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Case Study

The Circulatory Structure of Mind Model: An Integrative Theory of Dual Structure, Cognitive Dissonance, Cognitive Bias, Narrative Formation, and Social Approval in Obstetrics and Gynecology

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Received: June 26, 2026; **Published:** June 30, 2026

Abstract

This study proposes the circulatory structure of mind model, a theoretical framework describing how human psychological processes sustain themselves through a self-reinforcing cycle. The model integrates five domains traditionally examined separately-dual structure, cognitive dissonance, cognitive bias, narrative construction, and approval-seeking-and demonstrates that these mechanisms operate sequentially and recursively. Contradictions arising from the dual structure (e.g. honne-tatemae; private-public self) generate cognitive dissonance, which activates cognitive biases such as confirmation bias, rationalization, projection, and self-serving bias. These biases shape personal narratives, which subsequently become intertwined with the need for social approval. Approval stabilizes the external self but simultaneously widens the gap with the internal self, thereby reproducing the dual structure and closing the cycle. A proof-of-concept application in obstetrics and gynecology illustrates that generative AI can analyze patient narratives through this five-layer structure and identify clinically meaningful intervention points. These findings suggest that the mind functions not as a static entity but as a continuously circulating dynamic system. Understanding this circulation provides a conceptual foundation for clinical practice, cultural psychology, and AI design.

Keywords: *Circulatory Structure; Mind Model; Integrative Theory; Dual Structure; Cognitive Dissonance; Cognitive Bias; Narrative Formation; Social Approval; Obstetrics and Gynecology*

Introduction

Patients in psychosomatic medicine frequently present with recurring psychological patterns such as persistent distress, dependence on external approval, and rigid personal narratives. Conventional linear psychological models struggle to explain why these patterns persist, why approval becomes addictive, and why narratives become increasingly inflexible. To address this gap, this study introduces the circulatory structure of mind model, which conceptualizes psychological processes as a self-reinforcing cycle. The model consists of the following sequential mechanisms:

1. Dual structure (private vs. public self).
2. Contradiction arising from the dual structure.
3. Cognitive dissonance.
4. Activation of cognitive biases.

5. Narrative construction.
6. Approval-seeking.
7. Reinforcement of the dual structure.

This cyclical system possesses both homeostatic and autopoietic properties, enabling it to maintain itself even when generating psychological strain.

Theory

Dual structure and cognitive dissonance

The dual structure of the self, shaped by Japan's vertical social organization [1] and the dynamics of amae [2], creates a divergence between honne (true feelings) and tatemae (social façade). This divergence produces psychological tension consistent with Festinger's theory of cognitive dissonance [3]. Because Japanese culture emphasizes interpersonal harmony, dissonance is often reduced through rationalization rather than behavioral change [4].

Cognitive bias and narrative construction

To alleviate dissonance, individuals employ cognitive biases such as confirmation bias, projection, and self-serving bias. These biases distort perception and shape the direction of narrative construction. Narrative identity theory [5,6] suggests that individuals construct meaning by selectively emphasizing, omitting, and interpreting experiences. Neuroscientific findings indicate that the default mode network (DMN) underlies self-referential thought, recollection, and imagination, providing a neural basis for narrative formation [7].

Approval-seeking and cycle reinforcement

Narratives become intertwined with the need for social approval, a fundamental motivation for maintaining group belonging [8]. In the age of social media, approval becomes visible and competitive, reinforcing tatemae-oriented self-presentation and widening the honne-tatemae gap. This reproduces the dual structure and closes the cycle [9].

Psychological dynamics: Improvement vs. deterioration

The direction of the cycle-toward improvement or deterioration-depends on narrative flexibility.

Improvement loop

Flexible narratives:

- Reduce dissonance.
- Weaken biases.
- Stabilize approval needs.
- Narrow the honne-tatemae gap.

This pattern resembles the growth mindset [10].

Deterioration loop

Rigid narratives:

- Intensify approval needs.
- Strengthen biases.

- Widen the honne-tatemae gap.
- Promote victimization, externalization, and emotional suppression.

Social media accelerates deterioration through algorithmic filtering, competitive approval metrics, and pressure for optimized self-presentation.

Clinical application in obstetrics and gynecology

Complex emotional processes-pregnancy-related anxiety, tokophobia, infertility-related guilt, postpartum fluctuations, and identity loss following gynecologic cancer-significantly influence clinical outcomes. To address these challenges, a generative AI system was developed to analyze patient narratives using the five-layer model.

Functions of the AI system

1. Classify the patient's narrative into five cognitive layers.
2. Detect distortions and emotional overload.
3. Identify the layer contributing most to psychological distress.
4. Extract the minimal effective intervention point.
5. Generate a concise, clinically actionable summary.

Case Analyses

Patient narrative

"I'm afraid something will go wrong with my baby. Everyone expects me to be happy, but I feel overwhelmed. I keep thinking I'm not ready to be a mother".

AI-derived structural analysis

- Dual structure conflict between societal expectations of "joyful pregnancy" and the patient's internal emotional state.
- Dissonance uncertainty regarding fetal health and personal readiness, generating cognitive tension.
- Bias catastrophic thinking ("If I'm not ready, I will fail as a mother").
- Narrative a self-critical storyline centered on inadequacy and fear of failure.
- Approval heightened sensitivity to perceived expectations from family and society.

AI-suggested intervention points

1. Normalize emotional variability during pregnancy.
2. Challenge catastrophic assumptions.
3. Reconstruct the narrative toward capability and support.
4. Reduce pressure from perceived external expectations.

Discussion

This proof-of-concept study demonstrates that generative AI can function as a psychological reasoning assistant in OB GYN practice. The tool reveals hidden cognitive-emotional structures that often remain unaddressed in brief consultations. By providing theory-guided, interpretable output, the system overcomes the common criticism of AI as a "black box" and enhances transparency in clinical decision support.

Clinical implications

- Enhances psychological assessment during prenatal and postpartum care.
- Supports early detection of risk factors such as postpartum depression or tokophobia.
- Assists infertility patients experiencing guilt, self-blame, or emotional overload.
- Improves communication with patients who struggle to verbalize emotions.
- Reduces clinician cognitive load in busy outpatient settings.
- Facilitates multidisciplinary collaboration among OB GYNs, midwives, psychologists, and nurses.

Theoretical contribution

This study also demonstrates that a complex cognitive model can be directly implemented in generative AI without programming, offering a scalable and low-cost approach to integrating cognitive science into clinical workflows [11].

Conclusion

The generative-AI clinical reasoning tool grounded in the circulatory structure theory provides a novel, interpretable, and low-cost method for understanding cognitive-emotional processes in OB GYN patients. This proof-of-concept study suggests that AI-assisted psychological formulation may enhance patient-centered care, improve communication, and support more compassionate and individualized obstetric and gynecologic practice.

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Volume 15 Issue 7 July 2026