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Choreographing the Interdisciplinary

Abstract: *Interdisciplinary works tends to have an inbuilt spatial logic, based, for example, on the model of the 'layer cake' – in which each layer encompasses a specific, tightly-bounded domain. This chapter is about distributions of space and time in interdisciplinary projects, and a critique of the dominant spatial logics and metaphors that often prop up interdisciplinary endeavours. Against such imaginaries, the chapter sets out four alternatives for rethinking the space of interdisciplinarity: matrices, topologies, incorporations, laboratories. The chapter positions these alternatives as ways of imagining interdisciplinary space, beyond the logic of fiefdom that now predominates.*

Keywords: expertise; interdisciplinarity; laboratory; matrix; space; topology

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Introduction

The distribution and use of space and time is a surprisingly potent – and fraught – topic in interdisciplinary projects. Funders, institutions, and researchers are increasingly paying attention to how physical buildings and centres might facilitate, or inhibit, interdisciplinary exchange (Dzeng 2013). One of us (DF), for example, spent almost a year at the expressly interdisciplinary Interacting Minds Centre at Aarhus University (Interacting Minds Centre 2014), where doorless, all-glass offices fostered a sense of free movement and exchange. The Hub at Wellcome Collection, in which we have written this book, was explicitly designed to facilitate collaborative, interdisciplinary interaction. Similarly, people collaborating at a distance from one another will often place a premium on having tools and funds for getting themselves into a shared space, whether physically or virtually. These are important issues, of course. And yet, over the years that we have been moving through diverse interdisciplinary landscapes, we have come to realize that the spatial logic of interdisciplinarity isn't only about the physical arrangement of offices and corridors: it's also about the careful (though often unspoken) arrangement of people, objects, ideas, technologies, and media in relation to one another. It's about the choreography – the 'deftly balanced coming together of things that are generally considered parts of different ontological orders' (Thompson 2005, 8) – through which those things are induced to relate to one another, as well as the habits and modes of comportment that, sometimes, prevent those people and things from getting *too* close.

In this chapter, we will be concerned with space in both senses (as physical entity and as choreography) – but we will pay closer attention to the second. Because it is precisely this tacit choreography, this highly elaborated dance of movement and fixture, we claim, that governs the distribution and use of time and space in interdisciplinary projects. Over the years that we have spent in interdisciplinary spaces that address the mind and the brain, we have become convinced, first, that the logic of the prefix 'inter-' tends to lie at the heart of those arrangements and choreographies, and second, that that prefix acts as a serious hindrance to the kind of research that might be done across the neurosciences, social sciences, and humanities. Indeed, this deceptively harmless prefix tends to govern the suturing of discipline to discipline (often via a particular way of envisaging how experiment is best put into practice), and has

significantly constrained how interdisciplinary research in this area is both imagined and conducted. ‘Far from being opposed to disciplinarity’, Thomas Osborne points out, ‘*interdisciplinarity* assumes a certain consciousness of disciplinarity as a condition for its accomplishment’ (Osborne 2013, 82; our emphasis). The problem for us with the prefix *inter-* is that it denotes both spatial and temporal ‘betweens’: it hence locates the point of interest *between* intervals of time, and *between* parts of things. The concept of interdisciplinarity, as it is currently practised, thus carries within it a very particular model of spatial and temporal relations – as if there were a chessboard of disciplines, weaving in and out of one another, but never occupying the same, uneven ground.

