Uses of Virtual Reality in an Applied Philosophy Course*

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Abstract

The paper focuses on the theoretical assumptions and the way in which an experimental course on the phenomenology of space, designed for architects and interior designers, was conducted. The course used virtual reality to allow students to directly experience the perceptual and cognitive effects induced by spatial forms, colour, the texture of materials, and light. Virtual reality also made it possible to translate certain philosophical concepts related to the phenomenology of space into an experiential and applicable field close to the sensitivity and spatial culture of the designers. The themes addressed gave rise to a progressive elaboration that allowed the students to develop an increasingly complex project and to experiment with intricate issues.

Keywords: Phenomenology of Space; VR Design; Interior Design; Immersive Education

Abstract

L'articolo si concentra sui presupposti teorici e sullo svolgimento di un corso sperimentale sulla fenomenologia dello spazio, ideato per architetti e interior designer. L'uso della realtà virtuale ha consentito di sperimentare direttamente gli effetti percettivi e cognitivi indotti dalle forme spaziali, dai colori, dalla texture dei materiali e dalla luce. La realtà virtuale ha inoltre permesso di tradurre alcuni concetti filosofici legati alla fenomenologia dello spazio in un campo esperienziale e applicabile, in sintonia con la sensibilità e la cultura spaziale dei

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progettisti. I temi trattati hanno dato luogo a uno sviluppo progressivo che ha consentito agli studenti di realizzare un progetto sempre più stratificato e di confrontarsi con questioni di crescente complessità.

Parole chiave: Fenomenologia dello spazio; VR Design; Architettura d'interni; Educazione Immersiva

Virtual reality (VR) holds educational potential of great interest for all disciplines that deal with spatiality and even more for those, like architecture, that have a privileged relationship with lived space, that is to say with the interaction between the body and its environment. I attempted to demonstrate this thesis through the conception and development of a course on "Phenomenology of space" that makes use of virtual reality to study the perceptual effects of architectural design.

The course began as a research project funded by an internal call for proposals in the "department of environments, construction, and design" of the University of Applied Sciences and Arts of Southern Switzerland (SUPSI-DACD, Mendrisio, Switzerland) dedicated to digitization. From the outset, its implementation required the formation of a small interdisciplinary research team. It included, alongside myself (philosopher and professor of spatial theory), Pietro Vitali (architect and professor of the degree course in interior architecture), Matteo Moriani (architect and assistant for the course developed by this project), and Marco Lurati (interaction designer and lecturer). The final goal of the educational project (which subsequently won the Credit Swiss Award for Best Teaching 2021-2022) was to create a course in phenomenology applied to architecture with the help of Oculus Quest 2 headsets. In other words, rather than just learning theories, the students would need to sharpen their spatial sensibility by experimenting with these theories in a virtual environment. The challenge was thus double: on one hand to offer a course on applied philosophy, and on the other to introduce virtual reality into a theoretical course, making it the tool for the application of theory.

VR has already come into use in university teaching. It has recently emerged in architecture and the arts as novel means for visualizing different design solutions and for building up the design model and its virtual environment.

In a manner similar to these applications, VR is commonly used in architectural education in the design process, as it provides the designer with an image to create the spatial and topological relationships of a project. Although the use of VR for teaching purposes is not yet widespread in architecture faculties (in Europe at least), its pedagogical effectiveness has been clearly documented (Khavari and Kaiser, 2022). Several studies on the pedagogical function of VR in architectural training have shown that the use of this technology increases the designer's

awareness during the design process in terms of the structural properties and component assembly of a structural system, (Abdelhameed 2013), helps develop students' approaches to these issues, critical thinking abilities, and problem-solving activities (Khavari and Kaiser, 2022), creates the possibility to "feel like being in the place," (Chandrasekera, Fernando, Puig, 2019) strengthens the memory and awareness of the spatial configuration (Angulo, 2013), augments their "spatial abilities"(Chandrasekera, Yoon, 2015; Schnabel et al., 2001) and trains their capacity to switch naturally from a planar representation of space to a 3D representation of the same space (Milovanovic et al., 2017). However, the use of VR that we wanted to experiment with differs from the common uses of this technology in architecture or design faculties. It is in fact designed to develop an "applied" philosophy of space (a philosophy with a phenomenological orientation). In other words, thanks to virtual reality, the students were able to experiment in various ways, according to a number of controlled possibilities, with how the manipulation of certain variables (positions of openings, colours, scales, relationships between objects in space, artificial lights, sequences of spaces) impact the spatial experience on a perceptive and cognitive level. The aim was not to obtain a realistic representation of space, nor was it to learn about and visualize certain spaces and construction processes through VR. The aim was rather to verify with one's own (virtual) body the perceptual effects induced by certain design choices, and to develop a method to derive generalizable knowledge from experience.

