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Frontier talk

Memo by Philip Hanspach

Digital Addiction

Speaker: Matthew Gentzkow (Stanford University)

This event has been organised by the Technological Change and Society Interdisciplinary Research Cluster

This memo summarises the third 'Frontier Talk' of the Technological change and society Cluster. In this format, we invite people to lecture about frontier technologies and research and to learn from speakers beyond the EUI's social science faculties. The speaker at this Frontier Talk, Matthew Gentzkow, is Landau Professor of Technology and the Economy at [Stanford University](https://www.stanford.edu/) and studies applied microeconomics with a focus on media industries.

The guiding question of this talk is: "How do people use smartphones and social media and are these technologies addictive?". Prof. Gentzkow discusses experiments on this question and finds use patterns that are consistent with addictive behaviour. In the ensuing discussion, we also explore the policy implications.

Inventions change our use of time

The focus of the talk is on understanding the way people use smartphones and social media. A historical view of leisure time helps us understand how digital media impacts well-being. The natural way to measure the impact of inventions for an economist would be some measure of human welfare. An alternative way to think about the impact of an invention on human lives is the amount of time that we spend with this invention in our day-to-day lives. Although there are many inventions that have changed welfare in a meaningful way, such as antibiotics, they did not change how humans spend their time. The amount of time most humans spend on taking antibiotics is quite small.

Historically, the most impactful innovations according to this metric were machines that changed the way we work, such as the mechanization that followed from the Industrial Revolution. Another important area that transformed time use was transportation: after cars and highways became commonplace, many people in the US spent a lot of time on the road commuting to their workplaces. Finally, media technologies such as radio and television stand out in a way unlike any other technology because of their almost immediate impact. Very soon after television was introduced in the 40s and 50s, people

starting spending three to four hours a day watching television.

Time-intensive technologies spark hopes and fears

Nothing else approached television in how it changed how people use their leisure time until the advent of smartphones. These time-intensive innovations shape our day-to-day lived experience. As a result, they provoke outsized fear and worries about the potential harms and downsides, as well as outsized optimism about the benefits that they could bring. These technologies also bring with them internalities, biases and processes that lead us to use them in a way that does not benefit us as users, as well as externalities, having implications that go beyond the single user, including impacts on democracy and the political process.

What is new about the latest generation of technologies is that their impact is much better to measure than that of past technologies. New research includes field experiments to understand the impact of social media and smartphones. Prof. Gentzkow presents a list of related experimental studies in recent years, engaging with the existing theories of how the use of these technologies' benefits and harms people.

How are smartphones different from television – and should we be worried?

Authors ranging from the ancient Roman fabulist [Phaedrus](#) to the British author and humourist [Douglas Adams](#) have written about how people perceive the effect of new technologies in relation to their own lives, occasionally expressing worry about the adverse effects of technologies from writing to television. Common concerns, for example about television, include that its consumption is passive, mindless, therefore especially damaging, and potentially addictive. [Urie Bronfenbrenner](#) compared the effect of television to that of sorcerers, bewitching the spectators and turning them into “silent statues”. He bemoaned the pro-social “behaviour it prevents”: talk, games, and interaction. Another common concern about television is that persuasive and misleading content could have adverse effects on democracy.

Are smartphones more of the same or something very different? If a main concern about television was the solitary and passive mode of consumption, how should we feel about smartphones, in particular about their use by children? Their interaction with their phones is not passive. Instead, children use them to take pictures and videos, editing, uploading and sharing them with friends, chatting online, making video calls and so forth. As such, smartphones have a very different profile of benefits and downsides compared to earlier media.

Paying people to give up Facebook

Beyond the anecdotal discussion, can we measure the effect that smartphones and social media have? Can we measure addictive properties? These questions motivate the first experiment that Prof. Gentzkow discusses. In a nutshell, he and his team recruited a group of about 3,000 Facebook users of which a treatment group was paid to deactivate their Facebook accounts for a period of time.

Surveys before and after the treatment were collected to understand the impact of deactivating Facebook of people's time use, their valuation for Facebook, happiness, news knowledge, and political polarization.

Comparison was possible through a control group, which answered the same survey questions but continued using Facebook throughout the experimental period. The experiment was designed to take place during the run-up to the midterm elections in the US in November 2018. Eligibility was for adult US residents that use Facebook intensely and do not have too high willingness to pay to give up Facebook. Attrition was fortunately very low. Consumer surplus was measured by asking for people's willingness to pay, using an [incentivized BDM mechanism](#) halfway through the experiment.

