Prior Knowledge: Figma

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Introduction

Human interaction with digital systems is shaped by top-down processing—cognitive mechanisms informed by long-term memory (LTM), including schemas, categorization, and mental models. Schema Theory (Bartlett, 1932; Rumelhart, 1980) provides the foundation for understanding how users process and navigate interface elements based on prior knowledge. From an evolutionary standpoint, these structured mental processes promote survival and efficiency—principles modern interface design leverages to minimize errors and cognitive load.

This paper analyzes a collaborative design platform built in Figma, focusing on whether its interface supports—or conflicts with—users' schema-driven expectations, categorization strategies, and adaptive learning. This design review is grounded in top-down processing and draws upon semantic network theory, procedural memory, and schema evolution.

Literature Review

Highly Structured: Schema Theory and Categorization: Schema theory is the foundational cognitive framework. The theory is structured in the idea that human cognitive efficiency fundamentally depends on the structure and organization of long-term memory. This enables swift retrieval and utilization of stored information during complex perceptual and cognitive tasks. Central to this structured cognitive architecture are the schemas–organized mental frameworks humans use to interpret and categorize new information based on past experiences (Bartlett, 1932; Rumelhart, 1980). Bartlett's foundational work (1932) defined schemas as active structures that simplify complexity by helping individuals predict and understand their environment. Expanding upon this, Rumelhart (1980) described schema as knowledge structures that influence attention, perception, and memory, significantly reducing cognitive load by streamlining information procession through recognition or familiar patterns. The schema theory serves as a foundational cognitive structure to further categorize models and refine schemas by implementing specific and efficient methods for the human cognitive processing of information.

Complementing schema theory, cognitive psychologists emphasize the importance of categorization models as a mechanism for refining and operationalizing schemas. Categorization aids information structure with schemas, which enable more efficient application retrieval. Rosch's Prototype Theory (1978) references an idealized average of prototype-encountered instances. In contrast, Medin and Schaffer's exemplar theory (1978) suggests that categorization occurs by comparing specific previously encountered examples. Aristotle's classical categorization, meanwhile, stresses clearly defined categories characterized by explicit rules and boundaries. Together, these models illustrate diverse yet interrelated cognitive strategies through which humans structure information for rapid, efficient retrieval and application.

Additionally, the concepts of mental models and affordances (Norman, 1983, 1988) enrich our understanding of cognitive organization. Mental models are cognitive representations formed from past experiences, allowing humans to predict and establish expectations regarding interactions with systems and environments. Affordances–perceptible cues indicating possible actions–are integral in shaping mental models. These elements work together, and mental models and affordances guide users toward appropriate actions by aligning external interface cues with internal cognitive structures. While schemas and categorization provide the structural basis, mental model models and affordances offer dynamic guidance within these structures, facilitating effective interaction with familiar and novel stimuli.

Ultimately, script and frame theories describe another critical dimension of cognitive organization. Minsky (1974) conceptualized frames as cognitive structures representing stereotypical knowledge about situations, roles, or contexts. Similarly, Schank and Abelson (1977) introduce scripts as structured sequences of expected behaviors within familiar scenarios. These theories understand that much human cognition and memory organization rely heavily on static knowledge and dynamic, sequential structures that provide cognitive efficiency by reducing uncertainty and facilitating rapid prediction in familiar contexts.

Intricately Connected: Semantic Networks, Spread Activation, and Mental Models: Beyond a structural organization, LTM also functions through an extensive network of interconnected information. These interconnected information theories–semantic and proposition network theories (Collins & Quillian, 1969; Pylyshyn, 1973)—depict memory as organized of nodes that represent concepts and ideas, interconnected through semantic and logical associations. The reflection of these nodes are the existing schemas, forming a web of meaningful and prosperous relationships. Retrieval occurs through activation patterns spreading throughout related nodes, rapidly bringing associated information into awareness. This connectivity facilitates swift cognitive procession, designing systems that help people find and synthesize relevant information effortlessly when solving problems.

The principle of interconnectedness is further developed through examination via the Spreading Activation Theory proposed by Collins and Loftus (1975). Their theory highlights how activating one cognitive node can trigger a cascade of activation across any related nodes that facilitate memory retrieval. This associative network model explains phenomena such as priming, where exposure to one stimulus influences subsequent responses to associated stimuli, demonstrating the strength and speed of interconnected memory networks.

Operating parallel to semantic network models, Dual Coding Theory (Paivio, 1986) establishes that dual-representation systems (verbal + visual) yield superior memory retention. To extend Paivio's (1986) theory, the Multimedia Leaning theory (Mayer, 2001) demonstrates that individuals comprehend and retain information better when visual and verbal modalities are presented concurrently. Collectively, these theories emphasize that LTM connectively is enhanced significantly through multimodal integration, which promotes deeper cognitive processing and more durable knowledge retention.

