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Research on Information Architecture Design of Short-Form Video Social Platforms Based on Cognitive Psychology

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This study investigates how cognitive psychology principles can be integrated into the information architecture design of short-form video platforms, like TikTok, to enhance user experience, engagement, and sharing. Using a questionnaire, it explores TikTok users' habits and preferences, highlighting how social media fatigue (SMF) impacts their interaction with the platform. The paper offers strategies to optimize TikTok's design. It suggests refining the organizational system using principles like chunking, schema theory, and working memory capacity. Additionally, it proposes incorporating shopping features within TikTok's interface to personalize product suggestions and enable monetization for influencers and content creators. Furthermore, the study underlines the need to consider gender differences and user preferences in improving TikTok's sharing features, recommending streamlined and customizable sharing options, collaborative sharing, and a system to acknowledge sharing milestones. Aiming to strengthen social connections and increase sharing likelihood, this research provides insights into enhancing information architecture for short-form video platforms, contributing to their growth and success.

Keywords: information architecture design, short-form video social, cognitive psychology, user experience

Introduction

In the mobile internet era, smart devices bridge the real and virtual worlds, enabling various interactions between individuals and information. Social networks have become vital, offering new business models and generating vast data. Integrating cognitive psychology and information architecture design into mobile application development is essential for optimizing user experience.

Cognitive psychology helps understand user behavior, emotions, motivations, interests, habits, and experiences. Information architecture design organizes information, making content accessible and understandable, which is crucial for mobile social apps due to the immense data volume generated by social networks.

By applying cognitive psychology theories and information architecture design principles, interaction designers can create mobile applications that accommodate users' mental models and introduce new symbolic metaphors and interaction modes. This ensures users can access and comprehend information effortlessly, leading to a more engaging and practical experience.

Literature Review

In information architecture design, the book *Web Information Architecture: Designing Large-Scale Websites* (Moggridge, 2006) written by American library scholars Peter Morville and Louis Rosenfeld has laid

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the foundation for developing information architecture design. With the continuous development of mobile applications, the book has also been updated to *Information Architecture: For the web and beyond* (Morville & Rosenfeld, 2007). This book defines the structure of information architecture and provides detailed descriptions of its components and explanations of the design process, methods, strategies, and business applications.

Regarding information architecture's main problems, the book identifies two: information overload and providing more ways to access information. These issues are especially apparent when users access mobile social networks, so this paper focuses on solutions to these problems and optimizing user operations from an architectural perspective. The book defines information architecture's structural components as the organization system, tag system, navigation system, and search system, which form the foundation of information architecture research.

The article "Web Page Design: Implications of Memory, Structure, and Scent for Information Retrieval" (1998) by Kevin Larson and Mary Czerwinski from Microsoft's research department explores website hierarchy division based on the organization system. It highlights balancing the depth and breadth of website levels, as too many entry points and too much depth can negatively impact usability.

For navigation design, the book *Web navigation: Designing the user experience* (Fleming & Koman, 1998) emphasizes that navigation plays a significant role in shaping web experience as it provides access to information, enhances visitor comprehension, reflects the brand image, and helps establish website credibility. Navigation design requires coordination of user goals, overall application goals, architectural organization systems, page layouts, and visual effects.

Innovation and Significance of Research

This research combines cognitive psychology theories on perception, attention, and memory with user behavior psychology in user experience design, focusing on short-form video social platforms. The study analyzes user mental models based on various task operation models, considering users' cognitive psychology.

Incorporating the user psychological model of short-form video social platforms and relevant information architecture design principles, this research examines information architecture from a functional perspective. The aim is to identify universally applicable design patterns for these platforms.

The paper investigates design strategies, patterns, and trends in short-form video social platform architecture, exploring information architecture, content organization, and navigation. The resulting practical design patterns guide organizing platforms, page control layout, and navigation control design. Furthermore, this research can be a valuable reference for designing large-scale mobile user-generated content (UGC) application architecture.

Exploring User Models in Cognitive Psychology

Analysis of User Visual Features

In general, there are six psychological processes involved in visual perception: visual search, detection, discrimination, recognition, identification, and memory search. These characteristics are essential for mobile social network app design. App page design is built on information architecture, which categorizes content and establishes logical relationships for navigation (Figure 1). Users' visual characteristics should match the information architecture to a certain extent.

