RESPACE

A virtual environment for rethinking about space.

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Abstract. ReSpace is a teaching module, which entices students in a playful way to work with computers and motivates them to think more deeply about the abstract idea of space. The goal of ReSpace is to enhance the concept of space by augmenting its content with additional levels of information like statements about emotions, by referring to senses, delineating impressions or telling stories and inducing memories. ReSpace takes advantage of the possibilities offered by virtual environments in the transfer of information and suggests space as a metaphor for the communication of ideas, knowledge and experiences about space. In this paper the module ReSpace taught by the author is described. Its central theme is the representation and communication of one's notion, perception, and interpretation of space with the help of a 3D, interactive, virtual, environment. http://alterego.arch.ethz.ch

1. (roomz) and (connectionz)

ReSpace is one of the four teaching modules of the mandatory CAAD courses "(roomz)" and "(connectionz)" taught at ETH for students of architecture in the second year. "(roomz)" and "(connectionz)" is the shared space, the common ground for the expression and exchange of ideas among the students on the concept of space. Both courses provide a web-based narrative environment in which the students are invited to create and place stories. In the course "(roomz)" the interface allows linear narratives, while the "(connectionz)" course takes advantage of the additional flexibility of the web-based environment by allowing narrative interactions within the students' stories and in this way providing a spatial continuity in the system.

2.1 THE MODULES

(roomz) and (connectionz) are short-term courses, each two hours a week for six weeks per semester. The students can choose from four modules. Each module focuses on a specific theme and uses different software to create the

visual material for the stories. Apart from ReSpace three more modules are offered in (roomz) and (connectionz): Spacepixels, Motion & Motion and Actors in Space.

ReSpace deals with the perception and representation of space. The module works with the duplication of space and the aspects between the original and animated, mutated model of the space.

Spacepixels explores the dialogue between light and material as an architectural phenomenon. The influence of daylight and artificial light in a virtual model is analyzed and images are rendered for different light qualities. The two-dimensional images are placed in the space or on the walls to create enhanced or ambiguous readings of space.

Motion & Motion focuses on the combination of motion within animations and motion through the space. Animations and videos are retrieved from the Internet, created directly from the digital model of the space itself, or simply recorded with a video camera and then placed into the space.

Actors in Space introduce newly created, dynamic objects into the space. These objects can be seen as digital organisms, animated geometry, or visual statements, establishing relationships between them and the space by introducing issues of orientation, scale, and meaning.

The common course interface, as well as the reviews of work-in- progress in class, allow students to be confronted and inspired with the themes and the design possibilities of the other modules, Strehlke (2000).

2.2. THE COURSE ENVIRONMENT

A 3D, web-based, online working environment is implemented for the courses. Since "(roomz)" and "(connectionz) are about the communication of ideas rather than the creation of the space itself, the students are provided with abstract digital models to work with. George Vantongerloo's sculpture "Der Volumenzusammenhang" ("The Volume Connection") was chosen as a basis for the students' work. Eleven L-shaped volumes with different proportions compose the sculpture. The students are asked to choose three adjacent volumes from the sculpture. A three-dimensional interface helps them to select the volumes in an easy and intuitive way and enter the space inside them.

Figure 1. The course interface

These volumes define the starting point - the space to work with, as well as the 3D-interface - the container into which the students will place their work later on.

Figure 2."Der Volumenzusammenhang"- selection of models

3. The Module ReSpace

In ReSpace the students deal at first with the exploration of space. They have to analyze and understand its characteristics and qualities. Furthermore, they deal with the expression and reflection of ideas about space. The method used for that purpose is the duplication and manipulation of space. The students are confronted with the aspect of relations between the original model, which remains unmodified, and its transformed and animated replication, which has to be placed into the original space model - the interface. This way the students are confronted with themes like innerworld, outerworld, encapsulation of space, orientation, proximity, scale, proportions, rhythm, continuity or intervals in space.

