throughout the two main phases of his working life. The first, archaeology, might be seen as a description of his historical method, his desire to dig beneath the surface of received 'fact' in order to divine the 'deep structures' of historical behaviour. As mentioned above, these structures are characterized as 'discursive formations'. For the most part, the study of such formations is set within those bodies of knowledge we usually refer to as 'disciplines' and the archaeological approach aims to identify how specific discourses mark the limits of what can be known at given moments in time. In his genealogical phase, Foucault is more concerned with the practical consequences of disciplines and their associated discursive frameworks. In particular, he comes to see discursive practices as part and parcel of the exercise of power. Thus, genealogical analysis explicitly links together power and discourse (or knowledge), and aims to analyse the inhibiting or constraining effects of discursive practice and the resulting impacts on social and spatial arrangements. In so doing, it takes us further into the materiality of space and the ways in which power relations shape the contours of material formations.

For the purposes of convenience we can treat the archaeological and genealogical periods as distinct. In this section we will therefore consider the main works emerging during the archaeological phase before turning to the genealogical phase in the next section. However, before putting this distinction into operation it is worth noting Eldon's caveat that archaeology and genealogy should not be viewed as mutually exclusive terms. He says:

> although genealogy is sometimes seen as a replacement for archaeology, it is better to see the two as existing together, as two halves of a complementary approach. Archaeology looks at truth as a system of ordered procedures for the production, regulation, distribution, circulation, and operation of [discourses], whilst genealogy sees truth as linked in a circular relation with systems of power which produce and sustain it, and to effects of power which it induces and it extends. (2001: 104)

On this view, the studies of discourse that emerge during Foucault's archaeological phase pave the way for the more materialistic studies of power/knowledge in the genealogical phase.

Foucault's first major work in the archaeological period concerns the history of madness (in French this was published as the *Histoire de la folie*, and in English as *Madness and Civilisation*).[3] Effectively Foucault's history documents a series of disruptions in the way insane people are treated by the rest of society. He discerns a first disruption in the mid-seventeenth century. This separates the Classical view of madness (prevalent during the seventeenth and eighteenth centuries) from the view dominating during the Middle Ages and the Renaissance. Another break can be seen at the end of the eighteenth century, and this heralds the birth of the modern view of madness. In documenting the shift from one regime of madness to another, Foucault pays particular attention to the

We can start here with the image of the 'ship of fools', a strange 'drunken boat' which emerges onto the imaginary landscape of the Renaissance. This imaginary ship, Foucault suggests, actually refers to the wanderings of the mad. During this era those people regarded as insane were driven out of towns and into the countryside where they lived an aimless and rootless existence; they moved from place to place as medieval fears defined their itinerant status. Eldon (2001: 123) summarizes it thus: 'treatment of the mad is [...] shown to be erratic – sometimes tolerant, sometimes exclusionary, sometimes hospitable. There is no regimented model, no overall plan'.

If the symbolic image of Renaissance attitudes is the ship of fools, then the symbolic image of the Classical period is the hospital. Foucault suggests that from the middle of the seventeenth century onwards the mad were no longer left to wander but were increasingly confined within dedicated 'mad spaces'. This shift takes place as part of a more general trend towards ordered urban spaces in which discrete social groups were positioned according to their function and status. Confinement was thus a new mechanism of social control within the city. Moreover, this mechanism was built around new forms of urban morality. In Gutting's view,

> the conceptual and physical exclusion of the mad reflected a moral condemnation. The moral fault, however, was not the ordinary sort, whereby a member of the human community violates one of its basic norms. Rather, madness corresponded to a radical choice that rejected humanity and the human community in toto in favour of a life of sheer (nonhuman) animality. (2001: 265)

The insane were therefore confined as a kind of moral punishment for their acquisition of inhuman characteristics and behaviours. And within these confined places, they were treated in a variety of ways: 'some had places in hospitals and almost had a medical status, whereas others were effectively in prison' (Eldon, 2001: 126).

As we enter the modern era, however, another change in perceptions of the insane takes place. Now the mad return to the human fold but are seen as offenders against social norms. As such, they require correction and treatment. Those lucky enough to be in hospital would be subject to medicalized processes of observation and classification. This medicalization of madness would lead to the condition of insanity progressively being seen not as a disease of the soul but of the body. Importantly, the re-location of madness in the space of the body allowed for the development of various medical interventions. As Gutting (2001: 266) comments: 'corresponding to this new conception of madness is the characteristic modern mode of treating the mad: not merely isolating them but making them the objects of a moral therapy that subjects them to social norms'.

so that the apparent autonomy of the patients was greater than the actual – false handles on certain doors, with some spaces forbidden; custodial features were minimised, such as the muffling of bolts, and the use of case iron frames around windows to remove the need for bars' (2001: 131). In these new asylum spaces, the mad were subjected to a moralizing judgement, a judgement that was itself closely bound into the material fabric of the spatial structure.

It should be apparent that in this work on madness Foucault weaves together morality, medicine and space to indicate how discursive formations (in this case, the discourse of madness) construct and confine human subjects (in this case, the mad). He shows a movement from a pure morality to a medicalized morality. This movement entails the construction of places of confinement where the mad are increasingly subject to the medical gaze; as this gaze is brought to bear, so madness is progressively redefined as a modern form of ill-ness. Yet, while the doctor now occupies a central place within the asylum, 'his intervention is not made by virtue of a medical skill but by the power of morality'. Thus, the asylum ensures a new form of 'moral imprisonment' (Eldon, 2001: 133). The space of the asylum is a space of morality with the internal structure somehow reflecting the (moralistic) character of the prevailing discursive formation.

In general terms, a discursive geography of madness emerges from Foucault's historical study. He shows how 'spaces of unreason' come to be successfully demarcated from 'spaces of reason', and he illustrates how space is used in rela-tion to the mad, 'tracing patterns of exclusion, ordering, moralisation and con-finement' (Eldon, 2001: 133). The focus on exclusions and confinements thus effectively reveals the 'spaces of dispersion' identified by Philo:

> Foucault's text concerns the historical emergence in Western Europe of an impulse both social and spatial towards segregating people labelled as mad (as 'lunatic', 'insane', 'mentally ill') from the 'normal' round of work, rest, and play, often with the conse-quence that these people ended up living out their days in houses of confinement both non-specialist (workhouses, prisons) and specialist (asylums, mental hospitals, mental health facilities). (2000: 223)

By pointing to this outcome, Foucault's history challenges the broad thrust of Enlightenment thought, which tends to see the adoption of medicalized treat-ments as reflecting the emergence of a more humane attitude towards those labelled 'insane'. The shift from one episteme of madness to another is not ren-dered in terms of progress; rather, it is seen in terms of the introduction of a more totalizing form of confinement and moral judgement. The mad begin as wanderers and end up as prisoners. This result is fairly typical of Foucault's assessment of modern knowledge systems. According to McNay (1994: 2), Foucault generally seeks to question 'the rationality of post-Enlightenment society by focusing on the ways in which many of the enlightened practices of

BOX 2.1

The following issues emerge during Foucault's 'archaeological' phase:

- Space is shaped by discourse so that discursive conventions become enshrined within particular 'micro' spaces (such as the asylum).
- Actors within those spaces are 'made' by the discourses that surround them (for example, the mad are 'made' by discourses of madness).
- There are sharp breaks in the structure of discursive formations as one inevitably gives way to another.
- Breaks in discursive formations indicate that there is a residual structuralism at work in Foucault's archaeologies as the formations take on almost structural qualities – once one can 'read' the formation' one can read behaviour in micro-settings.

A concern with the 'dark underside' of progress comes explicitly to the fore in Foucault's other major archaeological work, *The Order of Things*. Here he examines how the human sciences changed during a series of shifts from the medieval through to the modern age. Again, he emphasizes the contingency of knowledge and for each period he sketches the general epistemic structure under-lying the human sciences or their equivalents. Gutting explains the approach as follows:

> Foucault's characterisations of the epistemes of the Renaissance, the Classical Age, and the modern age are formulated in terms of, one, an episteme's fundamental manner of ordering the objects of thought and experience (its 'order of things'); second, the con-sequences of this ordering for the nature of signs (especially linguistic signs); and third, the consequences of the episteme's view of order and of signs for its conception of knowledge. (2001: 269)

As with the history of madness, this study of the human sciences delineates breakpoints, with one episteme inevitably giving way to another. For instance, Foucault argues that, within the Renaissance episteme, the underlying struc-ture of knowledge was given by the notion of 'resemblance' in which the rela-tion between one object and another derived from the perceived commonality of forms (for example, between signs and the things they signify). With the advent of the Classical age, this is replaced by an episteme based on the iden-tities and differences that exist amongst objects. Thus, we witness the emer-gence of formal systems of signs (such as classification tables) that aim to represent the degrees of sameness and difference between things. This Classical

(2001: 271) puts it: 'an entity is understood and related to other things in virtue of the role it plays not in an ideal table of possibilities but in a real, historically developing environment'.

Through all this, Foucault focuses on the status of 'man'. Following his history of madness, he aims to show how human subjects are 'constructed' by disciplinary discourses – as Ian Hacking (1986) puts it, he is interested in how differing knowledge domains 'make up people'. The domains in question are psychology, sociology and literary analysis, and the focus is on the status of 'man' as a representational being. Foucault claims that in the medieval and Classical ages people were simply not capable of 'representing' the human world, because modes of representation were set within resemblances and classifications of sameness and difference. However, in the modern age, 'man' as a representational being emerges and (disciplinary) questions are asked about the type of being this 'man' might be. Again, Foucault points to the structure of disciplinary discourses in order to show how they succeed in imposing their formal structures upon diverse modes of human representation and experience. Gutting suggests that with *The Order of Things* we witness the full flowering of the archaeological method:

> Archaeology emerges as a method of analysis that reveals the intellectual structures that underlie and make possible the entire range of diverse (and often conflicting) concepts, methods, and theories characterising the thought of a given period. Concepts, methods and theories belong to the conscious life of individual subjects. By reading texts to discover not the intention of the authors but the deep structure of the language itself Foucault's archaeology goes beneath conscious life to reveal the epistemic 'unconscious' that defines and makes possible individuals' knowledge. (2001: 269)

It would seem from this comment that Foucault retains at this time a lingering connection to structuralism – that is, he continues to pay a considerable amount of attention to the underlying structures of differing discursive formations. Although in his 1970 foreword to *The Order of Things*, he berates 'half witted commentators' who persist in thinking of him as a structuralist, Eldon (2001: 101) believes Foucault is here 'protesting too much'. There are, Eldon notes, clear similarities between Foucault in his archaeological phase and the structuralists, notably in the downplaying of human agency and in the significance ascribed to formal discursive rules.[4] As Hacking (2004: 288) puts it: 'Foucault proposed his various ideas of a structure that determines discourse and action from the top down'. And yet, Eldon believes, despite these affinities, even in this period of his work, Foucault is beginning to move decisively towards post-structuralism. This is particularly evident in the attention he pays to spatiality. Eldon (2001: 102) says that Foucault's histories 'were not merely spatial in the language they used, or in the metaphors of knowledge they developed, but were also histories of spaces and attendant to the spaces of history'. This

material places and spaces. We have seen some evidence of this in Foucault's history of madness but it is taken much further in the studies that comprise his genealogical phase.

Genealogy and discipline

The key text of this second period in Foucault's working life is *Discipline and Punish*, a history of penal reform and punishment, first published in 1975. The study of the prison allows Foucault to take forward themes that were explicitly addressed in *Madness and Civilisation*, notably the confinement of subjects within specific discursive regimes. However, the focus now shifts to the connections between bodies of knowledge and non-discursive practices. In particular, Foucault becomes concerned with the power relations that underpin or surround specific discourses and with the way such relations configure or construct practices of various kinds. His genealogical perspective highlights how relations of power link together discursive and material resources. Thus, the genealogical method pays particular attention to the relationship between power, knowledge, practice and space. Not surprisingly, it is during this phase that the relational character of space comes most fully into view.

As in his earlier work, Foucault contrasts the modern age of incarceration with a preceding Classical age. In the Classical period the most striking feature of the regime of punishment was its public and flamboyant character. Punishment was here a visual display of the power of the sovereign: 'pillories, gallows and scaffolds were erected in public squares or by the roadside; sometimes the corpses of the executed persons were displayed for several days near the scenes of their crimes' (Foucault, 1979: 58). Punishment thus worked as a visual medium and its power resided in its impact on the body of the miscreant, as well as in public perception of this impact. However, during the eighteenth century this Classical notion of 'punishment as spectacle' came to be questioned by penal campaigners who argued for a less physically harmful, more reformist mode of retribution. The campaigners put forward a variety of suggestions for reform, including a wider usage of exile and deportation. Yet, gradually another solution emerges: imprisonment. In Foucault's account, confinement as a mode of punishment becomes so ubiquitous that by the beginning of the nineteenth century a new regime of discipline based upon the prison has come in to being.

Just as the asylum materializes the discourse of madness, the prison materializes the discourse of crime and punishment. As Driver (1994: 283) puts it, in the modern carceral regime, individuals are to be 'trained into new habits, new patterns of conduct; their bodies subject to a dressage of disciplinary routines, their conduct monitored as closely as possible'. Activities are therefore to be strictly regulated in space and time: 'prisons are divided by cells, land-

of the modern regime of disciplinary correction. Foucault summarizes the implications thus:

> Disciplinary space tends to be divided into as many sections as there are bodies or elements to be distributed [...] its aim was to establish presences and absences, to know where and how to locate individuals, to set up useful communications, to interrupt others, to be able at each moment to supervise the conduct of each individual, to assess it, to judge it, to calculate its qualities or merits. It was a procedure, therefore, aimed at knowing mastering and using. (1979: 143)

Knowing, mastering and using, however, are further refined into a set of techniques of surveillance.