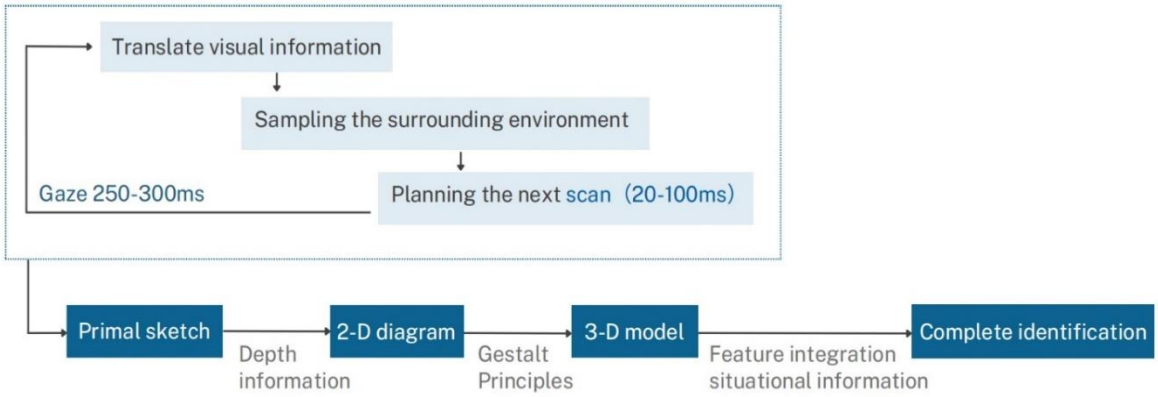

Figure 1. Visual characteristic analysis.

When users browse a page, their eyes move in two primary ways: fixation and scanning. Fixation is a physiological characteristic of the eyes and closely related to cognitive activity in the brain. When users search for a target on the page, their eye movement is characterized by scanning. If the number of fixations and scans is too high when completing a task, the design may need improvement, such as better icons or content organization.

Fixation and scanning are typical behaviors for users to discern and understand the information on a page. A typical fixation involves translating visual information, sampling the environment, and planning the following scanning action, all within 250-300 milliseconds. The number of scans can reflect the usability of an app's interface. A straightforward, well-organized interface should not require multiple scans.

To keep users' fixation time short, a concise and targeted navigation system can enhance the user experience. The recognizability of navigation icons is also essential, as unclear icons can increase users' cognitive load.

Gestalt psychology can help explore users' visual perception characteristics. This theory suggests that humans perceive a more extensive range of information than what is directly visible, processing elements into complete shapes in the brain. Visual characteristics tend to integrate elements, making them easier to understand.

Visual elements can be combined according to proximity, similarity, closure, symmetry, and continuity. These principles can be utilized in page layout design.

When designing social app interfaces, it's important to consider users' visual information processing. This process involves organizing visual information into objects, understanding users' basic eye movement behaviors, and analyzing visual structure perception. By understanding the entire information processing flow, designers can establish logical relationships between the steps and the page interaction design.

In summary, understanding users' visual perception characteristics can guide the design of social app interfaces. By enhancing users' visual perception processes and improving information architecture, designers can create a more seamless and practical user experience.

User Attention Feature Analysis

Visual perception involves processing vast sensory information. Attention selects valuable information for short-term memory retention. Attention is flexible but needs to be improved, leading to a sequence bottleneck. Designers should consider attention allocation in mobile applications, highlighting essential information and minimizing distractions. Simplifying page complexity and operation helps users focus on tasks.

Attention can be categorized into focused and distributed or endogenous and exogenous. Goal-oriented attention involves top-down control, while external stimuli and bottom-up control drive stimulus-driven attention.

In user interface design, goal-oriented attention means users focus on a goal and ignore distractions. Stimulus-driven attention captures users' attention unintentionally. Good interaction design should establish clear attention points and lead users to the most efficient path. Balancing visual elements on a page can enhance goal-oriented attention and use short-term stimulus-driven attention effectively to maintain a smooth user experience.

