

Psycho-Geographical Substrate Nesting Theory: A Multi-level Integrative Framework of Ecology, Culture, and Psychology

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Date: 2025-10-13T00:00:00+00:00

Abstract

Human psychological activities do not exist in isolation, but are deeply embedded within geographic and ecological environments. The geographic substrate establishes both constraints and pressures while simultaneously providing resources and possibilities, and humans gradually develop cultural practices and cognitive patterns through their adaptive responses. The Psychological-Geographic Substrate Embedding Theory proposes three logical dimensions – ‘Geographic Substrate–Micro-level Transmission–Cultural Archetype’ –and further operationalizes them into five hierarchical levels, thereby revealing the causal chain from physical environment to psychological cognition. The model emphasizes the synergistic interaction among embodied cognition, social learning, cultural tools, and cognitive schemas, explicating how macro-ecological conditions are transformed into cultural archetypes and individual psychological tendencies, and manifests dynamic evolutionary characteristics through feedback loops, historical inertia, and external regulation. Through cases including the rice theory, the honor culture of the American South, the ecological origins of Japanese cultural psychology, and the geographic foundations of ethnic music, the theory demonstrates its explanatory power and interdisciplinary potential, offering a novel perspective for understanding cultural diversity and the origins of cognition.

Full Text

Preamble

Psycho-Geographical Substratum Nesting Theory: A Multilevel Integrative Framework of Ecology, Culture, and Mind

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Abstract

Human psychological activity does not occur in isolation but is deeply embedded in geographical and ecological contexts. The geographical substrate imposes both constraints and affordances, shaping the range of human adaptation and creativity. In responding to environmental conditions, human groups gradually form distinctive cultural practices and cognitive patterns. The Psycho-Geographical Substratum Nesting Theory (PGSNT) proposes three interrelated dimensions—geographical substrate, micro-transmission, and cultural prototype—and elaborates them into five hierarchical levels, unveiling a causal chain from the physical environment to psychological cognition. The model highlights the synergistic roles of embodied cognition, social learning, cultural tools, and cognitive schemas, illustrating how macro-ecological conditions are transformed into cultural prototypes and individual psychological tendencies. It further emphasizes the dynamic evolution of these processes through feedback loops, historical inertia, and external regulation. Drawing on empirical and ethnographic cases such as the rice theory, the culture of honor in the American South, the ecological roots of Japanese cultural psychology, and the geographical foundations of ethnic music, the theory demonstrates its explanatory power and interdisciplinary potential. It offers a novel framework for understanding cultural diversity and the ecological origins of human cognition.

Keywords: Psycho-Geographical Substratum Nesting Theory; cultural prototypes; embodied cognition

Introduction

A complete account of psychology cannot be separated from geography, and vice versa. Human thought, emotion, and behavior are always rooted in specific geographical environments, which are themselves continuously understood, interpreted, and transformed by humans (Götz et al., 2025). However, despite early attempts to explore the relationship between mind and geography, this interdisciplinary connection never developed into a sustained academic tradition, leaving a significant blind spot in research perspectives (Götz et al., 2025). For a long time, mainstream psychology has relied on a universalist assumption that basic psychological mechanisms such as attention, perception, and learning are common to all humanity, treating cultural and ecological factors as negligible secondary variables (Wang, 2016). In contrast, cultural psychology emphasizes that the mind is not an abstract, cross-situational universal mechanism but a mental activity deeply embedded in cultural and ecological contexts (Shweder, 1990). This divergence in orientation has not only fragmented research findings but also made psychological conclusions overly dependent on “WEIRD” populations (Western, Educated, Industrialized, Rich, and Democratic), thereby limiting their representativeness of human experience as a whole (Henrich, Heine, & Norenzayan, 2010). In fact, substantial research demonstrates systematic differences in cognition, emotion, and behavior among populations from different cultures and regions (Markus & Kitayama, 1991). Therefore, to truly grasp the

complexity and diversity of human experience, psychological research must transcend disciplinary and geographical boundaries by incorporating cultural and geographical environments into its theoretical and methodological frameworks.

In existing behavioral genetics research, “environment” typically refers to individual-level contexts and experiences, such as family socioeconomic status, parenting styles, peer groups, and other unique life events. These micro-environmental variables, interacting with genetic factors, are believed to explain approximately 40-60% of individual differences (Vukasović & Bratko, 2015). However, this research orientation often overlooks more macro-level background conditions—geographical patterns, cultural traditions, and socio-ecological structures. Unlike micro-environments that directly influence individual development, macro-level geographical and human environments function more as “background constraints” that indirectly yet enduringly shape psychological and behavioral differences by structuring resource distribution, institutional arrangements, and social interaction patterns. The absence of a systematic integrative framework linking geographical conditions to psychological environments has left this level of influence underexplored. This study addresses this gap by examining the unique significance of geo-cultural-socio-ecological factors in human behavioral variation from a perspective that integrates macro-environmental and micro-individual interactions. In re-examining the relationship between mind and geography, we must first confront the historical legacy of environmental determinism. This theory posits that human culture and social development are directly determined by natural conditions such as climate and topography (Montesquieu, 1748). However, it has been criticized on both moral and scientific grounds for oversimplification, lack of empirical support (Fekadu, 2014), and its historical use as a justification for racism and colonialism—for example, claiming that “tropical climates make people lazy” to rationalize colonial rule (Donner, 2020). Such arguments are logically crude and cannot explain cultural differences under similar geographical conditions or economic disparities between neighboring countries. Consequently, environmental determinism gradually lost academic credibility. Yet its complete rejection created another bias: in many psychological and sociological studies, geographical environment was reduced to an irrelevant background variable, ignoring its deep role in psychological and social formation (Fukuyama, 2001).

Recent research has re-emphasized the significance of environment. For instance, the “pathogen threat theory” suggests that regions with high pathogen loads are more likely to develop collectivist and xenophobic tendencies to reduce infection risks; cross-national comparisons show significant correlations between historical pathogen prevalence and collectivism (Fincher et al., 2008; Schaller & Park, 2011; Murray & Schaller, 2016). Similarly, Talhelm et al. (2014) proposed the “rice theory,” finding that southern rice-farming regions, due to irrigation-dependent cooperation, exhibit greater collectivism, while northern wheat-farming regions lean toward individualism. Macro-level explanations have also attempted to restore the importance of environmental dimensions. In

Guns, Germs, and Steel, Diamond (1997) argues that differences in civilizational development stem primarily from geographical conditions such as the domesticability of plants and animals and continental axis orientation. While such theories are grand in scope, psychological mechanisms often remain implicit. In contrast, psychological micro-models can reveal the “ecology-psychology” chain but tend to be constrained by single factors. To bridge this tension, contemporary scholars have proposed integrative frameworks. For example, Van de Vliert’s (2013) “climate-economic model” suggests that culture represents a psychological adaptation to the interaction between climatic demands and economic resources: in regions with extreme climates and scarce resources, people prioritize survival and collective dependence, whereas in areas with favorable climates and abundant resources, individualism and self-expression flourish. Existing theories generally fall into two orientations: macro-level environmental-social determinism, which emphasizes environmental shaping power but lacks detailed psychological mechanisms; and micro-level ecology-psychology associationism, which values precise causal modeling but struggles to integrate multidimensional environmental factors.

