

## THE RESULTS OF THE VIRTUAL 3D RECONSTRUCTION OF THE EAST PEDIMENT OF THE TEMPLE OF ZEUS AT OLYMPIA

Final report of the project OTKA ref. no. NNF 78486

by

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### The subject and the problem

The sculptures of the temple of Zeus at Olympia (built ca. 475-455 B.C.) and especially the fragments of the east pediment have been thoroughly studied since their discovery in the 1880's, but the correct reconstruction of the group, i.e. the arrangement of the five central figures and the interpretation of the entire pediment is highly controversial even today. The basic problem is that the fragments themselves can be arranged in four substantially different ways and there are no obvious clues for choosing the most probable one. Moreover, each variant has already been selected by numerous renown scholars for various aesthetic, technical and other considerations. The reconstructions were, however, most often presented only in simple drawings (Figure 1), ignoring the three-dimensional form of the statues, or they were occasionally tested with miniature plaster models, which were actually proved to be inaccurate already a century ago.

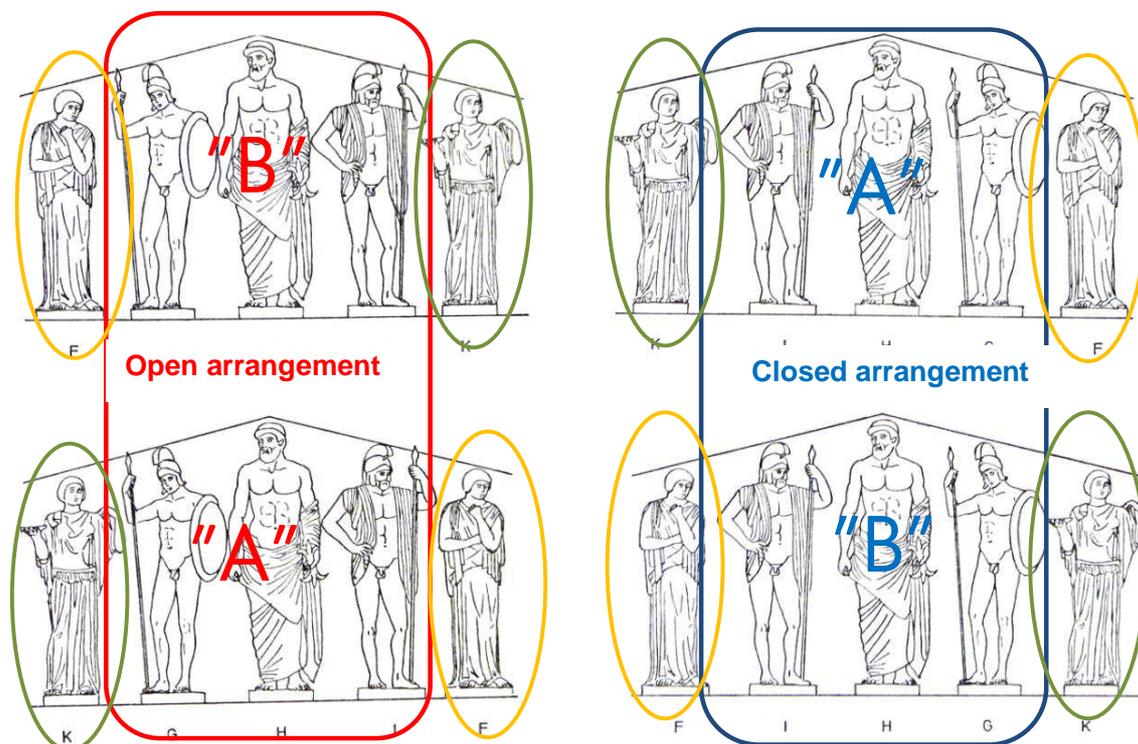


Figure 1. The central part of the pediment (marked with red in Figure 1) enlarged. Schematic reconstruction drawings showing every conceivable arrangement of the five central figures. Different colours highlight the differences of the four versions. After Herrmann 1972.