1. Phenomenology in Virtual Space

Phenomenology is undoubtedly the theoretical orientation most closely related to the intelligence of architects, who are accustomed to thinking about space "live," so to speak. Among the characteristic abilities of the architect are the capacity to consider the relationship between spaces and bodies, to imagine the atmosphere of environments and the way in which shape, colour, and spatial scale influence our experience of them, and to organize solids and voids, exteriors and interiors, the visible and the invisible, light and shadow, volumes and matter, as though they were elements of an aesthetically expressed spatial language. It is precisely this sort of sensibility that the course sought to thematically develop, strengthening students' awareness of and ability to design perceptual (i.e., not only spatial) environments imbued with cognitive and emotional meanings. To best realize the desired encounter between philosophy and architecture in this pre-categorical level of spatial experience, I found it useful to refer to phenomenology broadly defined, largely enough to include Gestalt psychology and some elements of behaviourist psychology. Before giving a synopsis of the thematic contents of the course, it will be necessary to evaluate the contribution that virtual reality can offer to the encounter between phenomenology and architecture, mediating between their languages. VR's potential

consists in its particular qualities as an immersive medium, or more specifically in its capacity to insert perception into an immaterial, interactive, and programmable *Umwelt*. The first aspect is perhaps the most important. If there is a single quality that the spatial intelligence of the architect must necessarily develop during the course of study, it lies in the capacity to move from an understanding of space based on plans – made up of lines, symbols, numbers, and so on – to a subjective understanding, ideally placed in the space that those signs represent abstractly. The passage from an objective and external gaze (the one that reads the plan) to an internal, embodied one, capable of bringing the signs to life in a volumetric space and corporealizing them, is normally entrusted to the imagination. But given the complexity of this mental operation, it is always necessary to turn to a plurality of media: sketches, models, photographs of the models taken from the inside, rendering, etc. None of these tools, however, is capable of physically including the subject, who thus continues to have a distanced and disembodied understanding of space. Given the importance of the role that the body plays in spatial experience, it is clear that the value of virtual reality lies in the possibility of transferring the subject inside of the space of representation, in such a way that allows them to have a direct, aesthetic, and even synesthetic experience. Thanks to VR, the architect can jump in and out of the representation: he or she can "enter the plan," making it into an immersive experience, and then exit, modify the design on the basis of this experience, and finally return to the virtual space to check the outcome of the operation. This movement in and out of the space of representation provides the intelligence of the architect with a new medium; this is not, however, virtual reality, but rather his or her own body as an "analogical" tool, one that provides an analogue to embodied sensory experience. On the one hand, virtual space replicates the intentional structure that the world presents to us: space moves with me, shows itself and hides itself in relation to my gaze, and declares its secondary qualities (for example, showing itself to be narrow and oppressive, or disorienting – all qualities that are related to a certain kind of subjective experience). On the other hand, even if they are "embedded" in a virtual environment, the subjects still maintain an interior distance, a remainder of objectivity; they know that they are in a representation, just like at every moment they know that their own body is only an *analogon* of the sentient one, which allows them to have a mediated, self-observed experience, and to register its effects. If virtual space is a distant relative of the sketchpad, the body that explores virtual space is a distant relative of the pencil that draws in the sketchpad, or more precisely of the manual intelligence involved in that experience. The risk of virtual reality causing the architect to lose an authentic relationship to space, or to "authentic space," is, when taken from this point of view, less serious than one might fear – and all the more so due to the fact that VR does not by any means claim to substitute itself for the traditional forms of mediation, translation, and representation of

space, but rather to integrate them into its own capabilities. Furthermore, VR remediates within itself many media to which we have long been accustomed, from the drawing pad to the cinema; from this perspective, rather than eliminating all mediation, it entails a deep and layered media culture. This is also confirmed by the educational usage of VR, given that in order to adequately use it, the students will necessarily continue to move through the representational languages of different media (from manual design to CAD, as well as the photos and films that can be made within virtual reality).

2. The Contribution of VR to the Phenomenological Study of Space

On a general consideration, the use of virtual reality in the architectural context can be summarized in four points. These, as we will see, were developed in the course through a series of exercises.

1) *VR allows for the modification of space at will, and for the verification of its effects on perceptual, emotional, and cognitive levels (depending on what one is interested in determining) in an immersive environment.*

For example, the height of a ceiling is, from one point of view, objective and mathematical, identical in any space. It is what it is, regardless of other spatial variables like colour and depth. Within the perceptual dimension, however, things proceed very differently, since all of these variables intertwine and influence one another in a manner so clear that to define it as subjective would be misleading. The depth of space modifies the perception of height in direct proportion to its increase. This can easily be experienced in virtual reality precisely because it only applies to a sentient body, which on paper does not exist. Experiments of this type can examine the relationship between colour and spatial perception, the modification of an environment through light (or shadows) depending on the hour of the day or the season, the perception of one's centre of balance in space, the relationship between different scales, the relationship between different volumes and shapes, synaesthesia, and many other analogous situations.

2) *VR allows for the implementation of "phenomenological variations" and the experiencing of their effects on different levels: aesthetic, psychological, ontological.*

The use of phenomenological variation (a Husserlian expression that I use very freely here) within the context of the project meant the possibility of varying one or two special elements, altering in a controlled way their position, breadth, depth, and other characteristics. One can, for example, modify the perception and geometry of an entire environment by changing where the entryway is located, thus deforming the environment in relation to the observer's centre.

