Speculative Machines Exploring Contemporary Data Futures

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ABSTRACT
This pictorial describes two projects that present alternative perspectives on the use – and misuse - of data in contemporary society. The first project, *Do Not Fold, Spindle, Or Mutilate,* takes a critical stance on the data that is collected while browsing the web through third-party tracking cookies. The second project, *Terminal,* speculates on a possible future in which data storage drives with vast capacities are readily available, reducing the reliance on cloud storage. By presenting these two viewpoints that challenge our preconceptions of data as a material in design process, it is hoped that designers can be inspired to create additional speculative interpretations on near-future data objects.

INTRODUCTION
Data has long been considered the 'new oil' of the 21st century – an immensely valuable resource, practically essential to the function of contemporary society and our everyday lives. However, the potential of data, beyond utilitarian purposes, has arguably been neglected. This ignores the capacity of data as a fruitful resource, not only for presenting visions of future alternative uses and interactions, but also to challenge accepted notions of what data can and should be used for. This pictorial describes two projects, undertaken as part of a postgraduate course, that take two separate, but similar stances on the use of data as a material for design.

Do Not Fold, Spindle, Or Mutilate transforms the digital data accumulated through online browsing into physical artefacts, in the form of punch cards. Through this, it is possible to better comprehend the sheer volume of data that is generated through dubious data-gathering practices. *Terminal* considers potential futures with regards to long-term data storage, facilitating deeper reflection on what data is important to us, and iterates the importance of backing up personal files in the face of obsolescence and potential data loss.

'DO NOT FOLD, SPINDLE, OR MUTILATE'
This section documents the process, development and outcome of a four-week speculative project exploring themes of data collection and privacy, through a 'machine' that converts digital data into physical. The name of the work refers to a notice imprinted on some punch cards, indicating that damage inflicted on them would render the data unable to be processed, essentially rendering the information inaccessible. A strong motivation for this project was to give the user the opportunity to 'disobey' this command, albeit now in a modern context.

Inspired by the IBM 029 Card Punch[1], the device mirrors this machine in form and aesthetic – unpunched cards lay on one side, awaiting processing, while the bulky keys of the input keyboard are replaced by a modern laptop. The device works by monitoring a user while they are browsing the web. As users visit websites, and are presented with a GDPR consent pop-up, the device will begin to 'punch' cards any time a user clicks 'accept'. Each card is imprinted with the corresponding URL of every tracker, alongside seemingly sporadic punched holes. Over time, the number of cards punched will build up very quickly as the user browses the web. While closer inspection of a card will uncover some familiar companies behind this tracking (e.g. Google, Twitter, Facebook) others are much more obscure. By visualizing and making physical the quantity of data produced, a symbolic transfer of control is created. The user, now with increased awareness, can now make more informed decisions about their online browsing habits.

To fully understand the motivations behind this project, it is important to gain an understanding into the cultural significance of the punch card, as well as modern practices of data collection on the internet.

A Short History of the Punch Card
While no longer in use, punch cards were once the main method for the creation, processing, and storing of data. Their use began to proliferate after the 1890 US Census, in which Herman Hollerith's tabulating machine was used to aid the processing of data collected on punched cards [3]. Over time, IBM eventually became the leading producers of punch cards, pioneering their use as part of
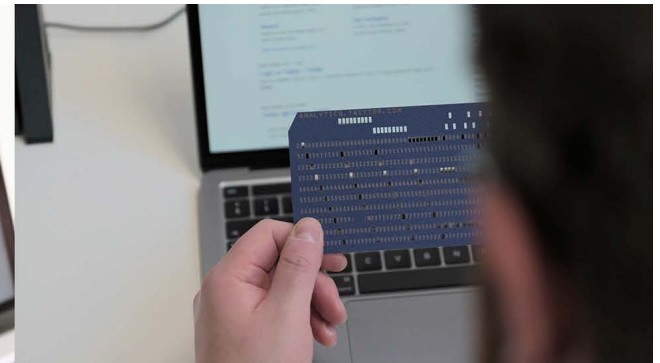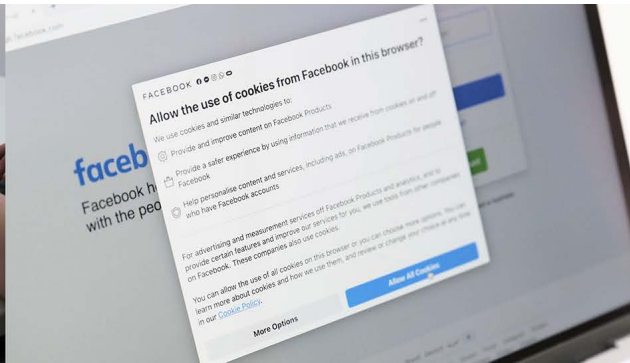
an increasingly technology-driven and bureaucratic society [8]. The IBM80 card, developed in 1928, became the standardized format, with variations in colour, design and layout for more specific applications [9].

