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Course of Studies: Computer Science

Methods to Maximise the Addictive Potential of Users on Social Media and their Consequences for Humans

by

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Statutory Declaration

I, **Pascal Dittrich**, hereby declare that I have wrote the information available in this work truthfully and independently by myself.

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Abstract

Due to the recent publications of internal documents from Facebook employees and the increasing criticism of the large digital corporations in Silicon Valley regarding the processes on their platforms, public interest in the techniques used by these digital products is increasing. More and more studies attest to the negative consequences of the excessive use of social media. Still, a closer look at the business model of these companies reveals that it is precisely this extended user stay that is required to maximize their profits. The Covid-19 pandemic and its consequences have significantly increased the screen time of many people, which has further increased the profits of these companies. But the pandemic is only a supporting factor in getting users to use these digital products. Instead, social media and streaming platforms use targeted functional and design techniques, which are developed in accordance with the latest scientific findings from psychology and behavioral research to influence the behavior of their users. These techniques can be described using the Hook Model, which shows how habit-forming technologies are best built and developed. However, all of this leads to health risks for users, to which children and young people are particularly vulnerable. With the help of some measures, users can at least partially protect themselves from these technologies, but in the long run, a general rethinking in the industry will be necessary to ensure the safety and health of the people that are using these products.

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1 Introduction

1.1 Motivation

Due to the Covid-19 pandemic and the resulting measures to contain the virus, digital products that allow people to stay in touch have become even more popular. As a result of the lockdowns and quarantines, many people have significantly increased their usage of digital devices, leading to record profits for companies such as Amazon, Meta, Google, and even YouTube. But recently, more and more scientists have also taken a critical look at these platforms and tried to analyze what negative consequences the usage of these digital products can have, both in the short and long term. On the one hand for the individual, on the other hand for society. At the beginning of September 2021, former Facebook employee Frances Haugen published confidential documents that reveal how Facebook is only interested in maximizing profits and is willing to risk the physical and mental health of its users to achieve that target. Numerous other Silicon Valley figures such as Tim Kendall (former Director of Monetization at Facebook) and Tristan Harris (former developer at Google and founder of the Center for Humane Technology) argue that companies design their digital products specifically to get people addicted to them, solely in the interest of maximizing profits.

While most people view social media or streaming platforms like YouTube as simple entertainment, the general question is whether these fears are justified. Can hundreds of millions of people be influenced or even addicted to a social media platform? Furthermore, it is important to clarify how exactly these companies design their products and how this supports their business model because the fact that these companies are probably the richest in the history of mankind to date can hardly be ignored or considered a coincidence.

1.2 Goal of this Paper

This work aims to investigate possible techniques to maximize the length of time users spend on those digital products and also to consider the consequences of these techniques for both the individual and society. By recognizing and understanding these techniques and their motivation, appropriate countermeasures can be intro-

duced. In the course of this seminar paper, these potential countermeasures will also be listed and examined more closely to show how one can protect oneself against these methods.

1.3 Approach

After the introduction to the topic of this paper, the following chapter explains the Hook model and takes a closer look at several techniques that aim to increase the potential for addiction to these digital products. Their concrete psychological approaches play a key role here. In the following chapter, the business model of large digital corporations is examined in more detail to understand the basic motivation behind these techniques. This is followed by an analysis of the health consequences for people and how their actions and thoughts are influenced. Finally, methods are discussed with which users can protect themselves from these techniques and how these techniques can be used to actively improve the lives of the users.

2 Methods to Maximize the Potential for Addiction

As the suspicion grows, that large digital corporations such as ABC and Meta, as well as smaller platforms, are deliberately designing their products to make users addicted, the question arises as to how this actually looks and works in practice.

2.1 Hook Model

An addiction usually forms from a previously established habit. When exactly one can speak of an addiction and what is still considered a habit, is, however, disputed among researchers. Nevertheless, this finding can be used to define a clear goal for the technical product, namely to manifest the use of this product as a habit in the user [12].