Depending on the breadth or depth of the entry, the experience of entering, and of the relationship between outside and inside, is modified. Depending where the two entries in a room are located – given that these establish between themselves, on a perceptual level, a reciprocal connection, a sort of invisible corridor – space will be "sliced" by that connection in different ways, redistributing internal space and generating areas (compartments) of variable shapes and dimensions.This method requires experimenting with a limited and controlled number of variations, and that the results be recorded from a perceptual and even ontological point of view. The dimensions of a window can be varied in such a way as to produce significant aesthetic discontinuities, but beyond a certain threshold of size the window changes in nature, becoming, for example, a glass door (if it alludes to the possibility of transit, taking on the potentiality of an opening-threshold), or a glass wall, where wall and window meet, each giving up one of its intrinsic potentialities (in the case of the wall, the possibility of visually separating spaces, and in the case of the window, that of connecting an inside to an outside atmosphere). The exercise of variation can take on many forms, all useful for testing a wide range of spatial effects with aesthetic, symbolic, or even ontological significance. To give a final example, which highlights the possibilities of VR, we might think of the effect of all of the possible variations applied to the height of a small room, from the minimum or even insufficient measurement to a generous one, say of 3 meters, up to a decidedly out of scale measurement of 10 or 20 meters. This modification allows for the discovery through intuitive evidence of the discontinuous relationship between stimulus and perception, or of the differential thresholds that punctuate the qualitative passage from one psychophysical condition to another (claustrophobic, comfortable, roomy, oppressive, etc.). The qualitative thresholds can also cause a change in the sense of space itself. For instance, a space in which the ceiling is too low will not be perceived as inhabitable. Habitability is a spatial quality that requires a certain minimum height, even if it is still a claustrophobic one. But if one exceeds this measurement greatly, one enters into a new context of meaning, for example that of an artistic installation, and space takes on a poetic significance that it did not have before.

3) *VR allows for the firsthand study of relationships between form and meaning*

Here, I turn to the field of Gestalt psychology, and more particularly to the possibility of simulating and studying phenomena of orientation and mental maps (at the base of which lie the tools of the psychology of shapes). To once again in this case offer some examples, one might think of virtual space as a site in which to experiment with different strategies for functionally dividing up space, for grouping families of objects on the basis of the principles of "figural unification," for generating rhythms, for anticipating the sense of space (directions and meanings), and for inducing motor responses. Within this field

of experimentation also lies the possibility of giving symbolic significance to a certain element of the environment (for example, the main entrance, the most important painting, the state room, etc.) as well as that of articulating in various modes the relationship between voids and solids, distances, or objects with different shapes and sizes.

4) *VR allows for experimentation with the constitutive factors of atmospheres*

This fourth point is the result of the interaction between all of the preceding spatial components and their relative interactions, and thus cannot but appear last. Experimentation with the constitutive factors of the atmosphere becomes explicit when attention is shifted to the holistic aspects of the environment, the emotional impact that the space has on us, and the moment of encounter with an atmosphere and the way it can be an object of design. The usefulness of virtual reality in respect to the phenomenological analysis of atmospheres is clear: precisely because an atmosphere is in itself an immersive and synesthetic phenomenon, it can only be observed through bodily presence. One is always *inside* an atmosphere, to the point that the very presence of a certain atmospheric connotation defines, when perceived, the confines of an interior (the interior of a work of architecture, of a certain city or neighbourhood, or of a particular culture, etc.). VR thus shows itself to be extremely effective as a tool for the analysis of the psychological aspects of atmosphere, facilitating an applied atmospherology. The various aspects that comprise the atmosphere of a place, that is to say its social and emotional characteristics, can become the object of critical analysis and can be used for the revision of designs. Within this field of experimentation there is also the possibility of observing space from any desired perspective and of moving, even if in a limited way, in a manner that unites visual and synesthetic experience.

3. The Course

The course (held for the first time during the first semester of the 2022 academic year) was divided into a wide introduction and 5 units. The introduction delivered a reflection on the relationship between body and space, bringing to light some of the fundamental issues in Merleau-Ponty and Heidegger's phenomenological approaches (Heidegger 2000; Merleau-Ponty 1945). Through the definition of these concepts and the relationship between them (space as correlate of the activity of a living body, as environment, as site, as a felt, perceived, lived space, invested with meanings), the course established a theoretical basis sufficient for understanding its aims[1].

1 Subsequently, together with Dr. Fabrizia Bandi, I edited an anthology entitled *Corpo, spazio, architettura. Fenomenologia dell'esperienza spaziale*, Morcelliana, Brescia 2024. The anthology

The first unit was dedicated to the theme of thresholds, or rather to the diverse configurations of the divide between interior and exterior that make the experience of space as a place possible (the possibility of "entering" or accessing that only the crossing of a threshold allows). Experimenting with the different thresholds that comprise space and mastering their rhetorical significance means knowing how to articulate space like a complex text, full of caesuras, connections, leaps, transitions, and transformations. Especially for architects, it is literally a fundamental issue. Le Corbusier writes:

> I ask a young student: how would you make a door? With what dimensions? Where would you place it? In which corner of the room would you have it open? Do you understand that these different solutions are the are the very basis of architecture? Depending on the way that one enters into an apartment, on where doors are located in the walls, you feel very different sensations, and the wall that you that you drill likewise takes on very different characteristics. You then feel that this is architecture. (Le Corbusier 2015, 182)

