Image and Force Schemas Interacting in Digital Environments: The Computer Game Antichamber

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Abstract

This paper investigates how embodied image schemas and force dynamics to operate and interact in the computer game Antichamber ([1]). Our main aim is to show how some of the most pervasive image and force schemata may serve as cognitive-semiotic tools to discern different kinds of dynamic orientation processes based on central problem-solving strategies.[1] Antichamber is particularly well-suited for our purposes as it offers a range of game-specific affordances such as different colors, riddles, bricks, arrows, straight lines, that is, different geometrical objects that anchor spatial reference coordinates. It is a game based on the impossible world in M.C. Escher's lithograph print 'Relativity'. Impossible worlds with upside-down staircases impose rather odd perspectives and viewpoints. In Antichamber, these worlds keep emerging and vanishing as the game proceeds, affecting and challenging the viewer's habits of perception and canonical knowledge of spaces and places. Whoever plays the game enters and actively interacts with this particular, constantly changing digital environment. In addition, the game is a case in point of constantly changing image schemas requiring online adaptation processes. From an enactive perspective [5] argues that perception is not merely a matter of passively structuring incoming information. It rather relies on dynamic bodily activity, and thus also on embodied image schemas and force dynamics. In this paper we present a first description showing that Antichamber a) presents an intriguing spatial architecture on its own differing from most other jump-and-run games, b) is a vivid example of how image schemas interact in game environments, and c) asks for continuously shifting combinations of image schemas and force dynamics based on the game-specific affordances.

Keywords

Image Schemas, Enactive Perspectives, Computer Game/Puzzle, Spatial Architecture in VR, Affordances,

[1]A perspectival analysis: [2]; on design conventions of the game: [3]; a detailed analysis on the game design: [4]

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1. Introduction

This paper investigates how embodied image schemas and force dynamics (e.g. [6]; [7])[1] operate and interact in the computer game Antichamber ([1])[2]. Our main aim is to show how some of the most pervasive image and force schemata may serve as cognitive-semiotic tools to discern different kinds of dynamic orientation processes based on central problem-solving strategies.[3] Antichamber is particularly well-suited for our purposes as it offers a range of game-specific affordances ([9]) such as different colors, riddles, bricks, arrows, straight lines, that is, different geometrical objects that anchor spatial reference coordinates. Here, we present a first attempt to show that Antichamber a) has a spatial architecture on its own, b) is a vivid example of how image schemas interact in game environments, and c) endorses continuously shifting combinations of image schemas and force dynamics based on the game specific affordances.

Regarding the spatial architecture we concur with Günzel's argument that games present different spatial concepts, e.g.:

> 1. Tetris as Topic Space (23-24), 2. Advent as Relational Space (24-26), 3. Portal as Curved Space (26-28), 4. Mirrors Edge as Hodological Space (28-29), 5. Assassins Creed as Horizontal Space (30-31), 6. Doom as Threshold Space (31-32),7. Ghost as Intentional Space (32-34), 8. Max Payne as Heautoscopic Space (34-36; ([10]: 13-40)).
>
> Hence, different games motivate different spatial concepts: "[…] computer games can exemplify philosophical concepts–perhaps more accurately than any other medium." ([11]: 181; see also [12]; and [13] on game architectonics)

We argue that computer game environments based on impossible spaces as in Antichamber offer further evidence that several image and force schemata tend to dynamically interact in processes of structuring perceptual experience and meaning construals (e.g., [14]; [15]). By impossible worlds we mean game environments that play with the player's knowledge and expectations of geometries, spaces, viewpoints and perspectives. Known and learned geometries and perspectives are questioned in such environments and ever so often expectations based on geometrical logic are fooled. Thus the question is how players draw upon basic image schemas when trying to make sense of the dynamically changing digital environment and act upon it to proceed with the game.

Our hypothesis is that in solving the puzzle and the maze more specifically, the player not only manipulates the game environment to find their way through the labyrinth, but at the same time the environment, or, rather its affordances, manipulates the player's embodied image schemas and force dynamics ([16]; [6]; [7]).

[1] "A schema is a recurrent pattern, shape, and regularity in, or of, these ongoing ordering activities. These patterns emerge as meaningful structures for us chiefly at the level of our bodily movements through space, our manipulation of objects, and our perceptual interactions. […] Image schemas constitute a preverbal and mostly nonconscious, emergent level of meaning. [...] Although they are preverbal, they play a major role in the syntax, semantics, and pragmatics of natural language. They lie at the heart of meaning, and they underlie language, abstract reasoning, and all forms of symbolic interaction." ([8]: 22, 144-145)

[2] Here is a walkthrough on Youtube: https://www.youtube.com/watch?v=-07OX-gNarc; We downloaded the game via Valve Corporation (Steam) September 9th, 2021: https://store.steampowered.com/app/219890/Antichamber/

[3] A perspectival analysis: [2]; on design conventions of the game: [3]; a detailed analysis on the game design: [4]

> Soon we begin to realize that we, too, can be sources of force on our bodies and on other objects outside us. We learn to move our bodies and to manipulate objects such that we are centers of force. Above all, we develop patterns for interacting forcefully with our environment we grab toys, raise the cup to our lips, pull our bodies through space. We encounter obstacles that exert force on us, and we find that we can exert force in going around, over, or through those objects that resist us. ([6]: 13)

Hence, image schemas "underpin cognitive, physical, emotional, and communicative responses on the side of the beholder" or player. ([17]: 327)

In this short sketch we will a) present some theoretical preliminaries and b) show selected examples from the game indicating the intricacies of image schemas in this computer game puzzle.[4]

2. Antichamber as Impossible World: Evoking Tacit Knowledge of Spaces and Objects

Antichamber is based on the impossible world in Maurits Cornelis (M.C.) Escher's lithograph print 'Relativity' (1953)[5]. Topological spaces or rather impossible worlds with upside-down staircases impose unusual perspectives and viewpoints in its 2 1/2-D sketch ([18]). Arguably, Antichamber, Manifold Garden or Echochrome present Escher's world as 3-D models. Different figures are following illogical or rather unknown paths, directions and rather odd geometries ([19]). As a consequence, the impossible worlds, which keep emerging and vanishing as the game proceeds, affect and challenge the viewer's habits of perception and canonical knowledge of spaces and places ([20]). Hence, both in Escher's lithography and in Antichamber, multiple viewpoints are used based on spatial image schemas for the most part, but also force schemas. Their composition and perspective get out of balance or equilibrium (see [6] on the image schema BALANCE and [17] on balancing acts in paintings and gestures).

Arguably, the logic of Antichamber is based on Escher's impossible world transposed into a virtual environment. It presents a case in point of enacted 'action-in-perception' based on the game's affordances and its spatial objects (see [9] on affordances and [5] on action-in-perception).

The point we wish to make here is that Antichamber challenges these internalized principles in very specific ways: It confronts the player with an impossible world, as described in the following quote:

> You may walk down a straight hallway into a room, then turn around and find that hallway has become a curve and leads somewhere other than where you came

[4]We would like to thank the three anonymous reviewers for their valuable and helpful comments on an earlier draft. Also, we would like to thank our student assistants Hannah Rost for technical support and the various implementations of images etc., and Chiara Hoheisel, Ragnhild Hinderling and Franziska Zimmermann for their helpful comments and proof-reading of the final version. Finally, Susann Lewerenz did the last fine tuning of our paper, thank you very much, as always. All remaining errors are solely ours.

[5]Find Escher's lithograph here: https://moa.byu.edu/m-c-eschers-relativity/ or here: https://artschaft.com/2018/04/26/m-c-escher-relativity-1953/

> from. Or, rather than a hallway, it's now another room. Or nothing at all. Maybe the room you entered suddenly has no exit. Here's another: say you enter a room and you find a sort of window framed somewhere near the centre. All around this window is the room you are in. But when you glance through the window, you see something else. Something new. And you want to see more, so of course you put your face as close as you can. And once you've stepped away, you're not in the room you were just in – you're now in the room you saw through the window. ([2])

Viewing Escher's static lithographic print or playing the dynamic digital game Antichamber, visual structures recruit ever shifting combinations of perspective, viewpoint, and spatial frames of reference. In addition, a number of gestalt principles are permanently at work in the player's embodied mind (on gestalt principles [21]; [22]). These principles range from CLOSENESS, CONTINUITY, GROUPING to certain shapes or FIGURE-GROUND asymmetries, among others ([23]; [7]; on FIGURE-GROUND asymmetries [24], [25], [26]).

To do justice to the dynamic and interactive nature of the perception processes involved in playing Antichamber, our view further builds on the idea of tacit knowledge in Antichamber as immersive cognitive sense-making. Tacit (knowing) refers to procedural, that is, highly automatized knowledge of mental computation ([27]; [28]).[6] For skilled players this means orchestrating the simultaneous handling of a keyboard and a mouse while orienting themselves in a 2D screen environment. We suggest that this handling is structured by dynamically interacting image schemas that drive the visual categorization construal involved in finding one's way through the game's labyrinth.

Antichamber's algorithm is based on geometrical objects used as proximate course-maintaining devices through the different hallways, rooms[7] and corridors.