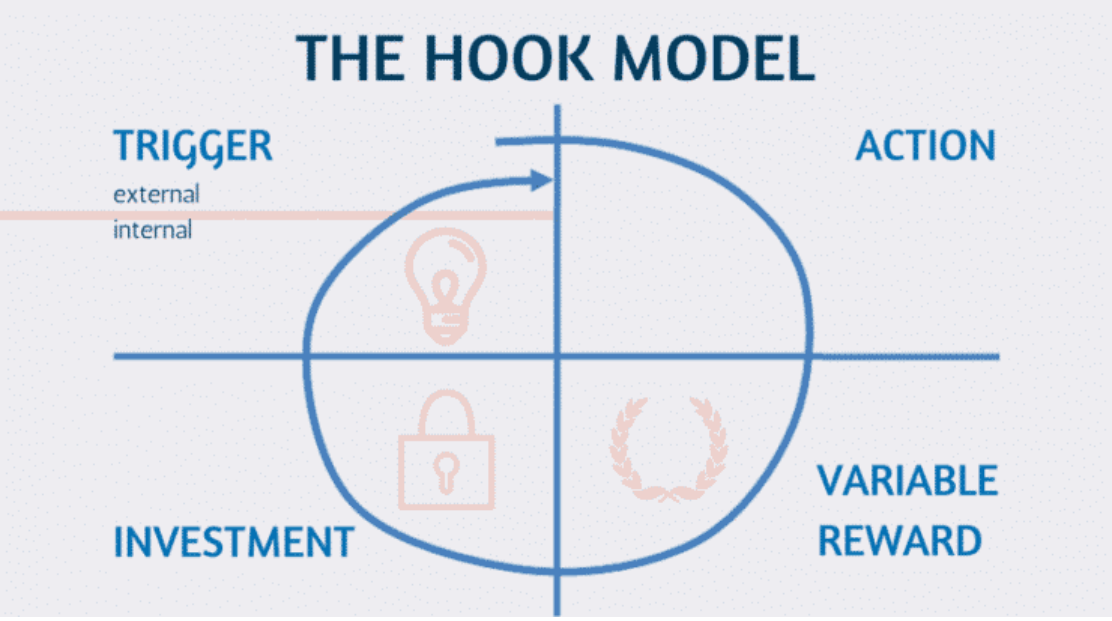

Figure 2.1: Hook Model [20]

The American author Nir Eyal has developed the so-called Hook model, which

describes how the use of a digital product can become an everyday habit in four phases [7].

As can be seen in the Figure 2.1, the four phases are called Trigger, Action, Reward, and Investment. The trigger forms the foundation for a habit. Here, a distinction can be made between internal and external triggers. Internal triggers represent, for example, boredom, loneliness, or other pre-existing routines. An external trigger can be a notification about receiving a new message. In general, it is something that makes a person perform a certain action [7].

The next step after the trigger is the action [7]. According to the behavioral model of the American scientist Brian Jeffery Fogg, three things are needed for an action to be taken: Motivation, opportunity, and a trigger. Here it is true that with increasing difficulty, or increasing effort, the motivation must be correspondingly higher, so that the trigger leads to an action, as illustrated in Figure 2.2 [8].

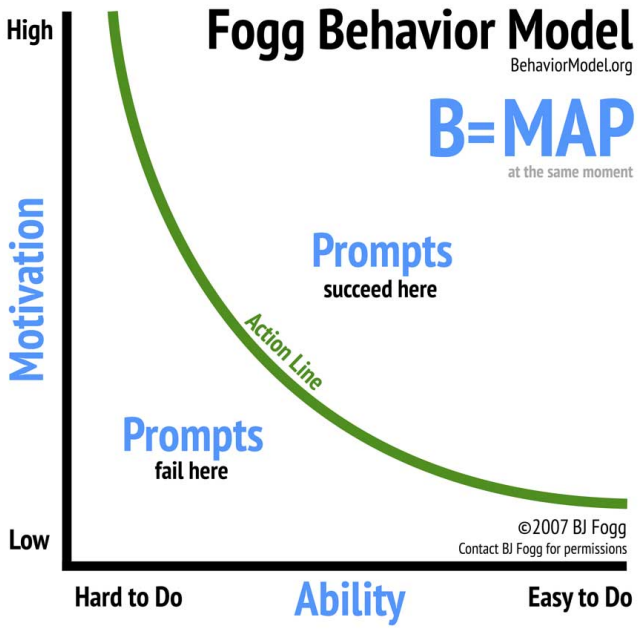

Figure 2.2: Fogg Model [8]

In turn, this means that for simple, low-effort activities, only a low level of motivation is required to get the user to perform an action. In the case of social media, this means that actions such as commenting, posting, or liking a post are made very simple and also readily available, which then in turn leads to more actions being performed. In addition, social factors, such as achieving social acceptance and

enjoyment as well as avoiding social rejection, can further increase the likelihood of an action being performed [8].

The consequence of an action is usually a reward. This should ensure that users use the product again in order to receive the reward again. Nir Eyal divides these into three different types: "hunt", "tribe" and "self". The reward in the "hunt" type is usually the consumption of new content, or new information, such as that pointed out in a "newsfeed." "Tribe" rewards are related to social aspects, such as likes or comments. "Self" rewards are more intrinsic things, such as the feeling of having mastered or completed something [7].

Finally, there is the investment. During the previous steps, the user invests time and resources in the product, for example in the form of posts, comments, followers, or generally generating an internal reputation for the product, such as karma on platforms like Reddit or Jodel. This ensures that users return to this product more frequently and are more likely to respond to the corresponding triggers [7].

2.2 Methods in Practice

Using the phases from the hook model, various techniques can now be used at different points to extend the duration of the user's stay in the digital product. These techniques and their effects are shown and explained below with the help of the four phases from the Hook model.

2.2.1 Trigger Phase

As already described, the trigger forms the foundation for a habit. The goal is now to establish a habit via an external trigger so that an internal routine develops from it over time. In the context of triggers, the term "nudge" is often used. A nudge is generally defined as a method that influences people's behavior in a predictable way, without using prohibitions or setting or changing economic incentives [1].

A typical ubiquitous nudge is notifications on the smartphone. The user is informed that he has received a new message, but the content is often not shown in full or not previewed at all. This usually leads to the user opening the application to read the message. Opening the application can now lead to the user not closing it again immediately after reading the message, but continuing to spend time on the platform [19].

