



An Exploration of the Interaction Mechanism Between the Dancing Body and the Environment from the Perspective of Ecological Perception

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ABSTRACT

This study employs ecological perception theory to examine its application and significance in dance improvisation and choreography. The theory emphasizes the direct coupling of perception and action, whereby movement emerges dynamically through the dancer–environment interaction. Three dimensions are highlighted: affordances, referring to how dancers perceive physical and spatial properties as potential movement possibilities; the perception–action loop, underscoring the ongoing refinement and extension of movement through embodied experience; and body–environment coupling, which conceptualizes dance not as an isolated creative act but as a process of co-construction with the environment. Case analyses from natural sites, urban spaces, and multimedia stages demonstrate how environmental features operate as sources of choreographic inspiration. The paper concludes that adopting an ecological perception perspective can enhance the openness of improvisation, support site-specific experimentation, and foster the development of interdisciplinary approaches in dance education and creative practice.

1. Introduction

As contemporary dance gradually moves beyond the confines of the theater and integrates into natural and social environments, the relationship between the body and its surroundings has emerged as a critical intersection of dance experience and academic inquiry. This shift has sparked ongoing attention to the generation of movement, spatial perception, and the dynamic interplay between dancers and their environments. Traditional theories often regard the body as a mere executor of movement and the environment as a passive backdrop. In contrast, recent

scholarship emphasizes the generative relationship between the two, offering a more dynamic and interactive framework.

Within this perspective, dance is no longer understood as the execution of predetermined choreography, but rather as a co-creative process emerging from the body's real-time sensory engagement with its environment.

Situated within this context, the present study adopts ecological perception theory as its analytical framework, combining theoretical interpretation with case analysis to investigate the mechanisms of body–environment coupling in dance. It aims to

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reveal the ecological dimension of dance as both a perceptual practice and a form of poetic expression.

2. An Overview of Ecological Perception Theory

In contemporary dance practice and research, the dancer's body is no longer regarded as a mere mechanical executor of movement, but rather as a dynamic perceptual agent—both the subject of perception and the generator of action. This shift in perspective aligns with the core principles of Ecological Perception Theory, which posits that perception is not a representation of the world, but a direct discovery of possible actions.

Ecological Perception Theory, developed by American psychologist James J. Gibson, asserts that perception does not rely on internal representations or inferential processes, but emerges from the direct interaction between an organism and its environment. Individuals are able to acquire information in real-time through this interaction, not by processing symbolic representations of the external world, but by directly perceiving the relationship between environmental properties and their own bodily capacities. In other words, perception is a dynamic phenomenon embedded within the organism–environment interaction.

A central concept within this theoretical framework is *affordance*—the action possibilities that the environment offers to an individual. Affordances are determined not only by the physical properties of objects, but also by the individual's bodily abilities, prior experience, and intentions. For instance, a rock may afford sitting or climbing; the affordance it presents varies depending on one's physical condition and the contextual situation. This implies that the environment is not a passive backdrop, but an active, ever-changing system that continually invites action.

Furthermore, the notions of direct perception and perception–action coupling elucidate the mechanisms through which the individual–environment relationship operates. Direct perception suggests that individuals can grasp environmental information directly through their sensory systems, without requiring intermediary cognitive processing. Perception–action coupling indicates that perception and action are not discrete processes but are dynamically co-constituted in an ongoing feedback loop. As individuals act, they alter the environment, which in turn reshapes their perceptual opportunities, forming what is known as a perception–action loop.

From this theoretical perspective, dance can be understood as a paradigmatic form of embodied interaction with the environment. As dancers move through space, shift postures, or engage with other performers, their bodies not only perceive

affordances but also actively modify the environment through their actions, thus participating in a continuous perception–action cycle. This dynamic interaction makes dance a vivid instantiation of ecological perception theory in practice, offering a unique lens through which to examine the interrelation between body, space, and environment. Consequently, the following discussion will begin by elaborating on the concept of *affordance* through specific case studies in dance, exploring how individuals perceive and enact potential movement possibilities afforded by their environment.

