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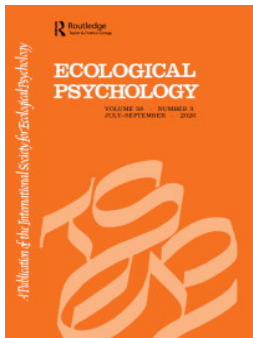
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RESEARCH ARTICLE

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Social Affordances as Spatial-Interactional Processes in Children's School Playgrounds

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ABSTRACT

Children's playgrounds are everyday environments in which social interaction unfolds without fixed roles, predefined shared goals, or institutionalized coordination. While ecological psychology has developed rigorous accounts of social affordances in structured, multi-agent contexts such as sport, less is known about how social affordances are realized in open-ended peer interaction. This study examines how opportunities for social engagement emerge, stabilize, and dissolve through children's spatial-interactional practices during recess in a Dutch primary school playground. Using micro-observational video analysis of 72 children (ages 5–12), we first assess the applicability of sport-derived social affordance categories to unstructured playground interaction. We then analyze episodes that resist categorical description to identify process dimensions through which social affordances are realized over time. The analysis yields four interrelated dimensions—initiation mechanisms, spatial-social coupling, participation diversity, and temporal dynamics—that specify how children negotiate access to interaction through movement, positioning, and responsiveness to peers and material features. These findings reconceptualize playground social affordances as spatially and temporally unfolding interactional achievements and suggest a shift in research focus toward examining how children negotiate access to social engagement.

Introduction

Playgrounds, open areas, and in-between school spaces are key settings for children's unstructured play and peer relations. In these everyday schoolyard environments, children use movement, positioning, and shifting group formations to initiate contact, manage distance, and regulate access to interaction, making recess a primary context for peer relations and social adjustment (Holt et al., 2015; Loebach & Gilliland, 2016).

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While research has shown that spatial layout, surfaces, and equipment shape where children gather and how they move (Chawla & Heft, 2002; Clark & Uzzell, 2002, 2006; Czałczyńska-Podolska, 2014), relatively little is known about how peer interaction itself is organized through real-time spatial and behavioral coordination in these environments.

Research in playground studies has documented how layout, surface material, and equipment influence where children gather and what activities occur (Dymont & O'Connell, 2013; Pawlowski et al., 2019), while developmental research has identified recess as a primary context for peer relations and social adjustment (Pellegrini & Smith, 2005; Veiga et al., 2016, 2017). Much empirical work operationalizes engagement through categorical participation states (e.g. solitary, onlooker, group play) or zone-based activity measures, documenting distributions and durations of play (Moreira et al., 2023; Rasmussen, 2004). Although these approaches provide valuable descriptive insights, they offer limited access to the spatial-interactive processes through which children actively organize participation and regulate access in real time. As a result, playgrounds are often treated as relatively stable containers for behavior rather than as environments that are continuously reconfigured through children's actions. Consequently, how peer sociality is enacted, negotiated, and sometimes withheld through real-time interactional coordination during recess remains less well understood.

To conceptualize these interactional dynamics, we draw on the notion of affordances. Originating in ecological psychology, affordances refer to the action possibilities that environments offer to particular organisms under particular conditions (Gibson, 1979/1986). For children in playgrounds, a sandpit affords digging or building only if it contains manipulable material and children have the skills, interests, and autonomy to use it. The physical dimensions of affordances in built environments have been extensively examined (e.g. Mohammadi et al., 2017; Mohammadi & Koutamanis, 2025), including in studies of children's play and schoolyards (Lerstrup & Konijnendijk van den Bosch, 2017; Nasri et al., 2022). There remains, however, a need to extend these bodies of research to the social dimension of affordances, particularly in schoolyards where action possibilities are co-produced with and through others (Czałczyńska-Podolska, 2014; Heft, 2023).

Gibson (1979/1986) argued that "the richest and most elaborate affordances of the environment are provided by other people" (p. 135). Social affordances refer to action possibilities that arise through others' presence, activities, and responsiveness in shared settings. In playgrounds, opportunities for engagement are not specified by equipment alone. Rather, they are generated through children's spatial and interactional practices, such as approaching, maintaining distance, observing from the periphery, joining ongoing activity, or deliberately holding back. These practices continuously open, transform, or close possibilities for social action. Despite their centrality to children's peer life, relatively little is known about how social affordances are realized as time-extended interactional processes: how contact is initiated, how spatial positioning functions communicatively, how participation shifts, and how interactions are sustained or dissolve. While participatory mapping, GIS-based studies, and systematic observation have advanced understanding of where children go and which features they use (Amholt et al., 2022; Loebach & Gilliland, 2016), they provide limited access to the temporal micro-dynamics through which peer interaction is coordinated in everyday playground settings.

Within ecological psychology, social affordances have been theorized most explicitly in multi-person sport contexts. Fajen et al. (2009) propose a tripartite framework distinguishing affordances for other people, affordances for joint action, and affordances of other people. This framework offers a precise ecological account of how others enter perception-action coupling in dynamic, multi-agent situations, making it a strong candidate for extending social affordance analysis beyond sport. Team sports, however, represent a particular class of social interaction: they are organized around explicit goals, relatively stable rules, designated roles, and constrained fields of action (Fajen et al., 2009; Marsh et al., 2006). Children's playground free play differs in that participation is spontaneous, activities are loosely structured, and interactional roles and rules are continuously negotiated. Children move between activities, engage peripherally through observation or shadowing, and actively regulate proximity and visibility in relation to peers (King et al., 2025). These differences raise an open empirical question central to ecological psychology: to what extent do sport-derived social affordance categories capture the organization of social action in open-ended peer interaction, and what additional process dimensions may be required to describe how social affordances are realized in children's everyday play.

This article addresses these gaps by examining how social affordances are realized through children's spatial-interactional practices and their engagements with peers and playground materials during recess in a Dutch primary school playground. Using micro-observational video analysis of children's recess activity, we combine a deductive application of Fajen et al. (2009) social affordance categories with an inductive analysis of interactional processes. In Phase 1, we assess the extent to which sport-derived social affordance categories capture the organization of children's unstructured peer interaction. In Phase 2, we analyze episodes that resist straightforward categorical classification to identify process dimensions that more fully describe how social affordances are opened, stabilized, transformed, and dissolved through children's movement, positioning, and shifting participation.

The study contributes to ecological psychology by advancing a process-oriented account of social affordances in open-ended interaction. By applying a well-established ecological framework to a less constrained interactional context, we clarify where categorical descriptions remain informative and where social coordination unfolds through more gradual, negotiated dynamics. Building on this analysis, we develop a process-based framework comprising four interrelated dimensions—initiation mechanisms, spatial-social coupling, participation diversity, and temporal dynamics—that specifies how opportunities for social engagement emerge through ongoing organism-environment coordination. Rather than treating playground features or peer presence as fixed determinants of interaction, the framework highlights how spatial configurations and material elements function as interactional resources through which access, participation gradients, and refusals are continuously organized over time.

Theoretical framework

This section sets out a framework for analyzing social affordances as spatial-interactional processes in playgrounds. We first situate affordance theory within ecological accounts of human-environment reciprocity and trace its extension from physical to social

domains. We then review sport-based categories of social affordances and explain why their applicability to unstructured playground interaction remains an open empirical question. Finally, we integrate ecological, sociomaterial, and interactional perspectives to specify a process-oriented lens that informs our analysis.

