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Digital Slot Machines: Social Media Platforms as Attentional Scaffolds

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Abstract
In this paper we introduce the concept of attentional scaffolds and show the resemblance between social media platforms and slot machines, both functioning as hostile attentional scaffolds. The first section establishes the groundwork for the concept of attentional scaffolds and draws parallels to the mechanics of slot machines, to argue that social media platforms aim to capture users' attention to maximize engagement through a system of intermittent rewards. The second section shifts focus to the interplay between emotions and attention, revealing how online attentional capture through emotionally triggering stimuli leads to distraction. The final section elucidates the collective implications of scaffolding attention through social media platforms. The examination of phenomena such as emotional contagion and the emergence of group emotions underscores the transition from individual experiences to shared collective outcomes. Employing online moral outrage as a case study, we illustrate how negative emotions serve as scaffolds for individuals' attention, propagate within social groups, and give rise to collective attitudes.

Keywords Social media platforms · Attentional scaffolds · Digital slot machines · Hostile scaffolds

1 Introduction

In recent decades, affective and cognitive states are increasingly conceptualized as extended in the world (Carter et al. 2016; Clark and Chalmers 1998; Colombetti and Krueger 2015; Colombetti and Roberts 2015; Krueger and Szanto 2016; Piredda and Candiotto 2019). According to extended theories of cognition and affect, scaffolds are processes and artifacts used to express, trigger, intensify or modulate emotions or cognitive states (Candiotto and Dreon 2021; Heersmink 2013; Piredda and Candiotto 2019). Considering the diversity of cognitive and affective task we fulfill through social media platforms–from informing ourselves, communicating with others and building social relations, to expressing and performing our identities–it becomes clear that digital platforms are suited for the application of scaffolding theory.

While scaffolding theory has not been used extensively in social media research, there is some work done in this direction. For example, Krueger and Osler (2019) argue that social media platforms are affective scaffolds, as people use them to regulate their affective lives, by interacting with others to elicit different feelings. But, the same study (2019, p. 226) highlights that oftentimes social media platforms dysregulate affective states, which is reflected in users' decreased ability to focus on essential tasks, indicating a detrimental effect on attention. On the other hand, Heersmink and Sutton (2020) argue that Web applications, including social media platforms, should rather be seen as cognitive and memory scaffolds. This is because social media platforms aid in cognitive and memory tasks, such as accessing information, or reminding users of different events. However, the authors stress that Web services have a negative impact on users' attention, as they promote "skimming of

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information, cursory reading, and distracted thinking." (2020, p. 161). Last but not least, Steinert et al. (2022) show that scaffolds need not be strictly cognitive or affective, as most of the time both dimensions are scaffolded at the same time. For example, social media platforms are affective scaffolds with cognitive effects because they encourage gut reactions that subvert critical thinking, by instrumentalizing people's attention (Steinert et al. 2022, p. 19).

Whether described as affective or cognitive scaffolds, most authors cited above recognize that social media platforms have a considerable, often negative, impact on our attention. All this, while our emotions are elicited by the content we see online, and our epistemic states are affected by the lack of control over how we process and integrate information. This raises a new set of questions: how do social media platforms manage to affect *both* our emotions and epistemic states? And what role does attention have in this process?

In this paper, we introduce the concept of attentional scaffolds and show the resemblance between social media platforms and slot machines, both functioning as hostile attentional scaffolds. We analyze how these platforms strategically harness users' emotions to capture and retain their attention, thus benefiting the platforms at the expense of users' interests. Drawing parallels to the mechanics of slot machines, social media platforms aim to capture users' attention to maximize engagement through a system of intermittent rewards. We then shift focus on the intricate interplay of emotions and attention, and their impact on epistemic states, to show in more detail how social media platforms work as digital slot machines. We argue that despite being designed around individual users, digital platforms wield aggregate effects at the collective level. By exploring phenomena such as emotional contagion and the emergence of group emotions, we illustrate the transition from individual experiences to collective outcomes. Employing online moral outrage as a case study, we illustrate how negative emotions serve as scaffolds for individuals' attention, propagate within social groups, and give rise to collective attitudes.

