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Article

The Second Wave of Attention Economics. Attention as a Universal Symbolic Currency on Social Media and beyond

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Abstract

Since the advent of social media, capturing and holding the attention of people has become paramount for the success of products, political messages and even research. The economics of attention is often seen as part of the market economy. We argue that a larger societal transformation is underway, which will see attention become the defining currency that moves individuals, exchanges, and many other elements of society. This paper connects the attention economy to the institutional foundations of modernity. It then discusses how attention can be accumulated and exchanged like a currency and proposes a dual-stream model distinguishing between calcified and flow attention. Based on this model, we investigate recent developments facilitating the use of attention as a currency, and their potential impact on our daily lives more generally. We conclude by providing an outlook and concrete questions for future research to understand where the economics of attention economy is heading.

Research Highlights

- As attention is becoming an increasingly scarce and valuable 'resource', it should be conceptualized as a symbolic currency.
- This paper formulates proposes a model for the attention economy how attention can be accumulated and exchanged like a currency and proposes a dual-stream model distinguishing between calcified and flow attention.
- The paper takes the stance that attention could eventually fulfil the role money plays in our current economic system.
- This paper poses six key research questions for the HCI community for future investigation into the developments of the attention economy.

Keywords: *Attention Economy; Social Media; Systems Theory*

1. INTRODUCTION

The notion of the 'information society' has existed for quite a while now, and a great deal has been written about how information and know-how have become commodities (Goldhaber, 1997a; Beller, 2006). At the same time, it is impossible to ignore that information is all but short in supply. In fact, '[w]e're drowning in it. There is too much information around to make sense of it all. Everywhere we look, we find information overload' (Lanham, 2006). And it is not just the information itself that seeks to capture our attention, but also the increasingly interactive artefacts surrounding us (Janlert and Stolterman, 2017). What is it that is scarce then? As Herbert Simon's often-cited answer goes: It is, what information consumes, that is, attention (Simon, 1971). With the rise of the internet in the mid to late nineties, research on a potential 'attention economy' started to develop, centring around several publications by Michael Goldhaber (Goldhaber, 1997a, 2006; Ghosh, 1998). The main concern of this debate was how such an attention economy would look like; and in many instances whether or not it really was an independent economy or just the next step in the corporations' fight for the money of the consumer. The discourse swayed towards the latter position and has thus produced a detailed account of the economic models underlying such an 'advertising' attention economy (Falkinger, 2007, 2008). In recent years, attention economics have experienced another major surge in scientific scrutiny, mostly due to the exponential growth of influencer marketing on social media. This literature focuses on understanding how spending attention on social media translates into buying preferences, and how receiving attention translates into individual capital, specifically through reputation and personal branding (Parmentier *et al.*, 2013; Fournier and Eckhardt, 2019; Smith and Fischer, 2020).

Despite this relatively sizeable amount of literature, to this day the attention economy remains confined to the economic modelling of a 'regular' competition for money by proxy of attracting consumer attention. This line of research points to neuroscience and psychology to understand the physiological basics of the issue (Beller, 2006; Crogan and Kinsley, 2012). On the other hand, the route of conceptualising the attention economy as an independent entity in which attention is the primary currency of exchange has not been fully developed to this day. This is mostly due to

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two factors: First, up until recently there was little opportunity for people to engage in attention economics in the fullest sense, a) due to a lack of technology infrastructure and b) due to a lack of social readiness; that is to say, both consumers and producers of content on social media needed to recognize and 'catch up' to the technical possibilities together. Hence, while an attention economy appeared intuitive in theory, it lacked empirical footing and had to remain merely more than an academic pipe dream, if one with strong anticipatory power (Münch, 1991; Davenport and Beck, 2001; Lanham, 2006; Franck, 2016, 2019a). Second, the main question for such a full attention economy, how attention could look like as a currency of peer-to-peer exchange and how it could be accumulated, stored and traded, which had already been posed in response to Goldhaber's original conjectures, still has not been answered satisfactorily from a theoretical standpoint (Ghosh, 1997, 1998).

This paper will focus on the route that understands the attention economy as an independent entity and will try and shed light on how such a full attention economy could look like by providing a functional model of attention as a currency of social exchange. It will also centre the discussion around the attention economy on developments in Human-Computer Interaction, and on social media in particular, which have created the technological framework for a true attention economy to be realised. To do so, we are first going to give a brief overview over the conceptualization of attention we will be using in this paper, as well as a broad overview over the core theoretical ideas of the attention economy. We are then going to discuss how attention could function as a universal currency using a framework of symbolic capital and systems theory (Parsons, 1963; Luhmann, 1987). Crucially, we are going to look at how this currency can be brought to economic fruition and exchanged rather than just accumulated. We are then going to discuss how a full attention economy could look like and provide some observations of recent developments on social media and changes in user behaviour to see how far down the road these processes already are. Finally, we formulate six key questions for the HCI community that need to be addressed to develop our understanding of attention as a currency for social exchange in computer-mediated interactions, as well as to help develop more equitable and fair practices within this system of the attention economy.

2. A SUMMARY OF ATTENTION

In his *Principles of Psychology*, William James famously and courtly concluded that 'everyone knows what attention is', and ever since, it has often been treated as a self-explanatory, experiential or mental state which does not require further discussion (James, 2006). Perhaps aware however, how unsatisfactory it would be for his readership to be left with an 'it is what it is', James adds: 'It is the taking possession of the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought' (James, 2006).

The American Psychological Association defines attention as 'a state in which cognitive resources are focused on certain aspects of the environment rather than on others and the central nervous system is in a state of readiness to respond to stimuli', and differentiates between voluntary attention, arising from conscious participation and involuntary attention that is captured by environmental stimuli (American Psychological Association, 2020).