We want to break the spatial and temporal structure assumed by the *inter-* of interdisciplinarity. In its place, and drawing on our own experiences, we open other ways of imagining and unfolding the – in fact – much more tangled and patterned world of complex relations, and non-relations, between human and non-human entities, as well as between the various domains of knowledge that attempt to address them. For it is that tangled world – with its heterogeneous rhythms and mysterious arrangements – that is what those calling for interdisciplinary research involving the neurosciences and social sciences are attempting to understand and to intervene upon, even as they sometimes tend their own epistemologically bounded spaces. We are certainly not arguing that interdisciplinarity is found in just one form (for various examples of the heterogeneity of forms, see Schaffer 2013). As Barry and Born have noted, the question, rather, is: ‘How might one understand interdisciplinarity less as a unity and more as a field of differences, a multiplicity?’ (Barry and Born 2013, 5). Still, we argue that to understand the complexity of brain–mind–body–environment relations, we need to jettison the spatial logics of the *inter-* if we are at all to make good on the promise that interdisciplinarity holds. In so doing, we work neither with a fantasy of pure, prior disciplines that the logic of the *inter-* attempts to make concrete (see also Osborne 2013), nor with an integrative vision in which different disciplines are tugged ever-closer to one another (see also Fitzgerald and Callard forthcoming). We ask our readers to join us on in departing from the temporal frameworks and spatial strictures to which so many of today’s practices of interdisciplinarity remain sadly tethered.

In this chapter, we are particularly preoccupied with the scales, relationalities, patterns, rhythms and voids that might be useful for understanding practices of interdisciplinarity, once we have abandoned spatial

logics that privilege either what happens ‘between’ disciplines, or that are premised on working towards their future integration. We reflect on the spaces, times, and rhythms – material and conceptual – that we have found most generative, in terms of fomenting epistemological excitement and novel ways of practising collaboration. Here, as everywhere in this volume, one of our primary concerns is with developing new forms of experimental practice that also comprise, simultaneously, new forms for thinking around and with problems. Collaboration, is, for us, ‘a distinctive and changeable set of practices, an object of enquiry, a field of dispositions, a relation of power, an intervention in a space, a set of affective and embodied comportments’ (Callard, Fitzgerald, and Woods 2015, 4): how one envisages and organizes collaboration, then, is far from inconsequential in shaping how both experiment, and thinking with and through others’ concerns and models, might take place. But acknowledging and bringing to the foreground richer and less predictable accounts of the spaces and times in which collaboration across disciplines might take place is no easy task. Before rooting some of those accounts out, we first self-consciously divest ourselves of what we believe to be some of the more unhelpful assumptions about the ‘proper’ space and time of and for interdisciplinarity that we have – repeatedly – witnessed and experienced.

Have you got a neuroscientist yet?

Consider the vignette with which we started this book (see the Introduction), in which our group had not (yet) acquired the indispensable neuroscientist. What does this vignette reveal? In retrospect, we realized that it exemplified the way in which a particular vision of interdisciplinarity involving the mind sciences, life sciences, social sciences, and humanities was being assumed – by funders, by institutions, and by many of those (including, at times, the two of us) who are gathering in this field. It carries strong prescriptions about what interdisciplinary research in this field is, how it should be carried out, whom it ought to enrol, what role each member of the team should perform in relation to the others, and what kinds of results should emerge from it. There ought to be a scientific experiment. The experiment should take place in a laboratory. It will, most likely, involve a scanner. (Increasingly, in our experience, fMRI is regarded as the default option, though positron

emission tomography (PET), electroencephalography (EEG), and other technologies are of course also possible.) The cognitive neuroscientist should be on hand to conduct the experiment and process the data; the psychologist should take charge of fine-tuning the protocol (sometimes the neuroscientist and the cognitive psychologist are subsumed within one person); the bioethicist should be there to soothe our consciences about any ethical implications of the study; the social scientist should be there to help assess the suitability of the sample and to comment on the generalizability of the findings; the philosopher should be there to ensure rigorous parsing and application of constructs (and to make the tea). The most important data to emerge are those produced through the coming together of the human experimental subject(s) and the scanner; these should be published in a neuroscientific journal (though ancillary publications that address other disciplines' concerns are of course welcomed).