User Memory Feature Analysis

Memory, a crucial component of cognition, consists of short-term and long-term dimensions. Short-term memory is temporary, limited-capacity storage often used in interface design like mobile navigation controls. Long-term memory forms when short-term memory is reinforced and repeated, with meaningful repetition more effective in transitioning information. The depth of processing and enhanced processing theories support the idea that more detailed information processing improves memory.

This section discusses various long-term memory types relevant to user experience design and user modeling:

Episodic and semantic memory: Tulving identified episodic memory, storing specific situational experiences, and semantic memory, covering abstract concepts and principles without personal aspects. These systems cooperate to form comprehensive memories.

Explicit and implicit memory: Explicit memory involves conscious use and awareness, while implicit memory influences tasks automatically without conscious effort. The primary difference lies in conscious retrieval for explicit memory and unconscious retrieval for implicit memory.

Declarative and procedural memory: Memory can be declarative, involving facts and events, or procedural, concerning skills and tasks requiring practice. Declarative memory aligns with explicit memory's concept-driven processes, while procedural memory corresponds to implicit memory's data-driven processes.

User Model Construction

User models abstract typical user behavior and are crucial in guiding design. Cognitive, behavioral, and emotional models represent different aspects of user experience. User cognitive models can be divided into perception, cognitive, task, error, and learning models.

User mental model exploration can be approached from two perspectives: (a) The user's mental model focuses on cognitive processes and analyzing information architecture. User thinking models for short video social platforms include experiential and anticipatory thinking. In mobile application page design, incorporating user thinking models can improve usability by considering application scenarios, user types, and user psychology. (b) The user's task model emphasizes the operation process within mobile applications, targeting the application design process. User task models analyze users' operational thinking when using short video social platforms, providing theoretical support for interactive interface design. Construction involves task decomposition, task description, and task refinement. For mobile social apps, these can be further detailed as:

Task decomposition: Break down tasks into goals, methods to achieve goals and interaction details.

Task description: Describe the user's operational behavior based on their cognitive characteristics and task objectives. Modify as the project progresses using simple, accurate language.

Task refinement: Divide main tasks into subtasks and operational actions, considering technical feasibility, execution sequence, and cycle for a smooth user experience.

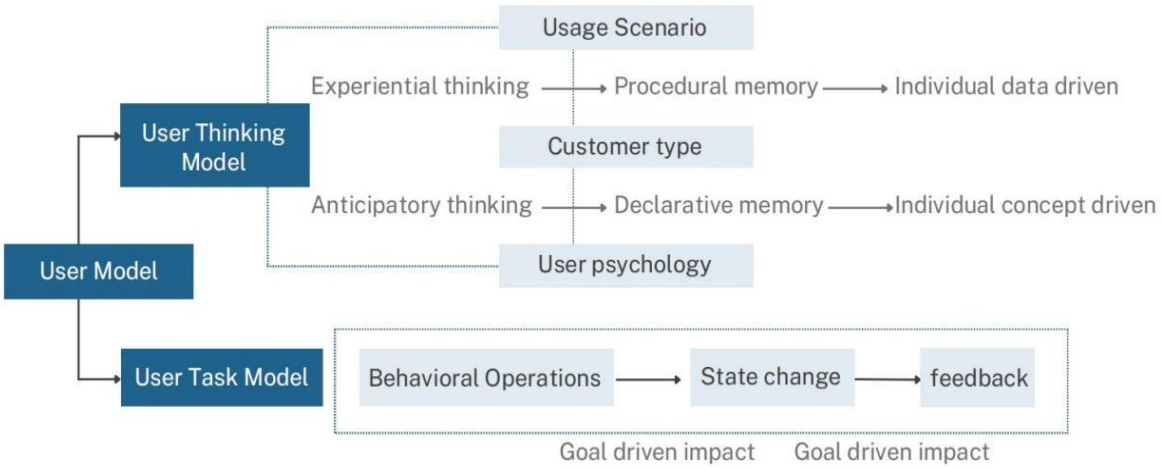

Figure 2. User model.

