

Redefining the Psychology of Games: A Unifying Framework Beyond Play and Gaming

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This article proposes a novel theoretical framework for understanding the psychological processes involved in playing games, distinguishing it from broader concepts like play and narrower concepts like gaming. By identifying and delineating the core psychological dimensions inherent in game-playing experiences, the aim is to provide a structured approach for experimental psychology to study this form of human activity as object of inquiry and to use it as an experimental tool in psychological research. The framework emphasizes the interplay between symbolic, perspectival, performative, and metacognitive processes during gameplaying, offering insights into how games can serve as tools for psychological research. The implications of this framework for experimental design, measurement, and interpretation highlight its potential to advance our understanding of human behaviour through the lens of game-playing.

Public Significance Statement

This study proposes a new framework to understand how people experience games by identifying four key psychological processes and how they interact. This approach can help researchers and practitioners design more effective games for education, training, and communication and better understand why different types of games produce different experiences.

Keywords: games, gamefulness, playing, psychology of games, agency

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Introduction

The study of games within psychology is grounded on a very fragmented terrain. Games have been found to shape emotional and cognitive engagement (Jennett et al., 2008), influence motivation and self-determination (Noda et al., 2019; Ryan et al., 2006), foster critical thinking (Cicchino, 2015), support prosocial behaviour (Cès et al., 2026), and form parasocial and identity-based relationships with their avatars (Bessière et al., 2007; Klimmt et al., 2009). Psychological research has explored, in and through games, emotional regulation

and coping (Villani et al., 2018); potential for learning and skill transfer (Boot et al., 2008; Zhong et al., 2025); negative consequences associated with excessive or maladaptive play (Kuss & Griffiths, 2012; Przybylski et al., 2017); educational and therapeutic applications (Matorin & McNamara, 1996); capacity to promote empathy, perspectivetaking, and identity exploration (Bowman, 2010; Yuliawati et al., 2024); role in narrative coconstruction; and emotional regulation within group contexts (Hendricks, 2014). All the mentioned studies deal indisputably with games. However, the differences among games are striking. People's experiences of distinct games can vary greatly (Landers et al., 2019). To illustrate the point, just compare analog (board games and roleplaying games) to digital games (video games): Does Tomb Raider promote empathy as Dungeons&Dragons, or does maladaptive behavior exist in World of Warcraft as in Hide-n-Seek? The reader may take up the challenge of guessing which studies concern digital and which analog games¹. Can any singular evidence or result be generalized? Are commonalities between games enough to justify the generalizations? Are the commonalities known at all? There is still no agreement on what constitutes a game (Stenros, 2017). Nonetheless, several subdisciplines of psychology have approached different game-related phenomena, particularly play (developmental psychology) and gaming (media psychology), and different applications of games, such as game-based learning (educational psychology) and gamification (organizational psychology). In the absence of a unifying theory of games, one is left to guess if any research on playing games or using games should not be considered a nongeneralizable, noncomparable case study. This article aims to solve this problem by presenting a unifying framework that allows researchers and theorists in psychology to reinterpret and compare existing findings and to design new research grounded in the specific psychological dimensions that games activate.

The Fragmentation Problem and Directions Toward a Solution

Historically, the most attention in psychology has been given to play, a broader domain that includes playing games (Huizinga, 1938). Piaget (1951) interpreted play as a mechanism of cognitive development; Vygotsky (1978) emphasized its social role in developing higher functions; Bruner (1973) viewed play as meaning-making in cognitive growth; Bateson (1955) framed play in communicative metamessage; Csikszentmihalyi (1990) described playlike activities as optimal experiences. These diverse psychological perspectives illustrate both the richness of the topic and the lack of agreement on what constitutes the psychological foundations of playing, let alone of games. Recently, the attention in psychology shifted to gaming, a narrower domain, usually defined by technologically mediated activities and the intensity of investment of the player (e.g., Kowert, 2014). Research has explored multiple facets of this phenomenon, including motivational mechanisms and reward sensitivity (King et al., 2019), emotional regulation and escapism (Snodgrass et al., 2018), social relatedness and identity work (Bessière et al., 2007; Kowert et al., 2014), and the emergence of problematic or addictive gaming patterns (Kuss & Griffiths, 2012). Again, however, the lack of a unified psychological framework makes these diverse findings nongeneralizable. Games are primarily recognized as such through the experience they evoke (Calvillo Gámez et al., 2009). Indeed, a unifying construct, gamefulness, has been proposed to describe the experiential quality specific to playing a game, like a focused, goaldirected engagement, as opposed to playfulness, more characterized by lack of purpose (Landers et al., 2019; McGonigal, 2015). This construct is experience-based. This implies