> Hierarchical, continuous and functional surveillance [...] was organised as a multiple, automatic and anonymous power [...] This enables the disciplinary power to be both absolutely indiscreet, since it is everywhere and always alert, since by its very principle it leaves no zone of shade and constantly supervises the very individuals who are entrusted with the task of supervision; and absolutely 'discreet', for it functions permanently, and largely in silence. (1979: 176–7)

The material fabric of the prison must ensure, 'hierarchical observation' – that is, 'careful monitoring by observers who are not themselves observed' (Gutting, 2001: 280). Hierarchical observation lays the groundwork for 'normalizing judgement' – that is, an assessment of prisoners that culminates in pronouncements of 'normality' or 'abnormality' (Foucault, 2004). The monitoring of bodily conduct is aimed at establishing a rigid adherence to norms on the part of prisoners so that deviant behaviour can be easily apprehended.

As Foucault explains, close monitoring requires observation by observers who are not themselves observed. He provides, as the most striking illustration of this hidden but intrusive process of observation, the example of Jeremy Bentham's Panopticon. Although it was never actually built, Foucault believes Bentham's design for the 'ideal' prison shows how 'nomalizing judgement' and 'hierarchical observation' routinely become enshrined in modern disciplinary institutions. As envisioned by Bentham, the Panopticon was a multi-storied building with a tower at the centre of a circular space (see Figure 2.1). The cells in the outer ring faced the tower with a completely open but barred frontage. The outer end of each cell was open to light from the outside so that, from the central tower, each cell was backlit in an illuminatory fashion. All activities in all cells were therefore rendered highly visible. However, the tower itself was maintained in darkness so that the prisoners could never know whether or not they were actually being watched. As a consequence, each prisoner was forced to assume *constant* surveillance even though this surveillance might be intermittent or even non-existent. In this building, then, prisoners were expected to monitor and regulate their own conduct, albeit on the assumption that they
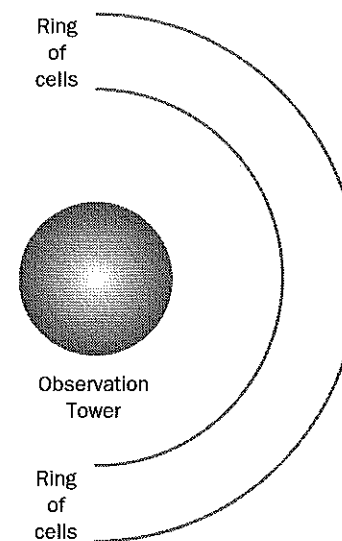
FIGURE 2.1   A plan of Bentham's Panopticon (Source: Hannah, 1997)

self-discipline, as inmates were enlisted into controlling themselves, and as the external eye in the inspection tower was replaced by the internal eye of conscience'. In a commentary on the Panopticon, Matthew Hannah draws out similar implications:

> Prisoners as human objects are visible as individuals: each one is distinguishable from all the others; each irregular activity is assignable to a specific person. All prisoners are potentially visible in all activities; they are completely limned by light. None can escape punishment as an automatic consequence of abnormal behaviour. The watchers in the tower have direct control of the means of punishment through a hierarchical structure of command unifying what I call three moments of control: observation, judgement and enforcement of behaviour [...] while watching is only sporadic, the threat of being watched never ceases [...] Panoptic power, then, brings together a completely visible, distinguishable and precisely punishable human object, and a unified, infallible, omniscient and anonymous authoritative subject. (1997: 347)

We clearly see in the Panopticon how power links together subjects and objects within the context of a discursive regime, one aimed at establishing specific norms of behaviour. We also see the spatial implications of this linking as complex architectural spaces bring forth the relations of power developed initially at the discursive level: 'Jeremy Bentham's Panopticon relates power and knowledge, norm and surveillance, in an interplay of architecture and social science' (Flynn, 1994: 41). By displaying these relations, the Panopticon usefully illustrates how power, discourse, practice and space come to be aligned in the

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BOX 2.2

Some core features of Foucault's genealogical approach:

- Discourse becomes deeply embedded in the materiality of given spaces to the point where it might be argued 'material arrangements' generate the 'discursive' aspects of these spaces.
- These material and discursive spaces act upon the bodies of human subjects. Thus subjectivity is constituted spatially, in some real sense it is *made* by the spatial configurations in which the subjects (that is, inmates) find themselves.
- Thus, 'external' discourses are 'internalized' to the extent that these discourses help to produce subjectivity.
- In this regard Foucault has moved much more fully into post-structuralism as the subject is now 'decentred' into the relations that surround him/her.
- Moreover, these relations combine discursive and non-discursive elements so that relational configurations can be seen as 'heterogeneous'.

Foucault focuses on the Panopticon because he believes it crystallizes key features of a new discursive regime associated with discipline and punishment. Within this regime, the penal system becomes a kind of 'factory' for producing knowledge about individual prisoners. However, this 'knowledge factory' is concerned 'not with the crimes committed but with the potential danger that lay hidden in every individual' (Barker, 1998: 56). It is therefore the suppression of potential dangers that drives the development of Panoptic monitoring and surveillance. Moreover, Foucault argues these mechanisms are increasingly adopted beyond the prison gate in a host of institutional settings – schools, factories and hospitals – where the same processes of observation and normalization are valued. Foucault claims that these new Panoptic spaces come to comprise a a 'carceral archipelago', organized in line with the ubiquitous strategies of hierarchical observation and normalizing judgement. It seems, then, that the prison has spread, heralding the emergence of what might be called a 'disciplinary society'.[5]

However, Eldon (2001) suggests there is another way of reading *Discipline and Punish*. He suggests that the Panopticon should be seen as 'the *culmination* of a variety of technologies of power rather than their *beginning*' (2001: 147; emphasis added). He believes that we should study not the Panopticon itself but 'panopticism'. In his view, 'we can best understand the birth of the prison from the general rise of what is designated panopticism, rather than the reverse'

being a diluted form of the prison, the prison is the general trend in its most extreme form' (2001: 147). Thus, in Eldon's account, Foucault details aspects of the Panopticon not because this particular arrangement of power has gradually inserted itself into every nook and cranny of modern society but because it usefully shows how power relations in general work in 'microphysical' environments such as prisons, hospitals, schools and other institutional spaces.

Government and governmentality

The analysis that Foucault provides in *Discipline and Punish* is emblematic of his later work, especially in its focus upon strategies of 'normalization'. These strategies are of abiding interest to Foucault (see, for instance, Foucault, 2004). In fact, they are soon extended beyond micro-locales, such as prisons, to a broader study of systems of 'government' – that is, the normalization of behaviour at the *societal* scale. This turn towards 'societal government' takes Foucault beyond the juridical sphere into a host of other domains – such as education, welfare services, urban planning, economic regulation and health – anywhere that modes of 'normalizing judgement' are routinely brought to bear (2004: 134).

In order to develop his perspective on normalization 'outside' the prison Foucault adopts a very broad definition of 'government'; it applies to 'any more or less calculated and rational activity [...] that seeks to shape conduct'; that is, it applies to 'any attempt to shape with some degree of deliberation aspects of our behaviour according to particular sets of norms and for a variety of ends' (Dean, 1999: 10–11). Increasingly, then, Foucault sees disciplinary and other forms of power in terms of the 'shaping of conduct' in line with governmental strategies of 'normalization' (Foucault, 2004: 49). Yet, while this notion of the 'conduct of conduct' might be applied to almost any form of governmental activity,[6] Hindess (1996: 106) believes Foucault intends it to be applied in a narrower fashion to refer to 'less spontaneous' exercises of power over others, to 'those exercises that are more calculated and considered'. Indeed, Foucault brings government and calculation explicitly together in the notion of 'governmentality', a topic he discusses in a series of lectures in the late 1970s (eventually published in Foucault, 1991). According to Lemke (2001: 191), the development of this concept 'demonstrates Foucault's working hypothesis on the reciprocal constitution of power techniques and forms of knowledge. The semantic linking of governing ("gouverner") and modes of thought ("mentalité") indicates that it is not possible to study the technologies of power without an analysis of the political rationality underpinning them'. Thus, there are two sides to governmentality. First, the term defines a discursive field in which the exercise of power is 'rationalized'. The 'rationality' of government is defined by Colin

capable of making some form of that activity thinkable and practicable both to its practitioners and to those upon whom it is practised'. However, as Lemke (2001: 191) notes, a political rationality is not 'pure, neutral knowledge which simply "re-presents" the governing reality; instead, it itself constitutes the intellectual processing of the reality which political technologies can then tackle'. This bring us, secondly, to technologies of government – that is, to those procedures that enable rationalities to act effectively upon diverse subjects and objects. These consist of 'mundane programmes, calculations, techniques, apparatuses, through which authorities seek to embody and give effect to governmental ambitions' (Rose and Miller, 1992: 175). Rationalities and technologies are closely aligned within specific regimes of governmentality – that is, 'thought as it becomes linked to and is embedded in technical means for the shaping and reshaping of conduct and in practices and institutions' (Dean, 1999: 18).

Foucault's work on prisons and asylums clearly indicates that the practice of government is widely dispersed throughout society. In fact, it seems that almost all forms of disciplinary expertise are being brought to bear in a governing process that extends throughout modern institutions. As Dean (1999: 10) puts it: 'there is a plurality of governing agencies and authorities, of aspects of behaviour to be governed, of norms to be invoked, of purposes sought, and of effects, outcomes and consequences'. Lemke (2001: 201) suggests that we might discern a continuum of governmentality, one that extends from political government right through to forms of individualized self-regulation. In the context of this continuum, we can see that the bulk of Foucault's work is located squarely in the middle: he analyses a range of institutional forms that sit somewhere between the state and the individualized subject.

More recent analysts of governmentality have, however, shifted the focus more firmly towards conventional notions of government. Miller and Rose (1990), for instance, argue that the notion of governmentality is particularly appropriate to understanding the conduct of political government in liberal democracies. They note that, in distinction to 'police' states (not simply current totalitarian regimes, but also the states of the pre-modern *ancien régime*), where there is an urge to specify and scrutinize all forms of behaviour, liberal democracies typically hold limits to state power. These limits have been evident since the latter years of the eighteenth century, when the term 'civil society' came to signify a realm of freedom, rights and activities *outside* the legitimate sphere of the state. Thus, the delimitation of the powers of political authorities arose in conjunction with a private, civil realm – consisting of markets, families, firms and so on – which existed d *beyond* the boundaries of the state. Simultaneously, however, government took on the role of fostering the self-organizing capacities of this civil realm: 'Political rule was given the task of shaping and nurturing that very civil society that was supposed to provide its counterweight and

Foucault (1991) identifies a recurring concern around the need to establish a viable boundary between state action and inaction in liberal society. In the early period of what might be termed the classical liberal state, the overwhelming assumption was that the totality of economic processes was ultimately unknowable and, as a consequence, economic sovereignty on the part of the state was impossible. Thus, any intervention by the state in this sphere had to be amply justified.[7] As in his earlier historical studies, Foucault discerns a 'breakpoint' in the middle years of the nineteenth century. Now a series of new roles for the state emerge which themselves begin to acquire something of the density and complexity formerly attributed by liberal thinkers to commercial society and the market (Gordon, 1991: 34). The economic sphere comes to be seen not just as an extant, natural state of affairs but as one that can only exist under certain political, legal and institutional conditions, and these have to be guaranteed by government. Rather than thinking of state action in terms of its necessary justification, there thus emerges 'an intimate symbiosis' (Gordon, 1991: 35) between government and civil society. The economy and, crucially, society become thought of more as a catalogue of problems *for* government than as a self-regulating sphere that can only be undermined *by* government.

As the engagement between state and society becomes more complex, so it becomes increasingly apparent that if modern governments are to manage the multiple domains of civil life they must have some understanding of these domains. The conduct of government is, then, tied to expertise, for this allows 'the calculated administration of diverse aspects of conduct through countless, often competing, local tactics of education, persuasion, inducement, management, incitement, motivation and encouragement' (Rose and Miller, 1992: 175). According to Miller and Rose (1990: 189), experts enter into a double alliance: on the one hand, they ally themselves with political authorities, translating political concerns about such issues as economic productivity, law and order, and pathology into the vocabulary of management, social science, medicine and so on; on the other hand, they form alliances with 'private' actors, translating their concerns over such issues as investment, child rearing or illness into a range of techniques for improvement. These two-way alliances result in what Dean (1999: 22) calls 'regimes of practices', which serve to define subjects and objects and codify appropriate ways of dealing with relations between them.