In short: what emerges here is a spatial imaginary centred on the model of a multi- (rather than inter-) disciplinary mix, a mix that will establish, it is hoped, a methodological and conceptual 'layer cake'. (We are employing here the usual distinction between the multi-disciplinary, in which disciplines line up alongside one another, from the interdisciplinary, which usually carries some commitment towards creating emergent, and novel forms of knowledge different from those contained within any one discipline.) Within this layer cake, each disciplinary layer has dominion over a particular kind of expertise, particular methods, and particular objects of knowledge. You can see this play out in numerous published interdisciplinary books and studies that address the mind and brain (see e.g. Goldman 2006; Slaby and Gallagher 2015). Joseph Dumit, we should note, has provided a powerful analysis of how cognitive psychology was brought into contact with PET to produce the interdisciplinary layer cake that became the foundation of the interdisciplinary field of cognitive neuroscience (Dumit 2004). We should not be unduly surprised, therefore, that the layer cake functions as the buttressing logic for other interdisciplinary endeavours involving the brain and mind.

There are a few examples that depart from the layer cake genre. Roepstorff and Frith, for example, in elaborating a model of experimental anthropology 'as a method, as an object of study and as a research aesthetic', argue that joint engagement (*doing things together*) in research projects across the disciplines leads to the need for researchers of all stripes then to 'be sensitive both to the type of facts and the types of contexts produced by going experimental' (Roepstorff and Frith 2012,

108). The dominance of the layer cake model, however, means that the methods and technologies of cognitive neuroscience tend to be endowed with a particular luminosity and generativity. *And we emphasize that it is often social scientists and humanities scholars, rather than neuroscientists themselves, who manifest the greatest enthusiasm in doing so.* In short, it is the brain scanning technology (of whatever kind) that ends up being granted the most substantial epistemological value (which nicely sits alongside its substantial economic weight). Experts from other disciplines can help to fine-tune, interpret, or contextualize what goes into it, and what comes out of it, but the work that the scanner does is where the real action is.

Such a model tends, at the same time, to embed a particular temporality at the heart of interdisciplinary labours in this arena. As soon as the cognitive neuroscientific fMRI study is installed as the groundwork of the collaboration, all are constrained by two particular timelines. First: when is the scanner available? (This is *always* a vexed question.) Second: how lengthy will the period of recruitment need to be to find people to insert into the scanner? The difficulty with this model is that its spatial and temporal characteristics occlude the multiple other modes through which collaborations might unfold, and through which interventions – into existing literatures, and into the worlds of experimentation and investigation – might take place. What would it mean to conduct an interdisciplinary experiment that did not orient itself around the temporal logic of scanner availability? What if the scanner had to wait, instead, on the very different – but no less fraught – timekeeping that is inherent to the ethnographic method? What if an interdisciplinary workshop, which had been initially planned so as to fine-tune the constructs under investigation in the forthcoming neuroimaging study, ended up determining that a neuroimaging experiment were not necessarily the most appropriate kind of experimental procedure to engage in? What if philosophers were freed up – and freed themselves up – to do more than maintain the conceptual rigour of psychological constructs? (For one example of this, see Haueis 2014.)

Good fences make good neighbours

“No: I don’t agree with your account of the permeability of disciplines, one to the other, at all. I do think that good fences make good neighbours.”

Both of us were at the workshop at which a highly regarded interdisciplinary researcher conveyed this strong account of appropriate interdisciplinary practice – one that defended disciplinary turfs and disciplinary expertise. The sentence above was spoken after one of us (FC) had countered what she interpreted as the academic’s territorialized landscape of interdisciplinarity with a question about the untoward relationalities unfurled by postcolonial studies – as well as by other interdisciplinary theoretical domains that have been committed to queering the pitch of orthodox histories and geographies. In many ways, we understood this researcher’s response. In calling for interdisciplinarity, no one wants to be misunderstood as championing sloppiness, and few, we imagine, want to be interpellated as the inevitable jack of all trades and master of none. We certainly would not want to find ourselves endorsing, say, an analytical philosopher who planned to get by in an interdisciplinary project, untrained, as a sociologist; we do not wish to champion an anthropologist who imagines she can, in a trice, become a conceptual artist. But in this chapter we want, nonetheless, to challenge the spatial logic of fences and neighbours – and the specific forms of territory it brings into being. Here is discipline thought through the figure of the happy householder – willing to reach over the fence, for sure, but still very keen to maintain a proper sense of where the boundaries lie. Indeed, there is an important claim embedded in this metaphor (and one hears it all the time) of good fences, insofar as it dramatizes what is still sometimes an unquestioned assumption about the primacy of the private space of disciplinary training.