This chapter analyzes users' cognitive characteristics (visual, attention, memory) and their application to short video social platform design. User models (Figure 2) prioritize task models, focusing on user intentions, plans, implementations, and evaluations. Integrating mental models into user task models provides a theoretical basis for information architecture design and subsequent design patterns.

Information Architecture Optimization Research for TikTok

In this section, we employ a questionnaire to conduct a typical study of mobile social network users, primarily investigating their usage scenarios, habits, and psychological behaviors. This approach aims to improve the overall quality of the paper, making it more concise, readable, and engaging for submission to a scholarly journal.

Questionnaire Survey on TikTok Usage

This study examines TikTok user behavior through questionnaire surveys and in-depth interviews. Our questionnaire comprises 40 questions, including 33 single-choice questions (24 matrix questions) and seven multiple-choice questions. The survey primarily covers user demographics, motivation for using the app, user behavior, and emotional loyalty.

We distributed electronic questionnaires via Google Opinion Rewards and received 310 valid responses. After cleaning the data and filtering it based on predetermined skip patterns, we categorized the participants into three groups: "TikTok users", "non-short video app users", and "short video app users who do not use TikTok". As our research objective is to investigate user behavior on the TikTok app, we further refined the questionnaire based on our skip patterns, resulting in a final sample of 196 valid responses from TikTok users.

Utilizing this sample, we conducted an SPSS analysis to explore user demographics, motivations, behaviors, and emotional loyalty. Furthermore, we employed in-depth interviews to validate the findings derived from the questionnaire survey.

Analysis of User Behavior on TikTok

Social media fatigue and its impact. Short video social platform users exhibit negative attitudes and behaviors, a phenomenon known as "social media fatigue" (SMF). Influenced by privacy concerns and increased competition, our research reveals that privacy leaks and self-presentation must contribute to user fatigue. Most heavy users act as passive observers.

This phenomenon occurs as frequent updates in early platform development stages boost user confidence and experience. However, after reaching a peak, social media fatigue emerges due to fading interpersonal relationships, focus on self-presentation, and information overload. Our analysis reveals common user behaviors:

1. A “fatigued” attitude with infrequent updates.

2. Content browsing preference.

3. We prioritize communication features over posting updates, news, and knowledge expansion, with excessive features harming the user experience.

4. Concerns about negative health impacts and annoyance with spam.

Strategies for enhancing TikTok’s information architecture.

Table 1

User Age Range

		Daily usage time of the user	User age range
Daily usage time of the user	Pearson	1	-0.017
	Significance		0.808
	N	196	196
User age range	Pearson	-0.017	1
	Significance	0.808	
	N	196	196

Table 2

User Duration

	N	Mean value	Standard deviation	F	F
0-20	19	2.74	1.851	0.041	0.96
20-30	174	2.62	1.678		
30-40	3	2.67	2.082		
Total	196	2.63	1.691		

Based on the one-way ANOVA, F-statistic is 0.041, and the p-value is 0.960, more excellent than 0.05 (Table 1). The results show no significant difference in TikTok usage duration among different age groups. Younger groups, especially college students and employees, prefer TikTok, due to their occupational characteristics and fragmented attention; they tend to use it casually and for shorter periods, with no correlation between age and usage duration (Table 2).

Regarding TikTok’s positioning as a “social interaction platform”, we further investigated its users’ social attributes. Our survey shows that 70% of users share videos they like. Among the platforms they share, 52% share with WeChat friends, 18.1% to WeChat groups, 14% to WeChat Moments, 12.2% to in-app TikTok friends, and only 3.7% to Weibo. Users share their favorite TikTok videos, primarily to WeChat, where they have closer relationships.

Based on differences that there are gender differences in sharing behavior. The chi-square statistic (Table 3 & Table 4) is 13.473, and the p-value is 0.019, less than 0.05, indicating that different genders share distinct sharing behaviors. Male users are more willing to share it on moments or group chats, while female users are more willing to share it with friends alone. This difference is consistent with general psychological behaviors: Men prefer a sense of community and are more willing to express their opinions in a group. Such group forwarding can bring more attention and publicity to the Tiktok platform.

