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Object as Portal: Actual-Virtual Multi-Space of Temporary Urban Games Space

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DIGITAL TECHNOLOGY

ABSTRACT - *This study proposes utilizing AI text-to-image technology to project virtual multi-space onto the spatial operations of actual objects. The foundation of this research lies in demonstrating multi-space within urban game spatial practices. The interplay between actual and virtual notions of space recalls the multi-space concept. The actual-virtual relationship is infinite, potentially giving rise to virtual entities mirrored through spatial mechanisms and operations.* Alun-alun*, a public space in Indonesia, undergoes everyday time-based temporal-spatial alterations. Notably, it transforms into an imaginative game space at night. By constructing temporary spaces with simple game objects and mechanisms, we observe the potential for multi-space presence based on spatial operations. Generative AI, particularly text-to-image operations in architecture, can project game objects and their properties, revealing various virtual, imaginative multi-space alterations. The study's findings contribute to expanding spatial design methods in architecture, envisioning collaboration between multi-non-physical spaces within the actual-virtual framework in a future digital realm.*

Keywords: actual-virtual; artificial intelligence; generative; multi-space; space place

This study explores actual-virtual multi-space through AI text-to-image virtual space projection, considering society's spatial alterations based on its system of objects. Multi-space could serve as a foundation for managing objects in specific spatial operations. As observed by Michel Foucault and Jay Miskowiec:

> The mirror functions as a heterotopia in this respect: it makes this place that I occupy at the moment when I look at myself in the glass at once absolutely real, connected with all the space that surrounds it, and absolutely unreal, since in order to be perceived it has to pass through this virtual point which is over there.[1]

MULTI-SPACE FROM TEMPORAL-SPATIAL PRACTICE ALTERATION

Parallel spaces, accessible through human thinking and perception, can be constructed as real virtual experiences. According to Wojciech Kalaga access to virtuality occurs through physical objects—the most actual of actualities.[2] These virtual spaces extend beyond the digital realm, emerging from our perception of physical space.[3] While abstract, they exist within alteration-based spatial practices. *Alun-alun* exemplifies this concept with its dynamic temporary alterations in city public spaces. An AI-driven text-to-image generative platform could serve as a medium to illustrate how actual objects act as portals to spatial virtuality. This parallel multi-space of actual-virtual could potentially enrich spatial practice readings and design methods.

In this context, architecture transcends mere physical space; it represents a collaboration between abstract (space) and concrete (place) dimensions that are relational and potentially coexist. The theoretical discourse on space and place explores architecture's capacity to convey not only material space (matter-substance) but also the experiential dimension (mind-meaning).[4] A tension exists between the spatiality of abstract material (space) and the lived experience of space, where individuals imbue daily encounters with meaning (place). Anthropologically, place assumes significance, connecting personal mediation to familiar, meaningful, and locally specific realities.[5] This potent relationship goes beyond mere geographical location, profoundly shaping lived spaces and experiences.[6]

Arguments surrounding non-place and placelessness further underscore the dynamic interplay between space and place.[7] Spatial discourse positions objects, subjects, and their relations in a perpetual state of transformation and renegotiation. The concept of relating abstract physical spatiality (actual space) to thought-based spatiality (virtual place) serves as the foundation for exploring the reproduction of intermediate spaces. Parallel spatial realities are explored from various perspectives, including social, cultural, and personal dimensions. Concepts like "first-second-third space," [8] "lived-conceived-perceived space," [9] and "space-spatial-spatiality-spatialities" [10] contribute to this discourse. Abstract spatiality yields multiple representations and concrete reflections.

As proposed by Bernard Tschumi, architectural disjunction separates space from function, creating dynamic opportunities for temporality, movement, and spatial experience.[11] Another idea is to position architecture and space within a complex, contradictory, yet distinctive dynamic. Additionally,

Jean Baudrillard's hyperreality [12] and Marcus Novak's trans-architecture [13] suggest a fusion of simulation and reality. Plural realities need not involve multiple physical dimensions; a single space can carry diverse experiences, memories, and imaginations.[14]

Alun-alun, the central open space in most cities in Java, Indonesia, is a model for everyday societal spatial practices. Its flexibility allows for various activity functions. Beyond being multi-functional, *alun-alun* embodies multiple dimensions—political, social, economic, and cultural—within a community.[15] Originally a private government space, it has transformed into a public area with spatial alterations, including temporary game-based zones.[16] These alterations come alive at night, turning an empty field into a dynamic space through game-object-related activities.
Society's spatial alterations represent organic and contextual adaptation practices. In urban contexts, partial or whole spaces are collective components closely tied to those who inhabit them.[17] Dynamic changes in public spaces forge new connections between users and their environment,[18] reflecting responses to evolving times. These everyday architectural adaptations reveal contextualized and specific spatial practices within neighborhoods. Studying such distinct practices, divergent from typical stakeholder planning, offers insights into the presence of multi-space.

Spatial alteration involves expanding function, form, and construction from single- to multi-space. Emerging digital tools, such as artificial intelligence (AI), enable spatial expansion across mediums. Text-to-image operations, a widely used AI platform, generate visual illustrations based on creative imagination.[19] These tools inspire spatial design possibilities. AI's role in architecture, including CAD and parametric design, reflects progress in design methods.[20] As AI integrates with collective data, it becomes an integral part of human creation. In the context and discussion above, AI has the potential to project a wide range of possible multi-space alterations as an extension of design methods. The foundation of object operations reveals the potential for reconfiguration and modification in constructing game-based spatial operations.
The game space of *alun-alun* involves temporary spatial alterations through actual-virtual interactions. Urban game spaces combine physical environments with virtual game experiences.[21] Interaction and experience within the game are central to spatial practice. Adaptive spaces allow diverse forms of interaction and sensory experiences.[22] Experiential and sensory-based interactions expand the possibility of dimensions beyond physical space.[23] These variations constantly navigate between actual and virtual realms.

Game-based interactions alter the rules of original spaces, following the specific rules of each game. The dynamic actual-virtual relationship in game space alteration is a basis for observing other possible spaces.

AI can project these spaces based on object operations. Figure 1 illustrates the operation of temporary space alteration in *alun-alun*, representing an actual-virtual multi-space model in everyday society.

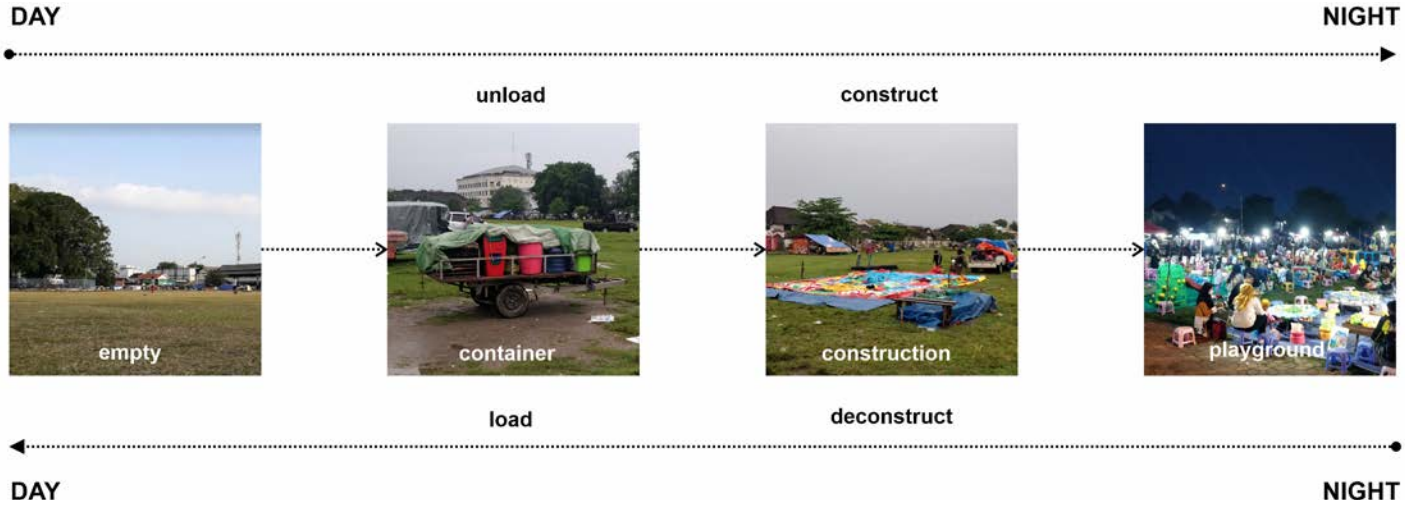

Figure 1. The temporality of game space unfolds as an everyday operation within *alun-alun.*