3. The Co-Constructive Relationship Between Dancer and Environment

The concept of *affordance* proposed in ecological perception theory reveals that the environment is not a passive stage backdrop, but an active agent capable of eliciting movement potentials. For dancers, the physical properties of the environment—such as texture, shape, gravity, and climate—continuously offer “invitations to act.” At the same time, the dancer's perceptual sensitivity and bodily condition determine how these invitations are perceived and enacted. This reciprocal influence forms a co-constructive relationship: while the environment shapes the possibilities for movement, the body redefines the meaning of the environment through its actions.

This co-constructive mechanism is vividly manifested in specific dance practices. In *Rice*, a production by Cloud Gate Dance Theatre, the generative mechanism of *affordance* is exemplified through the dynamic interplay between body and environment. Throughout the piece, the moist resistance of soil, the flexibility and density of rice stalks, the shape and weight of farming tools, and the rhythmic changes of season and climate all function as ongoing affordances directed toward the dancer's body. The performers activate movement through interaction: bending to plant rice responds to the depth and support of the land; the push-and-pull motions of harvesting emerge from the tension and resistance of the stalks; collective footwork embodies the influence of the rice field's spatial layout on rhythm.

The dancer's bodily condition and technical capacity determine the way in which these affordances are actualized, resulting in a diversity of movement expressions even under identical environmental conditions. More importantly, this mechanism not only grounds movement in the materiality of the environment but also, through embodied practice, assigns new meanings to the environment itself. The rice field thus becomes a generative site for memory, labor experience, and collective rhythm. *Rice* vividly illustrates a co-constructive relationship between environment and body—one that is not unidirectional or deterministic, but mutually formative.



Fig 1. Photograph by Liu Chen-hsiang (劉振祥), 2013. Captured during the premiere year of the production and used as the official production still.¹

This case demonstrates that the dancer does not unilaterally control the body, but rather co-constructs the generative logic of movement through the perception of possibilities afforded by the environment. In this process, dance emerges as the outcome of a continuous negotiation between affordances and bodily perception—a dynamic practice of symbiosis and co-creation between human and environment.

4. Direct Bodily Perception of the Environment

From the perspective of affordance, the material, shape, and gravitational properties of the environment present themselves as informational cues—*action possibilities* that are directly perceivable by the body. This underlines the centrality of *direct perception* in ecological perception theory: the body does not require intermediary representations to access these cues but can respond to them immediately within the present context. In this sense, movement emerges as a timely bodily response rooted in acute environmental sensitivity.

Such immediacy of response depends on the sensory system's ability to directly capture spatial structures, material textures, shifts in light, and air flow dynamics. In this process, the body functions as an open perceptual system—capable of quickly detecting subtle environmental changes and transforming them into opportunities for movement generation.

This heightened state of sensitivity fosters deep interaction between the dancer and the environment, forming a dynamic “co-dancing” relationship. The physical properties and situational shifts of the environment continuously issue *invitations to act*, activating latent movement potentialities. The dancer, in turn, responds according to their bodily condition and awareness, shaping a unique vocabulary of expression.

The *co-sensory* relationship between body and environment forms the basis for dance improvisation. In such a state, the dancer relinquishes prestructured movement patterns and instead generates action in real time by responding to environmental feedback. Dance becomes an open-ended and generative process, no longer a replication of fixed forms, but a unique response emerging from each interaction—embodying the generative nature of dance as a lived practice.

For instance, in Anna Halprin's *Planetary Dance*, participants do not perform predetermined choreography against a natural backdrop; rather, they move through valleys and open spaces, actively sensing the texture of the ground, the flow of wind, and the shifts of light and shadow. These perceptual inputs become the point of departure for movement. The sensation of bare feet touching the earth influences the rhythm and weight of each step, while the breeze brushing against clothes and hair modulates the trajectory of the arms, the breath, and the center of gravity—demonstrating how the body, through direct perception, remains intimately attuned to the environment.