However, the omnipresence of the punch card had wider implications within society. As Steven Lubar states in *"Do Not Fold, Spindle, or Mutilate": A Cultural History of the Punch Card:*

> Punch cards became not only a symbol for the computer…but a symbol of alienation. They stood for abstraction, oversimplification, and dehumanization. The cards were, as it seemed, a two-dimensional portrait of people, people abstracted into numbers machines could use. [5]

This sentiment was echoed further during the Free Speech Movement protest at Berkley University during the 1964-65 academic year. Students took blank punch cards and manipulated them to create messages and slogans in support of their cause [10]. The sentiment of this protest has arguably become increasingly relevant with each passing decade, with data becoming an extremely valuable and essential commodity to the function of society, in many cases at the expense of personal privacy. The most significant change is that this once tangible manifestation of data through punched cards, or any other 'analog' format, is practically entirely replaced by digital methods of data storage. What once was visible, and

easily manipulated, has become almost entirely intangible and invisible – not just through the proliferation of digital methods of storing data, but through deliberately evasive designed interfaces.

Reflections

Through repurposing the obsolete punch card as an analogy for current data collection techniques, it was possible to shed light on this covert and questionable practice. While initially appearing to offer transparency in presenting the user a choice with the handling of their data, the disruptive manner of GDPR consent notices is intentional, and arguably encourages users to choose the option that will get rid of the pop-up as quickly as possible[2]. Users are likely to encounter many of these pop-ups online, without realizing the true extent of their impact. While one browser extension, *Privacy Badger[11],* does some work in making this data visible, it does not effectively visualize the quantity of data being harvested. The desired outcome of this project was to build upon this initial groundwork and create a more convincing representation of this dishonest procedure.

Feedback received noted that the project communicated these ideas well, despite the short turnaround time of only four weeks. Steeped in critical design practice, the project is entirely conceptual in nature, and the design itself is not fully functional – using 'smoke and mirrors' alongside video editing to achieve the illusion of a working

'machine'. Despite this, the work demonstrates how data can be used as a critical tool in a conceptual context. By combining the cultural significance of the punch card as a historical form of data storage with contemporary methods of data collection (through cookies) the intent was that by making this data tangible, and able to be manipulated, this practice of data collection could be uncovered in an effective, and perhaps shocking manner. The mirrored setup of the IBM029 Card Punch establishes the user themselves as the producer of the data, rather than an unknown person in some distant office. Replicating this context creates a situation which encourages reflection on how we have the agency to change our browsing habits; to avoid becoming part of a machine that only cares about gathering as much data about us as possible. In addition, the 'bespoke' punch cards themselves have proved to be a powerful way of representing data, so much so that they have worked on their own as a stand-alone design project[12].

In the future, this concept could be applied in a manner that allows the public to engage with it themselves on a deeper level, to curate a more personal picture of data creation and consumption. Through the distribution of physical data assets created by speculative products, users could 'live' with the data outcomes for a period of time and enable researchers to study the influence of living and connecting with abstract data types. There is space for
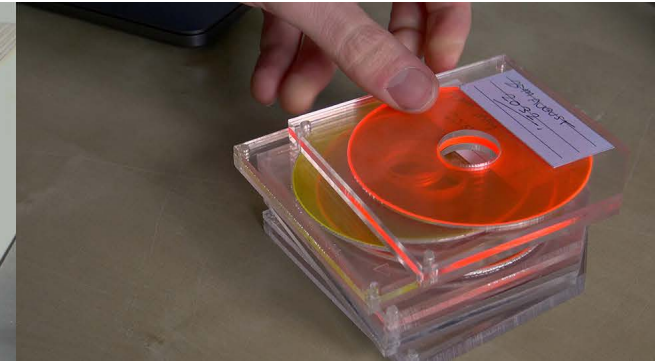
interesting research to be conducted as to whether users feel more connected or responsible for the data created.

