Research on Emotional UI Design Based on Biological Morphology

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Abstract: With the growing demand for digital mental health interventions, the application of emotional design in user interfaces has garnered increasing attention. This study, grounded in biomorphic theory, explores its practical value in emotional UI design. Using the visual design of the mood-tracking app "Petals" as a case study, it analyzes how biomorphic elements enhance user emotional engagement and long-term usage intent through visual metaphors and interaction mechanisms. The research further proposes a "Biomorphic Emotional UI Design Framework," encompassing three dimensions: visual, interactional, and systemic. In "Petals," users' emotional data is transformed into the growth state of virtual petals, combined with generative AI-powered emotional analysis to produce anthropomorphic feedback, creating a closed-loop experience of "recording—empathy—healing." Through aesthetic design or interactive feedback, the UI interface fosters positive emotional connections between users and the system.

Keywords: Emotional Design; Visual UI Design; Mood Tracking Application; Companion Needs

1. Research Background

In the fast-paced modern life, emotional health issues are increasingly prominent. According to data from the World Health Organization (WHO), approximately 280 million people worldwide suffer from depression, and emotional problems such as anxiety and loneliness are particularly common [1]. The popularization of digital technology has provided new opportunities for mental health services, but existing tools often have problems such as single functionality, insufficient interactivity, or lack of emotional warmth. Users not only need data recording, but also crave a natural, warm, and personalized emotional companionship experience. The three-level theory of emotional design proposed by Norman (2004) (Figure 1) provides a basic framework for emotional expression in this design [2]. Therefore, based on the emotional health and companionship needs of the modern digital age, Petals aims to create a fusion application of "emotional recording + healing companionship". Through aesthetic design or interactive feedback in the UI interface design, it helps users establish positive emotional connections.
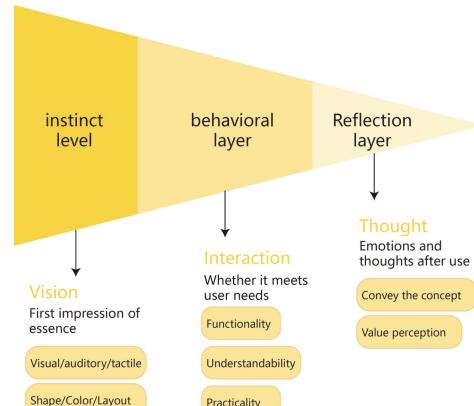

Figure 1. The Three Level Theory of Emotional Design

2. Problem to be Solved and Research Significance

This study focuses on innovative emotional interface design in the field of digital mental health, taking the visual design of the "Petals" emotion recording application as the research object, and deeply exploring the mechanism and practical path of biological form design in enhancing user emotional experience. Every emotion injection is a deep mining of user value, but also a reinterpretation of the design mission [3].

UI serves as the visual embodiment of brand philosophy, where emotional design subtly communicates core values through visual elements. Petals, guided by the philosophy that "every emotion deserves to be cherished like a

petal," transforms its brand proposition of "Embracing Emotions, Nurturing Growth" into tangible visual experiences. The interface features biomorphic elements like petals and plants, paired with a warm, healing visual tone. Through this design approach, users not only experience functional value but also develop deep emotional resonance with the brand's core values. This UI-driven emotional connection gradually evolves into trust and affinity, ultimately establishing a unique brand competitiveness that sets it apart from similar functional products.

2.1 Solve Problems

The research focuses on two core issues in current mental health applications: firstly, the mechanical interaction of traditional emotion recording tools leads to low user engagement, and secondly, existing digital healing products lack effective emotional resonance mechanisms.

The study adopts a combination of theoretical construction and empirical research. Firstly, based on the theory of biological morphology and the pro life hypothesis, a three-layer emotional design framework of "visual metaphor dynamic feedback system empathy" is established. This framework innovatively establishes a mapping relationship between plant growth process and human emotional changes, visually presenting the user's psychological state through the morphological changes of petals (such as blooming, withering, and regeneration). The study pays special attention to the role of natural imagery in reducing psychological defense mechanisms and proposes the design principle of "progressive emotional disclosure" to make the emotional recording process more secure and ritualistic [4].