> Knowledge of an object embodies knowledge of the object's spatial dimensions, that is, of the gradable characteristics of its typical, possible or actual, extension in space. Knowledge of space implies the availability of some system of axes which determine the designation of certain dimensions of, and distances between, objects in space. ([31]: 7)

These objects shape and determine a detailed topographical cognitive map of Antichamber's labyrinth, which prompts various spatial practices, e.g., the decision to turning right, left, or simply to proceed straight ahead (in some cases through a pitch-black hallway). So, within the described spaces, Antichamber presents an assembly of ambiguous figures, i.e., objects

[6] "We have a sense of the body in what it accomplishes. I have a tacit sense of the space that I am in (whether it is crowded, whether it is wide open, or whether it is closing in). Likewise, I have a proprioceptive sense of whether I am sitting or standing, stretching or contracting my muscles. Of course, these postural and positional senses of where and how the body is tend to remain in the background of my awareness; they are tacit, recessive. They are what phenomenologists call a 'pre-reflective sense of myself as embodied'." ([29]: 137; see also [30])

[7] "Rooms don't necessarily connect to other rooms based on relative spatial position. Rooms often also connect to rooms based on where the player is looking and at what angle the player is coming from, or on the player's previous series of actions. Some rooms even change after visiting other rooms. However, the more esoteric means of getting around have distinctive objects that you can associate with what you need to do." (see entry "Bizarrarchitectur" in: [4])

that keep changing their functions and affordances based on online visual meaning ascriptions. Pinpointing one figure in space, for instance, the one at the center of the bottom stairs, and adopting its perspective – similar to an avatar – instantly shifts the viewer's position and viewpoint. Thus, the player switches their perspective, e.g., from a birds-eye to a hodological perspective. There is a constant shift of perspectives while running through the hallways and different rooms.

One of the points this paper wishes to make is that drawing on tacit knowledge of objects and practices involves different image schemas, some of them will be laid out below.

3. Enactive Practices: Perception- Action in Virtual Environments

Research in various disciplines has shown that image schemas are at work in different media and modalities ([32]; [33]; [16]: 33-51; [15]). It is thus reasonable to assume various interacting image schemas the players relies on. They underpin the dynamic and multimodal processes involved in understanding and playing a computer game like Antichamber (and other impossible worlds like *Miegakure, Manifold Garden, Disoriented, Echochrome.*

According to [34] (p. 215) an image schema is:

> [...] a condensed redescription of perceptual experience for the purpose of mapping spatial structure onto conceptual structure. [...] Image schemas behave as "distillers" of spatial and temporal experiences. These distilled experiences, in turn, are what Cognitive Linguistics regards as the basis for organizing knowledge and reasoning about the world. ([34]: 215)[8]

In the present study, this kind of "reasoning about the world" (ibid.) guided by image schemas is anchored in the virtual world of Antichamber. Whoever plays the game enters and actively interacts with this particular, constantly changing digital environment. From an *enactive* perspective, [5] argues that perception is not merely a matter of passively structuring incoming information. It rather incorporates dynamic bodily activity, and thus an adaptation of image schemas, as we argue.

> Perception is not something that happens to us, or in us. It is something we do. Think of a blind person tap-tapping his or her way around a cluttered space, perceiving that space by touch, not all at once, but through time, by skillful probing and movement. This is, or at least ought to be, our paradigm of what perceiving is. The world makes itself available to the perceiver through physical movement and interaction. [...] I argue that all perception is touch-like in this way: Perceptual experience acquires content thanks to our possession of bodily skills. *What we perceive* is determined by *what we do* (or what we know how to do); it is determined

[8] See also[16]; [6]; [35]; [17]; [15]; [7]; [36]: 421-425, 434-436.

> by what we are *ready* to do. In ways I try to make precise, we *enact* our perceptual experience; we act it out. ([5]: 1; emphasize original) [9]

The coupling of action and perception is already, and perhaps most convincingly, articulated by [37]. In his chapter on *The spatiality of one's own body and mobility* ([37]: 112-170) the following description of an everyday situation is given:

> Let us first of all describe the spatiality of my own body. If my arm is resting on the table I should never think of saying that it is beside the ashtray in the way in which the ashtray is beside the telephone. The outline of my body is a frontier which ordinary spatial relations do not cross. This is because its parts are interrelated in a peculiar way: they are not spread out side by side, but enveloped in each other. For example, *my hand is not a collection of points.* ([37]: 112)

As formulated in this quotation, the body is not only directly related to perceptual experience, but in particular to *spatial* experience. The *hand is not a collection of points*, rather it is experienced as a spatially coherent gestalt. Thus, spatial orientation is based on embodied, that is, corporeal experience. In terms of this experience, in Antichamber the player can change their perspective and thus orientation which implies that a previously present profile fades into the background and another one becomes foregrounded.

4. Navigating through Antichamber: Interacting Image and Force Schemas

In this section, our objective is to identify the most important image schemas that are activated in the process of making sense and use of such non-places in the dynamic virtual game environment. Our future analysis will explore all image schemas available, among other things also on actual problem-solving tests with actual players.

In the game Antichamber, we see at least three predominant image schemas that jointly structure the game, interacting, in different moments, with a range of other schemas (listed below; for a recent overview see [16]). First, the name Antichamber prompts the CONTAINER schema; it thus evokes, by principle, spatial relationships and thus spatial-relations schemata such as IN-OUT or ABOVE-BELOW (e.g., [38]). Second, when playing the game, the ultimate objective is to find one's way through the labyrinth with its intricate sub-spaces and sub-pathways. That is, we can assume that the SOURCE-PATH-GOAL schema is constantly activated: the path is not pre-set or given, but actually emerges while the player moves through the virtual environment and influences the way in which the game proceeds through subsequent perception-in-action phases. Third, along the emerging PATH, the phased flow of motion, and thus the game's progression, comes about through instantiations of interacting FORCES. FORCE

[9] Moreover, he argues that "the basis of perception, on our enactive, sensorimotor approach, is implicit practical knowledge of the ways movement gives rise to changes in stimulation." ([5]: 8) And Hedbloom argues with respect to image schemas: "Image schemas are described as conceptual building blocks learned from the body's sensorimotor experiences. Similarly to the way geons [geometric shapes; MT and IM] capture visually perceived geometric shapes, image schemas capture spatiotemporal relationships that can capture the affordances of an object." ([16]: 17-18)

gestalts ([6]: 41-48), such as BLOCKAGE, COMPULSION, ATTRACTION and RESISTANCE, or FORCE dynamics ([7]: 409-470, 462-465), such as FOCAL-PERIPHERAL, STRONGER-WEAKER, BALANCE-MAINTAINING vs. BALANCE SWITCHING etc. form their own sub-group of schemas.

In Antichamber, the basic schema BLOCKAGE, in particular, repeatedly manifests in various ways (see Figure 1 and Figures 2-4 and [7]: 259). This gallery or life room consists of a number of different cubes including various, rather odd looking objects. As a player one asks what these cubes are suppose to do? Do they somehow help to solve the puzzle? The straight forward answer is, no, they do not. The player walks around the life room exploring its objects. We may say that the life room is like a sculptural room interesting to wander through, but it has no purpose regarding the problem-solving of the maze.

The player is literally blocked by (transparent) walls, barriers, and various other obstacles, thus the player faces constant resistance. Unblocking or overcoming the obstacles (REMOVAL OF RESTRAINT) is mandatory to find their way through the labyrinth. Given the specific spatial and topological nature of Antichamber, finding a way out of the blocked situation involves checking which of the main spatial schemas, e.g., RIGHT-LEFT, UP-DOWN, ABOVE-BELOW, may allow the player to move forward. The player's problem-solving process, depending on their gaming skills, might simply be an action bumping into the obstacles over and over again until a different image schema is activated to overcome the obstacle. BLOCKAGE affords the player to select a different schema.

Understanding Antichamber's visual structures and navigating through them thus involves at least the following set of schemas:

Basic image schemas:

- CONTAINER/CONTAINMENT
- PATH (SOURCE-TRAJECTORY-GOAL)
- CONTACT (+/- topological relation)
- OBJECTS
- BOUNDARY
- BALANCE

Spatial-relation schemas:

- IN-OUT
- UP-DOWN
- LEFT-RIGHT
- CENTER-PERIPHERY
- NEAR-FAR
- FOREGROUND-BACKGROUND

Force gestalts and force dynamics:

- BLOCKAGE
- COMPULSION

- DIVERSION
- REMOVAL OF RESTRAINT
- RESISTANCE

Let us now look more closely at some scenes from the game. Figure 5 presents a scene in which the player is blocked by a wall. The image schema BLOCKAGE[10]

here again interacts with the PATH schema. The PATH schema is activated by instantiating the SOURCE (which may be the starting point of the game or the current position of the player's tool) and the TRAJECTORY and implying the GOAL. The GOAL is blocked in this situation and the player needs to find an alternative approach to navigate through the game. Hedblom mentions that BLOCKAGE uses a sequential series of image schemas:

> While BLOCKAGE is considered an image schema in its own right, it is also possible to describe blockage using a sequential series of simple image schemas: MOVEMENT OF OBJECT, CONTACT and 'force', followed by the lack of MOVEMENT OF OBJECT. ([16]: 114)

Figures 6-8 presents another instantiation of the BLOCKAGE schema, in which FORCE needs to be activated since moving forward does not solve the problem.