2 Social Media Platforms as Attentional Scaffolds

The central role of attention in the business model of social media platforms is driven by the well-established connection between revenue generation and user engagement (Zuboff 2019). Social media platforms rely heavily on personalized advertisements, which, in turn, depend on collecting and analyzing users' personal data. To gather a substantial amount of data for targeted ads, social media platforms must ensure that users spend as much time as possible scrolling.

Consequently, the algorithms underlying these platforms are meticulously designed to maximize user engagement, while the user interfaces are created to attract users' attention (Narayanan 2023). Engagement is "any score that is defined only in terms of the moment-to-moment actions of the user" (Narayanan 2023, p. 18). To put it simply, recommendation algorithms structure users' newsfeeds, ranking information depending on how likely it is for users to engage with it. For this purpose, algorithms look into users' behavioral data to find patterns that could predict engagement with posts. So, algorithms are not made, per se, to keep users hooked or to make them addicted; they only look for patterns in data to maximize engagement. Engagement is easy to measure, and it is a good proxy for other goals; for example, "A user who is engaged is more likely to keep returning and generate ad revenue for the platform." (Narayanan 2023, p. 18). At the same time, every element of the user interface of social media platforms is chosen because it works to attract and capture people's attention–for example, 'pull-to-refresh' mechanisms in newsfeeds and infinite scrolling feeds are implemented in almost all social media platforms because of their potential to maximize time spent online (Burr et al. 2018, p. 757; Narayanan 2023; Mihailov et al. 2023; Voinea et al. 2020).

Therefore, attention holds a central position in the business model of social media companies. The more attention users devote to the platforms, the more data can be collected and used for recommending content and targeted advertising. This symbiotic relationship between attention, user engagement, and advertising revenue drives the constant refinement and optimization of algorithms and of platform design, all with the ultimate aim of maximizing profitability (Deibert 2019). Social media platforms are designed to capture, direct and retain people's attention; they are attentional scaffolds.

2.1 Beneficial and Hostile Attentional Scaffolds

We define attentional scaffolds as designed external structures, artifacts or processes that systematically influence users' focus, management, and direction of attention, either benefitting or harming their ability to achieve their goals. Following Saarinen (2020) in their theorization of affective scaffolds, we advance a broad understanding of attentional scaffolds, as it allows for richer and more productive analyses. A narrower understanding would look to find more and more restrictive conditions that describe the concept, to clearly delineate between scaffolded and non-scaffolded attention. Our focus in this paper is just to put forth a concept that might reveal something relevant about the relations between external objects and people's attention. Just like Saarinen (2020), we side with a broad understanding

of scaffolds, in our case, attentional, as it is useful to illustrate how our attention is constantly shaped and directed by external objects and processes.

Scaffolds can be beneficial or hostile (Timms and Spurrett 2023), depending on the role they play in users' ability to achieve their goals and on the intentions behind their design. Beneficial scaffolds are generally those that are created to help users with various tasks and to advance their interests. For example, a GPS map that helps people get from point A to point B without investing too much effort in this task is a beneficial cognitive scaffold. On the other hand, hostile scaffolds undermine the interests of the agent using the scaffold, while at the same time, serving the interests of another agent, usually the one who created it (Timms and Spurrett 2023, p. 63). Slot machines are a paradigmatic example of hostile scaffolds (Timms and Spurrett 2023) as they are designed to prolong gambling episodes to maximize casinos' profits, even by instilling compulsive behaviors and addiction in gamblers (Schüll 2012). Slot machines serve the interests of the casinos, but hurt the interests of gamblers–which plausibly have other goals than losing money and becoming addicted (e.g., they might play for entertainment, for winning, for getting into a state of flow, etc.) (Timms and Spurrett 2023, p. 73). It's important to stress the difference between hostile and accidentally harmful scaffolds, which is given by the intention between the design of the scaffold. A malfunctioning GPS, for instance, may lead users astray but lacks the deliberate, exploitative nature of a hostile scaffold, like slot machines. To put it simply, hostile scaffolds have both victims and beneficiaries.