Each threshold represents a critical point in space because it is called upon not only to manage the different practical and symbolic functions of the environment, but also the relationship between seemingly irreconcilable opposites: interior and exterior, public and private, the familiar and the foreign, the inside and the outside. The phenomenology of thresholds thus aimed to show through numerous examples how the threshold could be designed and conceived of in different ways depending on goals and intentions (aesthetic, symbolic, practical). The second unit, which clarified some of the theoretical elements already present in the first, analysed the principles of field theory, or better, an ensemble of theories based on the shared presupposition that a space occupied by volumes does not coincide with their physical space, but extends beyond it, without however being independent of the originating form (Arnheim 2009, Portoghesi 1971, Marcolli 1971 and 1978). To quote Paolo Porteghesi:

> By emphasizing the generated field in addition to the architectural object, one raises once more the problem of space, but in different terms by giving the concept a different value. In traditional criticism space is aa homogeneous structure, a kind of counterform to the mural envelope, indifferent to the lighting conditions and to its position in relation to the buildings, whereas the notion of field stresses the continuous variability of what surrounds the architectural structures" (cited in Arnheim 2009, 31).

The field thus coincides not with the borders within which everything is enclosed, but with a certain arrangement of forces and vectors acting in space.

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brings together a series of classic and recent contributions on the body-space relationship, also considering, in the last section, the specificity of virtual space.

Space thus becomes an active and reactive environment: a field of psycho/physical forces. Every volume present in the field, by virtue of its mass and its shape(s), changes the field's appearance. The field generated through design deeply affects our perceptual schemas through the play of forces that act within it. But within the concept of field, the concept of centre, already encountered in the previous unit, plays a fundamental role. While geometrically a centre is simply a point, perceptually it extends as far as the conditions of stability that it is based on will permit. Of course, the centre may or may not be indicated. In architecture, it can be indicated (or suggested) by a ceiling lamp, a mobile, a decoration, or a mosaic. Or, it can be an empty space at the centre of two diagonals or of the geometry dictated by the positions of the thresholds. Normally, however, there are multiple centres at work in each field, each of which attempts to prevail over the others. The unit thus brought attention to the problem of the interaction between fields of different shapes and strengths, suggesting the possibility of making corrections to one's designs by working on the centres, the directions of the volumes that generate the field, or their distance from one another. This illustrates the concept, well known to phenomenology and cognitive psychology, that space is born as the relationship between objects. On the basis of this idea, shifting attention from the shapes of objects and their interaction to the void that separates them, the lesson then also discussed the concept of "interspace," and along with it the fundamental law of attraction-repulsion: "Objects that look 'too close' to each other display mutual repulsion: they want to be moved apart. At a somewhat greater distance the interval may look just right or the objects may seem to attract each other." (Arnheim 2009).

The third unit insisted on the importance of understanding the multisensorial character of perception since, whether one likes it or not, space communicates with bodies in this way, through the intertwining of different perceptual faculties.

> Synaesthetic perception – claims Merleau-Ponty – is the rule, and we are unaware of it only because scientific knowledge shifts the centre of gravity of experience, so that we have unlearned how to see, hear, and generally speaking, feel, in order to deduce, from our bodily organization and the world as the physicist conceives it, what we are to see, hear and feel . . . The senses intercommunicate by opening on to the structure of the thing. One sees the hardness and brittleness of glass, and when, with a tinkling sound, it breaks, this sound is conveyed by the visible glass. One sees the springiness of steel, the ductility of red-hot steel, the hardness of a plane blade, the softness of shavings. (Merleau-Ponty 1945, 266-267)

By relativizing the predominance of sight in the structure of perception, the theorists of synaesthesia invite us to discover the persistence of "unauthorized" sensory registers (like sound and temperature in colours, or touch in something perceived visually), which condition experience in mostly unconscious and unconditioned ways. The many examples referring to the field of architecture had

the aim of leading the students to a decisive point: given the original complicity between body and space, to design means, perhaps before anything else, to organize a complex perceptual environment in which each element not only has multisensory potential in itself but also inevitably relates with that of the others. By experimentally testing the synesthetic effects of the designed space in virtual reality, intertwining their own bodies with it, the students had a way to determine the results of their choices on multiple perceptual levels. These could work towards creating syntonic or dystonic effects, or could play with the composition of different synesthetic qualities within the same element, for example, combining a given material with a colour that contrasts with it in temperature.

The fourth didactic unit was dedicated exclusively to the topic of light and colour. The reason for this choice resided primarily in the importance of these two factors for spatial perception (in various ways: from coloured light to the relationship between natural light and materials that reflect it). Furthermore, light and colour play a decisive role in the connotations of atmospheres. In dialogue with various others, from Goethe (1970) to Conrad-Martius (1923 and most importantly 1929), from Sedlmayr (2009) to James Turrel (2018, Govan 2013), the lesson highlighted both aspects: the perceptual dimension and what Conrad Martius calls "the character" of light, or rather the way in which a given property of light is intermittently given expression. Light is undoubtedly a special atmospheric agent, since temperature and colour can give space a very clear emotional timbre. But it can be used—as in the phenomenological art of James Turrel and Robert Irwin—to change the form of space, up to the point of distorting it and erasing its borders.