From physical affordances to social affordances

Gibson's ecological concept of affordances shifted perception theory away from objective properties toward action possibilities: environments offer what organisms can do, given their capabilities and conditions of action (Gibson, 1979/1986). Affordances are relational properties of organism-environment reciprocities, defined by the fit between environmental features and an organism's abilities rather than by properties of either alone (Chemero, 2003; Heft, 1989). This perspective has been influential in reframing children's environments in terms of what they enable children to do, rather than as collections of discrete features. Heft (1988) proposed a functional taxonomy of outdoor affordances (e.g. surfaces for locomotion, objects for manipulation), while Kytta (2002, 2004) examined how settlement form shapes children's access to and realization of environmental affordances. Playground studies similarly focus on how equipment, surfaces, and layouts afford climbing, sliding, running, or balancing (Lerstrup & Konijnendijk van den Bosch, 2017; Storli & Hagen, 2010). While these scholars have substantially advanced the understanding of physical affordances, they have paid comparatively less attention to social affordances—that is, to how action possibilities are generated with and through others in peer interaction.

Social affordances refer to possibilities for action that arise from others' presence, characteristics, and ongoing activities, including opportunities for communication, collaboration, competition, care, or avoidance (Costall, 1995; Valenti & Gold, 1991). This extension shifts analytical attention from what individuals can do alone to what becomes possible through co-presence and coordination (Richardson et al., 2007). Although recent studies acknowledge that playground affordances are socially and culturally mediated (Kytta et al., 2018; Pawlowski et al., 2019), most rely on children's reported perceptions or global behavior codes. As a result, existing research offers limited insight into the interactional processes through which social affordances are enacted, negotiated, and transformed within playground settings.

Social affordances in sport contexts

Within ecological psychology, sport contexts have become a central domain for theorizing social affordances in dynamic, multi-agent environments. Ecological approaches conceptualize decision-making as a continuous process of perceiving and acting upon affordances for running, intercepting, passing, or blocking in information-rich situations. Fajen et al. (2009) distinguish three categories of social affordances that structure such interactions. Affordances for other people concern what an environment offers someone else, given their action capabilities. Empirical research in human movement science shows that people can directly perceive such affordances in rule-governed games, including judgments about others' action capabilities and opportunities for coordinated action (Richardson et al., 2007; Stoffregen et al., 1999). Affordances for

joint action arise when two or more individuals coordinate actions that exceed individual capacities, such as lifting heavy objects or executing coordinated plays. Research indicates that people are prospectively sensitive to when joint action becomes necessary and spontaneously shift from individual to collective coordination (Schmidt & Richardson, 2008; Weast et al., 2014). Affordances of other people refer to how another's body, position, or movement constrains or enables one's own actions, for instance, using a teammate's position as a screen or responding to an opponent's posture. Together, these categories provide an operational vocabulary for describing how others figure in perception–action coupling in rule-governed tasks.

Playground research and the missing process perspective

Research on playgrounds and recess has predominantly linked physical affordances to aggregate behavioral outcomes, such as activity intensity, location preference, and behavioral diversity (Prezza et al., 2001; Prieske et al., 2015; Sporrel et al., 2017; Storli & Hagen, 2010). Studies of social competence and socio-emotional functioning similarly identify recess as a key context for peer relationships and adjustment (Moreira et al., 2022; Pellegrini & Smith, 2005). Yet social engagement is typically operationalized in categorical terms (e.g. solitary, onlooker, group play) or as counts and durations within predefined zones.

Some studies move beyond this by showing that children realize affordances in ways that diverge from adult design intentions, valuing flexible, non-programmed spaces and revealing tensions between designed play spaces and lived play practices (Pawlowski et al., 2019; Rieffe et al., 2025). Reviews further emphasize that affordances emerge from children's active engagement with both material and social aspects of environments (Kytä et al., 2018). However, most of this research relies on interviews, mapping, or global behavior coding rather than fine-grained analysis of interaction sequences. Consequently, the literature offers limited insight into how social affordances are produced, sustained, and transformed through moment-to-moment peer interaction (Mohammadi et al., 2026).

Toward a process-based view of playground social affordances

Integrating complementary ecological and sociomaterial accounts, we extend Gibson's insight that affordances are relational properties of organism–environment relations (Gibson, 1979/1986; Heft, 1989). While Gibson emphasized relations between organismic capabilities and environmental properties, our analysis focuses on how such relations are realized in practice: they are progressively assembled, tested, and reconfigured through children's movements, positioning, and shifts in participation. In playgrounds, social affordances are thus not only relational in Gibson's sense but processual, unfolding through temporal phases rather than existing as discrete momentary possibilities.

First, ecological accounts of behavior settings conceptualize schoolyards as socio-institutional structures in which material arrangements, routines, and normative expectations organize what is likely to occur (Heft, 2001, 2026). While physical affordances are broadly available to anyone with sufficient capability,

social affordances involve socially mediated access: joining a peer group, for example, depends on invitation, tacit acceptance, or the absence of exclusion. Teacher supervision, recess schedules, and age-group organization shape the conditions under which peer social affordances can arise, even as children actively negotiate them.

Second, sociomaterial perspectives conceptualize environments as *landscapes* of affordances structured by shared practices (Rietveld & Kiverstein, 2014). Within this landscape, children encounter situation-specific *fields* of affordances shaped by material arrangements, peer cultures, and institutional routines. Skilled intentionality highlights that children selectively respond to affordances based on their abilities, concerns, and social positioning (Rietveld et al., 2018). In playgrounds, the same space may afford competitive play, observational engagement, or withdrawal depending on a child's skills, relationships, and perceived social risks. In this study, material and institutional factors are treated as enabling and constraining conditions, while the analytic focus remains on peer interaction itself.

Bringing these perspectives together, we conceptualize playground social affordances as emergent, relational processes rather than fixed types. They are ecologically situated within behavior settings, sociomaterially constituted, peer-culturally organized and gatekept, affectively charged, and temporally extended. In light of this framework, the study addresses two research questions:

RQ1: How can social affordance categories developed in sport contexts apply to children's unstructured playground interaction, and what aspects do they fail to capture, and why?

RQ2: What dimensions, identified through systematic analysis of children's unstructured playground interactions, characterize the processes by which social affordances emerge, stabilize, and dissolve?

Materials and methods

Using micro-observational video analysis of children's playground interactions, we examined the applicability of an established sport-derived framework and then inductively derived a process-based set of dimensions suited to playground interactional settings. The focus was on observable coordination rather than inferred intentions. The approach combines systematic behavioral observation from environmental psychology (Cosco et al., 2010; Gifford, 2016) with a deductive-inductive analytical design appropriate for theoretically under-specified phenomena (Fereday & Muir-Cochrane, 2006). Video recordings allowed detailed documentation of spatial practices, movement trajectories, and interaction sequences as they unfolded during recess, without disrupting children's usual routines. Brief field notes and schematic behavioral maps were used as contextual aids to situate observed episodes within the playground layout and to support later spatial interpretation.

Study setting and participants

The study was conducted at a primary school in the Netherlands, selected for its urban residential location and playground design offering multiple, spatially differentiated

Table 1. Participant demographics.

