

case studies: ‘structural spatial plans’ and ‘flexible frameworks’ with a more or less fixed spatial outline combined with design guidelines (p. 588–9). Based on eight examples, the authors conclude that younger European projects like HafenCity in Germany or King’s Cross in UK have built-in flexibility.

The third atlas, *Paris Haussmann*, analyses and reveals the potential of today’s Parisian urban model in relation to the challenges of tomorrow’s cities. The book, published in parallel with an exhibition at the Pavillon de l’Arsenal (January 31–May 21, 2017), shows, categorizes and compares the typical Haussmann urban axes, the public spaces and city blocks and buildings according to their current geometry. In addition to beautiful maps and photographs, the book provides analysis using contemporary criteria such as walkability and energy efficiency and compares the performance of the Haussmann solution with other international metropolises. It is, for instance, shown that the Haussmann grid is efficient in terms of walkability measured as the accessible portion of roadways within a walkable perimeter of 400 meters. Paris’s score is more than 60% which is comparable to Toledo and much higher than Brasilia, a city designed for motorized movement and long distances. This performative dimension is absent in *Urban grids* and *Urban being* and merely qualitative in *The grand projet*.

After studying the hundreds of maps and reading thousands of pages in these four atlases, two aspects are worth highlighting. First, types are used to communicate results in three of the four atlases (all atlases except for *Paris Haussmann*) and prove to be a powerful tool to distinguish similarities and/or differences between and within cities. The addition of the performative dimension would be a logical next step in this line of typo-morphological research, where some recent publications are worth noting: Araldi (2019), Bobkova (2019) and Berghauser Pont *et al.* (2019). Secondly, adaptability is highlighted repeatedly, as reason to study grid cities in *Urban grids* and to describe the performance of the megaprojects in *The grand projet*. Adaptability is an important aspect for sustainable urban development and, in a next step, should be studied using longitudinal models to prove the hypothesis put forward in the atlases in line with the morphogenetic approach.

To conclude, at least three of the four atlases are ‘must-haves’ just because of the beauty of the maps, especially *Urban grids* and *Paris Haussmann*, although unfortunately the latter has

already been out of stock for some time. However, if one also wants to use the atlas for planning and design purposes, I recommend *The grand projet* which, despite the small number of case studies, provides the strongest spatial arguments of how to make future projects more adaptable and inclusive, underpinned with a detailed description of the making and impact of eight megaprojects.

References

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Meta Berghauser Pont, Department of Architecture and Civil Engineering, Chalmers University of Technology, SE-412 96 Gothenburg, Sweden, E-mail: meta.berghauserpont@chalmers.se

Human spatial navigation by Arne D. Ekstrom, Hugo J. Spiers, Véronique Bohbot and R. Shayna Rosenbaum, Princeton University Press, New Jersey, USA, 2018, 201 pp. ISBN 978–0691171746.

The authors of this book are well-known international researchers in the field of human navigation. Based on their expertise, it is clear that this book is written with a strong experimental psychology and neuroscience perspective. It is also worth noting that it is not written for a ‘popular science’ audience, rather it is apparently intended for students already entering this field, or researchers from closely-aligned fields requiring an authoritative overview of the topic.

This book is intended to be a comprehensive overview of what is known about human

navigation, spanning roughly a period from Tolman's early work on the cognitive map (Tolman, 1948) to the present day, spanning a period, therefore, of approximately 70 years. During this period, knowledge of how humans navigate has been utterly transformed through experimental and technological advancements in studying the brain 'in action'. The book provides a very clear explanation of how studying the brain 'in action' is possible. Until such recent advances we had only two ways of studying the brain, via the observation of behaviour or by studying people with injuries to their brains. Current methods of measuring brain activity fall into two categories: invasive and non-invasive. Broadly, invasive methods consist of recording the electrical signals in brains via implanted electrodes, while non-invasive methods essentially mean functional magnetic resonance imaging (fMRI) which uses changes in blood flow to record neural activity.

The first chapter of the book, however, is concerned rather with reviewing a number of classic behavioural studies, which naturally overlap with fields such as behavioural psychology, environmental psychology, experimental psychology and geography. Concepts such as how humans judge distance or direction, different spatial scales, how spatial knowledge of new environments is acquired, different scales of space, path integration, orientation and how we represent space are all covered. In particular, this chapter covers the work of researchers, possibly known to readers of this journal, such as Montello (judging distance and direction), Appleyard (urban spatial knowledge), Loomis and Klatzky (path integration) and so on. For readers with an interest in the understanding of urban environments, this is likely to be the most accessible chapter and a good entry point into the wider subject.

The next chapter covers the neural basis of navigation and this is where the basics of the role of the hippocampus is explained along with the different kinds of cells found therein (place cells – broadly mapped to a specific location, grid cells – approximately giving a sense of metric distance, and head direction cells – firing in certain cardinal directions). It also goes on to explain how these might work together to form a sort of 'cognitive map'. Taken together, these first three chapters will give any interested reader a good overview into the fundamentals of human navigation (should they choose to progress no further).