Attentional scaffolds, too, can be beneficial and detrimental. On the beneficial side, they are created to help users focus attention on specific goals or significant events that they might otherwise overlook, thus advancing their interests. For instance, meditation apps, alarms, or reminders serve as beneficial attentional scaffolds by guiding users' attention toward tasks or purposes chosen by users in advance. Some find meditation apps useful for regaining control over their attention and improving their mental health (Flett et al. 2018). Similarly, consider the benefits of alarms reminding someone of a colleague's birthday during a busy day. Or the signal of an approaching ambulance prompting people to clear the way (which advances people's fundamental interest to live). These examples highlight how beneficial attentional scaffolds can support people in achieving their goals, by aligning with their intentions or by advancing their interests.

There are also hostile attentional scaffolds. Unlike a broken alarm clock that should ring in the morning but fails to do so because it malfunctions, intentionally designed hostile attentional scaffolds instrumentalize users' emotions and biases to capture their attention and to steer it towards goals that were not deliberately chosen by users and which do not serve their interests. For example, supermarkets' product layout is designed to maximize impulse purchases (Gul et al. 2023), which are not only unplanned, but also immediate, triggered by a stimulus that offers hedonic pleasure in the spur of the moment, but that oftentimes provokes regret in impulsive buyers (Sarwar et al. 2023). Store layouts thus work as hostile attentional scaffolds that divert shoppers' focus from their shopping lists and lead to purchases of unnecessary items, ultimately increasing the store's revenue at the expense of shoppers' budgets, intentions and interests.

Social media platforms too are a case of hostile attentional scaffolds. Algorithms and user interfaces are optimized for engagement and to keep users engrossed and scrolling, directing their attention towards goals that were not specifically chosen in advance and that do not serve users' interests (see, for example, Voinea et al. 2023). Many users feel that they spend more time on social media than they should, which distracts them from other, more important goals. Research backs this up, with studies already analyzing the phenomenon of compulsive social media use (see, for, example, Aladwani and Almarzouq 2016; Dhir et al. 2018; Apaolaza et al. 2019; Ali et al. 2023) or digital overuse (Fasoli 2021). Surveys also seem to confirm these concerns. For example, a recent Pew survey of social media use amongst US teenagers shows that around 36% of the interviewees declare that they spend too much time online on a daily basis (Massarat 2022). Similarly, another survey of adults' social media use shows that 32% of the responders consider that they spend too much time on social media (Adults' Media Use and Attitudes, 2023). Fasoli (2021, 1412) shows that multiple sources indicate that for some, social media use is problematic because it is excessive, and interferes with their personal and professional lives.

This excessive time spent online is a direct consequence of platforms' hostile design, which is created to capture users' attention to maximize the time spent online, serving the interests of the platforms, but not those of some users. Burr, Cristianini & Ladyman show that some users regret using social media platforms and "those apps that we regret using the most, also appear to be those apps we spend most time on (e.g. Facebook was used for an average of 59 min a day, and 64% of users regret their use of the app)." (2018, p. 760). Regret can be attributed to users' realization that they get distracted form other, more important and valuable goals. For example, teenagers who spend more time on social media report being more distracted than their peers who spend less time online and also regret it (Siebers et al. 2022; Meena et al. 2012).

For a lot of users, thus, social media platforms work as hostile attentional scaffolds which benefits the platforms–as users spend more time online, leaving more data behind

that could be used for targeting them later with content that keeps them engaged–but hurts the interests of the users, who, as shown above, report feeling that they spend too much time online and also regret doing it. Nonetheless, it is important to stress that whether something is a beneficial scaffold or not depends very much on how it is used. Some users manage to resist the temptations that social media platforms throw their way and use these services in order to accomplish their goals, such as communicating with others, entertaining or informing themselves, etc. But there are worries that for a lot of users, it is very hard to exercise self-control when on social media platforms (Fasoli 2021, 1422). After all, there is an asymmetry between our capacities to control our attentional resources and the "armies of engineers, programmers, designers, and executives working to extract ever-smaller 'slivers' of our focus in a highly competitive attention economy" (Hanin 2021, p. 397).