	Playgroup 1	Playgroup 2	Playgroup 3	Total Sample
Number of Children	18	22	32	72
Mean Age (SD)	6.80 (1.09)	9.39 (0.78)	11.41 (0.64)	9.64 (2.03)
Girls	9 (50%)	13 (59%)	20 (62%)	42 (58%)
Boys	9 (50%)	9 (41%)	12 (38%)	30 (42%)
Number of Videos	17	6	10	33

activity contexts (Mohammadi, 2024). The site is bounded by streets on three sides and residential backyards on the fourth, producing varied edge conditions relevant to children’s movement, visibility, and interaction. The playground comprises several distinct spatial zones, including a small football field, bench seating areas, a climbing structure and storage shed, a table-tennis area, a bicycle-parking zone, and additional climbing and monkey bars. This spatial organization produces areas with differing degrees of enclosure, visibility, and activity intensity, as well as informal edges, thresholds, and interstitial spaces between more clearly programmed zones. Participants comprised 72 children (42 girls, 30 boys) aged 5–12 years, enrolled in eight classes. Classes were organized into age-based playgroups with non-overlapping recess periods (see Table 1). All children whose parents provided informed consent participated. Ethical approval was obtained from the Psychology Research Ethics Committee of Leiden University, and all procedures followed institutional guidelines for research with children.

Video data collection

Data collection took place over two weeks in autumn 2020, when weather conditions supported consistent outdoor recess. Prior to recording, researchers conducted reconnaissance visits to familiarize themselves with the playground layout and recess routines, and to discuss typical use patterns and behavioral norms with staff. These visits informed camera placement and zone delineation and supported later interpretation of observed interactions. During each recess period, two researchers filmed simultaneously from predetermined peripheral positions that provided complementary angles on activity areas and circulation routes. Positions were selected to capture interaction sequences together with their immediate spatial context, while remaining unobtrusive. Researchers followed a rotation protocol: each researcher filmed one focal child for approximately 3 min, then rotated clockwise to another child, repeating this procedure throughout the recess period. This protocol ensured distributed coverage across children, activities, and zones, reducing bias toward highly visible, centrally located, or physically active participants.

Across the two weeks, multiple recess sessions were recorded for each playgroup, producing a corpus spanning varied activities, spatial zones, and peer configurations. While the use of cameras may introduce observer effects, several features of the design reduced this risk. Children were accustomed to adult presence during recess, cameras remained at the playground edges, and researchers did not interact with children while filming. No consistent shifts in activity patterns or interactional behavior were observed across recording sessions.

Episode identification and analytical design

Episodes were defined as peer-relevant interaction sequences lasting at least 30 s, bounded by changes in activity focus, participant configuration, or spatial positioning. The 30-second threshold was selected to capture sustained interactional processes while remaining sensitive to the brief and fluid character of playground interaction. Episodes were required to meet three criteria: (a) the presence of at least two children within proximate visual or physical range; (b) evidence of mutual awareness or responsiveness (e.g. gaze orientation, approach-avoidance movements, verbal exchange, coordinated action); and (c) temporal continuity, allowing for brief pauses or repositioning without loss of interactional relevance. Episodes ended when participants dispersed, attention shifted fully to different activities or partners, or an institutional interruption (e.g. bell, teacher intervention) terminated the interaction.

Applying these criteria to video recordings across the two-week observation period yielded a corpus of 33 interaction episodes ranging from 30 s to 3.5 min ($M = 1.9$ min, $SD = 1.1$ min), distributed across all three playgroups and a wide range of activities and playground zones. Three episodes slightly below the 30-second threshold (12–20 s) were retained due to their analytical significance for understanding initiation and rejection sequences. All identified episodes were included in both the deductive and inductive analyses. Analysis followed a two-phase design: deductive application of an existing social-affordance framework and inductive identification of emergent interactional dimensions (Fereday & Muir-Cochrane, 2006; Charmaz, 2006). This design enabled a systematic assessment of established categories while remaining open to processes they may not capture.

Phase 1: application of ecological social affordance categories

In phase 1, we applied three categories derived from Fajen et al. (2009):

- Affordances for other people (S1): what the environment offers another child, given their body and capabilities.
- Affordances for joint action (S2): what two or more children can do together that exceeds individual capabilities.
- Affordances of other people (S3): what another child's body, position or actions afford the perceiver.

Two researchers trained in behavioral observation and familiar with affordance theory independently coded all identified episodes. For each episode, coders recorded start and end times, participating children, spatial positioning, a brief behavioral description, and applicable category assignments. Episodes could receive more than one category assignment. Initial inter-rater agreement for episode identification and category assignment was 87%. Discrepancies were resolved through discussion to reach consensus. Agreement statistics are reported for initial coding only; final datasets reflect consensus coding. During coding, researchers wrote analytic memos documenting episodes with unclear category fit, overlapping assignments, or ambiguous category boundaries. Examples included gradual interactional approaches *via* positioning, sustained peripheral observation, and disengagement through spatial distancing. These

memos were retained as analytic material for Phase 2 and as evidence for evaluating the boundaries of applicability of sport-based categories in playground interaction.

Phase 2: inductive derivation of interactional dimensions

Phase 2 examined how playground interaction was organized beyond the predefined categories, thus creating new dimensions. Using constant comparison (Corbin & Strauss, 2015; Thornberg & Charmaz, 2014), both researchers reviewed categorized and uncategorized episodes, focusing on recurring interactional processes rather than category assignment. Each researcher conducted open coding of observable strategies and configurations (e.g. gradual approach, peripheral hovering, object claiming, unsolicited helping, following movement, creating distance). Codes were iteratively grouped into higher-order clusters. In joint analytic meetings, clusters were compared and refined to distinguish recurrent dimensions from context-specific themes.

The analytical procedure proceeded in three stages. First, open coding: we viewed all 33 episodes repeatedly, generating descriptive codes that captured observable interactional features (e.g. “child approaches from side,” “activity continues despite interruption,” “child watches from distance”). Second, focused coding: we identified patterns across codes and grouped them into provisional categories using constant comparison. It was during this stage that four orienting questions took shape, emerging from the accumulating patterns rather than guiding the initial pass: (1) how children initiated, invited, or declined interaction; (2) how spatial positioning and movement functioned communicatively; (3) how participation varied within and across episodes; and (4) how episodes emerged, stabilized, shifted, and ended over time. These questions functioned as sensitizing lenses that focused attention without constraining emergent findings. For instance, codes related to approaches, demonstrations, and object-handling clustered into what became “initiation mechanisms”; codes related to hovering, positioned watching, and parallel activity clustered into “participation diversity.” Third, dimension refinement: we iteratively tested and refined these categories across the full 33-episode corpus, ensuring each dimension was empirically grounded in multiple episodes and analytically distinct from the others. All episodes were re-analyzed after dimension derivation to verify their applicability and identify boundary cases.

This analytic process generated four interrelated dimensions that structure the subsequent analysis. Dimensions were retained through iterative comparison across the full corpus rather than through selective case sampling. A dimension was considered analytically robust if it: (a) recurred across multiple episodes; (b) helped explain interactions that could not be adequately described using the sport-based social affordance categories; and (c) contributed non-redundantly to describing how interaction unfolded over time. Dimensions that did not meet these criteria were merged or discarded. Finally, we examined how dimensions co-occurred within individual episodes. The resulting framework is presented in the following section and illustrated with behavioral episodes.