In short, the political governance of modern society requires a range of actors, practices and discourses to be mobilized across diverse socio-spatial domains. Political forces can only govern by influencing or co-opting domains in civil society that they do not *directly* control. Liberalism is thus marked out by the degree to which power is exercised, not so much by direct repression, but more by the invisible strategies of normalizing judgement that are brought to bear on apparently 'free' subjects (McNay, 1994). Such strategies emerge from a variety of

BOX 2.3

Foucault's interest in 'governmentality' gives rise to the following considerations:

- Discourses shape not just micro-spaces but much broader territories (i.e. societies) also. These governmental discourses work in much the same way as disciplinary discourses in that they configure subjectivity but now in a wider range of settings.
- Governmental discourses are made up of 'rationalities' – that is, broad justifications for governing certain spatial domains in certain ways – and 'technologies' – that is, the precise means by which rationalities can be implemented in practice..
- The combination of rationalities and technologies in the notion of 'governmentality' highlights the fact that government is a heterogeneous affair, it requires the mobilization of many resources and many differing types of actors, both 'inside' and 'outside' the state.
- The mobilization of rationalities and technologies relies upon 'expertise' of various kinds. Experts work to link governmental authorities to nominally 'free' subjects. Foucault's interest in expertise stems from his interest in disciplinary knowledges.
- Governmentalities thus work inside and outside the state and easily cross the state-non-state frontier.

The processes of confinement and discipline that were the subject of the earlier studies can now be seen as part of a broader concern for government in all its forms. As Foucault himself says of the analysis presented in *Discipline and Punish*: 'discipline was never more important or more valorised than at the moment when it became important to manage a population; the managing of a population not only concerns the collective mass of phenomena, the level of its aggregate effects, it also implies the management of a population in its depth and its details' (1991: 102). In other words, disciplinary techniques are to be seen as instruments of government. As Hindess (1996: 118) summarizes: 'the suggestion is, then, that we live in a world of disciplinary projects, many of which cut across other such projects, and all of which suffer from more or less successful attempts at resistance and evasion. The result is a disciplinary but hardly disciplined society'.

In fact, as we have already seen, liberal society is governed by a multiplicity of rationalities and techniques. As Rose and Miller (1992: 173) put it: 'political power is exercised today through a profusion of shifting alliances between diverse authorities in projects to govern a multitude of facets of economic

inducement, management, incitement, motivation and encouragement' (1992: 173). The analysis of discipline as presented in *Discipline and Punish* should thus be seen as but one aspect of Foucault's general analysis of government.

Subsequent studies within the governmentality field have amplified this concern for the management of territory and therefore space. For instance, Murdoch and Ward (1997) investigate how statistical representations of territory allowed the British state to bring conceptions of a national rural space into being in the eighteenth and nineteenth centuries. This national space was superimposed upon the many local rural formations that could previously be found scattered throughout the British countryside. As powerful modes of national representation emerged so a national territory was consolidated in government policy. By the middle years of the twentieth century this national territory was represented as a 'national farm', a spatial zone that would be administered by state agencies in line with the governmental priority of increased food production. The effect was a radically reconfigured spatial assemblage in the British countryside (for example, larger farms, fewer farmers, more machinery and a changed natural environment).

Perhaps because they assess such spatially extensive entities as the countryside, the rural and the agricultural, Murdoch and Ward can stress the statistical emergence of territory and its gradual solidification within governmental modes of representation. However, in using the same perspective to analyse the nineteenth-century city, Osborne and Rose (1999: 740) emphasize a rather different set of governmental concerns. They believe the city at this time must be seen as 'a plane of indetermination – a dense, opaque, unknown, perhaps ultimately unknowable space: a domain where the criteria and techniques of good government were no longer self-evident'. Where Murdoch and Ward's account of rural governmentality stresses the effective and far-reaching nature of governmental interventions, Osborne and Rose see urban government as 'having ambitions that were entirely negative', linked to fears of the mob, problems of overcrowding and the degenerating effects of urban squalor. In assessing governmental responses to these problems, Osborne and Rose (1999: 758) conclude that there is something 'ungovernable' about the city, as efforts to convert the sociability of the city to the ends of government appear to simultaneously require the preservation of the 'spontaneous underdetermined character of the city itself'. Governmental distinctions between country and city therefore seemingly rehearse the age-old problem of liberalism – that is, where to draw the line between state and society (for a fuller discussion of urban–rural distinctions see Chapter 7).

It would appear, then, that Foucault's conceptualization of government can help us to understand the relationship between space (for instance, in the form of institution or territory) and discourse (for instance, in the form of differing mentalities and techniques of rule). However, we should note at this juncture

given above might suggest. For instance, John Allen (2003: 75) has expressed some disquiet about the move from one scale of geographical analysis to another in Foucault's genealogical studies. He believes the 'diffuse topography' evident in the governmentality literature 'sits rather awkwardly next to the meticulous and rather dense configurations of the prison or the clinic'. Allen argues that once Foucaultian analysis moves beyond particular sites and specific institutions, it tends to become 'impressionistic' and 'metaphorical' – that is, it loses sight of the precise spatial arrangements (detailed in *Madness and Civilisation* and *Discipline and Punish*) that obviously work to regulate behaviour. He says:

> In contrast to the detailed survey of techniques in Foucault's earlier institutional analyses – documenting the distribution of individuals in penal spaces, for example, on the basis of a series of grid-like expectations about how prisoners should conduct themselves – we have scant detail of the spatial assemblages involved in the management of dispersed populations. (2003: 82)

In other words, as Foucault's gaze shifts from enclosed micro-spaces to more diffuse macro-spaces, the specifically spatial aspects of his approach fade into the background.[8]

In Allen's view, Foucault's geography can be seen most clearly when the precise 'diagrams of power' encoded in institutions like the prison and the asylum are shown to interact with broader discursive formations or modes of classification: 'the layout, disposition and orientation of the various clinical or prison buildings [...] are all deemed to have played a part in inducing particular forms of conduct, although not in isolation from the classificatory techniques and normative strategies designed to engage the minds of particular subjects' (Allen, 2003: 71). Allen goes on to say:

> [R]egular forms of conduct are indeed induced, but not because they are 'read off' by subjects from a particular series of techniques or a particularly stark spatial arrangement. Rather it is the interplay of forces within a particular setting which makes it possible to extrapolate diagrams from the power relations inscribed within particular institutional spaces: subjects are progressively constituted, symbolically and practically, through specific points of purchase; mobilised and positioned through particular embedded practices; and channelled and directed by a series of grid-like expectations about how, when and where to conduct themselves and others. In simple terms, different kinds of diagrams make different kinds of government and control possible, even though things rarely turn out quite as planned. (2003: 73)

In Foucault's institutional studies the diagrams are easy to see and it is clear that spatial and discursive arrangements become intimately intertwined as behaviours are regulated and as practices are moulded by governing agencies (even though, as Allen emphasizes, 'things rarely turn out quite as planned', a point that we shall consider at some length in subsequent chapters). In the institu-

government, we lose the rich spatial vocabulary of the institutional diagrams: 'once outside the walls of the institution, so to speak, it was as if a concern for the detailed spacing and timing of activities, and how they induced and channelled particular patterns of behaviour, no longer had any real purchase on the more expansive matters at hand' (Allen, 2003: 90). This results, Allen argues, in a 'geographically skewed topology' in which 'the transformation of power relations across space is of less fascination or interest than those transformed in space' (2003: 89).

Power and space

Allen's reservations about the shift in the spatial focus of Foucault's genealogical studies are expressed during a general consideration of Foucault's work on power. In Allen's view, Foucault is the pre-eminent exponent (along with Gilles Deleuze, see Chapter 3) of the notion that power is an 'immanent affair' – that is, power is a normalizing force, one that works *through* (rather than *upon*) the discourses, techniques, practices and arrangements which frame and compose everyday life.[9] This perspective on power has proved highly influential and is usually seen as a central aspect of Foucault's contribution to post-structuralist thought (McNay, 1994; Hindess, 1996). In this section, I will briefly outline Foucault's account of power before returning to Allen's reservations about its application in spatial analysis.

Power became increasingly central to Foucault's work in his later years, especially in the studies of discipline and government. In Flynn's (1994: 34) view, 'power relations underwrite all Foucault's genealogies'. In the genealogical phase, Foucault ties together knowledge, discourse, space and power, with power relations acting to somehow bind all these aspects together. For instance, in his studies of the asylum and the prison, Foucault shows how power works *through* discursive regimes, spatial arrangements and social practices. He also shows how the patients and the prisoners are made the subjects of power; that is, he shows how they become *subjected to* power relations of various kinds.

In *Discipline and Punish*, the mode of subjection is discipline: 'Discipline makes individuals; it is the specific technique of power that regards individuals both as objects and as instruments of its exercise' (Foucault, 1979: 170). Power is here immanently invoked within the range of detailed techniques – hierarchical observation, normalizing judgement and examination – that comprise the disciplinary regime. Foucault refers to these techniques as the 'micro-physics of power' (1979: 26), and he discerns micro-physical power relations in the instruments, techniques and procedures that are brought to bear within the confines

BOX 2.4

Some general features that characterize Foucault's perspective on power:

- Power and knowledge are closely combined.
- Power relations are interwoven with social practices and material arrangements.
- Knowledge and practice construct a world that is both knowable and governable.
- Power/knowledge relations produce subjects whose behaviour is regulated and modified in line with given rationalities.
- Power circulates through specific assemblages of materials and practices.
- Power produces a series of local effects within these assemblages.

In this broad characterization of power we can also see some general features of Foucault's spatial sensibility:

- Power works through knowledge domains that specify how particular sites should be organized.
- Modes of spatial organization simultaneously constitute power/knowledge relations.
- There is no clear distinction between power, knowledge, practice and space – all these aspects are interwoven with one another.
- This interweaving shows space to be relational in nature.

These general observations are enough to show that Foucault sees power almost everywhere. And he sees power almost everywhere because he believes it comes from almost everywhere – discourse, knowledge, practice, spaces of dispersion and so forth. And yet, as Allen (2003) observes, despite the obviously diffuse nature of power relations in Foucaultian theory, it is only within enclosed institutional sites such as asylums and prisons that Foucault seems able to successfully reveal the spatial mechanisms at work. Moreover, it is also clear that within such sites power is both *dispersed* (for instance, in materials, techniques and practices) and *concentrated* (for instance, in processes of observation and surveillance). In fact, the degree of repression and prohibition evident in Bentham's Panopticon suggests that, for the most part, *Discipline and Punish* refers to a state of *domination* in which the prisoners are reduced to the status of 'docile bodies'. As McNay notes:

account of any 'other' knowledges – such as prison subculture or customs inherited from the past – which those in control may have encountered and come into conflict with means that Foucault significantly overestimates the effectiveness of disciplinary forms of control. (1994: 101)

In McNay's view, this partial perspective means that Foucault 'slips too easily from describing power as a tendency within modern forms of social control to positing disciplinary power as a fully installed monolithic force which saturates all social relations' (1994: 104). We ultimately gain, then, a rather traditional view of power as the ability of a regime to exercise control *over* its subjects. In *Discipline and Punish*, to be a subject of power is quite clearly to be *subjected* to power of a prohibitive and repressive kind.

However, upon completing *Discipline and Punish*, it is clear that Foucault came to realize he had described power rather too negatively in that volume. For instance, in lectures he gave in 1975 (eventually published in Foucault, 2004) he explicitly argued a need to escape from 'outdated historical models' that see power as always 'prohibiting, preventing and isolating' (2004: 51).[10] Instead he asserted that 'what the eighteenth century established through the "discipline of normalisation", or the system of "discipline-normalisation" [is] a power that is not in fact repressive but productive, repression figuring only as a lateral or secondary effect with regard to its central creative and productive mechanisms' (2004: 52). Thus, discipline repression is superimposed upon 'positive techniques of intervention and transformation' (2004: 50). These 'positive' techniques are seen simply as 'government', meaning the 'conduct of conduct'. We can thus discern two main types of power relation: one (in the prison) that is dominant and coercive; another (in processes of liberal government) that is productive and affirmative. As Judith Butler explains,

> We are used to thinking of power as what presses on the subject from the outside, as what subordinates, sets underneath, and relegates to a lower order. But if, following Foucault, we understand power as forming the subject as well, as providing the very condition of its existence and the trajectory of its desire, then power is not simply what we oppose but also, in a strong sense, what we depend on for our existence and what we harbour and preserve in the beings that we are. The customary model for understanding this process goes as follows: power imposes itself on us, and weakened by its force, we come to internalise or accept its terms. What such an account fails to note, however, is that the 'we' who accept such terms are fundamentally dependent on those terms for 'our' existence. Are there not discursive conditions for the articulation of any 'we'? Subjection consists precisely in this fundamental dependency on a discourse we never chose but that, paradoxically, initiates and sustains our very agency. (1997: 2)

This second, positive, mode of power comes to the fore in Foucault's last publications, notably the three volumes that comprise his *History of Sexuality*. Here, power is still thought of as 'the total structure of actions', but this structure

'power is exercised over those who are in a position to choose and it aims to influence what their choices will be […] where there is no possibility of resistance there can be no relation of power'. Foucault (1982: 213) refers to this interaction between power and resistance as an 'agonism' – that is, 'a relationship which is at the same time reciprocal incitation and struggle'. Thus, as Paul Patton points out, the human material that systems of power work upon is not docile but active:

> it is composed of forces or endowed with certain capacities. As such it must be understood in terms of power, where this term is understood in its primary sense of capacity to do certain things […] whatever else it may be, the human subject is a being endowed with certain capacities. It is a subject of power, but this power is only realised in and through the diversity of bodily capacities and forms of subjectivity. (1998: 65)

We here arrive at a conception of a subject that is not just subjected to (negative) power relations but also actively constructs (positive) power relations. Moreover, this subject is also *embodied*; thus, power relations work upon and through bodies while resistance to power also takes an embodied form. This naturally leads on to a concern for the spaces of embodiment including the prison, the asylum and so forth.