At the technical implementation level, the research integrates generative AI emotion analysis and biometric visualization technology. The system recognizes user input emotional features through natural language processing, converts them into corresponding plant growth parameters, and generates personalized visual feedback and textual suggestions. A comparative experiment was designed to evaluate the user experience between the traditional emotion recording interface and the biometric interface of "Petals". The measurement indicators included usage stickiness, emotional resonance, and self disclosure depth.

2.2 Significance of the Study

This study theoretically expands the application paradigm of emotional design in the field of digital mental health, and establishes a correlation model between biological form UI and psychological healing effects; In practice, it provides actionable design guidelines for lightweight mental health applications, especially the integration method of natural metaphors and emotional computing [5]; By lowering the threshold for seeking psychological help in terms of social value, we can promote the improvement of public awareness of mental health. The final research results provide important references for the development of future digital healing products and open up new directions for emotional computing research in interface design.

Petals not only addresses the shortcomings of existing tools in terms of functionality, interactivity, and emotional warmth, but also promotes innovation in the field of digital health through interdisciplinary research, with the ultimate goal of making emotional management a natural, warm, and sustainable daily practice. Using "petals" and "gardens" as emotional visualization carriers, this study investigates how natural imagery reduces users' psychological defenses and enhances their self-awareness willingness. To provide a new paradigm for mental health tools, breaking through the statistical logic of traditional emotion tracking applications, and creating a "record feedback motivation" loop, proving that the integration of aesthetic narrative and functional design can enhance user compliance.

3. Literature Review and Existing Shortcomings

It can be concluded from the current research status of domestic and foreign literature that there is a significant increase in attention to the emotional health of Generation Z. However, there are relatively few research papers and cases on the integration of emotional recording and healing companionship, so there are certain limitations. At present, in the literature research on information visualization in China, 1939 results can be obtained by searching for keywords such as "emotionalization", "emotionalized design", "APP", and "user experience" on CNKI. Analysis shows that this type of design approach combined with design will exist for a long time.

In recent years, research on emotional design in the field of digital mental health has gradually received attention from academia. Related studies have shown that biological forms can effectively reduce users' psychological defenses and enhance emotional engagement in interface design. The theory of pro life states that human closeness to natural elements has an evolutionary basis, and UI design with natural metaphors can enhance users' sense of security and comfort. In terms of emotion recording applications, previous studies have explored the impact of data visualization on mental health interventions. For example, emotion visualization can help users understand their own emotional changes more intuitively. The application of generative AI in the field of mental health has also made certain progress, such as emotion analysis technology based on natural language processing. However, existing research has mostly focused on clinical level mental health tools, and there is still a lack of systematic exploration on the design optimization of lightweight, daily emotion management applications [6].

4. Emotional Design Presentation of Petals Petals APP

Petals is an innovative mental health application that helps users intuitively understand and manage emotions through intelligent emotion tracking and plant growth metaphors. The core functions include AI emotion analysis, personalized chemotherapy healing tools, and anonymous mutual aid communities, which transform complex psychological states into visualized plant forms.

In the process of recording and managing emotions, users can achieve self-healing and growth like cultivating plants, and finally create a full-chain mental health service experience from tools to emotional companionship, from individual healing to group resonance. This article will explore the design elements of apps through three dimensions of emotional design.

4.1 Research Methodology

Evaluate users' emotional experience, willingness to use, and healing effects of biomorphic UI interface design through questionnaire surveys and online searches. From this, it is understood that the users are divided into four layers: the core layer of Generation Z (18-24 years old), the emerging layer of the

workplace (25-30 years old), the middle-aged stress layer (31-40 years old), and the silver haired exploration layer (50-60 years old). The following is a portrait of simulated users (Figure 2).

Figure 2. User Profile

Functional architecture is the logical framework of a product (Figure 3), which clarifies functional modules, hierarchical relationships, and interaction processes to ensure clear system logic, strong scalability, avoid functional redundancy or loss, and improve development efficiency and user experience consistency. Petals 'functional architecture follows a logical chain of' personal records-community resonance-personalized healing ', transforming abstract emotion management into concrete' plant cultivation 'practices. This approach not only fulfills users' diverse needs for self-awareness and social interaction, but also establishes a complete closed loop from 'emotion recording' to 'emotional growth' through the synergy of its features.
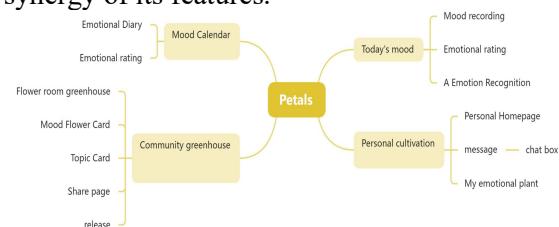
Figure 3. Functional Architecture