In this case, the player is blocked by a staircase. Approaching the staircase with the 'matter gun' or block gun, which is similar to a portal gun (the so-called Aperture Science Handheld Portal Device connecting different spaces) from the game puzzle Portal opening portals, or gathering blocks, the former simply vanishes in front of the player. This results in a hallway opening behind it inviting to activate the PATH-schema. The block gun, shoots and sucks up blocks in different manners depending on which gun you have. Both movement and the placement of blocks are the primary focuses in puzzle solving. A simple step to the left or placing a block one square higher can make all the difference in progressing to the next chamber. The staircase again with respect to its affordances canonically invites one to take the stairs. The hallway prompts the player to start walking. We can thus say that the COMPULSION image schema is activated in the process, interacting with the CONTAINER schema. Arguably, COMPULSION is too strong here, as noted by a reviewer. ATTRACTION has been suggested instead, and indeed, this seems to be the right image schema selected in this situation. In addition to the interacting image schemas, different perspectives and viewpoints also need to be taken into account, e.g., frog-eye, hodological, birds-eye perspectives, and a vectorial coordinate system based on viewpoint in a relative frame of reference.

In another situation, the player needs to choose between two staircases (see Figure 9). Before they approach the staircases, a riddle appears, saying "the choice doesn't matter if the outcome is the same". From this point (SOURCE) onward, going to the left would lead down a staircase marked in red, and going to the right would lead upwards through a staircase marked in blue. As a natural first decision, the CLOSE-PATH-MOVEMENT/MOVEMENTS-IN-LOOPS schema does

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not guide the player anywhere, it leads naturally back to the SOURCE ([16]: 68-69). Regardless which direction they opt for, the player always ends up standing in front of the two staircases again and again. The only schema helping here is DIVERSION. We argue that the player activates this vector-based schema and thus reinterpret Johnson's understanding of this force schema slightly, since no direct colliding force acts upon the player. They simply need to turn around 180° in the direction they came from ([6]: 46). This problem-solving process opens up a new space, which is accompanied by another riddle saying "when you return to where you have been, things aren't always as remembered". Hence, only this action-in-perception process enables the solution.

The examples discussed in this section have evidenced the tendency of image and force schemas to intertwine sequentially and/or simultaneously: once a certain image schema is activated, e.g., PATH to find one's way in the labyrinth and thus solve an orientation problem, another image schema gets activated in response to the player's decision and action. Hence, the player's own action-in-perception influences which image schemas emerge, thus offering schematic affordances, and interact in various ways.

Our final examples consist of a series of screen shots in two scenes. In one scene the player needs to rearrange red blocks in a 2D maze, in a second scene the player needs to first place a red cube to block a door to then remove the cube again so that the door can slide down (see Figure 10-19). The sequence is interesting insofar as the dynamic event is based on the player's use of the gun solely to get rid of a wall or obstacle. Collecting, recollecting, and displacing blocks to overcome the obstacle asks for problem-solving processes based on amalgamed image schemas. The examples in 6 show not only BLOCKAGE, but also RESISTANCE and REMOVAL OF RESTRAINT (see Figures 20-23).) The player has to first place two red cubes under a door or roof. The cube keeps a door or gate blocked from sliding down. Removing one of the cubes leads the door to slide down which in turn enables the player to use at a different place another hallway to pass through.

Force dynamics is applied in forcing the maze to disappear in the blue room followed up by the green and white room to get to the final level. "Every journey comes to an end", the riddle states. After a collapse of image schemas shooting an amorphous black mass, the final stage is actually a black-and-white bridge in a straightforward hodological manner. It is a path without a ceiling or any kind of container-like boundary except to the left and right. It reminds of a bobsled run. Everything, including the matter gun, is now black-and-white, a very reduced geometry. A strange spherical object occurs from above and again the amorphous black mass, morphing into different geometries. The path seems to be slightly tilted or running upstairs. At the same time the player moves on, the black spherical object occurs again, the player ends at the same level as the spherical object. The whole final scenery reminds of different movies, most notably the end scene of the science fiction and horror movie *Event Horizon* (1997) in which a strange spherical object opens up to another dimension in space-time. While moving onwards, the BALANCE schema is activated since at one point the void is completely white without any black lines guiding anywhere, so that the player's orientation is disturbed. Running upstairs to what occurs to be a tower is challenging for the problem-solving process of the player since all image schemas used so far fail to guide into the right direction. A reached platform asks to chose between a number of exits to finally reach the spherical black object - a ball of some sort, a planet?

5. Concluding Remarks

As the foregoing discussion has shown, image and force schemas play a crucial role in the process of solving the puzzle involved in navigating through space and time and thus finding a path through the labyrinth. In light of the particular logic and objective of the game Antichamber, it was suggested that the basic schemas PATH, CONTAINER and BLOCKAGE are the predominant schemas, interacting, in particular, with spatial-relation and force schemas. A decisive factor here lies in the fact that these embodied conceptual structures underpin not only the player's manipulating the computer game-environment, but also in how the environment itself does manipulate the player's perception and decision-making processes that lead to cognitive and manual action.

> Antichamber presents a bold idea of an environment which interacts with the player, not the other way around, and it does this through clever trickery revolving around the player's perspective and subtle manipulation of that perspective. In short, what you see (or don't see) is the main thing you interact with. (see: [2])

In our view, such interactive, digital scenarios broaden the stage analogy introduced by Langacker in ascribing a crucial and dynamic meaning potential to the perceiver in their spatial construals ([39]: 356).

> [T]he stage model pertains to how we apprehend the outside world. The term is meant to suggest that the general process is analogous to the special case of watching a play. We cannot see everything at once, so viewing the world requires the directing and focusing of attention. From the maximal field of view, we select a limited area as the general locus of attention (the analog of looking at the stage). Within this region, we focus our attention specifically on certain elements (analogous to actors and props). ([39]: 356)

We have argued that the selection mechanisms are based on mental triangulation processes in tacit actual bodily actions in meaning attribution. These bodily and mental actions are grounded in specific combinations of image schemas and force dynamics that constantly shift and recombine based on the specific affordances of the elements in the environment. These present themselves to the player in a given moment and in a given place during the game process.

Another point we made is that in Antichamber, different objects, dimensions, scales, scopes, geometries, axes, vectors and obstacles function as symbolic representations [11] and act as barriers[12] such as walls, staircases, or holes. In this virtual environment, schematic objects

[11]The concept of representation is used here according to Foucault's reading of Magritte's painting "Ceci n'est pas une pipe" ([40]). It is an open-ended meaning ascription–intertext–in the interplay of symbols (the written riddles) and images (the image of the game space).

[12]Gates and doors can be defined as thresholds from one place to another. A non-place of spatial transition as is known from different computer games such as Manifold Garden (2020) in which colors help to orient oneself, *Miegakure* (to be released), *Portal* (2007), *Echochrome* (2008) or *Disoriented* (2018) (see Soja's transition zones on airports as Third Spaces, [41]; also [42]; [43])

of this kind guide the player while navigating through the different rooms and hallways, i.e., through an impossible Escher-like world. In a follow-up study, we will elaborate the first insights offered in this short paper, especially the dynamic visual and spatial characteristics of computer game puzzles. Moreover, we will not only compare different kinds of similar computer puzzles, but also work out a thorough analysis of the whole catalogue of available image schemas.

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Appendices

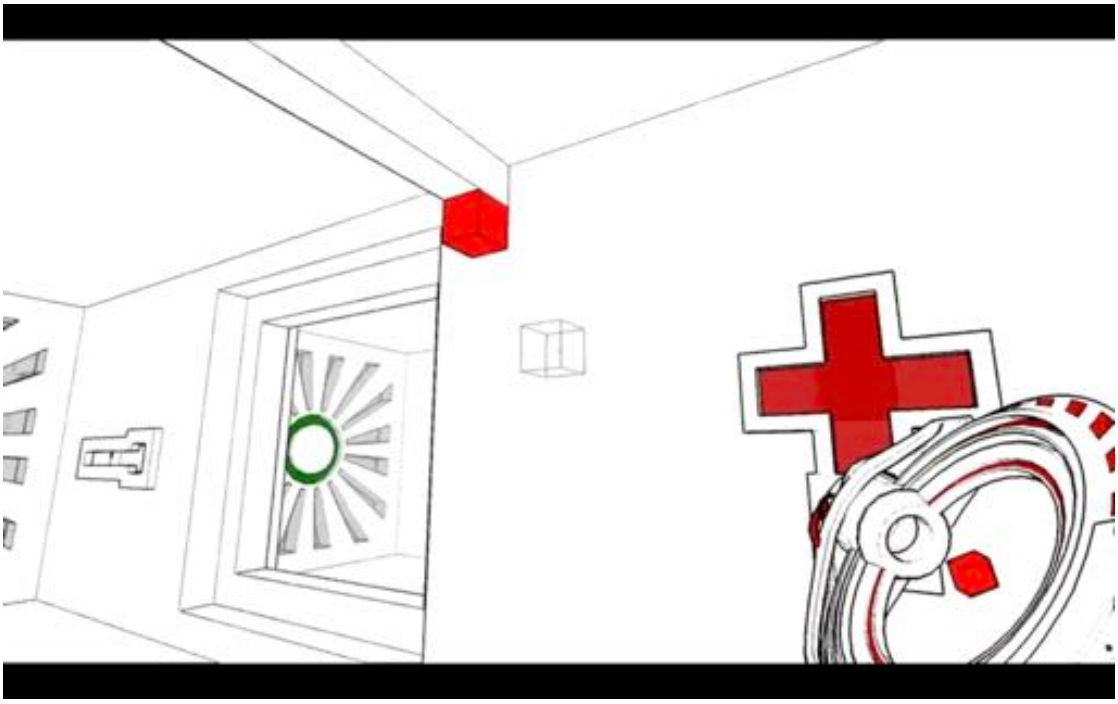

Figure 1: Blockage by object (red cube).

