

THE ATTENTION DEFICIT

Unintended
Consequences
of Digital
Connectivity

Swati Bhatt



The Attention Deficit

“This is a timely book on a pressing topic. Individually and collectively we face problems caused by the unintended consequences of digital connectivity, and Bhatt’s book brings helpful clarity to these issues.”

—Matthew J. Salganik, *Professor of Sociology, Princeton University*

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The Attention Deficit

Unintended Consequences
of Digital Connectivity

palgrave
macmillan

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ISBN 978-3-030-21847-8 ISBN 978-3-030-21848-5 (eBook)
<https://doi.org/10.1007/978-3-030-21848-5>

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This Palgrave Macmillan imprint is published by the registered company Springer Nature Switzerland AG

The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

To Ishaan

Preface

And thus the native hue of resolution
Is sicklied o'er with the pale cast of thought,
And enterprises of great pith and moment
With this regard their currents turn awry,
And lose the name of action.
—William Shakespeare, *Hamlet*

I write this book to explain why things are the way they are, why we live the lives we do and why we make certain choices in the face of rapid technological change. Why has the rhetoric about the rise of social media, privacy and tech behemoths escalated? Why is fear, mistrust and risk aversion on the rise? Why is entrepreneurship losing “the name of action,” as in the quote above?

Attention is a scarce resource and emergent demands for this resource create a deficit, much like a budget deficit. The unique approach to attention in my book is in defining this resource in terms of time. Balancing the hours available for attention against the hours demanded by a tsunami of content creates a time deficit, called the attention deficit. Humans have never before been so profoundly networked and exchanged such vast quantities of information. Ubiquitous connectivity and sharing have unleashed a torrent of information and created an extravagant demand for mental effort. The very process of filtering information is effortful, placing additional stress

on cognitive resources. At the same time, devices and algorithms map our preferences, generate predictions to optimize our lives, anaesthetizing and shrinking our available attention resources. Greater demand matched against a reduced supply of attention results in an attention deficit, which manifests as cognitive apathy or mental paralysis.

In the face of rapid technological change, a deficit of mental resources precludes adaptation. Adjusting to technological change is an effortful process since it requires reframing and rebalancing of lifestyles and world-views. In order to conserve scarce attention resources, there is resistance to change and a refusal to adapt in the event of change. This manifests as risk aversion. The principle thesis of this book is that fear, mistrust and risk aversion, driven by the attention deficit and cognitive apathy, have diminished creativity, entrepreneurship and risk-taking.

This book has grown out of courses on technology and markets that I have taught at Princeton over the past five years, and discussions with students both in class and outside. The intellectual energy brought by these young folks has invigorated and shaped my thinking. Their probing questions helped clarify my ideas and sharpen my message. I am deeply grateful to all.

In particular, David Kim, Caroline Lippman, Reed Malcionda, Elizabeth Petrov, Phoebe Rogers, Noah Schochet and Samantha Shapiro offered valuable feedback on early drafts, along with cherished conversations, inducing me to write lucidly yet simply.

Discussions with Bevin Benson, Brandon Callegari, Zachary Dinch, Trevor Forbes, Alex Ford, Abigail Gupta, Bryce Mbanefo, Pooja Parmar, Jamie Rosen, Elias Stern, Ayushi Sinha, Ryan Yao, Yan Zhang, Cameron Zeluck and Katie Zhou were not only beneficial but injected a touch of much appreciated levity. Fernanda Macias, as a graduate student assistant, was incredible in facilitating class discussions.

Term papers for classes revealed deep insights by the students. Joseph Flynn, for instance, wrote about the unforeseen consequences of Facebook's Free Basics program, which gave users in Africa and South-East Asia free access to services but also incited violence against the Rohingya Muslims in Myanmar and uprisings in the Amhara and Oromia regions in Ethiopia; John Colangelo talked about podcasts, adding to the content tsunami by enabling multitasking; Claire Collins investigated

how consumer preferences change when popular brands are associated with influencers on social media, pointing out that content derives from the person and not the brand; and Zachary Kuehm showed how technology is industrializing the production of music when the same set of people write songs for multiple artists.

The economics department at Princeton University has been my incredible home for the past 27 years, providing intellectual challenges in a secure open environment. My deepest gratitude is to Avinash Dixit, who taught me how to apply economic reasoning intelligently and wisely. He was my Ph.D. adviser, is now my lifelong friend and holds my highest regard.