¹ Digital: Bessière et al. (2007), Boot et al. (2008), Jennett et al. (2008), Klimmt et al. (2009), Kuss and Griffiths (2012), Przybylski et al. (2017), Ryan et al. (2006), Villani et al. (2018), and Zhong et al. (2025). Analog: Bowman (2010), Cicchino (2015), Hendricks (2014), Cès et al. (2026), Noda et al. (2019), and Yuliawati et al. (2024).

that games can—and perhaps should—be understood as psychological systems. Here, I propose a theoretical framework that focuses precisely on the psychological components involved in playing games, aimed to provide a coherent structure that can guide experimental research in psychology and offer insights into the cognitive, social, executive, and metacognitive dimensions of game-playing.

Framing Games

For experimental psychology, it is crucial to isolate the specific processes that are unique to game-playing. Clarifying the evolutionary roots is a necessary step toward defining game-playing. From an evolutionary standpoint, games can be understood as structured extensions of play. Play, as observed in many animal species, provides a low-risk context for experimentation, discovery, learning, and behavioural refinement and represents an adaptive behaviour that confers evolutionary advantages (Bateson & Martin, 2013; Graham & Burghardt, 2010). As a mechanism for safe exploration and learning, play has provided fertile ground for the evolution of more structured forms of interaction: Animals—and later humans—developed firstly motor and cognitive skills, then social negotiation, rule-following, and symbolic representation (Burghardt, 2005). Play became progressively codified into games: cultural artifacts that retain its exploratory and learning functions while amplifying them through formal constraints and shared intentionality (Caillois, 1958; Huizinga, 1938). As such, games inherit the original function of play: to provide a safe learning environment. Subjectively, players refer to be driven, beyond entertainment, by the pleasure of overcoming obstacles and achieving mastery (Gursesli et al., 2024) and feeling competent (Deci & Ryan, 2000), which are expressions of occurred learning. Instead, the rewarding nature of game-playing that is often considered central in play (Lazzaro, 2004; Stenros, 2017) may share evolutionary roots with other pleasurable adaptive behaviours, such as eating and sex, which are promoted through intrinsic reinforcement (Balkaya & Catak, 2016). Alongside safe experimentation and its rewarding nature, playing games is also uniquely characterized by the experience of agency—the capacity to act intentionally and perceive oneself as the origin of action and consequence. Indeed, games can be considered the medium of agency (Nguyen, 2025). Players are enabled by agency to take responsibility for their actions, internalize the locus of control, and face situations in which outcomes depend on chance (*alea*) as in the use of dice, cards, or random algorithms (Caillois, 1958; TobiasWebb et al., 2017; Vilaza et al., 2014). Central to agency is autonomy, the perceived freedom to engage voluntarily (Deci & Ryan, 2000; Przybylski et al., 2010). While voluntariness is often regarded as one of the defining characteristics of play itself (Caillois, 1958; Huizinga, 1938), players can feel compelled to play by social, motivational, or external pressures (Deci & Ryan, 2000; Przybylski et al., 2010), such as when the game is offered in classroom as part of a learning program. Play, however, is autotelic in nature—that is, its orientation toward being an end in itself rather than a means to an external goal (Csikszentmihalyi, 1990), and thus, intrinsic motivation is supported even in these contexts. However, autonomy impacts intrinsic motivation, which in turn impacts engagement and learning outcomes (Deci et al., 1999; Papastergiou, 2009; Rodríguez-Aflecht et al., 2017; Ryan et al., 2006). While autonomy is continuous in nature and might be considered an independent variable, perception of agency is a threshold condition for a game to be perceived as such. Taken together, these constructs define game-playing as a structured experience emerging from play and inheriting its function, characterized by agency and sustained by intrinsic motivation. Let us now dive into the experience of playing games.