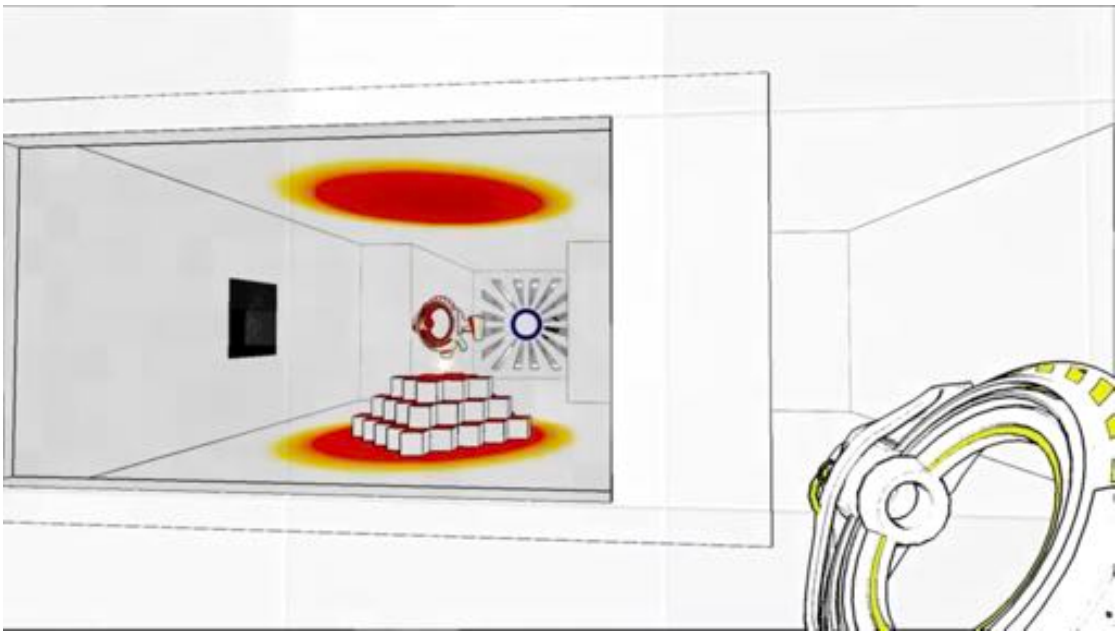

Figure 2: Blockage by object (wall).

Figure 3: Blockage by object (cube).

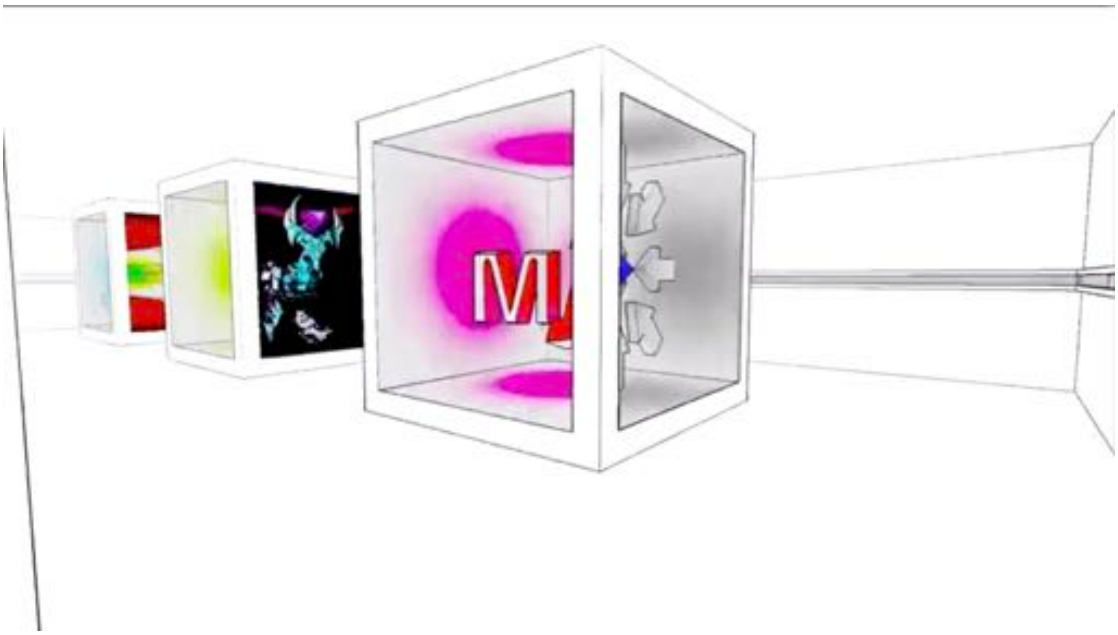

Figure 4: Blockage by object (cube).

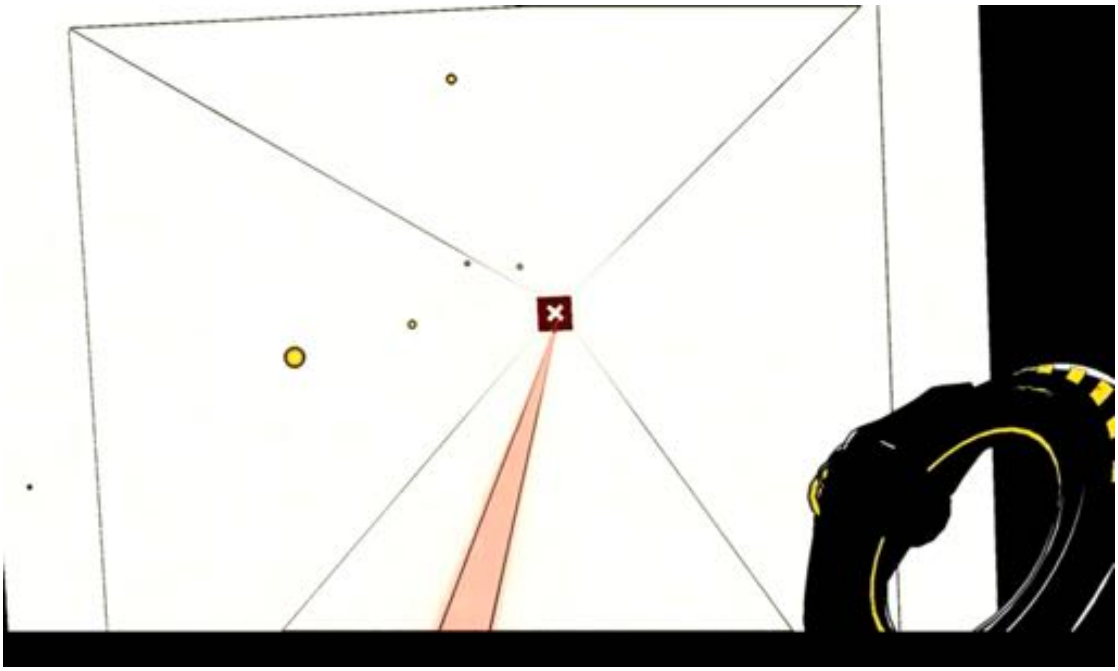

Figure 5: Blockage by wall/hodological perspective.

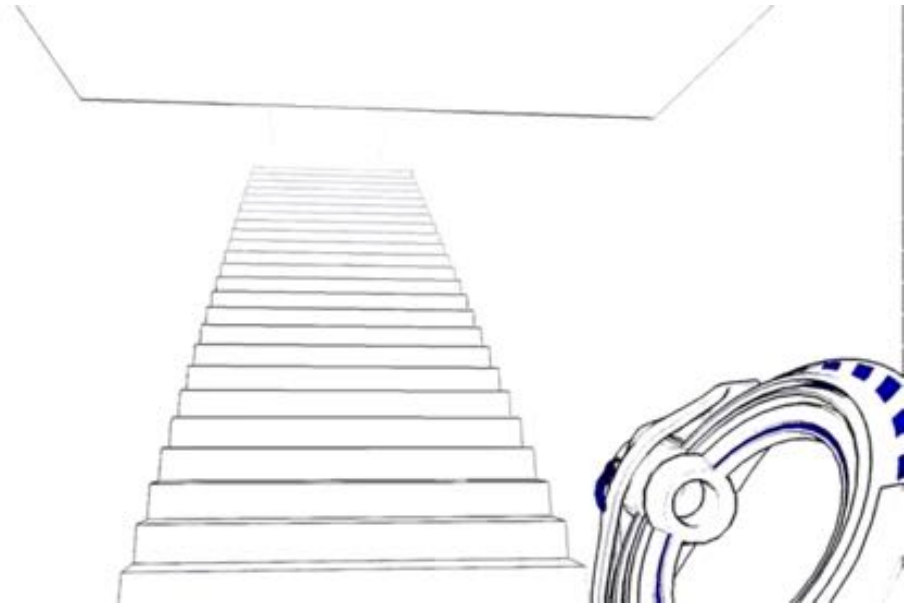

Figure 6: Blockage staircase.