VR is a unique instrument for testing how light reacts to surfaces, their textures, and their colours in the widest range of different conditions (for example, depending on the time of day, and also by adding natural light to artificial light sources). It is also useful, though, to create spaces and spatial languages linked to the psychology of shapes. Five possible functions of light capable of perceptually altering space in respect to different design aims: illumination, indication, division/unification, connection, creation of rhythm. Of course, each of these functions raises specific questions (the type of light source and its temperature, the shape and position of the light sources, the relationship between light and darkness, background and foreground, etc.), but in a theoretical sense, the exercise aimed above all to demonstrate the potential applications of a complex theoretical framework like the one mentioned above.

Finally, the discussion turned to the phenomenological theme of atmospheres, a field that, as already noted, could only appear last, once the basic elements for an analytic understanding of the body-space relationship had been acquired. With few exceptions, "atmosphere" is a concept used in a very intuitive way by architects, yet is central to their specific form of spatial intelligence. It is here that VR perhaps offers its greatest contribution: it is one thing to

introduce students to the thought of the usual authors on the subject, such as Böhme (2002, 2010), Norberg-Schulz (1991), Schmitz (2012), Ströker (1987) or Zumthor (2006), and quite another for them to have the chance to analyse atmospheres from within, to study their perceptual effects, and to modify their factors in the desired (often experimental) way. Describing the extraordinary power of atmospheres to influence our mood is much simpler and more effective when one has the possibility of interacting with a virtual environment. From within these environments, variation in light can be understood atmospherically in all of its significance.

Thanks to VR, the symbolic and potential connotations of an atmosphere – which are often an involuntary outcome – can finally become the objects of direct experience, which would otherwise be impossible.

The final didactic unit dealt with the theme of spatial orientation on the basis of the line of research opened up by the work of Kevin Lynch (Lynch 1960, Letenyei 2019). At the basis of this choice are two assumptions. The first is that Lynch has given us a scalable methodology, which can also be effective when applied to interior spaces. The second is that such a methodology, based on psychology of shapes and on a study of mental maps that we might say are akin to phenomenology, places itself in continuity or in dialogue with the content already explored in the preceding units of the course. The formation of mental maps takes place in the interaction between subject and environment. On a cognitive level, for Lynch the maps reveal the constant presence of five elements, which we can also define as structures, in the sense that they structure the experience of (urban) space by connecting it back to a universal mental schema. Such irreducible elements, even if they are not necessarily always co-present, are the path, the edge, the district, the node, and the landmark. A space's degree of comprehensibility, or rather our own capacity to orient ourselves in space and to have a clear mental image of it, depends on the form, character, and composition of these structures. The capacity of design to give spaces identity, structure, figurability, and meaning is fundamental in fostering a positive interaction between subject and environment, or even to induce emotional well-being. This gives us the capacity to anticipate how space will be understood, to support our spatial awareness (and hence our confidence in the space), and to develop a positive identification with spaces. Using only the spatial language of the five fundamental elements (appropriately scaled) and working in syntony with the principles of the psychology of shapes, the students were asked to give their design a high cognitive value for the users. VR is a very useful tool for studying phenomena of orientation and environmental image. Its usage, however, can be extended to other psychological aspects related to the design of the environment, as for example to the concept of affordance, which in Gibson's language refers to the physical qualities of objects that suggest to a subject the appropriate actions for manipulating them (Gibson 2015).

Descrizione

Stanza 1
- *Essenziale*
- *Croma prevalente grigio*
- *Texture ruvide*
- *Pareti in calcestruzzo*
- *Pavimento in pietra*
- *Soffitto e parete di fondo intonacato*

Stanza 2
- *Luce naturale abbondante*
- *Spazio neutro*

Percezione

Stanza 1
- *Spazio arioso*
- *Minimal*
- *Pulito*
- *Fresco*
- *Rigido*
- *Ruvido*

Stanza 2
- *Abbagliante*
- *Fresco*
- *Arioso*
- *Liscio*

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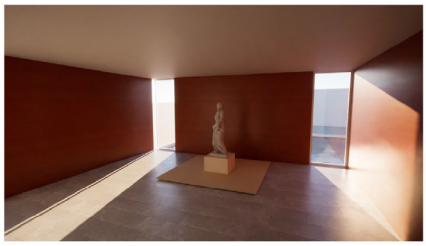
Figure 1a. Final presentation of a selection of spatial experiences in virtual reality developed by the "Phenomenology of Space" class, SUPSI-DACD (2023).



