

Kleroterion: reconstruction report

Jena Methodology:

The identification of the object: **Kleroterion**.

- The collection of sources: **articles, photos, drawing, 3d models, reconstructions**.
- Their classification according to their nature: **it is not a model of a specific kleroterion but it is based on the structure of the ones described by Aristoteles in Agora of Athens, and specifically based on the description of Dow's article (with some edits according to Bishop's article)**.
- The creation of the structure of the model (identification of the hierarchy of semantical elements): **modelling hierarchy on Cinema 4D? If yes, then it follows the structure elements of a kleroterion from the bottom to the top**.
- The modelling phase: **Cinema 4D – Reconstruction report**.
- The documentation of the reconstructed elements: **this paper**.
- The publication of the results: **3D Repository of DFG 3D-Viewer**.

Description

The object of concern is a kleroterion (an allotment machine in ancient Greece for the distribution of the services at civic offices). Such fragments of kleroteria are found for example in ancient Agora of Athens for the election of the court judges (*dikastai*). The way of their function is reported by Aristoteles in his work **Athenian Constitution**. The front side of the kleroterion had a number of slots separated in columns (*kanonides*), where the bronze tokens (*pinakia*) with the names of the candidates were placed. Black and white cubes or most probably spheres, according to the new interpretations of Aristoteles' text, were placed in the opening on the upper part of the machine to go through a bronze tube attached at one of the sides of the front side of a kleroterion. A result of a white sphere would symbolize the selection of the officials in contrast to a black sphere which would imply no assignments. However, it is not clear, if the lots were drawn for its row or for its name. The second hypothesis seems to be less probable, as the procedure would last for ages.

Most of the relative finds concern fragments of kleroteria made of marble and bronze tokens, dating in the 4th century BC. The description of Aristoteles refers also to their state and function during the 4th century BC in Athens. Taking everything into consideration, our digital reconstruction shows generally a kleroterion of the 4th century BC and it is based on the finds and sources related. At this point, it must be mentioned that no tube for the lottery spheres is either preserved or found. After studies of the machine and the traces of the tube left on the preserved fragments, it is considered to have been bronze. Besides, the tube must have been portable in contrast to the main part of kleroterion, a feature that is highlighted by Bishop's article and proves that the tube with the conical part on the top of Dow's drawing would be

dysfunctional. Another factor is, that it is not known, how the lottery spheres in the tube would be controlled and picked individually every time. Dow and Bishop describe different ways. It was decided for our 3D model none of these ways to be presented, since no tube is survived. However, the tube itself was modeled, as it is a more certain feature of the ones assumed. The number of the slots and the columns are different on the fragments preserved, thus it is supposed that their form must have been different according to the kind of the civic assignment given. Another feature not preserved, but known through the sources, are the letters of the Greek alphabet over its column of slots. On other reconstructions, they are depicted inscribed or painted. On our 3D model the letters are depicted out of bronze and attached separately on the stone, a feature which would also explain, why they were not preserved (like in the case of the tube). On Dow's drawing and on the other reconstructions the case of the selection of judges (*dikastai*) is represented. That would mean two kleroteria with 5 columns of slots each, because it is known that the Athenian tribes (*phylae*) were 10 and the dikastai came from each tribe. Our 3D model depicts such a kleroterion, too and follows Dow's drawing: the number of slots is 250 in total and 50 for each column on one kleroterion. It is decided not to make a second kleroterion model, since the selection procedure of dikastai mentioned using two kleroteria is a hypothesis in the research and is not proved through the finds.