Elizabeth Graber, my editor at Palgrave Macmillan, believed in my message and supported me with great equanimity throughout the process. Also at Palgrave Macmillan, Sophia Siegler's gentle reminders about the devil being in the details helped me polish my message. Barbara Radvany, Laura Sciarotta and Laura Hedden did graceful handholding at crucial and unexpected moments. Matthew Parker made the computer and networking logistics so much smoother.

Writing a book places challenges on one's family and mine was no different. But daily morning runs with my son, Ishaan, lightened the pace. As did planning and participating in my daughter Anjali's wedding as this book was going to press—we both agreed that the *best* need not be the enemy of the *good*. Ravin, my husband, developed the mental fortitude to see movies and attend music concerts unaccompanied, in solo mode, a process laced with much humor.

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Swati Bhatt

Contents

1	Connectivity, Attention and Risk	1
2	Time: The Measure of Connectivity	29
3	The Psychology of Connectivity: Follower Counts and Identity	45
4	The Economics of Connectivity: Communication Markets	61
5	Streaming Technology and the Entertainment Industry	75
6	Content Tsunami and the Attention Deficit	97
7	Diminished Risk-Taking	117
8	Restoring Boldness and Reducing Apathy	153
9	Conclusion: Dialogue, Not Walls	167
	Index	179

List of Figures

Fig. 1.1	Attention deficit = deficit of cognitive bandwidth hours. (See Chap. 6 for details. Source: Author's calculations)	5
Fig. 1.2	Intellectual property products over gross private domestic investment, seasonally adjusted, chained 2012 dollars. (Note: Intellectual property products is a line item under gross private domestic investment, which is the sum of nonresidential investment, residential investment and change in private inventories. Gross domestic product is the sum of personal consumption expenditures, gross private domestic investment, net exports of goods and services, government consumption expenditures and government gross investment. Source: Data from the Bureau of Economic Analysis, US Department of Commerce. National Data: GDP and Personal Income, Table 1.1.6. Accessed 4/15/19 from https://apps.bea.gov/iTable/iTable.cfm?reqid=19&step=2#reqid=19&step=2&isuri=1&1921=survey)	8
Fig. 1.3	Aggregate market for digital content. (Source: Author's image)	16
Fig. 2.1	Majority of Americans now use Facebook and YouTube. (Source: Share of adults using social media is unchanged since 2018, Pew Research Center April 10, 2019. Retrieved on 6/5/2019 from https://www.pewresearch.org/fact-tank/2019/04/10/share-of-u-s-adults-using-social-media-including-facebook-is-mostly-unchanged-since-2018/)	36

Fig. 4.1	Average hours per day—leisure and sports (includes travel). (Source: Bureau of Labor Statistics, American Time Use Survey. Retrieved on July 16, 2018, from https://www.bls.gov/tus/)	71
Fig. 4.2	Average hours per day—leisure and sports (includes travel, weekend days and holidays). (Note: Leisure and Sports = (Socializing and Communicating) + (Watching Television) + (Participating in sports, exercise, and recreation). Source: Bureau of Labor Statistics, American Time Use Survey. Retrieved on July 16, 2018, from https://www.bls.gov/tus/)	71
Fig. 4.3	Annual consumer expenditure in 2016. (Source: https://www.bls.gov/cex/2016/combined/age.pdf . Retrieved 8/7/2018)	72
Fig. 4.4	Annual consumer expenditures 2013–2016. (Source: https://www.bls.gov/cex/2016/combined/age.pdf . Retrieved 8/7/2018)	72
Fig. 5.1	Average hours per day—socializing and communicating. (Source: American Time Use Survey, Bureau of Labor Statistics. Retrieved on 6/5/2019 from https://www.bls.gov/tus/)	80
Fig. 5.2	Average hours per day—watching TV. (Source: American Time Use Survey, Bureau of Labor Statistics. Retrieved on 6/5/2019 from https://www.bls.gov/tus/)	81
Fig. 5.3	Average hours per day—participating in sports, exercise and recreation. (Source: https://www.bls.gov/tus/ . See the following for definitions: https://www.bls.gov/tus/lexicon-noex0317.pdf)	81
Fig. 6.1	Ten-year treasury constant maturity rate, quarterly average rates from 1999 to 2019. (Source: Board of Governors of the Federal Reserve System (US), 10-Year Treasury Constant Maturity Rate [DGS10], retrieved from FRED, Federal Reserve Bank of St. Louis. Accessed 4/5/2019 from https://fred.stlouisfed.org/series/DGS10/)	109
Fig. 6.2	Five-year treasury constant maturity rate, quarterly average rates from 1999 to 2019. (Source: Board of Governors of the Federal Reserve System (US), 10-Year Treasury Constant Maturity Rate [DGS10], retrieved from FRED, Federal Reserve Bank of St. Louis. Accessed 4/5/2019 from https://fred.stlouisfed.org/series/DGS10/)	109

