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Practical Dilemmas and Optimization Directions of Social Media Technology Communication from the Perspective of Cognitive Psychology

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Abstract: Social media technology is widely diffused and is transforming the cognitive ecology of information delivery. Algorithmic suggestions, emotive computing and multimodal symbolic systems have changed the mechanisms of users' attention allocation and information filtering at the level of cognitive processing. However, the empowerment of technology has also brought a series of cognitive dilemmas: algorithms are constantly pushing homogeneous content, trapping users in self-reinforcing information cocoons and limiting their information horizons while polarising their views; the human brain is naturally inclined to emotional information, and social media amplifies this tendency, allowing emotional content to consistently dominate in dissemination; information overload prompts the brain to shift from deep thinking to a shallow cognitive mode of frequent attention diversion, inducing widespread cognitive fatigue. The article starts from the basic cognitive laws of information processing, analyses the internal mechanisms of social media dissemination dilemmas, and explores the optimisation direction with emphasis on the reconstruction of cognitive autonomy, including the cognitive ethical adjustment of algorithms, the cultivation of users' cognitive defence capabilities, and the multi-dimensional collaborative governance. The paper argues that the answer to solving the conundrum is not the denial of technology, but the re-establishment of human cognitive agency during technological iteration.

Keywords: Cognitive Psychology, Social Media, Algorithmic Recommendation, Information Cocoon, Cognitive Load, Communication Optimization.

1. Introduction

Social media has gone from being an additional tool to an infrastructure for the dissemination of information. Short films and content communities have become part of daily information acquisition and social interaction, and have become the major medium for the public to reach the outside world. The popularisation of technology has not brought free information and rational dialogue. Instead, it has brought mental exhaustion and information anxiety. Public discussions are squeezed by emotional expressions and extreme remarks, and false information is spread by algorithmic recommendations. This demonstrates that the difficulty of communication is not merely an external expression of the disorder of the information environment, but also reflects a fundamental problem at the level of cognitive processing.

The dilemma can be understood from the perspective of cognitive psychology. Limited working memory capacity and few attention resources are limitations of the human information processing system. Humans in the face of huge information are far from being rational omniscient beings; they are limited-rational actors influenced by cognitive prejudices. Dr Xu Jun from Beijing Tiantan Hospital said the speed of collecting sensory information is like a waterfall gushing, and the brain's processing capacity is like a dropper trickling. Social media is designed to take advantage of these cognitive prejudices. Algorithm recommendations lock attention by predicting and catering to user preferences, interaction design triggers dopamine cycles through random rewards such as likes to reinforce behavioural addiction, and emotional content wins the competition for attention due to its higher arousal level [1]. The strong integration of technology and cognition leads to the structural endogenous aspects of the communication dilemma. It is not the crudeness of algorithm design or the irrationality of users, but a natural consequence of the mutual reinforcement of technological logic and cognitive principles.

From the standpoint of cognitive psychology, the approach can not only expose the deep mechanism of the problem, but also provide a theoretical grip for investigating optimisation approaches. The following sections will analyse from four dimensions: algorithm recommendation and cognitive narrowing, emotional dissemination and cognitive bias, information overload and cognitive load, and cognitive dissonance and information avoidance. Then it proposes optimisation directions based on the reconstruction of cognitive subjectivity.

2. Algorithm Recommendation and Cognitive Narrowing: The Formation of the "Algorithm-Cognition" Reinforcement Loop

Content is delivered on social media platforms depending on algorithm recommendation algorithms. It is based on a constant learning process that gathers information about the user's prior activity and generates a broad profile of interests for each person and then does tailored content filtering and sorting according to this. This method of distribution is very effective and accurate, but the picture is not so bright from the point of view of the health of the information environment. The algorithm works in a way that implicitly coincides with the human way of thinking. When analysing information humans have instinct. anything that is in line with their inbuilt position is always automatically given preferential treatment

and anything that contradicts it is subconsciously discarded. The technological design logic of the algorithm suggestion magnifies this individual psychological tendency at a systemic level. It relies on the previous behaviour to predict the future preferences and provide the same information as an alternative for varied presentation. It's always observing your clicks and your stays and your interactions behind the scenes, and it's turning them into preference signals, then batching those and pushing comparable material. This is a steady inertial track, and people are firmly anchored in it for a length of time, during which the cycle of "contact-identification-re-contact-greater identification" is constantly reinforced [2].

The immediate consequence of the loop's extension is the gradual disintegration of the information environment and the narrowing of the cognitive scope. Consumers are getting less and less information and no one even knows it, much less thinking about it. We are steadily pushing out varied viewpoints, new perspectives and information that compels you to refresh yourself. All of these should be a part of our everyday intake of knowledge. That narrowing does not end with the person, but proceeds to the collective. Choice divergence is individual and they are sent to their own subspace of knowledge. In the end the somewhat full and common environment of public knowledge is gradually eroded and broken down to isolated information cocoons. Like minded people communicate and reinforce each other pretty often inside these cocoons. Dissenting views are purged when positions become more and more entrenched in the small echo chamber [3]. And so cognitive narrowing takes a full turn from individual psychology to group structure, becoming a more basic cause of the ongoing shrinking of the scope of public discourse in the algorithm age.