The Four Foundational Dimensions of Playing Games

The proposed framework is composed of four foundational dimensions constituting the core of the psychological experience of playing games. They are derived from several diverse disciplines and interpreted

in terms of psychological constructs and phenomena. For example, Stenros (2017) analysed game definitions from fields such as game studies, sociology, anthropology, economics, and game design, finding many recurring elements, some of which have a direct psychological counterpart: For instance, conflict resolution can be related to problem solving, the role of the player to perspective-taking, and the importance of rules to executive control. Importantly, the proposed dimensions are not intended as discrete containers of specific psychological processes. Rather, they represent distinct functional organizations within the game-playing experience. As such, the same cognitive or psychological function (e.g., attention, planning, or perspective-taking) may contribute to different dimensions, depending on the role it plays within the system. This reflects the multifunctional nature of psychological processes and their flexible recruitment across dimensions, allowing them to support different aspects of the game-playing experience. This functional perspective highlights the need for a systemic approach: No single dimension fully captures the experience of playing games, and their boundaries are not defined by exclusive processes, but by their distinct functional roles within the overall system. Rather, the psychological profile of game-playing emerges from the dynamic interdependence of these dimensions, as they jointly organize the player's experience. The following are the four identified dimensions of the game-playing experience.

Regulated Symbolic Framing

Rules are central to all games, defining possibilities, forbiddings, system operation, and success criteria. Psychologically, a rule can be understood as a schema (Piaget, 1951), a structured model that organizes and guides both information and behaviour. Rules are perceived as constraints but are generative structures whose interaction delimits possibilities but creates the space for meaningful action and interpretation. For instance, in poker, no rule explicitly mentions bluffing, yet the system of rules implicitly allows and sustains it. Exploring this rule-based possibility space constitutes a key aspect of the cognitive experience of playing a game. Rules also reassign meaning to elements and actions, transforming objects and behaviours into symbolic representations: A stick becomes a magic wand, a line on the ground becomes a territorial boundary, and moving tokens on cardboard represents war. This symbolic redefinition corresponds to the notion of pretend or symbolic play (Bruner, 1973; Fein, 1981; Vygotsky, 1978), in which multiple representations coexist simultaneously. In short, this dimension views games as regulated symbolic systems that structure meaning, guiding players' interpretation, action, and experience.

Altered Role Perspective

Assuming a role, as required by games, shifts the player's perspective, transforming how the self is experienced and enacted (Decety & Sommerville, 2003; Vygotsky, 1978). Players inhabit a function, position, or fictional identity that shapes perception, motivation, and decisions toward a novel objective, engaging perspective-taking and identity exploration processes. In games, especially role-playing and simulative ones, players experience a layered perspective: They make decisions as themselves, yet within the constraints and narrative of another character, role, or viewpoint (Bowman, 2010). This engages empathy, projection, and cognitive flexibility (Goldstein & Winner, 2012), inviting players to oscillate between internal and external perspectives. In social game-playing, role adoption is inherently relational: Roles are defined by their position within a network of other players, enabling processes such as coordination, negotiation, and shared intentionality (Heesen et al., 2017). In summary, this second dimension conceptualizes the experience of game-playing as a process of shifting perspectives and exploring roles, adopting new goals that exist only within the symbolic framework of the game.

Goal-Organized Performance

Players are oriented toward achieving a specific state of the game, called the prelusory goal (Suits, 1978). The pursuit of the prelusory goal transforms arbitrary actions into a meaningful, structured activity. Players organize and coordinate interpretation, strategic or improvisational choices, and cognitive and emotional effort toward winning the game (Locke & Latham, 2002). The challenge or conflict embedded in the goal elicits problem solving and is sustained by intrinsic motivation and perceived competence (Rodríguez et al., 2021). This performative dimension connects game-playing with the construct of self-efficacy (Bandura, 1977). The interplay between the difficulty of the task and the player's skill level often results in the phenomenological state of flow (Csikszentmihalyi, 1990), in which attention, motivation, and action merge into a unified phenomenological experience. Game goals exist in the symbolic domain; even when linked to external rewards, the psychological significance of the goal remains confined to the game itself. In the absence of a goal to pursue, engagement fades, and actions become unorganized. In summary, this dimension frames game-playing as an intentional and motivated action within a symbolic goal structure.