Future research must transcend these two orientations by developing a multi-level, non-deterministic theoretical framework that reveals the progressive mechanisms from ecosystems to social institutions, behavioral norms, and individual psychology. Based on this, we propose the **Psycho-Geographical Substratum Nesting Theory (PGSNT)** as a multilevel integrative framework for understanding the relationship between ecology, culture, and mind. The core proposition of PGSNT is that geographical environment does not directly determine human psychology through a single path but “nests” its influence on mind and behavior through a series of environment-derived intermediate levels. This framework seeks to integrate insights from geography, anthropology, and psychology while avoiding the pitfalls of previous single-factor determinism. It is crucial to emphasize that PGSNT is an open and agnostic theoretical framework that does not presume the superiority of any particular theoretical paradigm. Instead, it advocates incorporating multiple perspectives within the same framework and explaining the complex relationship between ecology and psychology through dialogue among different theories. This aligns with the “three-axis framework for geo-psychological interaction (geographical variables, psychological variables, interaction mechanisms)” recently proposed by Götz et al. (2025), which similarly advocates granting equal status to geography and psychology, viewing their relationship as bidirectionally constructed rather than unidirectionally causal, and calling for multidisciplinary integration to identify neglected research blind spots. The goal of PGSNT is to provide such a holistic map spanning macro-meso-micro levels, pointing directions for interdisciplinary research while encouraging the testing of multiple competing hypotheses to avoid any form of theoretical dogmatism. Thus, introducing PGSNT helps overcome previous research limitations and responds to psychology’s renewed emphasis on cultural and ecological factors.

1.1 A Multilevel Perspective Borrowed from Ecological Systems Theory

To construct a theoretical framework capable of accommodating multilevel influences from macro-geography to micro-psychology, this study first borrows Bronfenbrenner's ecological systems theory as its structural blueprint (Bronfenbrenner & Ceci, 1994). This theory revolutionarily posits that individual development occurs within a series of nested environmental systems, each profoundly influencing the individual. These systems include the microsystem (immediate environments like family and school with bidirectional interactions), mesosystem (connections between microsystems, such as family-school interactions), exosystem (social levels the individual does not directly participate in but that affect their life, such as parental work environments and community policies), macrosystem (overall cultural values and laws), and the chronosystem across time. Ecological systems theory emphasizes the interactive and contextual nature of development, particularly its "bidirectional influence" perspective, providing a powerful anti-determinist tool (Cherry, 2023). However, the theory has limitations: its model is difficult to test empirically, and it relatively neglects the fundamental role of the physical environment (e.g., climate, topography) as the basis of all social systems (Elliott & Davis, 2018; Tudge, Mokrova, Hatfield, & Karnik, 2009). To address this deficiency, the PGSNT framework emerges. Building on ecological systems theory, PGSNT adds a more fundamental "substratum" layer—the physical-geographical and ecological environment—and emphasizes that this substratum provides the initial constraints and possibilities for generating all upper-level sociocultural systems. PGSNT inherits the hierarchical nesting approach of ecological systems theory but highlights the transmission chain from physical environment to psychological outcomes. In other words, its focus is not merely on static correspondences between macro-environment and individual psychology but on how ecological influences "permeate" the psychological level through a series of mediating mechanisms. Thus, PGSNT uses ecological systems theory's hierarchical divisions as a starting point while introducing more specific transmission mechanisms and pathways, transforming abstract environmental influences into an operational and testable analytical framework.

1.2 Mechanisms of Cognitive Construction: Schemas, Embodiment, and Cultural Tools

If ecological systems theory provides the structural answer to "where" influences occur, then cognitive psychology theories reveal the "how"—how external reality is transformed into internal psychological structures. This theory integrates three core cognitive construction mechanisms.

First is Bartlett's schema theory, which posits that knowledge is not a passively recorded copy but is actively constructed and organized into mental frameworks called "schemas" (Bartlett, 1995). Schemas originate from individual past experiences and function as evolving knowledge networks that guide how we under-

stand and remember new information. Bartlett's famous "War of the Ghosts" experiment demonstrated that memory is a reconstructive process: when people recall stories inconsistent with their cultural schemas, they unconsciously modify, simplify, or rationalize them to fit their existing knowledge frameworks (Wagoner, 2013). This provides a key mechanism for understanding how cultural experiences shape stable and enduring mental models: experiences derived from specific ecological adaptation activities gradually form shared cultural schemas, which in turn filter and shape individual perception and memory.

Second is embodied cognition theory, which challenges traditional psychology's mind-body dualism by 主张 (zhǔzhāng) ing that cognitive processes are deeply rooted in bodily interactions with the environment. Cognition serves action, and our sensorimotor capacities fundamentally shape how we think and perceive (Goldinger et al., 2016). For example, a baseball outfielder catches a fly ball not by performing complex parabolic calculations in the brain but by maintaining a dynamic visual coupling with the ball's trajectory while running. This theory provides a direct bridge connecting specific physical activities (e.g., rice cultivation, herding) to specific cognitive styles. However, embodied cognition theory has been criticized for conceptual vagueness and insufficient attention to sociocultural factors; this theory aims to situate it within a broader cultural-ecological framework to address this limitation.

Finally, Vygotsky's cultural-historical psychology builds the bridge from society to the individual. Vygotsky argued that uniquely human higher mental functions (e.g., logical memory, abstract thinking) are not innate but are mediated through social interaction (Miller, 2014). The core of this mediation process is "cultural tools," which include both psychological tools (language, writing, symbolic systems, maps) and material tools. Through interaction with more experienced social members (e.g., parents, teachers), children learn and "internalize" the use of these cultural tools, thereby transforming external social activities into internal psychological processes (Veraksa & Veraksa, 2018). This process perfectly explains how shared cultural practices (which are themselves adaptations to the environment) become individual cognitive structures.

These three theories are not mutually exclusive but describe different facets of the same grand process: the internalization of environment. Individuals exist in environments and must engage in purposeful, embodied actions for survival (embodied cognition). Repeated action patterns form stable experiences that are organized into mental frameworks (schema theory). The strategies, languages, and symbols used to organize and execute these actions are cultural tools internalized through social learning (cultural-historical psychology). Together, they constitute a complete pathway depicting how the external world is actively "brought into" the mind.

1.3 Dynamics of Cultural Evolution: Social Learning, Feedback Loops, and Path Dependence

Once psychological patterns originating from the geographical substrate are formed, how can they persist across generations? This requires introducing the dynamic mechanisms of cultural evolution.

Bandura's social learning theory provides the core transmission mechanism. The theory states that human behavior is largely learned through observation, imitation, and modeling rather than relying solely on direct trial-and-error and reinforcement. Bandura identified four key processes in observational learning: attention, retention, reproduction, and motivation (Bandura, 1977). Particularly important is the concept of "vicarious reinforcement," where individuals adjust their behavior by observing the consequences of others' actions (reward or punishment) without direct personal experience (Bandura, 1986). This mechanism greatly enhances the efficiency of cultural norm and complex skill transmission, explaining why behavioral patterns under specific social structures (e.g., violent responses in honor cultures) can be rapidly acquired and internalized by younger generations.

Second, cultural feedback loops explain the self-reinforcing nature of culture. The process by which cultural elements (values, norms, practices) are created, transmitted, and reinforced in a society is cyclical, where the output of one iteration becomes the input for the next (Hamedani & Markus, 2019). For example, a behavior receiving social approval (positive feedback) encourages more people to adopt it, further strengthening its normative status. This continuous interaction among culture, brain, and behavior forms a powerful feedback system that endows cultural patterns with dynamic stability (Crafa & Nagel, 2020).

Finally, the concept of path dependence from social sciences explains the persistence of cultural patterns. This theory suggests that certain early historical events or choices, even if accidental, can have profound and irreversible effects on subsequent developmental trajectories. Once a technology, institution, or cultural practice becomes "locked in" through "first-mover advantage" or "increasing returns," society finds it difficult to escape the original path even when superior alternatives emerge later (Page, 2006; Thelen, 1999). This explains why certain cultural traits can tenaciously survive long after the ecological pressures that initially produced them have disappeared, becoming a form of historical inertia (Cooke & Rehfeld, 2011).

Social learning theory explains "how" cultural patterns are transmitted, cultural feedback loops explain "how" they are self-maintained, and path dependence explains "why" they are so persistent. Together, these three dynamic mechanisms ensure that culture-cognition patterns originating from specific psycho-geographical substrates can transcend individual lifespans and become stable, profound collective characteristics.