Constantly Evolving: Cognitive Adaptation and Proceduralization: While LTM is very structured and interconnected, it is also inherently dynamic, continuously evolving through interactions with changes in environment and experiences. The concept of assimilation and accommodation by Piaget (1952, 1977) illustrates how cognitive structures adapt to new information. Accommodation involves significant differentiation or entails new schemas when faced with inconsistencies, while assimilation requires new experiences and integration into existing schemas with any substantial changes. These two capabilities underscore the fluidity and flexibility inherent in human cognitive development, which enable efficient navigation and adaptation to novel environments and information. By positioning the schemas theory as an evolving mental structure, the view that interacts with unfamiliar systems or environments often requires individuals to revise, reorganize, or expand their cognitive frameworks.

Developing on Piaget's concept, Rumelhart and Norman (1978) characterized conceptual development as occurring through complementary processes of gradual accumulation (accretion), iterative refinement (tuning), and paradigm shifts (restructuring). According to their conceptual development, accretion refers to the incremental incorporation of new knowledge into existing cognitive frameworks, which expand their scope while preserving their fundamental structure. Tuning entails gradually refining and optimizing existing frameworks through experience to enhance their precision and applicability. Lastly, restructuring represents a more precise transformation involving reorganizing cognitive schemas to accommodate paradigm shifts in understanding. These processes depict cognitive evolution as an ongoing, iterative cycle, continuously refining cognitive structures to maintain efficiency, accuracy, and adaptability in ever-changing environments.

More recent neuroscientific research complements these cognitive theories by demonstrating how cognitive evolution translates into physical neural adaptations, such as neuroplasticity. More recent empirical studies (Schlegel et al. 2019; Matzen et al. 2020) have demonstrated that repeated cognitive activity physically develops brain structure, strengthening neural connections and improving mental efficiency. Schlegel et al.'s (2019) and Matzen et al.'s (2020) findings reveal that these biological changes present how our brains adapt through experience, directly linking physical neural modifications to enhanced cognitive performances and flexibility.

Finally, the ACT-R model (Anderson, 1983, 2005) further elucidates memory development by distinguishing between two core systems: declarative memory, which is explicit knowledge and is initially engaged when encountering novel stimuli, and procedural memory, which encodes skills and routines, which become automated through repetition, reducing reliance on conscious processing. This progression underscores the efficiency gained through cognitive evolution from deliberate and intensive attention tasks to nearly automatic actions, thus conserving cognitive resources for handling novel or complex tasks.

Design Review

Structured Memory and Schema Activation: The layout in Figure 1 demonstrates the implementation of schema–consistent patterns. The left-hand sidebar includes terms like "Homepage Prototype" and "Component." These labels evoke hierarchical navigation schemas that Bartlett (1932) and Rumelhart (1980) mentioned in their research. Yet, confusion arises within the interface layer "Main Page – Analytics," where multiple similarly named frames are grouped without clear visual or semantic distinctions. At the same time, the structure implies organization, the repetitive and indistinct challenge of schema recognition, especially without any supportive cues. This weakens schema activation and increases cognitive load.

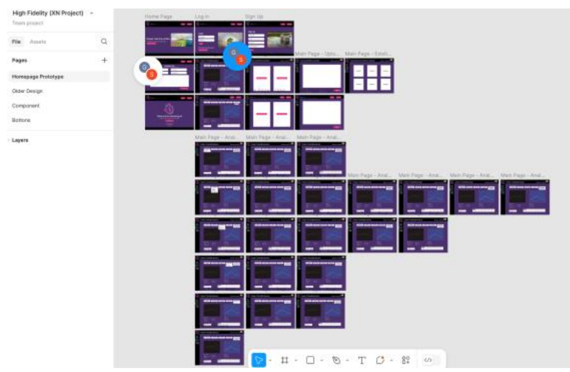

Figure 1: Figma's sidebar displays labeled layers such as "Homepage Prototype" and "Component."

Categorization and Interconnected Memory: In Figure 2, Figma's resource library uses headings like "Brainstorming" and "Team Meetings," which align with categorization models (Rosch, 1978). These heading cues allow users to sort tools by prototype or task types, streamlining mental filtering. Furthermore, the interface also activates semantic networks (Collins & Quillian, 1969), where related concepts trigger connections to known workflows. This also supports spreading activation (Collins & Loftus, 1975), allowing users to anticipate tool behavior and relevance. That said, the minimalist design–lacking icons and visual variation–might hinder these connections, especially for users unfamiliar with the platform.

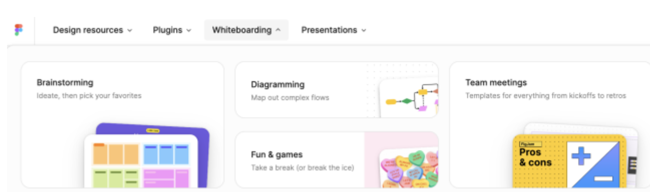

Figure 2: Categorized interface options such as "Team meetings" and "Strategic planning" from Figma's resource browser.