A cursory look at definitions of attention from dictionaries and the extant literature shows that they have in common three general elements that seem to make up the core concept (Merriam-Webster n.d.; Oxford Dictionary n.d.):

1) Attention is a mental state or a mental faculty
2) Attention requires readiness and receptivity of the mind
3) Attention is an act of selection of something, or of something taking possession of the mind

From everyday experience, we know that paying attention to someone or something can be an active, meaningful activity, like solving a Rubik's cube, as well as a passive, meaningless activity like staring at a news screen while waiting at the airport without really noticing what is being displayed.

There further appear to be 'stages' of attention that most individuals will have anecdotal experience of. If you try to look at everything that is within your visual field on your desk, you will inevitably lose focus of what is around it—unless you have a very tidy desk. The number of sensory impressions that we can be aware of at the same time is biologically limited (Stróżak and Francuz, 2017). This reading works well to describe situations like solving a Rubik's cube, or staring at an airport TV, but it does not really take into consideration the wilfulness (or forcedness in the airport situation) of these activities, nor their outcomes.

Some theories therefore tie attention to (the consideration of) action or emotion to move it beyond a purely passive capacity (Davenport and Beck, 2001; Tassi, 2018). Nevertheless, the line between full attention and its antecedents would remain fuzzy in many situations, which points towards the bigger issue at stake here: The problem with tying attention to action or emotion is that it tries to define attention *as experienced by the individual*. This may be intuitive, but at the same time sets up attention so that it can only be understood in relation to the person that is acting and her subjective thoughts and actions. However, the 'raw material' that becomes either awareness or attention is constantly depleting from our stock with every moment that passes. Hence, whether you stare out of the window of a train apathetically, aware of your surroundings, or attentive to your surroundings, you inevitably expend the biologically limited capacity that holds the possibility to become awareness, attention, or action. This 'biological resource' is at the very centre of the economics of attention.

3. FROM THE ECONOMICS OF TIME TO THE ECONOMICS OF ATTENTION

The concept of the Attention Economy goes back to Herbert Simon's investigation of organisations in the context of computerisation. He suggested that 'in an information-rich world, the wealth of information means a dearth of something else: a scarcity of whatever it is that information consumes. What information consumes is rather obvious: it consumes the attention of its recipients. Hence a wealth of information creates a poverty of attention and a need to allocate that attention efficiently among the overabundance of information sources that might consume it' (Simon, 1971). This issue has become so prevalent in today's society that decisions about where and how to allocate our attention are in fact much more frequent than those about other resources, and in particular, money (Goldhaber, 1997b).

Economic approaches to thinking about the use of time have implicitly used this understanding of the biological resource attention for several decades already: 'Since the scarce resource of time must be spent, a basic problem of human existence is to spend it well, to use it to bring in the greatest return of happiness

that can be achieved' (Sharp, 1981). At the same time, the utility that can be gained from spending a continuous amount of time on one thing may be decreasing, or even discontinuous when it turns into a displacement activity. We are, similarly, compelled to attract at least a minimum of attention to be able to survive and participate in society even if we are not in the habit of frequently seeking it out proactively (Goldhaber, 1997a). The analogy between time (or attention) and money as a resource ends, however, when it comes to the ability to *not* use it, to store it, or to accumulate it: 'While we are alive we are compelled to spend our store of hours. Other goods and services that may yield displeasure need not be acquired, or can be given away or remain unused. But time must be spent even if it produces boredom or unhappiness or pain' (Sharp, 1981).

Thus, as time is available to everybody in a fixed and finite amount it can be a source of pressure, creating *time stress*. Time stress, like poverty, is a problem that arises from a lack of resources, but while the constraint on goods relaxes in a growing economy, time stress increases: With an increased availability of information, individuals will increasingly feel that their time does not suffice to consume everything they desire (Hamermesh and Jungmin, 2007). In support of this, several studies find that the experience of high time pressure is associated with depression (Roxburgh, 2004), lowered life-satisfaction (Hamermesh and Jungmin, 2007; Whillans *et al.*, 2017), and interpersonal conflicts both at work and at home (Wajcman *et al.*, 2008; Höge, 2009; Hartner-Tiefenthaler *et al.*, 2023). Further adding to this, Davenport and Beck suggest that 'the psychobiological design of our attention allocation is such that we are in a wild, premodern environment' (Davenport and Beck, 2001). It thus, appears that humans may not be well-adapted, biologically speaking, to the information rich world they have created, particularly when it comes to fulfilling the often monotonous tasks demanding large amounts of focused attention that are required of many of us every day to earn a living.

4. ATTENTION AS A CURRENCY

As the original conceptual work on the attention economy has fed into research on time-use, the question where the time-crunch and the struggle for attention originate became more salient. Market and specifically marketing-driven responses to this question have, thus, looked towards understanding attention expenditure, from the emergence of the 'Nielsen-ratings' and competing measures in the 1950s to the current dominance of views, likes, impressions and other behavioural traces on social media. While this focus on attention expenditure is useful from a commercial perspective, for the discussion of attention as a form of symbolic currency, it makes more sense to start with the circumstances under which people receive and proactively attempt to attract attention first.