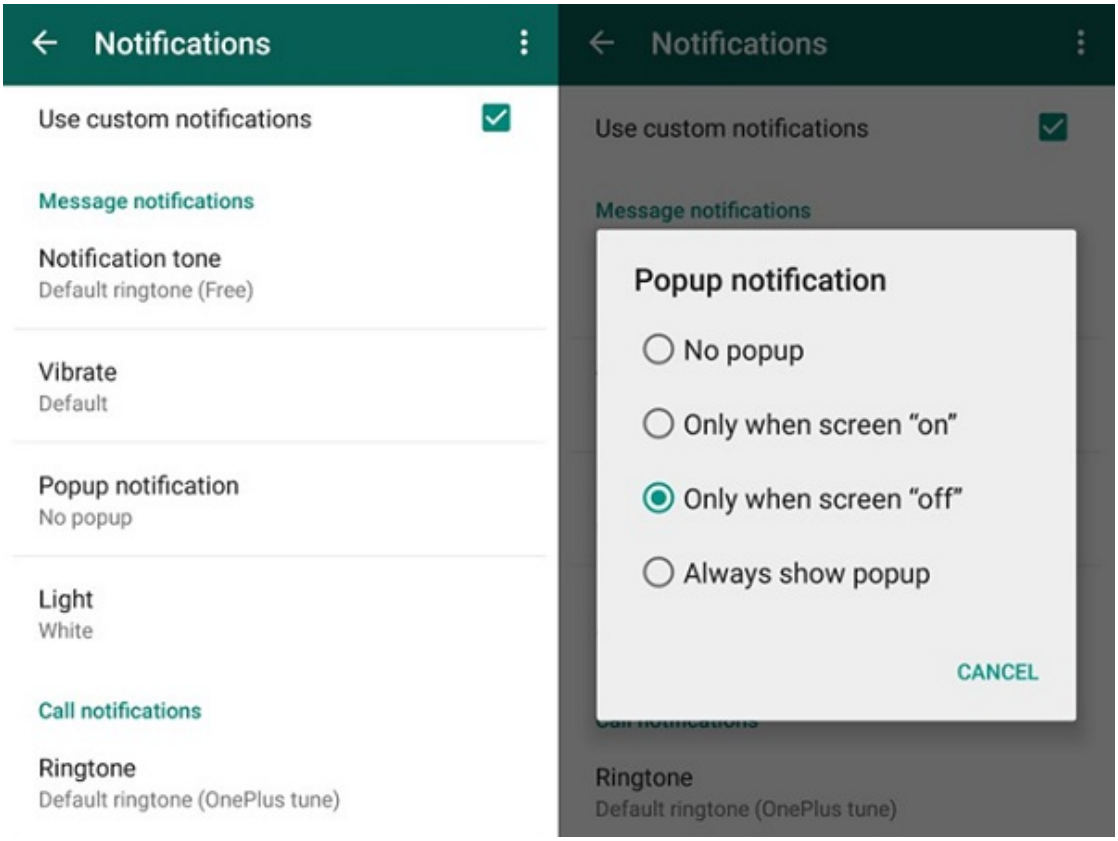

Figure 2.3: Settings for Notifications on Whatsapp [6]

Applications such as Facebook, Whatsapp, or even news apps, for example, have numerous events for which they send a so-called push notification. These are displayed to the user as a pop-up on his smartphone and generate an alarm sound to get his attention. This kind of nudging or triggering is extremely intrusive, but also very effective, as it makes the user interrupt his current activity and open the application [19]. These notifiable events are listed in the settings and illustrated here using the example of Whatsapp in Figure 2.3. At this point, the default settings ("Default Options") come into play. Studies show that few users bother with the settings of individual applications and thus stick to the default settings [1]. For example, in a report by Jared Spool, it was reported that in a study conducted, less than 5% of users had changed the default settings of their Microsoft Word application and thus did not facilitate useful functions such as "Autosave" [21]. By activating all notification options by default, many nudges can be generated, which in total leads to a higher activity of the users. [1].

In addition to the pressure to read the message directly, there is often also the social pressure to reply promptly. Many messenger applications work with a concept

that not only shows the sender of a message whether his message has reached the addressee but also whether he has already read the message. This way, the sender knows exactly when his message has been read and a timely response is expected. This social pressure pushes users to communicate faster, which leads to an increase in activity [17].

