

## Preface

*Exploration of Space, Technology, and Spatiality* brings together researchers working at the intersections of digital, geographical, geometric, linguistic, information, and organisational space. They address complex and challenging issues that cross traditional domains of study, and together bridge perspectives from information science, geography, design, anthropology, computing, psychology, and philosophy.

The nucleus of the collection has been developed from papers presented at the second international *Space, Spatiality and Technology* workshop held at Napier University, Edinburgh, supplemented by a subsequent wider call for contributions. After peer-review, around half the submissions have been accepted for this book. This new collection builds upon the coverage of the first *Space, Spatiality and Technology* workshop and the resulting edited volume (Turner & Davenport, 2005) by addressing new areas that include our primary experience of space, the social and organisational dimensions of the places where we work and play; the artistic representation and use of spaces and places and, finally, how we talk about space and place.

### SPACE, SPATIALITY, AND TECHNOLOGY

This book addresses the three interrelated themes of space, spatiality and technology and we begin by briefly considering each of these in turn. From a Euclidian perspective, space is an unbounded volume in which everything exists. Curiously, both an individual atom and the entire universe are largely empty space. Interstellar space contains about one atom per cubic centimeter (there are about five sextillions atoms in a drop of water – or five followed by 21 zeros), but this is the space of the physicist, of the astronomer, and is beyond our immediate experience and is not something with which we can directly engage. Of greater interest, immediacy, and relevance is spatiality, the experience of local, bounded, and human-scale space. One readily recognizable form of which is the experience of place, that is, space given meaning by the activities we engage in there (e.g., being born, living, and dying). It is experienced through the senses and, perhaps more importantly, through our bodies. Finally, there is technology. A word derived from the Greek Τεχνη meaning craft or skill, and that has, only in the last 100 years or so, become associated with the current state of our civilization. With technology, we believe we can master space; note, for example, Arthur Mee, the great encyclopedist, writing of technology and space, “If, as it is said to be not unlikely in the near future, the principle of sight is applied to the telephone as well as that of sound, earth will be in truth a paradise, and distance will lose its enchantment by being abolished altogether.” (Mee, 1898). Mee, anticipating the videoconference by decades, imagined that technology could be used to effectively eliminate the space between people and in doing so, mediating a new form of spatiality.

## MAKING SENSE OF SPACE, SPATIALITY AND TECHNOLOGY

*Equipment has its place, or else it “lies around”; this must be distinguished in principles from just occurring at random in some spatial position. When equipment for something or other has its place ...*Heidegger (1926/62: section 22).

Making sense of these three themes is no small matter. Space is an absolute as it is not defined in terms of anything other than itself; spatiality is personal, human scale and experiential; and technology is the cultural product of our skills and crafts. It is, perhaps, unsurprising that we turn to philosophy for an explanatory framework. Heidegger notes in the same section of his *Being and Time* as the previous quotation that “The bare space is still veiled. Space has been split up into places.” The presence of the term *place* in both references is not a coincidence. Early writers were clear about the fundamental association between being and place. In the fourth century B.C., for example, we find Archytas of Tarentum observing that: “to be (at all) is to be in (some) place” (Casey, 1997:4) an observation that virtual reality researchers have returned to in recent years (cf. Turner & Turner, 2006).