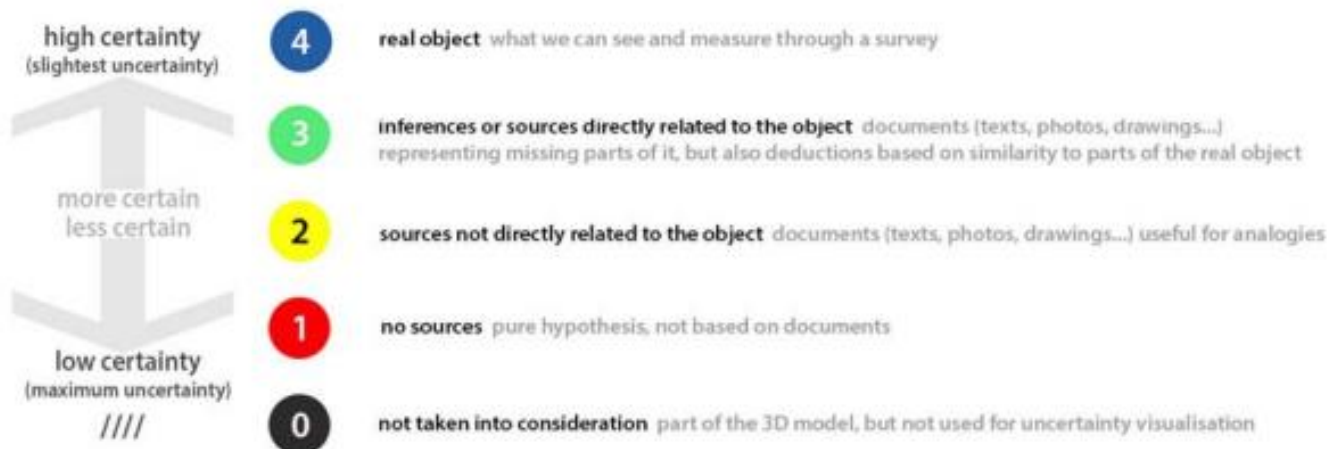
Even if there are many reconstructions, interpretations and papers concerning a kleroterion, we cannot be completely sure how it worked and how the exact lottery procedure took place. This model endeavors to suggest another example and to bring again in focus a relative unknown ancient machine of the first democratic city-state in history, Athens.

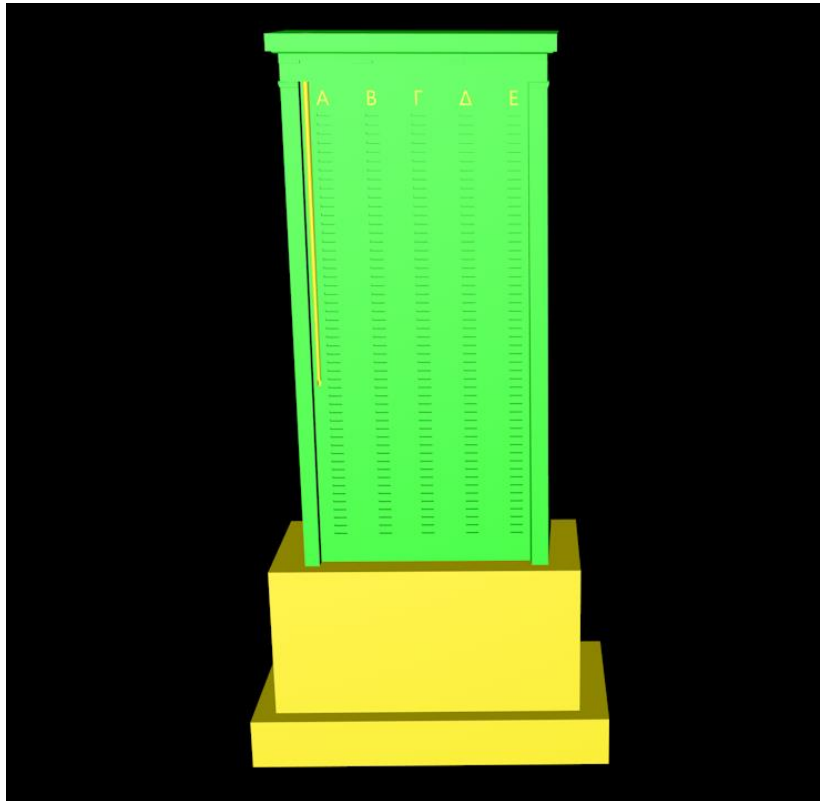
Organisation of source materials

See Excel file (name: kleroterion_14.11_sources).