## Brief history of research

There were also some early experiments with reconstructed life-size plaster models demonstrating that at least one of the four arrangements can be ruled out purely because of the lack of space available in the pediment. This empirical result was generally accepted for ca. 50 years (as long as the models were accessible in Dresden), but nowadays it is practically ignored: recent publications usually do not even mention it any more, and during the last 60 years no one has attempted to verify or to refute it. This is all the more astonishing, because the reconstruction, which has been judged to be physically impossible, is considered today as the most probable one (Figure 2).

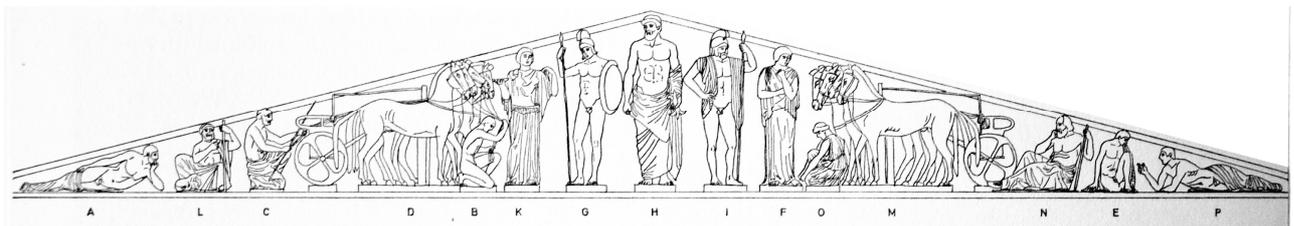


Figure 2. The most commonly accepted reconstruction (open arrangement "A") of the pediment (after Herrmann 1972 fig. 95)

## General presentation of the project

The present project tried to approach this controversy in a new way, by producing a virtual 3D reconstruction of the group. Digital models of the statues were produced by scanning the original fragments and by reconstructing them virtually. For this purpose an innovative new modelling software (Leonar3Do) has also been employed. The virtual model of the pediment surrounding the sculptures was prepared on the basis of the latest architectural studies and afterwards the reconstructed models were inserted in this frame, in order to test the technical feasibility and aesthetic effects the four possible arrangements.

The resulting models (Figure 3) enable easy and very instructive experimentation, which would be otherwise impossible with the originals and/or very expensive and not very effective with real-size plaster models. One can e.g. easily adopt the viewpoint of a visitor standing in front of the temple and have a look at the model from below.

The complete model (Figure 4) can effectively be used to verify the results of the early experiments with life-size plaster models and to compare the aesthetic effects of the different reconstructions. And last but not least, the 3D models of the individual fragments can be used for further research and for visualization, e.g. one can reconstruct the lost metal attachments of the statues.