2 Construction and Operation of the Psycho-Geographical Substratum Nesting Theory

Having clarified the contributions and limitations of existing theories and established the necessity of building an integrative framework, this study formally proposes the Psycho-Geographical Substratum Nesting Theory (PGSNT) and presents its core architecture and operational mechanisms.

PGSNT aims to depict a dynamic and complex picture: the geographical substrate sets the stage and initial script, the body is the primary actor, social learning is the rehearsal process, cultural tools are the props and lines, and the resulting cultural schemas are the deeply internalized character roles. This script can be modified by later directors (e.g., technology, foreign ideas), but the original shape of the stage always invisibly constrains the style and direction of the entire performance.

2.1 Core Definitions

The core definition of the Psycho-Geographical Substratum Nesting Theory is as follows: Human psychology and culture constitute a dynamically evolving nested system constructed upon a specific geographical substrate through multidimensional transmission mechanisms including embodied cognition (transformation of bodily experience), social learning (replication of behavioral patterns), cultural tools (shaping of mental logic), and cognitive schemas (construction of internal frameworks). In this system, the geographical substrate serves as the underlying logic. Though not deterministic, its influence profoundly shapes cultural prototypes and, through continuous interaction with individuals and the external world, demonstrates powerful historical inertia and contemporary explanatory power.

This definition emphasizes five core elements. First, **nested system**: Psychology and culture are not single-level phenomena but multilayered complex structures where underlying physical environments and upper-level psychological cognition are interrelated and progressively linked. Second, **geographical substrate**: The physical environment is the system's starting point and foundation, providing "constraints" and "affordances" that set the initial probability distribution for human survival strategies. Third, **micro-transmission mechanisms**: These are the theory's core engine, explaining how the geographical substrate's influence is "translated" and "amplified" through specific psychological processes (embodied cognition, social learning, etc.). Fourth, **cultural prototypes**: These are the theory's output—relatively stable psychological tendencies and behavioral patterns in a society. They are not fixed "traits" but "prototypes" with dynamic evolutionary potential. Fifth, **dynamic evolution**: The psycho-geographical substratum nesting system is open, contains feedback loops, and is continuously modulated by historical inertia and external shocks, keeping it in constant flux.

PGSNT aligns conceptually with the "three-axis framework for geo-psychological

interaction (geographical variables, psychological variables, interaction mechanisms)” proposed by Götz et al. (2025). The latter similarly advocates granting equal status to geography and psychology, viewing their relationship as bidirectionally constructed rather than unidirectionally causal, and calling for multidisciplinary integration to identify neglected research blind spots. PGSNT further proposes a “nested” causal transmission chain that embeds the three-axis classification framework into a multilevel system, preserving both the breadth of interdisciplinary integration and the depth of causal explanation. Therefore, PGSNT not only responds to psychology’ s renewed emphasis on cultural and ecological factors but also provides a holistic map spanning macro-meso-micro levels for future interdisciplinary research.

2.2 Hierarchical Analysis

The theoretical model can be parsed into three nested layers, borrowing from Bronfenbrenner’ s ecological model but focusing more on the transmission path from physical environment to psychological structure.

Layer 1: Geographical Substratum

The geographical substratum is the theory’ s logical starting point and cornerstone. It comprises macro-level physical environmental features within a specific region that are long-term stable and not easily changed by individuals—akin to a culture’ s “genome” or “underlying operating system.” It does not write specific cultural “applications” (e.g., particular myths or rituals) but sets the basic parameters and constraints for their operation. Its main components include: climate and hydrology (e.g., rainfall, temperature, humidity, river distribution, water availability); topography and landforms (e.g., plains, mountains, plateaus, islands, coastlines); resource endowments (e.g., land fertility, mineral resources, available flora and fauna); and geographical location (e.g., continental interior, coastal, isolated islands), which determines the difficulty of contact with other cultures. The geographical substratum’ s role is not to “determine” but to “shape probabilities.” It does not directly prescribe what humans must do but, by providing a series of “constraints” and “affordances,” makes certain survival strategies more feasible and rewarding than others. For example, a fertile alluvial plain with abundant water “affords” agricultural settlement, while an arid grassland “constrains” large-scale agriculture while “affording” nomadic life.

Layer 2: Micro-Transmission Mechanisms

This is the theory’ s most innovative component, detailing how the geographical substratum’ s macro-level influences are transmitted and internalized into individual psychological structures through four synergistic psychological mechanisms. These mechanisms form a complete chain from physical to psychological.

- **Embodied Cognition:** The first link in the transmission chain. Environmental information enters the mental system through the body. Cognition is not abstract computation independent of the body but is deeply rooted in the body’ s structure and its interactions with the environment. The

survival pressures exerted by the geographical substratum first require adaptive behavioral responses from the human body. These repeatedly performed, highly coupled bodily postures, movement patterns, and sensory experiences constitute the most primitive and direct form of “knowledge.” For instance, in regions with year-round hot and humid climates requiring frequent cleaning of wooden houses to prevent mold (as in parts of traditional Japan), specific bodily postures like kneeling to wipe floors emerge. This posture is not merely a labor method but a long-term, repetitive bodily experience that shapes individuals’ relationship with their living space—a low-perspective, intimate relationship requiring substantial physical labor. This knowledge is not abstract symbols but sensorimotor patterns stored in bodily memory.

- **Social Learning:** The second link, responsible for replicating and disseminating successful embodied adaptive behaviors within the group. According to social learning theory, individuals learn behaviors through observation, imitation, and modeling. When an individual or small group develops an effective survival behavior (e.g., an efficient irrigation technique or cooperative hunting method), other group members develop learning motivation through observing its successful outcomes (vicarious reinforcement) and imitate it. This process transforms individually embodied adaptive behaviors into group-level, standardized social practices.
- **Cultural-Historical Psychology:** The third link, responsible for symbolizing and meaning-making of social practices. Drawing on Vygotsky’s theory, uniquely human higher mental functions are internalized from external social activities mediated by cultural tools (especially language). When a social practice (e.g., cooperative irrigation) is widely adopted, society develops corresponding language, rules, stories, and values to describe, organize, and legitimize the behavior. Terms like “cooperation,” “collective interest,” and “harmony” elevate utilitarian behaviors into morally meaningful cultural norms. Language is not merely a communication tool but a tool for shaping thought, transforming external behavioral logic into internal mental logic.
- **Cognitive Schemas:** The final link, responsible for solidifying internalized cultural norms into stable psychological structures. Schema theory posits that knowledge is organized into mental frameworks or “schemas” that actively influence how we perceive, interpret, and remember information. Long-term immersion in social practices shaped by specific geographical environments and mediated by social learning and cultural tools leads individuals to construct corresponding cultural schemas. For example, individuals raised in rice-cultivation cultures develop a “collectivism schema” that automatically guides them to understand the world from relational and contextual perspectives, prioritizing group harmony.

Layer 3: Cultural Prototypes and Dynamic Evolution

This is the outermost layer of the nested system—the observable result of in-

teractions between the first two layers. It includes dominant psychological tendencies, social structures, and cultural products in a society. We use “cultural prototypes” rather than “cultural traits” to emphasize their non-fixed nature.

- **Cultural Prototypes:** Typical, high-probability psychological and behavioral patterns in a specific culture. Examples include the “collectivism prototype” in rice-cultivation regions, the “honor culture prototype” in nomadic regions, and the “relational dependency prototype” in island cultures. These prototypes are macro-level manifestations of cognitive schemas at the group level.
- **Dynamic Evolution:** Cultural prototypes are not static but evolve dynamically, manifesting in three aspects:
 - **Feedback:** Human cultural activities in turn transform the geographical substratum (e.g., building terraces, urbanization), creating new constraints and affordances that initiate new cycles of adaptation and transmission.
 - **Historical Inertia:** Once cultural schemas are established and reinforced over generations, they become highly stable. Even when the original geographical environment that produced them has changed, they continue to influence thought and behavior.
 - **Modulation:** The system is open and subject to external regulation. Globalization, technological leaps, and cross-cultural exchange interact with historically inertial cultural prototypes, potentially leading to their reinforcement, modification, attenuation, or the emergence of new hybrid cultural forms.