Whatever our – and your – feelings about private property might be, it strikes us that there is a pernicious notion, embedded here, that maps intellectual inquiry on to the taken-for-granted boundaries of relationships between public and private space. (In this regard, we find it intriguing that many writings that address cross-disciplinarity employ language that conjures private property relations. We might turn, for example, to the philosopher Brian Massumi, who discusses the ‘poaching’ of a scientific concept (which, moreover, on his account, does not result in ‘prevent[ing] it from continuing to function in its *home* environment’, and who maintains that if he ‘were a concept, [he] could emigrate *and* stay behind in [his] home country’ [*italics in original*] (Massumi 2002, 21)); or to Thomas Osborne, who describes interdisciplinary movements via languages of poaching and trespass (Osborne 2013).) What would change, for the kinds of projects that we are trying to bring into

being, if we were to think through very different accounts of property, of home, of migration, of arrangement, and of distinction? What if we were to recall, for example, the commons that preceded those strong fences? What if we were to turn to forms of community relation, and of being-in-common, that refused – for good and for ill – the always-assumed bourgeois propriety of *neighbourliness*?

After fiefdom

In her analysis of the intellectual terrain marked out by the term ‘American Studies’, literary studies scholar Wai Chee Dimock demonstrates how a ‘fiefdom’ has been drawn under the first half of that term, such that the founding adjective *American* comes to ‘[govern] the domain of inquiry we construct, the range of questions we entertain, the kind of evidence we take as significant’ (Dimock 2001, 755). Does not the adjective ‘interdisciplinary’ do the same kind of demarcation work? Consider how that term, for example, constitutes itself as a place of intensity and the site of boundary transgression; consider also how it sets out a specific range of allowable – and not allowable – modes of investigation; and how it, in so doing, in fact occludes the congealed, compacted ‘interdisciplinary’ peregrinations of those ‘disciplines’ from which it apparently draws. For, as Philippe Fontaine reminds us, the dominance of the image of ‘two cultures’ (sciences and humanities), marked by fences and boundary-points, has tended to elide the distinctive history of the social sciences as a particular culture – and, in particular, the development of a post-war social scientific culture that was intensely ‘cross-disciplinary’ in both its intentions and its practices (2015, 2; see also other essays in that special issue of *Journal of the History of the Behavioral Sciences*). As Fitzgerald, Rose, and Singh (forthcoming) have argued elsewhere, there is a far more entangled palette of relationships between, say, psychiatry and sociology, or between psychology and political science, than those imagined in orthodox accounts of ordered interdisciplinary exchange. Andrew Pickering, similarly, has pointed out that cybernetics, far from simply combining existing disciplines, ‘amounted to the explosion of a nonmodern ontological stance across, and beyond, the disciplinary map’ (Pickering 2013, 217).

How might such insights help us to rethink the spatial and temporal commitments of interdisciplinarity (as well as those of ‘disciplinarity’

on which they are founded)? Can we, as Dimock suggests in another context, ‘draw a different input map of the world’ (2008, 29)? Elsewhere, we have proposed a rethinking of the interdisciplinary scene through a logic of ‘experimental entanglement’ – in an attempt to gesture at our shared realization that working across the social sciences, neurosciences, and humanities was not at all about figuring out how to move fences, or how to work across them; instead it was about recognizing how tangled were the roots into which those stakes were driven into in the first place (Fitzgerald and Callard 2015). In advancing the spatial dimensions of that conceptual move, we offer, below, four additional terms that help us to think about the patterning and arrangements of interdisciplinary entanglements. What we hope is that these might move all of our imaginaries away from that of the layer cake, or that they might spark, in some readers, new and allied terms of their own.