In his treatise on metropolitan life, Georg Simmel argued that the uprooting of the individual from traditional social settings had two adverse effects that eventually set the stage for the attention economy: On one hand, people were liberated from the constraints of traditional societies, which gave them more freedom for self-expression. On the other hand, strong social ties are also a source of purpose and identity, the lack thereof possibly resulting in a loss of self-hood (Simmel, 2016). As a result, Simmel observed, individuals living in large cities developing the 'strangest eccentricities, [...] specifically metropolitan extravagancies of self-distantiation, of caprice, of fastidiousness, the meaning of which is no longer to be found in the content of such activity itself but rather in its being a form of being different - of making oneself noticeable' (Simmel, 2016, p. 18). Being emancipated from the constraints of traditional societies, the individual enters into a competition to be noticed and to forge a recognizable identity for herself: 'There's always something to see in cities. People dress for others, show off what they possess, make the most astonishing efforts to induce others to watch' (Franck, 1998). The wish to be famous and successful has therefore evolved into an end in itself (Lasch, 1984, 1987). And while the esteem an individual was held in by other others was traditionally rooted in her accomplishments, as well as her moral integrity, celebrities in modern society derive their reputation from the coherent, and often visually appealing, public identity they maintain, or just any other means by which they have managed to draw attention to themselves (their 'front', see (Goffman, 1959). It can, thus, be argued that individuals in modern societies do not strive directly for power, fame, or wealth, but rather seek the public attention that usually comes with the possession of these things, which makes the economics of attention really also an economics of reputation (Ghosh, 1998; Smith and Fischer, 2020). However, the urge to attract attention is more than an expression of excessive self-importance. As Georg Franck suggests, in a competition for attention *vanity* is the healthy and necessary urge to earn the appreciation of others in order to keep our self-esteem intact (Franck, 2016, 2020). In this sense, attention economics is something that humans are hardwired to do, judging from the lifestyle of our early ancestors and the behaviour of our closest animal relatives (e.g. Latour, 1996).

Since the early foreshadowing of the competition for attention, technological progress has made the world a 'global village', essentially decoupling locality and temporality (Giddens, 1990). In such a society, 'in which everything is moved by communication, nobody can defy the pressure to attract public attention. Otherwise, one is forgotten and lost' (Münch, 1991). Hence, two new complications in the struggle for attention arise: The competition for attention, first, expands exponentially with the growing number of people and devices that try to capture our attention. The individual is, thus, forced to be highly selective about what she directs her attention to, which information she consumes and which she does not (Franck, 1998). In turn, the media, and particularly social media platforms use interface designs, algorithms and interaction techniques to exponentially grow the prominence of already attention-rich individuals to ensure they are reliably able to capture the attention of the masses, just like big business uses capital to generate further revenue and interest (Franck, 2005, 2016). And since social media are not just a tool to store and distribute information, but also a channel for communication between individuals, they have become a prime contributor to the constant stream of information individuals are subjected to. They are thus both a means to attract attention, as well as a reason why attention is becoming increasingly scarce.

The second complication is that it is much harder to filter out what is currently considered important with the increased amounts of diverse information available. The individual is then forced to use more of her attention to 'be in the know', and the freedom of choice offered by modern societies becomes constrained again by the need to attract attention (Münch, 1991). The important insight here is that external appreciation can only be acquired 'wrapped in the attention' of others (Franck, 1998, 2016, 2019a). If we need the attention of others to feel good about ourselves, while attention overall becomes both increasingly scarce and difficult to attract, a 'fight for visibility' ensues (Schroer, 2014).

Modern media have thus created 'centripetal attention structures that bottle celebrity and celebrities, for sale' (Lanham, 2006): Since every individual needs to spend attention to understand what is required to attract attention (this applies in any field, politics, academics, fashion, art, restauration, sports), those 'in the know' are moved into the spotlight, become opinion-leaders, and eventually gain agenda-setting power. Hence, although information is overabundant and days are limited to 24 hours for everyone, an imbalance in the distribution of attention arises like in any other economy (Aigrain, 2006). The amount of attention that is 'being paid to' an individual depicts her entrepreneurial success in this new economy, and with the increasing relevance that social media play in society, the amount of attention being paid to an individual will have to be understood less metaphorically and more literally. And on a grand scale, the collective striving for attention 'wait[s] to be utilized by society as exchange systems where goods and services are exchanged for attention instead of money' (Franck, 2016). This sets the stage for the accumulation of 'capital' in the attention economy.

5. EXCHANGE MODEL FOR ATTENTION

We will now turn to how attention behaves as a currency, how it could be traded and where and how the analogy between attention and other currencies falls short. Much like modern monetary currencies attention is not valuable in itself, only as a means to provide access to valuable things - in this case information. Unlike modern currencies, however, attention is inherently limited, it cannot be saved for later and it is foregone if it is not spent 'wisely'—at least to date.[1] In this sense, attention as experienced by the individual should not be treated as a stock, but as a *flow* currency. Our stock of attention constantly empties and refills itself at the same time, with the maximum amount of attention we can hold at any given time determined by a biological limit that remains largely invariant for the individual (different bodily states like hunger or fatigue, as well as stimulants can of course temporarily influence this biological limit). While time use studies have attempted to document what individuals spend their attention on, the sheer size of the attention economy and the microtransactions that make it up have been made visible to full extent only through social media. Surely, the number of copies a newspaper sold, or the viewers who tuned into a TV program hint at the underlying processes, but it is only with likes, views and followers that the immediacy of the flow of attention from consumer to producer and the circularity of the system become evident. When watching a video on YouTube, every single viewer immediately contributes to the accumulated view count, which subsequently influences how many other viewers the video is suggested to. On Instagram, likes count social approval as a 'hard' currency for social comparison and the number of followers quantify a user's personal audience, i.e., the people who regularly pay attention to them (Hayes *et al.*, 2016).

By recording, storing, and making visible the attention users expend and receive instead of letting it dissipate at the end of the transaction, social media have found a way around the fleeting nature of attention. Whilst still unable to store or save up attention internally, in the original form of the flow currency, social media allow attention to accumulate and calcify externally. Of course, calcified attention is different from the flow attention we use in our lives; you cannot 'use' the attention that people paid to a photo you have taken to take yet another photo, but it can determine how many people will pay attention to the next photo you take and how much someone might be willing to pay you to feature their product in it. Calcified attention can thus create a positive, self-reinforcing feedback-loop of attention attraction. It also signals the potential to attract further flow attention and can be 'activated as an income-generating asset' (Franck, 2019b) with an immediacy that was not possible prior to the advent of social media.