Society's alteration of game space constitutes a specific spatial practice, bridging actual objects and spaces with virtual interactions and experiences. Each gaming object, shaped and operated by society, holds significance due to its system of interrelated objects, creating distinct spatial rules. Despite limited research on this relationship, positioning game space within the context of multi-space expansion is crucial. Generative AI, specifically text-to-image processing, can project cross-medium spaces based on actual-virtual connections. AI generates illustrations that showcase potential spatial alterations by representing game objects as textual data. These societal ideas and notions contribute to specific spatial knowledge, offering an alternative foundation for design methods. Game space practice presents an opportunity to expand architecture, encompassing both virtual and digital realms.

ACTUAL-VIRTUAL RELATION AS MULTI-SPACE FRAMEWORK

The actual-virtual connection serves as the foundation for cross-medium multi-space alterations. They view objects as portals that open up virtual spatial possibilities, with the actual representing the physical aspect and the virtual representing the non-direct physical aspect. Joaquim Braga describes the complementary nature of the actual-virtual relationship. [24] Perception, experience, and interaction contribute to constructing this relationship.

Gilles Deleuze emphasizes that the actual can describe the virtual as a new entity or as an inherent aspect of the actual itself—a coexistence.[25] Elizabeth Grosz highlights the need for the actual to trigger the relative and

differential nature of the virtual.[26] Kalaga further underscores that actual-virtual existence is relative, extending beyond a simple dichotomy.[27] This relationship reveals various non-physical entities coexisting with physical ones, forming a multi-space with expansive possibilities.
These arguments support the concept of actual objects as portals, allowing access to various virtual entities, including experiences and interactions within a space. Discussing the virtual involves exploring the boundaries between the visible and invisible.[28]

According to Rina Arya, objects are not limited to a single function; they can undergo alterations based on specific experiences.[29] The actual object coexists with its relational virtual entity. The notion of multi-space exemplifies the actual-virtual connection.[30] Multi-space practice involves designing diverse universes through repetition and multiplication, fostering variation and differentiation.[31] Objects and their interactions hold the potential to reveal additional dimensions, forming the basis for multi-space exploration.
Virtuality encompasses non-physical attributes, including spatial interactions and experiences. It arises from imagination rooted in actual encounters. This imaginative dimension extends beyond personal experience to shape our perception of space.[32] Actual-virtual spaces facilitate multi-modal, multi-sensory interactions through gestures, body movements, and tactile and auditory experiences.[33] Game spaces exemplify diverse interactions between the actual and virtual realms.

The actual-virtual relation involves physical and non-physical entities, potentially leading to multi-space creation. Grosz suggests that appropriating and arranging temporary objects from actual elements connects the actual-virtual context to spatial transmutation.[34] Virtuality spans possibility, potentiality, and interpretive spatial relations. The overlap of actual-virtual realms gives rise to various digital instruments where coexistence and collision occur.[35] Positioning the virtual as a generative spatial practice acknowledges its transformative nature, influencing and being influenced by reality.[36] Generative practices extend beyond physical space to other mediums.
Virtual space transcends physical boundaries, existing in the realm of imaginative experiences and interactions. It breaks free from the constraints of materiality while still functioning as a mediated space. Built upon familiar elements, virtual space offers imaginative extensions of the present with speculative future visions. The virtual promises unlimited potential and articulates the future, distinct from the actual.[37] This distinction positions virtual space as a non-physical transformation within different mediums, fostering exploration and diversity of spatial readings.

The actual-virtual relationship is not merely a two-way connection; it also carries implications for future possibilities and potentials. As a portal, the actual object projects various attributes—both actual and virtual—

related to its own existence, experiences, and spatial interactions. These projective connections form the foundation for cross-medium spaces, particularly within the digital realm. The question arises: How can we imaginatively visualize the projection of multi-space possibilities based on actual relations to shape future digital virtual spatial practices? Beyond digital contexts, the concept of virtual multi-space presence also offers opportunities for rearticulating and modifying object-based actual spatial practices.

OBJECT-PROMPT UNLOCKS SINGLE SPACE INTO MULTI-SPACE

The actual-virtual relationship, dominated by interaction and experience, necessitates a medium for projecting its spatial possibilities. Text-to-image AI operations offer an alternative approach to architectural design. Initially used to explore architectural possibilities, AI has evolved beyond mere representation to become an integral part of the design process, expanding spatial potential.[38] Stanislas Chaillou emphasizes AI's role as an integrative unit, combining representation, learning, and process.[39] The iterative design process mirrors the prompt construction process in AI. Prompts are text data constructs, the main commands in operating AI digital tools. The structure of the text in the prompt is crucial because it has a particular meaning that AI processes later. Designers now grapple with formulating prompts and positioning designers and AI as collaborators in collective creativity. Creativity in design involves explicitly seeking multi-space practices across various mediums, aligning with AI's prompt-driven mechanisms.

A prompt is no longer a mere command; it has evolved into a systematic language of creativity. Text-based prompts transcend their original role as instructions and now contribute to a personal, collective imaginative process.[40] These prompts serve as descriptive operations, yielding specific outcomes. The process of generating and testing prompts involves design, programming, and predictive simulation. Constructing prompts follows a systematic sequence, positioning it as an extension of spatial readings. By extracting mechanisms, attributes, and entities from both physical and virtual contexts, prompts lead to imaginative operations.
AI-based generative operations project imaginative spatial and architectural possibilities. Text-to-image AI not only produces visualizations but also sparks imaginative potential. Beyond mere images, it explores alternative space alterations.[41] Imagination involves creatively combining familiar elements.[42] By constructing and deconstructing design elements, AI dreams up abstract possibilities that are close to reality.[43] In architectural design, AI-generated prompts illustrate diverse spatial options, from constructing and deconstructing design elements to programming a space.[44] Complexity and pattern-based prompts enrich the design process.

Illustrative AI output expands spatial design beyond abstract illustrations. The AI text-to-image output, a product of machine creativity, holds transformative potential. These artistic and architectural AI creations serve as a form of technical exploration.[45] While AI text-to-image remains complex, it aligns with the creative process of designing spaces, including inspiration, guidelines, design thinking, and visualization.[46] Integrating AI into spatial design methods is a promising design method exploration and development.
In general, this study demonstrates the presence of multi-space as a diversity of readings of space through AI text-to-image projections to illustrate the intensive actual-virtual relationship in spatial discourse.

