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Original Paper

A Dynamic Systems Perspective on the Interaction between L2 Anxiety and Willingness to Communicate among Chinese Learners: A Mechanism-Based Model

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Abstract

Second language (L2) anxiety and willingness to communicate (WTC) have long been recognized as two central affective variables influencing language learning and performance. However, existing research has predominantly conceptualized their relationship as static and linear, often neglecting the dynamic, context-sensitive, and interactive nature of these constructs. Drawing on Dynamic Systems Theory, this paper proposes a Dynamic Affective–Performance Interaction Model (DAPIM) to reconceptualize the relationship between L2 anxiety and WTC among Chinese learners. The model integrates affective, intentional, cognitive, and performance dimensions, incorporating moderating variables such as working memory capacity and task planning conditions. It is argued that anxiety and WTC co-evolve over time through reciprocal interactions, and their influence on L2 performance is mediated by cognitive resource allocation and task demands. By synthesizing insights from second language acquisition, cognitive psychology, and task-based language teaching, this paper offers a mechanism-based explanation of how affective and cognitive systems jointly shape L2 oral fluency. The proposed framework advances theoretical understanding and provides directions for future empirical research.

Keywords

Second language anxiety, Communication willingness, Dynamic systems theory

1. Introduction

Affective factors have long been considered central to second language (L2) learning, particularly in shaping learners' communicative behavior and performance outcomes. Among these, L2 anxiety and willingness to communicate (WTC) have attracted sustained scholarly attention (Ellis, 2005; Ortega,

1999). L2 anxiety is typically associated with feelings of tension, apprehension, and nervousness in language use situations, whereas WTC refers to a learner's readiness to initiate communication when given the opportunity. Although both constructs have been extensively examined, the majority of prior research has approached them as relatively stable individual differences and has relied on linear models to explain their relationship.

Such a perspective, however, is increasingly insufficient. Empirical observations suggest that learners' anxiety and communicative willingness are highly sensitive to contextual and temporal factors (Ortega, 1999; Yashima, 2002). A learner who is willing to speak in one moment may withdraw in another, and anxiety may fluctuate even within a single communicative task. These patterns point to a need for a more dynamic understanding of affective variables in L2 contexts. In this regard, recent developments inspired by Dynamic Systems Theory have provided a productive alternative (Baddeley, 2012; Larsen-Freeman, 1997; Wen, 2016). This theoretical perspective conceptualizes language development as a nonlinear and emergent process shaped by the interaction of multiple subsystems over time, thereby offering a more suitable framework for examining affective–cognitive interactions.

Against this backdrop, the present study seeks to reconceptualize the relationship between L2 anxiety and WTC from a dynamic systems perspective. Rather than treating these constructs as independent predictors, it examines how they co-evolve and interact during language use. Furthermore, it integrates cognitive factors—specifically working memory capacity and task planning conditions—into the analysis, thereby extending beyond traditional affective models. To this end, the paper proposes a Dynamic Affective–Performance Interaction Model (DAPIM), which aims to explain how affective, cognitive, and performance-related processes jointly shape L2 oral production. The study is guided by four research questions concerning the dynamic interaction between anxiety and WTC, the influence of task conditions, the moderating role of working memory, and the impact of these interactions on fluency outcomes.

2. Literature Review and Theoretical Background

Research on L2 anxiety has traditionally framed it as a situation-specific emotional response arising from language learning contexts. Numerous studies have documented its negative impact on performance, particularly in speaking tasks (Horwitz, E. K., Horwitz, M. B., & Cope, 1986; Peng, 2012) where learners are required to process linguistic information under time pressure. From a cognitive standpoint, anxiety is often assumed to consume attentional resources, thereby limiting the capacity available for language processing. This aligns with broader theories of cognitive load, which suggest that emotional interference can reduce processing efficiency in complex tasks.

In parallel, WTC has been widely studied as a key determinant of actual language use. Early conceptualizations treated WTC as a relatively stable trait influenced by personality and motivation. However, subsequent research has increasingly emphasized its situational nature, showing that WTC varies depending on contextual factors such as topic familiarity, interlocutor characteristics, and

perceived competence (de Bot, Lowie, & Verspoor, 2007; Tavakoli & Skehan, 2005). This shift has led to a growing recognition that WTC is not merely an individual disposition but a dynamic state shaped by ongoing interactions between the learner and the environment.