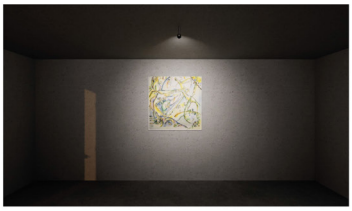
Stanza 3
- *Pareti e soffitti intonacati*
- *Luce abbondante*

Stanza 4
- *Pareti in legno di mogano*
- *Pavimento in pietra*
- *Soffitto intonato*
- *Luce naturale abbondante*

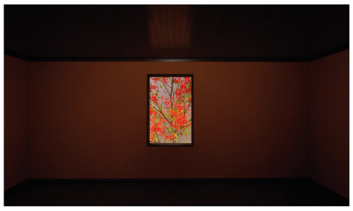
Stanza 3
- *Luminoso*
- *Accogliente.*
- *Casalingo*
- *Fresco*

Stanza 4
- *Avvolgente*
- *Caldo*
- *Luminoso*
- *Richiama la natura*
- *Liscio*

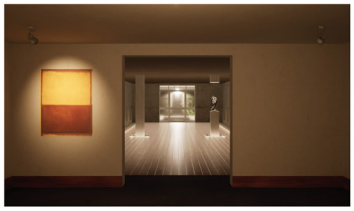
Figure 1b. Final presentation of a selection of spatial experiences in virtual reality developed by the "Phenomenology of Space" class, SUPSI-DACD (2023).



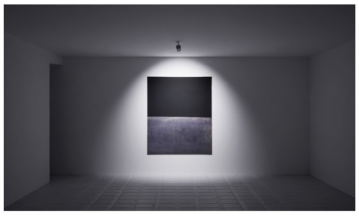
Gruppo 1



Gruppo 1



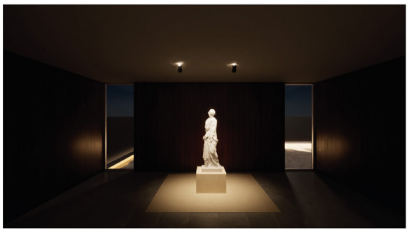
Gruppo 3



Gruppo 4

Luce come strumento per mettere in evidenza i riferimenti

Figure 2a. Final presentation of a selection of spatial experiences in virtual reality developed by the "Phenomenology of Space" class, SUPSI-DACD (2023).



Gruppo 2

Gruppo 5

Figure 2b. Final presentation of a selection of spatial experiences in virtual reality developed by the "Phenomenology of Space" class, SUPSI-DACD (2023).

Figure 3a. Final presentation of a selection of spatial experiences in virtual reality developed by the "Phenomenology of Space" class, SUPSI-DACD (2023).

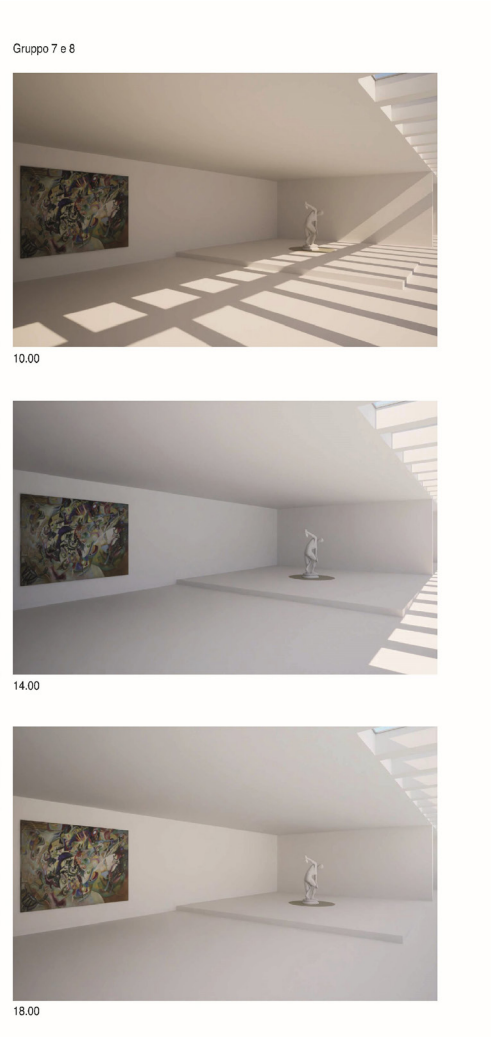


Figure 3b. Final presentation of a selection of spatial experiences in virtual reality developed by the "Phenomenology of Space" class, SUPSI-DACD (2023).