Results

Video analysis identified recurring patterns in how social affordances were organized during recess. We first report Phase 1 findings from applying Fajen et al. (2009)

categories (S1–S3). We then present Phase 2 results, which derive four process dimensions and illustrate them through four behavioral episodes (Figures/Examples 1–4).

Limitations of sport-based social affordance categories

Applying the S1–S3 categories captured a subset of episodes, particularly those resembling structured games. Children frequently oriented to peers' action capabilities in ways consistent with sport-based accounts. For example, waiting for a less confident climber, offering a hand onto a high platform, or selecting pass recipients based on speed or strength were typically coded as S1 or S3. Organized games (e.g. football matches, chasing games) aligned with S2. However, three recurring issues limited categorical assignment, especially in episodes characterized by gradual entry, peripheral presence, and shifting roles.

First, many episodes did not present as a single, bounded “task state” but as extended entry and adjustment sequences in which participation was gradually negotiated. For example, observations involving a skateboard showed children moving from peripheral observation to tentative spatial approach, to moments of refusal, guarding, or invitation by the current user. Across these sequences, affordances shifted from watching to testing receptivity, to potential participation, sometimes accepted and sometimes declined. Because the interactional work unfolded over time, no single S1–S3 category remained analytically dominant across the episode, highlighting the boundaries of applicability of task-based social affordance classifications for capturing temporally extended playground interactions.

Second, episodes often involved graded participation rather than clear in/out membership. For example, in monkey-bar play, two children engaged in synchronized swinging while a third child remained at the edge, maintaining visual attention without being directly addressed. This peripheral stance was organized and consequential: it maintained availability for joining while limiting exposure and physical risk.

Third, access to social engagement was frequently regulated through interactional responses that varied with approach manner and peer relations. In one episode, two children approached the same girl with a skateboard: one tentatively, the girl responded by placing her foot on the skateboard, refusing access; one more directly, the girl relocated entirely. The same action thus afforded negotiation in one case and threat in another, based on approach manner and implicit status relations. These differences were not well represented by S1–S3 labels alone because the consequential variation lay in how access was managed through the unfolding exchange.

Overall, in 20 episodes (61%), no single S1–S3 category remained analytically dominant across the interaction sequence, reflecting the fluid, negotiated character of playground interaction and the open-ended conditions under which coordination was being achieved. In these cases, interactional organization changed over time—access was negotiated rather than given, participation was incrementally achieved, and roles were continuously adjusted—rendering categorical assignment ambiguous without reducing the episode to a misleading static representation. This pattern motivated the Phase 2 shift toward a process-based account of how social affordances are produced as episodes unfold.

Process-based analysis of behavior episodes

The three limitations identified in Phase 1 indicated that sport-based social affordance categories alone could not account for how interaction unfolded in the playground. In Phase 2, we therefore shifted analytic focus from assigning episodes to predefined categories to examining how social affordances were organized across interaction sequences: how they were initiated, spatially configured, graded in terms of participation, and transformed over time. Through this process-oriented analysis, four interrelated dimensions emerged as central to the organization of playground interaction: initiation mechanisms, spatial-social coupling, participation diversity, and temporal dynamics. Together, these dimensions describe how social affordances are progressively assembled, negotiated, and reconfigured through children's ongoing movements and interactions.

Conditions shaping social affordances

Before describing the four process dimensions, we briefly note the material and institutional conditions that structured when and how social affordances became salient in the playground. These conditions do not constitute social affordances themselves but shape the field of possibilities within which peer interaction unfolds. Material scarcity versus abundance influenced whether interaction took competitive or parallel forms. For example, a single skateboard generated negotiation sequences over access rights (claiming, refusing, offering), whereas multiple bicycles enabled parallel mobile coordination, with children following similar paths and adjusting speeds without requiring explicit negotiation. Object properties also channeled social possibilities: a frisbee requires a partner for throwing and catching, making it inherently social.

Institutional organization further structured the social affordance field. Teacher supervision constrained rough physical play, with children moderating aggression or repositioning themselves closer to teachers when conflicts escalated. Recess timing introduced institutional temporal boundaries: the school bell abruptly terminated all activities regardless of participants' intentions or interactional momentum. These material and institutional features set conditions for interaction but do not determine how children engage with one another. In what follows, we therefore focus on the spatial-interactional processes through which children actively generate, regulate, and transform social affordances within these constraints.

Examples of children's behavior episodes

Initiation mechanisms: how children begin peer interaction

Across episodes, children opened social possibilities through four recurring initiation mechanisms. These mechanisms often appeared in sequence, indicating that social affordances were enacted through bids that invited uptake and made responsiveness possible. Initiation was rarely a single act but a progressive process through which children tested receptivity and negotiated access. Four mechanisms were identified, frequently combined within the same episode.