In seeking to understand more fully the productive subject of power, Foucault begins to look more closely at 'sources of selfhood'. In particular, he discusses 'technologies of the self' – that is, the ways in which individuals 'effect by their own means or with the help of others a certain number of operations on their own bodies and souls, thoughts, conduct and ways of being, so as to transform themselves' (1988: 18). Foucault also begins to investigate an 'ethics of the self'. This involves not only a relationship to oneself as an ethical or moral agent but also recognition of oneself as a subject of power relations of various kinds. As Arnold Davidson (1994: 119) notes: 'in his last writings Foucault expressed concern that the ancient principle "know thyself" had obscured, at least for us moderns, the similarly ancient requirement that we occupy ourselves with ourselves, that we care for ourselves'. In these late works (for instance, *The History of Sexuality*, volumes 2 and 3) Foucault sees the self as something to be worked on *by the self*. In other words, the subject is no longer simply subjected to constraining power relations but can operate within productive relations to fashion new ways of being.[11]

We therefore arrive at the position where power is always exercised between subjects that have (to varying degrees) their own powers. As Pottage (1998: 23) puts it: 'power presupposes freedom in the sense that the relation itself is sculpted by a constant movement of reciprocal anticipations and interventions such that each actor is dependent on the autonomy of the other'. In the context of this 'constant movement' power relations are always potentially resistible

possibility of effective resistance has been removed does the power relation between two subjects become unilateral and one-sided'. *Discipline and Punish* therefore describes not the routine imposition of power relations but a fairly extreme version of power as repression. In more normal circumstances, power relations sit somewhere between domination and freeplay: they comprise mixtures of the negative and the positive. This is perhaps most noticeable in the case of liberal government as it 'hovers between forbidding subjects/objects on the one hand and constituting objects/subjects on the other' (Barker, 1998: 66). The balance between direction and constitution entails that power relations be both flexible and robust, amorphous and consolidated. It ensures also that the existence of power relations through space and time 'depends on a multiplicity of points of resistance: these points play the role of adversary, target, support or handle in power relations. These points of resistance are present everywhere in the power network' (Foucault, 1981: 95).

BOX 2.5

On power, Foucault concludes that:

- Power is dispersed across many heterogeneous domains with many of these domains retaining their own specific powers (which can be realized in strategies of either resistance or accommodation to hegemonic forces).
- The construction and consolidation of power relations takes a considerable amount of work and the work increases as resistance increases.
- At times the consolidation and imposition of power relations can result in domination (as in the panoptic prison).
- But perhaps more routinely power leads to the production of new forms of subjectivity (as in processes of liberal government).
- Thus, Foucault's work helps us to see the diversity of power relations and their effects.

In actual fact, Foucault shows power relations to be *so* diverse that our attention is increasingly drawn not to power *per se* but to the 'materials' that make power whatever it 'is'.[12] And given that power is constituted through bodies, practices, spaces and so forth, it cannot be seen as something imposed from above or from the outside; rather, as John Allen (2003: 9) remarks, it is 'coextensive with its field of operation'; this field of operation arranges materials, demarcates

these power-relations, which are simultaneously local, unstable and diffuse, do not emanate from a central point or unique locus of sovereignty, but at each moment move from one point to another in a field of forces, marking inflections, resistances, twists and turns [...] There is a multiplicity of local and partial integrations, each one entertaining an affinity with certain relations or particular points. (1988: 73–4))

Thus, a relational view of power brings us again to a relational view of space. Space is here composed by the variable construction and consolidation of power relations. Discrete spaces emerge out of complex assemblages of discourses, practices and materials, all somehow bound together by relations of power. Moreover, power is not only materialized in space, it is also 'localized': it works relationally through situated and specific knowledges, practices and materials, all arranged at precise points and bound together by heterogeneous actions of alignment. As Foucault (1986: 252) says: 'space is fundamental in any exercise of power'.

Yet, if we return once again to the distinction between 'micro-physical' and 'macro-physical' forms of power (loosely associated in Foucault's work with, on the one hand, the closed institution and, on the other, liberal government) then we see that the 'localized' (and therefore spatialized) character of power relations can all too easily get lost in the move from the smaller to the larger scale. This point is clearly expressed by Allen when he suggests that the 'expansive and diffuse topography' of governmental modes of power compares unfavourably with 'the rather dense configurations of the prison or the clinic' (2003: 75). Where, in the institutional setting, we have clear descriptions of the spatial arrangements that reflect precise configurations of power, at the level of government we get 'scant detail of the spatial assemblages involved in the management of dispersed populations' (2003: 82). Allen is concerned that the mechanisms which allow power relations to be assembled *inside* institutional spaces are much easier to see than the mechanisms that allow power relations to be assembled *across* non-institutional spaces. In short, Foucault describes 'spaces of domination' much more convincingly than 'spaces of production'. Allen believes this problem is exacerbated by the fact that we cannot simply 'aggregate up' the institutional mechanisms and techniques described in books such as *Discipline and Punish* to the level of a society or a state. As he says: 'Bridging the gap between here and there to bring a diffuse population within reach is singularly unlikely on the basis of a scaled-up version of confined arrangements' (2003: 84). Allen therefore concludes that 'the challenge for those who hold that power has an immanent presence is to grasp how, in the context of a diffuse population composed of a multitude of wills, the subject and power remain mutually constitutive of each other in space and time' (2003: 85). In order to fully meet this challenge, he explains, Foucaultian scholars must turn their attention to the spatially mediated relationships that compose modern systems of governmental power in order to show how relations are stabilized across heterogeneous

need, in short, to attend to the constitutive as well as the coercive powers of governmental space.

Conclusion

The reflection on Foucault's work provided above shows that the notion of 'relational space' emerges strongly from within his studies of discourse, knowledge and power. However, Foucault also focuses our attention on the interrelationship between spatial relation and spatial formation: he shows that particular discourses, networks of power, sets of material resources can all be stabilized in discrete spatial zones (the hospital, the prison and so forth). The spatial fabric of given institutions is, then, a key means of 'materializing' discursive relations. The space of the prison and the space of the asylum serve to 'perform' the relations of power specified at the discursive level.

Space and power mutually constitute one another in Foucault's work. Yet, the nature of this constitution gets harder to discern once we move out of the enclosed institutions into the dispersed populations of nation-states and other large-scale political units. Foucault clearly feels the spatial mechanisms at work are much the same: governmental processes of discipline and normalization act to configure modes of subjectivity and serve to regulate patterns of behaviour; they work in amorphous and dispersed ways and are multiple in form (the system of domination discerned in the Panoptic prison is merely at one end of a continuum of power relations). In the eyes of critics, however, the shift away from micro-scale power relations entails a loss of spatial focus: the precise means whereby dispersed and diverse relations of power act upon dispersed and diverse forms of subjectivity become hard to discern. Instead of the seamless integration of power, knowledge and space we get the assertion of governmental discourses that seemingly work both everywhere and nowhere.

We can therefore conclude that Foucault's work takes us some considerable distance in our exploration of relational space but not quite far enough. His analyses of the asylum and the prison are exemplary in helping us to understand how institutional spaces come to reflect particular power/knowledge configurations. But his extension of this analysis beyond enclosed institutions raises certain questions about the relationship between power/knowledge systems and the wider dispersal of these systems across extensive territories. In order to investigate the dispersal of power within diverse and loosely co-ordinated spatial arrangements, we turn in the next chapter to examine in a little more detail the precise spatial mechanisms that must be employed if heterogeneous spaces are to be aligned by 'rationalities of rule'. In so doing, we investigate more fully how power becomes 'materialized' in 'things' and how, in the exercise of power relations, the alignment of things becomes as significant as the alignment of

SUMMARY

In this chapter we have investigated key aspects of Foucault's work and have attempted to draw out the implications for spatial analysis. It was shown that Foucault worked for most of his career with an implicit notion of relational space, but this only came fully to the fore in his 'genealogical' phase with books such as *Discipline and Punish* and the essays on governmentality. In his analysis of power Foucault clearly shows how the social and the spatial are bound inextricably together – the one is 'immanent' in the other. This sets the scene for the fuller investigation of relationalism undertaken by other post-structuralist authors.

FURTHER READING

There are many books on Foucault, but few deal explicitly with his work on spatiality. For a general introduction Lois McNay's *Foucault: A Critical Introduction* is one of the best. For an interesting reflection on Foucault's spatial thinking, see Stuart Eldon's (2001) book, *Mapping the Present: Heidegger, Foucault and the Project of a Spatial History*. For an overview of work on governmentality, Mitchell Dean's (1999) book, *Governmentality*, is a useful starting point. For an excellent analysis of Foucault's work on power, with particular relevance to geographers see John Allen's (2003) *Lost Geographies of Power*.

Notes

1. We should also acknowledge that Foucault's interests, while mainly historical, always relate to some issue of pressing contemporary concern. He suggests his writings might be termed 'histories of the present' (1979: 30–1), in that they attempt to reveal how current circumstances *could have been different*. Thus, Foucault's histories aim to show that the processes leading to our present practices and institutions were by no means preordained or inevitable. This focus on 'histories of the present' again highlights the specific and unique nature of Foucault's historical writings.
2. For recent examples see McNay (1994), Barker, (1998), Dean (1999), Danaher et al. (2000), Miles (2003).
3. It should be noted that *Madness and Civilisation* contains only around one half of the original French text. For this reason, various commentators have argued that only the original will suffice but as this has yet to be translated into English I will use the English version as well as commentaries on the French version.
4. As Darier (1999: 13) puts it: 'Foucault may have tried to turn his back to structuralism, but structuralism remains stuck to his back'.
5. Sometimes this disciplinary society seems confined to certain key institutional

investigation that would be extended without limit to a meticulous and ever more analytical observation, a judgement that would at the same time be the constitution of a file that was never closed, the calculated leniency of a penalty that would be interlaced with the ruthless curiosity of an examination'. The tendency then is to greater and greater surveillance with few clues as to how this tendency might be resisted.

6. Foucault adopts this broad and all-encompassing notion of government because he is referring back to eighteenth-century meanings of the term associated with philosophy, medicine, guidance for the family and so on (see Lemke, 2001).
7. However, before concluding that the demarcation line between state and civil society was firmly drawn at this time it should be noted that 'laissez faire is a way of acting, as well as a way of not acting' (Gordon, 1991: 17): it is both a limitation on political sovereignty and a positive justification for market or civil freedom.
8. Allen here echoes Massey's (1992: 80) complaint that Foucault proposes 'a notion of space as instantaneous connections between things at one moment'.
9. Andrew Sayer suggests that immanence should be thought of as 'emergence':

   Where there are two or more objects in an internal relation, that is one in which the nature of each of the *relata* depends on the other(s) through their relationship itself, instead of merely being contingently or externally related, it is possible for them to develop "emergent powers". These are causal powers dependent on but irreducible to those of their constituent elements, just as water has emergent powers for those of its constituents, hydrogen and oxygen. (2004: 266)

10. Foucault has in mind here the continued existence of models based upon slave society, caste society, feudalism and the administrative monarchy. He says, the continued use of such models comprises 'a failure to grasp what is specific and new in what took place during the eighteenth century and the Classical Age' (Foucault, 2004: 51).
11. It is worth noting that this turn to 'selfhood' in Foucault's last years has been treated sceptically by some critics. For instance, Christopher Norris (1994: 160) argues that even in his last writings Foucault continues to see subjectivity as 'constructed through and through by the various discourses, conventions or regulative codes that alone provide a means of "esthetic" self-fashioning in the absence of any normative standard'. He thus argues that

   what emerges is not as much a radical rethinking of [the] issues as a shift in rhetorical strategy, one that allows [Foucault] to place more emphasis on the active, self-shaping, volitional aspects of human conduct and thought, but that signally fails to explain how such impulses could ever arise, given the self's inescapable subjection to a range of pre-existing disciplinary codes and imperatives that between them determine the very shape and limits of its "freedom". (1994: 161)

   Likewise, Butler (1997) remarks that Foucault failed to elaborate on the specific mechanisms that help to form specific subjects. These criticisms might be taken to indicate that Foucault was never able to fully extricate himself from structuralism.

12. In a similar vein, Deleuze (1988: 25) says in his commentary on Foucault's legacy: 'power is not homogeneous but can be defined only through the particular points through which it passes'.

3

Spaces of heterogeneous association

Look upon it this way: the search for pattern is an attempt to tell stories about ordering that connect together local outcomes. (Law, 1994)

Introduction

As we have seen in Chapter 2, Foucault portrays space as intrinsic to discursive regimes. Within such regimes, power, knowledge and space mutually compose one another. As power relations come into being, discourses, knowledges and spaces gain shape – they co-evolve in complex ways, coiling around one another until some kind of stability emerges. Thus, within these heterogeneous assemblages any separation of the discursive and the spatial becomes almost impossible to conceive: knowledge is materialized in practice, practice is materialized in the body, and the body is immersed in modes of spatial organization that in turn 'perform' systems of knowledge. Foucault conjures up this circular assemblage of power most clearly in his description of the (Panoptic) prison. Here, systems of knowledge bring together hierarchical observation and normalizing judgement within a regime of disciplinary power. This power extends beyond the realm of knowledge into architectural arrangements, which are designed to allow observation, judgement, regulation and normalization to occur on a regular basis. In short, the prison emerges as a stable and coherent entity from the confluence of discourse, practice and spatial organization.

