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INTRODUCTION

PAUL ATCHLEY AND SEAN LANE

Although it is clear that the internet age has suffused modern life, what exactly is its impact? The popular answer to this question seems to fall into two camps. One is that technology has had an overwhelmingly positive effect on human beings and that life is only going to get better as technology advances (Kurzweil, 2006). The other emphasizes that this influence has primarily been negative, making us less safe and more vulnerable (Carr, 2010; Turkle, 2011b).

Books aimed toward a general audience that examine the impact of the internet age on humans present little or no theory or empirical research. One such book is *Alone Together: Why We Expect More From Technology and Less From Each Other*, by Sherry Turkle (2011a), which argues that in an age in which we have nearly unlimited ability to communicate with each other, we are facing a new type of social isolation. Another example is *The Shallows: How the Internet Is Changing the Way We Think, Read and Remember*, by Nicholas Carr (2010), a *New York Times* best seller, which asks what aspects of our human experience are we sacrificing for new technology. These are excellent books, but they lack an overarching theoretical framework and a grounding in empirical research.

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Human Capacity in the Attention Economy, S. Lane and P. Atchley (Editors)

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In this volume, we provide a different, more nuanced, and theoretically grounded perspective to the question of the impact of the internet age on human cognition. The basic premise is that information technology (IT) is purposely designed to attract and hold attention, a valuable and limited resource. We must understand how this “attention economy” interacts with attending to technological devices to affect how we think, feel, and behave in both positive and negative ways. We have previously offered a general framework (Atchley & Lane, 2014) to articulate how attentional and cognitive processes are impacted by IT, and how more complex aspects of human experience are affected as a result.

The current volume presents theoretically motivated research on the effects of technology on thinking, feeling, and behavior across a diverse set of research domains. The aim is for the theoretical and empirical research discussed in these chapters to help generate new theory and research on these topics. The contributors of this volume have thought carefully about the implications of their research for the everyday world, and the nuanced view they present is one that is both realistic and optimistic.

We hope this volume will appeal to a broad audience, from researchers to students. Researchers in broad areas including psychology, sociology, design, computer science, and engineering will find provocative ideas in this volume. Within psychology, researchers in human factors and engineering psychology, environmental psychology, applied cognitive psychologists (perception, attention, memory), emotion (particularly those focusing on cognitive control), and clinical psychology (particularly those studying technology addiction) will find topics that intersect with their work. And we hope that this book will appeal to advanced undergraduate and graduate students who are taking classes in areas such as human factors, interface design, computer science, and technology and society, and who, themselves, are developing their own research agenda to answer the critical question of how IT will impact the human experience.

THE ISSUE

The rise of IT in the form of computers, mobile devices, and internet-connected appliances has become commonplace. In this millennium alone, the percentage of adults using the internet in the United States has gone from a slim majority (52%) in 2000 to near totality (89%) in 2018. Moreover, about one quarter of internet users are on the internet “almost constantly,” an increase from previous surveys (Perrin & Kumar, 2019). The number is closer to one third for those who access the internet with a mobile device,

and nearly two thirds (64%) of American adults own a smartphone (Smith, 2015). And in the young adult demographic (18- to 29-year-olds), the number of those “almost constantly” on the internet according to the same survey (Perrin & Kumar, 2019) is (what some would consider to be an alarming) 39%.

The depth of use has also increased. With respect to mobile access, the term *phone* is almost not an accurate term to describe smart devices. “Traditional” use of the devices (talking) has actually decreased significantly over time (by 25% between 2012 and 2015; Gaskill, 2016). Communication via texting or equivalent applications, video, and new modalities, such as Snapchat, is quickly replacing voice communications. But synchronous communication probably accounts for a diminishing portion of device use. The internet, and all that it brings, and the flexibility of the programs that run on the devices that deliver it allow users to curate their own experience. This permits individuals to build the environment of information as they see fit.

The internet has changed the way we think, feel, and behave. Or, more accurately, it has interacted with the ways in which we are already wired to think, feel, and behave to produce extreme versions of natural tendencies. For example, curiosity is a natural human trait as is sharing what we learn. Curiosity applied to nonvirtual social situations is usually limited by social expectations of propriety and privacy. When the rise of the virtual environment removes those limitations, only unbridled curiosity and the ability to share the results of that curiosity remains. Similarly, the requirement to attend to others in a social situation is supported by the presence of common activities and by the absence of competing stimuli. When we place a device in a person’s hands that can deliver a tailor-made, rewarding, experience, it competes for time with other activities, including socialization. And we are wired to attend to the opinions and actions of others. But we can now choose to only surround ourselves with like opinions even when many of those “opinions” are artificially augmented by nonhuman actors. A measure of how “the internet has changed everything” is that these new ways of thinking, feeling, and behaving have given rise to a new internet-inspired lexicon.

