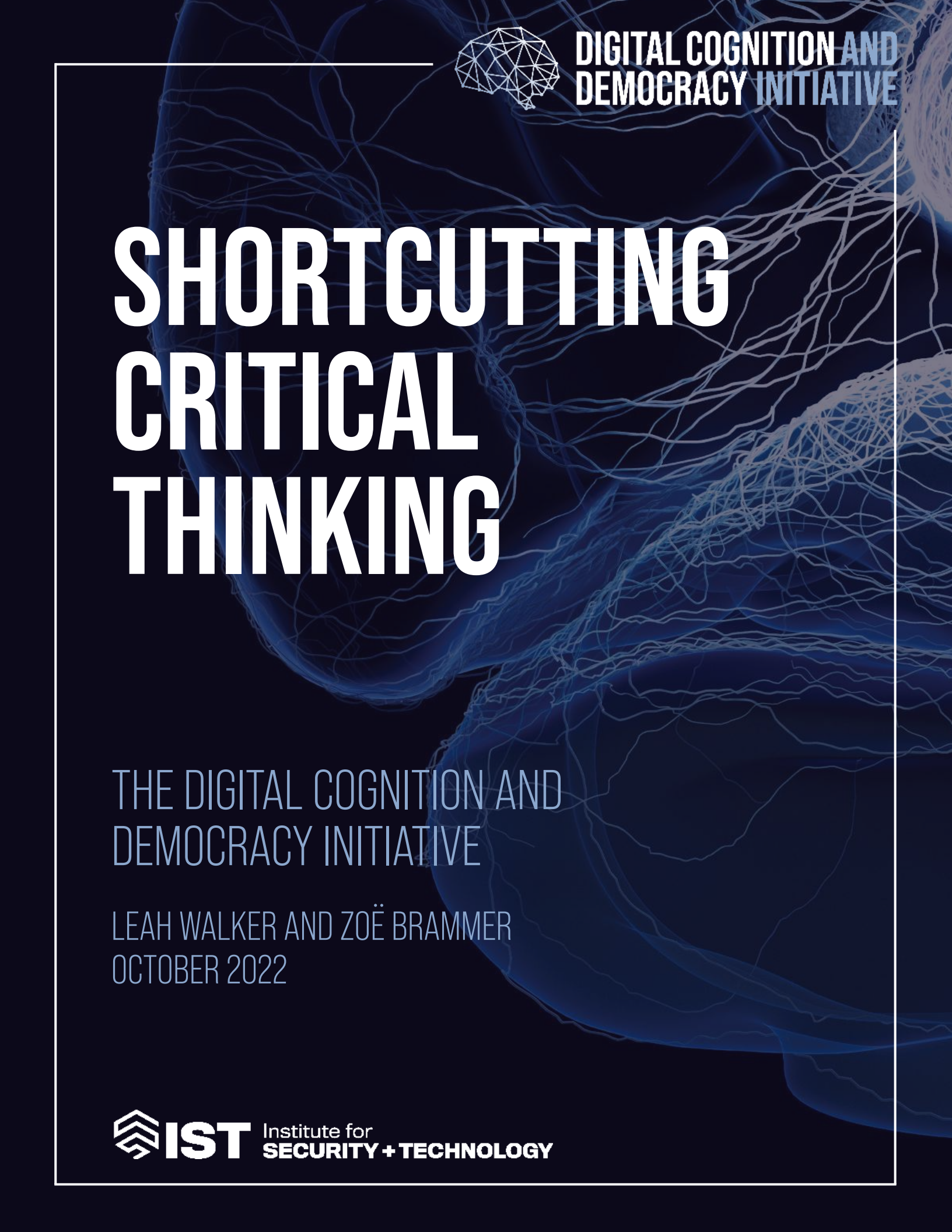

DIGITAL COGNITION AND DEMOCRACY INITIATIVE

SHORTCUTTING CRITICAL THINKING

THE DIGITAL COGNITION AND DEMOCRACY INITIATIVE

LEAH WALKER AND ZOË BRAMMER

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About the Digital Cognition and Democracy Initiative

Digital technology has become a fixture in everyday life. The landscape has dramatically shifted in recent years, increasingly catering to individualized neurochemical reinforcement. Information mediation is now fast-paced, high-volume, low-friction, and extra-sensorial, garnering increasing concern about the impacts digital ubiquity is having on individuals, society, and democracy more broadly.