Metacognitive Executive Monitoring

Players plan and organize their goal-directed actions while continuously tracking outcomes in relation to intended achievements. From a psychological perspective, this organizes the constant interplay between executive control (Norman & Shallice, 1986) and metacognitive monitoring (Efklides, 2008; Flavell, 1979). This captures the functional role of both online monitoring—immediate detection of errors or unexpected outcomes (Botvinick et al., 2001)—and offline reflection, allowing for post hoc evaluation and refinement of one's performance and strategy (Zimmerman, 2000). The controlled environments with clear feedback allow players to self-regulate (Diamond, 2013). In strategic board games like chess or go, players continuously monitor the consequences of their moves within the evolving game state, while in real-time games such as action video games, they must also manage attentional resources and inhibitory control under time pressure. Metacognitive monitoring in games extends beyond self-observation to others' actions. Here, mentalizing and perspective-taking processes (Decety & Lamm, 2007; Frith & Frith, 2006) are integrated with executive monitoring, bridging internal regulation and social coordination with other players' intentions, beliefs, and likely actions, adding an additional level of cognitive demand (Lee et al., 2021). When adopting game-prescribed roles, players track perspectives, identities, and goals while inhibiting out-of-game relational scripts (e.g., affection, hierarchy, social obligation) that might spill over into games and conflict with goal achievement. This requires coordination of multiple executive functions—notably cognitive flexibility, inhibitory control, and working memory, as well as multiple representational frameworks based on perspective-taking and theory of mind. Ultimately, this dimension highlights that game-playing depends not merely on executing a plan but on the continuous metalevel regulation of that execution.

Systemic Interdependence

Rather than representing independent components, these four dimensions should be understood as necessary parts of a dynamic system. Game-playing emerges when a regulated symbolic framework establishes a constrained possibility space of meanings and actions, within which a player adopts a role that defines perspective and agency. This, in turn, enables goal-directed performance, which organizes action toward a desired state. This performance is continuously shaped and adjusted through metacognitive executive monitoring, which evaluates discrepancies between intended and actual outcomes. This dynamic system

creates a self-sustaining psychological configuration: Symbolic constraints enable role-based agency, agency enables goal-oriented action, action generates feedback, and feedback is integrated through metacognitive processes, which in turn refine future action. Each of the four dimensions is necessary but not sufficient on its own to account for the full psychological configuration of gameplaying that emerges from their dynamic interplay rather than from any single component in isolation. Removing just one dimension modifies the entire experiential configuration into a nongameful experience. Indeed:

- Regulated symbolic framing enables the alteration of roles, drives the performance, and sets criteria for orientation toward the goal and monitoring. Without the symbolic structure, the experience becomes unregulated or purposeless, such as in free play.
- Altered role perspective defines the role of the player according to the rules and symbolic meanings and sets the goals for performance, requiring monitoring to keep track of the difference between in-game and out-of-game identities. Without the perspectival component, the activity impacts the out-of-game world in which the unaltered perspective of the player resides, such as in war, politics, and courtship.
- Goal-organized performance orients all the choices and actions toward the executive goal, according to the role of the players and the regulated symbolic structure of rules, and is monitored metacognitively. When the motivational/performative dimension is absent, intentionality and engagement collapse, and one shifts from a gameful to a passive, nonperformative activity.
- Metacognitive executive monitoring tracks the goal-oriented performance in alignment with the altered role of the players and according to the rules. Without the metacognitive/executive layer, regulation and feedback integration fail, producing chaotic or uncoordinated behaviour.