Table 3

User Sharing Statistics

		N	Percentage
Which software to share	Friend	141	52%
	Friend group	49	18.1%
	Circle of friends	38	14.0%
	All	10	3.7%
	TikTok friends	33	12.2%

Table 4

User Sharing and Gender Analysis

		Male	Female
Which software to share	Friend	28.4%	71.6%
	Friend group	36.7%	63.3%
	Circle of friends	47.4%	52.6%
	All	50%	50%
	TIKTOK friends	36.4%	63.6%

TikTok should pay more attention to male users' preferences during platform development and operation, addressing gender imbalances. Additionally, TikTok should improve deep sharing rates and social interaction to promote platform development and user sharing probability.

Strategies for Enhancing TikTok's Information Architecture

Organizational system design. The initial phase of information architecture design involves organizing the content through classification. This is accurately described by the statement, "All understanding begins with classification". Content organization is critical in information architecture design, which involves understanding, describing, and controlling content to help users find solutions to their problems.

The organizational structure consists of two parts: organizational plan and structure. The organizational plan is how content is defined and information is sorted and grouped. The organizational structure explores the hierarchical way information is presented. Both organizational plan and structure significantly impact how information is searched and understood.

There are two types of organizational information plans. Precise organizational plans are based on clear principles, and content is classified according to them. Standard precise plans include alphabetical, chronological, and geographic plans. In contrast, fuzzy organizational plans are more helpful in mobile social networks where users need clarification on what they are searching for. In a social media scenario, users browse complex and diverse information streams. Fuzzy organizational plans use more subjective factors from user habits and user testing. They include thematic, task-oriented, user-oriented, and metaphor-driven plans.

After organizing the project plan, establishing the organizational structure is crucial, taking into account advanced cognitive psychology principles. This structure, which defines users' information browsing methods, can be hierarchical, database, or hypertext. The rationality of the hierarchical organization in mobile applications is vital for user experience and the research focus (Mullins & Sabherwal, 2020).

Cognitive psychology, which studies how people process and interpret information, is essential in designing user-centered structures. Utilizing cognitive psychology concepts, such as chunking, schema theory, and working memory capacity, can significantly enhance the design of the hierarchical structure (Figure 3).

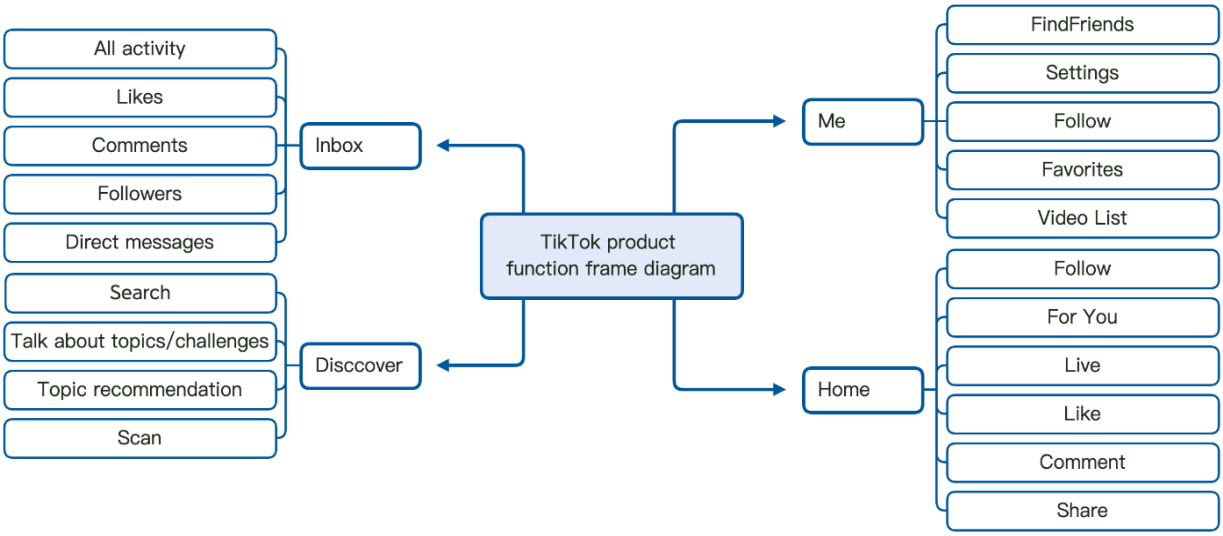

Figure 3. TikTok information architecture design.