Matrices

The spatial logics that underpin the management of interdisciplinary projects tend to fall, we believe, into two, not mutually exclusive, categories: (1) a dominant principal investigator, looking down upon all the disciplinary ranks; and (2) fantasized – and ever thwarted – parity across these ranks. Both logics envisage interdisciplinarity through the efficient arrangement of different-but-equal silos – to use the management *cliché*. A matrix, by contrast, opens up a very different kind of spatial and temporal imaginary – one that attends more closely to the ‘organizational physiology’ of the project, to use Bartlett and Ghoshal’s (1990) evocative term. The term matrix carries long histories. Alongside its use as a designator of the womb, it denotes the environment in which something is created or developed; it is also variously employed within biology, pharmacology, mathematics, business, sociology, and political theory. What draws us, then, to this term, is its history of promiscuous movement across terrains of expertise and interest, and the manner in which it draws attention to the multiple ways in which to understand the processes and pressures of connection, support, embedding, binding, and generation.

In the history of organizational design, matrix structures were championed, against the bureaucratized hierarchy of the post-war years, as ways of putting things and people together, around specific questions, with an attention to the quality of *lateral* relations – pointing out that the unidirectional flow of information ‘up’ to a single manager of a

single department stymies both communication and creativity (see e.g. Sayles 1976). If we replace the ‘manager’ with the ‘disciplinary expert’, the power of the matrix for rethinking logics of collaboration becomes clear. And we need not seek inspiration only in the management literature: the complex and variable ‘meshwork’ of proteins that make up the extracellular matrix of animal tissue was once thought to be an ‘inert scaffold’, but is now thought to play ‘a far more active and complex role in regulating the behaviour of the cells that contact it, influencing their survival, development, migration, proliferation, shape and function’ (Alberts et al. 2002). It is worth thinking further about how working with and through matrices might afford new means through which collaborative interdisciplinary projects and relations might be set into motion. One example, here, is Hubbub, though Hubbub is far from being the only place that we could turn. Hubbub’s Core Group (the principal investigator and co-investigators of the research project) have attempted precisely to attend to this pliable meshwork, much more than the cells – or silos – themselves. Collaborators, from whichever discipline, are encouraged to self-organize as they like, and communicate amongst themselves; disciplinary experts neither form teams around projects, nor tend to act as gateways to the joining of projects. We would certainly not want to imply that the project exists without checkpoints in some magical, frictionless space: we are sure that many collaborators could enumerate multiple ways in which they are baulked from moving, playing and binding. But we still contend that what is most at stake, around any individual project within Hubbub, is not the specific expertise a person ‘brings’, but rather her capacity to fold into, and expand, a matrix that is developing around a particular question.

Topologies

Across the sciences, social sciences, and humanities, the topological has become, in recent decades, a particularly resonant mode through which to map the enfolding relations that enjoin entities and constitute dynamics. Researchers in this mode draw upon topological theories, as they have emerged in the mathematics of continuous space, to think more broadly about the ways in which (as a series of events on ‘topology’ as Tate Modern put it) ‘static ideas of space as a container [might be] replaced by understandings of movement-space, of multiplicity, differentiation and exclusive inclusion that in turn have led to new ideas of power, subjectivity, and creativity’ (Tate 2012). As Celia Lury

and colleagues have argued, ‘topology is now *emergent* in the practices of ordering, modelling, networking and mapping that co-constitute culture, technology and science’ (Lury, Parisi, and Terranova 2012, 5; our italics). The language of topology, as Martin and Secor have analysed, is one full of ‘flows, deformations, twists, folds, torsions, severations, and cuts’ – and thereby well positioned to be variously employed ‘as a metaphor, a heuristic device, an analytical approach, a figure, and an ontological relationship’ (Martin and Secor 2014, 421). We cannot but gesture here to the genealogies and theorizations of topology – which have dense histories in scientific, philosophical, social scientific, and psychoanalytic literatures.