Here, the attention economy connects with other systems: A wealth of calcified attention can facilitate a cross-system exchange of other currencies (e.g. money or power) for the access to future flow attention it promises. Unlike flow attention, calcified attention is therefore inherently valuable as it can be translated into other currencies at market rates and generate further income or 'interest'. This translation of flow attention into a digitally stored stock currency is the central mechanism of a true attention economy (see Fig. 1).

To understand the modalities of how exchanges in the attention economy take place, attention should be treated as a *symbolic currency* (Parsons, 1963; Luhmann and Luhmann, 1975). In its calcified form displayed as subscribers, followers, likes, etc., attention acts as a signifier of reputation and status that puts into evidence previous success in the attention economy, a) with the promise of attracting more attention in the future and b) with the opportunity to 'exchange' it for other valuable resources, such as money. Parsons had theorized that money is a specialized language that enables its users to symbolically communicate meaning to one another. Money, he argued:

> '[. . .] is a symbolic "embodiment"' of economic value, of what economists in a technical sense call 'utility'. Just as the word 'dog' can neither bark nor bite, yet 'signifies' the animal that can, so a dollar has no intrinsic utility, yet signifies commodities that do, in the special sense that it can in certain circumstances be substituted for them, and can evoke control of relations with them in the special kind of process of social interaction we call economic exchange. This means that holders of objects of utility will, on occasion, be willing to relinquish control over them for money, and conversely, holders of money will be able to acquire, by use of the money (its "expenditure"), control over objects of utility" (Parsons, 1963).

Parsons called this class of symbolic signifiers *generalized media of communication*; Luhmann then employed the notion for his conceptualization of systems theory (Luhmann and Luhmann, 1975; Luhmann, 1987, 1994). This approach divides society into subsystems such as the economy, the legal system, or the political sphere, which are understood to mostly revolve around themselves, using a specific symbolic currency as their transactional medium to reduce the complexity of internal relationships (Luhmann and Luhmann, 1975). This would be influence for the political system, expertise for the legal system, or money for the economic system (Luhmann, 1994). For exchanges between systems, one symbolic currency can normally be translated into another, either directly or indirectly, e.g., expertise into influence, or influence into money. As we have seen before, calcified attention like Instagram followers or views on YouTube videos symbolically communicate a system specific meaning and are a signifier

[1] It is beyond the scope of this paper to delve into the physiological aspects of this issue. For the current research agenda, a socio-psychological understanding of the nature and the limitations of attention is adequate. As a first point for the reader interested in examining the discussed phenomena from a neuro-biological or physiological viewpoint, Lang's limited capacity model of motivated message processing may be interesting as a framework of analysis (Lang, 2000), and Strózak & Francuz' EEG studies on attention allocation as a way of measurement (Stróżak and Francuz, 2017).

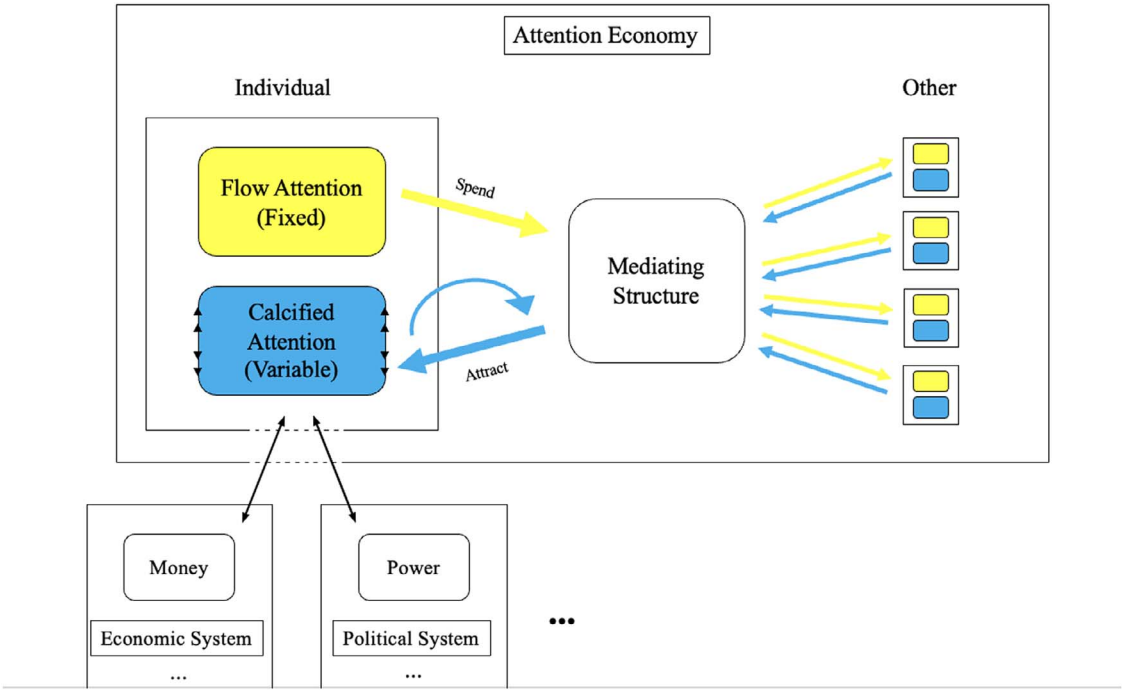

FIGURE 1. Model for flow of Attention in the Attention Economy. The individual spends and attracts flow attention through mediating attention structures (which include physical objects and software). Calcified attention can be translated into different symbolic currencies that are used in other societal subsystems and can itself generate feedback or 'interest' from the mediating structure by attracting further flow attention.