3. Emotional Spread and Cognitive Bias: The Systemic Erosion of Rational Judgment by Emotional Logic

Algorithmic recommendations result in a tight framing of "what is seen" and emotional dispersal leads in variety in "how to judge". Social media content is extremely affective and this is a general characteristic of the new media ecosystem. Facts don't carry as far as emotional things, nor do they get as much play. When we look at how public opinion changes on hotly debated issues, we often see the logic of facts being swamped, and emotions such as wrath, anxiety and empathy become the primary drivers. People process information systematically and this processing is moderated by intense emotional states. People are more likely to depend on their intuition and emotional reactions when they are emotionally aroused than to take the time to think things through extensively [4]. Social networking sites are also built to increase this effect. The more you're passionate about your material, the easier it is to grab attention, to get people to engage with it and the algorithms are more willing to push it. i.e. the content that most strongly stimulates emotional responses is better located in the distribution process and the calm, complex and needing time to be assimilated is pushed progressively to the margins.

Emotion distribution is not an individual characteristic. The daily engagement behaviours such as comments, reposts and emoticons rapidly express feelings in social networks, and are constantly communicated and amplified among the users. When a person is in a very homogeneous emotional situation, his first independent assessment capacity will be fast buried in the feeling of the group [5]. At this stage individuals do not think independently on the basis of factual facts, but conform their cognitive judgements to the emotional reactions around them in a bid to gain a sense of security and group identity. This convergence process increases the cognitive preconceptions. People not only tend to believe information consistent with their emotional orientation, but they also tend to miss or reject data contradictory with it. Algorithmic suggestion and emotional distribution establish a mutual reinforcement loop: algorithms reward content with high interaction rates, and it is emotional information that is most likely to induce engagement. If the assessment index is the click-through rate, the length of stay and the amount of interaction, then the content that inspires emotion the most will invisibly gain an advantage, and the algorithm subsequently plays the function of the emotional amplifier. The pattern of the temporal dispersion of social media points to a context where emotional logic trumps factual logic. If intuitive processing continues to dominate the processing of information, cognitive prejudices are no longer an atypical occurrence of psychology, but a structural communication norm, common and commoner.

4. Information Overload and Cognitive Load: Structural Overuse of Limited Cognitive Resources

Not only can emotional dissemination damage the accuracy of judgement, it also heavily drains the limited cognitive resources. We human beings can take in so much knowledge. Competing attention resources. To focus on something is to set aside other knowledge for a while. Working memory can hold only a very limited quantity of knowledge. Deep processing requires constant investment of time and cognitive resources and any interruption may interfere with this process. Such limits are the physiological structure of the neurological system and can not be transcended by the force of will alone. But the information flow from social media is almost unending. Updates from friends, news alerts, ad push notifications, group conversations, tips for short films, and so on. There is a great amount of stuff pouring into brain circuits all the time in a fragmented, multimodal way.

First, information overload affects the cognitive load [6]. The information demands placed on the system exceed the system's capacity to process information and the system is overloaded. This has obvious repercussions such as slower processing, lower quality decision making and poorer memory encoding. The reading is shallow the judgement wavering. People don't digest and assimilate knowledge over time. Importantly, there is a vicious loop of information overload and psychological drive: the existence of a huge volume of information causes worry, and this anxiety enhances the "fear of missing out"-the constant fear of not knowing about important news or hot events [7]. This in turn leads to more frequent application visits, updating of information streams and online time, more information absorption and greater overload. There is always a load on cognitive resources.

Cognitive load builds up over time and leads to social media weariness. This tiredness is not sleepiness but emotional depletion with the beginning of cognitive ennui and depersonalisation. If consumers do not feel they can understand the data in front of them, it makes them feel

despondent and alienated. They learn to resent social media. A deeper shift will be that the brain will finally adapt to the shallow attention mode of fast switching in the long term exposure to highly fragmented information settings. The capacity to read carefully and think in lengthy chains begins to fade. Such psychological activity, autonomous thinking, critical scrutiny, creative synthesis takes a tremendous lot of cognitive flexibility. It's hard to do in a situation that is constantly draining cognitive resources. Bit by bit, in cyclical increments, the increase of cognitive load, the power of social media to push the envelope of cognitive constraints, chips away at the depth of intelligence.

5. Cognitive Dissonance and Information Avoidance: The Trigger of Psychological Defense Mechanisms

Users are not entirely passive in the presence of psychological suffering and automatically try to lessen it. There's a fair amount of discomfort here. What the algorithms advocate may not be what they themselves believe in. The amount of information might be overwhelming. They may disagree with the range of notions about social interaction they are presented with. This sort of psychological discomfort has a different word in cognitive psychology, which is cognitive dissonance. When there is conflict or contradiction between cognitive elements that a person holds, it is a difficult situation that needs to be handled. In this uncomfortable position the most natural reaction is to conceal from knowledge [8].