Documented risks to the individual include impacts on mental health, particularly among young people; the proliferation of false information; and an overreliance on outsourced information. Impacts at the individual level cumulatively manifest in societal level concerns, such as affective polarization–defined as the tendency to distrust people from the opposite end of the political spectrum–and risks to public health as a consequence of disinformation campaigns. While digital technologies are not the sole cause of these concerns, the facilitatory and amplifying role they play is significant. A sound ability to update one's beliefs and to engage in constructive discourse are key elements of civic engagement and therefore healthy democracy. These skills rely on a concert of cognitive processes that are increasingly influenced by rapid and extensive technological proliferation. The urgency of exploring this web of challenges has grown as the risks to individual and societal well-being have become more evident and the threats to democratic society more immediate.

About this series

Through a series of coalition meetings and discussions with our advisory committee over a period of five months, we coalesced around several key overarching themes and a specific set of cognitive operations that are central not only to how democracy functions, but to how we view and engage with our democratic processes and institutions: critical thinking, trust, and emotion.

This report is informed by the DCDI coalition, interviews with related experts, and past and current cognitive science research findings relevant to the human relationship with digital technologies. Unlike the DCDI papers on memory, attention, and reasoning, this series is not meant to review the literature, but to synthesize our thoughts and research on the effects of digital systems on trust, critical thinking, and emotions.

Why Critical Thinking?

Critical thinking provides the avenues for debate and decision making. As the neuroscientists and medical doctors in the DCDI coalition explained, critical thinking affects democratic deliberation in three primary ways: 1) It allows humans to analyze information; 2) It revises beliefs according to evidence, and; 3) It makes action-oriented decisions and judgements. Thinking critically allows us to overcome biases, solve problems, and stay informed, all of which feed into how citizens behave and engage in the essential activities of a democratic society.

A growing body of qualitative and quantitative research shows how digital technologies have exacerbated certain issues that affect our critical thinking skills, including information overload/fatigue,[1] bias reinforcement,[2] learning and information retention[3], and attention hijacking[4], to name a few. We already knew that people don't always make decisions that are in their own best interests. Certain emotions, like fear, anger, and shame, can cloud people's judgment, undermining their ability to make informed, deeply considered, decisions. These emotions can of course be stirred up without digital technologies. Yet it is increasingly apparent that digital technologies are posing novel challenges–through scale, reach and sophistication–to critical thinking.

Through our research and coalition conversations, we have been exploring this key question: What effects *do* digital technologies have on critical thinking? The DCDI coalition and IST researchers came to five major conclusions:

1. The scale, accuracy, and speed of digital technologies make them particularly effective at activating the very emotions that influence and undermine critical thinking. Not only do digital technologies have the ability to inflame those emotions, but they often are designed to do so, as those very emotions drive engagement, use, and consumer spending.[5]

2. Digital technologies are affecting the cognitive processes that comprise critical thinking, including memory, attention, and reasoning.

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[1] David A. Ziegler et al., "The Acute and Chronic Impact of Technology on Our Brain," in *The Wiley Handbook of Psychology, Technology, and Society* (Hoboken: Wiley-Blackwell, 2015): 3-19.
[2] Eryn J. Newman et al., "Evidence that Photos Promote Rosiness for Claims about The Future," *Memory & Cognition* 46, no. 8 (2018): 1223-1233.
[3] David Schacter, "Media, Technology, and the Sins of Memory," *Memory, Mind, and Media* (2021), https://www.cambridge.org/core/journals/memory-mind-and-media/article/media-technology-and-the-sins-of-memory/4F169E671DFA95639E971B43B5E4D57A.
[4] Alexa Wehsener, "Pay Attention," *Institute for Security and Technology* (2020), https://securityandtechnology.org/virtual-library/reports/pay-attention/.
[5] Dag Wollenbaek et al., "Anger, Fear, and Echo Chambers: The Emotional Basis for Online Behavior," *Social Media + Society* (2019), https://journals.sagepub.com/doi/full/10.1177/2056305119829859.