of success or 'power' on the social networks or, more generally, in the public sphere. Attention can moreover be translated into other subsystem currencies like influence or money relatively easily, albeit not as easily as money. In that regard, attention behaves more like power or influence as the exchange resembles a credit or a loan on the attention that one has rather than giving away a specific quantity of it for something else (Ghosh, 1998). An exchange of calcified attention into political power or influence for example is relatively easy: a typical case would be a famous actor or singer raising awareness for a pro-environmental campaign or engaging in dialogue with a politician on Twitter. An illustrative example of an exchange of attention into money is product placement: Most content creators on the internet have accumulated their following through the content they produce. If they then start capitalizing too much on this following and mostly use the attention of their followers to advertise products to them (and receive large reimbursements) rather than continuing to produce content, they will lose their following rather quickly. If they find the right balance, however, their following will likely accept the occasional advertisement and an exchange of audience attention for money is possible without a loss of calcified attention (i.e., followers).

Crucially, the number of views on YouTube or followers on Instagram directly influence how easily attention can be exchanged into other symbolic currencies and at which 'exchange rate': 'The wealth of attention a star enjoys is more than just conspicuous: it proves profitable. It has turned into financial capital: wealth multiplying itself according to its order of magnitude' (Franck, 2019b). For example, the larger the following of an individual on social media, the more likely politicians are to engage with them if they comment on current matters, and the more a company would pay for a sponsorship. Because large amounts of calcified attention hold the promise of attracting attention in the future, individuals rich in calcified attention can also exchange the flow attention *of their audiences* into other generalized media of communication. Thus, people can take out a 'credit' on calcified attention, on one hand, by virtue of the signalling value of being able to attract attention again in the future (just like reputation or political power), and on the other hand, by acting as a channelling point for other people's attention, explicitly guiding their audiences in certain directions. This duality in the way in which the attention individuals receive can be spent makes the ways in which attention works as a currency highly complex and is the key to understanding transactions in the attention economy. The remaining question to clarify for attention as a currency is for which system attention is the symbolic currency. Tentatively, the modern, mediated public can be seen as an independent subsystem for public life in the sense in which the ancient Greeks understood the *agora*. Alternatively, attention might be a secondary currency for the economic system and eventually replace money. Lastly, given the influence attention has on all subsystems of society already, it might evolve into meta-currency that is indigenous to each part of society. It is too early to give a definitive answer in which of these routes, if any of them, the attention economy is heading. In many respects, however, a broader shift towards attention as the prime medium of exchange appears to be under way already. What we are witnessing could be a fledgling revolution in the societal mode of exchange and production. As Goldhaber suggested:

> 'Attention transactions, which already are far more numerous than monetary transactions will come to dominate even further. So even if you have lots of money, you will find it less and less convenient or worthwhile to bother to use it. As a result, our deeply ingrained desire for monetary recompense will begin to fade as well' (Goldhaber, 1997a).

6. THE IMPACT OF SOCIAL MEDIA

The main reason why the discussion of attention as a currency has remained underdeveloped so far is that only relatively recent developments on social media have made the attention economy fully visible. And while a full attention economy is of course still far from being reality, it is much more developed now compared to when the debate originated in the late 1990s. Social media was merely the starting point through which the credo of attention maximization has gained a grip on people's minds, and the very same logic is slowly permeating into every aspect of our lives. In journalism, investigative pieces are struggling to compete with sensationalist content and 'clickbait' headlines (Chakraborty *et al.*, 2016; Munger, 2020). In politics, as false promises and populism often trump feasibility and content, political messages are amplified, distributed and sometimes altered through the social networks (Park *et al.*, 2011). The attention of the public thus becomes '"micro-donations" of time and effort to political causes: liking, sharing, following, downloading, signing petitions and so on, which extend the ladder of participation at the lower end and draw more people into politics, particularly in younger age groups' (Margetts, 2016). Moreover, with public attention being spread across a variety of global issues, political leaders are aware now that even the success of wars seems to entail a fight for sustained attention to the matter (Jordan *et al.*, 2023).

In public life, 'going viral' or 'shitstorms' have become a commonly observed phenomenon where the self-reinforcing mechanisms of the attention economy create a gravitational pull around a person, event, or piece of mediated content based on the amount of attention it has already received. What is perhaps even more interesting is that the negative side of virality can ultimately culminate in 'getting cancelled' or 'deplatforming', the intentional and collectively organised withholding of attention from an individual and their content (art, opinions, etc.), as a form of collective punishment. Even in academia, publication counts and scores like the h-index greatly determine job trajectories for individual researchers, and journals compete over impact factors and social media attention (Kortelainen and Katvala, 2012; Entradas and Bauer, 2019; Karmakar *et al.*, 2020). In this contest for scholarly authority, academic citations are the 'attention fee' that is paid to authors, and it has been argued that the scientific model of free provision of information in exchange for recognition via citation can be seen as the first step towards the development of modern intellectual property and, subsequently, the attention-based advertising model of broadcast media (Franck, 1999, 2016, 2020). Lastly, making the exchange of attention into money even more immediate, a company now offers a credit card to influencers that determines the creditworthiness of its users through the size of their following on social media and the interactions their content receives (Pardes, 2020). While only being aimed at influencers who have already amassed relatively large amounts of calcified attention for now, this clearly points into the direction where attention may become more 'convenient to use' than money (Goldhaber, 1997a).

