

Introduction

Thinking does not only happen in the brain. We humans have become so smart because we are exceptional at incorporating the world into our psychological processes. We use memorials to remember. We use photographs to see. And we use medical devices to make decisions. Because we can remake the objects and spaces around us to transform our thinking, we are now able to do much more than our ancestors, even with more or less the same brains.

Take a cognitive endeavor as basic as getting from one place to another. Gone are the days when you needed to memorize the complex geography of London's winding streets. Now anyone with a smartphone can get from here to there with ease. Many of us don't navigate with our brains much anymore. Instead, we make use of only a tiny bit of the cognitive power that our meatware provides, and let the magic in the silicon take care of the rest.

In the past, navigation was not merely resource-intensive, but it was also a very different kind of cognitive problem. To know where you were going, you needed to consult your memory, or a paper map, for a representation of how the roads connected to one another. To know where you were, you needed to look around for landmarks or signs, or—to go back further in time—the stars and the moon. And then you needed to put together where you were with where you were going to figure out how to get from here to there. But now, with GPS navigation apps in your phone, the cognitive problem has changed. Look, and you only need to make sure that your arrow stays on the route that has been drawn. Listen, and you only need to make sure to turn left when you are told.

Our cognitive powers and practical capabilities have always depended on, and have always been transformed by, the material objects and concrete spaces that we have made. Now we have GPS navigation apps in our phones. But before that we had paper maps, landmarks and signs, and the roads themselves too (Haugeland 1995/1998: 234–235). There are clear upsides to thinking outside the brain. Unlike London taxi drivers, you and I do not need to literally grow our posterior hippocampi—at the cost of shrinking our anterior hippocampi—to contain The Knowledge of London's streets in our heads (Maguire *et al.* 2000). Instead, with objects and spaces as *cognitive scaffolds* for navigation, we can do something else with our perfectly ordinary brains.

But there are also downsides to thinking outside the brain. One concern is that the change to how we navigate might be *prudentially bad*, or bad for ourselves. Some people argue that GPS navigation apps in our phones undermine our capacities for attention and memory, and diminish our intellectual virtues of autonomy and carefulness (Aagaard 2021; Gillett & Heersmink 2019).

A different concern is that the change to how we navigate might be *politically bad*, or bad for others and for the society as a whole. By transforming our cognitive powers and practical capabilities, objects and spaces can make us contributors to unjust social forces, even if we do not mean to be. By routing

our walks away from so-called “dangerous” neighborhoods, GPS navigation apps can reinforce existing race- and class-based segregation (Thatcher 2013). By routing our drives to maximize our own efficiency, GPS navigation apps can convert residential neighborhood streets where kids play into dangerous traffic zones (Foderaro 2017). By turning every one of us into a potential minimum-wage taxi driver, GPS navigation apps can enable the ongoing labor exploitation by tech oligarchs and conglomerates (Simet 2025).

This book aims to reveal the dark side of cognitive scaffolds by focusing on the political badness that comes with thinking outside the brain. If our cognitive powers and practical capabilities depend on the world, then we must ask: what is this world that has been built? There are memorials that distort how we remember people who are dishonorable. There are photographs that distort how we see people with darker skin tones. And there are medical devices that distort how we make decisions about people who are oppressed in different ways. If these are the objects and spaces that we have made, how do they transform how we think?

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A common metaphor for oppression is the closing of doors. Our options for what we can do, in part, depend on the structures of the world—including the design of everyday things (Norman 1988/2013). These structures, social and material, open some doors and close others. In fact, they open doors for some and close them for others. And that inequality is where the injustice of oppression can be found. Depending on a person’s social position, a door can be closed for them to different extents, in different ways, with different impacts on what they can do. A closed door that is locked takes away an option completely, but a closed door that is too sticky or too heavy still makes an option much less accessible.

The closing of doors is not only a metaphor. Some doors are literally harder to open for some people than others. A door lever can be easily turned by most. But a door knob cannot be easily turned by some disabled people because it requires a simultaneous grasping and twisting movement. For those disabled people, a door can be a part of the ableist oppression that they experience in the world, when they are trying to do something as basic as getting from one place to another. That is why the accessibility standards issued under the Americans with Disabilities Act of 1990 include an entire section on the how doors, doorways, and gates should be made. In turn, this section contains a specific advisory that recommends levers over knobs. Many choices that we have made in the past were made without consideration for the vulnerable members of our society. The marks that these choices left behind can recede into the background, as if they were simply natural features of the world that we encounter. Ordinary door knobs make ableist oppression ordinary. Marks like them are features of the environment that we have collectively made—and have the power to remake—to open doors for some and close doors for others.

Opening a door is a pragmatic action—something you do to bring yourself physically closer to a goal. Turning your body to align yourself with the arrow in your GPS navigation app, however, is an epistemic action—something you do to aid a mental activity, such as information processing (Kirsh & Maglio 1994; Kirsh 1995). Epistemic actions use our situated bodies in the world to transform cognitive problems; they are what we do to incorporate cognitive scaffolds into our thinking. We perform epistemic actions when we use memorials to remember, use photographs to see, and use medical devices to make decisions.