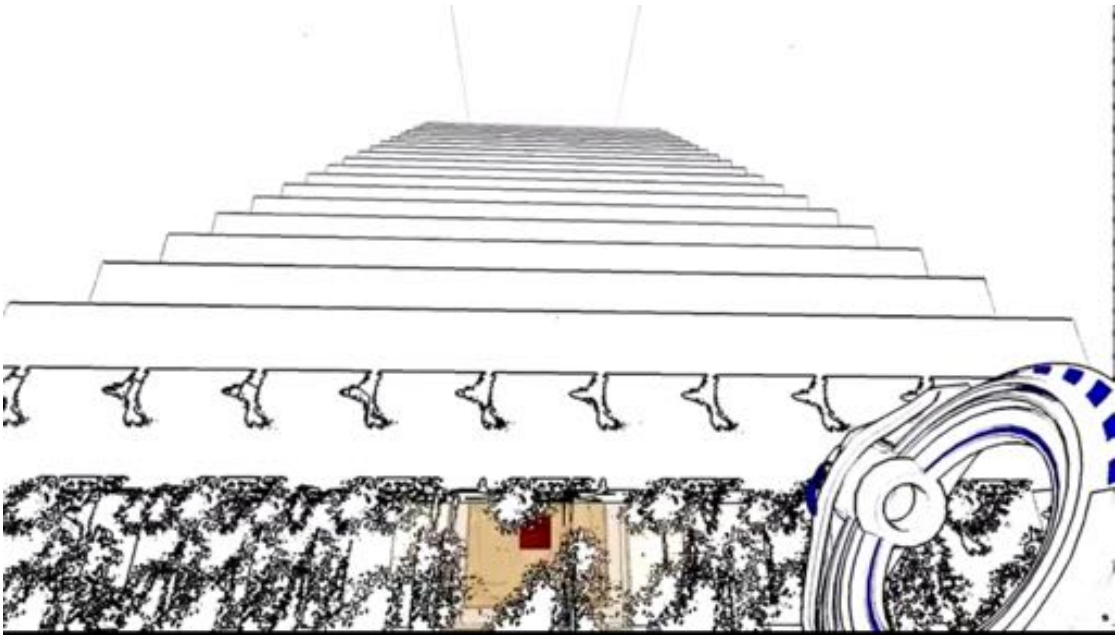

Figure 7: Blockage/dissolving staircase.

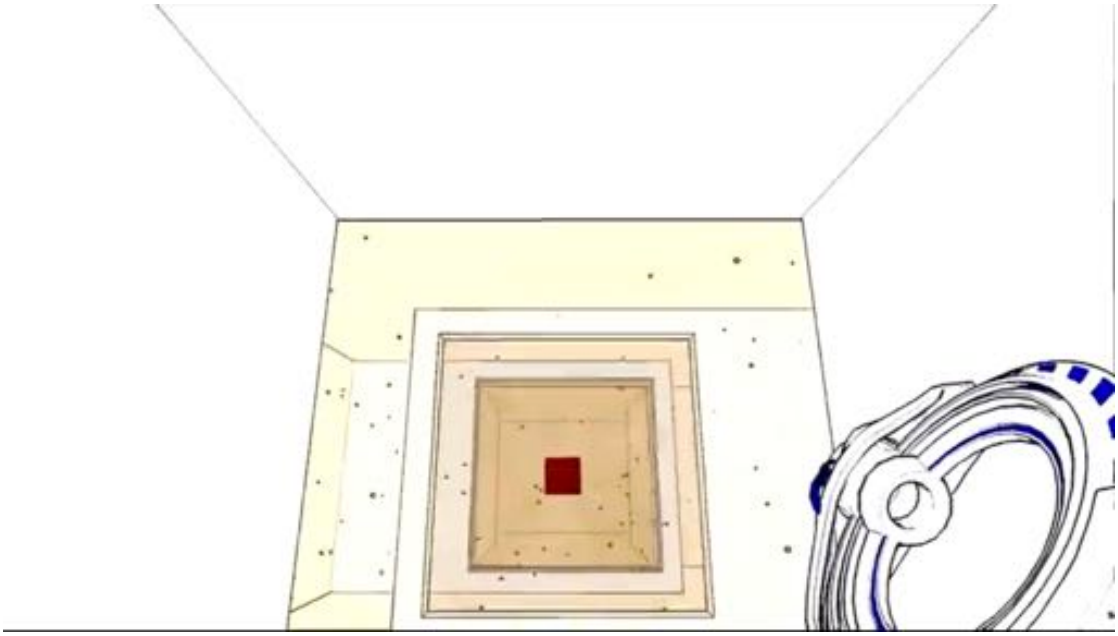

Figure 8: PATH activated after dissolved object.

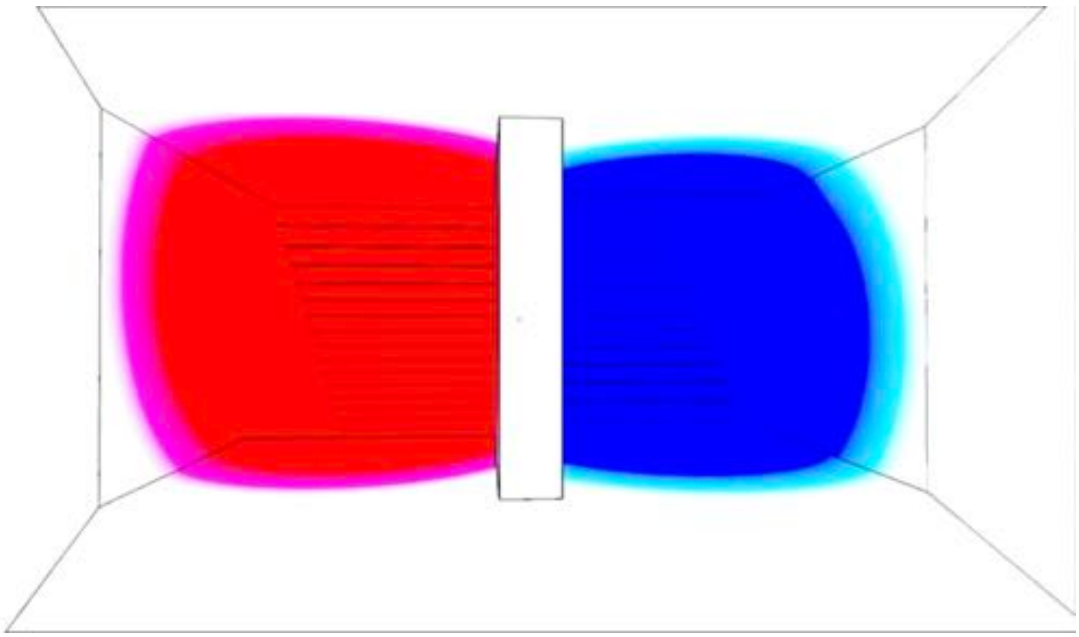

Figure 9: What goes around, comes around: two staircases.

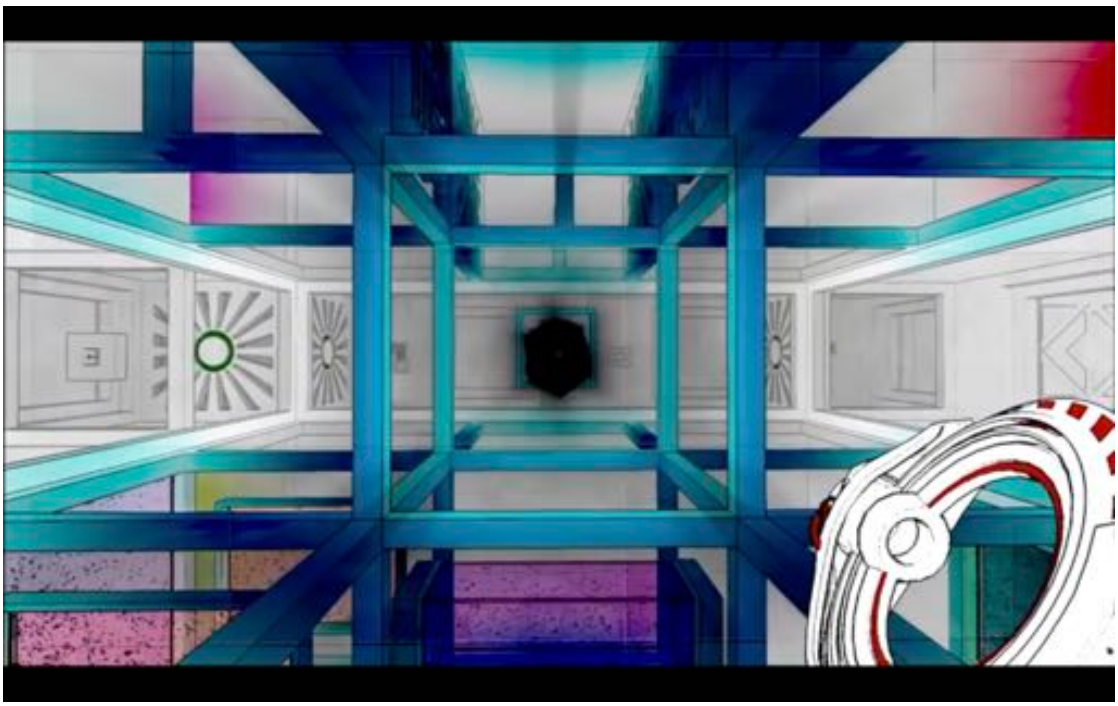

Figure 10: Path and Force.