In general, social media of course remain at the spearhead of these developments, acting as both a testing ground and a space in which typically younger generations are socialized. It is, thus, likely that more practices of pioneer attention economists on social media will inform or be directly adopted by society at large in one way or another in the long run. We shall discuss here exemplarily one of the fastest growing trends on social media, live streaming, which has wide-reaching implications for the attention economy. The market for live streaming on platforms like Twitch, YouTube, or DouYu has grown exponentially in recent years, with the number of hours watched skyrocketing across the industry with viewers on Western platforms alone watching 7–8 billion hours of content per quarter (May, 2022). Streamers interact with their audience in real-time, most commonly talking to or playing computer games for and with their audiences. Here, interactions between content creators and their audience become even more immediate compared to asynchronous social media interactions (Hamilton *et al.*, 2014; Hilvert-Bruce *et al.*, 2018). One common format of live streams entails streamers 'reacting' to media content, sharing their opinions on it with their audience (Palladino, 2016). Reactors are thus able to tap into the attention that the author of the original content has (when reacting to a famous song or personality for example). Furthermore, this allows users to publicly discuss with their audiences, take requests and even engage with other content creators, using mutual reactions as a stage for public discussion, and to exchange streams of audience attention.

Research into live-streaming also hints at the performative elements of the streamers' interactions with their audiences (Woodcock and Johnson, 2019b), and the 'affective labour' that they are performing (Hardt and Negri, 2004). In this context, terms like 'playbour' (Kücklich, 2005) have been used to emphasize that live streaming often blurs the lines of work and play, while the terms 'aspirational work' (Duffy, 2017) or 'hope labour' (Johinke, 2020) highlight that the majority of streamers neither receive monetary compensation for these activities, nor manage to build up substantial amounts of calcified attention (Woodcock and Johnson, 2019b). In this vein, it has further been argued that, unlike other platform markets, livestreaming platforms *highlight* rather than hide the labour of workers (Johnson and Woodcock, 2019). This is one of the key reasons why streaming platforms lend themselves well to pioneering the translation of performative work, and the attention it receives, into other currencies.

Already as of now, there is a variety of ways in which these platforms facilitate the conversion of attention into money. One common way is users paying a monthly subscription fee to gain access to special emotes and badges, or additional content. A more immediate way of converting attention into money are 'donations' that viewers send their chosen streamers. These donations are usually displayed on the live stream image and rewarded with little jingles or animations, and often an explicit expression of gratitude by the streamer. In some cases, donators can also write a message that appears live on stream, asking a question, or suggesting a song to listen to or a video to watch. Taking this one step further, many streamers also feature the names of their 'top-donators' on the stream image. In these ways, viewers can receive some attention themselves, and actually convert money into vicarious attention from the streamers' audience.

> 'There is a circular, self-reinforcing and self-reproducing dynamic: attention generates more attention. Paying attention to an attention-rich public figure, a celebrity, is in turn a means of attracting attention (to one-self). This is an essential component of how Twitter and Facebook function. One can observe second-order attention wealth-creation: the attention of those rich in received attention is "worth" correspondingly more' (van Krieken, 2019).

Following this format, different streamers employ various activities like live calls, chats, or competitions for sending in the best song, meme, etc. to engage their audiences, promising access to the attention of the community to viewers and increasing their own attention capital at the same time (see Johnson and Woodcock, 2019 for a detailed discussion for ways in which streamers

can convert their attention capital into money). In this way, live-streaming platforms broker the exchange of attention into money and vice versa; streamers can directly convert attention into money, and users can convert money into attention, receiving an acknowledgement or answer to their question from their chosen streamer and becoming visible to the entire audience of the stream for a moment.

But the platforms themselves are also becoming a massive testing-ground for new ways of converting audience attention into money and other material goods, both for streamers and platform operators. Twitch is trialling the gamification of influencing activities with 'bounty boards' that give missions like watching a promotional video live on stream, or playing a specific game for a while, to streamers. This allows even the 'smallest' of content creators in terms of audience size, who would not normally be noticed by advertisers, to convert their audience's attention into other currencies, and advertisers to reach into the farthest corner of the platform (Woodcock and Johnson, 2019a). As streaming platforms are overseeing the exchange of the affective labour of content creators and the attention they receive, and translating it into money or goods already, the step to cutting out the intermediary exchange of attention into money altogether is only small, and for the payment side this step has already been made with *Facebook Gaming Stars* or *Twitch Bits*; the latter of which can not only be purchased with money, but also earned by watching advertisements, i.e. 'paying attention'. Especially when content creators can exchange these attention currencies for goods or get food or other goods from their audiences directly without engaging in a monetary transaction themselves, these individuals might become the first ones who find the use of money less convenient than the use of attention, as Goldhaber had suggested (albeit the monetary exchange still being performed at this point of course; just by one of the viewers). But with competition for attention continuing to increase on social media and in society in general, holding the attention of an audience and eliciting interaction to be able to continue to convert attention into money and other symbolic currencies will be the next challenge for attention economists. Audiences as 'producers of attention' in standard economic terms will be the next 'scarce' element in this new economy of attention (Goldhaber, 1997b). This development is very clearly visible in the music industry, where the model of limiting access to music and selling physical units has been replaced almost entirely by streaming models that maximize access and remunerate artists based on the attention their music receives (with all the imbalances in distribution of income this brings) (Bruenger, 2019; Aly-Tovar *et al.*, 2020).

Current developments on social media provide clear indications that the attention economy is steadily extending its reach and its impact. Calcified attention as an indicator of quality or success has gained importance far beyond the realm of social networks and many of our daily choices are now guided by it, be it directly through our choices, or indirectly through what is available to choose from. Inversely, it is becoming increasingly difficult to participate in society without leaving digital traces that contribute to the attention capital of others, be it by reading an article, listening to a song, or reserving a table at a restaurant. It is furthermore becoming increasingly easy to exchange attention into money and other symbolic currencies, and in certain areas even necessary, with social media and particularly live streaming remaining at the spearhead of these developments. Money now 'tracks attention', meaning that those who manage to attract attention find it easy to make money as well, and those who do not will find themselves struggling to obtain money (Goldhaber, 2006). Moreover, the notion that attention may be the more convenient medium of exchange does not seem as incredibly distant as it did twenty years ago when the economics of attention entered the spotlight of research for the first time.