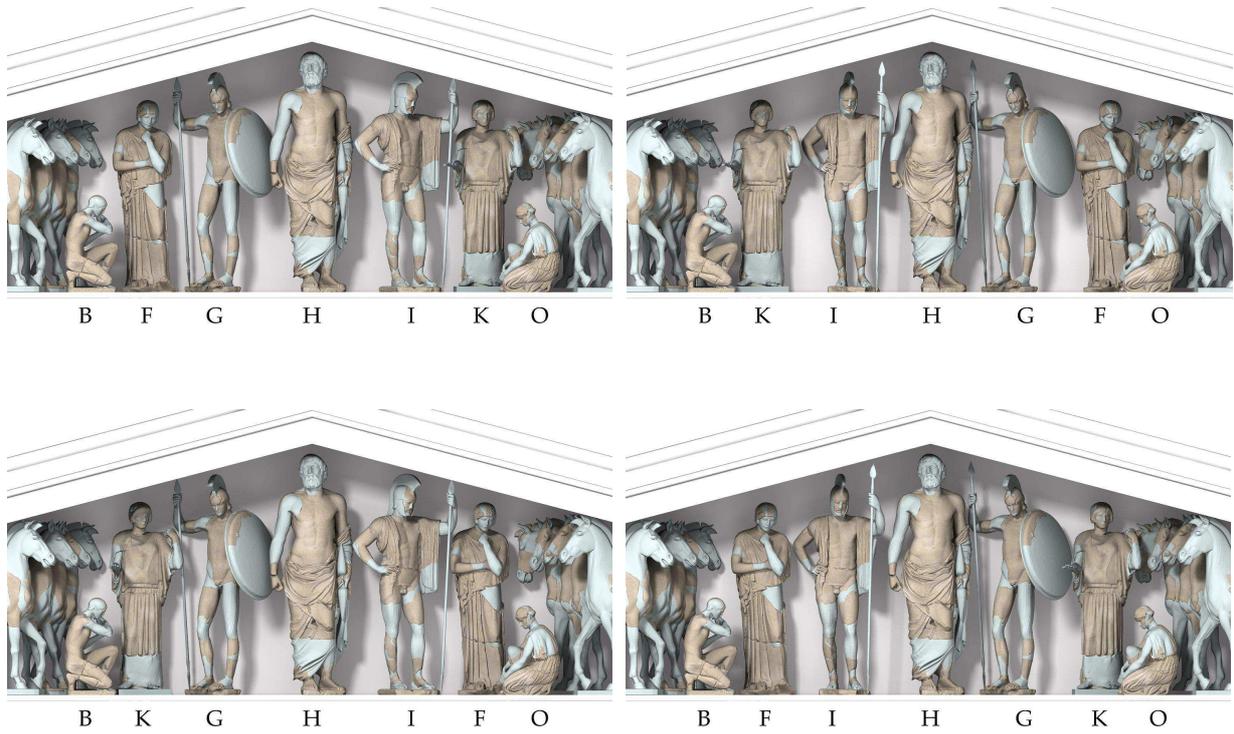


Figure 3. Virtual 3D reconstructions of the central figures, arranged as in Figure 1.

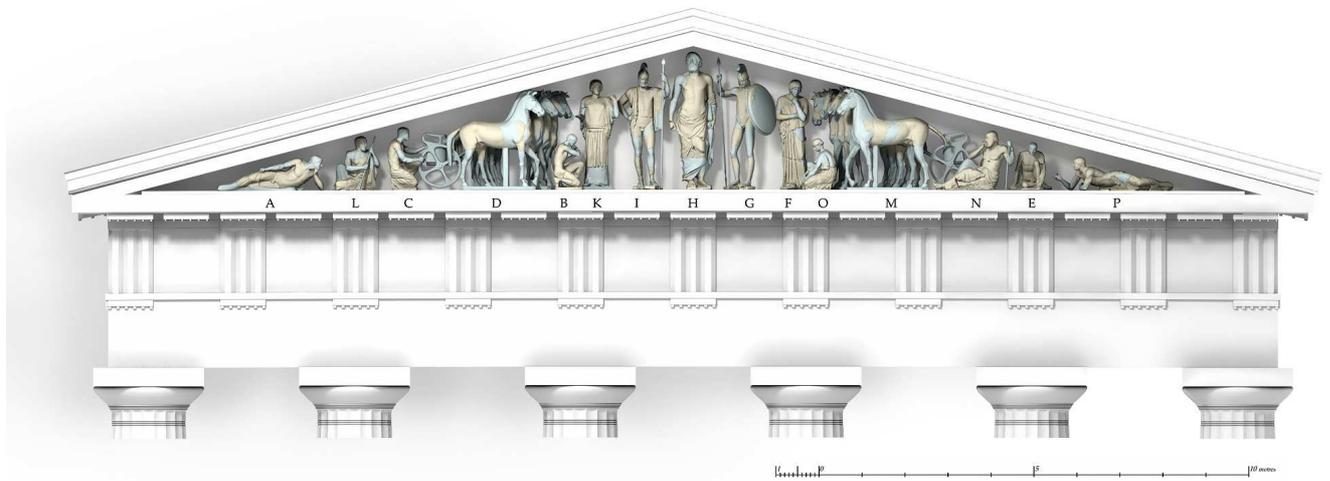


Figure 4. The new virtual reconstruction (closed arrangement "A") of the complete pediment