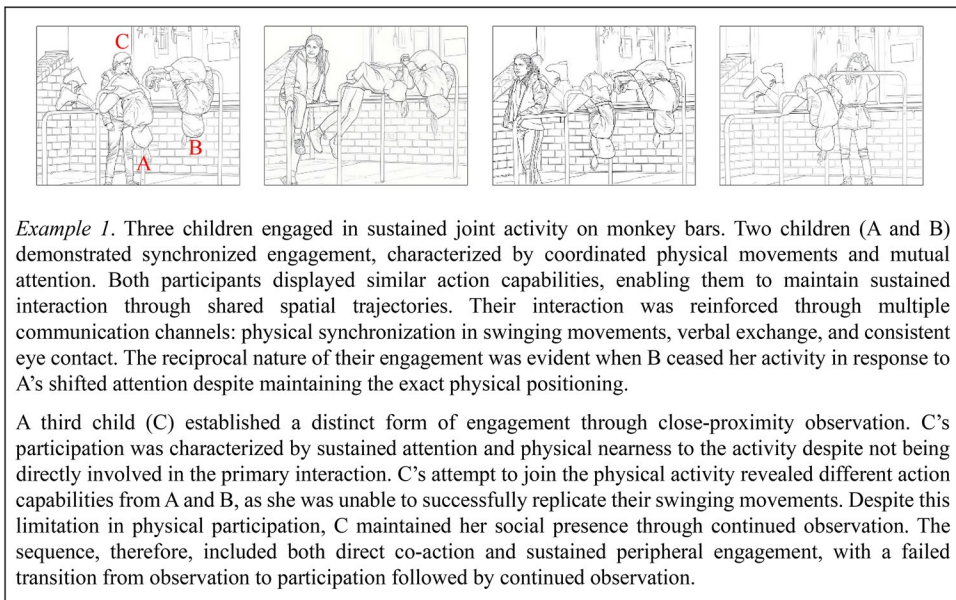


Figure 1. Monkey bar participation modes

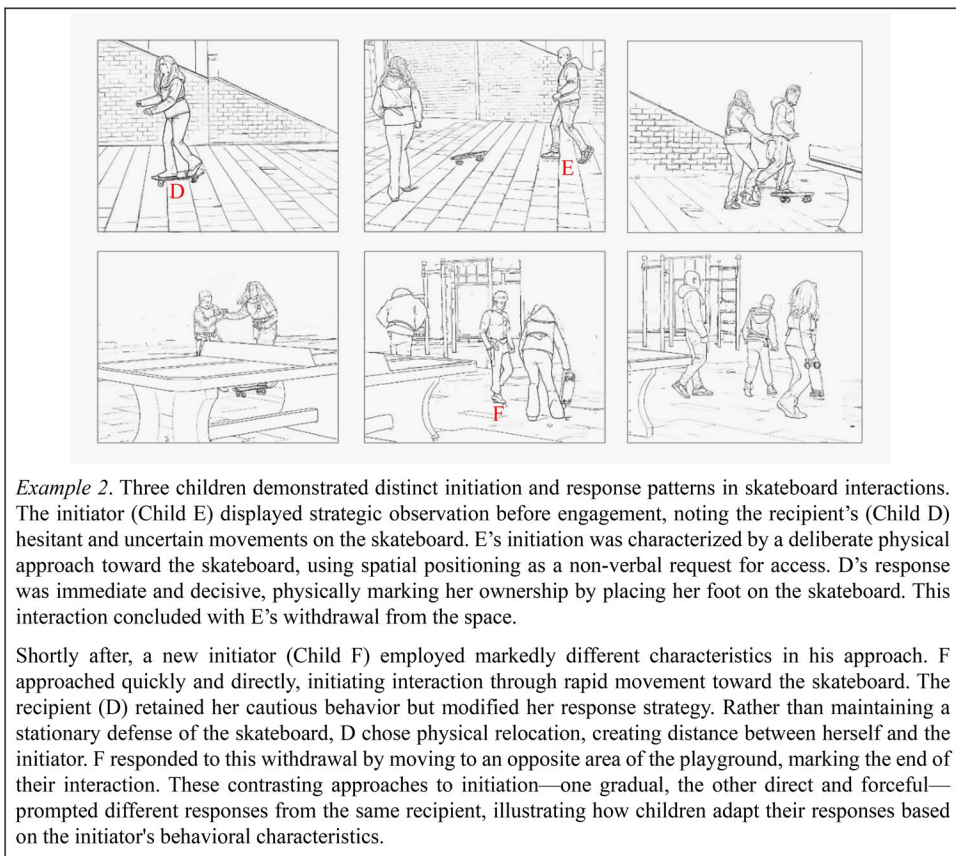


Figure 2. Negotiation and withdrawal.

Physical demonstration. Children often used visible bodily performances to attract attention and signal potential participation. For instance, synchronized swinging on the monkey bars functioned both as personal achievement and as an implicit invitation, allowing nearby peers to observe the activity's demands and assess their own capabilities (see [Figure 1](#)). Such demonstrations enabled entry without verbal negotiation. However, not all physical displays elicited engagement. Performances that occurred in peripheral locations or low-density areas were less likely to attract response, even when they involved skillful action. Overall, physical demonstrations were most effective when they were visually prominent, showcased recognizable competence, and occurred in spatial hotspots where other children were already present.

Spatial positioning and approach. Spatial positioning and approach operated as a key nonverbal initiation mechanism. Children adjusted distance, orientation, and bodily placement relative to peers and objects to signal interest and probe interactional possibilities without explicit invitation. Such spatial modulation enabled graded entry: initiators could incrementally test peer receptivity and activity demands before committing to direct participation. Responses to approach, such as guarding, withdrawal, accommodation, or invitation, were likewise enacted spatially, indicating that access to interaction was negotiated through positioning rather than verbal coordination. Approach thus functioned as an interactional resource for managing uncertainty, regulating access, and supporting transitions between observation, negotiation, and participation.

Verbal invitation and coordination. Verbal initiation played a secondary but targeted role in playground interaction, emerging primarily when explicit coordination was required. Spoken bids were rarely standalone actions; instead, they functioned within multimodal sequences, clarifying or specifying invitations already made perceptible through spatial positioning, gesture, or object use. Short verbal directives helped align positions, timing, or roles once engagement was underway, supporting coordination rather than initiating it. Language thus operated less as an entry mechanism and more as a fine-tuning resource within ongoing interaction, embedded in spatial-behavioral coordination rather than replacing it.

Object-mediated initiation. Play objects functioned as both focal points and communication devices through which social initiation was negotiated. Approaching, displaying, or repositioning objects such as skateboards or frisbees signaled interest in interaction and prompted responses from peers, ranging from invitation to refusal. Whether objects afforded solitary or cooperative use—and whether access was scarce or clearly shared—shaped the form these initiations took. Skateboards frequently generated layered negotiations over access, with claiming, guarding, offering, and declining unfolding before play could begin (see [Figure 2](#) and [Figure 3](#)), whereas inherently cooperative objects such as frisbees more readily invited joint participation or reinitiation after pauses (see [Figure 4](#)). Across these exchanges, spatial configuration was central: object placement, visibility, and reachability structured who could initiate, who could respond, and how affordances for engagement emerged and dissolved through peer-managed regulation.

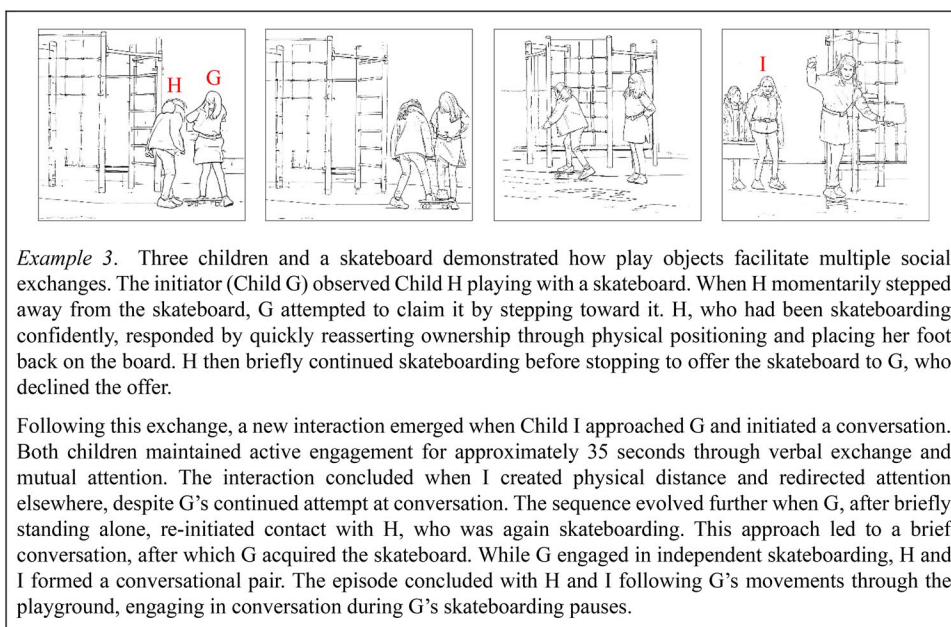


Figure 3. Skateboard Interaction.