The next chapters begin to unpack a number of topics in more detail and explore them in greater

depth: looking at landmarks and how our visual system helps make adjustments to compensate for incremental errors that naturally occur while navigating (chapter 4); the relationship between keeping a goal in mind versus navigating habitual routes automatically (chapter 5); individual differences in navigational strategies and how stress affects these (chapter 6); and the effect of ageing and other clinical disorders on navigation (chapter 7). Of these four chapters it is probably the chapter on landmarks and visually guided navigation that is more directly relevant to those of us studying urban environments and their design. Since the work of Lynch (1960) there has been some debate as to whether landmarks are actually used by people when navigating through cities or to help people form internal representations of a city or neighbourhood. Although this chapter does not address these real-world applications directly, there is no doubt that the authors consider visual-based, landmark navigation to be a key aspect of the human navigational system. Therefore, the design, appearance and location of landmarks in the built environment must, by extrapolation, also be important and worth studying.

The final three chapters are less specific and more overarching. Chapter 8 presents two theories for how the brain navigates, the first being the taxonomy of Aguirre and D'Esposito (1999) in which specific areas of the brain, each responsible for a different aspect of navigation, work together to help us navigate. The alternative theory presented by the authors is a 'network' conceptualization which is a more distributed and synergistic model. The authors comment that they 'suspect that overall the truth is somewhere between' these two (p. 145). Chapter 9 continues with the more general approach, looking specifically at memory, the fundamental role of the hippocampus in spatial memory, and how other parts of the brain also support spatial memories with the hippocampus acting as a 'hub' (p. 163). The concluding chapter not only summarises the preceding chapters but also returns to a key question: is human navigation similar to the navigation of other animals, or is it quantifiably different? The authors conclude that it is fundamentally different, if only in three ways: our superior, high resolution vision, our use of language and maps.

Overall the book is clearly-structured and the writing style appropriate to an academic audience. As already mentioned, it would certainly help if a prospective reader already had an interest in this area or some basic knowledge of different brain

structures, but it is not inaccessible without this background knowledge. The case is made, at the end of the book, that the field of spatial navigation is a growing one and should clearly be studied in its own right; I believe that this book's existence strongly makes that case.

References

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*Ruth Conroy Dalton, Lancaster School of Architecture, Lancaster University, Lancaster, UK.
Email: r.dalton1@lancaster.ac.uk*

Socio-spatial inequalities in contemporary cities by *Alfredo Mela* and *Alessia Toldo*, Springer, Cham, Switzerland, 2019, 83 pp. ISBN 978–3–030–17256–5.

Socio-spatial inequalities in contemporary cities gives an overview of concepts related to social sustainability in an urban context, a topic of great concern today. The overview covers not only contemporary cities, as the title suggests, but includes examples from a longer period. The aim of the *Springer Briefs in Geography* series is to present a condensed overview of a certain topic. Alfredo Mela and Alessia Tolo have definitely succeeded and the book includes texts from a wide selection of researchers, discussing the urban inequalities of cities. Yet it is a selection and, although anything else would be impossible, the delicate selection of contributions is of huge importance to avoid knowledge gaps. For instance, the book discusses many relevant aspects of inequalities, but with a strong focus upon *residential* segregation while non-residential segregation is not elaborated to the same extent even though it is mentioned in a few passages. It would be more valuable with a more balanced focus since research on residential segregation is much more developed, compared to studies of segregation in public space, at workplaces or in schools. The few examples that are found in this

book are valuable and important since they widen the perspective to study inequalities and segregation beyond residential segregation.

In chapters 2 and 4, the authors present 'classical' icons such as Durkheim, Simmel, Wirth, Weber and Marx, along with more contemporary scholars. Furthermore, the authors systematically introduce core concepts, especially in Chapter 2, for example social exclusion, inequalities, social integration, social inclusion, difference, and intersectionality. Together, this provides a good general background to studies and discussions related to socio-spatial inequalities.

In Chapter 3, segregation and exclusion are discussed in relation to, for example, changing norms and attitudes, globalization and political development. The book refers to research by Giddens, Castells, Young, Butler, Zukin, Smith, Sassen, and De Verteuil among others. Specific themes include social class, gender differences, queer spaces, ethnic minorities, Roma people, and homeless people. The selected theories and approaches presented here introduce the reader to these questions and provide a guide where to look for more if one wants deeper knowledge.

It is emphasized throughout the book that there are large variations in how segregation plays out in different cities, regions, or countries, partly as a result of history or socio-cultural contexts and, thus, how difficult it is to transfer knowledge and insights about segregation and inequalities from one context to another. One needs to keep in mind, and weigh in many different aspects, such as history, political system, socio-cultural aspects, traditions and changes in population composition over time.

The book is especially useful for this community when the prerequisites and conditions created by urban form, that is, spatial structures and urban morphology, are highlighted, which are in general rarely included in texts about inequalities. It is important to see the spatial dimension in relation to the social, and perhaps chapter 3 describes this most explicitly. It is important to keep in mind that space not only influences the reproduction of certain phenomena or social processes, but may also influence the constitution of different kinds of groups and/or urban practices that turn them into spatial phenomena. In research, we may study the social and the spatial component separately but, at some point, it is important to bring them together again if we want to deepen our understanding.

Also, in relation to the urban environment, the authors highlight the difficulty of knowing when