¹ Cloud Gate Dance Theatre. (n.d.). *Rice*. Cloud Gate Dance Theatre. Retrieved September 29, 2025, from <https://www.cloudgate.org.tw/en/cg/node/528>

Planetary Dance thus reveals a co-constructive relationship among environment, collective, and body. Participants' movements are continuously shaped and extended through the interplay of natural rhythms and others' temporalities. Perception and action become mutually embedded, forming a continuous

generative loop. Dance is no longer a form imposed upon the environment, but a process of organic emergence, driven by direct perception—an immediate dialogue between human and nature, between self and other.



Fig 2. Planetary Dance at Mt. Tamalpais, California (2002). Photograph by John Veltri & Marguerite Lorimer. Courtesy of The Estate of Anna Halprin.²

The above examples demonstrate that the generation of movement in dance does not stem from predetermined patterns, but is instead grounded in a cyclical mechanism of *environmental invitation–bodily response–movement generation*. Spatial configurations, textures, lighting, and air currents within the environment continuously activate the dancer's perceptual system, prompting immediate embodied responses. Through this open perceptual engagement, dancers generate unique movement expressions in real time.

Consequently, dance reveals a high degree of *openness* and *generativity*, highlighting the symbiotic relationship between body and environment in embodied practice.

5. The Perception–Action Coupling Process in Dance

Anna Halprin's practice demonstrates that dance is often generated through real-time interaction with the environment and with others. Movement is not predetermined, but gradually takes form through an ongoing cycle of perception and response. This suggests that dance is not a one-dimensional act of expression, but rather a continuously evolving process—one that is constantly revised and extended in the present moment. This naturally leads us to a core mechanism in dance: how perception and action become coupled through continuous interaction, enabling the dancer to maintain a dynamic relationship with the environment.

In dance, perception and action do not progress in a linear fashion; instead, they form a reciprocal and cyclical process of

mutual shaping. The dancer's perception—of the environment, the body, the music, and even the movements of others—constantly feeds back into and adjusts their own movement strategies. Conversely, bodily action also activates new perceptual cues. This coupling mechanism operates not only on the level of immediate reaction but also profoundly influences the generative logic and rhythmic structure of movement, rendering dance a fluid system of continuous perceptual adjustment and embodied elaboration.

This perception–action coupling becomes particularly salient in the choreographic processes of folk and ethnic dance traditions. In such contexts, choreographers often do not begin from purely abstract movement structures; rather, they immerse themselves in specific cultural and geographical environments, observing how local dancers interact with nature, labor, and social life within real-world settings.

For example, the Mongolian folk dance *The Ringing Bells Sing of Happiness* (choreographed by Alatanbagera, Taoetengjirigala, and Xu Xiaoping) offers a vivid illustration of this dynamic feedback loop. Rooted in the cultural ethos of the “Mongolian horse spirit,” the piece draws its movement vocabulary from the rhythms and temperament of galloping horses and the ringing of horse bells. During the creative process, the choreographers did not simply imitate equestrian movements. Instead, they repeatedly guided dancers through physical experiences of running with horse herds, allowing the dancers to develop embodied impressions. Based on these direct experiences, the choreographic

² Museum Folkwang. (n.d.). Cultural Festival “We are Garden”: Planetary Dance. Retrieved September 23, 2025, from <https://www.museum-folkwang.de/en/event/cultural-festival-we-are-garden-planetary-dance>

structure was continually adjusted, gradually refining the movement dynamics into a dance language that not only reflects ethnic identity but is also suitable for stage performance.



Fig 3. 《马铃薯儿摇响幸福歌》The Ringing Bells Sing of Happiness, stage performance still. Photograph by Wang Lei.³

This process exemplifies the mechanism of perception–action coupling: perception triggers action, and action, in turn, feeds back into perception. Through continuous dialogue between choreographers and dancers, the movement vocabulary emerges at the intersection of body and culture, rather than being statically transplanted. This coupling ensures that movement is no longer a mechanical repetition, but a dynamic flow shaped by environmental stimuli—enhancing the ecological sense of place and the expressive force of local culture.