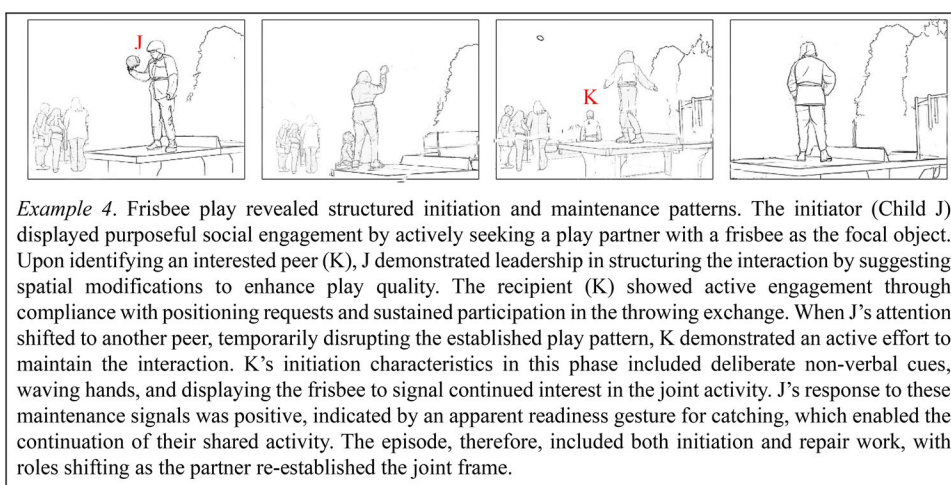


Figure 4. Frisbee play maintenance.

Spatial-social coupling: distance, positioning, and movement

Children's management of space functioned as a key medium for structuring interaction. Distance, positioning, and movement were not merely background conditions but active resources through which engagement was shaped, modulated, and regulated.

Proximity management and distance as communication. Interpersonal distance functioned as a continuous social signal through which children indicated interest, participation, or withdrawal. Close proximity enabled eye contact, verbal exchange,

and coordinated action, supporting joint engagement, while slightly increased distance allowed observation without commitment. Shifts in distance were also used to manage tension and regulate access: rejected approaches were often followed by withdrawal, whereas more forceful approaches prompted protective movement away by the current participant. In conversational episodes, disengagement was frequently marked not verbally but by turning away and increasing distance, even when speech momentarily continued. Across episodes, approach signaled interest, sustained proximity signaled participation, and increasing distance communicated boundary-setting or disengagement, demonstrating how spatial regulation operated as an efficient, nonverbal mechanism for managing social affordances.

Positioning relative to peers, teachers and features. Children's broader placement within the playground shaped the social possibilities available to them. Peripheral locations were often used to limit engagement or maintain separation, with some children repeatedly selecting edge positions and relocating when others approached. In contrast, recurring interactional hotspots—such as areas beneath the bicycle-parking shade, around equipment like monkey bars, and near teacher positions—consistently attracted clustering and sustained interaction. Teachers functioned as mobile spatial anchors: children gravitated toward them, paused nearby to converse, or used proximity to teachers as a protective boundary when tensions arose. Even in open areas without clear physical partitions, children appeared attuned to informal social territories, navigating them through overall placement as well as moment-to-moment adjustments in distance and orientation.

Movement trajectories and circulation patterns. Movement across the playground generated recurring opportunities for social engagement. Activities such as cycling, scootering, and skateboarding produced informal circulation routes that others could join, follow, or intersect. Children adjusted speed, paused at predictable points, and used following or trailing behaviors to create episodic interaction opportunities when movement slowed or stopped. Environmental features shaped these dynamics: hard surfaces afforded fast circulation and mobile encounters, open paved areas supported chasing and following games, and equipment clusters or edge spaces encouraged more stationary interaction. Movement thus functioned as a flexible interactional resource, allowing children to enter, sustain, or exit social contexts through spatial navigation rather than explicit verbal negotiation.

Participation diversity: modes of social engagement

Children oriented themselves toward peer activity in multiple ways beyond simple participating/not-participating distinctions. Across episodes, four recurring participation modes emerged, with children frequently moving between them within and across interactions.

Direct engagement. Direct engagement was characterized by mutual interaction, a shared activity focus, and reciprocal real-time responsiveness. Children maintained eye contact, responded contingently to one another's actions and utterances, and continuously

adjusted behavior to sustain joint activity. Roles were fluid rather than fixed: initiators and recipients frequently shifted positions as interaction unfolded, with leadership and followership emerging moment by moment. This mode of engagement tended to stabilize when participants had comparable action capabilities, allowing reciprocal contribution and reducing asymmetries in effort, risk, or control. Under these conditions, social affordances were maintained through ongoing coordination rather than explicit negotiation, supporting sustained peer interaction.

Observational participation. Observational participation functioned as a distinct and socially meaningful mode rather than a passive or inactive state. Children positioned themselves at the edge of activities in locations affording clear visibility without interfering with ongoing play, maintaining sustained attentional orientation toward others' actions (Brancazio, 2020; see [Figure 1](#)). Observers frequently adjusted their position to improve sightlines, tracked movements closely, and occasionally tested participation before returning to observation. Across episodes, this mode enabled children to remain socially connected while assessing activity demands, learning interactional patterns, and gauging receptivity prior to entry. Observation thus operated as an intermediate form of engagement, supporting peripheral inclusion and skillful timing of participation rather than signaling withdrawal from social interaction.

Parallel play. Parallel play occurred when children engaged in similar activities in close proximity without tightly coordinated goals. This mode was characterized by shared spatial orientation and overlapping attention rather than explicit collaboration. Children adjusted speed, direction, or timing to accommodate one another, occasionally pausing to exchange brief comments before resuming activity. Parallel play created a state of interactional readiness, maintaining social connection while preserving individual autonomy and allowing smooth transitions into more direct engagement when opportunities arose. This configuration was particularly effective when action capabilities were uneven or when activities were highly mobile, enabling children to remain socially present without committing to full coordination.

Intentional nonparticipation. Some children displayed deliberate nonparticipation despite clear opportunities for engagement. These children actively managed distance by relocating when peers approached, selecting peripheral positions, or engaging in solitary activities that discouraged interruption. Such behaviors indicated awareness of available social affordances coupled with a preference for remaining apart. Intentional nonparticipation thus differed from exclusion by others; it functioned as an active strategy for regulating one's position within the social field, with solitude operating as a legitimate mode of participation within a shared environment.

Importantly, these participation modes were not stable traits of individual children. The same child could shift between direct engagement, observation, parallel play, or nonparticipation across episodes. Together, these modes illustrate playground participation as a continuum, dynamically calibrated through spatial positioning and movement rather than fixed social roles.

Temporal dynamics: opening, negotiation, stabilization, and closure

Playground interactions unfolded as time-extended processes rather than static states. Across episodes, four recurring temporal phases characterized how interactions were opened, negotiated, stabilized, and closed.

Opening. The opening phase involved first moves toward engagement, such as demonstrations, spatial approaches, verbal invitations, or object displays. These initial bids made participation possibilities visible without committing participants to sustained involvement. Some episodes closed at this point through immediate rejection or withdrawal, while others moved into negotiation.

Negotiation. The negotiation phase captured shifts in interactional form, including changes in participation, purpose, or focus. Examples included movement from observation to attempted participation, from object negotiation to conversation, or from joint activity to disengagement. These transitions were not always successful and could result in stalled or abandoned interactions. Negotiation was ongoing rather than bounded: episodes could cycle through multiple transitions, with children continuously testing and adjusting the terms of engagement.

Stabilization. The stabilization phase described sustained engagement, in which children maintained mutual involvement across multiple exchanges or prolonged activity. Extended interactions depended on active maintenance rather than inertia. Children employed a range of strategies to sustain engagement when attention wavered or external events intervened, including reestablishing shared focus, adjusting pace or direction, waiting during brief interruptions, and using following behaviors to preserve coordination (see [Figure 4](#)). These actions reflected ongoing monitoring of interactional stability and deliberate efforts to repair and prolong engagement, highlighting stabilization as an active achievement rather than a passive continuation of play.