Chunking, the process of grouping related information into manageable units, can help reduce cognitive load and improve user experience (Wang, Zhang, & Han, 2016). A well-defined hierarchical structure underpins a straightforward, easy-to-use information architecture that aligns with users' cognitive processes, incorporating chunking principles to optimize content organization.

Schema theory focuses on how people organize and interpret information based on their mental structures. Incorporating schema theory into hierarchical design allows for better content categorization, ensuring mutually exclusive relationships between levels and facilitating quicker information retrieval.

Working memory capacity constraints should also be considered when balancing the depth and breadth of the hierarchical structure. Breadth refers to content options per layer, while depth indicates the system's layers. Both narrow and deep or wide and shallow hierarchies can weaken website usability by imposing excessive cognitive demands on users' working memory. Striking a balance between depth and breadth allows for a more efficient and hierarchical website, catering to users' cognitive abilities and working memory limitations.

Incorporating shopping functionality into TikTok. Incorporating a shopping feature into TikTok's existing organizational structure can enhance the user experience by offering a convenient way to purchase products directly from the app, which can also increase user engagement. According to a report by SocialMediaToday, incorporating shopping functionality into social media platforms has become increasingly popular in recent years, with image and video-sharing platforms like Instagram and Pinterest leading the trend. By adding a shopping feature, TikTok can stay competitive and meet the needs of its users.

To add a shopping feature to TikTok, the app can incorporate a "Shop" button or icon within the video player interface, allowing users to directly purchase products featured in the video while also considering cognitive psychology principles (Kalbach, 2007), such as attention and decision-making processes. Positioning the shopping button prominently, such as in the right corner of the screen, can increase the likelihood of users noticing and interacting with it, leveraging visual saliency and the principle of least effort.

Moreover, through machine learning and data analysis, TikTok's algorithm can be utilized to suggest products that align with the user's interests based on their viewing behavior, demographics, and interests. This

personalization can leverage the user's cognitive schemas and implicit memory to enhance product discovery and create a more engaging, customized experience.

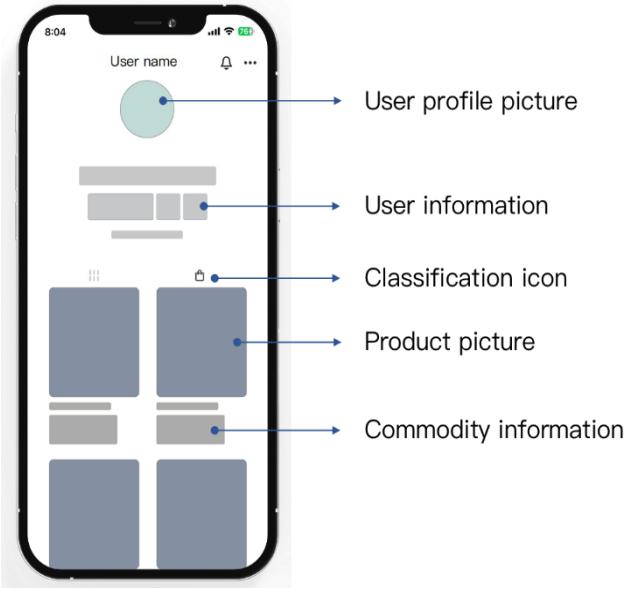

Figure 4. TikTok shopping functionality.

TikTok can also allow influencers and content creators to monetize their content by promoting products in their videos and earn a commission on sales generated through their recommendations, which can benefit both creators and merchants. This strategy taps into the power of social proof, a cognitive bias that influences users' purchasing decisions by observing others' choices and endorsements.

In conclusion, incorporating a shopping feature into TikTok's organizational structure (Figure 4) can offer a convenient way for users to purchase products and enhance the overall user experience while considering cognitive psychology aspects. By utilizing video recommendations and personalized product suggestions, TikTok can tap into the growing trend of social media shopping and provide a seamless e-commerce experience for its users. With the addition of a shopping feature, TikTok can keep up with the changing market trends and provide an enjoyable shopping experience for its users while also benefiting both creators and merchants.