Foucault's analysis of the prison illustrates the crucial role that space plays in the construction of power relations and the crucial role that power relations play in the construction of space. He shows how the composition of given micro-spaces follows from the discursive and material constitution of given assemblages of power. Yet, as we also saw in Chapter 2, the circulation of power relations *beyond* enclosed institutions is nowhere fully explained by Foucault. While he uses the term 'government' to describe broader alignments of power,

view; we simply find power relations (that is, Panopticism) circulating in a kind of spatial vacuum.

If we are to build on Foucault's insights we must move outside institutions such as prisons and asylums to spaces that are co-ordinated on a more extensive basis. In other words, we need to go beyond the enclosed institutions in order to consider how power circulates *between* clearly demarcated sites. In this chapter, we undertake this task. The aim is to show how spatial scales come to be aligned with one another by relations that somehow move 'upwards' from the local level and 'downwards' from larger spatial scales. By investigating the precise ways that such alignments emerge, we hope to illustrate how social relations of various kinds are extended across space and how these relations give rise to differing spatial scales.

In taking the analysis forward in this way, we make an important move beyond Foucault's concern only for the *human* sciences – that is, we show how his general approach can be brought to bear on the *natural* sciences. In so doing, we consider 'post-positivist' accounts of scientific activity that discern a close association between power and scientific knowledge (in much the same way that Foucault himself discerns a close association between power and knowledge in the human sciences). These 'post-positivist' approaches tend to reject the view that science gains its power from its *accuracy* – that is, from its direct observation of the way the world 'really is'; rather, they see the power of science lying in its ability to control and manipulate elements, both human and natural, in ways that allow scientific facts to be built and then disseminated beyond the centres of scientific practice. In this view, 'power is no longer external to [scientific] knowledge or opposed to it; power itself becomes a mark of knowledge' (Rouse, 1987: 19).

The main focus of the chapter is 'actor-network theory', an influential perspective on scientific knowledge that has been developed over the last twenty years or so by a trio of sociologists – Bruno Latour, Michel Callon and John Law. The approach takes Foucault's observations on power/knowledge as a starting point but builds upon these in order to account for the extensive power of science and technology in contemporary society. In parallel with Foucault's focus on paradigmatic sites, actor-network theory sees the laboratory (as opposed to the prison) as the crucial citadel of power in the modern world. In Foucaultian fashion, 'the laboratory, like the clinic, the asylum, the school, the factory, and the prison, serves as one of the 'blocks' within which [...] a 'micro-physics of power' is developed and from which that power extends to invest the surrounding world' (Rouse, 1987: 107). Yet, while it pays a great deal of attention to the internal organization of the laboratory, actor-network theory's main interest is in the relationship between the laboratory and its external environment. In other words, the actor-network approach

for the relationships between laboratories and other, external, micro-locales that allows actor–network theory to elucidate the various mechanisms that tie locations together across space.

We should, however, note that while actor–network theory clearly originates, at least in part, from Foucault's work on the human sciences, over time it has gradually moved away from a concern both for the laboratory and for power. In many ways the theory makes the most of the Foucaultian insight that it is not power *per se* that is important but the various materials, practices, discourses in which power relations are both *embedded* and *transported*. The theory therefore increasingly focuses on the complex alignments of heterogeneous entities that allow powerful scientific networks to emerge into the world. These networks are thought to link laboratories to chains of actors in a variety of other spatial locations. Thus, actor–network theory spends a great deal of time examining how actors are incorporated into chains and networks. In so doing, it also indicates how discrete spaces come to be relationally linked together. It thus shows how (networked) relations constitute and compose differing spatial locations. In particular, it investigates how processes of spatial demarcation (that is, 'localization') take place *within* network formations. In so doing, it introduces another aspect of relationality: the way spatial distinctions are carved out of broader social contexts, in this case networks.

In what follows we firstly examine the origins of actor–network theory and show how it emerged from the social scientific studies of laboratories undertaken during the late 1970s and early 1980s. We then turn to examine how the theory conceptualizes the relations between actors and spaces – that is, how it comes to adopt the notion of the 'actor-network'. Having assessed actor–network theory's distinctive approach to relationality, we then move on to consider some of the broader implications of the theory, notably its focus on 'hybrid' networks in which people and things get relentlessly 'mixed up'. Finally, we reflect on the status of the theory and tease out some of the main implications for understandings of relational space. As we shall see, actor–network theory poses some significant challenges to taken-for-granted notions of geography and space. These challenges will be assessed over the course of the next two chapters.

The emergence of actor-network theory

In the 1970s, following Kuhn's (1962) penetrating critique of positivist conceptions of scientific knowledge, a group of sociologists ventured into the citadels of scientific activity – laboratories – in order to study scientists at work. Their aim 'was to create a legitimate space for sociology where none had previously

between scientific knowledge and nature.[1] Within the ethnographies, scientists are shown to be using a variety of means to bring nature 'into being' in the laboratory just as Foucault had shown the human sciences bringing particular conceptions of 'man' into being within prisons and asylums (Hacking, 1986). The means include inscription devices, which serve to transform natural materials into literary techniques of persuasion (Latour and Woolgar, 1979), and political strategies, which permit the building of coalitions in favour of some scientific research programmes over others (Knorr-Cetina, 1981).

The laboratory studies seemed to demonstrate that scientists, far from simply observing nature, are busy actively constructing natural entities using all the social, economic and technological tools at their disposal. As Karin Knorr-Cetina (1981: 152) puts it, 'the study of laboratories has brought to the fore the full spectrum of activities involved in the production of knowledge. It has shown that scientific objects are not only "technically" manufactured in laboratories but also inextricably symbolically and politically constructed'. Thus, the laboratory studies emphasized that scientific outcomes (facts and artefacts) result from complex *social* processes. And the discovery of these social processes further undermined the rather simplistic understanding of scientific endeavour proposed in positivist accounts (see Zammito, 2004, for a discussion).

In the wake of the laboratory studies, scientific knowledge became a legitimate topic of sociological investigation. Thus, the content of science could be examined from a sociological perspective, with notions such as power, interest, norm, gender and class all being used to account for scientific behaviour (see Barnes et al., 1996, for an overview of this work). As a result, laboratories came to be seen as little different from other social settings and scientists came to appear much like other social actors. However, this finding raised a problem that Bruno Latour, himself a pioneer of the laboratory study (see Latour and Woolgar, 1979), took as a starting point for developing a rather distinctive mode of analysis. He began by asking: 'if nothing scientific is happening in laboratories, why are there laboratories to begin with and why, strangely enough, is the society surrounding them paying for these places where nothing special is happening?' (Latour, 1983: 141–2). By posing this question, Latour was expressing a concern that the social studies of science, in questioning many of the presumed special attributes of scientific knowledge generation, had also begun to undermine the sociologist's ability to account for the *power of* modern science. As he began to address this concern, Latour started to take the laboratory study in a new direction, a direction that led ultimately to 'actor-network theory'.

Latour (1983) approaches the task of accounting for science's power in the world through the use of a case study, which will be briefly summarized here. The case begins in 1881 with Louis Pasteur at work in his laboratory in the Ecole Normale Superieure in Paris. Pasteur at this time had managed to arouse

questions, Latour claims that Pasteur used a tried-and-tested approach: in short, 'he transfers himself and his laboratory into the midst of a world untouched by laboratory science' (1983: 144). In this case, it is the world of anthrax, a problem causing a great deal of distress in France at the time. The first move that Pasteur makes is to establish a link between laboratory and field. He does this by constructing a makeshift lab on a farm site in order to study the anthrax bacillus. Here he 'extracts', 'treats', 'filters' and 'dissolves' materials in order to render the bacillus visible (see Latour, 1999). Having completed the on-farm study, he then makes a second move and transfers the lab back to the Ecole Normale Superieure, taking the bacillus with him. According to Latour (1983: 146), Pasteur 'a master of one technique of farming that no farmer knows, microbe farming. This is enough to do what no farmer could ever have done: grow the bacillus in isolation and in such a large quantity that, although invisible, it becomes visible'. Once this move is accomplished, Pasteur suddenly gains the ability to talk with great authority about the anthrax bacillus, especially after he shows that it causes anthrax, a problem of considerable significance in French agriculture.

At this stage, however, the 'cause' of anthrax is still locked up inside Pasteur's laboratory and it has no real bearing upon either the disease or French society as a whole. The connections between the laboratory and all those potentially interested in Pasteur's work are weak and might easily be broken apart. If this situation prevails, Pasteur's power to interest society in general will be severely limited. Thus, it is necessary for Pasteur to make another move – from the laboratory back to the field. Having manipulated the bacillus in the lab, he manages to refine a vaccine which can then be submitted to a field trial. However, Pasteur is here confronted with the problem of ensuring effective vaccination procedures. How can such procedures be put in place? According to Latour (1983: 151–2), the answer is simple: 'by extending the laboratory itself [...] The vaccination can work only on the condition that the farm chosen in the village of Pouilly-le-Fort for the field trial be in some crucial respects transformed according to the prescriptions of Pasteur's laboratory'. After a series of negotiations the scientists persuade the farmers involved in the trial of the need for disinfection, cleanliness, conservation, timing, recording and so forth. Thus, as the trial unfolds, any clear distinction between the laboratory and the farm begins to breakdown: as Latour (1983: 154) puts it: 'no one can say where the laboratory is and where society is'. This result emerges as the laboratory, first, reproduces inside its walls an event that was happening outside – the spread of anthrax – and, second, extends to all farms something that had previously happened only inside the laboratory – disease prevention through vaccination.

The extension of the laboratory into the wider society is given a huge impetus once the field trials are declared successful. At this point, a new fact gains wide

Superieure, rue D'Ulm, Paris. In other words, on the condition that you respect a limited set of laboratory practices [...] you can extend to every French farm a laboratory product made in Pasteur's lab'. Thus, as the vaccine spreads so do the laboratory conditions. In the process many farms are transformed. But more than this, Pasteur transforms French society: he modifies the forces that make up this society and stirs in some new entities – microbes. In this way, Latour argues, Pasteur endows himself with a fresh and novel source of power:

> Who can imagine being the representative of a crowd of invisible, dangerous forces able to strike anywhere and to make a shambles of the present state of society, forces by which he is by definition the only credible interpreter and which only he can control? Everywhere Pasteurian laboratories were established as the only agency able to kill the dangerous actors that were until then perverting efforts to make beer, vinegar, perform surgery, to give birth, to milk a cow, to keep a regiment healthy and so on. (1983: 158).

Thus, Pasteurian laboratories come, not only to hold the solutions to many of society's ills, but also to change the composition of society itself. Society is remade, for now existing relationships must make room for microbes; and, in making room for microbes, society must also make room for the microbes' legitimate spokesperson – Pasteur. It is for this reason that Latour in a later work refers to this process of laboratory extension as the 'Pasteurization of France' (Latour, 1988).

BOX 3.1

The case of Pasteur shows Latour that:

- Scientists become 'great' and 'powerful' because they are able to enrol allies and to build networks.
- These networks must extend backwards and forwards from scientific centres (such as laboratories) to 'non-scientific' locations (such as farms).
- Thus, networks run across or through space and act to bind situated actors together so the composition of space and the facilitation of action are closely combined.
- The networks are 'heterogeneous': they are made of differing entities and resources. These entities and resources are combined in ways that facilitate the spread of scientific facts and artefacts.

In his study of Pasteur, Latour addresses the question of how laboratories gain

the laboratory studies, taking them beyond the micro-locale of the lab to the transformations that are wrought on the world at large. In so doing, he criticizes sociologists for their reliance on 'dualisms' such as science/society, micro/macro, content/context, inside/outside. He claims that we can only understand how modern science moves through the world if we leave dualistic modes of explanation behind and concentrate on following scientific actors as they tie other actors into networks. As the networks are consolidated, scientific facts and artefacts can spread outside the laboratories in conditions which ensure their proper functioning: 'there is no outside of science but there are long, narrow networks that make possible the circulation of scientific facts' (Latour, 1987: 167). If the networks function correctly, and if all the enrolled entities remain faithful bearers of the facts and artefacts, then authority flows back up the network to the scientist: she or he comes to be seen as the 'actor', the 'cause' of the network effects. In a similar fashion, Latour claims, Pasteur becomes 'powerful' and all those faithful (natural and social) allies that have contributed to his 'power' simply disappear behind his 'greatness'.

From actors to networks

Latour's study of Pasteur evidently follows from Foucault's ideas about the immanent and ubiquitous nature of power relations. Effectively, Latour adopts a Foucaultian perspective on the 'microphysics' of power in science, and shows how the generation of scientific knowledge relies upon the construction of complex alliances or networks. Importantly, power is seen to lie not in the properties or abilities of the scientists themselves but in the relationships they manage to establish between actors and entities of various kinds (that is, bacilli, vaccines, field trials and farmers). Power thus emerges from *within* the network; it is not something imposed upon it from the outside (Latour, 1986).[2] This perspective on power accords closely with Foucault's later ideas on the productive properties of power relations.