We worry, then, that our invocation of the topological will function simply as yet more adulation for one of the terms *du jour*. But if we persist in mentioning topology, it is because the term points to the need to attend closely to how one registers, analyses, and represents the dynamics, connections, breaks and transformations to which entities captured through a language of ‘the topological’ are subject. Those entities might be collaborative groups, experimental situations, or biosocial entities. What has been vital to this topological turn is attention to how nodes and edges are being defined: topological analyses are built around nodes and those connections that enjoin them. One way to think about this is to imagine how things might shift if different objects or technologies were set to fold into one another within interdisciplinary space – or if we brought to visibility often ignored nodes that might be present within the collaborative groups, experimental situations or biosocial entities under investigation. (One interesting example here is the ‘multispecies network analysis’ conducted by Michael Pettit and colleagues to understand historical relations between scientists, their preferred experimental animals, and institutions during inter-war research on sexual behaviour, and hence to demonstrate the often unacknowledged importance of particular laboratory animals in the constitution of distinct disciplinary and institutional cultures (Pettit, Serykh, and Green 2015).) We are reminded, here, of some of the most imaginative interdisciplinary neuroscientific studies that have been conducted within the laboratory of Andreas Roepstorff at Aarhus University (a sometime collaborator of ours) – in which the edges of anthropological and neurobiological accounts of intersubjectivity are rendered continuous, with intellect and attention coming to rest on the forms of enjambment that might run them together (see e.g. Xygalatas et al. 2011). What distinguishes the

intensely interdisciplinary work of Roepstorff and his collaborators is precisely this attention to the space of continuity, and to the forms of nodularity and edgework (both inside and outside the scanner) through which those continuities are made empirically visible.

Incorporations

Psychoanalysis proposes very different accounts of relationality, sociality, and negativity from many of those found within social and cultural theory. We could not be further from a world of happy zones of neighbourly exchange (or even from a world of carefully plotted poaching and trespass). What would it mean to think interdisciplinary spatialities and temporalities through, and with, the relationalities offered by Freud (or by many of those who followed him), instead of with the sanitized models of the ‘inter-’ that have colonized many formal and informal accounts of interdisciplinarity? For Freud, for example, incorporation marked the primitive wish to unite with, identify with, or cannibalistically annihilate an object. Within psychoanalysis more broadly, incorporation – theorized as a mode of ferocious identification – is one of the most foundational kinds of relationality (Laplanche and Pontalis 1968). It is this dynamic of ferocity and pleasure that distinguishes the spatial mode of incorporation. It is also a relational logic that is frequently at play within interdisciplinary projects, though its pleasures (and its dangers) are rarely acknowledged. Such a relational logic makes clear the indispensability of negativity in *any* account of relationality. Such indispensability has been perhaps made most clear by a dense braid of cultural-theoretical work in the humanities, which has been indebted both to Freud and to the foundational insights of queer theory (e.g. Edelman 2004). While much of this work has been quickly designated as ‘anti-social’, we are more interested in how it deforms our usual understandings of social relations. As Elizabeth Wilson has argued:

negativity is intrinsic (rather than antagonistic) to sociality and subjectivity ..., and this makes a world of difference politically. This queer work isn’t antisocial at all; rather, it wants to build theories that can stomach the fundamental involvement of negativity in sociality and subjectivity. (Wilson 2015, 6)

We have been keen in our research not to extrude negative, ferocious, and corrosive forms of relation and of sociality. (Outside of our empirical research within the interdisciplinary neuroscience–social science domain, one of us (FC) has been particularly interested in how these

problematics are recognized or ignored in the course of interdisciplinary ‘transfers’ of terms and knowledges, for example: in the taming of psychoanalysis within geography (Callard 2003); in the use of scientific models of affect within the humanities and social sciences (Papoulias and Callard 2010); or in the strange disavowal of Freud’s uncanny relationalities in the nascent field of neuropsychanalysis (Papoulias and Callard 2012.) We are also interested in our own desires for identification with the biological – desires whose reasoned articulation (and we are sometimes not even capable of such articulation) always leaves us slightly unfulfilled.