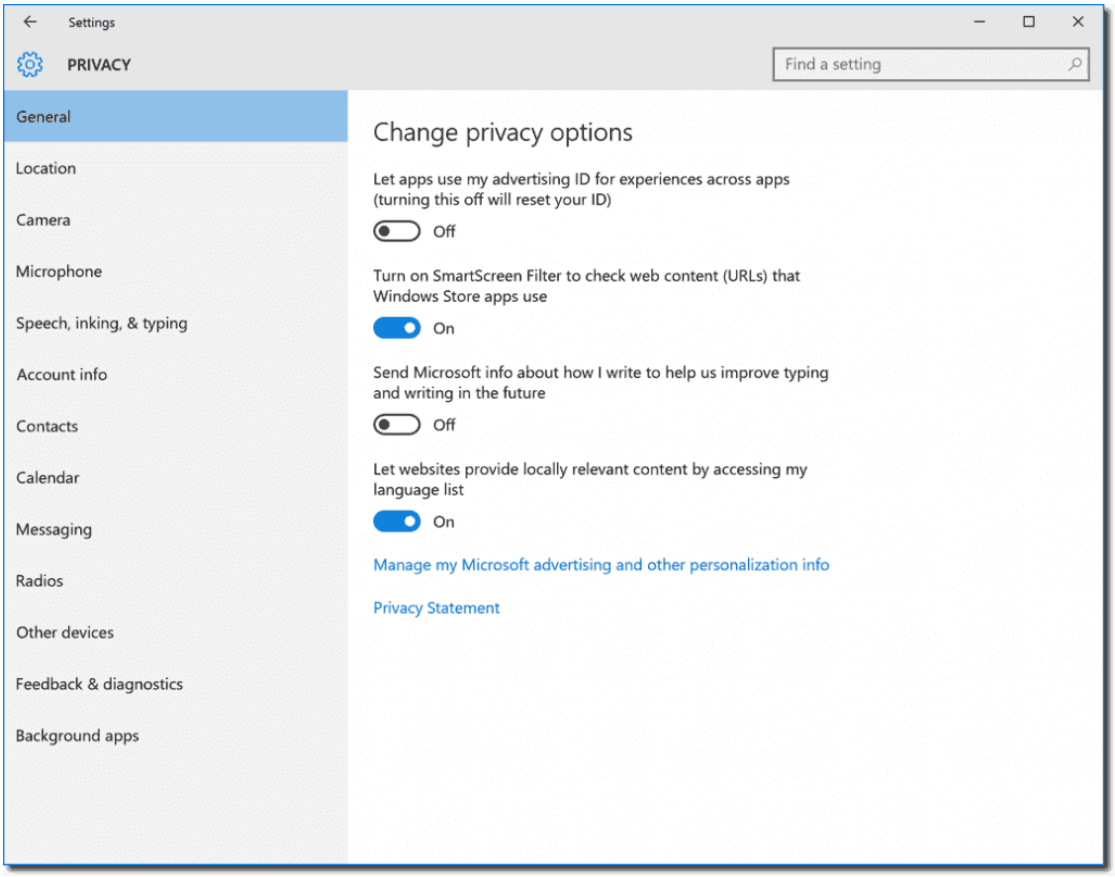

Figure 2.4: Windows 10 Privacy Settings [6]

Based on the practice regarding the default settings and the prevailing user behavior, so-called "opt-out policies" are also used. Here, the user's consent is assumed as default, which leads to the user having to revoke individual consent manually. Microsoft has been criticized for this practice, especially with its predefined privacy settings in Windows, which can be seen in Figure 2.4 as an example [1].

2.2.2 Action Phase

The action phase is about encouraging the user to take as many actions as possible on the platform. A key factor is therefore the positioning and design of the interface. Important actions must be easy to find and simple to use [19].

However, the most important action is not posting new content or similar activities already mentioned. It's simply scrolling through posts or passively watching videos. On many platforms, this accounts for the majority of the time users spend on the site. In doing so, the developers of digital products such as Facebook, Instagram, or YouTube try to create a so-called "flow" for the user [17]. Flow in itself is fundamentally a positive state of mind that can lead to high productivity in humans. The person is completely immersed in the activity and is fully absorbed in it. An important prerequisite here is that the task set corresponds as closely as possible to the person's abilities. Otherwise, he or she might feel bored or overwhelmed, which prevents flow. According to the Hungarian psychologist Mihály Csíkszentmihályi, a clear goal and a feeling of control over the task to be performed are also necessary. An important secondary aspect of flow is that the person experiences a change in the perception of time and virtually forgets space and time around him. In this flow state, people can devote themselves to an activity for hours without really realizing how much time has actually passed [17].

This side effect of time forgetfulness is exactly what many developers of social media applications want to take advantage of. On the one hand, they try to make the applications as immersive as possible. The user should be immersed as completely as possible in the virtual world so that the perception of the real world is reduced accordingly. This approach is currently predominantly used in computer and console games but is now also finding more use on social media as a result of the increasing digitization initiatives in the direction of virtual reality. Another approach is to reduce friction as much as possible.

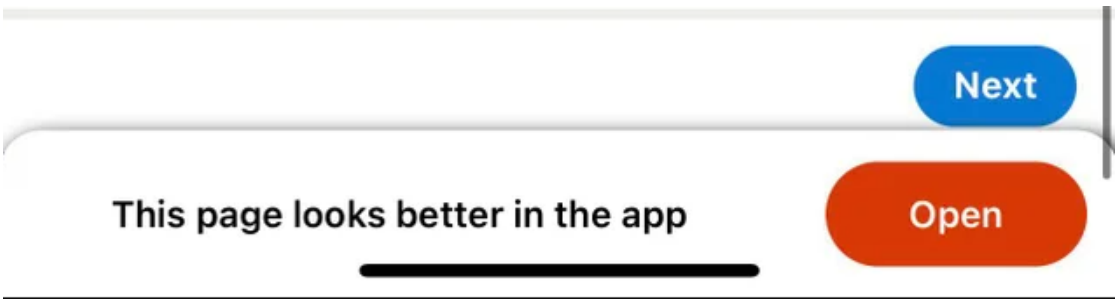

Figure 2.5: "Load Next Page"- Button on Reddit [6]

This is realized on Facebook or Reddit, for example, by enabling endless scrolling. Previously, another click had to be made after a certain number of posts, as can

be seen in Figure Figure 2.5, in order to display further posts, which served here as a kind of natural stop. This click has now been partially reduced or eliminated, allowing the user to view posts for hours without interruption with a simple finger movement or mouse wheel movement [17].