Closure. Interactions closed through multiple temporal routes rather than a single termination mechanism. Some concluded through explicit withdrawal or rejection, others faded as attention shifted toward more attractive opportunities, and some reached natural completion without conflict. Spatial distancing was the most common closure cue: children left the immediate area, turned away, or ceased maintaining proximity. In some cases, only a particular participation mode closed while the interaction persisted in another form, such as a shift from direct engagement back to observation. Episodes were also closed by institutional interruption, most notably the school bell, which abruptly ended all ongoing activities.

Together, these four phases indicate that social affordances in playgrounds operate as trajectories—opened, negotiated, stabilized, and closed through children's ongoing spatial-behavioral work—rather than as fixed options. This helps explain why momentary, category-based frameworks struggle to capture how social affordances are enacted in unstructured recess environments.

Social affordances as co-constitutive spatial-interactive processes

The four dimensions—initiation mechanisms, spatial-social coupling, participation diversity, and temporal dynamics—describe interrelated facets of interactional processes rather than discrete types of social affordances. Across episodes, these dimensions operated simultaneously: initiations were spatially staged through approach and positioning; participation modes were enacted through continuous distance management; temporal phases were marked by spatial repositioning; and all dimensions emerged through ongoing coordination between children's movements and peers' responses. No single dimension accounted for an episode on its own; rather, social affordances took shape through their concurrent operation.

Episodes involving scarce or shared resources illustrate this co-constitution particularly clearly. Material features shaped initiation, access regulation, participation shifts, and temporal sequencing at the same time, producing layered interactional trajectories rather than isolable affordance categories. Changes in approach, bodily orientation, object handling, and proximity simultaneously signaled bids for engagement, refusals, invitations, or withdrawal, while participation modes shifted fluidly between active engagement, observation, and nonparticipation. Temporal dynamics unfolded through phases of opening, negotiation, stabilization, and closure, often within short time spans, as spatial arrangements and peer responses continuously reconfigured the interactional field.

This co-constitutive pattern appeared across episode types, including object-centered play, parallel movement activities, and sustained joint engagements. Social affordances thus emerged as sociomaterially constituted, peer-culturally organized, spatially enacted, and temporally extended processes through which children continuously negotiated participation possibilities. Rather than specifying fixed affordance types, this framework characterizes how affordances are generated, stabilized, transformed, and dissolved through interaction, capturing the processual organization of social action that category-based frameworks struggle to represent in unstructured playground settings (Figure 5).

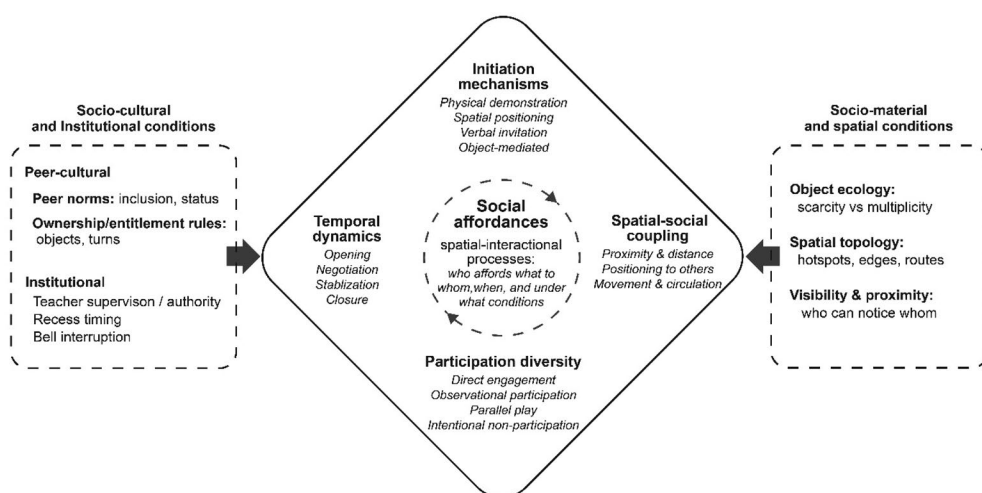


Figure 5. Process-based framework for social affordances in playground settings.

Discussion

This study extends ecological accounts of social affordances by examining how Fajen et al. (2009) social affordance framework in sports operates when applied to unstructured playground interaction. Our analysis shows that while Fajen et al.'s categories effectively capture moments of structured coordination, playground interaction requires additional process-oriented dimensions to account for gradual entry, peripheral participation, and shifting engagement. Phase 1 demonstrated that Fajen et al. (2009) social affordance categories were observable and informative, yet insufficient on their own for representing the majority of episodes. Phase 2 identified four co-constitutive dimensions—initiation mechanisms, spatial-social coupling, participation diversity, and temporal dynamics—that describe how social affordances emerge, stabilize, and dissolve through ongoing spatial-behavioral coordination. Together, these findings motivate a shift from treating social affordances as categorical descriptors toward analyzing them as interactional processes unfolding over time. The sections below situate this shift within environment-behavior research and clarify its theoretical and practical implications.

From categorical to processual social affordances

Fajen et al. (2009) tripartite framework—affordances for other people, for joint action, and of other people—was developed in sport contexts characterized by shared goals, defined roles, and institutionally stabilized participation. In such settings, social affordances can be prospectively perceived: coordination opportunities emerge and collapse against a background of already-established joint activity (e.g. a passing lane opening and closing). The analytical task is thus detecting when coordination becomes possible. Our findings indicate that unstructured playground interaction operates under fundamentally different conditions. When children approached ongoing activities, lingered at peripheries, or tested participation through gradual repositioning, they were not perceiving pre-established affordances but actively negotiating what actions would become available. The high proportion of difficult-to-classify episodes in Phase 1, therefore, reflects a limited theoretical fit rather than methodological failure. Categorical frameworks are well-suited to describing affordances once coordination has stabilized; playground interaction instead requires analytic attention to how coordination possibilities are opened, tested, transformed, and sometimes abandoned.

This distinction aligns with Rietveld and Kiverstein (2014) differentiation between the landscape of affordances—relatively stable possibilities within a form of life—and the field of relevant affordances that solicit particular individuals in concrete situations. Sport-based categories operate primarily at the landscape level. Our video data captured field-level dynamics, where moment-to-moment spatial positioning, bodily orientation, and peer responsiveness determine what actions become possible for whom. The co-constitutive character of the four dimensions suggests that playground social affordances require extending ecological theory toward what De Jaegher and Di Paolo (2007) describe as the autonomy of the interaction process: dynamics that unfold between participants and constrain individual options. Initiation illustrates this clearly. Physical demonstration alone did not reliably solicit joining; only when demonstrations

were coupled with spatial repositioning and peer orientation did invitations gain interactional traction. The spatial-social coupling dimension connects with work on interpersonal coordination dynamics, showing that the tendency to coordinate is foundational for social connectedness (Marsh et al., 2009; Schmidt, 2007). When coordination succeeded, children formed what Riley et al. (2011) describe as interpersonal synergies: temporarily stabilized groupings capable of acting as coordinated units. The maintenance of joint play through interruptions exemplifies such synergy, while dissolution occurred when compensatory adjustments could no longer be sustained (Schmidt & Richardson, 2008).