> Multi-space exists in the intersection of the physical and digital and in the blurring of their previously clear dividing lines. Multi-space is not a single space, but a hybrid space where we are, in effect, occupying multiple spaces simultaneously. It arises where the physical and digital intersect and collide. Multi-space is the messy space in between, constantly in flux, its boundaries perpetually shifting.[47]

Multi-space reading informs rearticulation, modification, and adaptation of objects within temporary spatial operations. The actual-virtual relationship extends beyond visible and invisible attributes, representing a projective possibility. Our demonstration case study focuses on game spaces—a blend of virtual experiences and the complexity of physical objects. We explore constructing additional game spaces within the virtual digital medium, where architecture's influence shapes the future.

PARALLELING SOCIETY'S GAME SPATIAL PRACTICE

This qualitative study interprets AI projections as game-based imaginative space, focusing on a specific case in Solo City's *alun-alun*. The study employs a linear procedural format and explores the relationship between AI and spatial alteration. Based on field observations, Solo City's *alun-alun* was chosen as the center of this demonstration of space alteration. The reason is that the variety and diversity of temporary games in *alun-alun* Solo exceeds that of *alun-alun* in other similar cities.

This qualitative study explores existing game spaces and their actual gaming objects. Observations focus on user interactions and object mechanisms within the game space. We gain deeper insights through complementary photos, videos, and parallel drawings.[48] Specific local case studies yield potential findings. Our parallel isometric visual catalog captures mechanics, actual objects, and virtual entities, emphasizing spatial experiences.[49] The parallel catalog is a documentation action that can become a complete map of an object of observation and a substantial aspect of specific spatial design pattern readings. This documentation

supports the concept that object systems serve as gateways or portals to diverse parallel multi-spaces.
Data analysis involved extracting game catalogs into actual-virtual data entities. The study focused on constructing prompts as a systematic language. By translating actual objects into various entities, we explored spatial visualization. Experimentation with text-to-image AIs led us to use the Dall-E model via Bing Image Creator.[50] Iterative projections refined the output, considering the quality.

This study conducted three projection experiments. The first replicated the actual game based on the description. Second, we added the prefix "nighttime gameplay" for imaginative context. The third incorporated "style" (fantasy next-generation games) for a digital game feel. Reflective and iterative practice informed the design process. The final AI spatial projection suggests cross-medium space alteration opportunities for future research. Spatial analysis of AI outputs informs object articulation in spatial games.
Object as Multidimension Portal to Multi-space

Alun-alun Solo is one of several public squares that were observed. From the initial observation, *alun-alun* Solo has the most complex game variants (around sixteen) and is a form of temporary urban space alteration. Other observed squares include Semarang Square, Yogyakarta Square, Kendal Square, Ungaran Square, Salatiga Square, and Sleman Square. *Alun-alun* Solo generally extends along a north–south axis, with the intensity of temporary game space alteration on the north side. The center is used for movement-based games (movement space), while the southern side is dominated by culinary activities from food vendors on the outer perimeter of *alun-alun*. Figure 2 shows the mapping of the various games in Solo's *alun-alun*.

Figure 3 shows the parallel game catalog. The game is grouped based on the object as the trigger for reading its main spatial operation. The grouping was done to facilitate a more explicit exploration of the research. The first category is games with static objects; the second is games with semi-moving objects; and the third is games with moving objects. The grouping based on movement shows the role of objects in generating spatial operations and mechanisms in each game.

The Actual: The Space and Its Object System (Catalog)

Based on sixteen types of games in *alun-alun* Solo, we observed space operations and actual objects. These included temporary space creation, play space lighting, methods of organizing game objects, game types, arena size, playing action movement, and playing patterns. The detailed observations informed prompts for text-to-image AI projection. Figure 4 illustrates the entire game as a catalog of spaces and objects.

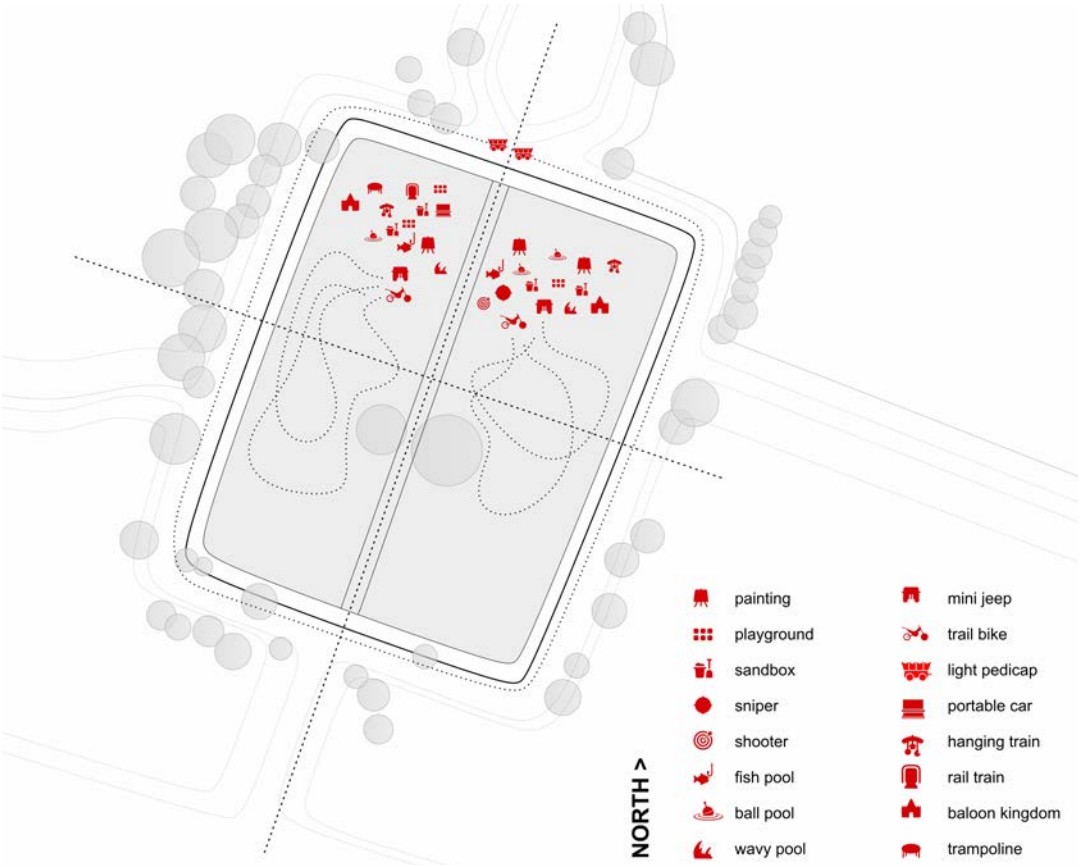

Figure 2. Initial observation of various games on *alun-alun* Solo.

STATIC OBJECT GAMES

SEMI-MOVING OBJECT GAMES

MOVING OBJECT GAMES

Figure 3. Catalog and classifications of society object-based spatial games.

The first category consists of games in which static objects shape the space's operation and mechanics. For arena-based games, spaces are defined by colored mat surfaces and the objects themselves. Portable general lighting and dynamic LEDs highlight stationary objects. These individualized games involve approximately ten players per medium-to-large-sized arena, with intensive interaction focused on objects.
The second category involves games with semi-moving objects that define the space's operation. These objects follow specific trajectories, rotations, or movement mediums. Portable general lighting and dynamic LEDs highlight on-the-spot movement. Individualized gameplay occurs in medium-sized arenas with approximately ten players, emphasizing object interaction.
The third category involves games with entirely moving objects that define the space's operation. Movement spaces lack strict boundaries and are defined by yellow tape or the square's perimeter. Vehicles—motorcycles, cars, and pedicabs—provide illumination. Players drive single vehicles, and the lighted pedicab is manually pedaled. Objects fall into three categories: small objects for play, medium objects that move with players, and large objects defining the game arena. Space is defined using additional mats for small objects and direct boundaries for large objects. All temporary objects can be assembled or disassembled quickly (approximately 1–2 hours before night, depending on complexity).