2.2 Digital Slot Machines

Social media platforms work as digital slot machines, instrumentalizing users' attention through a sophisticated system of intermittent rewards. Timms and Spurrett (2023, p. 64) consider gambling technologies to be a case of hostile scaffolding, precisely because of the intermittent rewards they offer. In behavioral sciences and psychology rewards refer to any positive reinforcement that encourages specific behaviors and feelings, shaping choices and learning (Schultz 2010, p. 1). Psychologists argue that intermittent rewards can be more effective than predictable rewards in establishing habits, regardless of overall gain or loss (Schüll 2012, p. 108). This is because intermittent rewards lead to the release of dopamine which ends up reinforcing the behavior that generates the intermittent rewards (Burr et al. 2018, p. 758). For example, the intermittent rewards (under the form of intermittent wins) offered by slot machines activate the dopamine circuits in the brain, which facilitates further gambling (Winstanley et al. 2011). Slot machines dispense rewards frequently enough to keep people playing, but not as frequent so that casinos lose money.

On social media platforms, algorithms and user interfaces are designed based on the concept of intermittent rewards (Fasoli 2018; Hanin 2021; Williams 2018; Anderson and Wood 2021; Lindström et al. 2021). Intermittent rewards may manifest in the form of content or social rewards (Anderson and Wood 2021, p. 87). Just as in the case of slot machines, "our reward learning systems find the cycling of action and feedback offered by gambling highly reinforcing" (Timms and Spurrett 2023, p. 72), so in the case of social media platforms, the intermittent rewards offered while scrolling reinforce the habit of spending even more time online.

First, content rewards are posts that attract users' attention when they are online (Anderson and Wood 2021, p. 87). The posts that are rewarding and that capture users' attention are usually those that violate users' expectations, thus eliciting strong emotions, such as anger or awe (Brady et al. 2020a, b). Strong emotional stimuli are motivationally relevant as they usually require immediate responses (Brady et al. 2020a, b, p. 994; Voinea et al. 2023). More precisely, we are naturally predisposed to attend to emotionally charged information, because it was evolutionarily useful, as it helped individuals secure cooperation by punishing norms violations or advanced survival (Mihailov et al. 2023). Already, there is burgeoning research showing that emotionally arousing information, such as moral norms transgressions or negatively valenced information, is more likely to be shared on almost all social media platforms (Berger and Milkman 2012; Kramer et al. 2014; Heimbach et al. 2015). Strong emotional content, either positive or negative, works as a reward because these posts "tend to spark conversation, capture attention, and spread broadly through others' shares" (Anderson and Wood 2021, p. 87). Thus, algorithms maximized for engagement effectively work as "attentional filters" (Brady et al. 2020a, b, p. 997) which personalize content so that they serve users posts that will elicit their emotions and will keep them scrolling (Fasoli 2018).

Second, interactions with one's social network offer social validation which are social rewards, received under the form of 'likes', 'shares', comments or any other type of social metric functioning as feedback to one's online social media behavior. Social rewards have long been connected with social media engagement. For example, studies showed that the more 'likes' people received for a post, the more they engage with it, and the more self-reported happiness is identified (Wohn et al. 2016; Zell and Moeller 2018). Along the same lines, after users post some new content, they increase the time spent on social media platforms monitoring what they posted, which researchers identified as reward anticipation (Grinberg et al. 2016). And, similarly, the more feedback users receive, the more feedback they themselves give (Eckles et al. 2016). More recently, a large-scale analysis of more than one million posts from over 4000 individual users on various social media platforms provides "clear evidence that behavior on social media indeed follows principles of reward maximization, and thereby give credence to the popular portrayal of social media engagement as a Skinner Box for the modern human" (Lindström et al. 2021, p. 7). This is because users get hooked on the positive social feedback they receive when online. Although there are other reasons for spending time on social media platforms, it seems that rewards seeking is one important motivation for it. Moreover, social rewards encourage users

to engage with specific content or topics, guiding their attention toward shared interests and discussions.

The mechanics behind social media platforms are similar to those of slot machines, with the purpose to draw users into prolonged engagement through a system of intermittent rewards. First, algorithms on social media platforms are designed to maximize engagement, thus they offer users content that elicits emotional responses, under the form of moral norms transgressions, shocking news, heartwarming clips etc (Vică 2023, p. 141). These emotionally charged posts act as intermittent rewards, capturing users' attention and prompting them to continue scrolling in search of similar gratifying content. Moreover, interactions within social networks offer additional reinforcement, akin to the rewards received from winning on a slot machine. 'Likes', 'shares', and comments serve as social validation, triggering a sense of accomplishment and satisfaction that encourages users to remain active on the platform. Just as gamblers are drawn to the anticipation of winning on a slot machine, social media users are lured by the promise of captivating content and social approval, reinforcing their habit of scrolling and contributing to the platform's addictive nature. Obviously, not all users are the same, so the effects of social media platforms on users' attention will not be uniform.