3. Digital technologies make it easier for people to confirm their existing beliefs, with little incentive to go through the often arduous processes of thinking critically. The most prolific online spaces are designed to validate beliefs, rather than challenge them. This constant reinforcement, in turn, makes people more confident in[6] and vocal about their beliefs.

4. Overconfidence in beliefs makes people more vulnerable to disinformation and less likely to take in contrary arguments.[7]

5. Compounding the problem, there is little financial incentive for tech companies to design products that encourage people to think critically, especially if that involves helping people slow down by building friction into systems optimized for speed.

The DCDI coalition often noted the fact that universal and consistent critical cognition is not a prerequisite for a stable, effective democracy. And the DCDI effort is to help protect the cognitive faculties that underpin critical thinking, not to make people reach the same conclusions that any one coalition member might hold.

The coalition noted that one of the big promises of technology was that it would facilitate debate and democratize civic engagement. But digital technologies also built new structures to influence the way we process information and the core of how we think. Regardless of the intentions behind digital designs, there are significant cognitive implications of these technologies.

"Too often we are asking is "is this patient capable of making the decision I think they should make" versus "are they capable of decision making?""

- *Coalition member Dr. Michael Rich.*

Updating Our Beliefs

Critical thinking is, at its core, about updating one's beliefs. Simply analyzing information is insufficient for critical thinking, it must be accompanied by the cognitive flexibility and willingness to change one's views to accommodate that new information.

In meetings, the DCDI coalition discussed the importance of central or peripheral cues for updating beliefs.[8]

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[6] Daniel M. Wegner and Adrian F. Ward, "How Google is Changing your Brain," *Scientific American* 309, no. 6 (2013): 58-61, https://www.jstor.org/stable/26018230.
[7] Ullrich KH Ecker et al., "The Psychological Drivers of Misinformation Belief and Its Resistance to Correction," *Nature Reviews Psychology* 1, no. 1 (2022): 13-29, https://www.nature.com/articles/s44159-021-00006-y.pdf.
[8] Lucia Riggio and Kim Kirsner, "The Relationship between Central Cues and Peripheral Cues in Covert Visual orientation," *Perception & Psychophysics* 59 (1997): 885–899, https://link.springer.com/article/10.3758/BF03205506.

- **Central cues** are facts and information that can influence and persuade individuals. Observing those cues takes effort, as it requires processing that information, analyzing it, and using it to put together an idea. For example, a paper about the risks and advantages of a specific medication would constitute a central cue, providing us in-depth information to inform our thoughts about whether to take said medication.

- **Peripheral cues** use biases or associations to "shortcut" critical thinking. A useful peripheral cue for critical thinking is trusting respected experts. For example, rather than deeply research a recommended medication, a patient might rely on trusting those with medical degrees to recommend the best treatment.

Digital technologies often encourage us to lean on peripheral cues more than central ones. Although the Internet gives us more access to facts and information, the overwhelming volume drives people to use heuristics to sort and process it. Often, the algorithms we rely on point us toward inappropriate answers or even inaccurate information. In addition, our constant exposure to information inhibits us from creating distance from narratives and information online,[9] distance that is critical in stepping back from an issue and assessing it (often called "breathing space"). The more we outsource how we process information, the less likely we are to change what we believe.

Barriers to Critical Thinking

Two of the challenges to analyzing information the coalition identified, both of which are amplified in our increasingly online world, are cognitive biases and the perils of multitasking.

With cognitive biases, we tend to favor information that is readily available, repeated often, and/or confirms our existing views. In today's world driven by digital technologies, information is curated, personalized, and often targeted by exploiting these very cognitive biases. When we are served information that confirms our existing biases, and our exposure to contradictory information is influenced or limited (or we are simply not seeking it out), it affects our ability to analyze complex information or take even the short moment necessary to retrieve alternative data points from our memories. This is where digital technologies exacerbate an already existing challenge to critical thinking at a scale and precision not previously seen.