2.3 Operational Mechanisms

To clarify how the theory operates, we now detail the complete transmission path from environment to mind, illustrating how the four micro-transmission mechanisms interlock to transform the geographical substratum’s potential influences into actual psychological structures.

Stage 1: From Environment to Body

The system begins with the geographical substratum’s most basic demands for human survival. This transformation is pre-linguistic and pre-reflective, translating geographical information into physiological reality through the body’s perceptual and motor systems. Take persistent hot and humid climates as an example. This constant sensory input creates biological pressures including fungal growth, food spoilage, and bodily discomfort. To cope, the body develops strong avoidance and cleaning needs. This sensitivity to “cleanliness” versus “filth,” “dryness” versus “dampness,” becomes a fundamental biological drive, laying the biological and phenomenological foundation for subsequent cultural practices (e.g., frequent bathing, specific architectural styles).

Stage 2: From Body to Social Practice

Individual embodied solutions to environmental pressures, if proven effective, are adopted, imitated, refined, and standardized through social learning mechanisms, becoming shared cultural practices or customs. Continuing the hot-humid climate example: individuals seeking to keep bodies and dwellings dry and clean might accidentally discover specific cleaning methods (e.g., kneeling to wipe wooden floors with damp cloths effectively removes moisture and mold). When neighbors observe these behaviors' good results, they imitate them. After multi-generational transmission and refinement, these initial individual adaptations can evolve into standardized cultural techniques. For instance, the elevated floors and permeable shoji screens in traditional Japanese architecture originally served functional purposes for coping with Japan' s hot, humid climate.

Stage 3: From Social Practice to Internal Schema

This is the crucial leap in PGSNT' s causal path. When individuals are long immersed in environments constituted by specific social practices and cultural tools, they learn not only the “how-to” of these practices but, more importantly, internalize their “deep logic.” Take traditional Japanese housing as an example. Living in residences divided by paper “fusuma” and “shoji” screens (Uyeda, 2023), individuals gain experiences far beyond efficient use of small spaces. Without solid walls and strict functional zoning, physical boundaries between family members become blurred, making one' s activities easily perceived by others. This architectural space itself is a powerful “cultural tool,” constantly conveying to inhabitants that individuals are interrelated parts of a group, privacy is relative and fluid, and personal behavior must always consider its impact on others. Growing up long-term in such environments, individuals internalize a highly contextualized, relationship-oriented cognitive schema. They learn to communicate through nonverbal cues, develop keen insight into others' emotions and intentions, and form behavioral tendencies prioritizing collective harmony over individual expression. Physical solutions originally for coping with dampness and space constraints ultimately transform into profound psychological traits.

Stage 4: System Dynamics

The nested system is not a unidirectional, linear “conveyor belt” but a vibrant dynamic system.

- **Feedback Loops:** Through activities like building terraces and canals, humans dramatically transform the geographical substratum. This modified “secondary substrate” generates new constraints and affordances, initiating new cycles of adaptation-transmission and making culture-environment coevolution more intimate.

- **Historical Inertia:** This is a key point of PGSNT' s explanatory power. Thinking schemas originating from agricultural patterns thousands of years ago can still profoundly influence social behavior in modern times. The persistence of the American Southern “culture of honor” is an excellent example: its core “honor schema,” originating from Scottish-Irish herders' survival strategies on frontiers, remains active in modern Southern men despite their no longer being herders.

- **External Modulation:** The system is open and continuously impacted and modulated by the external world. Trade, war, globalization, and modern technology bring new techniques, institutions, and ideas. The results are complex: sometimes foreign cultures are assimilated by indigenous schemas; other times they may cause “hasty stitching” contradictions between cultural systems, generating social and psychological tensions and conflicts. This dynamism ensures the theoretical model can explain cultural change, not just its origins.

2.4 Nested Interactions

The model’s core value lies in providing a clear, structured framework that makes complex, cross-level arguments intuitive and accessible. From an analytical perspective, this study summarizes the psycho-geographical substratum nesting system into three logical levels: geographical substrate, micro-transmission mechanisms, and cultural prototypes. However, in the operational model, to better reveal the progressive causal chain, this study further refines it into five levels (see Table 2). This dual articulation highlights both the theoretical abstraction’s integrity and the model’s practical operability in empirical research and application. It depicts not only the static “nested” structure but, more importantly, maps the various theoretical mechanisms discussed earlier (e.g., embodied cognition, social learning) onto different model levels, thereby revealing a dynamic causal transmission chain from geography to mind. This theoretical model is not a unidirectional, rigid determinism but emphasizes dynamic interactions across levels, including both top-down constraints and shaping and bottom-up agency and reconstruction.

Top-Down Influence (Constraint and Shaping)

The model’s primary causal flow transmits from Level 1 (substratum) down to Level 5 (individual cognition). The geographical substrate’s objective conditions (e.g., climate, topography) create ecological pressures that make certain survival strategies (Level 2) more adaptive than others. The practices of these survival strategies (e.g., cooperative irrigation or mobile herding) require specific social structures and cultural tools (Level 3) for support and coordination. To legitimize and effectively transmit these social structures and norms, societal members co-construct corresponding cultural schemas and worldviews (Level 4). Finally, individuals growing up in this environment internalize these schemas through socialization, forming unique cognitive and emotional tendencies (Level 5). Path dependence mechanisms make this entire system, once formed, powerfully inertial and difficult to change (Page, 2006; Thelen, 1999).

Bottom-Up Influence (Agency and Reconstruction)

Meanwhile, human agency operates at all levels, forming bottom-up feedback and reconstructive forces. Individuals and groups are not passive recipients of environmental shaping. Through “niche construction,” they actively transform the physical environment (e.g., building terraces, digging canals). They invent new cultural tools (e.g., technological innovations, institutional designs) that can 反过来 change survival strategies and even social structures. They also

reinterpret, challenge, and revise existing cultural schemas. These bottom-up changes can create new feedback loops that, over time, may alter the entire system's appearance (Crafa & Nagel, 2020). In the era of globalization, a particularly important phenomenon is the emergence of the “digital substrate.” The internet and social media, as human creations, are forming a new, virtual reality layer whose influence is beginning to rival traditional physical substrates—a most powerful proof of human agency reshaping its living environment (Stuart, 2024).

Table 2: Nested Levels Model of Psycho-Geographical Substratum Theory

Level	Name	Description	Key Mechanisms
1	Psycho-Geographical Substratum	Fundamental physical and ecological environment: climate, topography, resource abundance/scarcity, local pathogens. Provides ultimate constraints and affordances for human survival.	Ecological constraints and possibilities
2	Survival and Embodiment	Primary survival patterns and economic activities directly responding to the substratum. At this level, cognition becomes “embodied” through repeated, purposeful physical actions.	Embodied cognition; perception-action cycles
3	Social Structure and Cultural Tools	Stable social organizations, norms, and mediating artifacts developed to manage survival activities. Includes kinship systems, property rights, technology.	Vygotsky's cultural tools; social learning

Level	Name	Description	Key Mechanisms
4	Cultural Schemas and World-views	Shared meaning systems, values, and beliefs abstracted from social structures and tools. This is the “macrosystem” level of shared cultural reality.	Bartlett’ s schema theory; cultural feedback loops; path dependence
5	Individual Cognitive System	Individual internalized cognitive and emotional tendencies shaped by all above nested levels. This is the level accessible to individual psychological measurement.	Internalization; schema-driven perception and memory

2.5 Summary

Based on reviewing and reflecting on existing theoretical achievements, this section proposes and systematically elaborates the Psycho-Geographical Substratum Nesting Theory (PGSNT). The theory’ s core contributions are: (1) establishing a new perspective on human-environment relations with geographical substrate as the underlying logic, emphasizing its profound shaping of cultural-psychological prototypes; (2) proposing four micro-transmission mechanisms—embodied cognition, social learning, cultural tools, and cognitive schemas—to reveal the complete causal chain from physical environment to psychological structure; (3) distinguishing three logical levels and five operational levels, balancing theoretical abstraction’ s integrity with practical applicability; (4) highlighting the system’ s dynamic evolutionary characteristics, including both top-down constraints and bottom-up agency; and (5) incorporating the “digital substrate” as an important new dimension in the era of globalization and informatization, expanding the theory’ s practical explanatory power. In summary, PGSNT not only provides a multilevel, dynamic framework for understanding the generative mechanisms of mind and culture but also lays a theoretical foundation for subsequent empirical research and case analysis. The following sections will further explore the theory’ s application and validation in specific sociocultural contexts.