There was substantial heterogeneity in the valuation that participants expressed for Facebook. People's responses indicate that Facebook is indeed highly valued, with a median valuation of 100\$ per month or a mean of 180\$ per month, implying total US consumer surplus of 31 billion \$ per month if these responses are accurate and represent consumer preferences. The deactivation treatment decreases valuation by participants in the treatment group by circa 15 %.

People are happier without Facebook, and learn less about the news

How does social media use impact happiness? Although this adult intervention does not tell us about children and teenagers, being off Facebook made participants in the experiment happier (by about a tenth of a standard deviation, large relative to other interventions). The intervention also reduced depression and anxiety, according to survey responses at the end of the experiment. For comparison, the magnitude of the average effect on subjective wellbeing is estimated to lie somewhere between 25-40% of the effect of a therapy intervention, studied in other experiments.

People also used their time differently, directing at least some of it towards meaningful social interactions, such as spending time with parents and going out for dinner. A potential caveat is that it takes time to get started doing different activities, e.g., connecting with

friends might take time, so experimental results might be attenuated. That is why the intervention period of four weeks is relatively long when compared to other experiments.

Beyond individual effects, Prof. Gentzkow finds broader implications related to bias and knowledge. Being off Facebook clearly had a negative effect of news knowledge, as measured through factual quiz questions on news. Participants in the treatment group were also less likely to follow the news, politics and the activities of then-US president Trump.

Screen time addiction: a question of self-control?

In a different experiment, Prof. Gentzkow studied screen time addiction on a sample of 2,000 Android users with the help of a custom app to measure and control the use of a set of key apps. His team carried out two interventions: first, a “screen time bonus” was paid to participants in a treatment group for reducing their average daily smartphone use. In the second intervention, a commitment device was offered to limit own use without further incentives. The experiment was meant to inform a model of habit formation, or addiction. Again, attrition among the participants was low.

As a baseline, people’s interest in setting limits is interesting. A rational decision maker should not be interested in limiting their screen time as they can choose their use of technology rationally. In fact, responses by participants were mixed, with over 30% not interested in limiting their screen time, but about two thirds of participants being at least slightly interested in doing so. Among apps, Facebook stands out as the app which people wanted to use less often. Due to the impact of the pandemic at the time the experiment was carried out, people were also asked with respect to what they would have done a year earlier. Indeed, the circumstances of the pandemic seem to matter as people were using their phones more, but were more likely to say in 2020 that their phones were making their lives better.

Smartphone use is a persistent habit that many people would like to limit

Two main treatments were independently randomized. In the “screen time bonus” intervention, participants in the treatment group were paid 50\$ for every one-hour reduction in their average daily screen use. The effect of the bonus treatment in different periods before, during and after the bonus payment is measured. Participants in the treatment group reduced their screen time use by about 60 percent in response to the incentive. Even after the payment of the bonus, people significantly reduced their screen use, suggesting use patterns that are consistent with a consumer model of habit formation, where more intense use in one period implies greater use in the following period. This can

explain why an intervention that incentivizes reduced use in one period can have effects even after the incentive is no longer paid.

The other treatment was the unincentivized offer of apps that limit the use of other, specific apps chosen by the user. Rational decision-makers should not need such tools, so their use indicates self-control problems. A large fraction of participants in the treatment group did indeed set binding limits on use. Overall, with this treatment, the use relative to the baseline is reduced by 20-25 minutes per day, indicating substantial self-control problems. The experimental results give us a measure of sophistication of self-control problems. A model estimated from the experimental results indicates that turning off the non-rational components of addiction reduces daily usage by 30 percent.

Smartphones and social media: addictive, but at least they give us the news?

In conclusion, Prof. Gentzkow finds that although smartphones and social media have very different features than television, their addictive properties are real and tempting. Their use is characterized by habit formation and substantial over-consumption. The effect is heterogeneous on participants and consistent with incentives for social media platforms to engineer features towards maximizing interaction and use time. While usage is different from television in that their use can be social, Prof. Gentzkow finds that online time does crowd out offline interactions.

