Digital Living and its Impact on Cognition – Healthy or Harmful?

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Cognitive abilities (e.g. memory, attention, decision making, emotional regulation, etc.) are vital functions that underpin many of our daily interactions. As our lives have moved more online than ever before as a result of the COVID-19 pandemic, it is important to understand the ways in which modern digital living, learning, working and being are impacting our cognitive abilities. While there are indeed benefits to using technology, there are also several instances where digital interactions may be having a negative impact on our cognition, and more importantly longer-term effects are still unclear. This workshop aims to bring together researchers interested in the effects of technology on cognition, identify areas of future research, and foster collaborations between participants.

1. INTRODUCTION

Inspired by the theme of ‘Post-Pandemic HCI - Living digitally’, this workshop aims to bring together researchers investigating how digital living can impact cognition. Since the start of 2020 there has been a huge shift to online living. Most meetings and workplaces are now organised virtually, and education is conducted via online classrooms. However, the impact of long term technology on cognitive abilities is yet to be fully understood. While this has been a concern before the pandemic (e.g. NICM Health Research Institute, Western Sydney University, 2019), the increase in screen time necessitated by the pandemic may have exacerbated the effects of technology on cognition. However, there are further concerns the pandemic itself is causing cognitive decline. An article in The Atlantic (Cushing, 2021) reports self-perceived memory loss, and previous research into the effects on trauma suggest that living through this difficult period may cause cognitive issues. This raises the question as to whether and how technology can be harnessed to combat or mitigate cognitive and post-pandemic effects. Given this, discussing the after effects of the pandemic and increased technology use in relation to cognition is an important research area which will benefit from greater discussion.

Cognitive abilities refer to an array of high level functions such as memory, attention, decision making, risk assessment, or emotional regulation, and a growing body of HCI work has explored such abilities through memory technology (Le et al., 2016), wellbeing and affective technologies (Nadal et al., 2020), or those for aging (Sas et al., 2020). These are vital functions that underpin many of our interactions and as such it is important to understand how uses of technology may impact them. One negative effect of technology use during the pandemic has been ‘zoom fatigue’, where people report experiencing greater levels of fatigue from meetings taking place on virtual platforms such as ‘Zoom’, compared to in-person meetings. Bailenson (2021) suggests one reason for this is interactions via video call cause greater levels of cognitive load, as people are more aware of the non-verbal cues they are emitting, and exaggerate them, to ensure they are seen despite technological limitations. This increased cognitive load can have negative effects on people’s abilities to focus during long meetings, and causes feelings of fatigue. This can have a knock on effect on people’s productivity during the day, which can lead to disengagement (Taber and Whittaker, 2020). While so far we have highlighted how technology can potentially have negative effects on one’s cognition, there are also
instances where technology has brought benefit to people’s personal and work lives, before and during the pandemic. For example, technology use has helped overcome necessary social distancing guidelines to provide cognitive support—particularly in older adult groups with clinical needs. Bernini et al. (2020) give an overview of work in this area and suggest a system that may provide cognitive rehabilitation at home. However, there is limited empirical data to support these claims, due to the novelty of the research area. Despite this though, it is an insight into one way technology may be used to aid cognitive processes in a post-pandemic world.

These examples highlight the dual effect technology can have on cognition, its potential to negatively or positively influence these processes, and how this may vary across different populations. For instance, technology offers a wealth of opportunities to aid different clinical groups, however those groups can also be susceptible to different risks of technology when compared to the general population, for example, depression has been identified as a predictor of internet addiction (Şenormanci et al., 2014). Furthermore, younger age groups may be impacted by technology differently to older age groups, particularly in the case of generations who grew up with the internet and much debate on the effects of digital living is indeed concerned with children and younger adults (Przybylski et al., 2020). As such, we encourage researchers from a variety of application areas to join this workshop, so participants can hear from a variety of experiences and potential applications.

2. AIMS AND OBJECTIVES

The workshop aims to discuss the benefits and detriments of virtual interaction on cognitive processes, and identify future research areas. The workshop hopes to facilitate future collaborations between researchers in this area, as well as engage researchers in discussions surrounding the similarities and differences in application areas. To do so, three main objectives have been identified:

(i) To discuss attendees’ work and experiences regarding how digital living improves and supports cognition;
(ii) To discuss attendees’ findings and experiences in the area of how technology can negatively impact cognition;
(iii) To discuss future ways of reducing detriments to cognitive abilities in collaborative research.

From these objectives we hope to promote discussion around attendee’s thoughts and experiences of work in this field. The call for papers will include position papers and results papers (including null results) to allow attendees to explore a range of contributions in this field.

2.1 Workshop Schedule

To address these objectives we propose the workshop be divided into five sessions. The first session will consist of welcomes and introductions. During this, participants will be asked to give a brief presentation of their paper. We will also go over the plans for the day.

The second session will aim to discuss objective one. The workshop participants will be separated into smaller groups and asked to discuss the question of how technology can benefit cognition. We will aim to organise the groups so an array of research areas are represented in each. Prompts will be given to try and facilitate the discussion and following this, there will be 15 minutes for the groups to feedback some of the themes in their discussions to the rest of the workshop.

In the third session, the second objective will be discussed. This will run in a similar format to the second session, and again prompts will be used to facilitate the discussion. This will again be followed by an opportunity to feedback to the wider workshop before a one hour lunch break.

