving with our biological selves (if I've understood it correctly), of Anton von Webern's (1883-1945) writing about 12-tone music being grounded in 'the laws of nature'. In this, he's drawing on Goethe's influential *Metamorphosis of Plants* and also the *Theory of Colours*. The basic idea is that major and minor tonality are derivations of the 'natural' harmonic series - the constituent overtones present in any stable musical pitch, which follow a very precise set of mathematical ratios to one another. If people are interested I could do a short practical demonstration of this at some point. His argument is that music gets progressively more complex, in terms of pitch, as musicians have explored further and further the higher reaches of the natural overtones. Here's a couple of extracts from *The Path to the New Music* in which he tries to explain what he means.

'... Goethe sees art as a product of nature in general, taking the particular form human nature. That is to say there is no essential contrast between a product of nature and a product of art, but that it is all the same, that what we regard as and call a work of art is basically nothing but a product of nature in general' (p. 10).

'... man [*sic*] is the only vessel into which is poured what 'nature in general' wants to express ... just as a researcher into nature strives to discover the rules of order that are the basis of nature, we [*i.e. artists*] must strive to discover the laws according to which nature, in its particular form 'man', is productive. And this leads us to the view that the things treated by art in general, with which art has to do ... [are] a matter of natural laws, that all discussion of music can only take place along these lines' (p. 11).

'... one can say that music is natural law as related to the sense of hearing' (p. 11)
Seems to chime with the line taken by Cave. Just to be clear, by the way, the mathematical justification for western music theory in Webern's account, though popular and widely disseminated, is empirically wrong!

Interesting discussion around 'virus' and 'contagion' as metaphors - especially in terms of how viruses are actuated only inside living cells and have no 'life' of their own, to speak of. Some productive ways to think about things. It occurs to me that 'sympathetic vibration' was a potent image in the early modern - the lute string resonating 'in sympathy' with the voice, for example - and affords one way to think about bee communication, too, that might have been culturally meaningful to Butler. In a way his insistence upon bee 'voices' might be blocking the sympathy metaphor: sympathy as the activation of the inanimate by the animate, for example, which for me seems to afford some sort of tying back to the way viruses similar participate in a situation where

the animate and inanimate 'resonate'. Again, not clearly thought through yet, on my part, but interesting to pursue, perhaps?

Words – metaphors. Might etymology be deployed as a sort of rehearsal of the idea that 'ontogeny repeats phylogeny' - something like etymology standing as a sort of embryology and onto-phylo-genetic development of words (and their evolving meanings)? Might this make a fruitful encounter of science and literature, perhaps? Reference Lakoff and Johnson's *Metaphors We Live By* (1980) in which they trace the origins of words to the naming of directly experienced sensations - a 'warm' personality, for example.

Vivek

- What counts as an interaction between bees?
- How much could methods flex before it's no longer science?
- Science vs natural history
- Music as another naturally evolved 'artefact'
- Culture (colour rules of Goethe, music of Schoenberg etc) projected as a product of 'natural law'
- Uses and abuses of the idea of 'natural law' - justify supremacy, racism etc
- What is the best metaphor for literary artefacts? Suggestion: Virus
- Rhizomes vs trees - do we keep a diversity of interconnected ideas or unify them?
- Evolution as more than a metaphor- is there anything we can do to embed it in practice
- Emotions generated in us while running experiments and responding to the state of the colony
- Can bees smell fear? - Preserving myths, and folk wisdom about bees
- Cultural artefacts as conduits for emotional contagion
- Front end processing vs server end processing of computer interface: Compares to insects vs humans
- Topics of discussion: Contagion, Anthropomorphism, The definition of Emotion (?), The role of quantification
- Visualizing data and visualizing music - could we also represent the data as sound/music?

Olivia

Jenny talked about Butler's palette of emotions, and about the palette that is available in the lab. Is it as rich? Or does the necessary element of control mean a narrowing of scope. Balu and Vivek talked about containers and stress. I find myself recoiling against the idea of stress, wishing it was a happier emotion. I think about some of the teaching I did on the history of emotions and how we discussed whether emotions or feelings were positive, 'I am happy', or negative, 'the absence of stress'. I wonder whether we can talk into the gaps/negative space where the scientists create or discuss an absence of stress ('not stressed'). There's something suggestive about the absence of definition there, and I also thought about how this might relate to spaces in the text editing or editing process. That kind of emotional non-space.

We talked about cognition and I wondered about re-cognition (recognition). For something to be 'contagious' your body has to take it on and recognise it: re-cognise it: rethink it, somehow. Terence Cave has an earlier book called *Recognitions* about recognition scenes in literature and I wonder if these moments map on to the idea of contagion.

I also wondered about emotional contagion between humans and animals/insects. The environmental crisis has happened in part I think because of a lack of recognition or empathy between species.

I was fascinated to hear Bennett and Magnus talk about music theory and about the idea of natural messages or language just coming through humans as an 'interface'. There are some interesting parallels with early modern scientific theory in which some scientists decided that impartial (ha!) observation of nature was the ideal, and that somehow it would be possible to represent nature through experience and contact with it. I like to think about this writing as experimental literature, and I wondered if it would be possible to think about experimental literature inside-out, in which living creatures were the experimental zone or material that nature 'essayed' upon.

Jenny's response to Olivia: like Bennett I loved these ideas. I am glad you have said that you recoil at the idea of stress as an emotion, which is the (only available?) language of the laboratory. I am aware that Butler gets things wrong. He mishears and misunderstands aggression. But he is guided by the full emotional palette of his rhetorical training, and his 'bias' is to see the natural world as something we can emotionally connect to and be part of. There is a need for this too, as Olivia suggests when she talks about protecting; perhaps the emotions that really need developing are the human ones. How do we enable these different points of view to meet, given Vivek's poignant question: 'how much can his methods flex [for us?] before it's no longer science?' I might rephrase this, though, to find another meeting point: how much could our collective thinking flex to allow humanities into science, and science into humanities to address environmental challenges?

Thinking in this way, I also thought that it was possible to frame cultural artefacts (literature/music) as intensifiers and containers for life. They could be considered to present a formal frame and set of constraints like the conditions of the lab. Particularly when you think like Jenny about punctuation on the page: the page as a container/experimental zone.

I also thought: we are approaching spring (I hope!) and that is when bees start to appear. Perhaps not this year, but it would be an opportune time for an engagement activity. I was thinking about the idea of another 'bee book' – more like a scrapbook or notebook/commonplace book, or community diary – that we could place somewhere on campus for people to write about bees they'd seen or experience of them. We could collect bee stories as a part of the project and create a new artefact (which could be added to the library and archives itself). I also thought of a 'bee shelf/table' in the library (or online) showing the interdisciplinary reach of the topic.

I loved this meeting, even though I appeared in my own virtual box (via Teams). The project feels very alive.