Interdisciplinary complexities

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REVIEW ESSAY

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Introduction

We live in a world increasingly traversed by notions of 'interdisciplinarity'. Seldom could a term have been so widely deployed as now, in intellectual and policy circles (or so it would seem – see below). Interdisciplinarity is viewed as offering a response to the widely perceived multiple complexities of the modern age. A single disciplinary approach is no longer considered adequate to analyze or describe the complexity of all the big issues of the day: globalization, for instance, or the knowledge-based society and innovation, environmental sustainability, national and personal security, citizenship and identity. None of these is thought to satisfactorily lend itself to a single disciplinary approach.

Into this dynamic context Andrew Barry and Georgina Born (from now on B&B) have introduced an edited volume of essays that proposes to investigate the notion of interdisciplinarity afresh. And it represents a considerable achievement. It presents a set of programmatic chapters dealing with the proliferation of conceptual issues associated with interdisciplinarity and a series of illuminating case studies that exemplify the analytical distinctions they seek to elaborate. In this review I take up the general project that B&B set themselves and their chapter authors: to explore the complex configurations of the social and natural sciences as these are being recast within the field of interdisciplinary studies and policy formation. The volume explores the ways intellectual disciplinary structures have come into critical focus and the terminologies that are deployed to express challenges to the supposed homogeneity of the disciplines. Since there are many terms in play in these discussions, a preliminary focus is to recap how the B&B volume handles this terminological abundance and to add a few critical comments on its characteristic approach. The book does us a great service by providing intellectual clarity with respect to interdisciplinarity's terminological proliferation. Along the way B&B also redress some of the exaggerations and misconceptions associated with any focus on interdisciplinarity.

The disciplines

Perhaps the best place to begin a critical discussion is with the disciplines as traditionally understood. There are three aspects to these emphasized in B&B (mainly in the early chapters) that have served to bolster a strict commitment to disciplinarity and strengthen attitudes toward the preservation of the disciplines by those suspicious of too much fragmentation.

The first characteristic is that they display a certain unity in their problematics, categories and techniques of investigation. This unity provides the disciplines with a coherent intellectual field or purpose, associated with a singular and homogenous 'object' of investigation: the biological world, the economy, medical symptoms, etc.

The second feature of disciplines is a concern with rigor with respect to their procedures and methods of investigation. Rigorous disciplinarity is said to ensure against the perils of sloppy

thinking and the dilution of disciplines, which threatens to undermine the forcefulness, authenticity and authority of analytical results and truth claims.

The third aspect stresses autonomy in disciplines' modes of existence. This autonomy has two basic features. Disciplines are autonomous from each other and from the powers or authorities that might wish to appropriate them. This aspect is exemplified by disciplinary institutionalization, designed to ensure against encroachments on their territorial identities: professionalization, specialist organizations of support and dissemination, academic departmentalization, publishing outlets, etc.

The chapters in the B&B volume illustrate how these three characteristics rhetorically typify many social and natural science operating contexts. But the arguments made in the book chapters suggest that the disciplines display few if any of these features in their actual day-to-day practices: they are not unified, they are not necessarily rigorous, and nor are they autonomous. In fact, the disciplines are always already compromised, they are always subject to cross-fertilizations, they are riddled with disputes, and they exist as hybrids. Take the discipline of geography. Is this unified? Hardly. It is fractured by disputes, for instance between 'physical geography' and various forms of 'cultural geography'. Similarly with psychology: here one of the main lines of fracture is between 'behavioral' and 'social' psychologists. But the chapters in B&B demonstrate that these are not isolated instances; such disputes are an enduring feature of all disciplines. Obviously some display more unity, rigor and autonomy than others, but few are completely exempt from some compromise and accommodation. And – argue B&B – as a consequence, nor is interdisciplinarity such a novel feature of intellectual and analytical life. It has been an historical feature ever since the notion of an intellectual discipline was coined.

Terminological clarifications

In their introductory chapter B&B work systematically though various notions of what they initially term 'cross-disciplinarity' practices (C-D), namely multidisciplinarity, interdisciplinarity and transdisciplinarity (B&B, p. 8). For the moment I concentrate upon these terms while noting that B&B go on to conduct their own discussions in terms of a central distinction between interdisciplinarity and transdisciplinarity (pp. 7–17).