3 The Triangle of Distraction: Emotion, Attention, Epistemic States

In this section, we explore in more detail how social media platforms work as digital slot machines and what their effects are, by analyzing the interplay between emotions, attention, and epistemic states. The purpose is to show how social media platforms capture attention by exploiting affectivity, which in the end can have detrimental consequences on users' epistemic states. Our account builds on previous literature exploring the emotions-attention-cognition links and is neutral with regard to any particular theory about the nature of emotions. We acknowledge that emotions are differentiated from moods and feelings, mainly because, unlike the former, emotions are intentional mental states, directed towards an object and presuppose an evaluative dimension (Steinert and Dennis 2022).

3.1 Emotions and Attention

From an evolutionary perspective, emotions serve a crucial function by quickly and effortlessly directing our attention towards potentially important stimuli (Vuilleumier et al. 2003) that serve us by advancing survival (Brady 2014). Take fear: if one sees a car dangerously speeding in their direction, they will instinctively be overcome with fear, and the focus of their attention will remain on the car until it stops being a threat. In this focusing of attention, the subjects' resources will be mobilized to respond appropriately to the threat, which is to step aside from the car's way (Brady 2014, p. 53). Thus, stimuli that are emotionally arousing will be prioritized in cognitive processing; more precisely, our attention is directed toward them (Brady et al. 2020).

But not all emotions have the same impact on our attention, as they serve distinct functions in the organization of perception, cognition and action (Izard 1991; Mitchell 2023). For example, happiness leads to a widening of attention and to a shift of attentional focus away from the stimuli that triggered the response. This is opposed to fear or anger which narrows our attention on the stimuli and keeps its focus on the object (Mitchell 2023, p. 76). Emotions are puzzling in that despite their unitary status–they are part of the same category of mental states– they nonetheless modulate attention differently. Some widen, while others narrow attention; some keep the focus of attention on the stimuli, while others shift it away from the initial stimuli (Mitchell 2023, pp. 76–79). The answer to this puzzle lies in the functional role emotions play. Emotions have different functional roles, meaning they are useful for different purposes, and varying modulations of attention might help accomplish the role of that particular emotion (Mitchell 2023, p. 81).

But it is not just material objects and events that can be motivationally relevant emotional stimuli. Human beings are symbolic species, who seek and produce meaning, and use abstract systems of communication, such as written and spoken language, to convey emotionally charged messages and also to communicate simple facts about themselves and their environment. Kissler et al. (2009) show that our attention can also be drawn by language that represents emotions. This means that mediums where emotional language and social validation is especially salient, such as social media platforms (Brady et al. 2020), will be mediums that will draw and captivate individuals' attention. In what follows, we show what are the consequences of capturing people's attention through content and social rewards. In the last section we take the case of moral outrage to show the interplay between emotion, attention and epistemic states, at both the individual and collective levels. While we acknowledge that various emotions can spread on social media platforms and can have different outcomes, we focus primarily on anger and outrage as examples due to their extensive research but also because there is consensus that algorithms push such content in users' feeds, as it spreads faster and deeper within networks (Milli et al. 2023; Schöne et al. 2021; Brady et al. 2020a).

