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### Code/Space: Software and Everyday Life

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**Code/Space: Software and Everyday Life**, ROB KITCHIN and MARTIN DODGE, MIT Press, Cambridge, MA (2011). xiii + 290 pp. US\$35.00 (hbk). ISBN 978 0 262 04248 2.

This is an important book about a growing trend that has received relatively little scholarly attention within planning, geography and regional studies, namely the product/process of software (or code) embedded in the daily spatial practices of economic and social life. While code has largely been hidden from casual view it is central to the processes and spaces that make up the information age. Rob Kitchin and Martin Dodge are leading scholars on cyberspace, information and code and they masterfully use this expertise to present an accessible and extremely lucid argument as to why software matters. In particular they analyse how software creates new 'spatialities of everyday life' (p. 16) by helping to modulate the processes through which space comes into being. They characterize this process as code/space or 'when software and the spatiality of everyday life become mutually constituted, that is, produced through one another' (p. 16). Code/spaces are increasingly pervasive in everyday life – ranging from airport check-in counters to computerized check-out lanes at grocery stores – and if the software associated with these spaces crashes, daily practice likewise crashes. While one can imagine substitutes based on early techniques (paper tickets or hand check-outs), the non-code-spaces they represent are fundamentally different systems than those associated with code. Moreover, code/spaces are generally tied into global network architectures that stretch and merge them into complex assemblages that are essential for modern society and spatial practice.

A key part of Kitchin's and Dodge's argument (Chapter 2) is conceptualizing software as both a product of the world (created via a collective and contingent process) and a producer of the world (or code/space) through its relations and interactions as a

Latourian actant. While some may critique their characterization of code as a producer of the world as overly deterministic – imbuing code with the power to make things happen in a single way – this does not correspond with the careful formulation offered by the authors.

How code/space emerges through practice is contingent, relational, and context dependent. Code/space unfolds in multifarious and imperfect ways, embodied through the performance and often unpredictable interactions of the people within the space ....

(p. 18)

With this relational definition clearly in mind the book reviews how software remakes everyday objects (Chapter 3) into coded objects (or codejects) which rely upon code in order to perform their primary functions. The book outlines how these codejects appear 'almost stealthlike' (p. 61) across a range of items from pacifiers with built-in thermometers to digital picture frames to washing machines (a topic reviewed again in Chapter 8) and it argues that these codejects can represent important actants in understanding the spatialities of everyday life.

Chapter 4 details how software is implicated in the ongoing transduction of space or

the making anew of a domain in reiterative and transformative individualizations – it is the process by which things transfer from one state to another.

(p. 72)

The transduction of space by software builds upon the authors' conceptualization of space as 'in a state of non-deterministic becoming' with software able 'to modulate the conditions through which space is beckoned into being' (p. 80). For example, the use of coded objects and assemblages (barcodes and credit cards at a checkout lane) transduces the consumption space of a grocery store into a code/space that connects the local and the material (the grocery store) to global systems of finance, logistics and production. The resulting code/space (which itself is transduced by subsequent iterations) represents a very different space than would be possible without software. Moreover, these code/spaces are subject to new modes of governance – such as the automated management of people and objects (Chapter 5) – that seek to reshape key elements of everyday life. Code/space allows for the easy monitoring of the speed of checkout clerks as well as providing insight on patterns of consumer and citizen behaviour.

While the theoretical conceptualization of code/space and transduction are clearly the major contributions of this book, Chapters 7–9 provide three welcome case studies on how these processes emerge in everyday life. The first example on air travel (Chapter 7) highlights how the ticketing process embodies (at least in the case of paper tickets) the actual codes

associated with how a passenger moves through the space. Issues such as what check-in line can be used, how many bags can be checked in and at what cost, access to desirable seats, security risks, boarding priority, and even meal preference (if one is lucky enough to be offered one) are all disciplined by software categorization and algorithms in the enactment of the code/space of air travel. Supporting this process of automated management is an associated rhetoric of efficiency and security with the goal to create 'infallible' systems. Despite these promises, however, the code/space of air travel is not solely determined by code as there remain key contingent and relational aspects (the difference between small and large airports; the role of profiling at security checkpoints) which contribute to the transduction of air travel code/space.

In addition to air travel, code/space extends into other arenas of everyday life such as consumption (Chapter 9). The movement of money in the global economy is based on code and much of the world's wealth exists as database entries rather than any material form. Likewise code has fundamentally altered the logistics industry into a code/space in which individual products are traceable (including the wonderful example of eggs; p. 203) and whose entire histories – from raw material to final consumption – are stored in readily accessible databases. In addition, code has helped transform the definition of 'consumer' via the increased post-purchase and feedback duties/opportunities available to consumers (a practice known as presumption) as well as enlarged customer profiling and management as firms seek to maximize markets.

The most interesting case study of code/space, however, is the home (Chapter 8) in which coded objects have already slipped into the background of our awareness. Using a series of audits of a range of household configurations in the Western context, Kitchin and Dodge highlight the embedding of code in the home – sometimes literally as in the case of the radio-frequency identification technology (RFID) chip in a family's pet – from the expected computers and mobile phones, to the unexpected but often present examples of software in washing machines, vacuum cleaners, utilities monitoring equipment and even rubbish bins. While of great interest in its own right, the examples are particularly good at highlighting how code can transduce the home into a site of paid work (checking work email), a site of creativity (remixing family photographs) and a space of government/corporate surveillance (tracking patterns of water use or web-surfing).

Indeed, it is this latter category of surveillance that is a primary concern of the authors as they explore the relevance of 'everyware' – the idea that computational power will be ubiquitous (Chapter 10) – to code/space. While recognizing that access to everyware is highly contingent (in contrast to much of its associated rhetoric), the authors examine how it is envisioned based on

the discursive regimes of empowerment, securitization and *sousveillance* (or self-monitoring). In particular, this chapter considers the dangers of everyware for society (such as control creep and never forgetting) even as the code enabling it fades into obscurity. Lest one emerges from this review overly paranoid (often referred to as the 'tin foil hat' stage), Kitchin and Dodge note that despite the rhetoric, everyware can only be partial as issues of interoperability, data error, and expectations defy easy and general implementations. Moreover, they note the role of resistance (such as campaigns against automated speed cameras) in limiting the ubiquity of everyware.

The final chapter sets out a manifesto for studying software from a social science perspective with the goal of prying

open the black boxes of algorithms, executable files, captabase structures, and information protocols to understand software as a new media that augments and automates society.

(p. 246)

For example, analysing how the epistemologies of software developers influence the construction of ontologies for capturing the world and its relations are key in understanding how code emerges and does work in the world. Likewise, detailed Foucauldian genealogies tracing the process behind the creation of specific algorithms would provide important insight into how code is produced. Kitchin and Dodge also call for more in-depth studies on how code is reshaping aspects of life (referencing the case studies they offer in Chapters 7–9 as examples) as well as the discursive regimes surrounding and justifying any particular implementation of code. But perhaps most provocative is their call for studying the ethics of coding with specific appeals to design databases that forget slowly over time or algorithms that purposively mis-record events. Both of these suggestions run directly counter to a key strength of software (collecting and collating data accurately) which makes the implementation of these ideas unlikely but highlight the possible points at which studies of the ethics of code could be positioned.

In summation, *Code/Space* is a ground breaking book on the increasingly pervasive role of software in everyday spatialities and its recent awarding of the 2011 AAG Meridian Book Award for the Outstanding Scholarly Work in Geography comes as no surprise. 'Software matters' and to understand better how, where and why it matters, read this book. Do it today (tin foil hats are optional).

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