## Conclusions

The completed 3D reconstruction of the composition leads to the conclusion that the reconstruction, which is most widely accepted today, is technically very difficult to realize and would be feasible only if we ignored some general pictorial conventions of ancient Greek art. Still, it is important to emphasize that virtual reconstruction on its own does not enable us to establish the right arrangement, i.e. the one realized in antiquity, but only to exclude two of the four options. However, considering the uncertainties experienced so far, this result can be regarded as a great progress. Though the remaining two arrangements are still possible, other considerations might help to decide between them.

The virtual 3D reconstruction does not fully confirm the observations made with plaster casts, but it strongly suggests that the "open A" arrangement, which was considered to be physically impossible, and which is most commonly accepted today, is indeed the most difficult to realize: the limbs of figure K and G do not necessarily run across each other, but the distance between them is so small (max. 10 cm) that we can hardly believe that this arrangement could follow the original intentions of the designers or the sculptors.

In the case of both open arrangements, another problem arises: the spears in the hands of the male figures fit the available space only if both of them grip the shaft directly under the spear-head. Even Treu noticed this problem, but he thought that "open B" arrangement can be proven with the help of a fragment and also with the analogy of a Thessalian relief depicting a spearman in a similar way. No other analogy has been found to this phenomenon, moreover, no element of the reasoning provided by Treu stands its ground: the fragment in question was once interpreted as a centaur ear; Treu published only a sketchy drawing of it (1897 Abb. 59), and it has never been published with a photo. In 2009, the fragment could be found neither in the exhibition nor in the storeroom, thus we cannot assert anything about it. The warrior grasping the spear-head on the relief was certainly pressed for space, but one can hardly rely on a simple, modest, inferior and provincial work of art as a parallel to reconstruct one of the main figures of a sculpture group erected in the pediment of a huge temple in the principal sanctuary of Hellas.

In the case of closed arrangements, we have no such problems with the spears, thus these arrangements can be regarded more probable than the open variants. Technical or aesthetic considerations do not decide for either of them, yet the position of the excavated fragments at the site (secondary context) and the optical corrections in the elaboration of the hair of figure K and G expressly support the "closed A" arrangement, which was advocated first by F. Studniczka and E. Buschor, and most recently by P. Grunauer.

All pieces of evidence and every consideration which is independent from the interpretation point therefore unanimously to the "closed A" arrangement, which can therefore be regarded as the most probable reconstruction.

## **Reports, presentations**

The lists comprises various kinds of scientific and popular papers, presentations, broadcasts (given by the principal investigator of the project) in and outside Hungary arranged in chronological order:

- 2009. 10. 17 Vienna Congress on Cultural Heritage and New Technologies (Best Poster Award)
- 2010. 02. 19 Magyar Ókortudományi Társaság
- 2010. 02. 27 Magyar Katolikus Rádió: Távolkép
- 2010. 03. 16 MTA Régészeti Intézet
- 2010 04. 01 Hónap kutatója (OTKA)
- 2010. 04. 08 Granada, XXXVIII Annual Conference on Computer Applications and Quantitative Methods in Archaeology
- 2010. 06. 05 France 2: Accelérateur des neurones
- 2010. 07. 19 Duna TV: Heuréka
- 2010. 10. 12 Magyar Régészeti és Művészettörténeti társaság
- 2011. 03.02 Trento, 4th International Workshop 3D-ARCH 2011: “3D Virtual Reconstruction and Visualization of Complex Architectures”

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