The Virtual: Interaction and Experiences (Operation)

Besides physical objects and visible spaces, virtual game elements require careful observation. These relate to movement experiences, object interactions, and game rules, each unique to different games. Identifying these aspects involves discussing movement, object operations, and rule mechanisms. These virtual attributes complement the actual properties of game objects.
Mapping sixteen game types reveals three ways to define temporary space boundaries. First, a grass-surfaced landscape requires no additional instruments. Second, light-colored mats or canvas delineate the space. Third, the pavement around the square serves as a boundary. Lighting falls into two categories: arena (static and dynamic) and object (static and dynamic). Literal objects (balls, water) and symbolic objects (fish, cartoon characters) define the games. Player numbers range from single to multi-player, accommodating various arena sizes.

We encounter various categories related to movement, object operations, and game rules. Movement can be classified into four types: games without any movement, games with moving objects and still players, games with moving and still objects, and games with moving objects and players. Object operations fall into three categories: playing with objects (like painting on canvas), playing on objects (such as driving cars and motorcycles), and playing inside objects (think balloon castles or trampolines). Additionally, game mechanics can be grouped into four types: point-based systems (collecting points), leaderboard-based systems (highest scoring player), challenge-based systems (completing

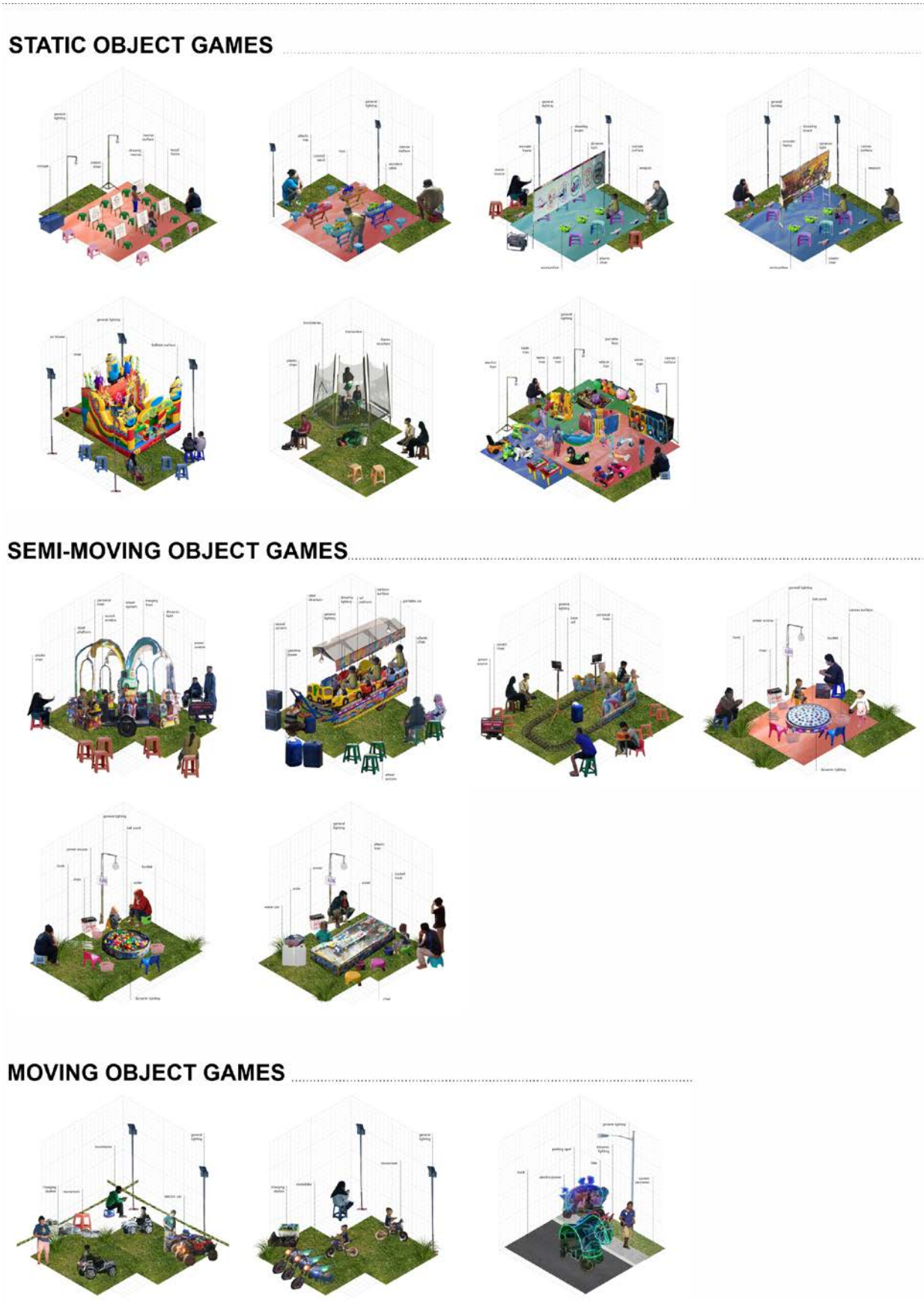

Figure 4. Games catalog classification and its system of objects (static-object, semi-moving object, and moving object).

challenges), and interaction-based systems (experiencing the game with others).

The above spatial object-based system is constructed temporarily and virtually observable invisible systems. Each game has its own specific system, with boundaries separating it from other games. These boundaries, though subtle and unclear, influence interaction and experience. The operating system of objects within the game enriches the construction of prompts for AI, especially in cross-medium space alteration projections. Figure 5 and Table 1 categorize the mapping of actual and virtual objects in the game.