7. THE ATTENTION ECONOMY IN EVERYDAY LIFE

While some of the recent developments around live streaming and social media generally hint at the direction society is moving into, the most pressing question is of course how a true attention economy would function in the real world, and what implications it would have for society as a whole, and the lives of individuals. Seeing that we do not live in the metaverse yet, the attention economy must still bridge the gap between the physical and the digital worlds we inhabit.

Turning to film and literature in such a situation can provide useful insights, and several interesting ideas on how such societies revolving around attention could look like have been explored already: In Cory Doctorow's *Down and Out in the Magic Kingdom*, for example, the 'whuffie' is a digital social currency that is used in lieu of money and measures how much social esteem an individual holds (Doctorow, 2003). Similarly, the TV series *Black Mirror* has explored both individual psychological, as well as societal and economic effects of digital currencies relating to reputation and status (Wright, 2011, 2016). The media tend to draw a rather dystopian picture of attention economies as highly unequal, repressive societies that subject individuals to constant social surveillance reminiscent of Bentham's panopticon (Bentham, 1791). In these societies, wealthy individuals form a ruling class that is 'beautiful' and lives lavish lives, but is either ignorant or morally corrupt. The masses of people, on the other hand, live in precarity and feed the system, always being on the brink of ruin and without any chance of social mobility. These narratives borrow heavily from the classical Marxian criticism of capitalism but are also reminiscent of Horkheimer and Adorno's writings on the culture industry (Horkheimer and Adorno, 2013). But these narratives are of course intentionally dramatized to sell a story. It is not within the scope or the aim of this paper to explore how fair the distribution of resources in our current economy is and what the chances for social mobility are. But, we can note that while (monetary) wealth is distributed rather unequally in the present system, violent repression and dictatorial plotting by ruling classes, pushing societies in a state of quasi-civil-war are significantly less prevalent than in these dramatizations. It is therefore questionable whether a society using attention as its main currency would necessarily lead to more inequalities than a monetary system, and whether these inequalities would be more likely to cause social unrest or even revolution. What can be said, however, is that just because every individual has access to the same amount of flow attention to dispose of the distribution of wealth in the attention economy is not necessarily going to be more equal. Unlike a universal basic income in the monetary system, the ability to *pay* attention in an attention economy does not immediately translate into the ability to consume (in principle) any type of good. Before flow attention can be used as a medium of exchange, it needs to be converted into calcified attention and stocked up, which is currently largely scaffolded by the previously mentioned platforms that broker attention transactions and create 'centripetal attention structures' (Lanham, 2006). And while this system holds the opportunity for more and more rapid social mobility both upwards and downwards ('going viral' vs. 'getting cancelled'), it is still predisposed to result in large inequalities; just as the children of the monetarily wealthy inherit their parents' wealth, the children of the attentionally wealthy become objects of attention themselves and begin building up calcified attention from the earliest age (e.g. Jorge and Marôpo, 2017; Schörgenhuber, 2023).

But apart from the 'eyeball market', there are of course other ways in which flow attention can be translated into calcified attention, with time banks being the most illustrative. Time banks, originally developed by Edgar Cahn (Cahn and Rowe, 1996; Cahn, 1999, 2001), are agency-based credit systems that enable local communities to support each other and 'call in favours' in exchange for credit obtained by performing social services oneself. Studies on time bank users show that motivations to not only participate in such schemes go beyond just an extension of purchasing power but also revolve around creating a better society and improving the quality of life in the area (Collom, 2007), and arguments that a time bank model lends itself better to a sustainable mode of production and exchange have been put forward (Ozanne, 2010; Seyfang and Longhurst, 2013; Válek and Jašíková, 2013). What is interesting here is that time banks translate social service and labour in general into a social currency that possesses and showcases an inherent value, that is, time spent on prosocial activity. The time bank model could thus be a way in which each individual can translate their flow attention into calcified attention as time spent on something that is socially reputable (or at the very least 'productive', which is effectively closely approximating paid labour), and current practices on live streaming platforms suggest that these structures work exceptionally well for attention economics. But this of course also raises the question whether socially undesirable behaviors should lead to a loss of wealth in an attention economy, akin to the social credit system the Chinese government is currently implementing (Kobie, 2019). While such scenarios are usually the point when the narratives turn dystopian in media representations, and Western governments were quick to condemn China for this, they may have been a bit too quick (Song, 2019). The question is whether this would better enable punishing anti-social behaviour. Can a wealthy individual in such a system just act without repercussions because their demeanours are not relevant in comparison to the social accolades they have amassed (are there celebrities that are *too big to cancel*)? And how is this different to a monetary system, where, for example, speeding tickets have very little financial impact on those who can afford cars that lend themselves to speeding (note that Scandinavian countries have thus begun to calculate fines based on income (Pinsker, 2015))?

Another highly interesting question is what the infrastructure to run such a system would have to look like. The favoured model in the media seems to favour the Orwellian notion of 'Big Brother' and a total surveillance infrastructure, which is going to be costly and difficult to install and enforce. Nevertheless, China is currently trialling such an infrastructure-based model, and the discourse around smart cities suggests that the sensors already in existence in many cities nowadays effectively render them akin to a panopticon (e.g. Haumann, 2020). Without wanting to engage in the discussion whether an infrastructure solution necessarily needs to lead to dystopian outcomes (as for example forecast in *Fifteen Million Merits* (Wright, 2011), these structures are going to be challenging to put into place, but the process is well underway already (Banks, 2022). Installed infrastructure, however, is not the only way to record and exchange such a currency, and a model of user input (individuals rating each other with personal devices, as suggested in *Nosedive* (Wright, 2016) is more in line with the current way attention is being accumulated and traded. If audience currencies mixing attention with reputation become more prevalent, and the consequences of possessing larger or smaller numbers of it become more relevant, social enforcement as can be observed in uber-ratings or restaurant reviews nowadays will reach an unprecedented, qualitatively different level. Game-theoretical models of human interactions such as reciprocal punishment and competitive altruism (Roberts, 1998; Fehr and Gächter, 2000, 2002) provide an interesting outlook on the direction in which social interactions might be headed, and the often-mentioned caveat that these models do not translate well into actual calculations individuals make may appear less relevant when an attention currency makes the 'payoffs' of interactions more tangible.