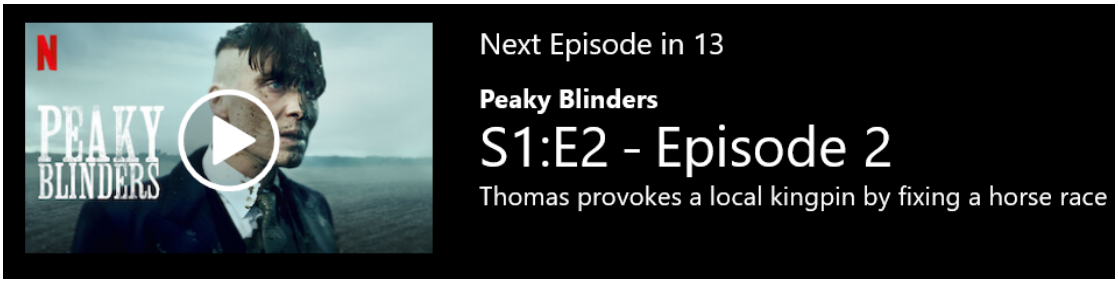

Figure 2.6: Netflix Autoplay Function [6]

Another example can be found on streaming platforms like Netflix and Youtube. These platforms have as a default setting that at the end of a video or episode, the next video or episode is automatically played. How this looks in practice is illustrated in Figure 2.6 using Netflix as an example and in Figure 2.7 using Youtube as an example. This feature also reduces friction by eliminating the necessary click to continue the series. On the contrary, even stopping the continuation creates friction and additional effort for the user [17].

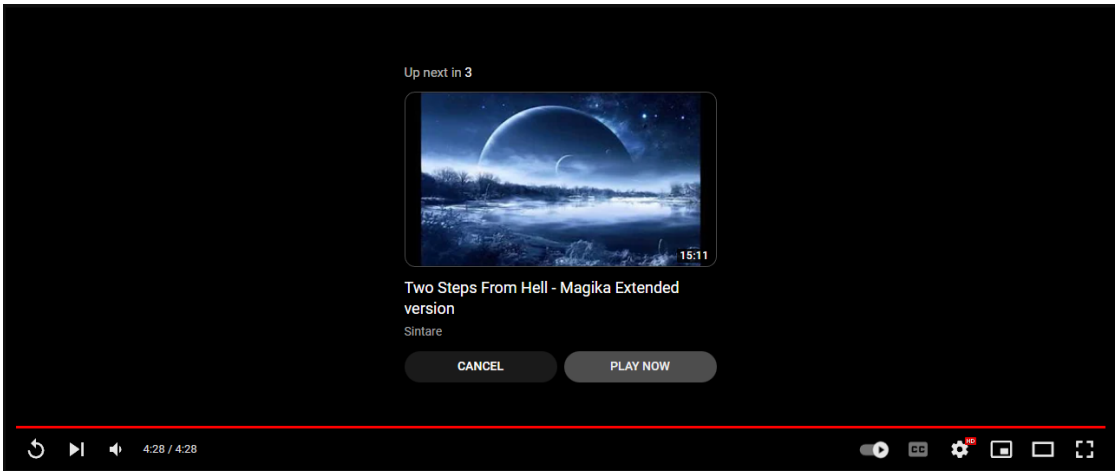

Figure 2.7: Youtube Autoplay Function [6]

Many social media platforms offer a kind of "newsfeed". This newsfeed can be used to display information or posts from people in the user's social network, but also content from other sites and providers, such as new, funny videos or news articles. On Facebook, this newsfeed represents the home page after logging in. In order to ensure that users stay on the site for as long as possible, the developers of these applications use machine learning algorithms to find out which content is most

likely to interest the user and which content correlates with the user's views. For this purpose, the algorithm analyzes the user's behavior in detail. In addition to likes, comments, and clicked content, the algorithm also records the time periods during which the user merely looks at a post or hovers over it with the computer mouse. On the one hand, the goal is to avoid the user getting bored and leaving the platform [17]. On the other hand, there is the so-called "confirmation bias", which describes the phenomenon whereby people tend to seek and consume information that confirms their existing views and positions [3].

2.2.3 Reward Phase

The reward phase is an integral part of habit formation. This is because users only return to digital products when they receive a reward for their actions. Intermittent reinforcement learning plays a central role here. In this behavioral psychology method, the desired result is actually achieved in only a portion of the attempts. The success rate is variable and unpredictable. A classic example of Intermittent Reinforcement Learning and its effect can be observed in gambling. If the gambler at a slot machine were to win every time he pulls the lever and wins an identical amount each time (this would be Continuous Reinforcement Learning), this would not be exciting, nor would it be fun for the gambler in the long run. In reality, however, the player does not always win, and when he does win something, the size of the win varies. This unpredictability and variability provide positive and euphoric feelings of happiness. Over the past decades, research has found that these characteristics make Intermittent Reinforcement Learning the most effective and appropriate method for establishing rapid learning and addictive behaviors in humans. Moreover, habits established via this learning method have been found to be most resistant to their disengagement [5].

Examples in the context of the topic covered here include receiving a message or discovering enjoyable content in the social media newsfeed. Also, the so-called "refreshing", i.e. updating the newsfeed page with a vertical swipe, can be compared to pressing the lever on a slot machine. These events can lead to feelings of happiness, but their occurrence is inherently unpredictable and happens at variable times [5].

But a reward can take other forms, as described earlier. For this, however, it is first worth taking a closer look at how the reward system in the human brain fundamentally works. When people engage in activities that are beneficial to them in an evolutionary context, the brain produces the hormone dopamine. This hormone is popularly called the happiness hormone because it plays an essential role in motivating certain behaviors and encourages their repetition. From an evolutionary perspective, these are natural activities such as consuming delicious food, having sex, or even enjoying social interactions. The latter finds its application especially in the field of social media [11].