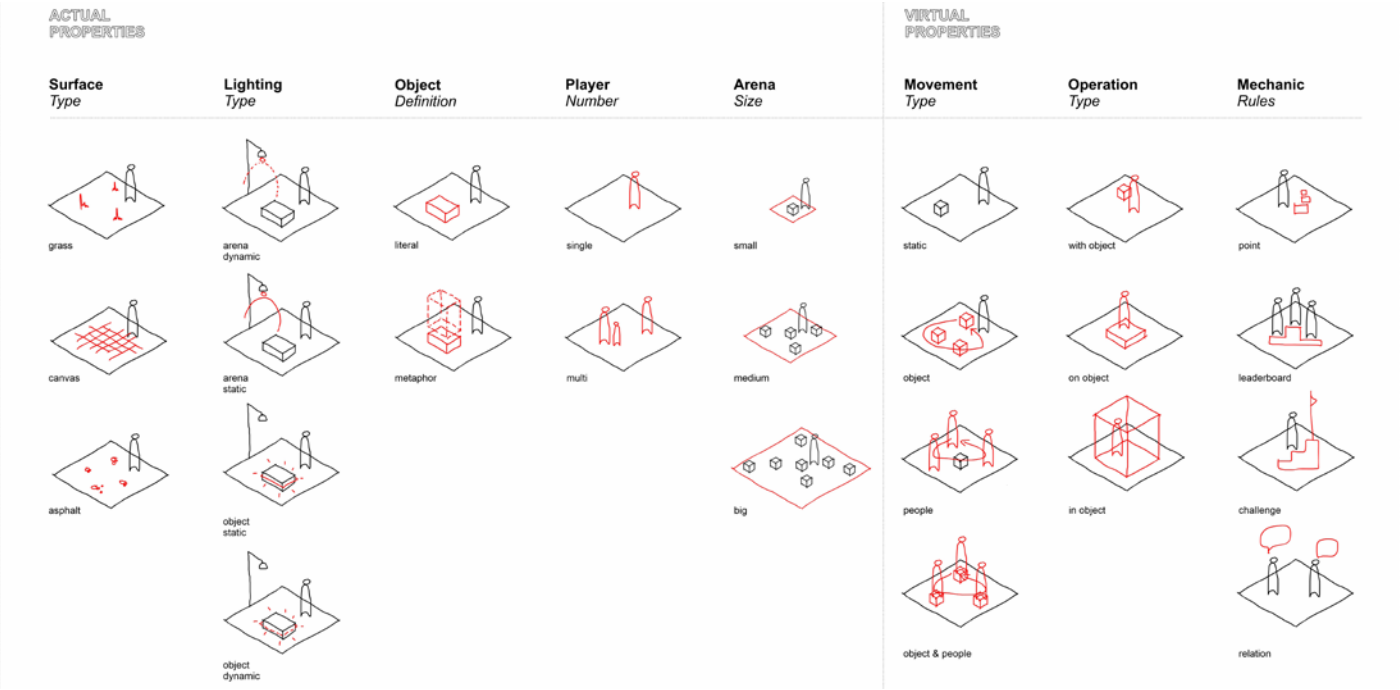

Figure 5. Isometric drawing of actual-virtual spatial entities' extraction categories.

	Games	Surface	Arena Lighting	Object Lighting	Object	Player	Arena	Movement	Playing	Mechanic
A	**Static Object Games**									
1	Painting	Canvas	General	General	Metaphor	Multiplayer	Large	Nothing	With Object	Relation
2	Sandbox	Canvas	General	Dynamic	Literal	Multiplayer	Medium	Nothing	With Object	Relation
3	Sniper	Canvas	General	Dynamic	Metaphor	Multiplayer	Medium	Object	With Object	Leaderboard
4	Shooter	Canvas	General	Dynamic	Metaphor	Multiplayer	Medium	Nothing	With Object	Leaderboard
5	Baloon Kingdom	Grass	General	General	Metaphor	Multiplayer	Large	People	On Object	Relation
6	Trampoline	Grass	General	General	Literal	Multiplayer	Large	People	In Object	Relation
7	Playground	Canvas	General	General	Metaphor	Multiplayer	Large	Nothing	With Object	Relation
B	**Semi-Moving Object Games**									
1	Hanging Train	Grass	Dynamic	Dynamic	Metaphor	Multiplayer	Large	Object People	In Object	Relation
2	Portable Car	Grass	General	Dynamic	Metaphor	Multiplayer	Large	Object People	In Object	Relation
3	Rail Train	Grass	General	General	Metaphor	Multiplayer	Large	Object People	In Object	Relation
4	Fish Pool	Canvas	General	Dynamic	Metaphor	Multiplayer	Medium	Object	With Object	Point
5	Ball Pool	Grass	General	Dynamic	Literal	Multiplayer	Medium	Object	With Object	Point
6	Wavy Pool	Grass	General	Dynamic	Literal	Multiplayer	Medium	Object	With Object	Point
C	**Moving Object Games**									
1	Mini Jeep	Grass	General	Dynamic	Metaphor	Singleplayer	Large	Object People	In Object	Challenge
2	Trail Bike	Grass	General	Dynamic	Metaphor	Singleplayer	Large	Object People	In Object	Challenge
3	Light Pedicap	Asphalt	General	Dynamic	Metaphor	Multiplayer	Large	Object People	In Object	Relation

Table 1. Spatial entities' extraction of all games.

The Projection: Parallel and Multiple Variation of Space (Prompt)

From the previous extraction of various entities and properties of actual-virtual attributes, a prompt can be constructed to show various alterations of virtual digital space with the help of AI. The general construction of the prompt language system is Adjective + Noun + Verb + Style (Dall-E via Bing Image Creator). From the previous table, a list of data is obtained to project space alteration, namely data related to the Player, Mechanic, Object, Surface, Operation, Arena, Lighting, Form, Movement, and Object. From these data, a prompt is constructed according to the following format:

- Adjective: “Night time gameplay of” (context of *alun-alun* night games),
- Noun: Player (character of imaginative player),
- Verb: Articulation of combined element (mechanic + object + surface + operation),
- Space: Articulation of combined element (arena + light + form + movement + object),
- Style: “with the style of Fantasy Next Generation Game” (imaginative exaggeration).

The initial projection iteration involves only nouns, verbs, and spaces. However, this approach yields spatial illustrations that are duplicative. The second iteration introduces adjectives to create more imaginative and contextually rich spatial illustrations. In the third iteration, styles are added to bring visuals closer to the spatial character of the game. The modification of the prompt text is guided by visual references and the prompt provided by the Bing Image Creator platform. The study’s results showcase the third iteration, where virtual spatial illustrations are more imaginative than actual spatial representations. Figure 6 illustrates the prompt construction.

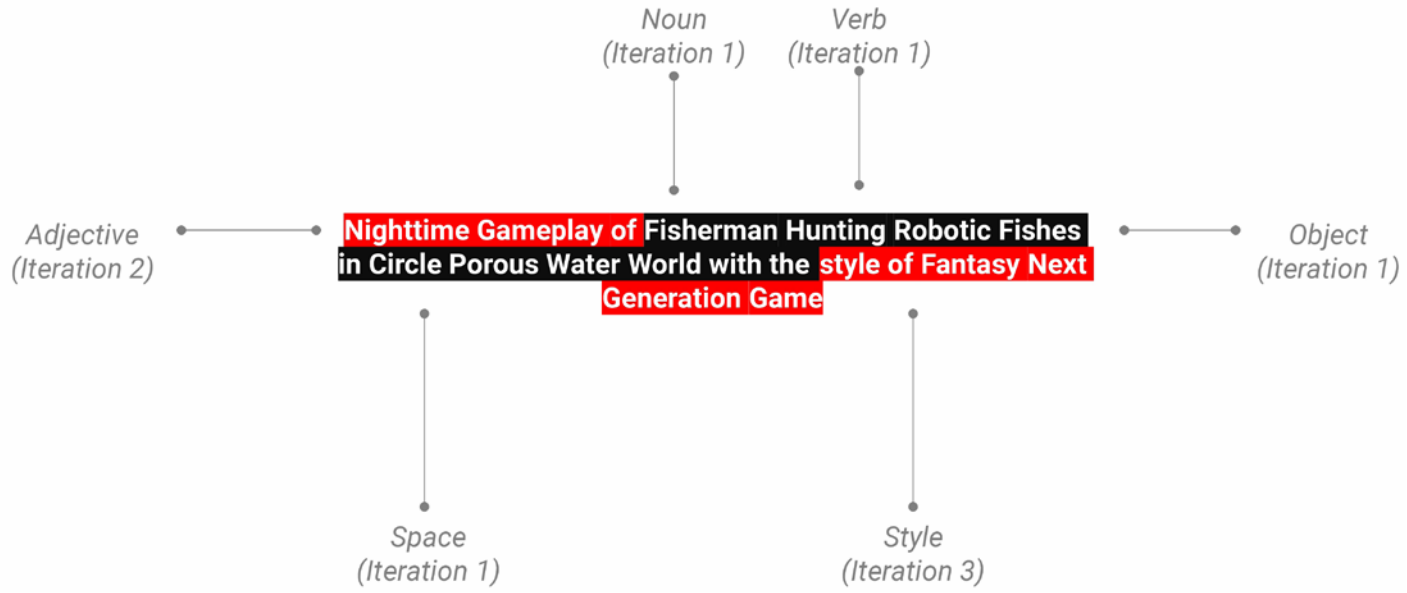

Figure 6. Prompt that is constructed from the data text of object properties and mechanism.

Table 2 shows how each attribute contains the source data for constructing the prompt. It also shows the prompt generated by constructing the words in the previous table. The prefix of the prompt uses the term “isometric image of” to get a similar style to the initial game catalog.