As an ecological practice, dance moves through a trajectory from the activation of affordances, to intuitive movement, and then to a continuous perception–action loop. This process reflects the body’s acute ability to perceive environmental information and respond instantaneously. Through ongoing interaction between perception and action, the body and environment form a mutually influential and reinforcing system—one in which movement arises organically and evolves continuously.

In other words, because dancers are capable of directly perceiving various movement possibilities in the environment, and because perception and action are intertwined in a dynamic and adaptive process, the body and environment remain in close, reciprocal interaction throughout the dance. Together, they co-drive the emergence and transformation of movement—this is the body–environment coupling mechanism.

6. Extending Dance Practice Between Ecological Perception and Action

6.1. The Current Landscape of Practice

As dance research gradually shifts from body-centered models of movement generation toward a more holistic examination of the body–environment relationship, the concept of ecological perception has increasingly permeated multiple areas, including dance education, choreography, and performance.

In education, certain universities and professional training institutions have begun integrating natural environments or ecologically simulated spaces into their teaching practices. Through outdoor training, situational rehearsals, and sensory awareness exercises, students are encouraged to experience the diversity of movement generation in response to real-time environmental changes. This pedagogical approach breaks away from the confines of enclosed studios and moves beyond visual imitation alone—activating tactile, auditory, and thermal sensory channels to facilitate movement development. In doing so, it enhances students’ spatial awareness and environmental sensitivity.

In choreography and performance, some artists are reimagining the stage as a dynamic field of perception, using light, sound, spatial arrangements, and audience mobility to construct contexts for real-time interaction between dancers and their surroundings.

³ *The Ringing Bells Sing of Happiness*, stage performance still. Photograph by Wang Lei, 2025. Source: Tongliao News Network (通辽网), retrieved September 23, 2025, from <https://www.tongliaowang.com/2025/01/16/99701101.html>.

These strategies have promoted the exploration of nonlinear narratives and open spatial perceptions.

However, such practices remain largely experimental and fragmented, lacking a systematic theoretical and methodological framework. As a result, their broader dissemination and application are still limited.

6.2. Future Directions for Development

This study suggests that future developments in dance practice should be grounded in the body–environment coupling mechanism, with advancement in two key areas: a reconstruction of the educational system and cross-disciplinary integration.

From an educational perspective, there is an urgent need to establish training systems centered on ecological perception—incorporating sensory awareness, environmental adaptability, and movement generation into curricula. Such an approach would enhance dancers’ ability to adapt and create in diverse contexts.

On the creative front, dance should collaborate with fields such as architecture, installation and sound art, virtual reality, and environmental science, to develop immersive and participatory performance formats. By engaging with themes such as ecological preservation and community culture, dance can also foster deeper connections between art and society.

At the same time, the emergence of ecologically intelligent theatres highlights how technological development is reshaping the ecology of dance. The integration of motion capture, environmental sensing, and real-time feedback systems allows performance spaces to dynamically adjust and generate interaction—establishing a highly coupled perception–action–feedback loop. This not only expands the expressive capacity and immersive quality of dance but also offers a new pathway for the

development of open and interactive ecological systems in future dance practices

7. Conclusion

Ecological perception theory offers a significant perspective for understanding the body–environment relationship in dance. The concept of affordance reveals that the environment is not merely a passive backdrop for movement, but a generative source of action potential. Through direct perception, dancers are able to sensitively detect these potentials—not by engaging in complex reasoning, but by generating movement in real time through their interaction with the environment. The coupling of perception and action further illustrates that movement in dance is not a predetermined outcome, but rather a dynamic result of the body–environment interaction.

This mechanism not only explains the fluid and immediate nature of dance movement but also provides a theoretical foundation for choreographic and performance practices. More importantly, it highlights the essence of dance as an open system: through continuous exploration and activation of environmental potentials, dancers co-construct a field of meaning in which perception and action jointly shape artistic expression—thus expanding the boundaries of what dance can be.

Looking forward, dance research grounded in ecological perception theory can further deepen our understanding of the body–environment relationship and promote innovative integrations of spatial awareness, movement generation, and artistic expression. In doing so, it may realize a form of symbiotic movement—a co-evolving interplay between body and environment at the heart of contemporary dance practice

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