This leads to a final important issue to consider, which is that the immediacy with which wealth and poverty are tied to an individual and her personal characteristics will have a much stronger influence on the psychological well-being of the individual in such a system. Poverty, in an attention economy, does not just mean a lack of resources, but also a lack of appreciation and social approval, while wealth, does not just, like in our current monetary system, often come with social repute, or gives access to it, but quite literally *is* positive reputation. Taking into account discussions of the effects of social comparison on social media on psychological well-being that are already visible now (Bessenhof, 2006; Throuvala *et al.*, 2019; White *et al.*, 2006), the general effects of wealth and particularly poverty on mental health are likely to be exacerbated in an attention economy.

8. OUTLOOK

In this paper we have discussed the theoretical foundations of the attention economy and recent developments that have increased its prevalence in our society. We have connected the literature on the economics of attention with the field of HCI and highlighted the importance of the developments on social media for the realisation of a true attention economy. We have also sketched a functional model for the use of attention as a currency based on flow and calcified attention.

With an overwhelming supply of information in contemporary society, attention is now a scarce resource that needs to be spent selectively. Social media are one means that allow such selective and individualized expenditure of attention, but at the same time are main contributors to the stream of information that makes it impossible for users to pay attention to everything that is addressed at them. Attention thus becomes increasingly valuable, not just for individuals who need to expend it, but also for media, politicians and marketers who must attract it to move their messages or products. Conversely, anything that attracts large amounts of attention is now almost automatically valuable, desirable, or relevant; what does not, likely is not. Hence, social media have developed numerous indicators of calcified attention like view counts or likes that document and exhibit such 'successes'.

It is difficult to anticipate future developments and we are not saying that money will disappear immediately (or completely necessarily). The overall value of one currency is in great parts defined by how easily it can be translated into other currencies. While money currently still is the most interchangeable, this has not always been the case. In the feudal and barter economies that preceded the current system, money played a second-order role before it rose to prominence. But:

> 'When the market-based, proto-industrial economy first began to replace the feudal system of Western Europe, in which the prime form of wealth was aristocratic lineage and inheritance of land, both the noble titles and the lands that went with them soon ended up disproportionately in the hands of those who were good at obtaining what was then the new kind of wealth, namely money' (Goldhaber, 1997a).

Just as the role-relationships between land, lineage and money reversed, money might fall victim to the same fate with attention. It is yet to be seen, however, what shape the basic structures and mechanisms required for society to progress to an attention economy from a theoretical standpoint will take in real world contexts. Moreover, closely monitoring these processes to make sure we are aware of and understand where the societal mode of exchange is heading, and what consequences this may entail is crucial. Specifically, we see six important questions that need to be investigated in a next step:

1) Where will the attention currency be stored, and in which form? Will time bank models be taken on by (streaming) platforms that connect content creators and audiences and broker the exchange of attention into a digital currency? Additionally, what novel methods for attention currency storage could emerge? Will there be digital wallets similar to those of cryptocurrencies, or might attention wealth be stored in a profile that is connected to a user through biometric identification markers, for example?
2) How will attention currency trading mechanisms be designed? Will attention currency take the form of familiar digital currencies (stars, bits, likes) or tokens representing specific actions, akin to time bank credits? How might these trading systems impact the interaction dynamics between users, content and platforms in the context of attention economies? And what are the implications of these attention trading mechanisms for the design of HCI systems?
3) Moreover, will there be a unitary attention currency that is universal to platforms, or will we see many different currencies that hold different 'attention value' and can be exchanged like British Pound into US Dollars?
4) How do people 'lose' attention capital and what are the psychological implications of this? Understanding the interplay between attention loss and user well-being within attention-driven environments is crucial for designing ethically sound human-computer interaction frameworks.
5) With an increasing focus on affective labour and blurred distinctions between receiving and giving attention, how can HCI researchers anticipate and address the potential impacts on user experiences, mental health and the concepts of productivity and leisure? Ultimately the concept of economic exchange, as we currently understand it, might change dramatically and resilient and adaptable HCI systems will be required to facilitate this exchange.
6) Currently the common denominator of exchange still is money. If attention is 'taking over', is it going to be a gradual process, or a momentous shift after a global event such as a financial crisis? How is this shift going to look like, and how is wealth in the old system going to translate into wealth in the new? Might this shift even cause a crisis of the current economic system when it occurs? Exploring the potential consequences of this transition, including the conversion of wealth from current to attention-based economies, is vital for understanding the potential disruptions and opportunities in HCI landscapes.

The HCI community can significantly contribute to address these questions by providing insights into user experiences of attention allocation, as well as how interfaces shape the societal exchange of attention. In this context, it can also investigate the ethical implications of attention manipulation and persuasive design, as well as digital social norms around attention allocation (Heitmayer and Schimmelpfennig, 2023). By addressing the six questions raised in this paper, research can help shape the responsible design and regulation of the attention economy, as well as ethical considerations related to its ongoing expansion. This can ultimately help establish guidelines for a responsible use of attention as a medium of societal exchange, as well as

the development of design practices that take into account the intricate relationship between attention, technology.

Data Availability

There are no new data associated with this article.

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