Aristotle includes *where* as one of the 10 essential characteristics of every substance. Aristotle’s concept of place is as a container or boundary for an object, as in the sense of being held in place, was widely accepted for centuries until being superseded in relatively recent times. However, from Plato until almost the present, this primacy of *place* is submerged in Euclidean *space*, in concepts of the relationship between space and time, and in the hegemony of the positivist scientific tradition. Place disappears as a fundamental aspect of being, and becomes a mere site or specific instance of universal Euclidean space until the concept is reclaimed by modern and postmodern authors. Among others, Kant, Husserl, Whitehead, Merleau-Ponty, and Heidegger were all active in reintroducing place to philosophical discourse, and were also instrumental in demonstrating the importance of the body when thinking about place. For Kant and Goerwitz “... this body is my body; and the place of that body is at the same time my place” (1915/ 2003). Kant goes on to argue that positions in space are relational, that is, should be understood in reference to aspects of the body, an observation only recently recognized by psychologists (e.g., Shepard & Hurwitz, 1983). These ideas lay dormant until amplified by Whitehead, who writes, “We have to admit that the body is the organism whose states regulate our cognition of the world. The unity of the perceptual field therefore must be a unity of bodily experience” (Whitehead, 1925: 91). Husserl also noted the *privileged position* of the human body: for him the body not only gives rise to the three dimensions but “everything that appears belongs to its environs” everything that is encountered is around the body. Similarly, in his *Phenomenology of Perception* (1945), Merleau-Ponty argues that it is only through our lived bodies do we have access to what he describes as the *primary world*. Without our bodies, there could be no world. The lived body is central, as is his *corporeal intentionality*, replacing the Cartesian mind-body distinction. The world and the lived body together form what Merleau-Ponty calls an *intentional arc* that anchors us in and to the world. More than this, Merleau-Ponty argues that the movement of the lived body actually creates (produces) existential space. It is not, however, the “objective” movement of the body as such, but rather the experience of this movement, “Far from my body’s being for me no more than a fragment of space, there would be no space at all for me if I had no body” (*ibid*). To feel our body (kinaesthesia) sensing its surroundings is not merely an exercise in self-reflection but the means by which we *prehend* the world. This kinaesthetic feedback is the means by which we both objectify the world and orient ourselves within it. To orientate ourselves is to adopt an external point or frame of reference. Thus, we need bodies to both create the world and to orientate ourselves within it.

Of Heidegger's complex and labyrinthine body of work, we have chosen to highlight two aspects only for the purposes of this discussion: his treatment of being-in-the-world as *dwelling* and his discussion of the nature of *in*. Heidegger identifies the existential character of being-in-the-world with human beings' propensity of inhabiting and dwelling. The following passage has been frequently quoted, and as can be seen for good reason - "*In* is derived from 'innan' - 'to reside', 'habitare', 'to dwell'. 'An' signifies 'I am accustomed', 'I am familiar with', 'I look after something' ... The expression 'bin' is connected with 'bei', and so 'ich bin' ['I am'] means in its turn 'I reside' or 'dwell alongside' the world which is familiar to me in such and such a way ... " (Heidegger, 1971). Heidegger holds that human beings (who he refers to as *Dasein*) and world are not two distinct entities, but only one that results from *Dasein*'s involvement in the world. *Dasein*'s way of being-in consists in dwelling or residing, that is, being "alongside" the world as if it were *at home* there. Thus the *in* of being-in-the-world is unrelated to ideas of Aristotelian containment, instead *in* is better understood in terms of *involvement*. Heidegger characterises everyday life as being an engaged, absorbed involvement in an undifferentiated world.

## THE ORGANIZATION OF THIS BOOK

Organising the 16 chapters of this book has proved to be remarkably difficult and is testament to overlapping cross- and multidisciplinary nature of the subject matter. However, the following four themes have been identified

- Moving through Space
- Social and Organisational Space
- Auditory and Pictorial Space
- Cognition, Language, and Space

and it is to these we now turn.

## MOVING THROUGH SPACE

The first chapter, from **Alan Dix**, is a wide-ranging discussion of the experience of space. It opens the book not only by reason of its stimulating content, but also because it heralds topics that will recur in other chapters. The chapter explores the interconnectedness of memory, stories, lived space and perhaps most importantly, journeying, traversing 1960s Cardiff, ancient Turkey and Carthage, and modern Nottingham, and considers the delineation and constitution of space by words and mathematics, maps, thresholds, and boundaries. The chapter explores the relationships between our understandings of physical and conceptual spaces. From childhood memories of the back lanes on the way to school to trans-articulation, the way words shape our conceptual and physical landscape, we will see that our understandings of space and of knowledge itself are similarly shaped.

**Kerridge's** chapter stands in sharp contrast to this by discussing the role of the objective measurement of (pedestrian) spaces, considers what can be measured, why those measurements are important, and how such measurements can be used to build better pedestrian spaces. Of equal importance, the chapter discusses what cannot be measured and why we should not even think to build representations that include such unmeasurable aspects. Unlike Dix's first-person perspective, Kerridge's third-person perspective focuses on the design of technologies for tracking and measuring peoples' movements through

particular interior or exterior spaces. The data thus gathered can be used, for example, to streamline emergency evacuation arrangements, to support the design of built spaces so that the pedestrian experience is enhanced, or even to identify aberrant behaviour.