4.2 Intuitive Level Visual Design

Explore the design style through the emotional version (Figure 4), transform it into design language, determine the design direction during the design process, and use pink as the main color tone and blue and green as auxiliary colors to obtain keywords. The app features three emotional themes— "Lively Hope," "Rational Order," and "Gentle Healing" —to cater to users 'varied emotional needs and aesthetic preferences across

different scenarios. This design transforms the app into a mirror of users' emotional states, strengthening the emotional bond between the product and its users. For instance, the "Gentle Healing" theme incorporates soft, petal-like textures to provide visual comfort when users are feeling down [7]. Font selection should also be paid attention to in the design, Standardize the font and unify the brand's visual language Ensure readability and hierarchy through parameters such as font size, font weight, and line spacing, strengthen interface professionalism, improve user reading efficiency and experience consistency, and avoid visual confusion.


Figure 4. Emotional Edition

4.3 Petals Logo Design

Using the letter "P" (the first letter of Petals) as the visual matrix and reconstructing the fluid biological shape curve, it not only symbolizes the organic growth of petals, but also metaphorically represents the trajectory of emotional flow, conveying the brand philosophy of "emotions are like flowers, freely stretching". (Figure 5)

The integration of emotional design with Logo Design not only enhances visual experience and interaction efficiency, but also builds deep connections between users, products, and brands through emotional resonance. Particularly for digital mental health products, this synergy enables functional and emotional values to reinforce each other, ultimately achieving the core objective of 'conveying warmth through visuals and empowering healing through emotions.'

The unique petal themed icon, such as using different shapes of petals to represent emotional recording, companionship chat, friend matching and other functions, allows users to visually perceive the brand characteristics of the APP (Figure 6). And the

brand slogan is set to "emotions are like petals, each piece is unique and worth cherishing", which is more in line with the brand's tone.
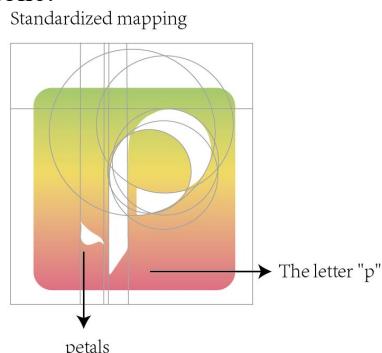
Figure 5. Petals Logo Design

Figure 6. Icon Design

4.4 Interaction Design at the Behavioral Level

Excellent guide page design can enhance the image of the product in the minds of users, guide them to understand the positioning and tone of the product, and bring them closer. For example, the first level title guides users in an emotional way, turning entering the app into a connection. The low-hierarchy diagram serves as a foundational framework in UI design, utilizing simplified lines and placeholders to validate functional logic, streamline user workflows, and reduce communication and development costs (Figure 7). It prioritizes structure over aesthetics, facilitating team collaboration and early testing while avoiding costly rework later.

The core strength of the hybrid research methodology lies in its complementary integration of qualitative and quantitative approaches. Qualitative research helps uncover users 'deep-seated emotional needs and latent pain points, infusing the study with human warmth, while quantitative research validates conclusions' universality, clarifies priority requirements, and ensures research precision. Through a progressive process of "preliminary needs analysis – mid-term design validation – post-iteration optimization," the methodology synchronizes research with product design cycles. This approach proactively identifies design issues to reduce trial-and-error costs, ultimately achieving comprehensive and

accurate needs insights, efficient design implementation, and products that are both functional and emotionally resonant. This perfectly aligns with Petals APP's core design philosophy of "emotionalization + functionality."