Specifically, the "tribe" rewards, which are already described before, are aimed at social confirmation and comparison. For example, users on social media can comment on other people's published content or rate it by awarding likes, upvotes, or hearts. Positive ratings are perceived as correspondingly successful social interactions and thus can lead to positive emotions and a corresponding release of dopamine [17].

In addition, people have a tendency to compare themselves to other people. The social comparison theory states that people can use comparison to gain information about themselves. This comparison is particularly applicable when there is a lack of an objective benchmark. In the context of social media, many users share events from their lives with other people in their social network on this platform. This leads to users comparing their own experiences with the shared experiences of other users. While the number of likes also plays a role here, it is always a subjective comparison, which can certainly be viewed as problematic. There are two variants of the social comparison, the downward comparison, in which individuals compare themselves with other people who are supposedly worse, and there is the upward comparison, in which individuals compare themselves with people who are supposedly better than themselves. The latter in particular can be problematic in this context because many people often present themselves and their lives on social media as being much better than reality. A resulting comparison with one's own everyday reality can lead to one's own life being perceived as considerably less interesting and one's own existence as insufficient. This in turn can have numerous other negative consequences for the psyche and well-being [4].

2.2.4 Investment Phase

The final phase of the hook model is about the investment that users make in a digital product through their actions. As already described, this investment also increases the probability that users will return to the platform and respond to the corresponding triggers. This can be explained based on further theories from psychology [19]. On the one hand, there is the "Mere Exposure Effect" which states that the more often a person is confronted with something neutral, the more he likes it. This can be observed in the example of one's own initials, but this principle can also be applied to social media applications [17].

Another approach is the so-called Ovsiankina effect. When a person is absorbed in a task and is interrupted, there is still a internal need to complete that task. During this interruption, there is some sort of emotional stress on the person, which can be relieved by finishing the task or finding a suitable replacement task. Due to the nature of endless scrolling and streaming, many platforms hardly have a natural end, which brings this effect to bear and encourages users to return to the platform repeatedly [17].

3 Economic Objectives

After looking at the individual methods and how they work, the question of how the developers of these digital products maximize the length of time their users spend on their products has been answered. What these methods do not answer, however, is the question of the motivation behind this goal.

Understanding why activity and engagement maximization is desired, requires a closer look at the business model of companies like Facebook or YouTube. The primary source of revenue for these companies is selling ads or allowing companies to advertise their products on their platforms [13]. This is the same business model found in print media and television or radio stations [15]. However, the key advantage of social media platforms is that they create a more targeted advertising opportunity by collecting data and analyzing it. This increases the effectiveness of the ad [16].

This in turn means that the more time and attention users spend on these digital products, the more advertising the operators of these products can place, which then in turn increases their profit [16].

4 Impacts on the User and Society

The previous chapters have shown how and why social media platforms and many digital products seek to extend the length of stay of their users. In these techniques, developers exploit numerous psychological peculiarities and mechanisms of the human mind. But these very mechanisms have evolved evolutionarily and certainly have their purpose in promoting evolutionarily important behavior in humans and ensuring their advancement and survival. Therefore, the question now arises to what extent these artificial incentives affect humans in the long term. This concerns both the mental health and the behavioral and thought patterns of a person.

4.1 Health Risks for Humans

A team of researchers from the Indian Institute of Public Health Gandhinagar, in light of the rapid increase in the amount of time people spend in front of screens due to the Covid-19 pandemic, has analyzed numerous studies on mental health-related social connectedness and excessive screen time. Here, many studies and analyses point to negative consequences for a person's physical and mental health that can occur with excessive screen time [18]. The World Health Organization (WHO) itself has already pointed out that increased screen time often replaces healthier behaviors and habits. Physical activity or a healthy sleep schedule take a back seat. On the other hand, reduced sleep, a day-night shift, headaches, and neck pain, among other things, are listed as health risks. Of particular concern are the negative effects on children and adolescents [23]. For example, numerous studies indicate that sleep problems and nearsightedness are two common negative consequences of excessive screen time among this age group. Long-term side effects can include eye strain, sleep disturbances, carpal tunnel syndrome, and mental problems that can extend to a general difficulty concentrating [18].

While the previously described consequences mainly refer to general smartphone or computer use, there are studies specifically dedicated to excessive social media use. Their findings suggest that these platforms support and promote the development of negative character traits, such as narcissism, shyness, low self-esteem, an exaggerated need to communicate, or exaggerated envy and general antagonism. Reasons for this can be found primarily in the social pressure that many users feel exposed to on social media. Insufficient positive or even directly negative feedback and repeated

upward comparisons can send the user into a negative spiral here, which becomes noticeable through the aforementioned character traits. This can have a fatal effect, especially on children and young people, who are still in the process of character formation [5]. Thus, experts such as the American psychologist Jonathan Haidt argue that studies on severe depression among adolescents have recorded a sharp increase in this problematic mental state since 2012. This phenomenon correlates very strongly with the emergence and increasing use of social media in this age group. In Figure 4.1, it can be seen that this has a strong impact specifically on girls, who tend to spend more time on social media than boys [10].