Following lunch, the fourth session will relate to applying what was discussed in session one to try and reduce the negative effects discussed in session two. This will again run in a similar way to the previous sessions but with a focus on potential future research and collaborations.

The final session of the day will begin with feeding back to the wider workshop what was discussed. There will then be a discussion with all the participants about overarching themes from all the groups as well as time to plan and discuss research ideas, and make future plans stemming from the workshop.

As stated, prompts will be given to help facilitate the discussion should participants want to use them. To do this, we will create a web resource, which will generate three key phrases from different categories. One phrase will relate to a cognitive domain, one will relate to a population, and the other will relate to an application domain. These will be hosted on a webpage, and will be accessible to the participants should they wish to use it.

Three 15-minute breaks have been scheduled throughout the day to reduce zoom fatigue and allow participants to rest. Participants will also be advised that they can and should take additional breaks when needed. The full schedule can be seen in Figure 1.

The proposed schedule aims to allow collaboration between participants from a variety of backgrounds...
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Steeds ● Cecchinato ● Sas ● Clinch

Table: Proposed Schedule for the Workshop

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 AM</td>
<td>Welcome and Introductions</td>
</tr>
<tr>
<td>9:30 AM</td>
<td>Break</td>
</tr>
<tr>
<td>10:00 AM</td>
<td>How is technology beneficial?</td>
</tr>
<tr>
<td>10:45 AM</td>
<td>Feedback</td>
</tr>
<tr>
<td>11:00 AM</td>
<td>Break</td>
</tr>
<tr>
<td>11:30 AM</td>
<td>How is technology detrimental?</td>
</tr>
<tr>
<td>12:00 PM</td>
<td>Feedback</td>
</tr>
<tr>
<td>12:15 PM</td>
<td>Lunch</td>
</tr>
<tr>
<td>12:30 PM</td>
<td>How to reduce detriments?</td>
</tr>
<tr>
<td>1:00 PM</td>
<td>Break</td>
</tr>
<tr>
<td>1:15 PM</td>
<td>Discuss themes and ideas</td>
</tr>
<tr>
<td>4:15 PM</td>
<td>Wrap-Up</td>
</tr>
<tr>
<td>5:00 PM</td>
<td>End of Workshop</td>
</tr>
</tbody>
</table>

Figure 1: The proposed schedule for the workshop. Sessions in blue indicate all workshop participants will work in one group, while orange sessions indicate the participants will be divided into smaller groups. Times are in GMT.

and the activities allow detailed discussions and encourage active participation. As such, we aim to match workshop discussions and prompts with participants' interests as much as possible (e.g. sessions themed around different cognitive areas), based on the range of submissions we will receive.

3. BENEFITS AND SIGNIFICANCE

This workshop will bring together researchers from a variety of fields, including human-computer interaction and cyberpsychology, and will give participants the opportunity to meet and engage with others in their field, and related areas. As such participants will benefit from having dedicated time to engage in discussions on their own research and others', and create links with researchers across the HCI community to promote future collaborations.

The workshop will be open to both position papers and results papers. By doing this we aim to allow early career researchers to present works in progress and null results. The acceptance of position papers will also allow researchers interested in the area, who are not yet engaged in research, to present their perspectives, and gain an entry point into this field.

The impact of technology on cognition is an important research area, which is particularly relevant due to the current climate of virtual working. This workshop will aim to output a report on key topics in the area, which identifies important areas of future work in the field. The report will cover the themes and ideas presented in the final session, to give people unable to attend an opportunity to engage with the workshop themes. We propose this report be submitted as a ‘state-of-art review’ to the journal Interacting with Computers.

4. ORGANISERS

The organisers of this workshop are:

Madeleine Steeds, a PhD student in the Department of Computer Science at the University of Manchester. Their research investigates the impact of technology on human memory, particularly in cases where the presence of technology can serve as an environmental cue.

Marta E. Cecchinato a senior lecturer in the Department of Computer and Information Sciences at Northumbria University. Her work focuses on understanding the complexities of dealing with technologies in everyday life and how digital experiences can be shaped to support mental wellbeing, at work and in personal life. She has published extensively on work-life balance and has organised the CHI 2019 workshop on Designing for Digital Wellbeing.

Corina Sas, a Professor in Human-Computer Interaction and Digital Health with the School of Computing and Communications at Lancaster University. Her research is in the area of technologies for wellbeing and health. She published over 150 papers, and her work received extensive media coverage as well as 4 Honourable Mention Awards at CHI and DIS. She has been investigator on grants totalling over £14.7 million and is part of the Editorial Boards of the ACM Transactions in Human-Computer Interaction, and Taylor & Francis Human Computer Interaction journals.

Sarah Clinch, a lecturer in the Department of Computer Science at the University of Manchester. Her research explores human interactions with pervasive technologies, particularly in the application domains of human cognition and mental health, and pervasive displays.
The organisers will serve as reviewers, with specialists invited to review where appropriate. For example, Andrew M’Manga (Bournemouth University) has agreed to provide specialist expertise in reviewing papers pertaining to security.

REFERENCES


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NICM Health Research Institute, Western Sydney University (2019) How the Internet may be changing the brain. www.sciencedaily.com/releases/2019/06/190605100345.htm (31/03/2021)