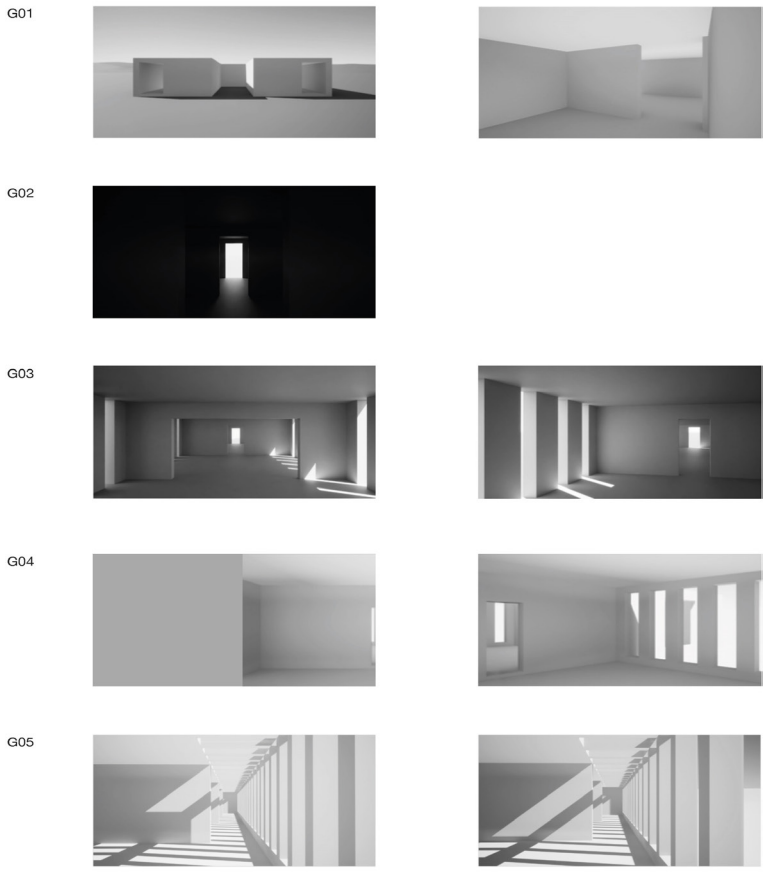


Figure 4a. Final presentation of a selection of spatial experiences in virtual reality developed by the "Phenomenology of Space" class, SUPSI-DACD (2023)

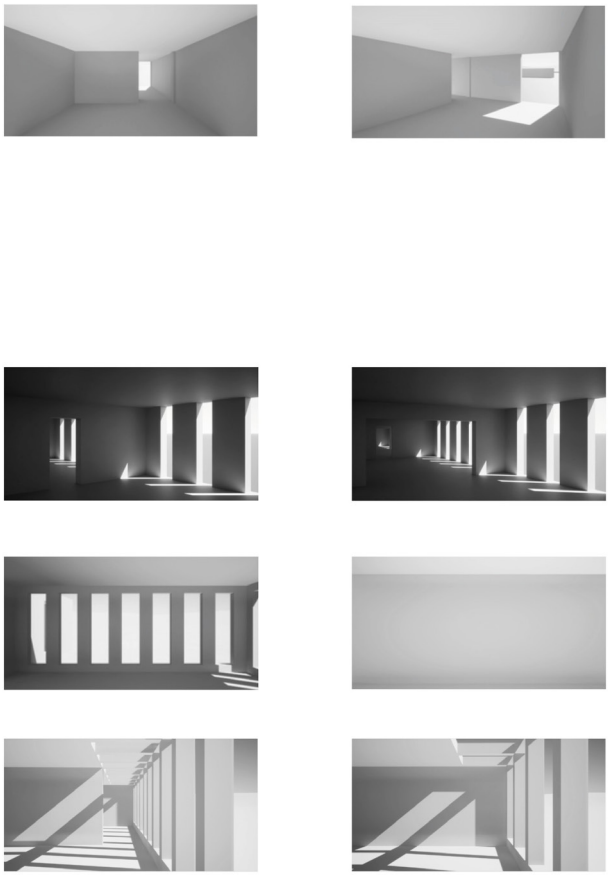


Figure 4b. Final presentation of a selection of spatial experiences in virtual reality developed by the "Phenomenology of Space" class, SUPSI-DACD (2023)