Participation diversity and temporal dynamics further reveal how playground social affordances are normatively structured and sociomaterially enacted. Observational participation exemplifies situated normativity (Rietveld & Kiverstein, 2014): skilled attunement to what counts as an appropriate response in a given situation. Children observing from the edges were not disengaged but actively calibrating when approach might succeed. Temporal dynamics similarly show that social affordances unfold through sociomaterial practices—patterns of activity shaped by and shaping material arrangements and institutional rhythms such as recess duration (Kiverstein, 2024). Sustaining interaction required repair work operating within these temporal constraints. Taken together, the four dimensions specify how playground social affordances are enacted as co-constitutive, temporally extended, and spatially regulated accomplishments.

Implications for research and design

The process-based framework repositions how peripheral participation is understood in playground research. Parten's (1932) influential typology framed onlooking as a developmental stage preceding more mature forms of social play, an assumption that has shaped decades of observation protocols and intervention approaches (Rubin et al., 2006). This developmental framing treats positioned watching as a deficit to be overcome. Our findings challenge this assumption. Children occupying peripheral positions were not socially stalled but strategically navigating access to ongoing activities by monitoring interactional cues, calibrating distance, and timing potential entry. This reframing aligns with Lave and Wenger (1991) concept of legitimate peripheral participation, in which newcomers engage meaningfully from the margins of a practice rather than through immediate full participation. Children navigating playground peer groups face analogous demands: they must read unfolding activity, position themselves within visual and spatial range, and negotiate entry without disrupting ongoing interaction. The participation diversity dimension captures this gradient—from observation through parallel engagement to direct involvement—revealing trajectories that categorical coding collapses into static types.

This processual account also clarifies how peer-cultural norms are enacted. Corsaro's (1992) notion of the "protection of interactive space" highlights children's active regulation of access to play, but largely at the level of routine and cultural patterns. Our framework specifies the interactional mechanisms through which such regulation occurs: spatial positioning, bodily orientation, calibrated responsiveness, and the management of distance, described in the initiation and spatial-social coupling dimensions. What

Corsaro theorized at the level of peer culture, the present analysis details at the level of real-time interactional process.

Methodologically, this reframing has implications for how playground research conceptualizes and measures social affordances. Kytta's (2002, 2004) participatory mapping approach powerfully distinguishes potential from actualized affordances across environments, but it cannot capture how access to social engagement is negotiated through real-time interactional sequences. The four dimensions identified here address this gap by specifying how social affordances are opened (initiation mechanisms), spatially organized (spatial-social coupling), differentially accessed (participation diversity), and sustained or dissolved over time (temporal dynamics). Similarly, Heft's (1988, 2001) functional taxonomy offers a robust vocabulary for physical affordances but does not extend to the negotiation of social affordances among peers. Heft's (2026) recent engagement with Mead's social pragmatism points toward precisely this intersection: our framework provides empirical specification of the micro-level processes through which children's individual actions and playground social structures mutually constitute one another. For developmental research, this broadens what counts as social competence. Maintaining appropriate peripheral positions, timing approaches, and sustaining parallel play without disruption are forms of skilled engagement rather than social deficit—calling into question interventions that prioritize interaction frequency over interactional quality and timing.

For playground design, the framework offers a theoretical reorientation rather than prescriptive guidelines. Withagen and Caljouw (2017) argue that van Eyck's play sculptures succeed because of their "open functions," inviting diverse appropriations rather than prescribing action. Subsequent work has shown that openness is itself socioculturally mediated, varying in the diversity of uses different elements invite (Jeschke et al., 2022, 2023; Van der Schaaf et al., 2020). Our findings suggest extending this notion from physical to social affordances: some spatial configurations are more open to diverse participation structures and interactional trajectories than others. This perspective aligns with affordance-based design evaluation approaches that emphasize actualized rather than intended use (Mohammadi et al., 2026; Mohammadi & Koutamanis, 2025), while also heeding Koutamanis's (2026) caution that not all design issues are affordance issues. Social affordances cannot be designed directly; they emerge through peer interaction. However, understanding how interactions are initiated, spatially organized, diversely participated in, and temporally sustained can help designers attend to conditions that support social engagement. Rather than prescribing social outcomes, the framework functions as a set of sensitizing concepts for evaluating how playground configurations support gradual approach, peripheral participation, repair following interruption, and flexible movement between participation modes.

Limitations

This study relies on video-based micro-observation to capture fine-grained spatial-behavioral processes, such as gradual approaches, failed initiations, peripheral positioning, and interactional repair, that are difficult to access through self-report methods alone (Lloyd & Gifford, 2024). At the same time, interpretations necessarily reflect adult analytic

readings of visible behavior within a single Dutch primary school context. The four dimensions identified here should therefore be understood as analytic heuristics rather than an exhaustive taxonomy of playground social affordances. Playground interaction is shaped by locally specific norms, supervision practices, age compositions, and spatial configurations, which may give rise to different process patterns in other settings. Video recording may also have subtly influenced behavior, although prolonged observation and unobtrusive camera placement likely reduced reactivity. Future research could examine the transferability of these process dimensions across diverse institutional and cultural contexts and strengthen interpretive validity by combining micro-observation with video-stimulated recall, wearable movement data, or longer-term ethnographic approaches to better link observed interactional processes with children's own experiences. The present analysis also did not systematically examine how gender and social class may shape the interactional processes described here. Both factors are likely to influence peer-cultural norms, access regulation, and participation trajectories in ways that the current framework does not capture, and future work should attend to these dimensions explicitly.

Conclusion

This study reconceptualizes playground social affordances as temporally unfolding, interactionally achieved processes rather than perceptually available categorical properties. Sport-based frameworks assume that affordances can be detected within pre-established coordination structures; unstructured playground play instead requires analyzing how such structures emerge through ongoing negotiation. The four process dimensions—initiation mechanisms, spatial-social coupling, participation diversity, and temporal dynamics—specify the interactional work through which children open, test, stabilize, and close opportunities for peer engagement.

This reconceptualization carries implications for research practice. Rather than asking *what types of social interaction does this space afford?*, researchers might instead ask *through what processes do children negotiate access to social engagement?* This shift foregrounds legitimate peripheral participation, strategic observation, and gradual approach as skilled achievements rather than developmental deficits or analytic noise.

Children's playgrounds do not simply afford social interaction; they afford ways of becoming social—gradually, unevenly, and on children's own terms. Designing and studying playgrounds through this lens shifts attention from participation as an outcome to the spatial-temporal processes through which children negotiate when, how, and with whom they engage.

CRedit authorship contribution statement

Mohsen Mohammadi: Writing—original draft, Writing—review & editing, Conceptualization, Methodology, Investigation, Validation, Visualization, Resources, Project administration, Funding acquisition.

Mohammad Mohammadi: Writing—review & editing, Conceptualization, Methodology, Investigation, Validation, Visualization.

Alexander Koutamanis: Writing—review & editing, Supervision, Conceptualization, Methodology, Investigation, Funding acquisition.

Yung-Ting Tsou: Writing—review & editing, Data curation.

Carolien Rieffe: Writing—review & editing, Supervision, Conceptualization, Methodology, Investigation, Validation, Funding acquisition.

Ethical approval

The informed consent form and the research protocol were approved by the Psychology Research Ethics Committee of Leiden University (V2-2428, dated 4 June 2020; V3-2685, dated 24 October 2020).

Disclosure statement

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