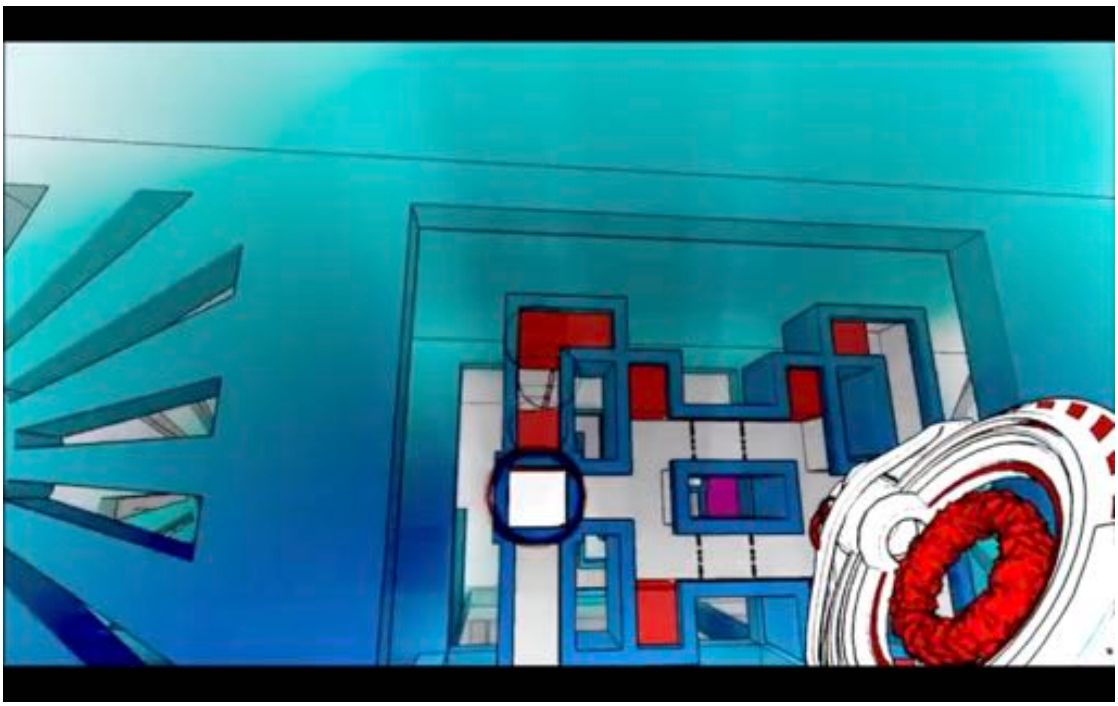

Figure 11: Path and Force: an Escher geometry.

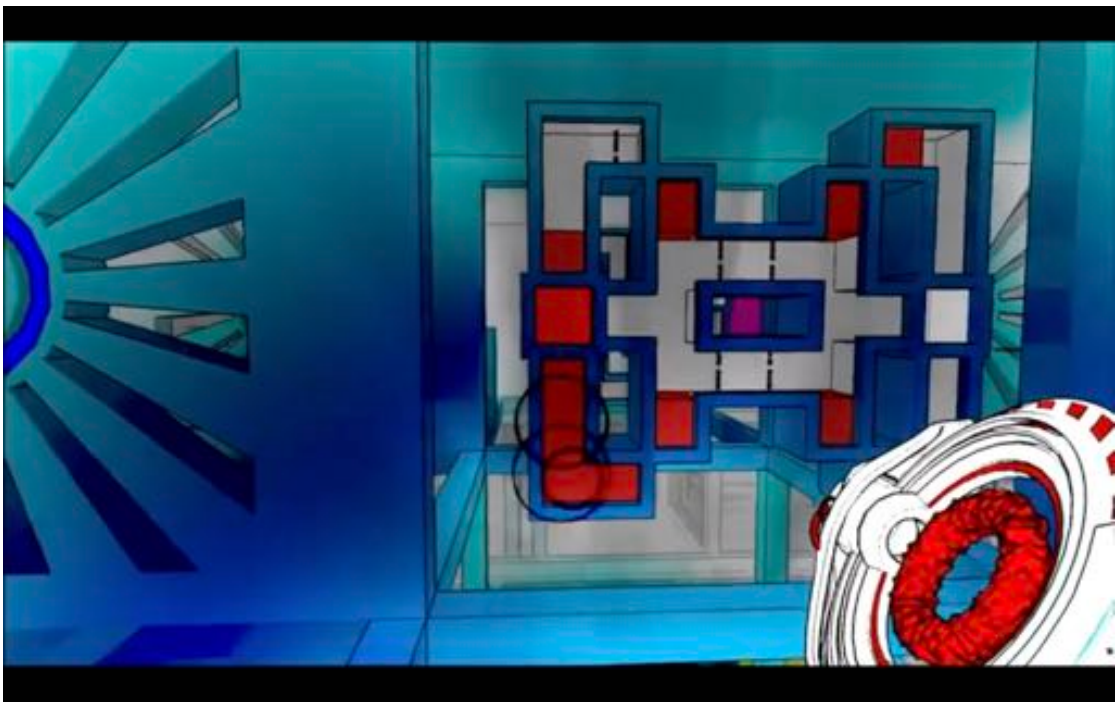

Figure 12: Path and Force.

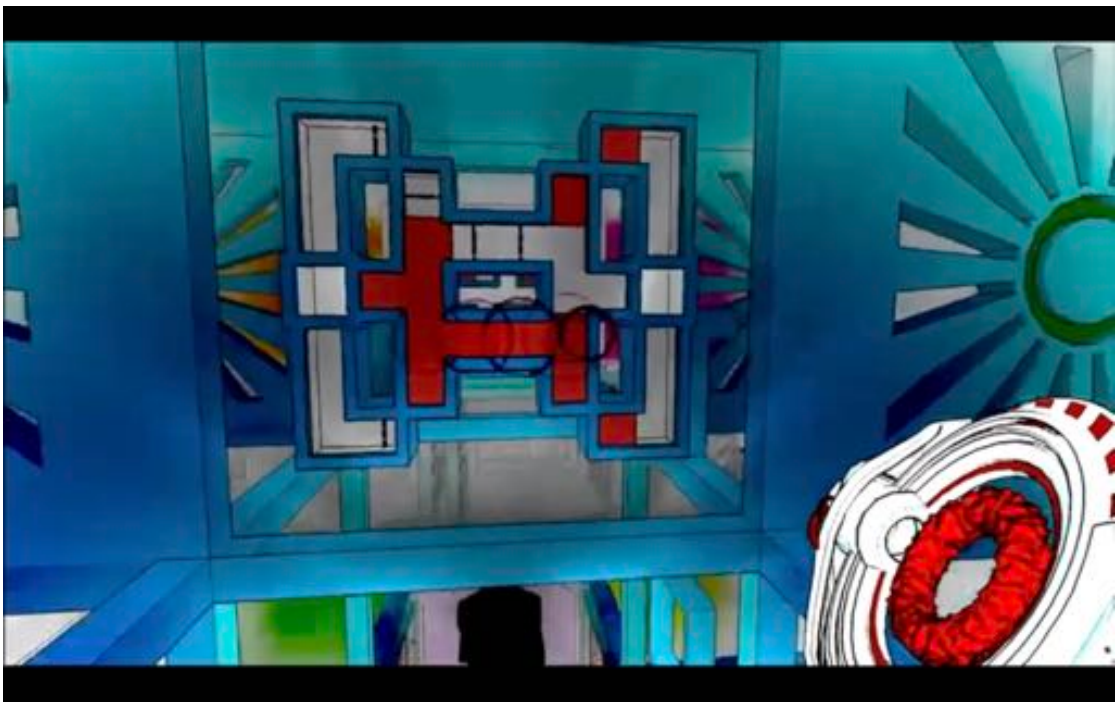

Figure 13: Path and Force: move cubes in a maze.

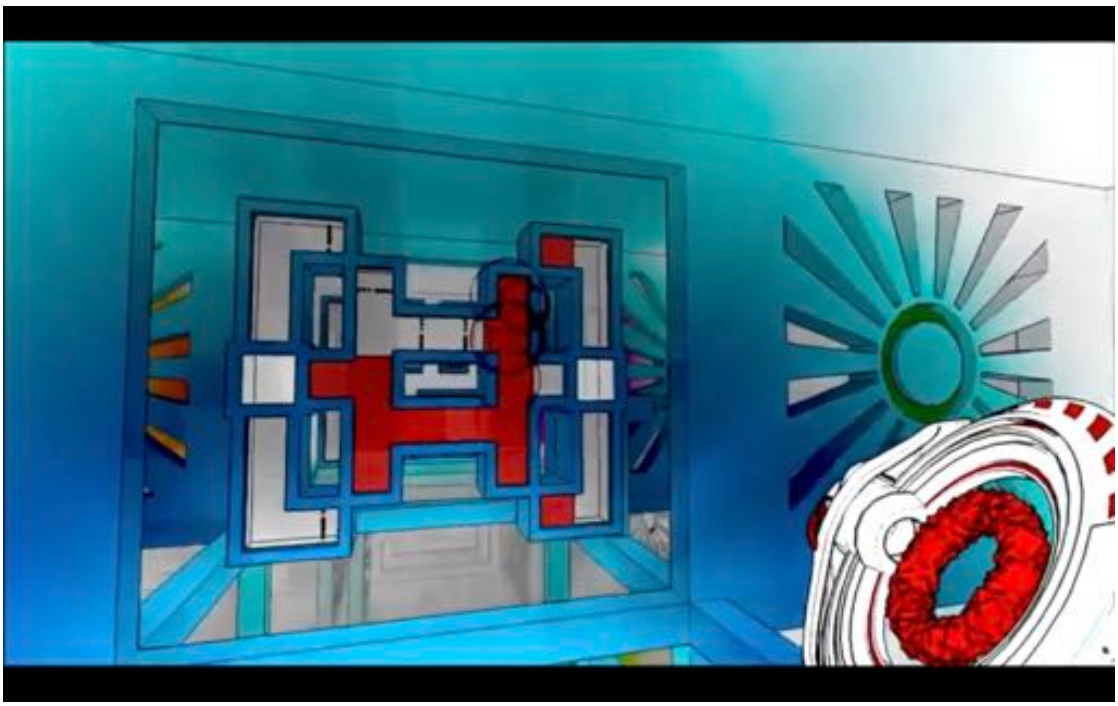

Figure 14: Path and Force: relocate cubes in a maze by circles.