	Games	Adjective	Noun	Verb	Object	Space	Style
A	**Static Object Games**						
1	Painting	Nightime Gameplay of	Players	Drawing	Cartoon Character Creatures	on A Canvas World	with the style of Fantasy Next Generation Game
2	Sandbox	Nightime Gameplay of	Players	Plays	Colorful Trucks and Colorful Sands	in A Square Sandy World	with the style of Fantasy Next Generation Game
3	Sniper	Nightime Gameplay of	Players	Shooting	on Marvel Superheros Character	on Luminous War World	with the style of Fantasy Next Generation Game
4	Shooter	Nightime Gameplay of	Players	Shooting	on Cartoon Characters with Circle Target	on Flat World of Canvas	with the style of Fantasy Next Generation Game
5	Baloon Kingdom	Nightime Gameplay of	Players	Adventuring	Inflatable Bouncy Colorful Minion Castle	in A Grassy Field and Cloudy Sky	with the style of Fantasy Next Generation Game
6	Trampoline	Nightime Gameplay of	Players	Jumping	Bouncy Structure with Nett Walls	in A Grassy Field and Cloudy Sky	with the style of Fantasy Next Generation Game
7	Playground	Nightime Gameplay of	Players	Playing	Colorful Imaginative Plastic Characters and Vehicles	in a City of Colorful Surface	with the style of Fantasy Next Generation Game
B	**Semi-Moving Object Games**						
1	Hanging Train	Nightime Gameplay of	Players	Riding	Hanging Toy Character on Mechanic Rotating Robotic Arm	in A Colorful Circle World	with the style of Fantasy Next Generation Game
2	Portable Car	Nightime Gameplay of	Racers	Racing	Colorful Car on Luminous Rail	in A Cartoon Character Platform	with the style of Fantasy Next Generation Game
3	Rail Train	Nightime Gameplay of	Players	Riding	Individual Cartoon Character Shaped Train	in A Rail Track World	with the style of Fantasy Next Generation Game
4	Fish Pool	Nightime Gameplay of	Fisherma	Hunting	Robotic Fishes	in Circle Porous Water World	with the style of Fantasy Next Generation Game
5	Ball Pool	Nightime Gameplay of	Players	Catching	Floating Colorful Plastic Balls	in Wavy Water World	with the style of Fantasy Next Generation Game
6	Wavy Pool	Nightime Gameplay of	Fisherma	Fishing	Colorful Water Creatures	in Lake and Box Island	with the style of Fantasy Next Generation Game
C	**Moving Object Games**						
1	Mini Jeep	Nightime Gameplay of	Racers	Racing	Colorful Offroad Jeep	in A Gravel and Grass World	with the style of Fantasy Next Generation Game
2	Trail Bike	Nightime Gameplay of	Bikers	Racing	Trail Motor Bike	in A Gravel and Grass World	with the style of Fantasy Next Generation Game
3	Light Pedicap	Nightime Gameplay of	Players	Riding	Colorful Creature Based Frame Carriage Pedicab	in A Loop City Based Circuit Track	with the style of Fantasy Next Generation Game

Table 2. Constructing particular prompt based on the attribute’s extraction.

DALL-E generates four illustration variants in each iteration. Pressing the refresh button produces four additional variations without any operation limit. Exploratory operations were performed on all sixteen game varieties, but overall illustrations are displayed for only three categories for discussion purposes, with one game represented in each category.

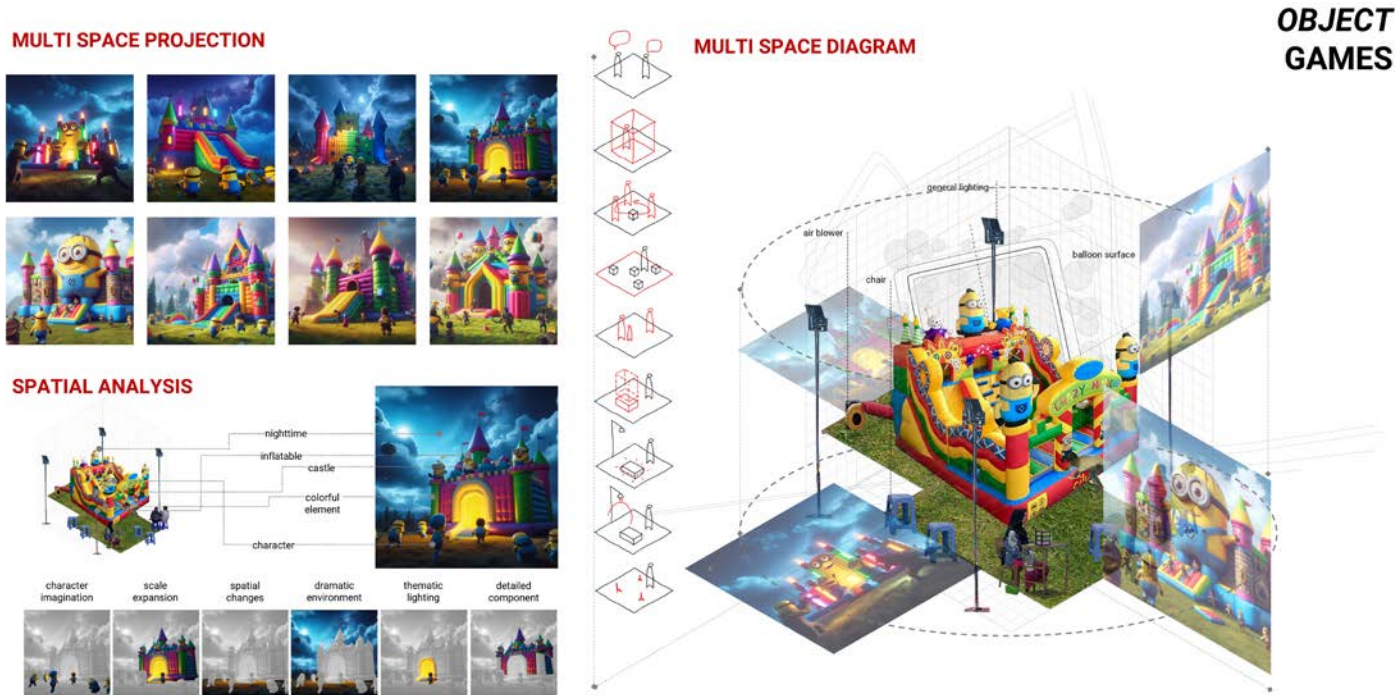

Figure 7. Illustration by AI prompt shows the multi-space presence of static-object games.

Figure 7 illustrates the multi-space of static-object games. The game is based on static objects, showing a deepening of the spatial character that emerges from the objects. There are some similarities in the multi-space projection, including the night conditions, the character of the objects that become the arena, and the characters illustrated based on existing objects. The spatial explorations show more imaginative characters, greater expansion of scale, more dramatic changes in spatial character and environment, more thematic lighting, and detailing of some of the spatial components.