Processes such as incorporation push us, in turn, to acknowledge how our collaborations do not bring us together as rational economic actors, across (what are thought to be) disciplinary lines, engaging in friendly exchange with our neighbours. *We* – and ‘we’ is employed broadly, here – are also propelled by preconscious and unconscious acts of ferocious identification with, ambivalence regarding, and envy of the other. The question then is: what kind of organizational and spatial logics might emerge from, or at least take account of, such unruly forms of relation? Or does this term remind us, rather, that there are (infantile, primitive) desires for proximity and ingestion that it might be as well to sate as to understand? How would our interactions with our collaborators change if we understood ourselves all to be variously constituted through and by ambivalence, envy, and ferocious acts of identification?

Laboratories

At least since the early work of Bruno Latour and Steve Woolgar (1986), the laboratory – as a physical space, a set of procedures, and an arrangement of people and things – has been the site of intense interest within the history of science, and science and technology studies. The laboratory, as Steven Shapin and Simon Schaffer point out in their seminal account of the debate between Boyle and Hobbes (1989), emerged in the seventeenth century as a space of constrained tinkering, witnessing, and demonstrating; it has a specific history within the natural sciences that is not only much less obvious or necessary than is often imagined, but is a good deal less innocent too (Haraway 1997). Laboratory is a capacious term, holding together not only a space of demonstration (e.g. the MRI suite) but also a norm of investigation (a laboratory science), as well as a highly contingent group (such as ‘my lab’) bound together around particular questions (see also Knorr Cetina 1992). But it is the choreography holding these different senses of laboratory together

that captures our attention here: a laboratory calls a group together; it directs attention to careful arrangements of humans and non-humans that make up a particular laboratory assemblage; and it sets out norms, within such an assemblage, for who must demonstrate, and who must witness, and from where they must do it in either case. Additionally, laboratories, as the historian of science Hans-Jörg Rheinberger has argued, pose the question of how experimental knowledge is captured through various modes of writing, tracing, and recording: '[r]eduction to a surface facilitates exploration of new ways of ordering and arranging data: sequential events can be presented in synchronic form.' Rheinberger asks, furthermore, whether there might be "collective" equivalents of such individual forms of scientific note-taking and write-ups, such that one might discern collaborative graphic traces that might tell us not only about the cultures of a particular laboratory, but might provoke new research questions (Rheinberger 2010, 251). What might this mean for practices of collaborative interdisciplinarity across the neurosciences, social sciences, and humanities? (We are particularly gripped by this question, given that we are currently collaborating with many researchers from the humanities and the arts, for whom graphic traces are central to their own experimental practices.)

Lately, such a choreography has been invoked by a range of interdisciplinary centres, such as the MIT Media Lab, the Urban Laboratory at University College London, or the Culture Lab at Newcastle University. One of us (DF) worked on a project that calls itself an 'urban brain lab', where the word is invoked precisely to associate with a particular kind of, and normative commitment to, proximity with others and their work – *viz.* a cathexis of people, disciplines, and interests in which the arrangement of those elements is prioritized above each individual's intellectual histories. One might see similar commitment in the various groupings that have described themselves as 'collaboratories' (see e.g. Collier n.d.). If 'laboratory' is a troubled term for many social scientists, it is not a ludicrous one. Spatially and temporally, one of its greatest advantages is that it moves us beyond many of the fantasies that many social scientists orient themselves towards (such as the 'the interpretive and authorial virtuosity of an individual', as Andrew Lakoff and his colleagues have argued (Lakoff, Collier, and Rabinow 2006, 5)). What would it mean to reimagine ourselves as co-workers experimenting and scribbling in a laboratory, rather than neighbours talking over a fence?

Into the void

The atmosphere was one of a strained energetics: all of us, delegates at an interdisciplinary workshop, were wanting – in fact, longing – to find points of connection and reassurance across what might have been seen as yawning disciplinary divides. Our expertise stretched from early medieval history, to early modern history, to cognitive psychology, to medical humanities, to geography. Each of us, in the course of the workshop, had been plunged, during talks, into the strange alterity of worlds and modes of academic presentation very different from our own; many in the room had discerned wonderful and startling connections between accounts of people’s sensory perceptions in different time periods, and current models in cognitive psychology and cognitive neuroscience to investigate those phenomena. Delegates frequently used phrases such as ‘this reminds me of something from my own field’; ‘this resonates with a concept from my discipline’; ‘it seems to be the same formulation’. Felicity began to wonder if we weren’t all working rather too hard, and if there might not be something to be said, ultimately, for sometimes not connecting.