3.2 Attentional Capture and Its Effects

Attention is cognitively, morally, aesthetically and politically relevant (Gardiner 2022; Whiteley 2023; Watzl 2023; Bommarito and Ganeri 2022; Voinea et al. 2022). Each individual has certain attentional priority structures, or attentional patterns, which are relative to a certain environment or stimuli (Watzl 2023). Despite the diversity of theories of attention and of the multiple ways of conceptualizing it, there is a common conception of attention underlying this diversity: "a subject's attention is the subject mentally selecting a target to guide behavior" (Wu 2023, p. 2). It put it more simply, attention is a form of mental management (Whiteley 2023). But one can intentionally focus attention towards some stimuli (attentional control, where attention is determined endogenously), while at the same time, attention can spontaneously and unintentionally be drawn towards other strong or unpredictable stimuli (attentional capture, where attention is determined exogenously) (Watzl 2023). For example, even if one's attention is invested in reading (attention is endogenously determined), if a loud ambulance passes nearby attention will be drawn towards it (attention becomes exogenously determined) (Watzl 2023; Gardiner 2022; Bermúdez 2017). When attention is determined exclusively endogenously, the person is in a complete state of concentration, called hyper-concentration, that may lead to blindness to other relevant stimuli. On the other hand, when attention is determined exogenously, one deals with the phenomenon of attentional capture (Bermúdez 2017, p. 62). Attentional capture is detrimental inasmuch as it makes it hard for individuals to follow their own goals and purposes which ultimately leads to an incapacity of self-determination and self-control (Bermúdez 2017, p. 63).

Recently, it has become more and more clear that attentional capture is important in the context of social media platforms (Brady et al. 2020). Attentional capture arises whenever we shift cognitive resources to attend to some stimuli over others. Research points towards the phenomenon of attentional capture online, where content containing moral and emotional language captures attention more than morally and emotionally neutral content (Brady et al. 2020b; Berger and Milkman 2012; Kramer et al. 2014; Heimbach et al. 2015). This is because emotional stimuli are motivationally relevant, as they either help us survive (we have to attend to dangerous situations or objects in order to maximize survival, Öhman and Mineka 2001) or they help us acquire social goals (such as increased cooperation, social bonding or accomplishing of shared goals, Wolf et al. 2016).

When users encounter content that evokes strong emotional responses, be it outrage, shock, or fascination, or social validation, thus when they encounter content or social intermittent rewards, their attention will be captivated by them (Brady, Crockett, et al. 2020; Brady et al. 2023; Brady, Gantman, et al. 2020; Tanesini 2022). This emotional engagement can lead to a state of heightened susceptibility to additional distractions (Hanin 2021). In essence, social media platforms' ability to exploit and amplify emotional responses in users, captures their attention, drawing them away from their original focus, ultimately affecting their cognitive and informational processing capabilities. Of course, this is not a universal reaction, as some users are able to resist distractions and to use social media in productive and efficient ways. Nonetheless, for a lot of users, social media has the effect of distractions (Koessmeier and Büttner 2021). Distraction hampers the attainment of evaluative knowledge, in that it focuses individuals on a single aspect that might not be relevant for a comprehensive evaluation of the concerned object, person or phenomena, while also making it difficult for individuals to integrate knowledge from various sources, weakening self-control, so that "automatic, bottom-up processes take over" (Williams 2018, p. 68).

Attentional capture leads to undesirable epistemic states, such as distraction, because it is correlated with weaker self-control (Derryberry 2002; Mann and Ward 2007). Self-control is essentially the capacity to delay gratification and to follow longer-time goals, despite their costs. For some, self-control is more than that, it is the capacity to control one's life by controlling the direction of our attention (Bermúdez 2017, p. 63). Lack of attentional control over one's mental landscape means that people will give in to distractions and temptations and that they will be unable to order their thoughts and act in accordance with them (Burgoyne and Engle 2020). Due to the widespread attentional capture fostered by engagement-maximizing algorithms, individuals are less likely to critically reflect on belief-forming mechanisms and more likely to react impulsively to emotionally-triggering stimuli.

Just like slot machines, social media platforms exploit users' emotional states to grab their attention, by offering intermittent rewards under the form of content that elicits their emotions and social rewards, which keep them scrolling. Murch and Clark (2021, p. 221) demonstrate that the attention capture seen in gambling leads to a state of immersion, where repetitive gambling activities absorb individuals' focus, interfering with other goals and activities. Similarly, social media platforms engage users' emotions through content that triggers various feelings such as anger, fascination, or awe, as well as through social validation in the form of likes, shares, and comments. These rewards are provided intermittently, fostering compulsive behaviors like endless scrolling. However, unlike casino slot machines, which impact individual users, social media platforms

connect people, leading to effects that are also networked, as we will illustrate below.