Fig. 6.3	Attention deficit in cognitive bandwidth hours (CBH). Attention Deficit = Demand for CBH minus Supply of CBH. (Source: Author's calculations. When content tsunami is zero, $\theta_{\text{tsunami}} = 0$, and all available cognitive bandwidth hours can be utilized for consumption of good content, θ_{good})	114
Fig. 7.1	S&P 500 Data: 2001–May 10, 2019 (logarithmic scale); Real Median Household Income and Case-Shiller Home Price Index 2006, 2012 & 2017. (Source: Federal Reserve Bank of St Louis Economic Research. Retrieved on 6/5/2019 from https://fred.stlouisfed.org/series/MEHOINUSA672N [for household income] and from https://fred.stlouisfed.org/series/SPCS20RSA [for Case-Shiller data]; and from Wharton Research Data Services [WRDS], retrieved on 6/5/2019 from https://wrds-sol2.wharton.upenn.edu/output/5e991c6ce39a13da.html# and author's calculations)	124
Fig. 7.2	Number of startups. (Note: Number of firms less than one year in existence and with 1–4 employees. Data source: Author's calculations based on data from https://www.census.gov/ces/dataproducts/bds/data.html)	125
Fig. 7.3	Startup firm share and employment share. (Note: Data from US Census Bureau Business Dynamic Statistics. Startup (mature) firm share is the number of age 0 (age 11+) firms as a share of total firms, and startup employment share is the annual employment in age 0 (age 11+) firms as a share of total payroll employment. Reproduced from Alon, Titan M., David Berger, Rob Dent, and Benjamin Pugsley, 2018. Older and Slower: The Startup Deficit's Lasting Effects on Aggregate Productivity Growth. <i>Journal of Monetary Economics</i> 93, January 2018, https://ars.els-cdn.com/content/image/1-s2.0-S0304393217301113-gr1_lrg.jpg)	126
Fig. 7.4	Rate of new entrepreneurs (1996–2017). (Source: Reproduced from the Kaufmann Foundation Report)	126
Fig. 7.5	Rate of new entrepreneurs by age (1996–2017). (Source: Reproduced from the Kaufmann Foundation Report)	127
Fig. 7.6	The generations defined. (Source: http://pewrsr.ch/2Dys8lr)	128
Fig. 7.7	Early startup survival rate (1996–2017). (Source: Reproduced from the Kaufman Foundation Report)	128

Fig. 7.8	Seed-stage venture capital funding by number of deals; investments and funds in the US. (Source: Author's calculations based on data from PwC/CB Money Insights. Accessed 5/7/2019 from https://www.pwc.com/us/en/industries/technology/moneytree/explorer.html#/currentQ=Q3%202018&qRangeStart=Q3%202013&qRangeE)	129
Fig. 7.9	Ratio of number of seed-stage deals over later-stage deals; investments and funds in the US. (Source: Author's calculations based on data from PwC/CB Money Insights. Accessed 5/7/2019 from https://www.pwc.com/us/en/industries/technology/moneytree/explorer.html#/currentQ=Q3%202018&qRangeStart=Q3%202013&qRangeE)	130
Fig. 7.10	Startup early job creation (1996–2017). (Source: Reproduced from the Kaufman Foundation Report)	131
Fig. 7.11	Productivity change in the non-farm business sector, 1947–2017. (Source: https://www.bls.gov/lpc/prodybar.htm)	132
Fig. 7.12	Part-time (for non-economic reasons) non-agricultural workers, in thousands, 16 years and over (seasonally adjusted). (Source: Bureau of Labor Statistics. Accessed on 3/8/2019 from https://data.bls.gov/pdq/SurveyOutputServlet ; https://www.bls.gov/cps/lfcharacteristics.htm#self)	133
Fig. 7.13	Self-employed non-agricultural workers, in thousands, 16 years and over (seasonally adjusted). (Source: Bureau of Labor Statistics. Accessed on 3/8/2019 from https://data.bls.gov/pdq/SurveyOutputServlet ; https://www.bls.gov/cps/lfcharacteristics.htm#self)	133
Fig. 7.14	Part-time + self-employed non-agricultural workers as a fraction of total non-agricultural workers, in thousands, 16 years and over (seasonally adjusted). (Source: Bureau of Labor Statistics. Accessed on 3/8/2019 from https://data.bls.gov/pdq/SurveyOutputServlet ; https://www.bls.gov/cps/lfcharacteristics.htm#self)	134
Fig. 7.15	Labor productivity—output per hour of all employed persons 1970–2017. (Source: Author's calculations using data from the Bureau of Labor Statistics. https://www.bls.gov/lpc/#tables)	145