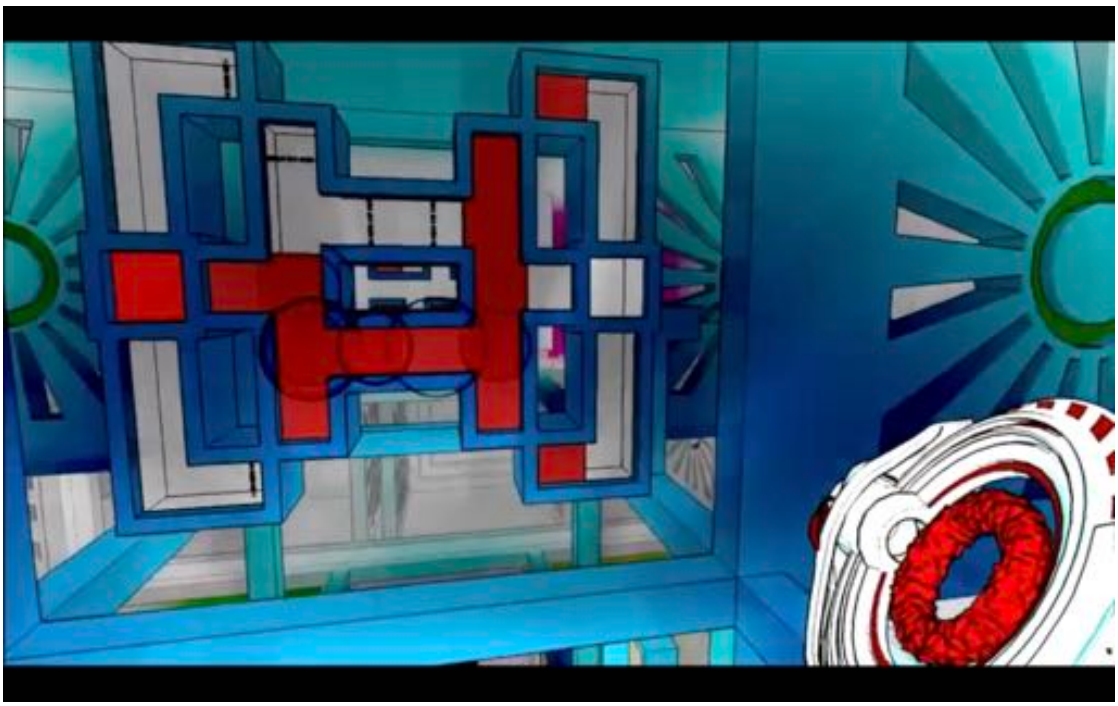

Figure 15: Path and Force: relocate cubes in a maze by circles.

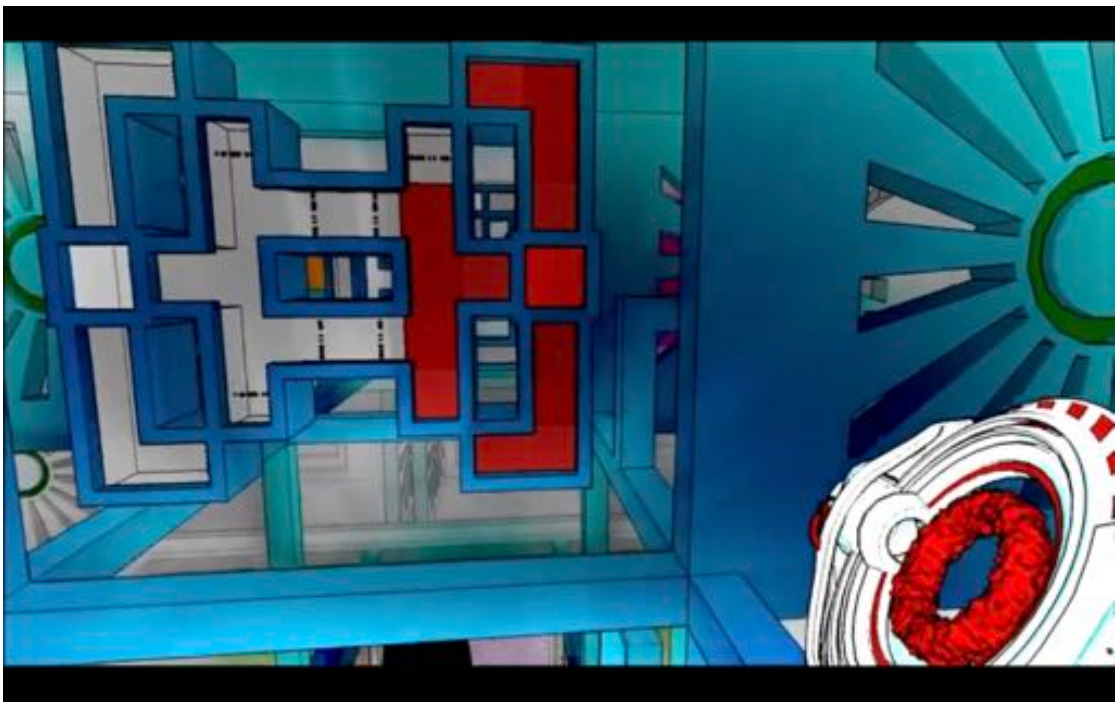

Figure 16: Path and Force: relocate cubes in a maze by circles.

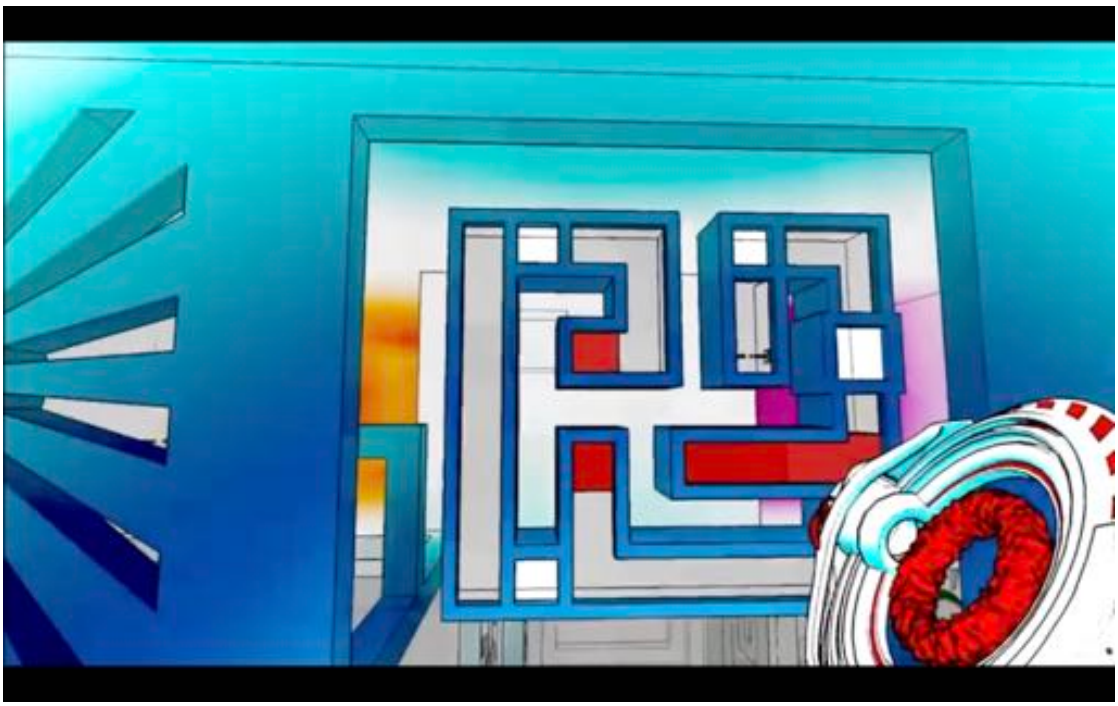

Figure 17: Path and Force: relocate cubes in a maze by circles.

Figure 18: Path and Force: relocate cubes in a maze.

Figure 19: Path and Force: relocate cubes in a maze.