**Leach and Benyon** conclude this section with a discussion of the microscopic. Tiny computational devices called *Specks* can be configured into wireless sensor networks, dubbed “SpeckNets.” These specks could be incorporated in to the fabric of buildings or even sprayed on to surfaces. The data generated by these specks creates a new kind of *information space* that, in itself, creates a range of new challenges for the technologist; what kinds of applications can make use of this space and how does one design interaction with the microscopic? Leach and Benyon conclude that one striking use of this information space is by way of augmented reality whereby real world places are overlaid with digital information.

## SOCIAL AND ORGANISATIONAL SPACE

This section opens with a chapter by **Bakke and Julsrud**, who aim to extend our understanding of the workplace as a key expression of organizational identity (cf. Relph’s concept of place identity – Relph, 1976). The chapter argues for the need to incorporate technologies into the discourses on organizational identity based on a study of the national branch of an international oil company. Bakke and Julsrud’s workplace study concerns the experience of the spatial reorganization of the offices belonging to a division of large oil multinational, set in the context of the recent turn to spatiality in organizational theory and technology studies. Their empirical observations are amplified with the views of the office workers themselves, which exemplify the differing perspectives on the organizational process underlying these new arrangements. The authors highlight the interdependency of physical features, social relations, and organizational design in the production of the workspace, and note how this resists the impact of information and communication technologies (ITC) that might have been expected to marginalise the traditional physical office by removing a need for co-location.

The next chapter by **Laegran** is another Norwegian study concerning the dynamic use of space in Internet cafés. An Internet café can be understood as a technosocial space producing connections between people and places at different levels. Laegran argues against the conceptualisation of computer-mediated spaces and ICTs as placeless, proposing that to understand usage patterns properly, it is necessary to consider the local physical and social settings in which technologies are used. The chapter reports a study of four Internet cafes, and examines the way places are created from the interaction between people and technology. The author draws on actor network theory and practice-oriented theories of place and space to understand the co-constructed technosocial space of an Internet café. These spaces create connections between different levels of granularity: the building itself; its parent village or city; national, and the transnational; and the “space” of the Internet itself. Laegran’s rich account of these settings, illustrated by verbatim material from their inhabitants, not only supports her theoretical argument, but affords a vivid sense of life at these particular intersections of space, place, and technology.

**Whitbread and Hall** discuss artists’ use of the virtual spaces, afforded by Internet chat rooms, to collaboration in the creation of a strikingly beautiful digital stained glass rose window. Historically, rose windows have been a major characteristic of the great cathedrals of Europe, their light filling the otherwise monochromatic interiors.

Whitbread and Hall explore the use of these virtual spaces to provide a working environment for artists, the Wombrose Web site, using the design metaphor provided by the rose window *itself* to create and structure a collaborative space. This space supported the team of practice-based artists in a negotiation process with their aim of developing this monumental artwork.

Finally, **Jacob** contrasts the physicality of space with the sociality of place. She draws on two recent lines of work in information science, philosophy of information and information architecture, to probe the relationship between space and place. Her approach is uncompromisingly humanistic, and she provides a meticulously argued account of the paths by which elements in a generic information space (e.g., a collection of resources) are transformed into a collective habitat, or information environment/place, by means of customised structures (such as information architectures, and ontologies). She concludes with some thoughts on “optimising” design, a well-executed architecture will support the “apprehension” of place. This approach can lead to the identification of meaningful differences that influence the functional activities of an information system and contribute to a greater understanding of what constitutes an information environment.