Regarding the broader impact of social media as a source of news, the results are mixed. Social media makes people more informed, but also more polarized. Although a lot of news content on social media might be of low quality, the alternative seems to be that people simply consume no news rather than better news.

What is the role of market structure in digital addiction?

The first set of questions covered asked how the market structure and potential monopoly power of firms like Facebook or Twitter impact the decisions that people make. For example, could it be that people think that they have very few alternatives to Facebook and Twitter. Does this make it more likely that people who give up these services move to socially productive activities like being offline doing sports or educating themselves? On the converse, could there be a case for monopoly platforms? From a legal perspective, they might be easier to regulate because you have a clear target.

Prof. Gentzkow finds that these questions touch upon the policy implications of his work. He also wonders how market competitiveness affects these sorts of outcomes.

Competition or lack thereof might merely affect the set of choices that people have and how attractive alternatives are. Fiercer competition might also lead to people spending more time with such services and on their phones, with potentially adverse effects. In addition, the impact of competition on quality seems ambiguous, such that more competition could lead to less investment. If that leads to lower quality platforms, people might use them less. Alternatively, when effective competition fragments social media platforms, they might degrade in quality through network effects, again harming user experience, but perhaps improving their welfare if users would otherwise use too much social media. Finally, the incentives of platforms to invest in platforms that are durable such that consumers keep coming back to them in the long run might be harmed by competition; leading companies to design platforms squeeze consumers for short-term ad revenue.

Prof. Gentzkow also raised the issue of trust in institutions and large companies, comparing the use of social media platforms to airplanes. Planes built by Boeing and Airbus might be more trustworthy than planes created by small upstart companies in a very competitive market. Similarly, small social media platforms tend to have problems with quality content or privacy protection themselves.

How much digital media is optimal?

Another audience member referenced the work by [Tristan Harris](#), a thought-leader in the use of digital media, and the interventions that he proposes to help people make better decisions about the time they spend with smartphones and social media. What can we learn from him to act on the results of Prof. Gentzkow's experiments? He recognizes that the details of how consumers use smartphones and social media matter a lot in designing effective interventions. One important example is the role of defaults, such as a recent change by Apple that made you choose explicitly whether apps are allowed to track you. Although the option has always been there, the intervention of forcing people to choose for or against tracking, reduced the share of people that consented to tracking from 95 to 5 percent.

Further modelling suggests that the optimal smartphone use might be 30-40 percent lower than it currently is. While this rests on strong assumptions, Prof. Gentzkow thinks this is a reasonable ballpark estimate of better time use. Qualitative researchers also investigated this question through interviews with participants of Prof. Gentzkow's experiment, finding common themes such as people re-evaluating their usage patterns and not missing social

media once they gave it up. Prof. Gentzkow also voiced scepticism about interventions that mainly aim at reducing the quality of the technology, such as setting phone screens to black-and-white, which certainly serves to reduce the time people spend with it, but which ultimately remains a blunt instrument, reducing the positive as well as the negative aspects of technology.

What is the solution, regulation or information?

Solutions might come from third-parties, rather than regulators, as can be seen in the proliferation of apps that help people regulate their own media consumption. Different tools and apps allow people to protect their time from intrusion by notifications and excessive use. In other circumstances, regulation can be helpful to regulate media consumption. Prof. Gentzkow regards favourably European regulation against persuasive advertisement targeted at children. He recalls his own anecdotal experience as a child comparing English television to the one he knew from the US. The former felt what boring with its lack of choice and cartoons, leaving him with a nuanced view: regulation can reduce harmful content, but also make people miss things they ultimately want and choose to consume.

Could a disconnect between the policy discussions and academia around the adverse effects of digital media arise from the different speeds of the policy making cycle and the research cycle? Prof. Gentzkow thinks that time-intensive technologies that permeate our everyday lives are easy to blame for everything. There are many changes in society contributing to a breakdown of communities, social structures and interactions and political polarization. In all of these cases, technology plays a role, but a smaller one than is commonly assumed.

Ultimately, he is not optimistic that addiction and self-control are promising areas for regulation. For example, limiting use time or banning specific platform features such as infinite scroll and auto play videos would be slow and blunt. It would be better to have motivation and awareness among users to control their behaviour and let third parties be part of the solution. Like with other potentially things consumers can demand, such as sugar, and which firms are then incentivized to provide, we might never actually reach the first-best use.