4 We Are Not Borg, But We Act Like One

The preceding sections showed that social media platforms are attentional scaffolds that capture users' attention by working as digital slot machines. In this section, we explore how the process of attentional capture can have aggregate effects at the collective level and can give rise to collective epistemic states. We use online moral outrage as a case study to demonstrate how negative emotions can shape individuals' attention, propagate within social circles, and engender collective epistemic attitudes.

4.1 Emotional and Attentional Contagion

People share their emotions with others because it helps increase social bonding by showing similarity and emotional convergence. But it can also serve the purpose of strengthening one's status within a community, as emotional expression ultimately conveys the values and norms that define not only one's identity, but also group membership (Brady et al. 2020).

One interesting aspect of emotions is that they spread from person to person. Day-to-day experience also speaks to this fact: it is not seldom that we are 'contaminated' by other people's sadness, joy, or even anger. This phenomenon is referred to as emotional contagion, which has been thought of as one of the drivers of individual and collective behaviors (Goldenberg and Gross 2020). Emotional contagion arises whenever people take others' emotions into consideration when assessing an event (Fischer et al. 2011), finally experiencing the same emotions they initially noticed in others. In other words, people react to other people's reactions, which creates emotion sharing feedback loops, especially in times of crisis (Garcia and Rimé 2019; Voinea et al. 2023). Emotional contagion contributes to strengthening group identity through emotional resonance amongst group members (Tanesini 2022). The phenomenon of emotional contagion and the salience of group-identity give rise to group-emotions which reinforce the boundaries and distinctions between groups.

Think of a protest in education, where professors take to the streets in order to oppose the government's decision not to increase wages and governmental expenditures on education. Each professor feels anger at the governmental decision, but the protest in itself is also an instance of a group emotion, namely anger, that mobilizes collective action. What is a group emotion? Firstly, it involves a feeling of solidarity, individuals know what others are feeling and become 'infected' by the group's emotions through emotional contagion. A second important feature of group emotions is "a form of acceptance and endorsement of the emotions of others" (Brady 2016, p. 99). Individuals might be angry about the government's decision when they realize that other individuals feel anger, based on their group allegiance. They might end up endorsing the group emotion, as a result not of active deliberation, but of group identity. The object of the emotion thus becomes the object of group attention.

Shared attention presupposes an awareness that others are predisposed to act in similar ways with respect to the object of shared attention. Brady claims that "group emotion can draw attention to some important or significant event; second, it can motivate or facilitate group understanding of that event" (2016, p. 105). This means that group emotions predispose people to attend to the same things and to act in similar ways. Group-based emotions modulate attention at the collective level. This phenomenon is known as shared attention, where the group collectively attends to the same environmental features (Gardiner 2022; Shteynberg 2015). Shared attention stems from an evolved adaptation when individuals belonged to a single group, and attending to the same objects ensured survival through collective action (Shteynberg 2015, p. 581).

4.2 Emotional Contagion, Shared Attention and Their Effects on Social Media Platforms

In a sense, the fact that there is emotional contagion on social media platforms is not news. Already in 2014, a controversial study by Facebook showed that "emotions expressed by others on Facebook influence our own emotions, constituting experimental evidence for massive-scale contagion via social networks" (Kramer et al. 2014, p. 8788). This study showed that emotional contagion arises even without direct interactions between people and in the absence of nonverbal cues. What is even more interesting is the temporal dimension of emotional contagion, as the study shows: "people's emotional expressions on Facebook predict friends' emotional expressions, even days later" (Kramer et al. 2014, p. 8788). When discussing emotional contagion online, it is especially important to take into consideration the platform that hosts the conversation and, more specifically, their purposes and means to accomplish these purposes. Social media companies are attentional infrastructures that yield collective attention-shaping powers.

Take the example of moral outrage, one of the most prominent collective social phenomena on social media platforms. Online platforms expose users to a higher number of moral norm violations, triggering anger responses that result in outrage cascades (Crockett 2017). Users express

strong reactions against moral transgressions, not only because the costs of expressing outrage are lower online but also because it signals group identity (Mihailov et al. 2023). Moral outrage presupposes first and foremost anger. The functional role of anger is to secure a form of reparation after an insult or transgression of a moral norm (Mitchell 2023, p. 90). The modulation of attention in anger-related emotions functions very much like the 'narrowing' of attention presupposed in the case of fear-responses, described above. Attention in this context would be consumed by a focus on the offender, in an attempt to restore a desired state (Mitchell 2023, p. 91; Ford et al. 2010), which means that users are focused on punishing the transgressor.