## AUDITORY AND PICTORIAL SPACE

The first two chapters of this section consider the relationship between space and the voice, listening, and the visual and pictorial. **Coyne and Parker** open this section with their *Voices Off: The Spatial Implications of Voice in Ubiquitous Digital Media*, in which they examine the significance of the voice in modern networked communications. They argue that the voice in this context has been accorded a renewed spatial significance in that it resides not only in what it says, but simply the fact of its being voice. Voice is a spatial entity, and the pursuit of its spatial characteristics can inform contemporary media design. Specifically, Coyne and Parker discuss the relationship between voice and space in the design of public spaces. They observe that this is a reciprocal relationship: spaces can be designed around the properties of the human voice, while individuals modulate their voices in response to the social norms pertaining to a place. The chapter explores how while the vocal mode, and architectures and technologies designed around it, can connote intimacy, communality and welcome, the voice, particularly the unseen voice, can be disquieting and disruptive. The authors advocate greater attention to voice in spatial design to counteract the existing dominance of the visual.

Next, **Turner** and her colleagues consider the role of sound, and more specifically, listening, in creating a sense of presence (of “being there”) in “places” recreated by virtual reality technologies. They begin by reviewing the treatment of sound in place and presence research. They report that sound is used to inducing a sense of presence in virtual environments that immerse their users in representations of particular places. However, this is treating sound as an instrumental property to be modulated and manipulated. But, presence is primarily concerned with experience; how we feel about the sound, what we understand by it, how we interpret it. The authors then consider the phenomenology of listening, the nature of different types of listening and their application: listening is active, directed, intentional hearing, and is not merely egocentric, it is body centric. A classification of modes of listening, which draws on work in film studies, virtual reality and audiology, is then proposed as a means of supporting the design of place-centric virtual environments in providing an effective aural experience. Finally, they describe a case study of listening in real and simulated soundscapes, and show how their classification system can be used to understand this otherwise neglected aspect of presence research.

**Boyd Davis’** chapter marks a change in tone from the auditory to the visual. In his *Representing Space: The Pictorial Imperative*, he examines the relationship between the planar space of graphic representations and the space that is represented. An historical developmental path is shown to be evidence of an almost irresistible pictorial imperative. Examples are taken from the history of painting, film, and television, in addition to computer games and other forms of computer graphics.



In his consideration of the relationship between the space of graphic representations in painting, film, television, computer games, and other computer graphics, and the “real” space that is represented, Boyd Davis contrasts the pictorial mode, in which the graphic presents a unitary “world space,” to the configurational mode, where different graphic elements combine to convey meaning. He traces the current hegemony of the pictorial mode in visual media to the then revolutionary development of perspective techniques in the Renaissance. An underlying theme throughout is the relationship between representational technique, meaning making, and the viewer of the image.

The fourth chapter in this section is from **Fiona Carroll** and is entitled, *The Spatial Development of the Visual-Narrative from Prehistoric Cave Paintings to Computer Games*. The author considers the nature of visual narrative, where the artist arranges images within some sort of space in order to engage people in a narrative. From prehistoric cave painting dating back more than 10,000 years to state of the art computer games, the aim is to explore the spatial development of the visual narrative. Carroll’s contribution also considers the treatment of space in visual representations, but with a focus on narrative. A visual narrative is not simply a series of visual forms, but a treatment of space within and around the image. Such techniques position the viewer with respect to the narrative, promoting flow and engagement. The discussion notes how, despite changing technologies, the central aim is to tell a story, and success rests on how far the representation achieves this. The argument provides a wide range of illustrative examples.

The final chapter in this section is from **O’Neill** and concerns “digitally enhanced cultural spaces.” O’Neill’s chapter is informed by the work of the Situationists. The Situationist International developed a coherent and incisive critique of modern society, the major tenet of which was a reaction to the alienation of the individual by an increasingly mediated and commoditised modern world that surreptitiously encroached upon felt life. The purpose of returning to Situationist ideas here is not only to highlight the level to which the spectacle has now permeated our everyday lives, in the form of computer-enhanced spaces, virtual environments, and convergent technologies; but to critically re-engage, using Situationist tools, with the problems of living within the newly evolving digitally interactive spectacle. The chapter provides a succinct introduction to selected aspects of Situationist thought. It is then argued that new media spaces, as diverse as virtual environments and reality television, constitute instances of the “spectacularisation” of society, a process of “commodification” and mediation that positions individuals as passive consumers, despite the illusion of agency. A selection of digital productions are discussed that subvert and reclaim accepted media genres in the manner of the original Situationists of the mid-twentieth century.