As such, these four dimensions represent minimal necessary conditions for sustaining this dynamic system, providing a cohesive framework for understanding the psychological underpinnings of game-playing. Accordingly, an experience that is deprived of one of these dimensions should not be considered a game, as gamefulness should not emerge. As notable examples, in doing jigsaws, individuals are goal-oriented, but there is no requirement for a performance or strategy. When using two identical sets and challenging an opponent to complete one first, then a performance is included in the structure of rules, and the experience becomes gameful. Similarly, the Goose Game does not require any performance, since there is no space for any meaningful choice: Agency is restricted to throwing the dice, with no impact over the result. Here, the experience is structurally similar to a gameful experience but lacks the fundamental property of being able to impact the performance. Another notable experience is expressive art, in which the regulative symbolic dimension sets rules that are more arbitrary than in games, so that both organization toward a goal and monitoring do not engage in the same rule-bound manner. A key implication of this systemic perspective concerns the role of social interaction, which cannot be fully captured by examining individual dimensions in isolation. Social interaction in games should be understood as an emergent property of the system rather than a separate dimension. When multiple players engage within the same symbolic framework, adopt interdependent roles, pursue shared or conflicting goals, and monitor both their own and others' actions, a dynamically coordinated system of interaction emerges. In this sense, phenomena such as cooperation, competition, communication, and strategic alignment are understood not as additional components but as patterns emerging from the underlying dimension configurations when distributed across multiple agents.

Operationalization and Experimental Implications

To enable empirical investigation, the proposed framework is understood as a structured and parametrizable system in which each dimension represents a distinguishable, yet interdependent, component of the game-playing experience. The four dimensions of the framework do not exhibit uniform activation across all forms of game-playing but instead constitute differentially weighted components within a stable systemic configuration. While all four dimensions are necessary for the emergence of a gameful experience, their relative salience varies as a function of the structure, purpose, and context of the game. For instance, competitive or achievement-oriented games may emphasize goal-organized performance (e.g., planning, strategy, outcome optimization), while games designed for therapeutic or reflective purposes may prioritize altered role perspective or metacognitive monitoring (e.g., understanding, exploration, emotion regulation). Narrative-driven or role-playing experiences may amplify altered role perspective (e.g., immersion, mentalization, empathy), while abstract or rule-intensive games may foreground regulated symbolic framing and executive control (e.g., systems thinking, pattern recognition, abstract reasoning). While games within the same traditional taxonomic category may exhibit similar patterns of dimensional weighting, the present framework enables the development of a novel taxonomy of games based on the relative configuration of their psychological dimensions, offering a theoretically grounded alternative to classifications based on structural or surface-level features. A key advantage of this framework is that it enables researchers to isolate, manipulate, and measure individual dimensions, as well as their interactions. For example, researchers may independently vary goal clarity (goal-organized performance) and feedback availability (metacognitive executive monitoring) to examine their combined influence on performance and learning. Moreover, the concept of dimensional weighting allows researchers to experimentally construct different configurations of game experiences by selectively amplifying or attenuating the salience of specific dimensions. This provides a structured approach to comparing heterogeneous game paradigms within a common theoretical framework. A list of potential operationalizations, behavioural indicators, and experimental paradigms is provided in Table 1. A visual representation of the dimensions and examples of their differential salience configurations can be found in Figure 1. Finally, the presented framework generates a range of empirically testable hypotheses at both the level of individual dimensions and their systemic interaction.

Baseline hypotheses (dimension-specific effects): Each dimension is expected to produce distinct and measurable effects when selectively manipulated. See the following example:

Hypothesis 1: Increasing goal clarity (goal-organized performance) may enhance persistence and performance.

Hypothesis 2: Manipulating role perspective (e.g., through avatar identity or narrative framing) may influence decisionmaking patterns.

Systemic hypotheses (interaction effects): Beyond baseline effects, the framework predicts that game-playing outcomes emerge from the interaction between dimensions. See the following example:

Hypothesis 3: The effect of goal clarity on performance and persistence may be moderated by metacognitive executive monitoring.

Hypothesis 4: The impact of altered role perspective on decision making may be amplified in multiagent contexts.

Hypothesis 5: Increasing rule complexity may initially reduce performance but, when combined with sufficient metacognitive monitoring, may enhance exploratory behaviour and learning outcomes.

Hypothesis 6: Different game contexts may produce distinct behavioural profiles as a function of their dimensional weighting.

Hypothesis 7: Optimal gameful experience (e.g., more stable, more engaging, more readily identifiable) may emerge from a balanced configuration of all four dimensions, rather than from the maximization of a single dimension.

These hypotheses illustrate how the framework supports both the isolation of dimension-specific effects and the investigation of interaction effects, nonlinear dynamics, and context-dependent configurations, offering a more nuanced approach than models that treat game-playing as a unitary construct.