Uncertainty level

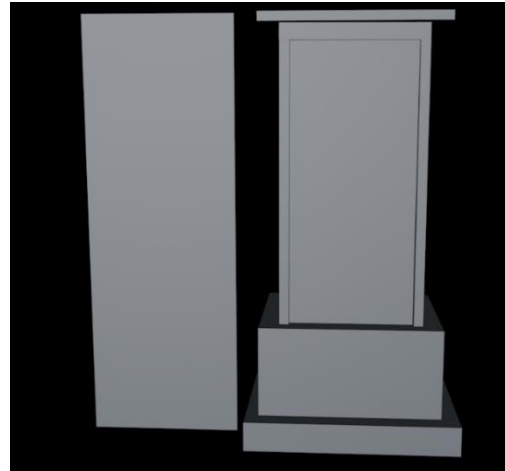
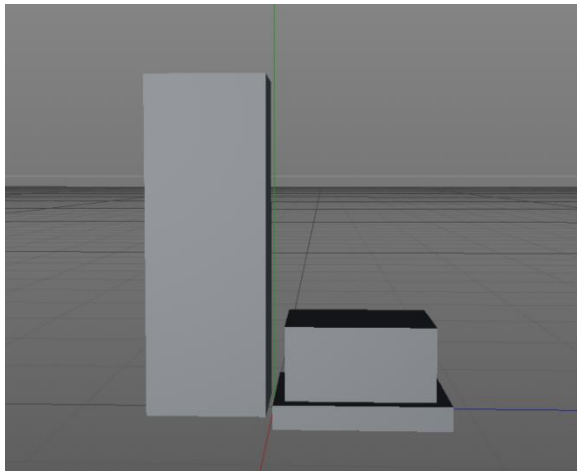
UNCERTAINTY DEGREE