Multidisciplinarity (M-D) brings together several separate disciplines to address a single object from their different perspectives. It signals an accumulation of disciplinary perspectives. An example would be 'urban studies', which brings together sociology, economics, geography, municipal engineering, planning, etc. to consider questions of urbanism. Thus M-D does not 'disturb' the disciplines as such but asks them to address the same issue from their already constituted intellectual perspectives, with the anticipation that this will provide a richer analysis, adding insights that could not be generated from the application of a single discipline.

Interdisciplinarity (I-D), on the other hand, describes an 'aggregation' process of disciplinary perspectives. Here, the disciplines are combined under an investigatory stance with respect to any issue, with the intention of producing a 'synthesis' between them. Thus while the integrity of the disciplines are still essentially 'preserved' in this process, interdisciplinarity, a central concept for B&B, also seeks a synthesis of their respective approaches through a process of their re-assembly and reconfiguration.

The other category with which B&B are centrally concerned is *transdisciplinarity* (T-D). The distinctive features of T-D approaches are that they overtly seek to 'transcend' or 'transform' existing disciplinary structures. The objective is to produce new structures of intelligibility, new orders of knowledge, new techniques of intervention and new forms of subjectivity. Above all, this is seen as an 'inventive' process: its outcomes are innovative and deliberately reconstructive.

By and large, these distinctions among cross-disciplinary practices serve the volume well. No volume of edited chapters gathered from several sources is going to demonstrate complete coherence in conceptual and terminological usage; nor do B&B want or expect them to. They suggest that a

certain differentiated fragmentation is inevitable and to be encouraged so as to demonstrate the fluidity and innovativeness of interdisciplinarity. However, further aspects of a broadly conceived interdisciplinarity complex, somewhat neglected by the B&B volume, are worth drawing attention to.

First, we could contrast this interdisciplinarity to the idea of post-disciplinarity (Pst-D). This is a deliberately 'de-constructive' practice; it trades on the idea that there can no longer be stable disciplinary discourse or boundaries (Turner 2006). These have been destroyed by several features of the post-modern world: globalization theory, postcolonial studies, networked knowledge, cybernetics, complexity theory and the like are seen as the modalities of this move into a Pst-D world (Spivak 2003).[1] Knowledges are necessarily fragmented, continually in play, fluid, always threatening to over-spill or overwhelm meaning and sense.

Attitudes toward Pst-D are likely to vary depending upon attitudes toward the idea of post-modernity itself, but it is one that could gather some momentum in the future. And it might be likened to another category that haunts this somewhat controversial side of interdisciplinarity, namely that of 'ill-disciplinarity' (Il-D). This category is somewhat similar to that of 'indiscipline' characterizing the analysis offered by Simon Schaffer in Chapter 2, where he discusses the genealogy of the category of discipline as such. And it might seem close to what Tomas Osborne presents in Chapter 3, stressing the necessary hybridity and porousness of the disciplines. Both of these chapters are interesting and entertaining in their own right. Finally, it might be what B&B term 'antidisciplinarity' (p. 5), and which Andrew Pickering explores in Chapter 9 in his study of cybernetics.

With Il-D, however, intellectual reason breaks down, any discipline dissipates and disruptive intellectual anarchy rules. This is not quite the same as Pst-D, which maintains some pretense at reason and intellectual rigor. And much of Andrew Pickering's chapter could be recast in this light, though he insists on maintaining the idea of modernity as the social backdrop against which cybernetics erupts. But it is basically the idea of a programmatic and epochal condition associated with Pst-D that is problematic here, that is, 'post-modernity' seen as a totally new configurative social order. If this does not exist, strictly speaking, nor would Pst-D. (And a similar comment could be made in this context about 'modernity' considered as a universal condition.)

Thus for a slightly wider consideration of cross-disciplinary practices we could add in some consideration of Pst-D and Il-D to those of disciplinarity, M-D, I-D and T-D. We also might add the category of 'pre-disciplinarity' (P-D) to capture the period 'prior' to the formation of a coherent discipline (to some extent also discussed by Simon Schaffer in Chapter 2).[2] All these categories and their relationships are summed up in Figure 1 ('The Inter-Disciplinary Complex').