Doxing, phubbing, and bots are terms associated with these new ways the internet, and the devices associated with them, interact with the ways we are already wired to think, feel, and behave. *Doxing* refers to using the internet to research and broadly share private information. “Nosy” and “gossipy” neighbors have always been a reality, but the internet has changed the concept of “neighbor,” adding more neighbors and increasing their anonymity as well as the tools and reach of their “gossip.” The power

and anonymity of the internet has changed the nature of privacy and added doxing to our lexicon. Now “neighbors” can find out aspects of our lives that we have not knowingly shared and may not wish to be shared. *Phubbing*, or “phone snubbing,” refers to focusing on a phone, rather than a person, in a social situation (Chotpitayasunondh, & Douglas, 2016). The focus of a social situation is others or the event that drew them together, creating a kind of “shared attention” (Shteynberg, 2015) by definition. But the addition of a personally curated information environment in each hand brings a strong competition to social interaction and adds phubbing to our language. Bots are a more recent internet-inspired phenomenon that many are only recently learning about. *Bots* often refer to automated social media accounts that can mimic specific viewpoints and port content. In some cases, bot content may comprise two thirds of posted content (Wojcik et al., 2018). People have always gravitated to sources of opinion that match their own and have been swayed by what is seemingly the “majority” view. But the ability to choose to follow only like-minded sources and the majority view enhanced by armies of nonhumans leads to increasing polarization.

Whether the changes that the internet will ultimately bring will be beneficial or harmful is one open to debate, and perhaps an answer will have no final form. A recent aggregation of the opinions of thought leaders, researchers, and others found that a majority see promise, but about one third predict more harm than good for well-being in a tech-saturated world (Anderson & Rainie, 2018). And, as of the time of final preparation of this volume, the global COVID-19 pandemic has, in many ways, added a layer of complexity as people worldwide use the internet to replace many of their daily face-to-face interactions. The purpose of this volume is not to form an opinion on the “goodness” or “harmfulness” of the internet and technology. What this volume sets out to accomplish is to develop a way of looking at the impact of both through the lens of human capacity. Specifically, we choose to look at the issue by considering how humans, as limited information processors, interact with an almost infinite informational environment. In other words, the answer to the question about how the internet will affect us lies less with the internet and all that it brings and more with what we bring to it with the cognitive capacity we have now.

OVERVIEW OF THE VOLUME

The purpose of *Human Capacity in the Attention Economy* is to look more closely at how our cognitive systems, unchanged over millennia, are responding to an information environment that is often crafted to take advantage of what

we now know about its inner workings. The purpose is not to judge the good or ill of those responses but to provide a framework for understanding them. The book is divided into three parts.

Part I, *How Information Technology Influences Behavior and Emotion*, examines how technology overcomes our more rational modes of thought. The first chapter in this part, “Digital Distraction: What Makes the Internet and Smartphone So Addictive?” (Chapter 2), focuses on the most extreme case of compulsion: technology addiction. In this chapter, a practitioner with a long history of frontline work on technology addiction has outlined his observations about why some of us take technology use to an unhealthy extreme. The author explores if internet addiction is special or if it is simply a new way to provide a distraction from feelings of isolation and lack of social support. The irony of social media use as a response to social isolation when it leads to increased isolation in some users parallels other substance abuse issues. In the next chapter, “Information Technology and Its Impact on Emotional Well-Being” (Chapter 3), researchers in the field of emotion explore the processes of emotion generation and emotion regulation as impacted by IT. Although there is much to be concerned about regarding how technology impacts emotion regulation, the authors also explore whether there might be a sweet spot for technology to support positive emotional outcomes.

Part II, *How Information Technology Influences Cognition and Performance*, explores the proposal that technology can improve the cognitive processes underlying learning while it, at the same time, results in decrements to other processes and to performance. The first chapter in this section, “Information Technology and Learning” (Chapter 4), looks at an area in which early technological improvements showed great promise: improving learning. This chapter provides a nice caution from adopting the assumption that everything in an attention economy is unhealthy. But it also demonstrates that an extreme of a good thing can be detrimental. The next chapter, “Say Cheese!": How Taking and Viewing Photos Can Shape Memory and Cognition” (Chapter 5), makes a similar argument that technology can produce benefits and harms. Furthermore, by examining the effect of taking pictures on memory, this chapter shows how seemingly positive practices that divide attention can produce unintended effects on specific cognitive processes that are not obvious to the person who is engaging in them. The final chapter in the section, “The Multitasking Motorist and the Attention Economy” (Chapter 6), takes on one of the most publicized places in which the attention economy produces costs: driver safety. In this chapter, the authors continue the theme started in the previous chapter about effects

of the attention economy on specific cognitive processes and expand it to a wider range of processes necessary for safe driving.

Part III, Getting Away and Looking Forward, ties the themes of the attention economy and imagines “what could be” in the years ahead. The first chapter in this part, “How Nature Helps Replenish Our Depleted Cognitive Reserves and Improves Mood by Increasing Activation of the Brain’s Default Mode Network” (Chapter 7), brings us back to the beginning, closer to the time of William James, to understand the role of brain networks that are active when we are not in an attention economy. One way to understand what is lost when attention is depleted is to understand what happens to us when attention is replenished. This chapter explores the idea that “tuning out, turning off, and getting outside” can change us in fundamental and positive ways. In the final chapter of the book, “Charting a Way Forward: Navigating the Attention Economy” (Chapter 8), we provide a summary of all that is positive, thought provoking, and concerning in the exploration of the attention economy in more detail. As the reader will discover, there is much to be gained if we exert control and much to be lost if we allow ourselves to live in, as James (1890) put it, “the confused, dazed, scatterbrained state which in French is called *distraction*” (p. 404).

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