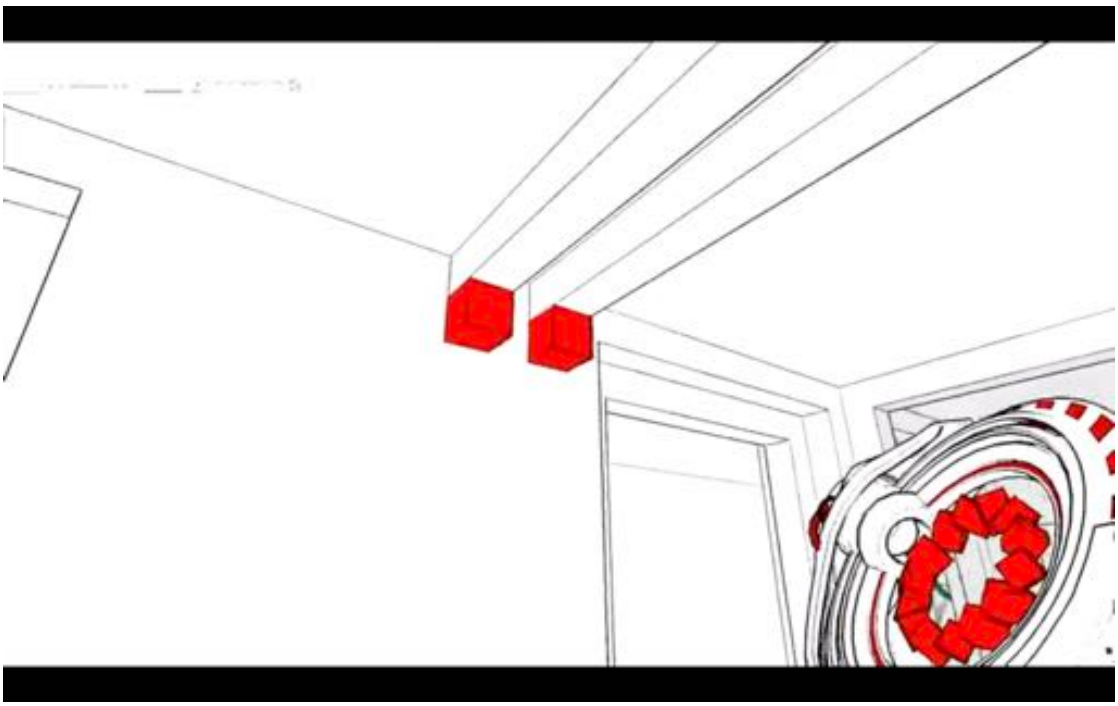

Figure 20: Blockage by red cube.

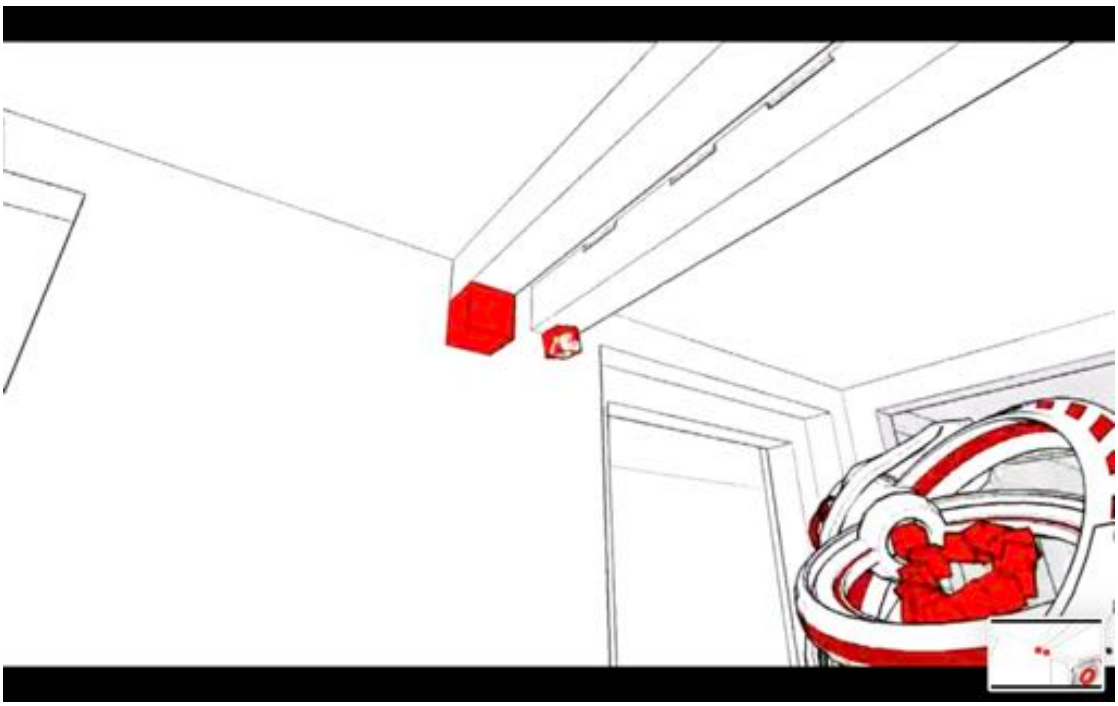

Figure 21: Remove blockage to enable door sliding down.

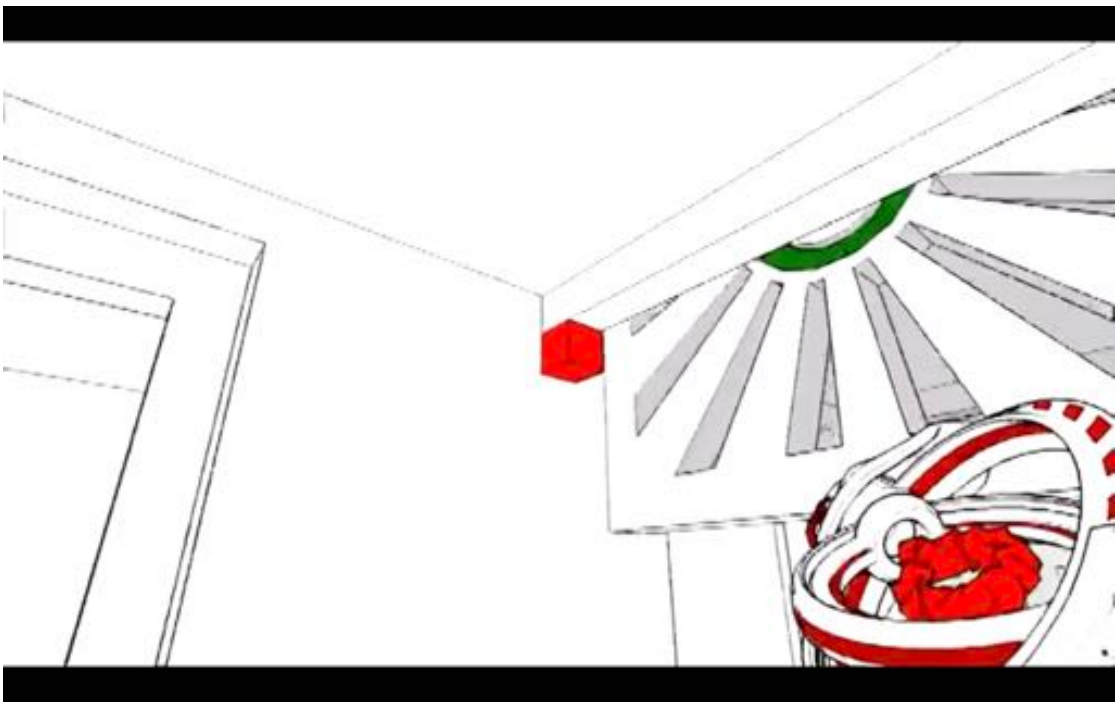

Figure 22: Blockage removed: door slides down.

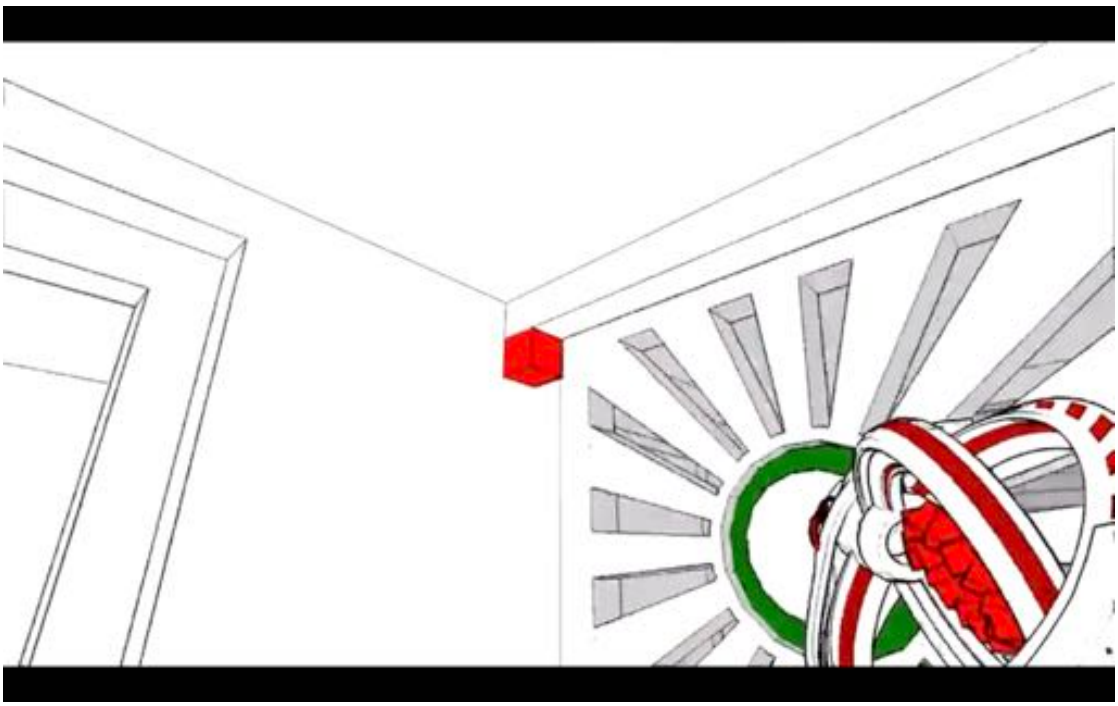

Figure 23: Blockage and restraint: door slides down after removal of restraint.