Beginning with a pre-disciplinary phase (P-D), a more or less coherent discipline as traditionally understood is forged (D), subsequent to which various forms of cross-disciplinarity emerge (C-D). At the T-D stage there is a possible 'side-track' into an ill-disciplinary stage (Il-D). This is put in the figure to pose the question of whether T-D in fact implies Il-D (as those skeptical of I-D would argue). Alternatively, these two phases could be characterized as a Pst-D stage. In the first case, however, there remains the possibility of a renewal of the pathway to link to the formulation of a new disciplinary phase (N-D), as the whole process begins again. But in the second case this looks to be impossible since Pst-D implies no 'return' to the routine of disciplinization: it is a kind of terminal disruption of that process.

Figure 1, however, may be too 'mechanical' or overtly 'evolutionary'. Another way to illustrate the relationship involves seeing the concepts as continually in play, rather than one being 'displaced' by the other in a sequence. This is illustrated by the Venn diagram in Figure 2 ('The Inter-Disciplinary Matrix'), which presents an overlapping range of P-D, D and C-D forms in a complex formation; the analytical issue here is to deal with the application of several frameworks at the same time. Any object of analysis can be confronted from several different disciplinary and C-D angles. This provides a richer framework for analysis.

Whatever one chooses to term the current enthusiasm for non-single disciplinary approaches, the underlying issue is the same. B&B argue that such cross-disciplinarity is promoted and celebrated for offering the only appropriate approach to current problems and concerns, basically because of the
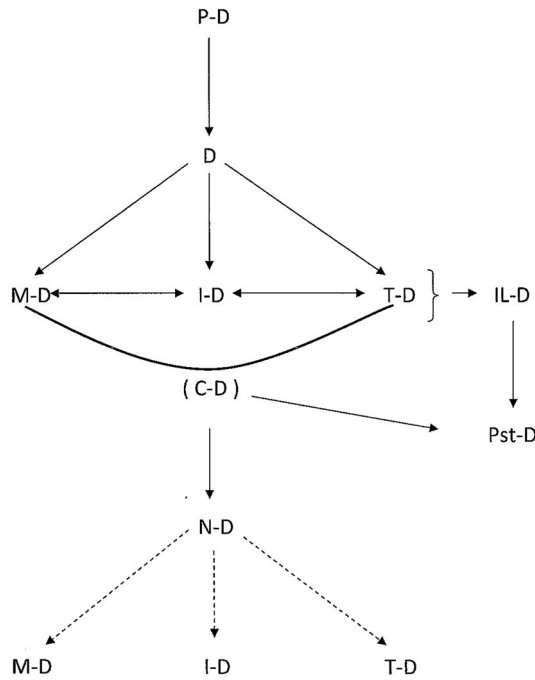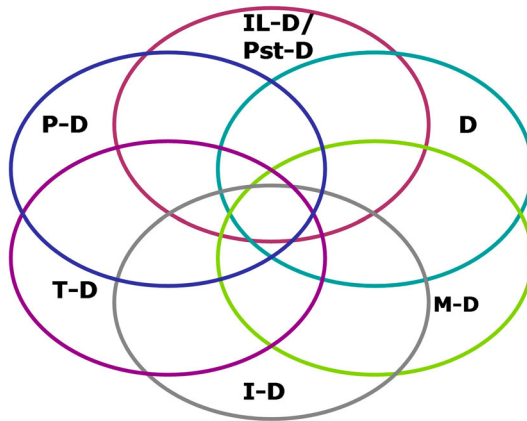
Figure 1. The interdisciplinary complex.

Figure 2. The interdisciplinary matrix.

perceived 'complexity' of the modern world. Their preferred 'interdisciplinarity/transdisciplinarity' coupling has become a mode of analytical thought that challenges the ubiquity and solidity of traditional disciplinarity. But what are the rationalities offered for the apparent recent explosive growth of this coupling? B&B discuss this under the heading of 'Logics of Interdisciplinarity'. Three such logics are identified: accountability, innovation and 'ontology'. Discussing these will enable us to review some of the political aspects of interdisciplinarity since it is via these logics, B&B suggest, that their 'I-D/T-D' coupling is governed.