In order to tie together the normative and productive aspects of power, Latour introduces the notion of *translation*, an idea that suggests that if scientific networks are to be extended through space and time, then actors of differing (natural *and* social) types must be 'interested' into the network – that is, their goals must somehow be aligned with those of the scientists. Network alignments, as the case of Pasteur indicates, require some degree of 'normalization' so that productive activities can be effectively co-ordinated; in order to produce a vaccine, natural entities must be regulated and farmers must be disciplined. In later work, Latour goes on to consider in some detail how this process of translation tends to operate. First, he distinguishes two main meanings of the

means that one version translates every other, acquiring a sort of hegemony: whatever you want, you want this as well' (Latour, 1987: 120–1). In both senses translation refers to the ways in which one actor gains the ability to speak *for* another. As Callon and Latour explain it:

> By translation we understand all the negotiations, intrigues, calculations, acts of persuasion and violence, thanks to which an actor or force takes, or causes to be conferred on itself, authority to speak on behalf of another actor or force: 'Our interests are the same', 'do what I want', 'you cannot succeed without going through me'. Whenever an actor speaks of 'us', s/he is translating other actors into a single will, of which s/he becomes spirit and spokesman. S/he begins to act for several, no longer for one alone. S/he becomes stronger. S/he grows. (1981: 279)

For Latour, the social scientific notion of 'interest' is important in understanding the mechanics of translation. Interests lie *between* actors, 'thus creating a tension that will make actors select only, what, in their eyes, helps them reach [their] goals' (Latour, 1987: 121). For translation to be successful, there must be a convergence of interests between actors (what Latour calls 'riding piggyback'), and all interests and interpretations of interests must be channelled into the network and must flow down the network in ways that solidify its shape. In other words, if Pasteur is to build associations between elements, translations must be effected so that they all converge on the same purpose or activity – that is, the refinement and dissemination of a vaccine.

By discussing translation in this fashion, Latour suggests that the successful construction and stabilization of scientific networks requires the building of a *consensus* between the participants. In other words, power relations cannot just be imposed but must be agreed upon. In this regard, Pasteur appears to have been a successful translator of interests, for he

> not only recruited many sources of support, but also strove to maintain his laboratory as the source of the general movement that was made up of many scientists, officials, engineers, and firms. Although he had to accept their views and follow their moves – so as to extend his lab – he also had to fight so that they all appeared as simply 'applying' his ideas and following his lead. These two movements must be carefully distinguished because, although they are complementary for a successful strategy, they lead in opposite directions: the recruitment of allies supposes that you go as far and make as many compromises as possible, whereas the attribution of responsibility requires you limit the number of actors as much as possible. (Latour, 1987: 118–19)

The process of translation allows groups of actors and entities to be assembled within a common endeavour and the greater the number assembled, the greater the influence of the network. However, once the multitude has been drawn together some means of maintaining the associations must be established:

Superieure in Rue d'Ulm in Paris. Breathing down Pasteur's neck were thousands of interests nested into one another, all ready to accept his short cut through the microscope, the artificial culture of microbes, and the promised vaccine. However there is a considerable drift between an interest in raising cattle on a farm and watching microbes grow in petri dishes: the gathering crowd might disband easily. After a few months of hope they might all leave disappointed, bitterly accusing Pasteur of having fooled them by creating artefacts in his laboratory of little relevance to farms and cattle. Pasteur would then become a mere precursor for the anthrax vaccine, his role in history being accordingly diminished. (Latour, 1987: 122)

Thus, once an initial translation has been achieved, something more is required to turn the network into a durable whole.

Is there anything that can be used to tie in the farmers' interests before they all go away bitter and scornful? A tiny bacillus inside a urine medium will not do, even if it is visible under the microscope. It is only of marginal interest to people who have been attracted to the lab by the promise that they will soon be back on their farms, milking healthier cows and shearing healthier sheep. If Pasteur was using his bacillus to do biochemistry or taxonomy, deciding if it was an animal or a lichen, others like biochemists or taxonomists would be interested, but not farmers. When Pasteur shows that sheep fed older cultures of the bacillus resist the disease even when they are later fed virulent cultures, biochemists and taxonomists are only casually interested but farmers are very interested. Instead of losing interest they gain it. This is a vaccine to prevent infection, something easy to relate to farm conditions. But what if the vaccine works erratically? Again, interest may slacken and disappointment returns. Pasteur then needs a reliable method to turn the production of vaccine into a routine, a black box that may be injected by any vet. His collaborators discover that it all depends on the temperatures of the culture: 44 degrees for a few days is fine, the culture ages and may be used as a vaccine; at 45 degrees, the bacillus dies; at 41 degrees it changes form, sporulates and becomes a vaccine. These little details are what clamp together the wavering interests of the enrolled farmers. Pasteur has to find ways to make *both* the farmers and the bacillus predictable. And he has to keep on discovering new ways, or at least for as long as he wishes to tie these farmers and these microbes together. The tiniest loose end in this lash up and all his efforts are wasted' (Latour, 1987: 123–4)

The network thus solidifies around the bacillus, the vaccine and Pasteur's ability to disseminate the vaccine in ways that effectively inoculate farm animals against anthrax. As noted above, successful inoculation requires the spread of 'lab conditions' as farmers are encouraged to adopt practices that allow the vaccine to work *in situ*. In Latour's terms, this means the network must retain an ability to transform space; as long as spaces are transformed (that is, farms are 'cleaned up') then the network can be extended; if spaces are not transformed (that is, farms remain 'dirty') then the vaccine will fail, leading to the eventual breakdown of the Pasteurian network.

With the network consolidated, Pasteur's lab in Paris effectively becomes

network – the links established between bacillus, vaccine and farmer – remain in place. And in the consolidation of the network, material artefacts play a key role for they, in effect, become 'delegates', able to carry 'rationalities of rule' generated by the centre out to all the localities enrolled in the network. However, these delegates – termed 'immutable mobiles' (Latour, 1987) – must do more than this: they must also carry aspects of the enrolled localities back to the centre. And they must undertake this task in such a way that when the centre holds the mobiles it also holds some very real facets of the localities themselves. Only in this way can control over the network be achieved and maintained.

Latour thus defines some general features of centres of calculation. First, they must somehow 'bring home' relevant features of the places and peoples of concern. This can be done by (a) rendering them mobile so that they can be moved, (b) keeping them stable so that they retain their shape, and (c) making them combinable so that 'whatever stuff they are made of can be cumulated, aggregated, or shuffled like a pack of cards' (1987: 223). In the case of Pasteur, these features apply to the anthrax bacillus, which is refined in the field and is then transported back to Paris to be combined with other elements so that eventually a vaccine can be produced. The second stage is for the centre to reach back out to the multitudes of micro-locales upon which it might act. Again, the ability to transport stable elements back out into the world is the crucial issue. As the case of Pasteur shows, the stabilized element (the vaccine) requires that conditions outside the centre are made propitious for its functioning. If the network is successfully extended, Pasteur's facts and artefacts can flow outward into French agriculture and French society.

There was nothing more dramatic at the time than the prediction solemnly made a month in advance by Pasteur that on 2 June 1881 all the non-vaccinated sheep of a farm in the little village of Pouilly-le-Fort would have died of the terrible anthrax disease and that all the vaccinated ones would be in perfect health. Is this not a miracle, as if Pasteur had travelled in time, and in the vast world outside, anticipating a month in advance what will happen in a tiny farm in Beauce? If, instead of gaping at this miracle, we look at how a network is extended, sure enough we find a fascinating negotiation between Pasteur and the farmers' representatives on how to transform the farm into a laboratory. Pasteur and his collaborators had already done this trial several times inside their lab, reversing the balance of forces between man and diseases, creating artificial epizootics in their lab. Still, they had never done it in full-scale farm conditions. But they are not fools, they know that in a dirty farm thronged by hundreds of onlookers they will be unable to repeat exactly the situation that had been so favourable to them [...] On the other hand, if they ask people to come to *their* lab no one will be convinced. [So] they have to strike a compromise with the organisers of a field test, to transform enough features of the farm into laboratory-like conditions – so that the same balance of forces can be maintained – but taking

BOX 3.2

In Latour's view building networks requires:

- Processes of 'translation' must be executed so that actors and entities are enrolled into network relations.
- 'Translation' means that the enrolled actor is persuaded to 'identify' with the network. This may mean some modification in the actor's identity and/or it may mean some modification in the shape of the network to accommodate a new actor.
- 'Translation' can be executed either consensually or coercively, or through some combination of the two. Actors can be persuaded to join the network because they come to believe it is in their 'interests', or they can be forced to join against their 'interests'.
- Once enrolled into the network, the relations between entities must be stabilized. These stabilizations are often delegated to non-human entities such as technologies, because materials of various kinds are themselves generally more stable than human actions. In short, technologies can make good disciplinary machines.

Associational action

Latour's analysis of Pasteur's anthrax vaccine illustrates how science works to 'colonize' a range of locales beyond the laboratory. Using this case study, he shows that science only 'works' if scientists somehow 'change the world' in ways that correspond with conditions inside the lab (see also Rouse, 1987). The influence of the laboratory on the outside therefore works in two ways. First, elements of the outside world (in this case the anthrax bacillus) are brought into the lab to be analysed and altered. Second, the modified elements are exported back out into the world in order to effect change of some kind. Both these influences require networks, defined as heterogeneous associations of actors and entities. The networks allow elements to flow towards the centre of calculation (the lab) and then back out again into a host of micro-locales.

We can see, then, that laboratories gain their powers from the associations they bring into being. They can act over long distances but any actions they undertake have to be conducted *through* the many other actors and entities that have been enrolled into the networks. Thus, in actor-network theory action – as the case of Pasteur clearly shows – arises from collective endeavour and the collective includes both humans and non-humans. As Latour (1999: 192) puts

laboratory. In the experiments conducted by scientists such as Pasteur, Latour (1999: 228) notices that action comprises 'not what people do' but 'what is accomplished along with others'. Action is therefore the result of network mobilization and networks rely on entities of many kinds.

In many ways, Latour is adopting a realist approach here as, in his view, 'things' play an effective role in social life – that is, they are more than just 'social constructions'. However, he also adopts a constructivist form of realism for he believes things only take shape in networks. In his study of Pasteur, he is interested in the anthrax bacillus only once it emerges as a discrete and autonomous entity in Pasteur's experiments. Thus, Latour argues, we should not imagine the bacillus is simply a thing 'out there' waiting to be discovered by intrepid humans 'in here' (or, for that matter, that the thing 'out there' is simply constructed by the human 'in here'). It is the *co-construction* of a complex socio-natural assemblage that allows the (natural) substance (and also the 'great scientist') to emerge. Thus, 'when a phenomenon "definitely" exists that does not mean that it exists forever, or independently of all practice and discipline, but that it has been entrenched' in a network (Latour, 1999: 155–6). And in a network, all entities are assembled 'symmetrically': that is, the 'natural' entities are just as likely to be active as those labelled 'social', so that processes of 'construction' cannot be seen as emanating from purely social or human causes.

Latour's colleague Michel Callon (1986) provides a clear illustration of action arising from the combined relations of humans and non-humans when he examines the application of scientific knowledge to scallop fishing in northern France. In a revealing (and much-cited) case study, Callon tells how a group of scientists attempt to persuade a group of French fishermen of the utility of their scientific knowledge by specifying a set of guidelines which will increase scallop numbers. Callon shows how the scientists attempt to build a scientific network by getting other actors to comply with them. As the scientists link the entities together, so they designate a set of interrelated roles. Importantly, the entities include non-humans, and Callon shows how the scientists enrol both scallops and fishermen into their network. However, he also goes on to show that for the network to be successfully stabilized, the designated roles have to be accepted by all the actors. In this case, the fishermen and the scallops reject their allocated functions and effectively go their own way, thereby breaking apart the network. As well as showing how processes of network construction can fall apart, this outcome indicates that non-humans can be just as effective in initiating action as humans. There are of course countless examples of non-human action: we might think of BSE where a new actor (a so-called 'prion protein') escaped from one set of relations within the food chain and linked together a new set of associations, incorporating cows, abattoirs, politicians, beefburgers and so forth (see Hinchliffe, 2001). Similarly, the explosion of the nuclear reactor at Chernobyl brought together a new set of associations between

Both classes of entities are associated within networks and retain the ability to act within network relations.

At this point it is worth pausing to consider how the notion of agency asserted by actor-network theory differs from that prevailing in much mainstream social science, for it seems that a truly relational view of the social actor is being asserted here. Fuller points to a key distinction between the actor-network theory view and traditional perspectives: 'instead of treating agency as an ontological primitive out of which societies are constructed [actor-network theory] treats agency as a theoretical construct carved out of an already transpiring social order' (1994: 746). The 'primitive view', referred to by Fuller, sees the agent as an already formed solid mass moving according to its own principles and tendencies unless impeded by other forces (for instance, power imposed from the outside). In contrast, the actor-network view of agency begins not with fully formed agents but with an already constituted social space (the network) and shows how agents (both human and non-human) emerge from a series of trials in which they are continually striving to become actors with powers (for instance, the relations between anthrax bacilli, vaccines, farmers and French society). It is only at the end of a period of stabilization that the actors can be distinguished from the lesser entities, which by now are simple intermediaries (that is, Pasteur has achieved actor status while all the others – bacilli, vaccines, and farmers – serve merely as linkages in the network).[3] 'Who will win in the end? The one who is able to stabilise a particular state of power relations by associating the largest number of irreversibly linked elements' (Callon and Latour, 1981: 293). Thus, actors are 'effects generated in configurations of different materials' (Callon and Law, 1995: 502), while action is the property of associations rather than agents: 'the prime mover of an action becomes a new, distributed and nested series of practices whose sum might be made but only if we respect the mediating role of all the actants mobilised in the list' (Latour, 1994: 34). Action thus emerges from association and responsibility becomes distributed along the chain of humans and non-humans. As Callon and Law (1995: 485) put it: 'it's the relations [...] that are important. Relations which peform. Perform agency'.