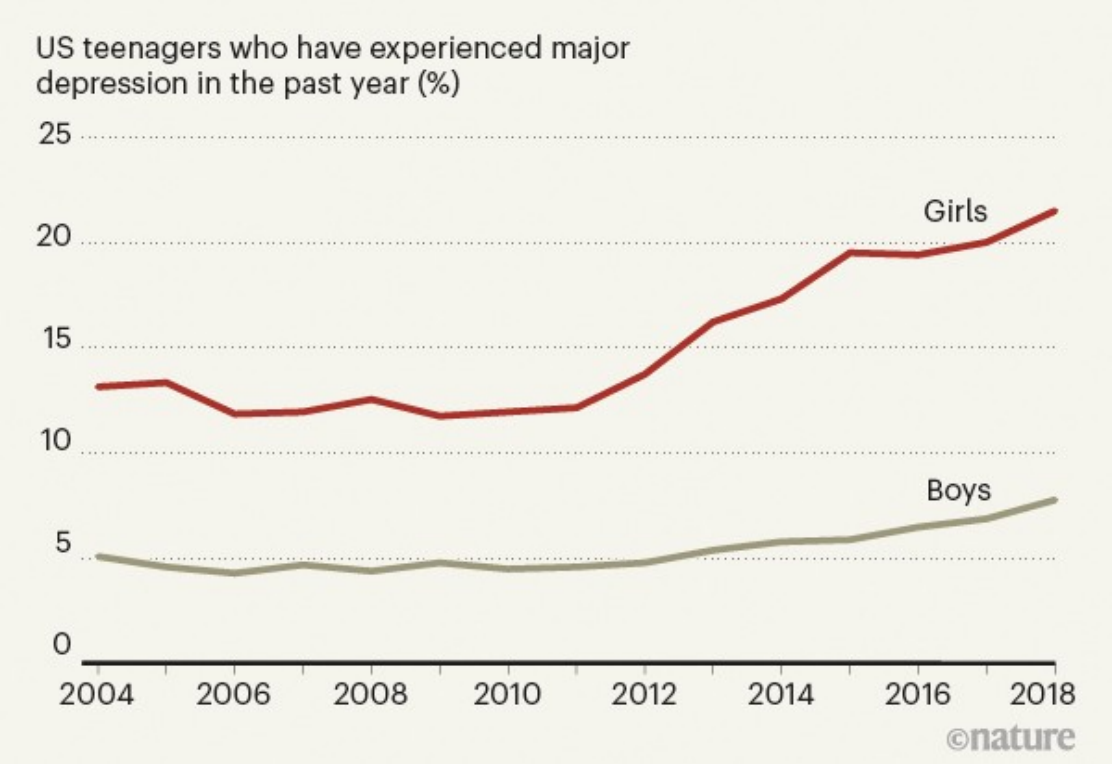

Figure 4.1: Statistic to major depression among teenagers in the US [10]

4.2 Social Media as an Addictive Substance

In Chapter 2, the human reward system has already been fundamentally explained. To understand why people are so susceptible to what is actually quite a short-lived activity that hardly provides any long-term added value, a somewhat deeper look into the human psyche is needed. In essence, the focus of research here is on two neural systems in the limbic system of the brain. The first system here focuses on maximizing immediate reward. This involves reacting to events in the environment

and determining the optimal psychological state for the person with which to meet that event. This can be, for example, deciding whether to approach someone or rather avoid them. In general, these tend to be quick behavior-based reactions. The second system, on the other hand, prioritizes future rewards, comparing all triggers to previous experiences and values to determine the optimal response. In this capacity, it can downregulate the first system. As the effectiveness of Intermittent Reinforcement Learning already suggests, people have a tendency to prefer an immediate reward. More precisely, as little effort as possible, resulting in as much dopamine output as possible. One problem with this is that the brain cannot distinguish between natural rewards, such as necessary food or sexual intercourse for procreation, and artificial rewards, such as those available on social media through likes. Thus, due to the ease of availability and use of these digital products, they may very well lead to addiction without generating any long-term benefit to the user [5].

While the studies described here were conducted by academics with no connection to the companies behind these digital products, there are also an increasing number of individuals from these companies who are publicly criticizing this situation. Tim Kendall, Facebook's former Director of Monetization between the years 2006 and 2010, is an example of this [22]. In that role, his job was to work out the best way how Facebook could earn money from its platform. In the course of a hearing on "Mainstreaming Extremism: Social Media's Role in Radicalizing America," the former company executive provides an insight into the intentions of Facebook's (now Meta) developers and leadership. In it, he describes that a primary goal had been to garner as much human attention as possible in order to turn that into previously unknown high profits. Specifically, they had taken an example from the tobacco industry, which makes their products as addictive as possible, right from the first use [14].

4.3 Impact on Society

Experience from studies shows that misinformation, conspiracy theories, and politically extreme content spread very quickly on social media and generate a lot of engagement. This fact is picked up by the suggestion algorithms on Facebook and other social media platforms and therefore this content is also suggested thus often. In 2016, then-Vice President of Facebook Andrew Bosworth summed it up in an internal memo, saying that the growth of the company and the platform was the only thing that mattered and also that any work and technology that contributed to that goal was absolutely justified. In doing so, he even cited specific examples such as a user potentially committing suicide by being exposed to cyber bullies or the possibility that the platform could be used to plan and coordinate a terrorist attack [16].