Fig. 7.16	Labor productivity—output per hour of all employed persons 1970–1982. (Source: Author’s calculations using data from the Bureau of Labor Statistics. https://www.bls.gov/lpc/#tables)	145
Fig. 7.17	Labor productivity—output per hour of all employed persons 1983–1991. (Source: Author’s calculations using data from the Bureau of Labor Statistics. https://www.bls.gov/lpc/#tables)	146
Fig. 7.18	Labor productivity—output per hour of all employed persons 1993–2003. (Source: Author’s calculations using data from the Bureau of Labor Statistics. https://www.bls.gov/lpc/#tables)	146
Fig. 7.19	Labor productivity—output per hour of all employed persons 2004–2017. (Source: Author’s calculations using data from the Bureau of Labor Statistics. https://www.bls.gov/lpc/#tables)	147
Fig. 7.20	Number of firms with 1–4 employees and less than one year in existence, 1977–2014. (Source: US Census: Business Dynamic Statistics, Longitudinal Business Database, Firm Characteristics Data Tables, 1977–2014, author’s calculations. https://www.census.gov/ces/dataproducts/bds/data_firm.html . Unit of Analysis: Active Establishments [Establishment activity is defined by March 12 employment])	147
Fig. 7.21	Number of firms with 1–4 employees and less than one year in existence, 2007–2014. (Source: US Census: Business Dynamic Statistics, Longitudinal Business Database, Firm Characteristics Data Tables, 1977–2014, author’s calculations. https://www.census.gov/ces/dataproducts/bds/data_firm.html . Unit of Analysis: Active Establishments [Establishment activity is defined by March 12 employment])	148

Key Words

Attention = Cognitive bandwidth hours = hours of mental effort, analogous to the range of frequencies available for data transmission on the Internet

Free will = Agency in initiating and managing decisions to achieve a desired outcome, measured as supply of attention or cognitive bandwidth hours. Usually fixed at normal waking hours or 16

Individual liberty = Freedom to execute actions to achieve desired outcomes

Attention deficit = excess demand for cognitive bandwidth hours relative to available hours

Digital content = information transmitted online

Internet = (shorthand for) Architecture and protocols of mobile and fixed digital information and communications technologies (ICT)

Information and communication markets = exchange of digital content for payment

Introduction

Information and communication technology has enabled connectivity on an unimagined scale. Acknowledging humans as social animals, economic activity promotes this socialization. Market transactions are based on optimism and trust, as individuals invest in the future by having children, by extending credit and accepting risk, and by building connections in the sincere expectation of this connectivity being reciprocated. However, in excess, connections compromise entrepreneurship and risk-taking.

Ubiquitous connectivity has four effects. The *first effect*, transparency in human interaction, is captured by the sharing model. Digital representation of information offers multiple avenues for sharing content. Human experience has been enhanced and enriched by the dense web of connections and the outpouring of shared digital content. Sharing personal information lights up the brain because there are benefits of group affirmation and inclusion when personality traits are shared; we derive self-esteem by comparisons with other groups and individuals.

However, this sharing and comparing leads to judgment. Negative judgments corrode self-esteem, leading to anxiety and depression. Paradoxically, active engagement with social connections creates a vacuum, a loss of self-esteem as connections inevitably lead to comparisons with other groups and individuals. Restoring esteem leads to even more connections, sharing and comparisons.