3 Empirical Illustrations—Mapping Theory onto the Real World

A theory's value ultimately depends on its ability to explain real-world phenomena. This section applies PGSNT's five-level model to systematically analyze four empirical cases from different cultural backgrounds and research fields, demonstrating the theory's explanatory power and applicability.

3.1 Agricultural Patterns and Thinking Styles: Revisiting the “Rice Theory”

Talhelm's (2022) “rice theory” provides a classic empirical case for this framework. The research found significant differences in thinking styles between southern and northern Chinese populations: southerners tend toward holistic thinking while northerners lean toward analytic thinking, attributing these differences to two agricultural patterns. Applying our five-level model:

Level 1 (Substratum). China's geographical substratum features a north-south divide roughly along the Qinling-Huaihe line. The south has a warm, humid climate with abundant rainfall and dense river networks—ideal natural conditions for water-intensive rice cultivation. The north is relatively dry and cold, better suited for drought-resistant wheat. This climatic and hydrological difference forms the geographical foundation for two distinct agricultural patterns. **Level 2 (Survival and Embodiment).** Rice cultivation, especially traditional paddy farming, is labor-intensive, requiring twice the manpower of wheat. Crucially, it depends on complex irrigation systems requiring community-wide cooperation to build, maintain, and allocate water (Krisnawati, Sujatna, Amalia, Soemantri, & Pamungkas, 2024). Farmers' daily labor itself is an “embodied” interdependence. In contrast, wheat cultivation is more individualized, with farmers able to complete most work independently. This daily physical practice deeply engrains cognitive patterns of “interdependence” versus “independence” into farmers' bodily experiences (Talhelm, Wu, Lyu, Zhou, & Zhang, 2023). **Level 3 (Social Structure and Cultural Tools).** To meet rice cultivation's high cooperation demands, southern villages developed corresponding social structures and cultural tools. The most important “tool” is the irrigation network itself, along with accompanying social customs like labor exchange and mutual aid. These norms are transmitted across generations through social learning, becoming central to community life. **Level 4 (Cultural Schemas).** Living long-term in such highly cooperative social structures fosters a cultural schema emphasizing collectivism, interdependence, and interpersonal harmony. Individuals must constantly attend to others' needs and the entire system's functioning (e.g., water distribution in irrigation systems), naturally leading to a “holistic” worldview that focuses on contexts and relationships rather than isolated individuals (Hu & Yuan, 2015). **Level 5 (Individual Cognition).** This cultural schema ultimately becomes internalized as individual cognitive style. Psychological experiments show that individuals from rice-cultivation regions demonstrate more holistic thinking across various

cognitive tasks (e.g., categorization, attribution tasks), value individualism less, and show stronger loyalty to in-group members (Talhelm, 2022).

This five-level analysis reveals that the “rice theory” phenomenon is not simply “rice causes holistic thinking” but a complete causal chain initiated by geographical substrate, transmitted through embodied practice, social construction, and schema abstraction, and finally manifested at the individual level. We should also note criticisms of the theory—for example, that a more accurate distinction might be “rice” versus “non-rice” agriculture rather than simply equating it with wheat (Hu & Yuan, 2015)—which reminds us to maintain precision and caution when applying the model. PGSNT responds to such issues: through multilevel nesting and multiple transmission mechanisms, it preserves the ecological-psychological connection revealed by rice theory while avoiding its single-causality limitations, providing a more open and systematic explanation for the complex relationships among agricultural patterns, social institutions, and cultural psychology.

3.2 Ecological Vulnerability and Honor Culture: The Psychology of Violence in the American South

Nisbett and Cohen’s (1996) research on the American Southern “culture of honor” provides another powerful illustration. They found that violent crime rates among Southern white males, especially homicide rates related to disputes and insults, were significantly higher than in the North, attributing this to a honor culture originating from pastoral economies. Applying the five-level model:

Level 1 (Substratum). Early Southern settlers came primarily from the Scottish-Irish border region, migrating to the Southern interior’s hilly and mountainous areas where law and order were weak, large-scale farming was unsuitable, but animal husbandry thrived (Nisbett & Cohen, 1996). **Level 2 (Survival and Embodiment).** Pastoral economies feature highly mobile and vulnerable wealth (livestock) easily stolen. Without effective legal protection, herders must rely on their own strength to defend property. This fosters an embodied posture of constant vigilance and readiness for violent self-defense (Nisbett & Cohen, 1996; Uskul, Cross, Günsoy, & Gul, 2018). **Level 3 (Social Structure and Cultural Tools).** In this ecology, a man’s most important “cultural tool” is his reputation for being “not to be trifled with.” Any form of insult cannot be ignored, as it is seen as a test of strength. Consequently, society gradually developed a norm: violence must respond to provocation, or one is seen as weak and invites greater aggression. This behavioral pattern is widely transmitted and imitated through social learning, with honor-defending violence receiving social approval and status enhancement (Asif, Lahiani, Alhourani, Al Mahamed, & Abou Adel, 2025). **Level 4 (Cultural Schema).** This social norm solidifies into a powerful “honor culture” schema. In this schema, masculinity, reputation, and dignity are central to social status, and violence is a legitimate and necessary means to defend these core values (Uskul, Cross, Günsoy, & Gul, 2018).

Level 5 (Individual Cognition). This schema is powerfully confirmed at the individual psychological level. When insulted, compared to Northerners, Southern white males cognitively perceive greater threats to masculine reputation; emotionally experience more anger; physiologically show higher cortisol (stress hormone) and testosterone (aggression-related) levels; and behaviorally display greater aggression (Cohen, Nisbett, Bowdle, & Schwarz, 1996).

This case again clearly demonstrates the complete chain from geographical substrate (vulnerable pastoral ecology) to survival strategy (violent self-defense), to social norms (reputation is everything), cultural schema (honor culture), and finally to unique psychological and physiological response patterns at the individual level.

3.3 Geographical Patterns and Social Fabric: A Case Study of Japanese Cultural Psychology

Japanese cultural psychology provides a more complex comprehensive case. Its unique collectivist tendencies, sensitivity to nature, and distinctive social customs can all be traced to profound geographical roots. Applying the five-level model:

Level 1 (Substratum). Japan is a typical island nation with a narrow territory where mountains occupy most of the land (only about 15% is arable), and natural resources are relatively scarce (Grant, 1998). Simultaneously, it lies on the Pacific Ring of Fire, frequently suffering natural disasters including earthquakes, tsunamis, typhoons, and volcanic eruptions (Pastrana-Huguet, Casado-Claro, & Gavari-Starkie, 2022). **Level 2 (Survival and Embodiment).** Land and resource scarcity forced Japan to develop highly intensive wetland rice agriculture requiring 极致 efficient use of limited space (Francks, 2006; Nakane, 1970). Persistent disaster threats fostered a universal, deeply embodied disaster prevention culture—“bosai culture” (Pastrana-Huguet, Casado-Claro, & Gavari-Starkie, 2022). Both survival strategies demand extremely high community cooperation and coordination. **Level 3 (Social Structure and Cultural Tools).** To adapt to intensive agriculture, the traditional large-family system became the basic unit of production and labor (Francks, 2006; Nakane, 1970). In cities, resource and space constraints gave rise to public bathhouses, which not only solved practical bathing needs but also became important social venues promoting neighborhood communication and community sentiment—so-called “naked communion” (Clark, 1994). To maintain order in crowded, interdependent communities, a complex and strict system of social etiquette and hierarchical norms also developed (Dalsky & Su, 2020). **Level 4 (Cultural Schema).** These social structures deeply rooted in survival practices collectively nurtured a powerful cultural schema emphasizing group harmony, collectivism, and interdependence, while relatively suppressing individualism (Dalsky & Su, 2020). Constant coexistence with unpredictable natural disasters may also have shaped Japanese people’s profound sense of impermanence and the “wabi-sabi” aesthetic of finding beauty in imperfection and transience (Kasulis, 2004). **Level 5 (Individual**