Leveraging Cognitive Psychology for TikTok Sharing Enhancement

Considering male users' preferences is crucial in enhancing TikTok's sharing features, as they tend to share more in group chats and moments. This behavior aligns with the cognitive psychology principle that men often seek social validation and group cohesion (Spears, Lea, & Postmes, 2007). By catering to their preferences, TikTok can foster community, drive user engagement, and increase its visibility and reach.

Addressing gender imbalances is essential for meeting the diverse needs of users. Recognizing that female users prefer sharing with friends individually reflects an understanding of their desire for more intimate, one-on-one connections (Harwood & Roy, 2005). Developing features that streamline this sharing process can make the experience more enjoyable and seamless, encouraging continued use and sharing among female users.

Promoting social interaction and deepening sharing rates can be achieved by simplifying the process of sharing favorite TikTok videos across various platforms (Figure 5). This approach is supported by the psychological concept of cognitive fluency, which posits that individuals are more likely to engage in actions

that are easy and intuitive. By making sharing more accessible and user-friendly, TikTok can capitalize on this cognitive bias to foster stronger social connections and increase sharing probability.

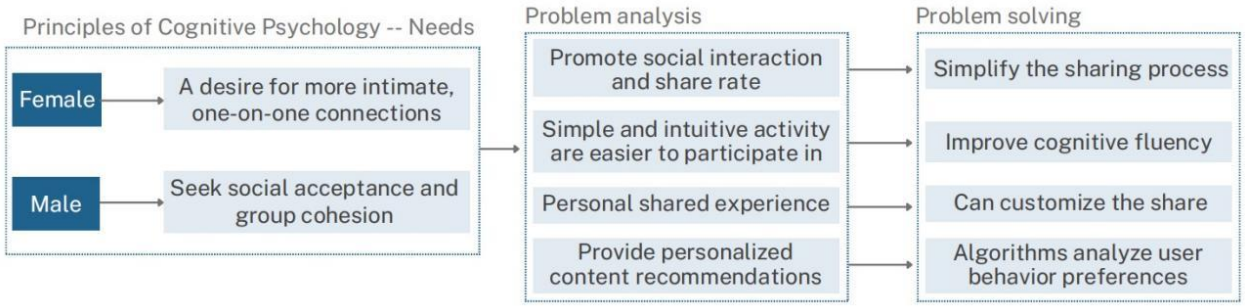

Figure 5. Problem-solving design process.

Introducing customizable sharing options can make the sharing process more engaging and entertaining. Allowing users to personalize the sharing experience by providing options to add captions, emojis, or GIFs when sharing videos taps into the cognitive principle of autonomy, individuals feel more motivated when they perceive a sense of control over their actions.

Encouraging collaborative sharing can foster a sense of community and drive user engagement. By introducing features that allow multiple users to contribute to a single video or challenge, TikTok can leverage the psychological concept of social facilitation, wherein people tend to perform better in tasks when they are in the presence of others.