Therefore, the *second effect* is commercialization of sharing, leading to a tsunami of content. Loss of self-worth, driven by the first effect, encourages further connectivity and sharing, as buyers seek more comfort, more reassurance, via social media, paying with time and personal information. The process of connecting and sharing, of exchanging content digitally, has become a market by commodifying each additional connection in terms of time.

Friendships are valued in follower counts, with each count implying that a friend has devoted time to your social media page. A larger number of followers connote a greater amount of time spent on your Facebook page. When time and content are decoupled in asynchronous communication, as when response time or delay on messaging apps is carefully controlled by users, multiple connections can be managed simultaneously. High follower counts, suggesting reliability, translate into personal wealth as individuals become paid influencers on Twitter.

The outcome of this content tsunami is an attention deficit, the *third effect*. Consumption of content utilizes time and attention, such that the product is digital content and the payment is with time and data. Correspondingly, social media fulfill this demand for content with exuberance, both via user-generated content and via commercially curated content. Not only does processing this vast quantity of information utilize available hours of attention but the need to filter this exorbitant content further captures the mind, exacerbating the scarcity of attention.

In addition, when devices and algorithms map our preferences and make predictions guiding decision-making, mental effort becomes superfluous. Not needing to exercise the mind, available hours of attention shrink.

The confluence of increased demand for digital content and reduced supply of cognition due to algorithmic prediction capabilities results in an attention deficit. This scarcity manifests as cognitive apathy, a mental paralysis equivalent to systemic failure of computer networks.

Cognitive apathy impairs judgment and decision-making, leading to the *fourth effect*, mistrust, fear and diminished risk-taking. Reorienting worldviews and lifestyles amidst the swirling winds of technology-driven disruption demands judicious adaptation. It takes some effort to incorporate new ways of doing things and absorbing new ways of perceiving

the world. When mental resources are compromised, adjustment to change is resisted and risk avoidance is predominant as nostalgia and the familiarity of entrenched behavior take over. We observe declining entrepreneurship, innovation and imagination.

Recognizing human beings as social animals, the content tsunami powers two streams of consciousness—sharing and individual liberty. With the sharing frame of mind, there is transparency, trust, inclusion and cooperation. On the other hand, the individual liberty approach magnifies the personal factor, with its focus on the individual. The ensuing comparisons and judgments invoke notions of privacy. A conflict arises because risk-taking invokes trust, while privacy is modeled on risk fearing and mistrust. Anonymity, freedom to be and do, is needed *because* our imagination fears catastrophic outcomes. Despite the benefits of affirmation and group inclusion, connectivity elicits judgment, mistrust, fear, anxiety and depression. The digital revolution that brought us connectivity is exhibiting the unimagined consequences of tribal prejudice and isolation in echo chambers. Cognitive apathy follows, as there is no need to adapt to changing circumstances or different people. What started out as a voice for individual liberty can mutate into a loss of free will.

The past decade has seen a lengthening trail of technology criticism and warnings about the threats of commerce and machine persuasion compromising our free will. To be sure, the innovative medium that provides information can also be used to serve nefarious purposes. Inventions, including the technologies developed for splitting the atom, have multiple possible uses and one cannot blame the tool for threats issued by users of the tool. So also, digital communication technology is a tool for knowledge dissemination and we must partner with it as best as we can.

On the digital savannah, “we are all connected. ...Everything you see exists together in a great delicate balance” as Mufasa says in *The Lion King*, Disney’s 1994 epic. Preserving this balance of connectivity in a spirit of bold thinking is the way forward.



1

Connectivity, Attention and Risk

On a cold January weekend in 2019, at a conference at Princeton University, a recently matriculated physics undergraduate appeared fascinated by entrepreneurial possibilities. The conference was on emerging risks, opportunities and governance of artificial intelligence in environmental and agricultural applications. The undergraduate had developed an algorithm, in the emerging field of agritech, to optimize water use in drought-prone areas. His idea was to power small, lightweight drones with moisture-sensing ability for watering agricultural land. However, he had been derailed by job obligations and, importantly, what he called “life’s distractions.” What had held him back? Mental overload or mental laziness? Was mental overload due to a content tsunami, generated by ubiquitous connectivity, or was mental laziness engendered by loss of autonomy due to devices and software? How was this young undergraduate a beneficiary of digital information and communication technology; a technology that spawned deep connectivity, communication and machine-enabled prediction and thinking? Why was it difficult to translate technology into action?