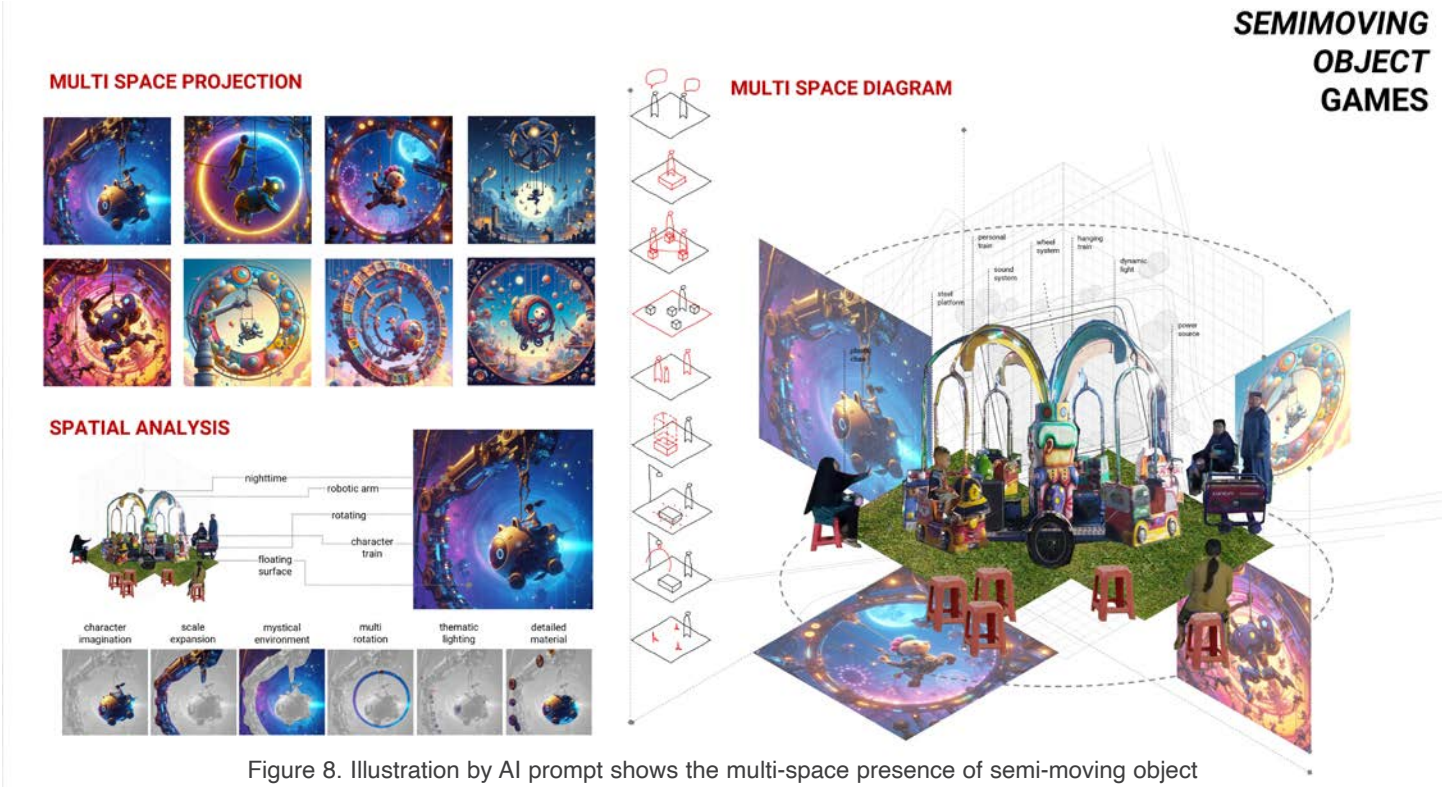

Figure 8. Illustration by AI prompt shows the multi-space presence of semi-moving object games.

Figure 8 illustrates the multi-space of semi-moving object games. The game is based on semi-moving objects, showing a deepening of the spatial character that emerges from the movement of objects in place. There are some similarities in the multi-space projection, including the night condition, the character of the objects based on the on-site movement, and the illustrated character based on the existing objects. The spatial explorations show a more imaginative character, larger scale expansion, more dramatic changes in spatial character and environment, more massive movement, more thematic lighting, and detailing of some of the spatial components.

Figure 9 illustrates the multi-space of moving object games. The game is based on moving objects, showing a deepening of the spatial character that emerges from the objects. There are some similarities in the multi-space projections, including night conditions, the character of the object

that becomes the main vehicle, and the spatial character illustrated based on existing objects. The spatial explorations show more imaginative and tangible characters, modification of various specific vehicle forms, more dramatic and complete changes in spatial character and environment, more thematic lighting, and detailing of some spatial components.

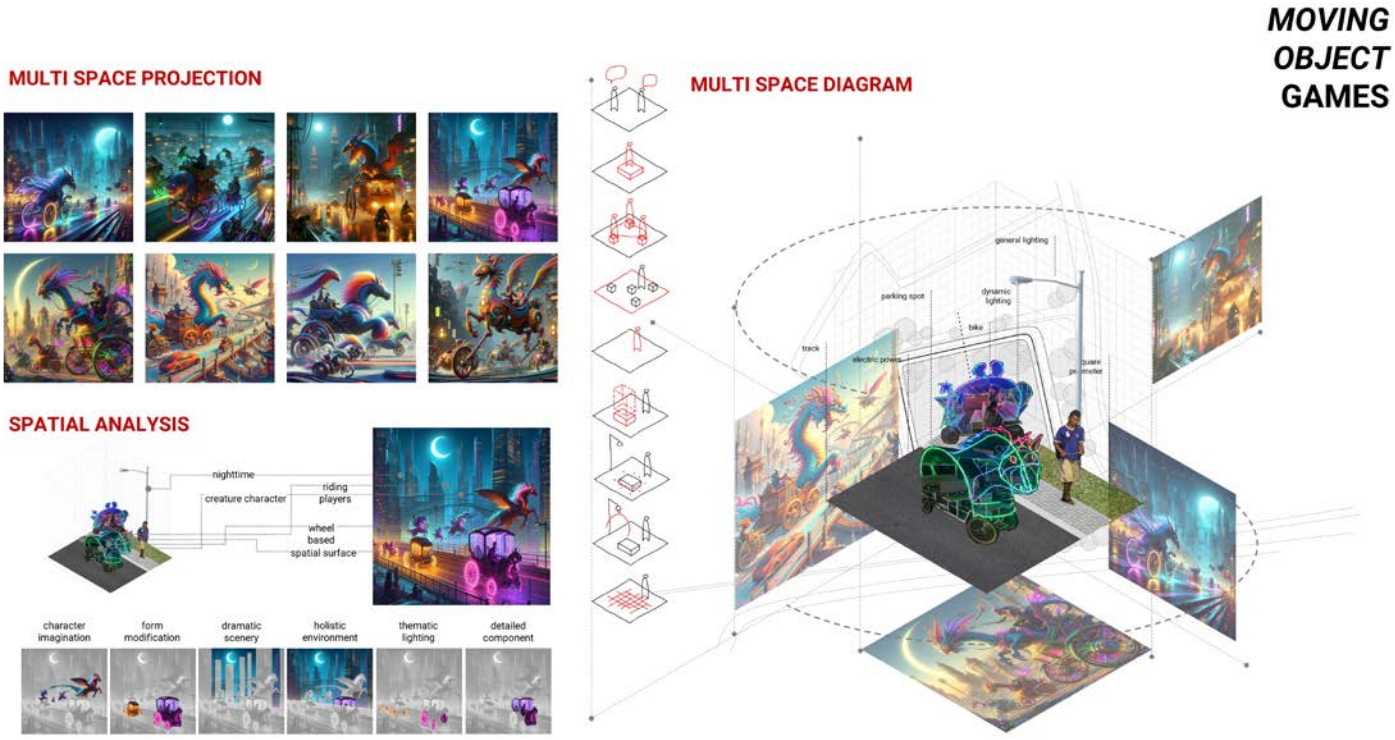

Figure 9. Illustration by AI prompt shows the multi-space presence of moving object games.