Conclusion and Implications for Experimental Psychology

This article has proposed a theoretical framework for understanding the psychological processes involved in playing games, distinguishing it from broader concepts, such as play, or narrower fields, such as gaming. By identifying four foundational dimensions—regulated symbolic framing, altered role perspective, goal-oriented performance, and metacognitive executive control—a structured approach for studying game-playing in experimental psychology is provided. By using a structured yet systemic perspective, this framework supports deeper investigation in both directions: more holistic and systemic and more focused on subdomains. The proposed framework can be positioned in relation to existing constructs and models in the psychology of games. The concept of gamefulness (Landers et al., 2019; McGonigal, 2015) plays a central role in the present account. Originally introduced to capture the distinctive experiential qualities associated with playing games, the construct has often remained broad and loosely defined, reflecting a lack of consensus regarding its underlying components (Huotari & Hamari, 2017). Subsequent work has refined this perspective by distinguishing between gameful experience, gameful systems, and gameful design (Landers et al., 2019). The present framework builds on the notion of gameful experience but shifts the focus from describing or designing gameful systems to providing a coherent psychological account of the processes underlying game-playing. In this sense, it aims to integrate existing insights within a structured and functionally grounded model. Self-determination theory (Deci & Ryan, 2000) has been widely applied to explain motivation and engagement in games, while flow theory (Csikszentmihalyi, 1990) describes a psychological state that is frequently associated with game-play, although not exclusive to it nor universally present. Both approaches characterize motivational states or experiential qualities related to game-playing. In contrast, the present framework operates at a different level of analysis, focusing on the functional architecture of the processes that constitute game-playing itself. The relationship between these levels remains an open empirical question, and future research may investigate how specific configurations of the four dimensions relate to experiential or motivational states. This positioning highlights the complementary role of the framework: It provides a structural and process-oriented account that enables the decomposition, comparison, and experimental manipulation of game-playing, offering a perspective that is not directly captured by state-based or motivational models. First, this framework allows for a redefinition of existing results. By interpreting existing empirical results within this framework, scholars are able to perform more precise and nuanced interpretations. By differentiating symbolic, perspectival, performative, and metacognitive processes, researchers can identify which dimensions contributed to observed behaviours or psychological outcomes. As such, this framework also helps reconcile divergent empirical findings, allowing seemingly contradictory results to be understood. Additionally, examining interactions between dimensions may reveal emergent phenomena that would remain hidden if gameplaying were treated as a single, undifferentiated construct. Second, but most importantly, this theoretical framework enables a more deliberate use of games in experimental research. Indeed, it enables researchers to systematically operationalize game-related phenomena by decomposing game-playing into the four distinct psychological dimensions. Each dimension can be independently manipulated, measured, or controlled within experimental designs. By framing games in this multidimensional structure, the contribution of each underlying process to

observed effects can be differentiated, interaction effects among dimensions can be identified, and boundary conditions for findings that would otherwise appear inconsistent across heterogeneous game paradigms can be clarified. Last, the framework also informs the creation of assessment instruments tailored to each dimension. Beyond experimental research, the design of games, serious games, educational games, applied games, and gamified interventions can benefit from this framework, enabling their adaptation to effectively target specific psychological or behavioural outcomes. Future research should focus on operationalizing each dimension in empirical paradigms and developing reliable, valid instruments to assess their contribution to game-playing outcomes. Interdisciplinary collaboration—between psychologists, game designers, and other stakeholders—can enhance both theoretical development and practical gameful applications.

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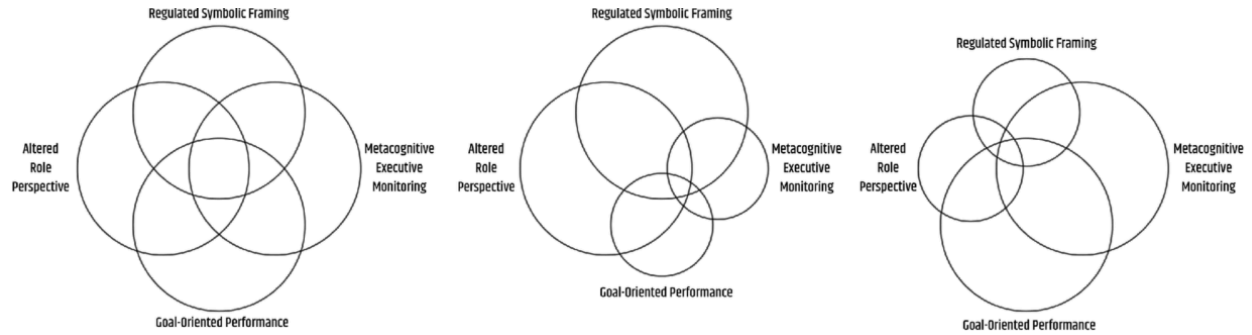
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Figure 1