In addition to these possible scenarios, however, social media fosters another, primarily societal problem, which is already hinted at by the title of the previously mentioned U.S. Congressional hearing. Since the suggestion algorithms are designed to show users only content that might interest them, if possible, this leads relatively quickly to this content becoming very one-sided. While conventional news tries to cover a somewhat broader spectrum of opinions and views, people who get their information primarily from the newsfeed of social media platforms are very one-sidedly informed [16]. This creates a so-called bubble, in which users only obtain information that confirms their existing opinion, leading to a fundamental rejection of other views and information that criticizes or questions their own viewpoints. Given the rapid spread of misinformation [16], users can find information on almost any topic and viewpoint that is rarely questioned. This "bubble formation" can lead to increasing polarization in society. The resulting unwillingness to listen to the other person at all if he or she does not share one's own point of view is already a fundamental danger to democracy for many people [2].

5 Countermeasures

After a closer look at the methods and their effects on humans, the question now arises, how to react to this situation? Since political and legal solutions to this complex of issues often fail due to a lack of understanding of those responsible regarding the actual problem and are usually blocked by correspondingly forced lobbying, it is left to the user to deal with this situation for the time being. In general, the problem can be viewed in two ways. There is the possibility to take acute countermeasures or the users, respectively the developers of these technologies can use these techniques to improve the life and well-being of the people instead of putting their health at risk for profit.

5.1 Individual Countermeasures

For this consideration, it is again worth taking a look at the Hook model. Based on the Trigger, Action, and Reward phases, appropriate measures can be taken to reduce one's own susceptibility [7].

The trigger phase is primarily about nudges. Specifically, there is the possibility here to hide or reduce corresponding nudges. In practice, for example, the notifications in applications can be reduced or completely deactivated. This allows users to determine for themselves whether and when they access the digital product [19]. In addition, after installing or logging in to a digital product via a pop-up window, users could be forced to set these settings themselves and thus determine when they receive a notification and when they do not. This would undermine the current standard of enabling all possible alerts by default [1].

In the action phase, the developers focus on the flow already described. The user should forget time and space around him and thus spend more time on the platform [17]. To counteract this, more friction must be generated. This increases the hurdles to simple dopamine reward, which requires a higher level of motivation to continue this activity [19]. This can already be achieved by adding additional time buffers and necessary clicks. For example, a time buffer of 10 seconds before submitting a post [1] or a button that must be clicked after a certain number of posts to load more content [19].

The reward phase is about reducing those very rewards. This can be achieved, for

example, with the help of "feedback nudges", which inform the user about the time already passed via negative reinforcement [19]. Appropriate background lighting or background effects ("ambient feedback") can also give the user correspondingly more subtle feedback about the time already spent on this platform [1].

5.2 Alternative use of the Methods

Alternatively, these methods can be used to improve people's lives or to prevent the very abuses that result from the current use of these techniques.

For example, it is possible to show users targeted content that not only agrees with the user's views but also contradicts them and encourages them to reflect again on their own viewpoints. This could counteract the polarization promoted by the confirmation bias [1].

Two further examples can be explained using a shopping website on the Internet. For example, poor quality or unhealthy products may be displayed very low in search functions on these websites, reducing the likelihood that they will be purchased. In addition, when these products are selected, healthier alternatives can be offered accordingly with the help of pop-up windows. Some companies have already tested these concepts and have been able to confirm their effectiveness [1].

6 Summary, Discussion, and Prospects

6.1 Summary

A closer look at the business model of large digital companies quickly reveals that they profit from users staying as long as possible on their digital products. The more attention users pay to these products, the more advertising can be placed, which in turn increases profits. With this motive, psychological phenomenons such as the flow principle, the theory of social comparison, or the confirmation bias are used to increase the addictive potential of these digital products. With the help of external triggers, developers try to establish habits in the user. To do this, methods of conditioning such as intermittent reinforcement learning are facilitated to further solidify these routines so that they can then develop into an addiction. Specifically, the evolutionary reward system in the human mind, which is supposed to ensure human survival and advancement, is exploited for these purposes. These methods bring with them numerous negative side effects, especially in the case of long stays on these digital products. Negative consequences can arise for both mental and physical health. Negative character traits are also increasingly recognized as related to the excessive use of these platforms, which in turn has a particularly devastating effect on children and young people. In response, there is an opportunity for individuals to protect themselves from these methods with some countermeasures and to counter them with ethical designs. Developers could also use these techniques to actively improve the lives and health of their users, rather than putting them at risk for profit.

6.2 Discussion and Prospects

While social media, especially through the Covid-19 pandemic, is making an important contribution to helping people stay in touch with their loved ones, the criticism made here is specifically about the unethical practices of these companies. While exploiting human psychology to maximize one's profits is not a new concept, the extent to which it is being used here is unprecedented. A handful of developers in Silicon Valley can influence the lives, thoughts, and actions of billions of people, sometimes on a massive scale, without the majority of these people even being aware of it. And the fact that institutions like the Stanford Persuasive Technology Lab, where, among

others, people like the aforementioned B. J. Fogg give lectures, continue to be very popular, shows that these developments are not going to disappear anytime soon and will probably only become more sophisticated in the future.

Many of the scientific studies and papers evaluated for this seminar paper have been written in the last five years. The negative effects of these methods are slowly making themselves felt in society. This trend will continue in the coming years and people must be educated about the dangers, just as warnings and education are currently being given about gambling and tobacco products. Many studies, especially long-term studies, are still ongoing and their results could paint a completely different picture of social media in the years to come than we encounter today.
Former Google design ethicist and founder of the Center For Humane Technology Tristan Harris summed up the danger with the following statement: "With technology, you don't have to overwhelm people's strengths. You just have to overwhelm their weaknesses. This is overpowering human nature. And this is checkmate on humanity." [9]

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