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Operational 3-D Images as Interactive Knowledge Space

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Introduction

Recent research in the field of cultural and media studies, and in the humanities in general, offers a wide variety of ideas how to analyse and understand images generated by new media technologies. Neverless, there is still a lack in research activities towards adapting these new media to the own disciplinary knowledge production.

Cultural and media studies mostly describe and interpret images and do not use them as a means for producing new knowledge. Within the humanities, the specific qualities of interactive 3-D environments might be applied for the interpretation of complex cultural situations as the overlay of fictive and real spaces.

In our research we do attempt to explore the epistemic qualities of computer games understood broadly as real time interactive 3-D environment, as tools for the analysis and production of knowledge within media and cultural studies. Our approach holds a RT 3-D interactive knowledge space (IKS) to be a particularly useful instrument in understanding socio-cultural processes that are deeply rooted in real and imaginary topographical structures: knowledge that is generated and transformed by space.

Diagrams as Operational Images for Knowledge Production

Our research focuses on the role of computer games in terms of visual representation, or so-called operational images. We may trace the line of argumentation and research that uncovers the potential of "visual turn" for humanities in the work of many researchers around the globe.

For Krämer, the base of *the operational image* is constituted in a confidence that everything essential might be visually displayed.[1] (In Dirmoser: 5). Dirmoser emphasizes the scope of visual display to embrace the verbally uncovered statements and includes the space-oriented representational approaches to the forms that shall move the operational image research

[1] "dass alles, was wesentlich ist, sich auch zeigen lässt", transl. By D. Riha, quote taken from recorded discussion round after the Expert workshop: "Logik der Bilder – wissenschaftliche Visualisierung und Bildlichkeit" 20.-21.7.2006 Berlin-Brandenburgische Akademie der Wissenschaften.

forward from "the static templates into the dynamic templates."[2] Bogen and Thürlemann understand operational images as "the third next to the image and text where the attributes of the diagramme do cross text-image binom and are not possible to be specified as a mixed form of image and text."[3] According to Rieber, "visualization is defined as representations of information consisting of spatial, nonarbitrary (i.e. "picture-like" qualities resembling actual objects or events), and continuous (i.e., an "all-inoneness" quality) characteristics (Rieber: 45)."[4]

Johanna Drucker states that visual images have always served diverse epistemological functions to provide information through graphical means (as images), but additionally through their specific visual features (texture, syntax, color and other characteristics). She defines "*graphesis*" as the field of knowledge production "embodied in visual expressions" and that envelops "the exposition and description of the principles for structuring knowledge through graphical form." (Drucker, 2011: 3). Graphesis is, according to Drucker, concerned with "the creation of methods of interpretation that are generative and iterative, capable of producing new knowledge through the aesthetic provocation of graphical expressions." (Drucker 2011: 33). Jessop proposed to study the spatial distributions and relationships that should serve for *dynamic mapping in the humanities*, because such maps will enable humanities researchers to switch towards visualization of new knowledge, revealing information that was not known before.

Robert. L. Solso identified main characteristics of visual image as: relative size, occluded objects, shadows (plasticity of objects), orientation, elevation, texture gradients, atmospheric perspective, colour and linear perspective. These rules of visual imagery are valid for cinescopic or moving images alike, as the viewer is capable of registering the differences of above listed visual characteristics as a meaning. We do argue that computer games are influenced by this visual canon.

Another principle of visual organization was invented in the era of Dadaism and Surrealism. The characteristics, described by Solso, are gaining very different semantic character from the design of spatial illusion, in these frameworks these have metaphorical and symbolical character. The visual content has been established in a mutual position and size of the objects. Elevation has been replaced by lower-higher or left-right positioning. A mutual position and size of the objects denotes the content and the variation of these parameters means the change of its content alike. Such a relational visual image design offers itself for an adaption to the computer gaming environments.