Visual Representation of the Framework



Note. On the left is an abstract representation of the four dimensions of the model. All dimensions functionally organize psychological processes, with possible overlaps due to flexibility in the recruitment of the processes. The four dimensions are represented as mutually interdependent nodes within a systemic configuration. The model does not imply separable components but functionally distinct dimensions whose interaction gives rise to the game-playing experience. In the center is an abstract representation of a configuration in which regulated symbolic framing and altered role perspective are more salient than goal-organized performance and metacognitive executive monitoring (e.g., a role-playing game with loosely defined goals and space for error-free creativity). On the right is an abstract representation of a configuration in which goal-organized performance and metacognitive executive monitoring are more salient than regulated symbolic framing and altered role perspective (e.g., an abstract game with minimal rules and no narrative structure).

Table 1
Operationalization and Experimental Mapping of the Four Dimensions of Game-Playing

Dimension	Operational definition	Experimental manipulation	Behavioural indicator	Example measure and paradigm
Regulated symbolic framing	Degree to which rules structure interpretation and constrain action within a symbolic system	Manipulation of rule complexity, ambiguity, or transparency; addition or removal of constraints	Rule acquisition, rule adherence, violation detection, exploratory behaviour	Rule-learning tasks, task-switching paradigms, framing modification, constraint-based problem solving
Altered role perspective	Degree to which players adopt a role that modifies perspective, identity, or decision making	Manipulation of avatar identity, narrative framing, or role assignment	Perspective-taking, role-consistent choices, identity alignment	Player-avatar identification scales, narrative manipulation paradigms, role-playing tasks, moral dilemmas
Goal-organized performance	Degree to which behaviour is structured and sustained by goal pursuit within the game	Manipulation of goal clarity, difficulty, or reward structure	Persistence, performance optimization, strategic behaviour, success rate	Goal-setting paradigms, performance-based tasks, reaction time and accuracy measures
Metacognitive executive monitoring	Degree to which players monitor, evaluate, and regulate their performance	Manipulation of feedback availability, uncertainty, or cognitive load	Error detection, strategy adjustment, planning, confidence calibration	Confidence judgments, error-monitoring tasks, think-aloud protocols, metacognitive awareness scales

Note. The examples provided are illustrative and nonexhaustive. Each dimension can be independently manipulated or combined with others to examine interaction effects within controlled experimental designs.

Table 1 Operationalization and Experimental Mapping of the Four Dimensions of Game-Playing Dimension Operational definition Experimental manipulation Behavioural indicator Example measure and paradigm Regulated symbolic framing Degree to which rules structure interpretation and constrain action within a symbolic system Manipulation of rule complexity, ambiguity, or transparency; addition or removal of constraints Rule acquisition, rule adherence, violation detection, exploratory behaviour Rule-learning tasks, task-switching paradigms, framing modification, constraint-based problem solving Altered role perspective Degree to which players adopt a role that modifies perspective, identity, or decision making Manipulation of avatar identity, narrative framing, or role assignment Perspective-taking, role-consistent choices, identity alignment Player-avatar identification scales, narrative manipulation paradigms, role-playing tasks, moral dilemmas Goal-organized performance Degree to which behaviour is structured and sustained by goal pursuit within the game Manipulation of goal clarity, difficulty, or reward structure Persistence, performance optimization, strategic behaviour, success rate Goal-setting paradigms, performance-based tasks, reaction time and accuracy measures Metacognitive executive monitoring Degree to which players monitor, evaluate, and regulate their performance Manipulation of feedback availability, uncertainty, or cognitive load Error detection, strategy adjustment, planning, confidence calibration Confidence judgments, error-monitoring tasks, think-aloud protocols, metacognitive awareness scales Note. The examples provided are illustrative

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