Governing interdisciplinarity

Accountability

The logic of accountability provides the most obvious connection to technologies of governance: how research practices are to be managed and regulated. A key feature of this, outlined in the volume, is a new emphasis on the desire to engage the public in dialog with traditional disciplinary culture and its outputs. This is expressed, particularly in the UK context, by the demand by funding bodies to engage the constituencies or stakeholders in any research project. Much effort by researchers goes into meeting this requirement for 'user involvement', which has effectively become a binding rule and condition for funding. Such reflexivity creates its own interesting 'imagined' parties in the relationship: the imagined lay person (Mareanta et al. 2003) and a possible counter in the imagined disciplinary expert (Strathern 2004). Both Sarah Whatmore in Chapter 7 and Gisa Weszkalnys and Andrew Barry in Chapter 8 pay close attention to this aspect of I-D, as participatory pressures appear intensively in the context of environmental research.

In many cases, however, the demand is to draw members of the public into the very process of investigation, such that they effectively become co-researchers. What seems to be at stake here is the attempt to muddy the boundary between 'experts' and 'lay opinion'. The implication is that there is no longer a clear distinction to be drawn between those with expertise and those without it, that is, the general public. Thus, to some extent, the notion of 'expertise' is under threat from the adoption of interdisciplinary approaches, which perhaps erode the distinction between expertise and lay opinion itself (Strathern 2004). In the UK context this has to do with a more general political program of 'social inclusion' and the 'democratization' of areas of social and economic life. All research has to be relevant, and a way to ensure relevance is to include the general public in the process of agenda-setting and 'assessment'. This is made more amenable by employing I-D/T-D approaches since these are not only thought to be more appropriate in dealing with a complex world, but also are more easily understood by the lay public, enabling them to intervene. In light of this, Gibbons (1999, C.84) suggests that 'reliable knowledge' is being replaced by a new category: 'socially robust knowledge'.

While several authors in the B&B volume recognize this as a feature of I-D/T-D approaches, they do not see it as a threat to the autonomy of the research process: it is a reasonable request that fosters accountability and encourages innovation. However, it could be in danger of allowing popular prejudice and opinion to drive the research agenda.[3] In addition, there is an increasing trend to subject all research activity, including academic research, to the test of the market. Market testing and market discipline, competition over funding, etc., is the language increasingly deployed in the academic research environment. C-D techniques could be a path to further this objective. They stress the self 'responsibilization' and 'autonomization' of agents and agencies. In this respect, they promote indirect 'governance at a distance' by shaping the 'conduct of conduct' among researchers.

Innovation

As B&B point out, the enthusiasm for innovation to be found with contemporary interdisciplinarity is not just about a *response* to an already conceptualized complexity but also a way of *generating* complexity: a way of setting up new problems or conceiving new experiments. This involves innovations in several respects, but these can be conveniently divided into methodological innovations and theoretical ones.

Methodologically, the chapters in B&B concentrate on the way ethnographic techniques have proliferated in research environments, particularly around STS, financial practices and their institutional contexts, the arts–science interface and environmental concerns. Marilyn Strathern and Elena Khilnovskaya Rockhill in Chapter 5 and Lucy Suchman in Chapter 6 detail this preference for ethnography in the contexts of the Cambridge Genetics Knowledge Park and the Xerox

Corporation's Palo Alto Research Centre, respectively. A parallel process to this interdisciplinization of analytical techniques has been the general progress up the research agenda of 'methodology', to some extent at the expense of 'theory'. Or rather, perhaps theory has been recast in this relationship: First, a lot of theory is now taught as methodology.[4] Second – perhaps as a consequence – theory is increasingly becoming a performative activity associated with celebrity theorists who tend only to talk among themselves or to the cognoscenti: theorists have become accustomed to speaking a particular kind of analytical language, one mainly directed at other theorists. This comprises an almost hermetically sealed discursive enactment, access to which is made deliberately difficult for those not familiar with its tropes and nuances. In a world where it is those projects and research issues that promise the most obvious link to clearly defined and immediate outcomes, it is things that can be easily assessed that will attract the funding. Traditional theoretical reflection is disadvantaged by this, since it often cannot show obvious performative outcomes that can be calculated, nor do these necessarily arise quickly or transparently. Perhaps that is why – as a result – it may be increasingly only 'performed' to other theorists.

