How to Communicate Complex Spatial Itineraries: A balancing act between diagram and simulation

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This paper shows our method of visually conveying the intricate pathway system of the unique amphitheatre in Durrës, Albania, in a way that allows visitors to experience the spatial implications for the ancient world. In the firm conviction as architects that architecture can best be understood when it is experienced, but that a destroyed building can no longer be witnessed, we have elaborated a method that does justice to this circumstance. In the communication of archaeological knowledge, the combination of find drawing, schematic illustration and descriptive text is often relied upon. Recently, perspective computer-generated drawings have entered the picture. What remains unresolved, is the perception of space as a process. Technology has not yet reached the point where a virtual world that deceives all the senses could simulate actual spatial perception. And so here, as in perspective composition, it is necessary to compensate for the actual perception of space by means of targeted image guidance by the film camera in such a way that a plausible impression of space is created. In addition to the composition criteria of point of view and angle of view, from which the focal length then arises, as well as the tilt-shift lenses for the compensation of the sense of balance, that is, that the recognition of the vertical is reproduced exactly in the image, and finally image framing, dynamic criteria are added. These are first and foremost the speed of movement, which has a considerable influence on the perception of the dimension, above all the length of the path travelled, but also the speed of rotation during changes of direction and, and here it becomes particularly demanding, the rotation as well as its speed before, during and after changes of direction, since the gaze does not run tangentially to the direction of movement, but anticipates changes of direction of the path, similar to directional headlamps in certain cars. In the end, the viewer receives a lasting impression that comes as close as possible to the archaeological hypothesis, but at the same time creates a spatial impression from an architectural point of view.

1. INTRODUCTION

At the London EVA 2020 (Lengyel 2020) we introduced our method of visualisation of hypotheses as a counter-position of presumed reconstructions of architecture. It emphasises that archaeological knowledge consists of a wide range of uncertainty including contradictions rising from multiple equally valid scientific assumptions. Instead of pure diagrams we work with subtle indications, mainly through versatile geometric abstraction. Contrary to the literal meaning this does not mean leaving things away but designing new and evident shapes of representation. Abstract shapes are then compensated by virtual architectural photography. The projects shown included works for the German Archaeological Institute (DAI) and several museums e. g. of the State Museums of Berlin and have always accompanied and enriched archaeological research (Figure 1).

At the London EVA 2021 (Lengyel 2021) we presented a project that goes beyond this. Funded by the Gerda Henkel Foundation for the Humanities, and developed in close cooperation with Henner von Hesberg and Heinz-Jörg Beste, it answers questions on the amphitheatre of Durrës that have arisen during the last decades of archaeological research by the Rome department.
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of the DAI. Durrës is situated the in today’s Albania, a harbour city on the road between Rome and Constantinople (Figure 2).

Figure 1: Water basin in the Palatine Palaces of the Roman emperors at Flavian times

Figure 2: The hypothetic vision of the amphitheatre of Durrës from the sea

The particular problem is that the orientation of the amphitheatre negates the supply provided by the topography. Its axes are indeed twisted. As a result, the accessibility is more than complicated, it is actually complex (Përzhita et al. 2014, Di Filippo et al. 2009).

2. THE FRAMING OF THE PHENOMENON OF MOVEMENT THROUGH SPACE

2.1 Complexity of the pathways

The aim was not merely to provide information about how the pathway might have been laid out, because diagrams in the form of floor plans, sections with graphic indicators for the differences in length, winding, stair gradient, etc. would have sufficed for this. No, we focused on the complex spatial impressions that, like an architectural design, go beyond what is objectively measurable, not because we are convinced that it could not be measured, but because we are convinced that the complexity that can be experienced is far ahead of what can be measured, and we cannot foresee when we will be capable of defining the parameters that would have to be measured in order to model this complexity. Beyond the fact that the measurability is lagging behind, we are convinced that now already the perceptible impression of space, even in the geometric simplification presented here, raises research questions in archaeology as well as in architecture that would not have arisen from diagrams or even just plans alone.

2.2 The phenomenon of spatial impression

Floor plans and sections, but also the non-planimetric and more analytical projections, the axonometries, should nevertheless supplement the perception of space here. In principle, their interpretation is only apparently more unambiguous than that of perspective projections, which are closer to natural visual perception, but even planimetric projections do require some experience and are often perceived and understood as being ambiguous or even misleading. Even axonometries only seem to be a compromise here, as they certainly convey spatial information, but only seem to convey a spatial impression. In order not to leave the central concern, the exploration of the corridor system, to linear wandering, we have placed the planimetric information, supplemented by diagrams, alongside the perspective projections, just as a visitor would create a plan with a height profile for himself and a diagram to compare the pathways and then subject them to analysis. The sum of the information compiled here thus represents the overall recording of the hypothetical complete building from the first inspection through revisions to sketches, plans and diagrams, that is, from experience to analysis. The complete conception of the building is to be revealed to the viewer. Our aim is the natural walk-through as a visitor, which means from natural eye level in natural movement.
Figure 3: Hypothetical external access route to the top seating row on the hill side of the amphitheatre
2.3 Visual orientation