In this chapter, we have worked with and through some of the spatio-temporal imaginaries through which researchers might plot as well as practise interdisciplinary research. We have used four terms (which are also, and variously, phenomena, constructs, abstractions, and metaphorical resources) to open up ways of conceptualizing the spatial organization of interdisciplinarity that push beyond those indebted to particular ways of carving territory and terrain, and that centre on producing connection, entanglement, and ingestion in the collaborative sphere.

Yet one important problem remains. In the current impetus towards collaboration, there is, we suggest, an implicit normative assumption of *connection* itself, and indeed of relationality as such. What happens to collaboration when connection is impossible to refuse? What becomes of those ontological and epistemological voids – which is to say, those spaces and temporalities that cannot be produced or even glimpsed within the current dispensation? Paul Harrison has argued, in response to the interest across a number of disciplines in ‘relation’ and ‘relationality’ (and here our earlier invocations of matrices and topologies are two such instances), that the question of the non-relational is at threat of occlusion:

it seems to me that in the proliferation of biophilosophy, the unstoppable materialisation of actor networks and constructivist totalisations of the social

or the cultural, few have been asking about breaks and gaps, interruptions and intervals, caesuras and tears. (Harrison 2007, 592)

For Harrison, much more work is required to think through what is ‘meant by the term “relation”’ if we are not simply to produce a ‘quantitatively expanded sociospatial imaginary rather than a shift towards the appreciation of intervallic topologies, complex figures, and diverse phrases and regimens’ (Harrison 2007, 590). Consider, in this respect, the nascent interdisciplinary field of neuropsychanalysis (Panksepp and Solms 2011). That field has founded itself on the conviction that it is possible to bring together psychoanalysis, (certain kinds of cognitive and affective) neuroscience, and evolutionary biology. But what gets missed, in such an insistence, are precisely the things that might not go together. Consider, for example, against that insistence, Jean Laplanche’s readings of Freud (e.g. Laplanche 1989), which force to the surface the impossibility of making Freud’s account ‘consonant with a model of the organism that is centred around adaptive need’ (Papoulias and Callard 2012, 211). We retain an anxiety that our focus on spatial logics of collaboration is already a refusal of this impossibility. We want to learn to collaborate in a world that is constituted as much through voids and non-relation as through contact and relation.

Notes & Queries: 5

Q: What kinds of people do I need for an interdisciplinary project involving the neurosciences, social sciences (and, perhaps, the humanities)? How do I arrange them?

A: This is a complex question – and one that opens in multiple directions, depending on the kind of phenomena you want to investigate, and the kinds of research you are interested in conducting. We wouldn’t for a moment want to imply that one can specify in advance the kinds of people one would need without attending to the particularities of a potential project. What we would say, however – and this is in the interests of departing from the ‘layer cake’ model we have described in this chapter – is that it’s worth thinking carefully before you decide you ‘need’ a psychologist, or an anthropologist, or a sociologist, or a cognitive neuroscientist, or a clinical researcher to make your interdisciplinary project work. It

might be helpful to explore the function that this initially perceived 'need' is serving and to disarticulate expertise in particular methods (performing statistical regressions; translating medieval Latin texts) from expertise in a discipline. There is also the important question of how appropriate expertise to take part in an interdisciplinary project does not necessarily map neatly on to seniority.

In many of the interdisciplinary projects in which we have been involved, we have been struck by: (1) what emerges – what topological relations unfold – from having people in the room with expertise in disciplines not commonly regarded as central to interdisciplinary neuroscientific projects (e.g. a poet, a medieval historian, a composer); (2) the torqueing of various disciplinary or discursive assumptions when the project includes people with varied disciplinary trainings (e.g. we are thinking of one of our collaborators who has expertise in computer science, anthropology, science and technology studies, and the history of science).



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