But there is less emphasis in the B&B volume than might have been expected on the implications of interdisciplinarity for the idea of 'theory' broadly conceived. In our new interdisciplinary world it would seem there also needs to be a reconceptualization of the theorist, perhaps seen as a consequential figure in the 'arts of reasoning'.[5] Those arts of reasoning now comprise a loose ensemble of logico-rhetorical methods, cognitive techniques, doctrines, modes of proof, techniques and ethical exercises, combined with experimental apparatuses, which constitutes a certain type of persona that can represent to itself a unity of purposes and a singularity of its 'ideas'. That assemblage is acquired through routines of practical mastery and often held together by pedagogical anchoring rather than by some set of self-contained beliefs. From this perspective this is what 'theory' comprises, and it fits well into the world of interdisciplinarity as sketched in the B&B volume.

Ontology

Finally, B&B find a proliferation of new forms of subjectivity constituting new publics and lay persons in the world of I-D/T-D (see Lucy Suchman's Chapter 6 in particular). As B&B point out, many of these arise within innovative pedagogic collaborations between disciplines: this has provided a key impetus for the growth of interdisciplinarity (as Chapters 4, 10 and 11 discuss). But we could extend this to the role of schools. An added incentive is provided by the kind of student entering the higher education system, as well as the demands made of them by the labor market as they exit that system. Increasingly, therefore, secondary schools promote cross-disciplinary activity to foster student interest as a strategy for social inclusion and to deal with mixed abilities. But when they get to universities, students expect more cross-disciplinary activity. Combined degree and vocationally orientated degree programs have, as a result, proliferated. And employers want a compliant and adaptable set of work skills, which emerge more readily from cross-disciplinary activity.

Finally, in relationship to all three logics, a critical point that deserves greater consideration is what distinguishes these logics from interdisciplinarity as such. Many of these characteristics would seem to be just as pertinent to the governance of disciplinary matters as to interdisciplinary ones.

Some final reflections

In conclusion it is worth stressing several features of the B&B volume and the critical comments offered above.

The first is to suggest that there is nothing either necessarily good or necessarily bad about I-D/T-D approaches to intellectual activity. There is a perfectly robust defense that can be mounted for disciplinarity, the outlines of which were offered in the early comment in this review. I-D/T-D approaches have their strengths as well as their weaknesses.

Second, one potentially worrying trend linked to the I-D/T-D coupling is the effacement of the distinction between the expert and lay person. This involves the way opinion and popular prejudice could seriously infect the research agenda, something, it was argued, not unconnected to the development of cross-disciplinary practices. Many of the 'lay-person agenda setters' operating in this world have no necessary expertise, yet they are the ones that both claim a voice and attract an audience. The question this poses is whether truth itself is becoming performative rather than substantive or constitutive?

Finally, as suggested in several places in the B&B volume, perhaps the best stance to take on these matters is to encourage a continued tension between the disciplines. It may well be that a slightly agonistic, or even antagonistic, relationship will prove the most productive. This really speaks to cultivating further 'collaborative troubling' between the disciplines, even in the face of strong trends toward overt interdisciplinarity.

NOTES

1. Here 'post-modernity' – essentially a discursive category -– and the 'post-modern condition' – viewed as an objective feature of the modern world through which we live our lives -– tend to run together.
2. Pre-disciplinarity is a necessary concept to account for both the period before the traditional disciplines were founded and as a category to illustrate the formation of 'new' disciplinary structures in the contemporary era.
3. This could equally well provide further justification for the legitimation of 'popular prejudice'. One only has to look to the USA where disputes around Darwinian evolution and other accepted scientific approaches have become incendiary in popular debate. This is not unconnected to the way scientific research is being recast along lines that undermine the distinction between expertise and lay opinion. This raises another important point. As disputation among scientists over the validity of research results increases, skepticism among the public similarly grows. What does the public do under such circumstances? In many ways, decision-making is thrown on to the public to makes up its own mind; the public is asked to assess what it should do 'on-its-own', as it were. It is 'abandoned' to its own devices in making a judgment. How might it go about this? It must detect partisanship and biases among experts, including by assessing the claims and counterclaims of different scientists by looking at their credentials: their universities or research institutes, their status within professional bodies, who publically backs this or that group, their reputation and authority, past record, etc.
4. Traditionally, theory was seen as a prelude to an investigation: theory and methodological protocols were separate activities. No doubt it is because our funding masters demand it that methodology has risen up the agenda and theory relegated to a secondary status.
5. See Gaukroger (2006) and Hunter (2007). Reasoning here has nothing necessarily to do with a 'rational being'; indeed it is precisely counterpoised to this figure.

Disclosure statement

No potential conflict of interest was reported by the authors.

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