'TERMINAL'
The following section documents the design, development and outcome of a ten-week speculative design project exploring themes of digital obsolescence and data loss in a possible future where technological development has allowed for unlimited local storage of data. The name *Terminal* is two-fold in its meaning; firstly, it is a reference to early computer terminals used to enter and manipulate data; secondly, something that is 'terminal' is in slow decline, eventually leading to death. This is particularly resonant with the themes of digital obsolescence and data loss that the project explores.

This work stipulates that in the near future, consumer-level storage drives will have extremely high capacities for storing data, subverting the need for cloud-based storage, or at least, high dependence on it. This has shifted the responsibility for storing digital data to the individual that created it or consumed it. Resembling 1980s style computers, users take a futuristic data-storage format, named 'glassdisk', and place it in the drive. This fictional format was inspired by both the floppy disk – which despite being an obsolete technology, has endured as a visual metaphor for saving data – and developments in 5D Optical Data Storage, a technology that has the potential to store vast amounts of data for an incredibly

long period of time [7]. The result was a futuristic, yet recognizable artefact, that serves as the main interactive element of the device. After the disk is inserted, a low-energy e-ink screen flashes, indicating that files are being read, and online browsing is being analyzed. During this time, users can reflect on their data use and consumption. After this process, the user is prompted to either 'delete or save' the data. Deliberately, and perhaps frustratingly binary, having 'yes' or 'no' as the only options afforded to the user forces the user to make a sudden and significant decision. Finally, there is a duty of preserving the *glassdisks* themselves. Without careful consideration and care into how the format is stored, the risk of obsolescence persists, and the data upon it could be lost. While the concept of digital obsolescence is not novel, its place within the context of digital preservation must be addressed to fully appreciate the potential consequences.

'Digital Dark Age'
The concept of a 'digital dark age' presents difficult challenges to the long-term storage and preservation of data. This phenomenon suggests that improper archival practices combined with digital obsolescence, will lead to the loss of important data and files over time [4]. Most work in this area has only considered the impact of such circumstances on libraries, archives, and museums, but there has been some research in this area with regards to how families and individuals may interact with digital data (and therefore, their memories) in the future [6]. The

significance of this problem is intensified when we consider our current relationship with data. With cloud-based storage, vast amounts of personal data are stored on servers, likely in a faraway unknown location. While providers of this storage can assure customers that their data is secure and safe from harm, this does not make them immune to digital obsolescence and the risks of a digital dark age.

Reflections
This project attempts to address the ever-increasing creation and consumption of data in the 21st century, alongside the persistent problem of digital obsolescence. This paradigm is all too familiar, but it becomes increasingly problematic when we consider the difficulties that long-term data storage presents, especially when we consider the fact that physical methods of data storage are much less widely used than digital ones. This has potentially massive repercussions for future engagement with data, the accessibility of which is extremely important to ensure for future generations. However, curating and preserving long-term is an active choice one must make themselves, and is not an imperative. The work tries to address this, by placing the responsibility of saving the data entirety in the hands of the user. If, for whatever reason, they do not wish to save this data, it is entirely their own decision. Beyond these potential scenarios, there is opportunity to confront our day-to-day interactions with data and investigate new

ways of engaging with it. The shift from physical to digital interaction with data also presents a different kind of loss - there is value in being able to physically interact with objects that embody our data within them. Through online cloud storage, people are inherently (and somewhat literally) disconnected to the files they have created, and without this tangibility, we begin to forfeit our sense of ownership and responsibility.

CONCLUSION

Within these projects, different perspectives on the potential uses of data as material for design have been explored, through the creation of interactive, designed objects. *Do Not Fold, Spindle, Or Mutilate* presents a symbolic meditation on modern data collection techniques, while *Terminal* offers a glimpse of possible data formats of the future, and suggests how a sense of agency, control, and visualization on our data as a material could influence the role of data in our lives. While conceptual in nature, both pieces of work offer alternative viewpoints that challenge our existing preconceptions of what data can and should be used for, as well as novel ways in which we might interact with our data. The hope is that, through examining these projects and others critically, new ways of using and interacting with data can be developed.

ACKNOWLEDGMENTS

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