Motion - the movement through space, animation - the mutation of space and its features and interaction - the dialogue with the space, are the methods used for the communication of the students' own perception of space. Time is an important issue in ReSpace. Through motion and mutation time is integrated into space as memory and allows the visitors to read the space as well as to build their own relation to the space – their own memory space.

3.1. EXERCISES

The module provides three classes: "Exploring Space", "Distorting Space" and "Staging Space". The software used for the module is the program Cosmoworlds that allows an intuitive way of working in an interactive 3D-environment. During the classes the students gain an overview of the software's capacity. However the aim consists not in learning details about the software itself but in learning how to use it as a means for expressing ideas about space.

The three exercises are not formulated as separate assignments but as a continuous development of the students' design work. Furthermore, the students are not obliged to use all the tools presented in the classes. Instead, they are free to make use only of the most suitable ones for the representation of their concept.

3.1.1. Exploring Space

The aim of the first phase of the course is to make the students familiar with the working environment and to give them a first feeling of the dynamic of 3D-environments. The students are confronted with the model composed by three L-shaped volumes, which are selected by the students in the preparatory phase of the course.

As a first step the students are asked to exercise with navigation in the three dimensional space in order to get familiar with movement in virtual world - in absence of gravity, horizon and collision. At the same time they learn how to observe virtual space. The use of the camera as a tool of observation and perception is of great importance in this phase. The students are invited to experiment with virtual motion without the obligation of following the paradigm of the physical world. On the contrary, they are encouraged to use the camera not only as a means of observation and representation of the space in a realistic way, but also as a means of distortion and disorientation. For that purpose, they are encouraged to use contrasting velocities for the movement of the camera - the visitors' eyes, to topple over or swirl the camera, move it smoothly or jump between viewpoints.

As a next step the students have to explore the model and examine its components on the one hand as separate objects and on the other hand as part of a whole.

If we have understood the components of space, we "own" new networks of knowledge about them and how they change and relate to each other. By exploring the logic of the structure of the original space, the students are free to break this logic and redefine the spatial relations of the space components. On that score, the students are asked to manipulate the volumes, to translate, rotate or stretch them and, at the same time, to observe the consequences of these actions on the space structure and on space itself.

Time is introduced as space component. Every "change" of the space has to be recorded in the form of animation that should demonstrate the whole process of the transformation and reveal the cause for the mutation.

The story telling is used as a means of revealing and transporting information. In the beginning of the course the students have to come up with a narrative scenario that would support the plot of the story.

3.1.2. Distorting Space

In the second phase the students operate on individual space components. By operating on their points, vertices and phases they learn new ways of manipulating form and experimenting with folding, cutting and splitting as methods for more drastic operations on space form like the deformation and distortion of form.

Sound is introduced in this phase as a new layer of information as well as an amplifier of perception.

3.1.3. Staging Space

The aim of this phase of the course is the enhancement of content of space through the use of additional layers of information.

A surface or entity overlaid with texture is composed of different, but at the same time morphologically integrated components. The integration of these components results in an additional virtual dimension.

The layering of the space elements with textures and images reveals a series of interpretations or even misinterpretations that complement space perception and support the communication of ideas.

The experimentation with materials, colour, transparency and light is a very important part of this phase of the course and aims not just at the refinement of the 3D-model, but is mainly used as a means of intensifing emotions and increasing dramaturgy in space.

Finally, the students are able to experiment with verbal expression in space by using text not only in the form of texture, but as a space component.

3.2. THE METHODS

The methods used in the course for the reflection and expression of ideas about space are the Duplication and Mutation of space. The methods used for the communication and reading of the content of space are Interaction, Navigation and Narratives.

3.2.1. Duplication of Space

During the exercises and while processing space in the program Cosmoworlds, the students have to place into the interface, i.e. in the original space, their animated, imaginary, mental space, the reflection of their interpretation of the

original one. The original space and its mutated replication are confronted with each other. This way a dynamic relationship is established.