Behind the Americans with Disabilities Act was disability activists' and theorists' insight that objects and spaces can unjustly open the door for some pragmatic actions and close the door on others—in some cases, quite literally. This book aims to extend that insight from pragmatic actions to epistemic ones. Objects and spaces, I argue, can also unjustly open the door for some epistemic actions and close the door on others. Because of their properties—in particular, the kinds of mental actions that they afford—memorials can distort how we remember, photographs can distort how we see, and medical devices can distort how we make decisions. If these are the objects and spaces that we have made, how do they *materialize oppression*? That is, how do they come to be not only shaped by, but also shape, oppressive systems such as colonialism, racism, and others?

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This book is about the everyday objects and spaces where cognition and oppression meet. **Ch. 1** is on the cognitive science of materialized oppression: how our psychological processes can be shaped by these objects and spaces. **Ch. 2** and **Ch. 3** are on the social philosophy of materialized oppression: how our social practices can too be shaped by these objects and spaces—first, in connection with racism, and second, at the intersection of multiple axes of oppression. **Ch. 4** is on the political significance of materialized oppression: how our political rights can be won and lost through these objects and spaces. Together, these chapters make a horizontal argument for an account on which objects and spaces play an indispensable role in oppressive systems that impact multiple facets of our lives.

But each chapter also makes a vertical argument of its own, centered on a case study—a set of material objects or concrete spaces, a set of cognitive powers or practical capabilities—that comes with a lesson. They can be read independently, in any order, so just start with whichever one that interests you the most.

- **Chapter 1 (Memorials and Memories)** is centered on the material infrastructures of remembering and imagining. Monuments and memorials not only shape how we remember the past, they also shape the possibilities we imagine for the future. Since our imagination—like all our other cognitive powers—is constrained by the world, we can best expand our imaginative

powers through piecemeal and experimental changes to our environment. The upshot is that we should not heed the frequent calls for radical imagination, which are unrealistic and unproductive, but instead make calls for incremental imagination: even though we do need to reimagine the world to remake it, we also need to remake the world to reimagine it.

- **Chapter 2 (Photographs and Phenotypes)** is centered on the material infrastructures of perceiving and evaluating. How we see and value others and ourselves are shaped by photographic technologies, from analog stocks to digital filters. When these technological artifacts are ingrained with a light-skin bias, they materialize racial oppression to the extent that they are causally connected, upstream and downstream, to our racist psychological processes and social practices. The upshot is that instead of trying to eliminate all the biases, we should try to counter oppression. The opposites of oppressive things are not unbiased things, but subversive things, which require investigations into the social and historical contexts that lie behind the biases.
- **Chapter 3 (Machines and Measurements)** is centered on the material infrastructures of diagnosing and deciding. Medical devices, such as pulse oximeters and spirometers, shape the thoughts and actions, as well as the policies and practices, that take place in healthcare contexts. A curious fact about many medical devices is that they often turn out to be not simply biased with respect to only race or only gender, but multiply biased across different axes of oppression. And this fact is best explained through a lens of interlocking oppression, not a lens of isolated biases. The upshot is that we should, in a slogan, *universalize universal design*. First, universal design can address not only ableism, but also interdependent oppressive systems of racism, sexism, classism, and others. Second, universal design can apply not only to pragmatic actions, but also to epistemic actions.
- **Chapter 4 (Playgrounds and Parents)** is centered on the material infrastructures of playing and parenting. Playgrounds and their equipment—slides, swings, and seesaws—not only shape children’s development of agency through play, but also how adults can help or hinder that development. It is important to protect children’s right to play, but that protection cannot only take place in the conceptual realm, the domain of laws and policies. Instead, it must also take place in the material realm, the domain of objects and spaces. Rights—whether it is the right to play or the right to vote—can be strengthened or subverted by material infrastructures. The upshot is that, in order to safeguard the political rights we value, we need to not only write the requisite laws and policies, but build the requisite objects and spaces.

Finally, this book takes a transcontinental journey between the two places that have divided most of my life. The opening and closing chapters are primarily situated in Taiwan, where I was born and forever my home. The middle two chapters are primarily situated in the United States, where I became the person I am now and made a home too. In Taiwan, this book traces a story that goes from an escape from colonial authoritarianism to a subsequent collective rebuild of a world that protects the agency of the most vulnerable. This is not a neat and tidy story of progress; the moral arc of the universe, if one exists, is not a smooth line but a rough and jagged squiggle of ups and downs. In the United States, as we find ourselves in the midst of a return to racial authoritarianism, my aspiration is that this book provides not only a diagnosis of our near past and present, but also—in this transcontinental journey—a tiny bit of hope for our near future.