The relationship between anxiety and WTC has often been described as inversely proportional, with higher anxiety leading to lower willingness to communicate. While this general pattern has been supported by empirical findings, it fails to capture the complexity of their interaction. In some contexts, moderate levels of anxiety may enhance alertness and facilitate engagement (Larsen-Freeman & Cameron, 2008), suggesting that the relationship is not strictly linear. Moreover, most studies rely on cross-sectional designs, which obscure temporal fluctuations and reciprocal influences between variables.

These limitations have prompted increasing interest in dynamic approaches to SLA. Within this paradigm, Dynamic Systems Theory provides a conceptual framework that foregrounds variability, interdependence, and temporal development. From this perspective, affective variables such as anxiety and WTC are viewed as components of a complex adaptive system, continuously interacting with cognitive processes and contextual factors (Ellis, 2005; Skehan, 2009). This approach allows for a more nuanced understanding of how emotional and behavioral patterns emerge over time.

At the same time, cognitive variables have received comparatively less attention in studies of affective–behavioral interaction (MacIntyre & Gardner, 1994). Working memory, which supports the temporary storage and manipulation of information, is crucial for L2 speech production, particularly under conditions of high cognitive demand (MacIntyre, 1995; Verspoor, M., de Bot, K., & Lowie, 2011). Learners with greater working memory capacity are better able to maintain fluency and manage linguistic processing in real time. Similarly, task planning has been shown to influence performance by allowing learners to allocate cognitive resources more efficiently. However, the extent to which these cognitive factors interact with affective variables such as anxiety remains underexplored, especially within a dynamic systems framework.

3. A Dynamic Affective–Performance Interaction Model

In response to the limitations identified above, this paper proposes a Dynamic Affective–Performance Interaction Model (DAPIM) that conceptualizes L2 communication as an emergent outcome of interactions among affective, intentional, cognitive, and performance-related processes. Rather than presenting these components as discrete and static, the model emphasizes their continuous and reciprocal interaction over time.

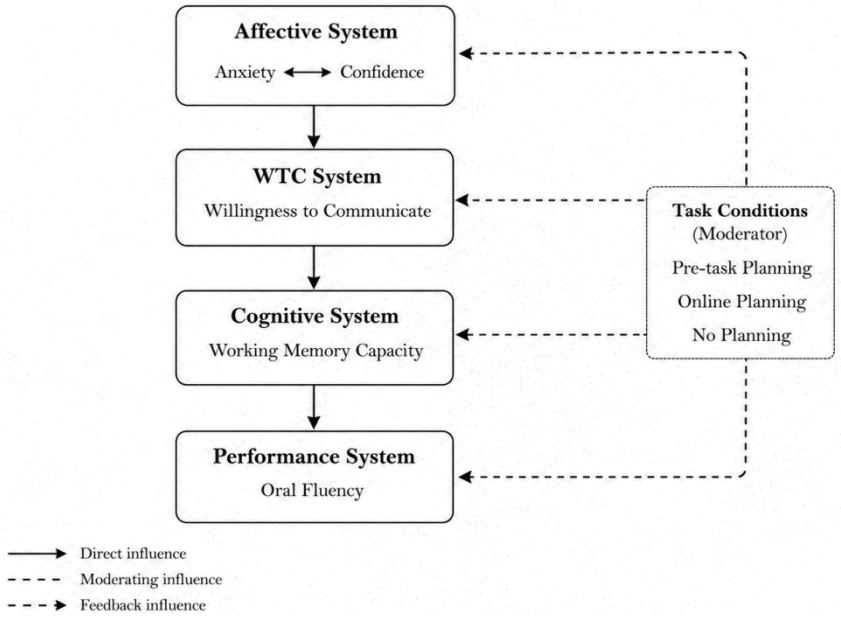

Figure 1. Dynamic Affective-Performance Interaction Model (DAPIM)

Within this framework, affective states such as anxiety and confidence fluctuate in response to task demands and prior experiences, shaping learners' psychological readiness to communicate. This readiness is manifested in WTC, which functions as an intermediate construct linking internal states to observable behavior. However, the translation of intention into performance is not automatic; it is mediated by cognitive processes, particularly working memory and attentional control (Baddeley, 2003; Segalowitz, 2010). When cognitive resources are limited, the negative impact of anxiety on performance may be amplified, whereas sufficient cognitive capacity can buffer this effect.