The space defined by the original model is called the motion space, the space where motion takes place, i.e. navigation and the motion of the components of the processed model. It is the space into which these components are activated and put to dialogue with the original model.

Thus, the space defined by the animated model is a subset of the motion space. As the mutated model is under permanent transformation, it is able to demonstrate either the tendency towards occupation or reduction. This way, issues like innerworld, outerworld and encapsulation of space can be investigated.

3.2.2. Mutation of Space

Animation implies the mutation of the form under the influence of shaping forces. The context for the processing of space has to be conceived as an environment of force and motion, an active abstract environment that directs the model within a current of forces. In naval design, for example, the abstract space of design is imbued with the properties of flow, turbulence, viscosity and drag so that the form of a hull can be conceived in motion through water, Lynn (1998).

Within the ReSpace module thoughts, senses and emotions form the abstract context into which the space mutates and behaves, and in this way gains a permanent redefinition through time. Thoughts, senses and emotions are considerd as the virtual forces that cause mutation within the abstract design environment. They are the information stored in the form of the space model, which is reflected to the visitor through transformations, translations, repetitions, dispersion, decomposition as well as distortion of the model.

The continuously mutated space changes form, shrinks, blows, gets stretched, deformed and distorted, grows, diminishes, comes in and out of existence. While the space components appear in a permanent change and their spatial relations undergo a permanent redefinition, space is represented in different perspectives and associations. Marvin Minsky explains: "A thing or idea seems meaningful only when we have several different ways to represent it. In other words, we can think about it. If only one way to represent this thing or idea existed, we could not call this representation thinking". Consequently, mutating space is a form of representing ideas and thoughts about space; mutating the space resembles thinking about space.

ReSpace is about communicating ideas and not only expressing personal thoughts. Thus, while mutation is conceived and manipulations are applied on space by the students, it is very important to consider how mutated space will be read and perceived by the viewer. In contrast to traditional built architecture, reading the mutating space, can be compared with listening to music. In traditional, static architecture, when we enter a room, we seem to see it all at

once; we are not permitted this illusion when listening to a symphony. "Of course", one might say, because hearing has to thread a serial path through time, while sight embraces a space all at once, Minsky (1981). But as mutating space is under constant change, the visitor can experience space only through time and similar to listening to music the visitor can remain unmoved, while space "performs" around him.

3.2.3. Interaction

The students are motivated to explore space not only as an "object" of perception but also as a system of communication. Interactive, virtual space reacts and acts, it enters into a discourse with its "users" or "viewers". In ReSpace the observing visitor and the observed space should be interacting and not opposed to each other. In ReSpace the visitor should not be put in the role of a passive observer. Space should offer possibilities of interaction; it should allow the triggering of actions as well as the requesting of information. In other words, a system of dialogue should be established between space and observer; together they should form a dynamic system of communication.

3.2.4. Narratives

The nature of web based representations induces alterations to the narration of architectural work and enhances the spatial perception.

Like cinema, narratives in virtual space allow discontinuous environments to be woven into a single, linear experience. Sound, text, texture, image and several other cues for understanding are interwoven into one object in time, Novak (1998). Since the different media used for the narratives can influence the way a message is formulated, a deep understanding of those media is necessary as well as the knowledge of how they intermingle and complement each other.

A story that reveals architectural meaning has as its goal the projection of experiences into the reader's mind. This purpose is easier to achieve with phantastic, poetic or even fictional narratives. Poetic narratives are subjective, while fictional narratives go beyond reality and unveil new interpretations. These kinds of narratives are very intriguing and allow wider and more creative interpretations as well as imply that the emotional information is intentionally part of the message, Engeli (2000).

3.2.5. Navigation

Navigation in virtual architectural space is more than just motion of subjects through space. The phenomenological existence of architecture, in contrast to its physic, static existence changes through the dynamic of its perception by the mobile observer, who obtains thus a conceptual path of the spaces he passes through.