Multitasking impairs critical thinking by limiting our ability to focus on information. Even if we feel like we are successful in multitasking or parallel processing, we can only truly pay attention to one thing at a time. Anything that requires multitasking hinders our ability to deeply process information, the crucial action needed to store information, build knowledge, and then be prepared to update beliefs. Research indicates that those who frequently multitask have more difficulty filtering out irrelevant stimuli and that those who multitask less frequently are better

[9] Silverblatt Art, "Media Literacy and Critical Thinking," *International Journal of Media and Information Literacy* 3, no. 2 (2018): 66-71.

able to focus their attention despite distractions.[10] Digital technologies, which incorporate attention-grabbing notifications and pop-ups, are designed to push us to multitask.

Shortcuts are neither all bad or all good. It is undeniable that digital technologies have vastly increased the amount of information we have at our fingertips and we need efficient means to process it all.[11] Humans have always used shortcuts, cognitive and otherwise, for efficiency. But with overuse, shortcuts run the risk of leading to the underutilization, and thus regression, of crucial cognitive skills.

Friction, Friction, Friction

Through all of our conversations, one routinely discussed potential key intervention is the idea of "friction," the notion of introducing "breathing space" into our processing of information. Particularly where it is necessary for critical thinking, the coalition consistently found itself asking how we can build more friction into our ever-growing digital worlds. As our DCDI co-chair, Yaël Eisenstat explained in her 2020 TED talk when describing what she called "a world optimized for frictionless virality," a key issue with the current construction of many of our online spaces is:

"There is no incentive to help people slow down, to build in enough friction that people have to stop, recognize their emotional reaction to something, and question their own assumptions, before engaging."

- *Yael Eisenstat, "Dear Facebook, This Is How You're Breaking Democracy."*[12]

A key question we will explore, and propose solutions for, is: Where and how can we add friction into the design of digital technologies in a way that, at the very least, doesn't shortcut the cognitive processes needed to think critically?

[10] Eyal Ophir and Clifford Nass, "Cognitive Control in Media Multitaskers," *Proceedings of the National Academy of Sciences* 106, no. 37 (2009): 15583-15587.
[11] Andrew Arnold, "How to Maintain Critical Thinking In The Modern World of New Media," *Forbes,* February 27, 2018, https://www.forbes.com/sites/andrewarnold/2018/02/27/how-to-maintain-critical-thinking-in-the-modern-world-of-new-media/?sh=6f9eabc550e5
[12] Yaël Eisenstat, "Dear Facebook, This is How You're Breaking Democracy." *TED Talk*, September 20, 2020, https://www.ted.com/talks/yael_eisenstat_dear_facebook_this_is_how_you_re_breaking_democracy?language=en.

Areas for Future Research: Encouraging Critical Thinking

The DCDI coalition focused on problem identification, building hypotheses, and developing a core set of indicators. But more fundamental research is needed to explore the links between critical thought and digital technologies. Some of the questions that future research must explore include:

- Is there a way to help people realize their cognitive autonomy is being compromised to empower them to seek change?
- How can we encourage people to think critically more often, despite its inefficiencies?
- Is there a way to make critical thinking more efficient, while limiting the negative externalities on cognition?
- What are better critical thinking shortcuts that digital technologies can offer? What empowers rather than diminishes these cognitive faculties?
- How can we incentivize technology companies to design and monetize products in a way that encourages more critical thinking, or at the very least, does not undermine it?

Our conversations and research have made clear that there is inherent value in encouraging people to think critically, despite its inefficiency and ostensible inconvenience. Critical thinking is an essential part of a well-informed and cognitively healthy citizenry. Our digital world, rife with false and misleading information, requires us to think much more critically about sourcing, bias, and malign intentions. It is crucial that people are made aware of the various ways our digital life manipulates and shortcuts critical thinking, the repercussions of that interaction, and proper preventative and mitigation strategies.