The most common way we reduce this pain is to look at less information. In practice that means unfollowing some accounts, blocking some topics, checking news less or even just cutting time on social media. This appears a realistic choice with limited cognitive resources where the psychological loss of seeing that knowledge outweighs the benefits it brings and avoidance is reasonable. But this avoidance is causing new problems in the communications landscape. The more people run back to their safe and familiar information worlds, unable to face the competing points of view, the less possibility there is for reasoned talks to address concerns. People become more attached to their original beliefs . This results in greater homogeneity of opinions within groups and greater differences between groups .

That combination of reinforcing the avoidance of information and the algorithmic suggestion is quite clever. The system then collects this signal and the suggestion weight of such material would further decrease if the user skips any item. So, the information range, which can be seen by the user, becomes narrower [9]. The more the information is monotonous, the less cognitive conflict, the more comfortable the users feel in the short term, but at the expense of a further narrowing of the cognitive perspective.Thus the paradox is that social media technology is supposed to be an avenue to facilitate the clash of diverse perspectives and the freer flow of information, but the actual operational mechanism has triggered people's psychological defence, resulting in information avoidance and cognitive closure. This is not a technological accident but the unavoidable result of the full-force clash of the basic logic of its operation with the fundamentals of human cognition.

6. The Optimization Direction of a Cognitive-Friendly Communication Ecosystem

We should make efforts together in three aspects: technical design, user capability and social governance to tackle these issues. First, the laws of human cognition have to be investigated for each trait.

From the technology perspective, algorithm design should not only be about efficiency but also about cognitive health. The present recommendation algorithms are based on click through rate, time spend and engagement rate. These metrics simply measure short-term user behaviour and won't be useful to users in the long-term. A more cognitively-friendly algorithm should set parameters for information diversity, cognitive intake and emotional effect [10]. The recommendation system should enable users to read content from different perspectives even without actively searching, and can track the user's usage time, reduce the push frequency or remind users to take a break when it finds that the user's cognitive load is too high; for content that is easy to arouse emotions, it can restrict dissemination so as not to allow extreme emotions to spread quickly. Different platforms and apps are already reducing down the amount of information, so there is a diversity which implies there are technical fixes that can be put in place. The question is does the platform care about mental well-being?

The last line of defence at the user level is to learn cognitive defence skills to defend oneself. Cognitive shielding does not mean that we block all inputs from outside. This means, being able to have a critical perspective when faced with knowledge, being able to identify your own biases and being able to consciously manage your cognitive resources. Users need to understand that the recommendation system is built on the idea of offering up what "will keep you" not what "is most worth knowing". They need to acknowledge their own cognitive prejudices and understand that everyone is biased. To be able to keep a diversity of information sources, they need to organise their information intake proactively, set boundaries and disengage from the internet. This competency should be introduced into the whole chain from primary school to lifetime learning and become the basic literacy of every person in the digital era.

At social level there has to be a governance framework, involving platforms, regulation and the public. Cognitive health should be taken into account as an information infrastructure in the product design [11]. Regulatory bodies need to develop legislation fit for the age of algorithms, like transparency of algorithms, ethical assessment of the recommendation system and guidance for the sector in terms of information overload. Academia needs to continue exploring Schools need to incorporate cognitive autonomy among the training objectives Media needs to reduce emotionalised transmission. Our aim is not to destroy social media but to restore the supremacy of humans over technology progress so that technology can help people to think better. The three levels have optimisation orientations in the same direction, toward the same core, defined by the friction between technology and people, leaving space for cognitive autonomy.

7. Conclusion

Ultimately, the social media communication problem is a

result of the ongoing tension between the operational logic of the algorithms and the cognitive habits of the human brain. The mechanics of the four dimensions are analysed independently in the previous text: Algorithmic recommendations, through the closed loop of preference reinforcement, are entangled with our innate characteristic of "only believing what we are willing to believe", resulting in a gradual constriction of the informational horizons of individuals, and a stance that is more and more extreme; Emotional content, since it is better than rational content at grabbing attention, has been pushing rational analysis out of the process of communication; The information overload bombards our attention continually, and uses up the "mental reserve" that must be there for profound thinking; Cognitive dissonance compels people to reflexively retreat into their shells, and the basis for public debate slowly disintegrates. These four issues are self-reinforcing and self-exacerbating, leading to an intractable standstill.

It's not so easy to blame this disaster on the technology or the customers. Often users are driven by cognitive rules. The technology is quietly programming the cognitive habits of people. These borders are designed to be a starting point. The sole path to success is to flip the technical logic and use technology to support people's individual decision at the same time. Algorithms must be efficient and address cognitive health Users need to transition from passive consumption of information to active management of it. The social level needs a rigorous governance framework as well.

Social media is the infrastructure. You can't fake that you don't need it. That's not right. Unfortunately, if we continue on current route, cognitive loss and weakening of thinking is for the most part inevitable. In the future, we need to further explore and practise how to perform cognitive-friendly algorithms, how to do literacy education and how to innovate platform governance. The only way to escape the crossroads between technology and humans is to really turn cognitive psychology research into operational communication approaches, while keeping efficiency and dignity.

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