One recent empirical study provides evidence for this. According to Barron et al. (2023) online public shaming campaigns, triggered by anger in response to moral norm violations, are not necessarily driven by a desire to promote good or rectify the situation but rather appear to be rooted in a sense of malicious pleasure derived from another's misfortune, known as "schadenfreude". When individuals encounter anger-inducing content, their attention tends to become focused on the transgressor, as they actively seek weaknesses or flaws with the intent of causing harm. Consequently, their attention becomes fixated on a singular aspect—the transgression—neglecting all other relevant dimensions that should be considered when assessing the person involved. This rapid spread of anger consumes the collective attention of social groups, resulting in an excessive and disproportionate escalation of collective shaming and bullying campaigns in comparison to the initial transgression that caused them. In these situations, it appears that individuals' capacity for critical self-reflection is suspended, leading to a cognitive state that propagates within the collective and fosters the emergence of lynching mobs, figuratively speaking (Mihailov et al. 2023). What is more, users who engage in these outrage cascades also do it because they get social validation for reacting in the face of a transgression (Brady et al. 2021). Thus, the case of moral outrage shows how content and social rewards often work together to capture users' attention, leading them to become focused on the details of the transgression while disregarding whether their reactions are proportionate to the offense committed.

The primary objective of social media platforms is to maximize users' time spent online, similar to how slot machines aim to increase users' play time beyond what users themselves would actually want. To achieve this goal, these platforms offer intermittent rewards under the form of highly-arousing emotional content or social validation which captures users' attention (Brady et al. 2020). As a result, social media platforms often amplify users' emotions, leading to increased exposure and intensity of emotion contagion (Goldenberg and Gross 2020, p. 318). This incentivizes the promotion of content eliciting strong emotional reactions, such as awe or anger, which rapidly spread within the network. The shared emotional experiences create common attentional patterns within social groups, causing them to feel, observe, and act similarly.

5 Conclusions

The collective negative cognitive effects of emotional contagion and shared attention on the digital slot machines that are todays' social media platforms are becoming increasingly evident. The social groups to which individuals belong play a decisive role in shaping their epistemic environments and beliefs. Negative events and moral norm violations tend to attract more attention and provoke moral outrage, which is characterized by anger and a focus on the offender. The rapid spread of anger on social media platforms consumes collective attention and can lead to disproportionate shaming and bullying campaigns.

How can the harms caused by the hostile attentional scaffolds that are social media platforms be minimized? One obvious solution lies in addressing the root cause—the business model underlying these platforms, which relies on showing people content that is supposed to engage them. And in order to do so, social media platforms have to harvest as much behavioral data as possible. If social media platforms were willing to reduce the distractions, social friction, and polarization stemming from the use of their services, they could simply modify their business practices and tweak algorithms so that they do not optimize for engagement, but for other, more civic, purposes which do not rely on personalized targeting. Similarly, the user interfaces of these platforms could be crafted with alternative goals beyond capturing and retaining users' attention. They could, for instance, be designed to assist users in more effectively curating or processing information, akin to Wikipedia.

However, there is a lack of incentives for social media platforms to alter their very effective profit-generating business models, in lack of direct regulation forcing them to. Consequently, the onus falls on users to be more mindful of how they use social media. To regain control over their digital lives, users should understand how these platforms operate and generate profits, which points towards the fact that there is a need to educate them about how these platforms work. Digital literacy programs should start as soon as possible, especially for current and future generations of digital native for whom social media platforms are a normal part of their lives.

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Data Availability No new data were created or analysed in this study. Data sharing is not applicable to this article.

Declarations

Ethics Approval and Consent to Participate Ethics approval and consent to participate were not required for this study.

Consent for Publication We hereby attest that all authors have agreed to the submission. This research has not been previously published, nor is under review elsewhere, and will not be submitted for review for publication while under review at Topoi.

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