## COGNITION, LANGUAGE, AND SPACE

Shaun **Lawson** and his colleagues examine the ways in which spatial language in computer-mediated communication. They found that people use spatial language in everyday face-to-face conversation. Such interactions can take place over mobile phones or in shared virtual environments such as multiplayer games. However to-date, very few academic studies have looked at how people’s usage and understanding of spatial language might differ when it is computer mediated. Our own experimentation has investigated the relation between the uses of route, survey, and also gaze perspectives in a simple virtual environment.

**Turner**, in his *Space, Place and Memory Prosthetics*, discusses how there have been a number of recent initiatives to develop technology (“memory prosthetics”) to enhance and extend human memory. Typical of these is “Memories for Life,” which is one of the Grand Challenges in Computing identi-

fied by the British Computer Society in 2004. So far, the emphasis has been on the development of psychologically informed technology, a technology that helps us to remember to feed the cat, take our blood pressure medication, and make our dental appointments. Yet memory is intimate, personal, self-defining, and without our memories, like those unfortunate sufferers of Alzheimer's disease, we cease to be ourselves. Nor can we separate memories from where and how they were formed. So rejecting this simple instrumental design and use of memory technology, an alternate conceptual framework is proposed based on the Heideggerian concept of *being-with*.

Finally, the last two chapters of this book are the most demanding, and attempt to use spatial concepts and constructs to illuminate aspects of information science. Though the focus in each of the two chapters is different, they are both concerned with fundamental domain problems that can be addressed in spatial terms. **Darányi** and **Wittek**, and **Warner** explore ways in which language and computation (or meaning and form) intersect, and how coding and decoding work across these different modes. The argument in both chapters is developed in spatial terms. This is a core issue in information science, a domain, according to Warner, that faces "both the technical world of bytes and data compression and the social world of language and meaning, and, equally significantly ... requiring understanding from the human and discursive as well as the mathematical and computational sciences." A second issue is how to characterise information, or the process of informing. Darányi and Wittek base their arguments on Bateson's definition, "a difference that makes a difference." Difference (and similarity) can only make a difference when it is perceived. This can be expressed in spatial terms, materially, for example, in a map or graph or geometric presentation, explored by Darányi and Wittek, and Warner. The approach in these chapters is speculative and philosophical, though all three authors provide examples of how and why the concepts and techniques that are presented might be relevant to design. They offer an informed view of some past and present perspectives on information space, and reveal some of what lies underneath, historically and in terms of engineering, many of our current computational habitats. Darányi and Wittek seek to clarify the geometry of information space by explaining, in nonmathematical terms, the process of vector space modelling. This provides a graphical presentation of similarities and dissimilarities between items that is based on probabilistic indexing techniques. The chapter also offers a useful summary of the history of this particular line of IR work, and provides insight into some of the spatial techniques that can improve efficiency in search engines.

**Warner's** chapter is an ambitious attempt to link explanation of the material acts of reading and writing to seminal theories in linguistics (Saussure) and computation (Shannon) in an exploration of the relationship between form and meaning. In this chapter, the term "space" is polyvalent, as Warner moves from discussion of the material phenomenon of the "space" between words, to more abstract discussion of how we express syntagmatic and paradigmatic language in spatial terms. The argument teases out relationships between the "line" and "surface" of expression, and notions of extension in time and space, and points are illustrated with a wide-ranging set of communication technologies, from ancient Greek script (the "boustrophedon") through the telegraph to text messages. Our everyday interaction with modern information technologies is permeated by activities that involve transformation of spaces, from surfaces to line and surface, and from line to line. A fuller understanding, of user activities and experience: of the technologies themselves, of the theories that underlie the construction of the technologies, and of those that impinge on their use for writing, can be obtained by examining their material basis and their connection with the line, of space and of time, and with the extension of the line of space across a surface.

## NEXT

As is evident from this introduction to the chapters, an unusually wide and varied range of disciplines have been called upon, leaving us with what we believe is a thought-proving collection of complementary (and occasionally colliding) theoretical perspectives and methodological approaches. However, there is a notable absence of contributions that *in themselves* report cross-disciplinary work. If this emerging field is to realise its full potential, such projects must represent the next stage in its development.

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