3. Operational 3-D Images as Knowledge Space

[2] "statischen/kristallinen Ordnungsmuster" → "dynamischen mustern"., in G. Dirmoser, 'Im Spannungsfeld diagrammatischer & graphematischer Ansätze', Beitrag zum Workshop *´Diagramm und Diagrammatik´*, FU Berlin, 29.-30.10. 2009.

[3] "das Dritte neben Bild und Text, da die Eigenschaften der Diagramme quer zum Text-Bild-Binom lägen und sich nicht als Mischform von Bild und Text bestimmen ließen." Transl. by D. Riha, cited in G Dirmoser, Überlegungen anlässlich des Expertenworkshops 'Logik der Bilder – wissenschaftliche Visualisierung und Bildlichkeit', 20.-21. 7. 2006, Brandenburgische Akademie der Wissenschaften, Berlin, 2006.

[4] Cited in Scheiter, Wieber and Holsanova.

Conceptually, the interactive 3-D environment of computer games might be understood as a virtual knowledge space. Strauss and Fleischman define knowledge space as "architectural space furnished with data", where the user is not understood only as the protagonist, but also "the producer of knowledge through interaction." (Strauss and Fleischmann, 2008: 1). The interactive 3-D space then might be experienced through perception of 3-D space with the exploration of data and production of knowledge through active experience.

Mathias Fuchs studied the manner in which interactive 3-D environments might be considered useful for knowledge representation. Fuchs uncovers interactive 3-D as a medium in which *de-categorisation* and *re-classification* may be positively implemented. According to Fuchs, the user always navigates his/hers authentic way and therefore channels his/hers individual pathways, or activities described by Fuchs as "re-contextualization" (Fuchs, 2005) of the experience. Fuchs considers the process of active movement in virtual space to be "the key mechanism for creating *a semantic structure* that is neither linear nor hierarchical." (Fuchs: 62). He also emphasizes offering the user free movement as "an important feature that allows for individually shaped *relational networks* inside a complex field of knowledge" (Fuchs: 61). Fuchs further argues about Warburg's methodology: 'Warburg's research emphasized to gain relevant knowledge on materials of timely open-ended origin through *process of collage*. Equally Warburg used to relocate locally disparate objects, narratives and symbols.' (Fuchs: 1). According to Fuchs, videogame designers may apply, in a similar way, Warburg's method of time-collage and space-collage to evoke 'amazed experiences' for their users.

Varano, Truchot and Bignon proposed new ways of 3-D navigation useful for knowledge transfer. The user not only explores the 3-D environment, but also concurrently creates *a memory map* of the explored environment. In the application, the user takes the topographical path, where "the data on the information route are reinvested in the *knowledge points* where the learner transforms the information into knowledge" (Varano et al, 2009: 2). The memory map as a support for different multimedia representations found during 3-D exploration is archived in *a multimedia notebook*. They propose 3-D navigation as an organized system "allowing the constant reinvestment of the information into data and then knowledge." (Varano et al: 6). The concept of memory map provides a major benefit to knowledge space research, recognized as *continuous validation of the knowledge construction*.

According to Hann, access to the scholarly process that informed the knowledge space design shall be required. She argues that in revealing the methodological process, the user as well as the scholar shall be "able to independently assess the researcher's conclusions, allowing the research to be recognised as a valid and reliable contribution." (Hann, 2006: 116). She introduced the concept called "*piercing of the skin*" where the layers of information might be exposed below the surface: "Information that documents the path, from the conceptual sourced material, to an interpreted three-dimensional environment." (Hann, 2006: 117).

In the interactive 3-D environments, the user constructs meaning through his or hers actions. Although, Price et al, defend an approach to the study of interactive 3-D environments based on semiotics, their approach is based on a similar foundation with the concept of reconfiguration. In the interactive 3-D environment, signs are "provided by static meshes, textures, sound, music, animations and other assets." (Price, Moore, Kuzma, 2009: 251).