Cognitive Adaptation and Schema Evolution: In Figure 3, users are presented with components like "Mobile Navigation Top" in the prototype interactive page. For experienced users, these can be assimilated into pre-existing design schemas. However, with first-time users, the atomic design hierarchies may require accommodation (Piaget, 1962), which forces schema revision. This also aligns with Rumelhart and Norman's (1978) view of conceptual change: accretion, tuning, and eventually restructuring align with the Figma logic component. The component browser also reinforces this mental refinement without tooltips or onboarding, which led to a learning curve that may steepen for unformal users.

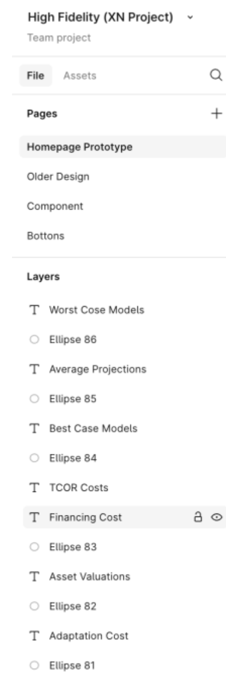

Figure 3: Layer panel showing labeled components like "Mobile Navigation Top."

Cognitive Adaptation and Schema Evolution: Figure 4 shows the Figma right sidebar panel, where users can adjust alignment, spacing, and constraints. These repeated interactions promote a shift from explicit thinking to automatic action, which is outlined in ACT-R theory (Anderson, 1983, 2005). Frequent users interact with the alignment fields and develop motor memory, streamlining workflow and reducing cognitive demand. This also reflects principles from neuroplasticity (Schlegel et al., 2019), where individual consistent behavior strengthens their neural connections. While this design method is efficient for experienced users, first-time users require more guidelines to develop procedural fluency.

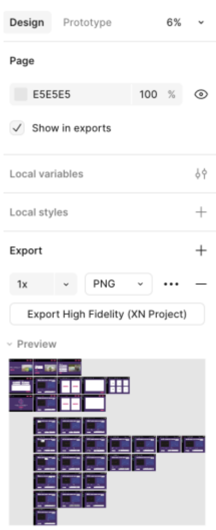

Figure 4: Right-hand property panel in Figma showing layout settings, alignment tools, and spacing adjustments.

Affordances, Signifiers, and Mental Models: This mobile interface leverages familiar design cues to activate mental models (Norman, 1988). In Figure 5, the checkmark, notification bell, and tab bar icons align with widely recognized patterns, allowing users to predict functions based on prior app experiences. In the prototype, the affordance is connincuated through the "View Result" button, which is significant, red, and visually raised, signaling urgency and tap-ability. Moreover, the bell icon signified that the user could expect alerts. These visual cues lower the need for user explanation and facilitate fluid interaction through intuitive perception. However, the absence of textual labels on the bottom icons may hinder clarity for first-time users without familiarity. The

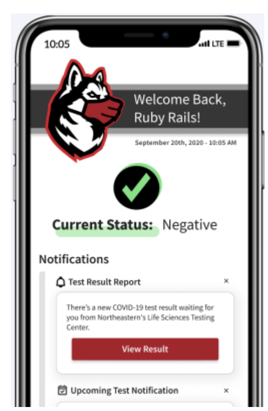

Figure 5: Mobile interface screen featuring prominent buttons like "View Result" and icon-only navigation bar.

interface can weaken affordance reliability and place more emphasis on memory or trial-and-error.

Recommendation

As a design tool, Figma enables interface building through reusable components and real-time collaboration. However, it often overlooks the layered mental models that first-time users bring from more traditional file systems. In Figure 3, elements like “Mobile Navigation Top” appear without contextual cues, requiring first-time users to infer structure through trial and error—a process that slows schema tuning. While Figure 1’s consistent visual formats support procedural fluency for experienced users, they lack scaffolding for those still learning to navigate between frames. Similarly, Figure 4 presents a uniform component layout without explanations, making it harder for users unfamiliar with atomic design to grasp interrelationships. Though this consistency reinforces expert workflows, it could better support conceptual development through adaptive onboarding. In Figure 5, strong affordances like the “View Result” button help guide interaction, yet reliance on icon-only navigation still challenges recognition for new users. Across all five figures, these gaps point to opportunities for more precise semantic networks, flexible onboarding, and role-specific scaffolding to ease the transition from first-time to fluent user.

Conclusion

This review highlighted the role of prior knowledge and structured memory in how users interact with digital design tools. Designers can build prototype interfaces that support learning and efficiency by applying cognitive frameworks such as schemas, categorization models, semantic networks, and procedural memory. Figma reflects many of these principles, particularly its consistent structure and reusable components, promoting fluency for experienced users. However, opportunities remain to better support first-time users through clear labeling, contextual cues, and adaptive onboarding. This shows the importance of designing an interface that evolves with users’ cognitive development.

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