The important point to again note here is that actors and entities only emerge from within – that is, their shapes and forms are only determined by – the relations established in networks. Although, as Latour notes, the subjects and objects incorporated into networks bring pre-existing identities into the here and now ('we hourly encounter hundreds, even thousands, of absent makers who are remote in time and space yet simultaneously present', Latour, 1994: 40), the network does not emerge as a simple aggregation of these already stabilized entities, for all are modified as they enter into new and complex interrelationships. 'External' identities become what Brian Wynne (1996: 362) calls '(inter)dependent variables'. However these variables do not sit outside the

processes of co-construction and mutual reinforcement' (1996: 362). This reshaping results from processes of translation.

> This crucial operation engenders the establishment – albeit local and provisional of social links. Thanks to translation, we do not have to begin our analysis by using actants with fixed borders and assigned interests. Instead, we can follow the way in which actant B attributes a fixed border to actant A, the way in which B assigns interests or goals to A, the definition of these borders and goals shared by A and B, and finally the distribution of responsibility between A and B for their joint action. (Latour, 1991: 127)

What the actor-network theorists seek to investigate, then, are the means by which associations between actors and entities come into existence and how the roles and functions of subjects and objects, actors and intermediaries, humans and non-humans are attributed and stabilized. They are interested in how these and other categories emerge from processes of network building. Actor-network theorists make the radical claim that it is only as a result of network-building activities that any stable categories emerge – categories do not exist outside specific network formations. Moreover, an actor (social or otherwise) will only come into being if the links established between the entities enrolled in the networks allow one of their number (perhaps the entity that initiated the enrolment process) legitimately to claim actor status (that is, power flows down the chain towards she/he/it, elevating her/his/its status above all the others). Thus, in an important sense the distinction between actors (those that *organize* the associations or networks) and intermediaries (those that are *organized* within networks) comes at the end of the construction process, when the former can take credit for the latter. However, we should remember that it is only through the (translated) efforts of these associated others that the actor is able to grow in size and extend its reach over greater distances, becoming in effect global: 's/he begins to act for several, no longer for one alone. S/he becomes stronger. S/he grows' (Callon and Latour, 1981: 279).

BOX 3.3

Latour's focus upon actors-in-networks leads to the following assumptions:

- Actors can only act in concert with others. Actors only become actors if those others conduct actions in ways approved and recognized by 'the' actor.
- Action is thus profoundly relational: it can only take place because of the alignments of actors, entities and resources. These alignments are common, everyday features of socio-spatial life.

- Actors, entities and resources only finally take shape (acquire identity) within network relations (any pre-existing identities are likely to be modified or displaced during the process of enrolment). Actors and entities are therefore co-constructed in networks.
- Because the networks are heterogeneous in nature, then a host of actors and entities must be mobilized to make any action effective. This means that if any actor or entity leaves the network the whole operation is threatened. Thus, all the enrolled entities have 'power' of some kind.
- This view of action means we should adopt a 'symmetrical' perspective on potential actors: both humans and non-humans have the ability to make moves that hold decisive implications for the network as a whole.

We therefore arrive, finally, at the *actor*-network: actors and networks become one and the same: it is now 'all for one and one for all' in the construction of joint actions. And as the actor-network grows, it will extend its influence and reach beyond a single locale into other locales, tying these together in sets of complex associations. There is, therefore, no difference in kind between 'macro' and 'micro' or 'global' and 'local'; in the view of actor-network theory longer networks simply reach further than shorter networks.

Network space

The notion that a laboratory is a centre of calculation, able to act at a distance on many diverse micro-locales, helps us to understand how spatial relations are established between sites. It seems from the above account that an interaction between network and site is required so that the site can be modified in line with the requirements of the network. As Latour puts it:

> Every time a fact is verified and a machine runs, it means that the lab or shop conditions have been extended *in some way* [...] forgetting the extension of the instruments when admiring the smooth running of facts and machines would be like admiring the road system, with all those fast trucks and cars, and overlooking civil engineering, the garages, the mechanics and the spare parts. Facts and machines have no inertia of their own; like kings and armies they cannot travel without their retinues or impedimenta. (1987: 250, original emphasis)

Through translation processes, it is possible to do things in one place (for example, the centre) that dominate another place (for example, the periphery). So the term 'local' has a double meaning: first, it refers to the coordinated practices of actors in some predefined locality (for example, the laboratory); second,

This concern for strategies of localization allows actor–network theory to move beyond the micro – macro divide that ultimately proved problematic for Foucault. By drawing our attention to networks, the theory suggests that everything takes place at 'ground level'; there is no need to jump between spatial scales. Latour illustrates this point by asking of a railroad, 'is [it] local or global?' The answer he provides is neither, for

> it is local at all points, since you always find sleepers and railroad workers, and you have stations and automatic ticket machines scattered along the way. Yet it is global, since it takes you from Madrid to Berlin or from Brest to Vladivostock. However, it is not universal enough to be able to take you just anywhere. It is impossible to reach the little Aubergnat village of Malpy by train, or the little Staffordshire village of Market Drayton. There are continuous paths that lead from the local to the global, from the circumstantial to the universal, from the contingent to the necessary, only as long as the branch lines are paid for. (1993: 117)

Thus, 'the words "local" and "global" offer points of view on networks that are by nature neither local nor global but are more or less long and more or less connected' (1993: 122). Size and scale are nothing more than the end product of network extension processes. For actor–network theorists, then, geographical analysis means staying within the networks: we should never vacate the local to look for explanations at another scale of analysis. Yet, neither should we remain trapped in the local, for this spatial demarcation only makes sense in the context of larger network formations. We should travel from locale to locale paying particular attention to the various relationships that serve to bind places together: 'though places are distant, irreducible, and summable, they are nevertheless constantly brought together, united, added up, aligned and subjected to ways and means. If it were not for these ways and means, no place would lead to any other' (Latour, 1988: 164).

To understand the construction and consolidation of space and time, we must therefore follow the networks wherever they might lead. To do this the actor–network theorists believe we must follow a simple methodology:

> We have to be as undecided as possible on which elements will be tied together; on when they will start to have a common fate, on which interest will eventually win out over which. In other words, we have to be as undecided as the actors we follow [...] The question for us, as well as for those we follow, is only this: which of the links will hold and which will break apart? (Latour, 1987: 175–6)

Importantly, this act of 'following' requires that we do not specify different levels of analysis in advance. Callon et al. believe the adoption of a single framework is crucial if we are to grasp the establishment of 'equivalences between places':

> to make use of a separate vocabulary for the large tends to conceal both the processes

could never be decreased in size and become weak. We believe the social theorist has no reason to aid those who happen to be powerful. (1986: 228)

Actor–network theorists thus reject the view that social life is arranged into levels or tiers (some of which determine what goes on in others).[4] It is only the mobilization of humans and non-humans across space and time that distinguishes the 'local' from the 'global', the 'macro' from the 'micro'.

> Instead of having to choose between the local and the global view, the notion of network allows us to think of a global entity – a highly connected one – which remains nevertheless continuously local [...] Instead of opposing the individual level to the mass, or the agency to the structure, we simply follow how a given element becomes strategic through the number of connections it commands and how it loses its importance when it loses connections. (Latour, 1997a: 3)

This 'grounded' approach suggests that length of network determines scale – some networks remain tied to what we would normally see as local areas, others extend over distances we might term 'national', while yet others run around the world in a 'global' configuration. The networks stabilize spatial relations using a range of resources, assembled in ways that allow the flow of knowledge, materials, personnel and so forth up and down the network from the centre outwards. The transported entities

> travel inside narrow and fragile networks, resembling the galleries termites build to link their nests to their feeding sites. Inside these networks, they make traces of all sorts circulate better by increasing their mobility, their speed, their reliability, their ability to combine with one another. We also know these networks are not built with homogeneous material but, on the contrary, necessitate the weaving together of a multitude of different elements which renders the question of whether they are 'scientific' or 'technical' or 'economic' or 'political' meaningless. Finally, we know that the results of building, extending and keeping up these networks is to act at a distance, that is to do things in the centres that sometimes make it possible to dominate spatially as well as chronologically the periphery. (Latour, 1987: 232)

The combination of materials used to build the networks will vary in accordance with the types of relations to be consolidated. In the case of Pasteur, the aim is to tie the laboratory in Paris to the many farms in France where anthrax is an acute problem. The linkages therefore have to be formed around the solution to the anthrax problem: the refinement of the bacillus, the development of a workable vaccine and the modification of farm conditions. But more than this, the linkages have to convey the vaccine into the outside world while *at the same* time conveying power, responsibility and recognition back towards the lab and ultimately to Pasteur. In other words, Pasteur's lab has to become an 'obligatory passage point' for all solutions to the anthrax problem (Latour,

where his lab is extended to almost every farm in France. This new spatial formation has its global and its local aspects: Pasteur's laboratory is 'globalized' through its affiliation with many French farms, while the farms are 'localized' by the nature of their relations with the lab.

BOX 3.4

Notions of space in Latourian actor-network theory:

- Space (and time) are constructed within networks; they are 'made' out of relations of various kinds.
- Thus, in order to analyse particular spaces (and times) we must 'follow' the networks in order to follow the processes that construct space (and time).
- The networks never shift registers or scales. So, in following the construction of space (and time), we never need to shift from the 'micro' to the 'macro' or from the local to the global; rather we just follow the networks wherever they might lead.
- Actor-network theory therefore provides a single terminology (and a single methodology) for the study of space and spatial relations. It simply emphasizes the need to follow networks and to study the materials they are made of and the relations established between these materials.

Actor–network theory therefore proposes a firmly relational view of space. Networks create various space-times out of the materials they bring together ('each invention of a new immutable mobile is going to trace a different space-time' Latour, 1987: 230). These space-times are extended as the networks draw external locales within their spheres of operation. In the case of Pasteur, the network draws in farms by arranging an interaction between the lab in Paris and conditions on the farm. Once this linkage is established, the bacillus can flow towards the lab and the vaccine can flow towards the farms. The space of the network is conditioned by the need to ensure this two-way flow.[5] In sum, 'space' is nothing more than a network 'effect'. Latour puts the point starkly when he says:

> we should force [the] immense extents of space and time generated by geology, astronomy, microscopy, etc., back inside their networks – these phentograms, billions of electrovolts, absolute zeros and eons of times; no matter how infinitely big, long or small they are, these scales are never much bigger than the few metre squares of a geological or an astronomical map and never much more difficult to read than a watch. We, the

on a photographic plate. To suppose, for example, that it is possible to draw together in a synthesis the times of astronomy, geology, biology, primatology and anthropology has about as much meaning as making a synthesis between the pipes or cables of water, gas, electricity, telephone and television. (1987: 229)

There is no absolute space (just as there is no absolute nature, no absolute society, no absolute time); only specific space-time configurations, conditioned by the rationalities and relations that run through networks.

Conclusion

It seems clear that actor-network theory's distinctive perspective on the natural sciences derives in large part from Foucault's earlier approach to the human sciences. In particular, actor-network theory builds upon two of Foucault's crucial insights into the operation of power relations: first, that power is everywhere (even in laboratories, those citadels of scientific rationality); second, that power is productive (within laboratories, power relations assist in the generation of scientific knowledge). Actor-network theory thus re-describes scientific activity in a language that somehow captures its suffusion by power relations. For scientists to be successful, they must 'translate interests'; they must build networks on terms that allow power and authority to flow towards them; they must extend the networks by extending laboratory conditions; they must deliver new definitions of both nature and society; they must, in John Law's (1986) phrase, become 'heterogeneous engineers'.

Actor-network theory also extends Foucault's approach by focusing upon the variety of materials that allow power to flow up and down the networks. As Allen (2003: 131) says, Latour 'has helped to render visible something of what is involved in establishing and maintaining ordered lines of conduct at a distance'. In many respects it is the combining of materials in durable and effective formations that allows conduct to be ordered in this way. Actor-network theory makes the bold claim that it is only through heterogeneous networks that actors make any impact upon the world; no actor can make any kind of effective intervention without the support of others; action is association. Thus, the associated actor is an actor-network, and the actor-network is a stable, enduring and effective ensemble of actors and entities, combined in ways that allow a centre to gather resources in and to export its products out.

Actor-networks can be found in science but in other domains as well, for the processes involved in making scientific knowledge – translation, enrolment, network extension – apply in almost all areas of social life. In short, there is no such thing as society: only (heterogeneous) networks. And space, too, is made ('materialized') by these networks. The alignment of heterogeneous resources

of the network. Thus, localities are 'localized' according to the rationalities and practices that make the network what it is. In most cases, processes of localization will occur as network 'nodes' work to establish durable structures of centralization and peripheralization within the networks; as these structures are constructed so discrete spaces are marked off from one another in the context of a network 'hierarchy' of centres and peripheries.

This brings us back to the relationality of space. In actor-network theory space is no longer absolute (something networks exist *within*); rather, space is an effect of network activity. It emerges from within heterogeneous networks and its shape and its form is given by the shape and form of the various networks. As Latour (1988: 25) puts it: 'Gods, angels, spheres, doves, plants, steam engines, are not *in* space and do not age *in* time. On the contrary, spaces and times are traced by reversible or irreversible displacements of many types of mobiles. They are generated by the movement of mobiles, they do not frame these movements'. Networks and the entities that flow through them *make* space; thus, multiple networks make *multiple* spaces. There may be some commonality in the delineation of network spaces but more likely there will be discrepancies, discrepancies derived from the differences in make-up. Differing networks co-exist; thus, differing space-times co-exist.