These authors point to the fact that the use of such signs does not create *a semiotic system*, because the user operates the signs and creates meaning that might "extend beyond the artist's project." (Price, Moore, Kuzma: 250). These signs additionally "gain their semiotic value from their inter-relationships." (Ibid: 250). This establishes for Price et al. *a semiotic system* as the user interacts with the 3-D environment. Further, they reveal a differentiating characteristic of interactive 3-D in relation to text as "a process of discovering meaning which is not expressed in a language based on a grammar, but through a semiotic system." (Ibid: 251).

Many computer games designs come still with a static mutual relations of the implemented objects, while offering free-move and interactions of the player´s avatars in 3-D environment. But *the relational visual image design*, having its roots already in Dadaism and Surrealism, and in media design tradition since 1958, for example Czech design principle of Polyekran and Prague´s Laterna Magica (V. Havel, 1999 or J. Svoboda, 1990) has not been explored in the interactive media context widely.

Image 1 - Polyekran, Award-winning Czech Expo 1958 in Brussels

In our research, inspired by structuralist art, we do attempt to collaboratively design analogue visual image designs with various groups of participants – researchers and university students (Image 2).

Image 2

Each participant selects freely a set of various objects that will serve to enter the structural design. These objects are implemented into the shared space according to the given rules. One of the “algorithms” requests from the participants to use one of their collected objects to surpass the others. There are different ways how to excel – with a distinguished design set of objects, positioning the object higher than are the objects of the others participants or by occupying large space of the design field. The surrealist situations are often uncovered. Such a configuration is often unusual and varies much from the classic visual image composition principles. The design of mentioned structures is a dynamic collaborative process that includes the interactivity not only between objects but as well among the participants. Equally, the study of transformation of the dominant forms must consider the variability. In spite of user´s collaboration over the same structured object, the final design process interpretation of each participant is unique part of the structure. Although, these structures might seem to be chaotic, all have been designed according to the organized processual modelling algorithms (Image 3).

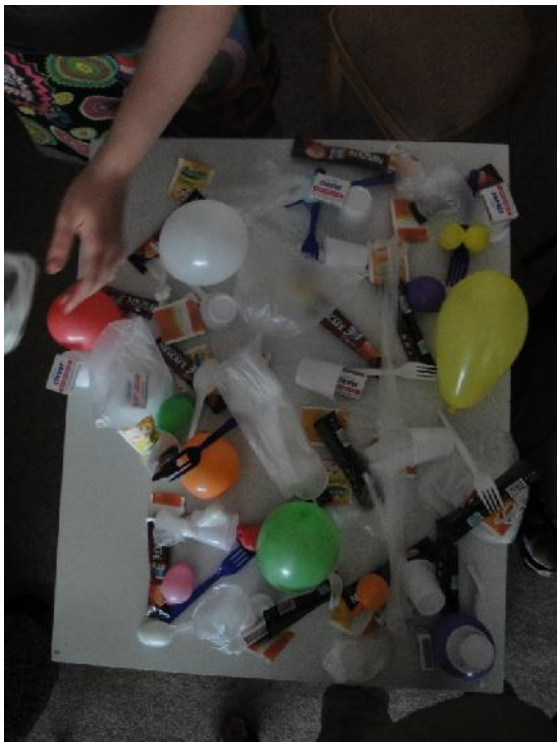

Image 3

We do attempt to conceive a research on new variants and revised principles of the presented relational visual image design in the interactive 3-D environment. This digital medium will not only offer to record and revoke all periods of the design process, but as well to express this process from the position of the participants, and to visualise partial structures by filtering, change content relations by resizing and other operation on the objects, or setting-up the alternative design processes. Another new feature foreseen for an implementation in a digital variant of the environment might be multi-directional relational structure format of the designs. We do currently work with the latest multi-touch hardware and software to experimentally validate our assumptions. We do propose that such a sort of experimental research practice might lead to the definition and design of the new types of visual images.

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