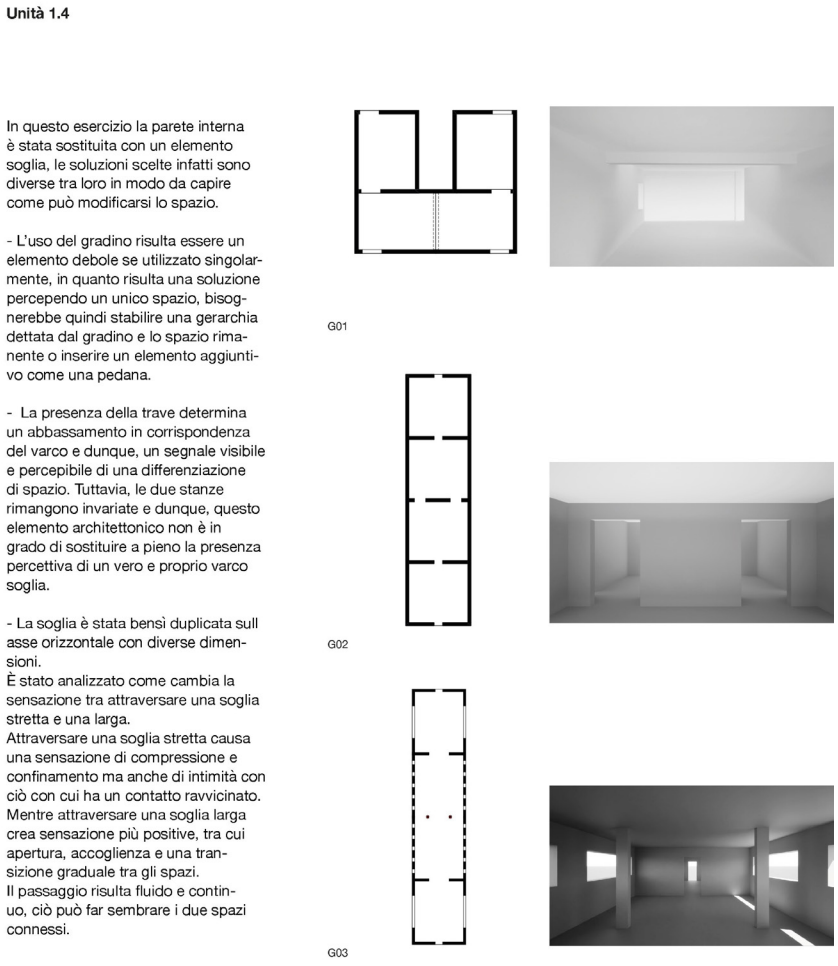


Figure 5a. Final presentation of a selection of spatial experiences in virtual reality developed by the "Phenomenology of Space" class, SUPSI-DACD (2023)

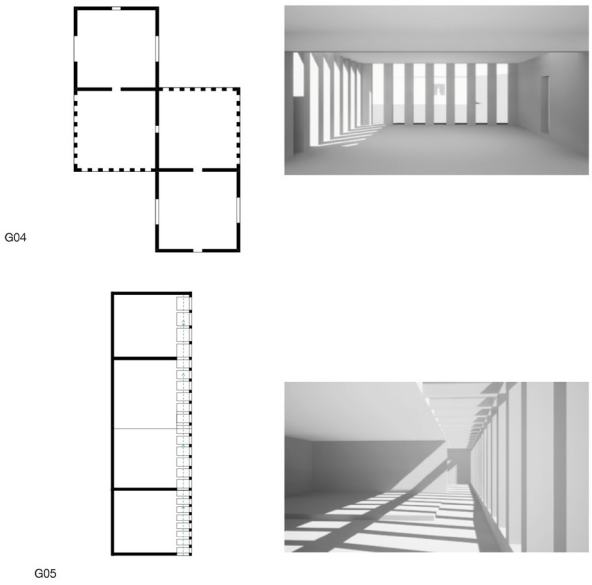


Figure 5b. Final presentation of a selection of spatial experiences in virtual reality developed by the "Phenomenology of Space" class, SUPSI-DACD (2023)

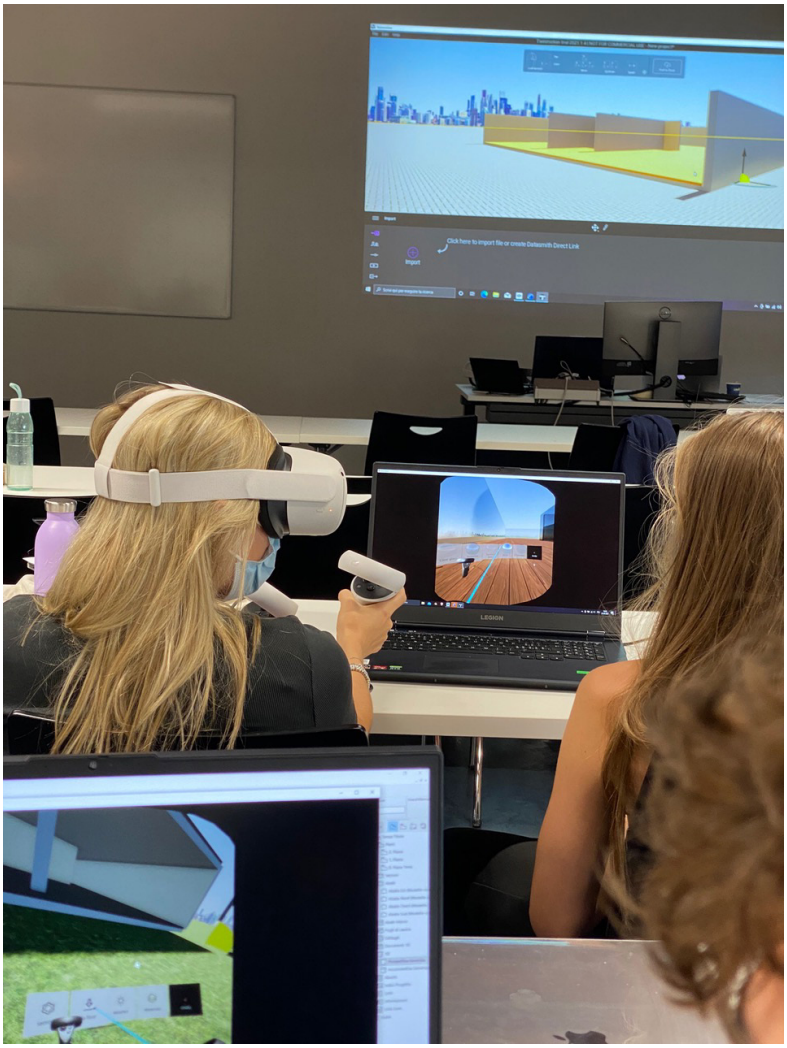


Figure 6. Final presentation of a selection of spatial experiences in virtual reality developed by the "Phenomenology of Space" class, SUPSI-DACD (2023)

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