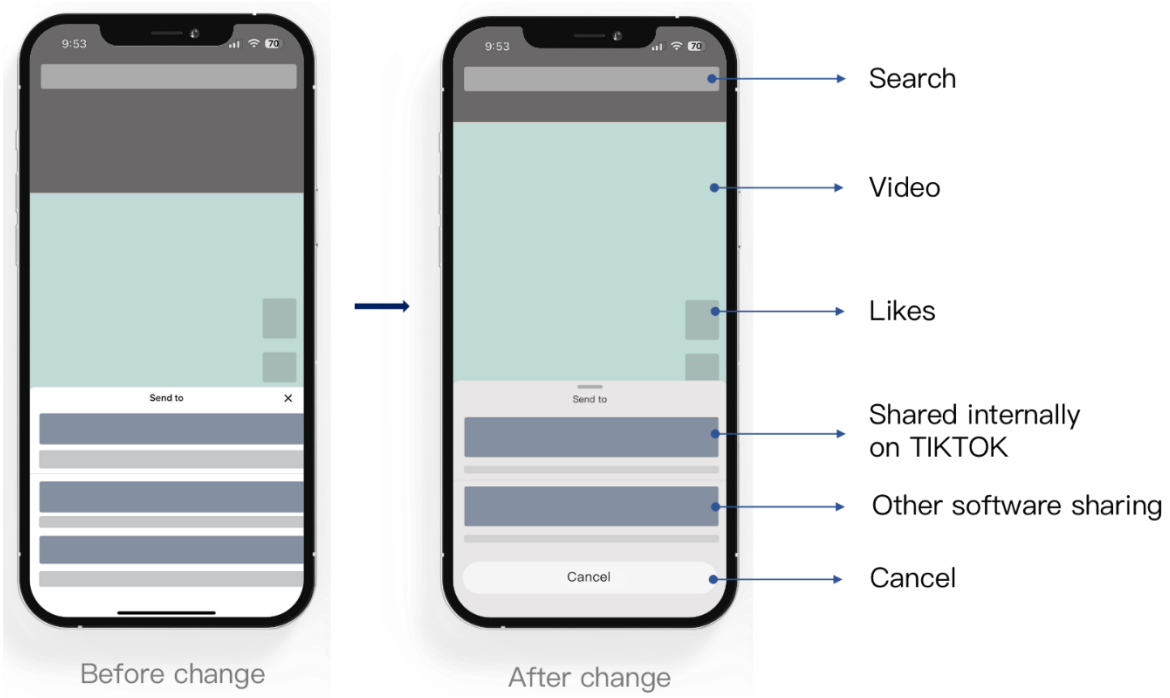

Figure 6. User sharing function optimization.

Using algorithms to analyze user sharing behavior and preferences, and offering personalized content recommendations based on their sharing habits, can increase the likelihood of users finding the content they are

interested in sharing, thus promoting overall sharing activity. This approach aligns with the cognitive psychology principle of selective attention, where individuals are likelier to engage with information relevant to their interests.

Utilizing push notifications or in-app reminders to prompt users to share content they've recently enjoyed occasionally can increase the probability of sharing by keeping the action top-of-mind for users. This gentle nudge aligns with the psychological concept of cognitive availability, where users are more likely to engage in activities that are easily accessible and memorable.

Creating a system that recognizes and celebrates users' sharing milestones, such as the number of videos shared, views, or likes received on shared content, can be a source of intrinsic motivation, encouraging users to continue sharing content. This strategy taps into the cognitive principle of reinforcement, where users are motivated to continue sharing content by receiving rewards and recognition.

Collaborating with other popular social media platforms to create seamless sharing experiences for users can make sharing TikTok content on other platforms more convenient, increasing the likelihood of users sharing across multiple channels. This integration is supported by the psychological concept of cognitive fluency (Hartson, 2003), which posits that individuals are more likely to engage in accessible and intuitive actions.

Figure 7. User model.

In this research, a novel feature has been introduced to improve user experience and facilitate communication among friends on the TikTok platform (Figure 7). By leveraging AI-driven technology, this feature aims to provide users with recommended sentences and emojis during the video-sharing process. These AI-generated suggestions are designed to assist users in summarizing the video's main points, expressing their reactions or opinions, or engaging in playful banter, thus fostering more meaningful interactions among users and their friends. This addition aligns with the study's emphasis on aligning platform design with users' cognitive processes and enhances user engagement and overall satisfaction.

By incorporating these strategies grounded in cognitive psychology and user research (Figure 6), TikTok can foster stronger social connections, increase user sharing probability, and ultimately contribute to the platform's growth and success.

Conclusion

In conclusion, this research has significantly contributed to understanding information architecture design for short-form video social platforms by incorporating cognitive psychology principles. The study emphasizes the importance of aligning platform design with users' cognitive processes, such as attention, perception, and memory, to enhance user experience and engagement.

A comprehensive analysis identified key factors impacting user interaction and satisfaction, leading to an optimized information architecture design that fosters efficient content discovery and consumption. The research also highlights the necessity of considering users' cognitive limitations and diverse needs when developing platform features.

This study provides practical recommendations for the design of short-form video social platforms and paves the way for future research in information architecture and user experience design. By embracing a user-centric approach, the research promotes the evolution of more engaging and effective short-form video social platforms that cater to users' cognitive capabilities and preferences.

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