Defining the paths, that is the movement paths themselves, is linguistically very simple to start with. After all, it is only a matter of getting from one place to another, and in our case that is from the forecourt of the amphitheatre to the seating area and vice versa. Nevertheless, the path cannot be described with the aim of conveying it as plausibly as possible as a simulation, because the actual walk through such a sequence of spaces would be characterised by unexpected visual impressions that would result in a searching gaze, especially at path crossings, looking around for orientation and correspondingly spontaneous changes of direction. In contrast, the claim of a linear film, which is at first not yet an interactive walk-through of the virtual model, but instead is intended to be a dramaturgical narrative, also so that it can be presented in the museum in such a way that no technical devices such as VR glasses are necessary, is to suggest to the viewer to follow that path. Also, the intended comparability of the pathways requires a movement that is as idealised as possible, as the comparability should allow one to experience how the circuitous pathways of this amphitheatre compare to the simple, actually optimised pathways of this but above all of most other amphitheatres. It should also be possible to walk along the different pathways several times one after another and still focus on comparability, which would also avoid spontaneous, i.e. realistic, but also unique impressions, as they would only be realistic on the first occasion, but would be distorting the second time. As in the abstracting modelling of architecture, this meant that in the routing of paths, and even more so in the routing of views, there was the aspiration to be valid in a generalising way, and just as a familiar space is walked through more and more similarly to one another with increasing iteration, so the idealisation of routing of paths and views aims precisely at this: at the idealised passage with idealised routing of views. At the same time, however, the focus should be on the casual visitor, not, for example, the guard or the courier, who would be able to traverse the path safely to a certain extent asleep, or at least in complete darkness. As with the careful balancing of the abstraction of geometry against the minimum of concreteness in favour of a coherent architectural vision of space, the challenge here was to find a balance between, to put it sportingly, an ideal line and intuitive navigation through a partly complicated system of corridors. In terms of fictional roles, and to make the abstraction even clearer, two deliberate examples from our time in mind here, it was a question of finding a balance between caretaker and tourist, as mentioned, and this is important, not for the sake of the roles, but for the sake of the spatial impression, which should turn out to be generic and specific at the same time, just as the entire geometry of the hypothetical completion of the image of a sparsely preserved amphitheatre oscillates between a generic and a specific solution.

2.4 The relevance of idealisation

The procedure was just as iterative as described above, it needed to be possible to move along the same path again and again without not being able to concentrate independently and intuitively sometimes on one and sometimes on the other. The even speeds, adapted to the circumstance of whether or not stairs have to be surmounted, allow the experience of the space to concentrate either on these speed patterns or on the geometry of the sometimes abrupt changes of direction or on the very different light conditions of the path or the depth of the view, or on the immediate geometry, the height and width of the room, the curvature of the vaults, the gradient of the stairs. Idealisation thus leads precisely to experiencing the space differently, just as it is possible to follow individual voices when listening to a composed symphony.

2.5 The necessity of iteration

The procedure had to be iterated because of the complex interplay of position and motion vector with the direction of gaze and that vector's motion, as well as the lens corrections that this necessitated, especially the shift-tilt effect, which is just as necessary in still images as it is in moving images in order to simply correspond visually to the actual spatial perception of, for example, vertical room edges. In order to take into account the equally important factor of navigation, even if it is only that the virtual visitor should also see when he is on a staircase, another difficulty was to open up the viewing angle sufficiently without having to face surreal distortions in the corners of the image. The supposedly simplest way of using a fisheye lens is as much excluded with regard to a natural perception of space as a lively panning of the picture plane.
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3. CONCLUSION

In the end, the result is a camera movement that was for the most part manually adjusted. Of course, this impression should not be created, and so the result can also be described as visually simulating a passage through a physical space, as an experienced visitor would perceive, i.e. experience it, confidently and leisurely, with a calm view and a set destination – and additionally equipped with a gimball hand stand, which merely compensates for the movement of the head caused by the walking motion.

This form of idealisation as a consistent continuation of abstract modelling naturally has to rely on our acquired habits of seeing. It demands from the viewer both an openness in interpreting the forms as architecture and the idealised image sequences as an offer to undertake a visual journey through architecture that is both open to interpretation and suggestive.

4. OUTLOOK

In ongoing research projects together with Stefan Schwan and Manuela Glaser at the Leibniz Institute für Wissensmedien (IWM) in Tübingen, Germany, we are using such scientifically based abstracted architectural models to explore the effects of camera movement in space, up to the present related to the centred zoom movement (Glaser et al. 2017). However, the measurable comparison parameters must first be defined for the experimental psychological evaluation of the theses put forward here with regard to the complex movement and gaze guidance in animated walk-throughs as described in this paper.

Obviously, the medium of text publication with still illustrations, even if these are made in the form of storyboards, cannot reproduce the effect of the film sequences described. However, the complete educational film will be published on The Science Portal of The Gerda Henkel Foundation (L.I.S.A.).

5. REFERENCES

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