Cognition). This cultural schema is reflected at the individual psychological level as stronger interdependent self-construal and a holistic aesthetic preference for expressing context and background in artistic creation (Senzaki, Masuda, & Nand, 2014). Although academic debate exists about whether Japan is a typical collectivist society, its cultural psychology' s high sensitivity to context and others is widely recognized (Dalsky & Su, 2020). Additionally, Japanese emphasis on nature' s psychological healing effects (e.g., forest bathing) also reflects the close connection between cultural psychology and geographical environment (Furuyashiki et al., 2019).

The Japanese case again demonstrates the progressive relationship from geographical substrate (island topography, resource scarcity, frequent disasters) to survival strategies (intensive rice cultivation and disaster prevention culture), to social structures (large-family system, public spaces, social etiquette), cultural schemas (group harmony, wabi-sabi aesthetics), and individual psychology and cognitive styles (interdependent self, holistic aesthetics, nature-healing concepts). This process reveals how geographical patterns profoundly shape social fabric and ultimately sediment into distinctive cultural-psychological styles.

3.4 Soundscapes and Embodied Expression: Ecological Roots of Mongolian Throat Singing and Guangxi Folk Songs

Ethnomusicology provides a unique, non-linguistic validation field, revealing how humanity' s most primitive artistic expression—sound—is shaped by geographical environment. Applying the five-level model:

Level 1 (Substratum). Mongolia' s vast, open steppes and mountains create a unique “soundscape” where sound travels far, with wind, water, and animal calls forming the environmental leitmotif (Pegg, 2001). Guangxi' s karst landscape in China provides another mountainous, echo-rich acoustic environment (Qin & Widman, 2012). **Level 2 (Survival and Embodiment).** Nomadic life means continuous and profound sensory interaction with the natural environment (Pegg, 2001). Mongolian throat singing (Khoomei) is a highly embodied vocal technique where singers precisely control laryngeal, tongue, and lip muscles to produce a fundamental frequency and multiple high-frequency overtones simultaneously, aiming to imitate and echo natural sounds—wind howling, streams murmuring, birds chirping (Pegg, 2001). Guangxi' s mountain songs are similarly connected to mountain labor and social life, their high-pitched, resonant melodies suitable for transmission across valleys (Qin & Widman, 2012). **Level 3 (Social Structure and Cultural Tools).** Throat singing techniques themselves are “cultural tools” transmitted across generations. Some specific styles are even directly named after landscape features (e.g., kargyraa, meaning “roaring” or “hoarse”) or nomadic activities (e.g., ezengileer, imitating stirrup rhythms), explicitly linking vocal tools to their ecological origins (Levin & Süzükei, 2006). **Level 4 (Cultural Schema).** These vocal practices are deeply rooted in an animistic worldview where everything in nature (mountains, rivers, trees) has spirit, and sound is the medium for communicating with these spir-

its (Levin & Süzükei, 2006). Music is therefore not merely entertainment but a ritual behavior of “mimetic exchange” with natural spirits (Taussig, 2018). **Level 5 (Individual Cognition)**. The act of throat singing itself is a direct, audible manifestation of a cognitive system deeply attuned to the geographical substrate. It demonstrates how human auditory, vocal, and entire bodily systems can be shaped into precise instruments for “reading” and “reproducing” their ecological environment.

The comparative cases of Mongolian throat singing and Guangxi folk songs vividly reveal how sound, as humanity’s most primitive artistic expression, directly maps and responds to its ecological environment. From the acoustic patterns of steppes and mountains, to embodied practices of nomadism and farming, to vocal techniques and social transmission as cultural tools, through animistic cultural schemas to individual cognitive experience, music demonstrates unique ecological embeddedness. It is not merely an aesthetic and social product but audible testimony to the deep interaction between the human body and the natural world.

Through comparative analysis of these four distinct cases, we discover a common underlying logic: a specific geographical substratum (Level 1) poses particular adaptive challenges that are resolved through specific embodied survival patterns (Level 2). These solutions are encoded as social structures and cultural tools (Level 3), rationalized and abstracted into cultural schemas (Level 4), and ultimately profoundly shape individual psychology and cognition (Level 5). This parallel structure across cases provides strong convergent validation for our proposed five-level nested model.

4 Theoretical Contributions, Challenges, and Future Directions

4.1 Theoretical Integration and Contributions

The core contribution of the Psycho-Geographical Substratum Nesting Theory lies in providing an integrative theoretical framework. First, it effectively connects macro-level geographical and anthropological theories with micro-level cognitive psychology mechanisms (Ellen, 1988). By grounding the “mutual construction” process of culture and mind in a solid physical substrate, the theory provides concrete origins and transmission paths for this somewhat abstract concept (Götz et al., 2025). Second, it offers psychology a strong, non-reductionist alternative that avoids the pitfalls of long-discredited environmental determinism while challenging the geographically decontextualized universalist paradigm that has long dominated psychology. Finally, through its nested structure, the theory encourages researchers to adopt a systematic, cross-level perspective to understand human behavior, recognizing that individual psychology, social norms, and ecological environment form an inseparable whole.

4.2 Challenges and Limitations: The Quantification Dilemma in Cultural Psychology

Despite the theory's broad explanatory potential, it faces severe challenges common to cultural psychology when subjected to empirical testing. First is the operationalization problem. How to transform abstract cultural constructs like "cultural schemas" or "interdependence" into reliably measurable variables without introducing researchers' own cultural biases is a huge challenge (Van de Vijver & Leung, 2021). Many psychological measurement tools were developed in Western cultural contexts; their concepts and items may not hold equivalent meaning in other cultures, and direct application may lead to erroneous conclusions. For example, the famous "marshmallow test" in cross-cultural research found that children's performance differences in delayed gratification across cultures may reflect different cultural norms (e.g., Cameroonian culture emphasizing hierarchy and obedience versus German culture valuing autonomy and self-expression) rather than pure self-control ability (Lamm et al., 2018). Second is sampling limitations. Current cross-cultural psychology research remains largely confined to simple "East vs. West" comparisons, not only neglecting enormous internal differences within these cultural regions (e.g., social class, religion, urban-rural differences) but also ignoring other vast cultural regions of the world (Grossmann & Na, 2014). Psychology's "WEIRD" sampling problem severely limits the generalizability of research conclusions (Henrich, Heine, & Norenzayan, 2010). Finally, there is the difficulty of causal inference. This theory proposes a historical causal chain spanning hundreds or thousands of years, while psychological research mostly relies on cross-sectional data, making strict causal proof nearly impossible. What we can observe are mostly correlations, and although alternative explanations such as genetics and language can be partially ruled out through sophisticated research designs (e.g., Talhelm's comparisons across Chinese regions), they can never be completely eliminated (Varnum et al., 2010). Additionally, in public perception, concepts of culture and race are often conflated, posing extra challenges for clearly communicating research conclusions about cultural origins (Lo & Sasaki, 2024).

4.3 Future Research Directions: Globalization and the Emergence of the Digital Substrate

The temporal dimension of ecological systems theory reminds us that environments shaping human psychology are not static. In today's globalized and digital era, two new forces are profoundly reshaping the relationship between mind and geography. First is **globalization and cultural hybridization**. Transnational media, global trade, and population migration are creating new "mediascapes" and "ethnoscapes" that transcend geographical limitations (Appadurai, 1996). On one hand, this may lead to the spread of dominant cultures (typically Western) and homogenization of local cultures; on the other, it fosters unprecedented cultural fusion and hybridization, challenging the uniqueness of cultural models rooted in specific local physical substrates (Appadurai, 1996).