The alternative spatial projections AI generates demonstrate diverse spatial variants in each iteration. These outputs have the potential to exemplify specific spatial concepts. The play experience in the mind (place) can be represented by the abstract space (space) in each object projection. Objects serve not only as game mechanics and play tools but also as portals to multi-space presence. Multi-space, representing diverse spatial presence, could be a foundation for rearticulation, remodification, and readaptation in object-based temporary spaces. Additionally, the illustrated digital space holds promise as a basis for broader architectural practices in the future.

PROMPT AS ACTUAL-VIRTUAL MULTI-SPACE PROJECTION

The above observation-based exploratory qualitative study makes it possible to discuss at least three critical points in projective AI of demonstrating multi-space presence in actual-virtual.

Extraction: from Object to Properties

According to the previous exploration process, the argument of the object as a portal becomes the starting point for finding other possible spaces built from it. Deleuze states that the actual can advance the virtual as a new entity or the actual entity itself. Actual objects always coexist closely with their virtual entities, between objects and the relationships within them,[51] and eliminate the boundaries between physical and non-physical, and between the visible and invisible.[52] The object's materiality expands, presenting various potential possibilities.[53] Understanding the portal becomes a new window, a new perspective on the spatial alteration possibilities by observing objects that work in a particular spatial system. Actual objects exhibit a wide range of visible and invisible attributes. While visible attributes can be directly documented, virtual attributes require firsthand experience or third-person observation. User interactions with objects yield diverse experiences across different mediums. Integrating text-to-image AI into the design process involves an initial stage of recording various instrument extractions for prompt construction in subsequent stages. Objects serve as portals, revealing both visible and invisible dimensions.

Codification: from Properties to Prompt

Programming in architecture is a complex process that organizes things, making them synergize and become the basis of design output. Generative AI, another potential way of managing the material properties of objects beforehand, becomes the basis of programming itself.[54] Prompts, a language system, are not just an arrangement of text; their construction plays an important role that can be supported by creativity.[55] In this context, various object entities are deconstructed, and reconstructed in a new way to glimpse the possibilities of spatial alteration across mediums. Constructing the prompt itself can indicate accomplishing a programming process in design.

Programming a prompt involves composing imaginative and creative-based commands. Consistency in the prompt leads to consistent visual output or illustrations. Each AI tool follows specific procedures. Balancing procedural guidelines with creativity in defining prompt language is crucial. The generated code, organized as a prompt, translates criteria and characters into programming commands. Specific prompts yield more precise AI outputs. The codification process is central in architecture programming, where creativity and consistency hold equal importance.

Projection: from Prompt to Alteration

Multi-space, in the context of this discussion, is the possibility of architectural design in a non-physical medium as an extension of design

methods, as well as the basis for expanding the role of objects for their actual spatial modification. A digital space as a form of mediated space, including games, shows variations of how objects work that undergo various changes.[56] Generative AI is beyond illustrative and can alter multiple variations in different mediums. Systematically constructed imaginative possibilities position AI as part of the creative process of design.[57] Infinite abstract iterations make generative AI not just design techniques, programs, and simulations,[58] but systematic constructions of an alternative process that works consistently.

Operating a prompt in an AI tool involves expecting a visual illustration based on the inputted code. The output, in the form of images and illustrations, is obtained by processing prompts generated in the previous stage. Designer creativity is essential to produce an output with broad interpretability. Keywords can enhance resultant illustrations, making them more spatial and three-dimensional.
The precise definition of the command language is crucial. AI-generated alterations go beyond simple variations. The complexity and infinite iterations in the process open up numerous spatial possibilities. By integrating AI, we demonstrate how virtuality expands our creative horizons. Figure 10 illustrates the virtual space procedurally generated through spatial alterations. Objects act as portals, enabling access to numerous multi-spaces based on alterations and spatial variants.

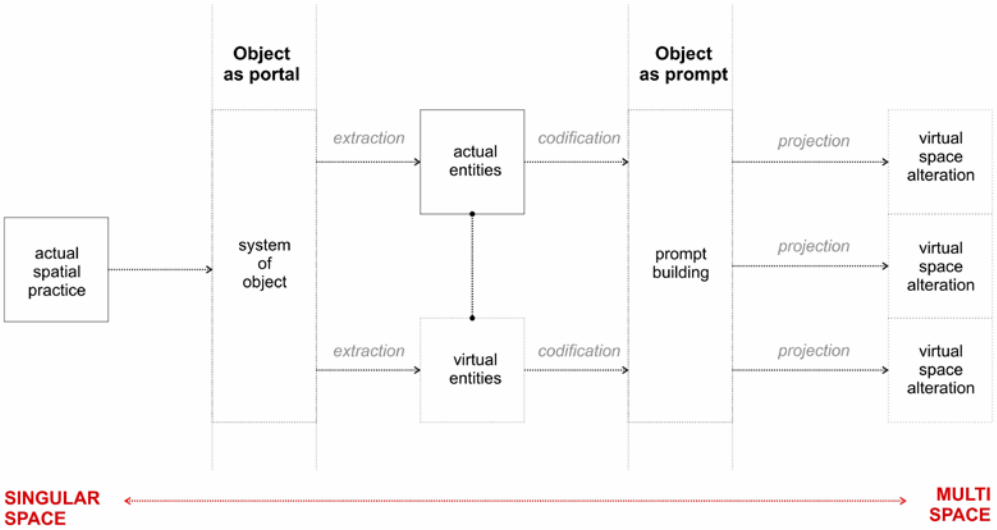

Figure 10. Virtual space as multi-space projection process through AI prompt.

Via this research process, it becomes evident that AI can illustrate multi-space presence by collecting object data and understanding their operating systems. Detailed prompts lead to more precise spatial illustrations from AI. This design process involves cataloging objects and their operational

systems in spatial practice. The concept of objects as portals opens up possibilities for cross-medium space variations, potentially expanding architectural spatial practice. The discourse on space and place extends to the concept of multi-space. Abstract space, subjectively experienced and articulated into place, has the potential to exist in plural forms. While this phenomenon has been discussed in spatial knowledge, current technology allows us to project virtual spaces—clear illustrations of imaginative or mind-based realms.

The greatest potential lies in recognizing space as a non-single entity, fostering diverse interpretations. Objects, acting as portals, go beyond temporary space construction. Changes to objects within spatial mechanisms encourage subjective and contextual experiential spaces. Objects, their interplay, and configurations define and construct spatial experiences. This perspective also opens up architectural practice to non-physical mediums, such as the digital realm, in the future.

FUTURE DESIGN PRACTICE OF MULTI-SPACE

Architecture extends beyond physical materiality, encompassing spatial creation, operation, and construction. Imagination and creativity play a crucial role in three-dimensional digital virtual spaces, including the potential for digital gaming. The study highlights the interconnectedness between actual, visible entities and virtual, invisible ones. With its focus on imaginative spatial representation, AI effectively demonstrates the connection between the physical and virtual realms.
Complex data iterations and variations hold the potential for integration into future design processes. Beyond mere inspiration, altering space aligns with the evolving digital and virtual mediums. Multi-space expands spatial design practice, operating within a realm demanding imagination and experience. AI's diverse role necessitates redefining design procedures. Reflecting on this study enriches architectural methods, emphasizing the interplay between actual and virtual realms in cross-medium programming.

Understanding virtual space involves recognizing it as an invisible entity accessible through object portals and a multi-space within the digital medium. While digital experiences, including gaming, offer alternative architectural practices, they differ significantly from traditional architecture. The infinite scale of game spaces contrasts with the physical spatiality of architectural design. Adjustments are necessary for design operations.

The study highlights the actual-virtual connection as a basis for redefining spatial practice. AI, while not replacing human creativity, can enhance the design process. Its countless iterations and variations open up limitless possibilities beyond human imagination. Further research is needed to integrate AI effectively into spatial design methods and architectural programming.

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Credits

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