Task conditions further influence this process by altering the distribution of cognitive load. Planning opportunities, for example, can reduce processing demands during task execution, thereby mitigating the disruptive effects of anxiety and facilitating more stable performance (Dewaele, J.-M., & MacIntyre, 2014; MacIntyre, 2007). Importantly, performance outcomes such as fluency are not merely end results but also feed back into the system. Successful performance may enhance confidence and increase future WTC, while breakdowns in fluency may reinforce anxiety and reduce communicative engagement.

This dynamic interplay suggests that the relationship between anxiety and WTC is best understood as a recursive process rather than a unidirectional causal chain. The DAPIM framework thus shifts the focus from static relationships to evolving patterns of interaction, highlighting the importance of temporal and contextual variability in L2 communication.

4. Implications for Research and Practice

The model proposed in this study carries significant implications for both theoretical development and empirical investigation in second language acquisition. From a research perspective, the most immediate implication lies in the need to move beyond static and reductionist approaches toward more process-oriented and temporally sensitive methodologies. Traditional cross-sectional designs, which rely heavily on aggregated data, are inherently limited in their ability to capture the fluctuating nature of affective and cognitive variables. As the DAPIM framework suggests, constructs such as anxiety and willingness to communicate are not stable attributes but evolving states that are continuously shaped by contextual conditions and prior system states.

This calls for the adoption of dynamic research methods, including longitudinal tracking, time-series analysis, and real-time data collection techniques such as idiodynamic approaches. Such methods would allow researchers to observe micro-level changes in learners' affective states and communicative behaviors, thereby providing a more accurate representation of the underlying system dynamics. Moreover, future studies should consider integrating multimodal data sources, including behavioral observations, speech performance metrics, and physiological indicators, in order to capture the complexity of affective–cognitive interactions.

Another important implication concerns the integration of cognitive variables into affective research. While previous studies have often treated anxiety and WTC as primarily psychological constructs, the present model emphasizes the role of cognitive resource allocation in mediating their effects. Working memory capacity, in particular, emerges as a crucial factor that determines learners' ability to manage competing demands during L2 speech production. Under conditions of high anxiety, learners with limited working memory resources may experience a disproportionate decline in performance, whereas those with greater cognitive capacity may be better equipped to maintain fluency. This suggests that future research should adopt a more integrative perspective that considers both affective and cognitive dimensions as interdependent components of a unified system.

The role of task conditions also warrants further investigation. Within the DAPIM framework, task design is not merely a contextual variable but an active force that shapes system dynamics. Planning opportunities, for instance, can significantly alter the distribution of cognitive load, thereby influencing the relationship between anxiety and performance. Pre-task planning may allow learners to stabilize their linguistic output, while online planning may introduce additional processing demands that exacerbate anxiety. These differential effects highlight the importance of examining task conditions as dynamic regulators rather than static background variables.

From a pedagogical standpoint, the implications of the model are equally significant. Language instruction has traditionally focused either on reducing learners' anxiety or on enhancing their communicative competence. However, the DAPIM framework suggests that these goals cannot be pursued in isolation. Effective pedagogy must address the interaction between emotional states and cognitive processes, creating learning environments that support both psychological readiness and

processing efficiency. For example, providing structured planning time before communicative tasks can reduce cognitive pressure and foster more stable performance, which in turn may enhance learners' confidence and willingness to communicate.

Furthermore, the model highlights the importance of feedback loops in language learning. Positive performance experiences can lead to increased confidence and reduced anxiety, thereby reinforcing future communicative behavior. Conversely, repeated breakdowns in fluency may create a negative cycle in which anxiety increases and WTC decreases. Teachers should therefore be mindful of designing tasks that allow for early success experiences, thereby promoting a positive trajectory of affective and performance development.