As Bingham and Thrift (2000: 290) point out, actor-network theory is less concerned with space and time than with unique acts of 'timing and 'spacing', acts that are conducted through associations of various kinds. Geography becomes then the study of associations or networks. However, the question this raises is whether any geographical overview of associational or network spaces is possible. Or put another way, can we gain understandings of spatial relations only from *within* networks, or should we somehow 'step outside' given network relations in order to gain some (objective?) understanding of the cumulative effects of multiple networks? From the preceding pages it might be inferred that actor-network theory would see the attempt to gain some general spatial overview as merely the misplaced ambition of a discipline such as geography that has always used 'absolutist' notions of space in order to gain dominion over the spatial realm. Latour, for one, clearly believes such ambitions to be misplaced. As he puts it:

the difficulty we have in defining all associations in terms of networks is due to the prevalence of geography. It seems obvious that we can oppose proximity and connections. However, geographical proximity is the result of a science, geography, of a profession, geographers, of a practice, mapping, measuring, triangulating. Their definition of proximity and distance is useless for [actor-network theory]. The notion of network helps to lift the tyranny of geographers in defining space and offers us a notion which is neither social nor 'real' space, but association. (1997a: 2)

Actor-network theory therefore poses a challenge to geography: it demands not only that a relational view of space is adopted but also that spatial relations

'heterogeneous engineering' – that is, processes of network building in which entities of various kinds are assembled in ways that allow networks to undertake certain functions. Actor-network theory claims that geographical analysis (like all other forms of analysis) should now come down to a few methodological points: follow the actors as they stitch networks together, observe what is linked to what, and assess how power flows up and down from centres to peripheries and back again (Murdoch, 1997). But, in concluding this chapter, we might legitimately ask whether such a simplified methodology is really sufficient grounds for geographical analysis (Thrift, 1999). Can geography simply be recast as network analysis? Must we always stay within single networks or can we make some effort to see beyond particular network arrangements to broader network formations in which multiple networks give rise to multiple space-times that somehow mesh together into a broader spatial context? We take up these questions in the next chapter as we assess more fully the spatial implications of actor-network and Foucaultian theory.

SUMMARY

We have examined Latour's 'version of actor-network theory' here in order to show how geographical locations are aligned in relations of various kinds. The chapter focused mainly on Latour's analysis of Pasteur and showed how a scientific network came into being around this scientist. The network was made of heterogeneous materials – anything that rendered it durable – and connected a range of differing locations. It also mixed up the 'macro' and the 'micro', the 'local' and the 'global'. The chapter therefore examined how scale is made relationally.

FURTHER READING

Latour's work is generally accessible. Probably the best introduction is his (2005) book, *Reassembling the Social. We Have Never Been Modern* (1993) is also very readable. For an analysis that teases out the implications of Latour's approach for geography see Sarah Whatmore's (2002) book, *Hybrid Geographies*, and for some criticisms of the actor-network view on power, see John Allen's (2003) book, *Lost Geographies of Power*.

Notes

1. As Cole (1992: 30) says, it was widely assumed that 'natural scientists were trying

2. Latour seems to retain something of an ambivalent attitude to Foucault. He professes to like Foucault's (1979) account of power in *Discipline and Punish*, and he believes this provides a model on which empirical studies of network building can be based. However, he expresses reservations about other aspects of Foucault's work, particularly the latter's neglect of the natural sciences, which Latour believes limits the utility of Foucaultian vocabularies and concepts (see the discussion in Latour and Crawford, 1993).

3. Callon and Latour (1981: 286) ask: 'What is an actor? Any element which bends space around itself, makes other elements dependent upon itself and translates their will into a language of its own. An actor makes changes in the set of elements and concepts habitually used to describe social and natural worlds'.

4. Moreover, as Callon (1986: 228) puts it: 'to make use of a separate vocabulary for the large tends to conceal both the processes by which growth occurs, and the uncertainties that are involved in maintaining power and size. In addition it reifies the status of the large, and makes it appear as if the latter could never decrease in size'. In order to better understand the precarious nature of network building, we should attend to the processes involved; these can only be seen from within the network itself rather than from the perspective of another spatial scale.

5. Space can also 'reappear' if the flow is for some reason interrupted. An illustration of this point is provided by Latour (1997b: 173), when he cites the example of a passenger on board a TGV train: 'He sat quietly in the first class, air-conditioned passenger car and read his newspaper, paying no attention to the many places passed by the speeding train, all of which looked to him like landscapes projected on a movie screen [...] No negotiation along the way, no event, hence no memory of anything worth mentioning'. This entity, this traveller, is transported relatively unchanged across space (he almost 'hovers above' the places passed en route) along a given time horizon. But if the train breaks down and the passengers are forced to disembark then they suddenly become very concerned about space. This space is no longer a 'landscape on a movie screen', a mere passing facade – something rendered almost invisible by the compression of time – but is now a complex and concrete place which the passengers have to negotiate during the time of their delay.

4

Space in a network topology

> To attend to the politics of becoming is to modify the cultural balance between being and becoming without attempting the impossible, self-defeating task of dissolving solid formations altogether. (Connelly, 1999)

Introduction

Actor-network theory builds on Foucaultian theory by showing how power is conducted within network formations. Power, in this view, lies in the heterogeneous materials assembled in networks in accordance with the need to make actions (scientific or otherwise) durable through space and time. Networks draw materials together into new configurations. Each network traces its own trajectory and this trajectory reflects a convergence of factors, including the combination of entities used in network construction, the relations established between these entities, and the ordering impulses of the network builder. If all these elements work in concert then the network becomes a solidified actor – an 'actor-network'. This term, which Law (1999: 3) claims is deliberately 'oxymoronic', refers, on the one hand, to a centred actor and, on the other, to a decentred network. Actor-networks are networks *and* points, individuals *and* collectives (Callon and Law, 1997: 174).

Latour and the other actor-network theorists believe it is the mixing of human actions into non-human materials which allows networks to endure beyond the present and to remain stable across space. It is therefore the heterogeneous quality of the networks that permits them to reach across spatial scales from the 'small scale' to the 'large scale'. Actor-network theory thus directs our attention to the means whereby spaces are made ('materialized') *inside* networks and it shows how spatial scales are distinguished from one another in line with the priorities of the networks or the network builders. In this respect, we can suggest actor-network theory extends Foucault's analysis of 'Panopticism' for, as we saw in Bentham's Panoptic prison, certain centrally

so their behaviour was 'normalized'. Thus, the arrangement of materials in the prison corresponded to the requirements of a specific disciplinary regime.

In Latour's analysis of Pasteur, we see precisely the same mechanisms at work. Pasteur turns his laboratory into a centre of calculation by rendering the anthrax bacillus visible. Once this visibility is achieved, the bacillus can be acted upon until a vaccine is developed. As the vaccine is exported, laboratory conditions are extended until it is no longer clear where the lab ends and the external environment (that is, French society) begins. In Latour's (1983, 1987, 1988) account, it appears that Pasteur is a network builder *par excellence*: he is able to align a host of entities in a way that permits the extension of his laboratory, while at the same time ensuring recognition and prestige flow towards himself. In short, Pasteur constructs an actor-network in which he is ultimately seen as 'the actor'. His laboratory in Paris becomes a centre of calculation, while all other spaces are positioned as somehow peripheral (despite their importance to the network as a whole). From this, we might assume that the networks in actor-network theory refer to systems of almost Panoptic power in which centres succeed in exercising effective control over all aligned entities and spaces.

Yet, subsequent studies have shown that Panoptic networks are not necessarily the norm; they may co-exist with much more fluid network relations, perhaps echoing Foucault's point that systems of domination comprise only one form of power relation. We can therefore suggest the existence of two broad network types (Murdoch, 1998). On the one hand, there are those networks where translations are perfectly accomplished, where the entities are effectively aligned and the network is stabilized – despite the heterogeneous character of the entities they work in unison, thereby enabling the enrolling entity (the 'centre') to 'speak for' the entire network (rather in the manner of the Panoptic prison and the Pasteurian laboratory). On the other hand, there are networks where the links between actors and intermediaries are provisional and divergent, where norms are hard to establish and standards are frequently compromised. Here the various components of the network continually negotiate with one another, forming variable and revisable coalitions, and assuming ever-changing shapes so that no clear centre emerges. While this second type might be seen as an early version of the first – once relations are settled then a dominating centre will emerge and norms will be imposed – it does not always work out this way; sometimes networks take shape in non-centred ways (Callon, 1992).

It seems reasonable to assume that these two network types demarcate differing spaces: in 'Panoptic' networks, spaces are strongly prescribed as delegates, mobiles, inscriptions and other envoys work to 'normalize' behaviour; in networks of variation and flux, alignments are interactional and unstable, giving space a more malleable character. These two network spaces might be described as 'spaces of prescription' and 'spaces of negotiation' (Murdoch, 1998). These

their control; in other networks, discretion and negotiation between all the assembled elements are the norm.

There is, then, more than just one set of spatial relations in the scenarios portrayed by actor–network theory. On the one hand, we have tightly ordered ('normalized') spaces; on the other hand, we have disordered ('undisciplined') spaces. As we shall see in this chapter, the distinction between 'prescription' and 'negotiation' is helpful in highlighting the differing sets of relations consolidated in networks. Moreover, it directs our attention to the varied sets of heterogeneous associations that compose differing spatial arenas. Yet, the two-fold typology 'prescription/negotiation' may be unduly restrictive when we turn to examine the relationships between differing networks and differing spaces. Thus, we introduce to the notion of 'multiplicity' as perhaps a better means of describing spatial complexity. The term multiplicity helps us to appreciate undulating landscapes of network relations in which differing spatial contacts coexist. An interest in multiplicity therefore leads directly to a concern for 'topology' – that is, the complex spatial interactions that take place both within and between networks. In what follows, we investigate the utility of these two concepts – multiplicity and topology – and assess how far each helps us to appreciate the interaction between network and space.

In assessing the notions of multiplicity and topology, we also address some of the challenges that actor–network theory poses for the practice of human geography. In particular, we consider whether *general* observations about (relational) space can be made from within a framework that suggests there are as many spaces (and times) as there are networks. In other words, given that actor–network theory appears to question whether 'geography' can legitimately gain access to any vantage point that provides an *overview* of the spatial realm, we assess whether geographers can still legitimately stand above 'ground level' in order to survey the broader socio-spatial terrain.

In order to address these issues, the chapter is divided into two main parts. In the first, we assess the way in which Foucaultian/actor–network theory conceptualizes network space. As we shall see, recent thinking in this theoretical stream highlights spatial complexity, for it is now evident that networks give rise to differing spatial forms. We consider how spatial complexity leads to an interest in multiplicity and topology, and we assess how Foucaultian/actor–network theory has attempted to incorporate these terms into its repertoire. In the second part of the chapter we move beyond the discussion of network space to consider the broad landscapes of spatial relations that arise in this 'world of networks'. In particular, we assess whether it is possible to develop a secure philosophical vantage point for broad geographies of relational space. In seeking a vantage point somewhere above 'ground level', we turn to the work of Gilles Deleuze and Michel Serres – two key philosophical influences on actor-

Foucaultian/actor–network theory. In conclusion we begin to draw out an analytical framework that combines both topographical and topological perspectives. This framework will guide the discussions presented in the case-study chapters.

Spaces of singularity and multiplicity

As we observed in the previous chapter, actor–network theory has been particularly adept at showing how action at a distance is achieved through the use of heterogeneous materials. 'Translation' is the conceptual tool most frequently utilized in the theory as an aid to this type of investigation. In short, translation refers to the processes of negotiation, mobilization and displacement that aim to establish enduring relations between actors, entities and places. It involves the re-definition of these phenomena so that they are persuaded to behave in accordance with network requirements and these redefinitions are frequently inscribed in the heterogeneous materials that serve to consolidate the networks. And as we indicated above, there is a close affinity between this approach and Foucault's analysis of normalizing power relations in institutional settings such as prisons and asylums.

Although the term 'translation' focuses our attention on the negotiated character of network enrolments, actor–network theorists sometimes imply that this is a *prescriptive* process. To take just one example, Law (1997: 4) suggests that 'networks may be imagined as scripts. Which means that one may read a script from, for instance, a machine which tells or prescribes the roles that it, the machine, expects other elements to play'. As indicated above, where a network behaves in this way, it is likely to be standardized and predictable. The most predictable networks tend also to be the most formal. In general, formalisms are composed of separate countable elements which stipulate a hierarchy of spatial and temporal relationships. As Bowers explains, these separate, countable elements provide a means of

> manipulating a few elements, combining and recombining them systematically, while practices of re-representation [or translation] retain the link between the few formal elements and many other representations [translations] which stand behind/before them [...] Like the strands in a rope, there are a multiplicity of well-ordered and combined elements connecting one end (the object) with the other end (the formalism). (1992: 245)

Thus, the elements of the network 'fold up' the representatives that stand behind them so that the network becomes 'singular' – it becomes an *actor-* network. If the network is to achieve 'actor' status then entire chains of translation must be arranged into complex hierarchies. These hierarchies will resonate centrally-