Humans care about control and autonomy over their lives. This is the idea behind free will and the maximization of utility. Consequently, the business model is based on trading data for free and personalized products

and services. But individuals also care about acknowledgment and legitimacy in who they are and what they do. Therefore, when self-revelation provides esteem and a sense of personal identity, individuals voluntarily share personal data.

This sharing model leads to a content tsunami. The capacity to comprehend is overwhelmed by this exorbitant demand for cognitive faculties and the outcome is the attention deficit. Human faculties were physically imprinted at least 50,000 years ago in the *Big Bang of Human Consciousness*, so our ability to attend to information is a scarce resource.¹ The process of applying filters and sorting through this tsunami further strains cognitive capacity. A resource deficit arises when the demand for attention exceeds this scarce supply.

Furthermore, artificial intelligence incorporated in devices automates day-to-day decisions by algorithms that organize information and make predictions and recommendations. Ceding agency to code shrinks available mental effort and weakens the capacity to adequately filter information, promoting mental atrophy. An overwhelming demand for attention combined with a weakened filtering capacity and scarce cognitive bandwidth has spawned a mental framework of *cognitive apathy* that does not support a wider vision of responsibility and risk-taking.²

Fear, mistrust and risk aversion are pervasive. Technologies that threaten our worldview and lifestyles by requiring adaptation and adjustment are faced with resistance. Widespread apathy is the response, and in the context of an increase in demand for our attention, there is impaired judgment and loss of decision-making skills.

¹ After the particularly harsh ice ages, spanning 190,000–90,000 B.C.E., eastern and southern Africa became warmer and wetter, according to Ian Morris. “By 50,000 B.C.E. modern humans were thinking and acting on a whole different plane from their ancestors.” The *Great Leap* around 50,000 B.C.E. “began with purely neurological changes that rewired the brain to make modern kinds of speech possible, which in turn drove a revolution in behavior” (Morris 2010). Neuroplasticity allows the mind to adapt to new environments, but the physical dimensions of the brain have remained unchanged.

² While I define cognitive bandwidth hours in terms of time, the unit-free umbrella term—bandwidth—was introduced by Mullainathan and Shafir in their book *Scarcity*. Bandwidth is a generic term for a scarce resource: computational capacity or mental capacity, and it encompasses “fluid intelligence, a key resource that affects how we process information and make decisions” as well as executive control or impulse control (Mullainathan and Shafir 2013).

The young man introduced earlier in this chapter was overwhelmed with distracting information. Having helped his friend launch a successful fitness application, he was anxious about keeping in touch with academic research that would impact his fledging idea and so he attended conferences, read voraciously and networked on all fronts. Amidst concern about his father's uneasy financial situation and anxious about geopolitical uncertainty, he had caved into a sense of fearfulness and insecurity about his own future. In other words, he had decided to "wait it out."

The reality is consistent with such anecdotes. About a third of college students reported feelings of overwhelming anxiety and over two-thirds felt overwhelmed by their responsibilities in 2018 (American College Health Association Survey 2018). There is a drag on economic dynamism as seen in a startup deficit and decline in seed funding; a rise in economic behemoths; cultural nostalgia and a reduction of civic awareness. Let me explain in terms of four forces, four facts and four aspects of the sharing model.

Four Forces

The first of the four forces unleashed by information and communications technology (ICT) is connectivity.³ Connectivity between individuals allows sharing, the transfer of information between individuals seamlessly and at nearly zero cost. Connections are being made and reinforced across the human network on an unimagined scale and information is being shared with abandon.

Second, the resulting content tsunami has led to an exorbitant demand for attention, defined as cognitive bandwidth hours available for mental effort. Filtering the vast quantity of information imposes additional demands upon mental faculties. The tsunami of content, while contributing to an attention deficit, has another perverse outcome.

³According to my colleague at Princeton, Brian Kernighan, who contributed to the development of Unix and multiple programming languages while at Bell Labs, digital information and communications technology encompasses universal digital representation of information plus universal digital processors (computers) plus universal digital networks and massive amounts of digital data (Kernighan 2018). Artificial intelligence is a general-purpose technology and an input in the production of ideas and goods. Machine Learning (ML), a subset of Artificial Intelligence (AI), addresses prediction, based on historical or experimental training data (Agrawal et al. 2018).