In component and animation design, the "Mood Tracker" module displays emotional data through a "sunflower growth" animation effect. The watering count (e.g., "80 waterings today") transforms emotional interactions into tangible "plant cultivation" activities, converting abstract mood tracking into interactive growth experiences with real-time feedback. This approach enhances user engagement and achievement satisfaction. The app icon's distinctive visual presentation on the home screen creates a unique brand identity, allowing users to instantly recognize the "Healing Space" in their daily interactions.
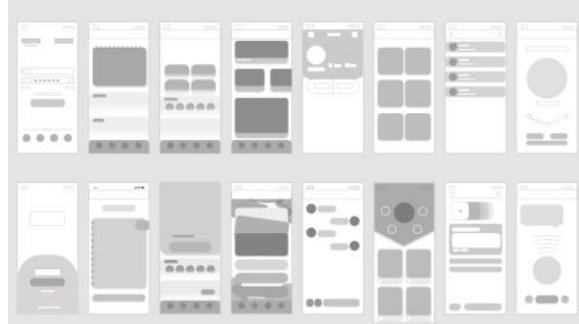
Figure 7. Low-level Structure Diagram

4.5 Reflective Level Emotional Experience Design

The analysis of user emotional experience in UI pre design (Figure 8) can predict user needs and pain points, shape pleasant experiences through tools such as empathy mapping and mood boards, reduce negative emotions, enhance product attractiveness and user stickiness, and provide emotional basis for subsequent design. When the design features things related to memory, the corresponding feelings and experiences are activated, resulting in a pleasant experience [8].

The onboarding page employs emotional copy like 'Let emotions flourish like plants' and 'Gently nurture emotions' paired with plant growth visuals. Through anthropomorphizing emotions, it redefines the app's role as a' companion', helping users recognize the app as an emotional ally from the start. This approach bridges the psychological gap between the product and its users.

Figure 8. Functional Architecture

All Petals 'functional designs revolve around a reflective loop of "long-term growth": The "Annual Plant Growth Chart" in the emotional calendar helps users reflect on the cyclical nature and developmental aspects of emotions over time, demonstrating that "emotional fluctuations are normal, and long-term cultivation can bring change." Through interactions with "emotional plants" in the community (pollination and maintenance advice), users help others while reflecting on their own healing experiences and growth paths, elevating individual emotional management into a "mutual aid ecosystem for collective growth." Ultimately, users' experience with Petals evolves from a "tool for recording emotions" to a life-reflection process of "self-awareness, self-acceptance, and self-growth," transforming the product into both an "external mirror" and "internal catalyst" for psychological development. This achieves the profound value shift from "emotional management" to "life growth."

5. Research Findings

This study focuses on the psychological health application of "Petals" and explores in depth the emotional design mechanism based on plant growth metaphor. The application takes "emotional recording + healing companionship" as its core concept, and constructs a complete emotional management system through the visual metaphor of "emotions are like petals, each unique and worth cherishing". As can be seen from the product structure diagram, the

system integrates three modules: AI emotional analysis, personalized chemotherapy healing tools, and anonymous mutual aid community, forming a closed-loop experience of "recording analysis healing" [9]. The clear pink color palette and organic form design in the design specifications, combined with the "P" shaped brand logo, successfully create a warm and safe emotional space. The user's emotional experience process is guided by the growth of flowers, transforming emotional fluctuations into examples of plant morphological changes.

From the first level interface display at the behavioral level, it is confirmed that dynamic plant feedback and AI generated emotional interpretation form effective emotional resonance. The design of anonymous mutual aid communities not only preserves the privacy of emotional expression, but also establishes social connections through the sharing mechanism of a "virtual garden". This design study also found that the progressive interaction design adopted by the application can effectively guide users to complete emotional sorting. These design innovations collectively realize the product vision of cultivating inner growth like caring for plants, providing a replicable "technology + temperature" solution paradigm for the digital mental health field. The core of emotional design is always "people" --understanding the needs of people, respecting the emotions of people, and realizing the value of people.[10] Conclusion, building upon the three-tier theory of emotional design (instinctive, behavioral, and reflective levels), Petals UI achieves emotional design effectiveness and cross-domain application value through biomorphic metaphors and dynamic interactive systems. This demonstrates that layered design across instinctive (sensory stimulation), behavioral (functional adaptation), and reflective (value recognition) levels can effectively evoke emotional resonance and enhance product stickiness. Moving forward, "Petals" will further research can further optimize the mapping accuracy between plant morphology and specific emotions, and explore metaphorical adaptability in cross-cultural contexts.

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