When we navigate through animated space, behaviors and characteristics are recognized. Something must remain in the mind to cause this, and perhaps before we learn about "space" itself, we learn ways of reading and perceiving it, Minsky (1981). In ReSpace, the students have to define the way the visitor reads, perceives and experiences space by designing the path of movement in a way that dramaturgy and the reading of the spatial scenario are supported. The path of movement should enable not just a spatial shift, a passage from one space to another, but rather a passage which leads from one state of mind to another.

4. Results

The students' works were of particularly high quality, which in some cases surpassed the course expectations. During the course, the students showed high enthusiasm in experimenting in the 3D, interactive environment and were very inquiring in discovering the possibilities it offers for the exploration of space, the formulation of spatial messages and the conceptualization of space. The methods used in the module helped the students to realize the goals of the course very early and allowed for a more systematic approach of the course's theme.

Since the module did not aim at an objective, realistic representation of space but rather at the revelation of subjective interpretations, the students were motivated to choose expressive representational "gestures".

Figure 3. A Travel by Train, by Yong Wook Cha and Frederic Jean Roland Biver

Figure 4. The Space Machine, by Michael Hendriksen and Raul Castano

5. Conclusion

The fast developing area of computer-aided design hardware and software leads to the question of what effect it has on the theory and practice of architecture.

In built architecture space does not have to communicate directly, only at a very basic organizational level. Media, on the other hand, does have to represent in a very strong way and therefore a lot of decisions are based on communication, Lynn (1998). But as new visualization techniques and processes are developed, representational and architectural forms are changing. New ways of description of space emerge, that support communication and encourage rethinking about space and architecture.

ReSpace motivates students to rethink about the concept of space by suggesting space as a metaphor for the communication of ideas, knowledge and experiences. It suggests the intermingled environments of mind, space, and emotion as a layered, dynamic means of expression within a digital environment; it suggests space as an interface to the imagination.
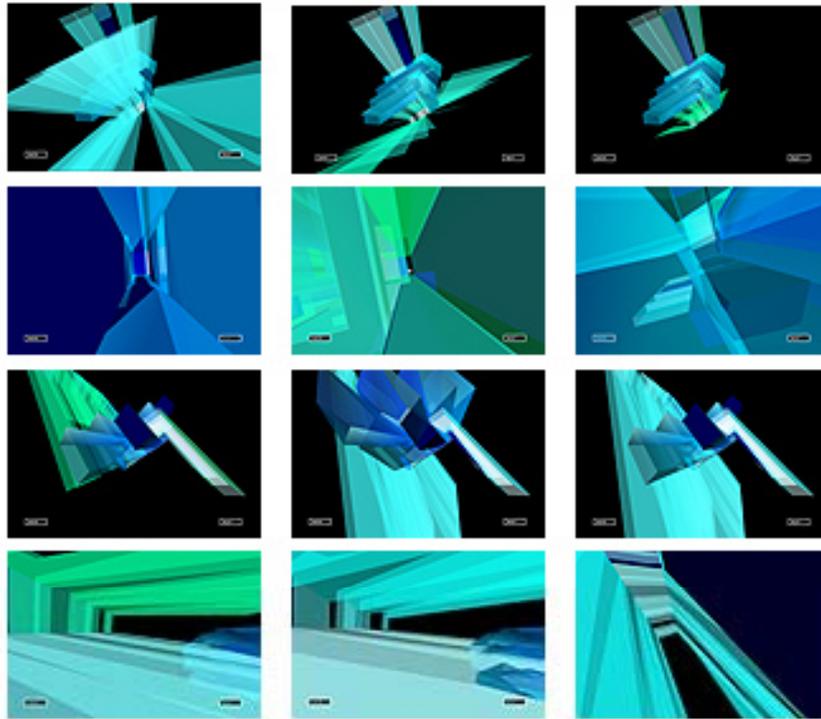
Figure 5. Digital Landscapes, by Marc Smit and Moriz Norbert Schoendor

Acknowledgements

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