Second, and more revolutionary, is the **emergence of the digital substrate**. The internet, especially social media, is constructing a new, virtual reality layer. This “digital substrate” follows laws fundamentally different from physical substrates: it is spatially decentralized, temporally instantaneous, and its information flow is carefully regulated by algorithms. It provides unprecedented platforms for social learning, dramatically accelerates cultural feedback loops, and may be incubating entirely new cognitive styles, social norms, and even psychological identities (Zuboff, 2019). Future research must focus on the tension between these two forces: on one side, the slowly changing cultural inertia rooted in millennia of agricultural and pastoral history and deeply embedded in geographical substrate; on the other, the rapidly evolving, powerful cultural accelerant rooted in the emerging digital substrate. Is the digital world rewriting our ancient ecological heritage, or are our inherited psychological patterns shaping how we use (and are used by) digital tools? Answering this question will be key to understanding human psychology in the 21st century.

4.4 Application Prospects: Providing Theoretical Support for Consolidating Chinese National Community Consciousness

The Psycho-Geographical Substratum Nesting Theory not only has universal explanatory power in cross-cultural psychology but also offers new theoretical support for understanding ethnic relations in the Chinese context. China’s vast territory and complex geographical patterns have shaped diverse survival methods and psycho-cultural patterns—this geographical substrate, rather than religion, language, or contingent events, has historically nurtured a multi-ethnic pattern. In other words, ethnic diversity is first and foremost a product of geo-psycho-cultural nesting. Meanwhile, another important logic has emerged in the development of the Chinese nation: while diverse geographical substrates bred differences, unified political structures and frequent exchanges, interactions, and integration continuously generated new shared substrates, gradually integrating multi-ethnic society into a “pluralistic unity.” The psycho-geographical nesting framework can reveal this evolutionary mechanism: the embodied practices and cultural schemas formed by various ethnic groups based on geographical conditions, especially after the founding of New China, have continuously exchanged and integrated in economic, social, and cultural development, gradually forming a new shared substrate—the “community schema” —which is ultimately internalized at the psychological level as Chinese national community consciousness. Therefore, Chinese national community consciousness is a historical inevitability deeply rooted in the dynamic nesting mechanism of geo-psycho-culture, the inevitable result of both China’s diverse geographical patterns and ethnic exchange and integration.

In the new era, this theory inspires us: to promote ethnic integration and resolve ethnic contradictions, we must simultaneously attend to the interaction mechanisms among geographical patterns, social practices, and psychological schemas. For example, narrowing regional gaps and promoting resource sharing lays a

new “material substrate” for common development; promoting deep interaction among ethnic groups in education, culture, and social life generates new embodied experiences and social learning; strengthening the shared symbolic system and value identification of Chinese culture forms cross-regional and cross-ethnic shared schemas. These pathways working together can fundamentally consolidate Chinese national community consciousness. This means that consolidating Chinese national community consciousness is not only a systematic project for consolidating and developing great unity among Chinese ethnic groups but also an inevitable choice that conforms to the historical logic and psycho-cultural evolution nurtured by China’ s diverse geographical patterns.

Conclusion

This article proposes and elaborates the Psycho-Geographical Substratum Nesting Theory, emphasizing a core viewpoint: understanding the human mind must return to the world it relies on and grasp its generative logic within the dynamic relationship among geography, mind, and culture. The theory provides a comprehensive, integrative, and open framework that connects macro-ecological forces with micro-cognitive processes while revealing the stable mechanisms and change logic behind cultural evolution dynamics, thereby pushing psychological research toward a new paradigm of cross-culturalism and deep ecological embeddedness. In the Chinese context, this theory demonstrates unique explanatory power. China’ s vast territory and diverse geographical patterns have nurtured a multi-ethnic pattern; unified political structures and long-term exchange and integration continuously promote psychological and cultural fusion. As General Secretary Xi Jinping pointed out, the formation and development of the Chinese national community is the inevitable trend of history, manifested in five dimensions: shared bloodline, shared beliefs, shared culture, economic interdependence, and emotional affinity. The Psycho-Geographical Substratum Nesting Theory provides solid theoretical support for this judgment: shared bloodline reflects survival communities shaped by geographical patterns; shared beliefs originate from institutional integration and social interaction; shared culture reveals schema reconstruction through exchange and mutual learning; economic interdependence highlights the supporting role of material substrate and regional complementarity; emotional affinity reflects the psychological mechanism of interaction-fusion-internalization. Reviewing the entire text, the Psycho-Geographical Substratum Nesting Theory, by revealing deep connections among mind, geographical patterns, and cultural evolution, not only promotes interdisciplinary integration in psychological research but also provides theoretical grounds for serving national strategies and consolidating Chinese national community consciousness. Future Chinese psychology can only contribute new wisdom and strength to the great rejuvenation of the Chinese nation and the progress of human civilization by building bridges between mind and geography, inheriting long-standing eco-cultural roots while responding to the challenges of globalization and digitization. This is precisely the theoretical consciousness and practical commitment of Chinese psychology in

the new era.

References

- Appadurai, A. (1996). *Modernity at large: Cultural dimensions of globalization*. University of Minnesota Press.
- Asif, M., Lahiani, H., Alhourani, M. I., Al Mahamed, A. M., & Abou Adel, M. A. (2025). Honor killing and the cycle of social influence: A study of the Pakistani bride through Albert Bandura's social learning theory. *Humanities*, 6(2).
- Bandura, A. (1977). *Social learning theory*. General Learning Press.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
- Bartlett, F. C. (1995). *Remembering: A study in experimental and social psychology*. Cambridge University Press.
- Bronfenbrenner, U., & Ceci, S. J. (1994). Nature-nurture reconceptualized in developmental perspective: A bioecological model. *Psychological Review*, 101(4), 568-586.
- Cherry, K. (2023, August 16). A comprehensive guide to the Bronfenbrenner ecological model. *Verywell Mind*. <https://www.verywellmind.com/bronfenbrenner-ecological-model->
- Clark, S. (1994). *Japan, a view from the bath*. University of Hawai'i Press.
- Cohen, D., Nisbett, R. E., Bowdle, B. F., & Schwarz, N. (1996). Insult, aggression, and the southern culture of honor: An "experimental ethnography". *Journal of Personality and Social Psychology*, 70(5), 945-960.
- Cooke, P., & Rehfeld, D. (2011). Path dependence and new paths in regional evolution: In search of the role of culture. *European Planning Studies*, 19(11), 1909-1929.
- Crafa, D., & Nagel, S. K. (2020). Traces of culture: The feedback loop between behavior, brain, and disorder. *Transcultural Psychiatry*, 57(3), 387-407.
- Dalsky, D., & Su, J. Y. (2020). Japanese psychology and intercultural training: Presenting wa in a nomological network. In D. Landis & D. Bhawuk (Eds.), *The Cambridge handbook of intercultural training* (4th ed., pp. 584-597). Cambridge University Press.
- Diamond, J. (1997). *Guns, germs, and steel: The fates of human societies*. W. W. Norton.
- Donner, S. (2020, June 24). The ugly history of climate determinism is still evident today. *Scientific American*. <https://www.scientificamerican.com/article/the-ugly-history-of-climate-determinism-is-still-evident-today>