5. Conclusion

This study has sought to reconceptualize the relationship between L2 anxiety and willingness to communicate through a dynamic systems lens. By moving beyond static and linear models, it has highlighted the complex and evolving nature of affective–cognitive interactions in second language communication. The proposed Dynamic Affective–Performance Interaction Model provides a theoretical framework that integrates emotional states, communicative intention, cognitive resources, and performance outcomes into a unified system.

One of the central contributions of this model lies in its emphasis on reciprocity and temporal development. Rather than viewing anxiety as a simple inhibitor of communication, the model positions it as a dynamic component that interacts continuously with other subsystems. Similarly, willingness to communicate is not treated as a fixed disposition but as an emergent state shaped by ongoing interactions between affective, cognitive, and contextual factors. This perspective allows for a more nuanced understanding of variability in L2 performance and offers a foundation for future research that seeks to capture the complexity of language use.

At the same time, the model underscores the importance of cognitive factors, particularly working memory and task planning, in shaping communicative outcomes. By incorporating these variables, the study bridges the gap between affective and cognitive approaches in SLA and provides a more comprehensive account of L2 speech production. The integration of these dimensions not only enhances theoretical coherence but also opens new avenues for empirical investigation.

While the present study is primarily theoretical in nature, it lays the groundwork for future research that can empirically test and refine the proposed framework. Such research will be essential for validating the model and exploring its applicability across different learner populations and instructional contexts. Ultimately, by offering a dynamic and mechanism-based perspective, this study contributes to a deeper understanding of how language learners navigate the complex interplay of emotion, cognition, and performance in real-time communication.

Reference

Baddeley, A. (2003). Working memory: Looking back and looking forward. *Nature Reviews Neuroscience*, *4*(10), 829-839.

Baddeley, A. (2012). Working memory: Theories, models, and controversies. *Annual Review of Psychology*, *63*, 1-29.

de Bot, K., Lowie, W., & Verspoor, M. (2007). A dynamic systems theory approach to second language acquisition. *Bilingualism: Language and Cognition*, *10*(1), 7-21.

Dewaele, J.-M., & MacIntyre, P. D. (2014). The two faces of Janus? Anxiety and enjoyment in the foreign language classroom. *Studies in Second Language Learning and Teaching*, *4*(2), 237-274.

Ellis, R. (2005). *Planning and task performance in a second language*. John Benjamins.

Horwitz, E. K., Horwitz, M. B., & Cope, J. (1986). Foreign language classroom anxiety. *The Modern Language Journal*, *70*(2), 125-132.

Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, *18*(2), 141-165.

Larsen-Freeman, D., & Cameron, L. (2008). *Complex systems and applied linguistics*. Oxford University Press.

MacIntyre, P. D. (1995). How does anxiety affect second language learning? *The Modern Language Journal*, *79*(1), 90-99.

MacIntyre, P. D. (2007). Willingness to communicate in the second language. *The Modern Language Journal*, *91*(4), 564-576.

MacIntyre, P. D., & Gardner, R. C. (1994). The subtle effects of language anxiety. *Language Learning*, *44*(2), 283-305.

MacIntyre, P. D., Clément, R., Dörnyei, Z., & Noels, K. A. (1998). Conceptualizing willingness to communicate. *The Modern Language Journal*, *82*(4), 545-562.

Ortega, L. (1999). Planning and focus on form in L2 oral performance. *Studies in Second Language Acquisition*, *21*(1), 109-148.

Peng, J.-E. (2012). Towards an ecological understanding of WTC. *System*, *40*(2), 203-213.

Segalowitz, N. (2010). *Cognitive bases of second language fluency*. Routledge.

Skehan, P. (2009). Modelling second language performance. *Applied Linguistics*, *30*(4), 510-532.

Tavakoli, P., & Skehan, P. (2005). Strategic planning and performance. *Language Learning*, *55*(2), 239-273.

Verspoor, M., de Bot, K., & Lowie, W. (2011). *A dynamic approach to second language development*. John Benjamins.

Wen, Z. (2016). *Working memory and second language learning*. Multilingual Matters.

Yashima, T. (2002). Willingness to communicate in a second language. *The Modern Language Journal*, *86*(1), 54-66.