

Preface

In writing this book, I am attempting to pull together many threads that have been gathered during thirty plus years investigating what it is that people do with digital technology. Over this time, my enthusiasm for digital technologies has waxed and waned either as a result of the opportunities I have had to tinker with devices or as the result of concerns over the reach that technology (and the organizations that control it) has into our everyday lives. In equal measure, this book reflects my journey from understanding human behavior in terms of cognitive psychology (as “information processing”) to an appreciation of the significance of embodied cognition. Specifically, in this book, I employ my understanding of Anthony Chemero’s radical embodied cognitive science (RECS) to some of the design challenges that digital technologies present.

My journey from information processing to RECS has involved a number of fortunate, often accidental, meetings, and I have benefited hugely from the opportunities that these have provided me. To put these meetings into some semblance of order would imply an organizing principle that is only vaguely correct, but this helps in telling the story of this book and how it developed. My academic career began in the applied psychology unit at Aston University, where I completed a PhD on the human factors of speech recognition, under the supervision of Rob Stammers and Dave Usher, in the late 1980s. This work explored the potential for speech technology to be used in the control rooms of electricity-generating power stations.¹ It was here that I learned about ergonomics and the delights of studying people doing their real work in their real work environments. I also learned about the perils and pitfalls of getting digital technology to behave in ways that would be beneficial, particularly the early forms of speech technology at our

disposal. It was at Aston that I struck up a lifelong friendship and working collaboration with Neville Stanton, and some of the ideas that have germinated from our early work (particularly the notion of “rewritable routines”²) have a ghostly presence here. Over the intervening years, making sense of these ideas (and what it means to study people at work) has led me away from the “standard” information-processing approaches that informs so much of ergonomics to search for alternative theories and explanations.

During my PhD, I became interested in how people could use speech technology when they were outside the control rooms of electricity-generating power stations. Initially this involved a laptop in a rucksack with a small head-mounted Phase Alternating Line (PAL) television screen (so that the person had visual confirmation of what the computer had recognized). Over a few years, my research team and I developed wearable computers for maintenance workers, emergency services personnel, and crime scene examiners (CSEs). For the most part, the work was a mixture of hardware/software development with experiments and metrics to evaluate the impact of these technologies on people. From the work with CSEs, I began to think about sensemaking at crime scenes. This led to thinking about the ways in which concepts from distributed cognition could be applied to crime scene examination. In parallel with this, I was working with Neville on projects involving distributed situation awareness. The crime scene work led to two unexpected invitations. The first was to present the work to the Naturalistic Decision Making (NDM) conference, where I first met Gary Klein and Robert Hoffman. The idea that expertise can only be studied in “ecologically valid” settings, which this community strongly endorses, is central to my thinking. This is one of the reasons why I went to the UK College of Policing’s Harperly Hall to study experienced CSEs and why I later worked with simulated crime scenes in Teesside to compare how experienced and trainee CSEs conducted searches.³ The second was an invitation to attend the fledgling Distributed Thinking Symposium series that Fred Vallee-Tourangeau and Stephen Cowley ran from Kingston University. These symposia not only introduced me to the notions of interactivity but also to David Kirsh, Anthony Chemero, and Lambros Malafouris. Subsequently, the Distributed Thinking Symposium moved (with Stephen) to the University of Southern Denmark, where I met Christian Mosbæk Johannessen, who initiated an interdisciplinary project on writing and drawing, bringing together Marieke Longcamp, Susan Stuart, Paul Thiobault, and me.⁴

In an attempt to consolidate my ideas about the role of physical objects in CSE, I started to look at the ways in which people used tools. The literature seemed, back in the 1990s, quite sparse and spread across different disciplines that tended to have little connection with each other. So, I pulled together what I could find and wrote a book.⁵ In part, this book was an attempt to make sense of tool-mediated interactions with the environment. I had benefited from discussions with colleagues at the University of Birmingham, particularly Ted Megaw (who had worked on ergonomics and motor control in the 1970s) and Alan Wing (who continues to define the field of how people coordinate physical movement). Both of them have an approach that marries engineering concepts (inspired by versions of control theory) with fundamental understanding of human activity, and both set up experiments that abstract the core features of real-life activity into tasks that are amenable to experimentation. While neither fully subscribed to the dynamic systems or RECS approaches in this book, I learned a great deal from them in terms of what a rigorous and testable description of activity ought to look like.

As I was writing *Cognition and Tool Use*, my thinking (while incorporating some aspects of distributed cognition and interactivity) was still influenced by information-processing concepts and the initial ideas of forms of engagement depended on “schema” and “automaticity.” I now recast the idea of forms of engagement to better fit with interactivity and embodiment, and the inspiration for this change has come from several sources. On the basis of the tool book, I was invited, by Witold Wachowski, to an AVANT⁶ conference in Torun, Poland. Alan Costall, Robert K. Logan, David Kirsh, J. Kevin O’Regan, Richard Menary, Joanna Rączaszek-Leonardi, and Anthony Chemero were the other invited speakers. From this event, I was able to compare my own stumbling efforts to explain what people did with tools to more cleanly developed theories, particularly of David (in his account of how people use artifacts and actions to “do” cognition) and Tony (in his radical embodied cognitive science). The tool book also led to invitations from Lambros to workshops in Oxford to learn more about his material engagement theory, and from Blandine Bril in Paris to learn more about her theory of functional reasoning account of tool use. I have drawn heavily from all of these ideas and have attempted to find synergies and parallels between them, within the overarching framework that RECS offers. No doubt I am misinterpreting and twisting their arguments, but my

misunderstandings are born purely from ignorance rather than malice, so I hope that they can forgive me. I urge the reader to go to the source material for these ideas. Lambros also encouraged Tom Wynn and Fred Coolidge to invite me to their workshops on applying material engagement theory to paleoarchaeology, where, alongside them and, among others, John Gower, Clint Janulis, and Lee Overmann, we discussed the nature of early hominid tool use.⁷ At Birmingham, I have also benefited enormously from ongoing conversations with Andrew Howes on computational modeling of human decision-making.⁸ More recently, Jan-Maarten Schraagen and Paul Ward, colleagues from the NDM conferences, invited me to contribute a paper on 4E (Embodied, Embedded, Enacted, Extended) cognition to their handbook on expertise.

I also want to thank Doug Sery and Noah Springer at the MIT Press for their help in taking this book from a sketchy manuscript to the version you are reading and to three anonymous reviewers, who have generously provided comprehensive and detailed reviews of the various versions of this book as it has evolved.

I am indebted to all of the people I have mentioned (and to the attendees of various workshops, symposia, and conferences and to all of the PhD students who have taught me through my supervision of them) for their inspiration and support in the development of the ideas in this book. In tracing the path from initial thinking (in distributed cognition and in making sense of how people use tools), it might appear as if there is a neat, linear path from “information processing” to “embodiment.” I doubt that this is the case, and this book is, in part, a continued reorientation of my thinking from information processing to RECS as a way of explaining how people think and act. In particular, I have chosen to couple the consideration of digital technologies with a broader consideration of design and creativity partly because of ongoing discussions that I have had with Tony Chemero and partly because there seems to be a gap in the information-processing literature when it comes to creativity,⁹ so it made sense to see how embodiment could plug that gap; and, of course, I liked the challenge of taking a theoretical position that many people dismiss as being about just “low-level” activity and demonstrating how it is equally applicable to high-level cognition, like creativity.