- Elliott, S., & Davis, J. M. (2018). Challenging taken-for-granted ideas in early childhood education: A critique of Bronfenbrenner's ecological systems theory in the age of post-humanism. In *Research handbook on childhoodnature* (pp. 1-36). Springer.
- Ellen, R. (1988). Persistence and change in the relationship between anthropology and human geography. *Progress in Human Geography*, 12(2), 229-262.
- Fekadu, K. (2014). The paradox in environmental determinism and possibilism: A literature review. *Journal of Geography and Regional Planning*, 7(7), 132-139.
- Fincher, C. L., Thornhill, R., Murray, D. R., & Schaller, M. (2008). Pathogen prevalence predicts human cross-cultural variability in individualism/collectivism. *Proceedings of the Royal Society B: Biological Sciences*, 275(1640), 1279-1285.
- Francks, P. (2006). *Rural economic development in Japan: From the nineteenth century to the Pacific War*. Routledge.
- Fukuyama, F. (2001). Culture and economic development: Cultural concerns. In N. J. Smelser & P. B. Baltes (Eds.), *International encyclopedia of the social & behavioral sciences* (pp. 3130-3134). Pergamon.
- Furuyashiki, A., Tabuchi, K., Norikoshi, K., Kobayashi, T., & Oriyama, S. (2019). A comparative study of the physiological and psychological effects of forest bathing (Shinrin-yoku) on working age people with and without depressive tendencies. *Environmental Health and Preventive Medicine*, 24(1), Article 46.
- Götz, F. M., Montello, D. R., Varnum, M. E., Luca, D., & Kenrick, D. T. (2025). A unified framework integrating psychology and geography. *Nature Human Behaviour*, 9(9).
- Grant, P. (1998). Geography's importance to Japan's history. *Education About Asia*, 3(1), 44-47.
- Grossmann, I., & Na, J. (2014). Research in culture and psychology: Past lessons and future challenges. *Wiley Interdisciplinary Reviews: Cognitive Science*, 5(1), 1-14.
- Hamedani, M. Y. G., & Markus, H. R. (2019). Understanding culture clashes and catalyzing change: A culture cycle approach. *Frontiers in Psychology*, 10, Article 700.
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, 33(2-3), 61-83.
- Hu, S., & Yuan, Z. (2015). Commentary: "Large-scale psychological differences within China explained by rice vs. wheat agriculture". *Frontiers in Psychology*, 6, Article 489.

- Kasulis, T. P. (2004). *Shinto: The way home*. University of Hawaii Press.
- Krisnawati, E., Sujatna, E. T. S., Amalia, R. M., Soemantri, Y. S., & Pamungkas, K. (2024). The farming ritual and the rice metaphor: How people of Kasepuhan Sinarresmi worship rice. *Cogent Arts & Humanities*, *11*(1), Article 2338329.
- Lamm, B., Keller, H., Teiser, J., Gudi, H., Yovsi, R. D., Freitag, C., ...& Lohaus, A. (2018). Waiting for the second treat: Developing culture-specific modes of self-regulation. *Child Development*, *89*(3), e261–e277.
- Levin, T. C., & Süziukei, V. (2006). *Where rivers and mountains sing: Sound, music, and nomadism in Tuva and beyond*. Indiana University Press.
- Lo, R. F., & Sasaki, J. Y. (2024). Lay misperceptions of culture as “biological” and suggestions for reducing them. *Perspectives on Psychological Science*, *19*(1), 295–311.
- Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*(2), 224–253.
- Miller, R. (2014). Introducing Vygotsky’s cultural-historical psychology. In *The Cambridge handbook of cultural-historical psychology* (pp. 9–46). Cambridge University Press.
- Murray, D. R., & Schaller, M. (2016). The behavioral immune system: Implications for social cognition, social interaction, and social influence. In *Advances in experimental social psychology* (Vol. 53, pp. 75–129). Academic Press.
- Nakane, C. (1970). *Japanese society*. University of California Press.
- Nisbett, R. E., & Cohen, D. (1996). *Culture of honor: The psychology of violence in the South*. Westview Press.
- Page, S. E. (2006). Path dependence. *Quarterly Journal of Political Science*, *1*(1), 87–115.
- Pastrana-Huguet, J., Casado-Claro, M. F., & Gavari-Starkie, E. (2022). Japan’s culture of prevention: How bosai culture combines cultural heritage with state-of-the-art disaster risk management systems. *Sustainability*, *14*(21), Article 13742.
- Pegg, C. (2001). *Mongolian music, dance, & oral narrative: Performing diverse identities*. University of Washington Press.
- Qin, J. D., & Widman, J. (2012). A tale of two song fairs: Considering tourism and tradition in China’s Guangxi Province. *Ethnomusicology Review*, *17*.
- Schaller, M., & Park, J. H. (2011). The behavioral immune system (and why it matters). *Current Directions in Psychological Science*, *20*(2), 99–103.
- Senzaki, S., Masuda, T., & Nand, K. (2014). Holistic versus analytic expressions in artworks: Cross-cultural differences and similarities in drawings and collages

by Canadian and Japanese school-age children. *Journal of Cross-Cultural Psychology*, 45(8), 1297-1316.

Shweder, R. A. (1990). Cultural psychology—What is it? In J. W. Stigler, R. A. Shweder, & G. Herdt (Eds.), *Cultural psychology: Essays on comparative human development* (pp. 1-43). Cambridge University Press.

Stuart, J. (2024, November 21). Digital cultural diffusion: How digital technologies shape intercultural understanding. *UNU Macau Blog*. <https://unu.edu/macau/blog-post/digital-cultural-diffusion-how-digital-technologies-shape-intercultural>

Talhelm, T. (2022). The rice theory of culture. *Online Readings in Psychology and Culture*, 4(1), Article 7.

Talhelm, T., Wu, S. J., Lyu, C., Zhou, H., & Zhang, X. (2023). People in rice-farming cultures perceive emotions more accurately. *Current Research in Ecological and Social Psychology*, 4, 100122.

Talhelm, T., Zhang, X., Oishi, S., Shimin, C., Duan, D., Lan, X., & Kitayama, S. (2014). Large-scale psychological differences within China explained by rice versus wheat agriculture. *Science*, 344(6184), 603-608.

Taussig, M. (2018). *Mimesis and alterity: A particular history of the senses*. Routledge.

Thelen, K. (1999). Historical institutionalism in comparative politics. *Annual Review of Political Science*, 2(1), 369-404.

Tudge, J. R., Mokrova, I., Hatfield, B. E., & Karnik, R. B. (2009). Uses and misuses of Bronfenbrenner's bioecological theory of human development. *Journal of Family Theory & Review*, 1(4), 198-210.

Uskul, A. K., Cross, S. E., Günsoy, C., & Gul, P. (2018). Cultures of honor. In S. Kitayama & D. Cohen (Eds.), *Handbook of cultural psychology* (2nd ed., pp. 793-821). Guilford Press.

Uyeda, T. (2023). Reuse and recycling: Implications in Japanese painting conservation. *Ars Orientalis*, 52, Article 3994.

Van de Vijver, F. J., & Leung, K. (2021). *Methods and data analysis for cross-cultural research* (Vol. 116). Cambridge University Press.

Van de Vliert, E. (2013). Climato-economic habitats support patterns of human needs, stresses, and freedoms. *Behavioral and Brain Sciences*, 36(5), 465-480.

Varnum, M. E., Grossmann, I., Kitayama, S., & Nisbett, R. E. (2010). The origin of cultural differences in cognition: The social orientation hypothesis. *Current Directions in Psychological Science*, 19(1), 9-13.

Veraksa, N., & Veraksa, A. (2018). Lev Vygotsky's cultural-historical theory of development and the problem of mental tools. *Papeles del Psicólogo*, 39(2), 150-154.

Vukasović, T., & Bratko, D. (2015). Heritability of personality: A meta-analysis of behavior genetic studies. *Psychological Bulletin*, *141*(4), 769.

Wagoner, B. (2013). Bartlett' s concept of schema in reconstruction. *Theory & Psychology*, *23*(5), 553-571.

Wang, Q. (2016). Why should we all be cultural psychologists? Lessons from the study of social cognition. *Perspectives on Psychological Science*, *11*(5), 583-596.

Zuboff, S. (2019). *The age of surveillance capitalism: The fight for a human future at the new frontier of power*. PublicAffairs.

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