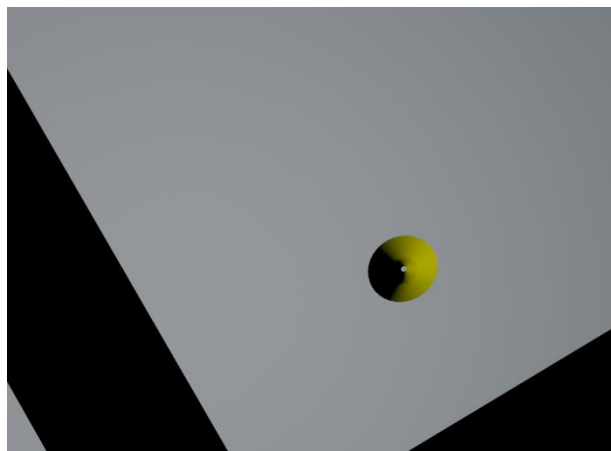


Documentation

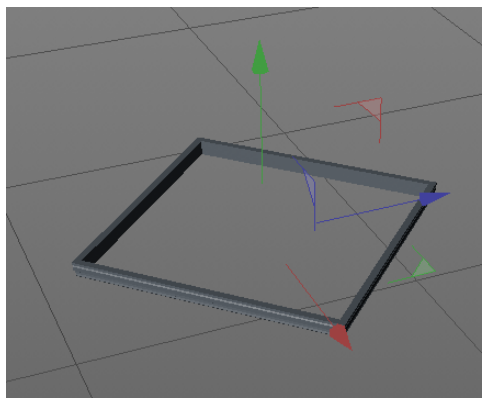
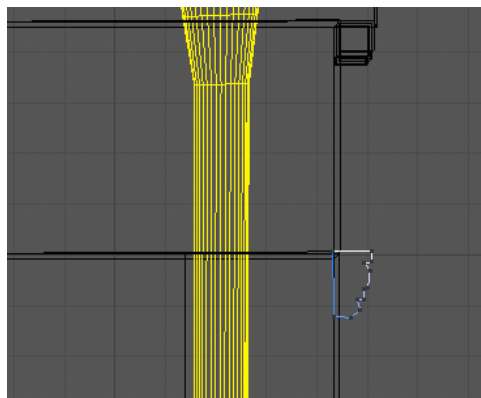
Base, main body and cover 18.10.2022: I started creating a cube object with an intent to use it as a reference, with the dimensions mentioned on the article. The height is supposed to be the same with a human, including the base (so I assessed 1,70 m) and the width 0,60 m. I used two cube-objects to make the podium and the base. 0,60 must be the width of the main stele, so I made them a little wider. The main stele of the kleroterion consists of a cube object, which I transformed it to an editable one, so as to give it its main form. Then, I made the top section of the 3D-model, separating it finally into two layers (because of the guttae and architraves added later). A third layer was made at the end, which was named cover (cube and then editable object). This is because the highest layer on a kleroterion is wider than the lower layers (the same width with the base) and there is the cone opening where the tube for the spherical/cubic lots would be added (see report on 24th of October). With cut tool (K) I made on the front side of the main stele one central department and then with extrude tool I pushed inwards for the final form. It needs also to be mentioned that on the mode menu and on the view settings>Back, I inserted the design to refer to for the addition of details, which is the model based on (even if the angle isn't the right one).

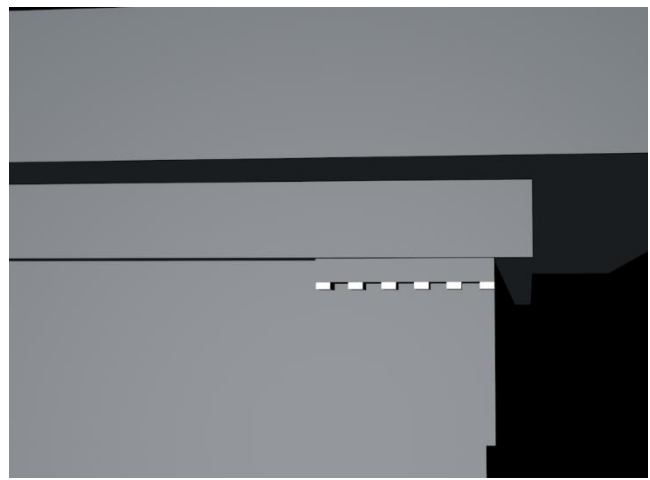
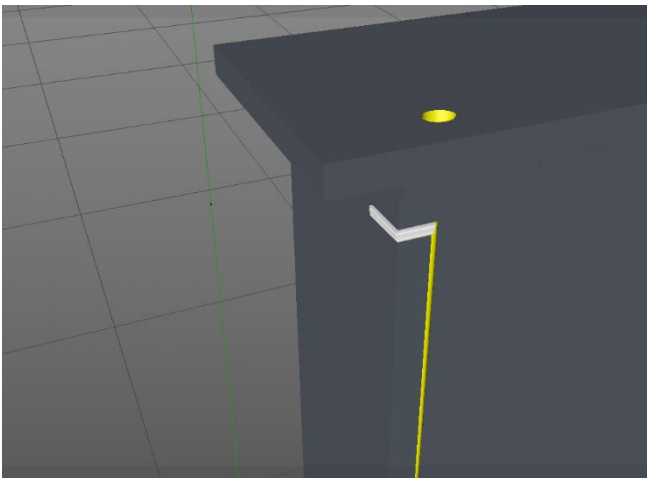


Tube 24.10.22: I have inserted a cone object, because of the tube form in the upper part. Then I changed it to an editable object pressing C and I expanded the edge of the cone. After scaling the object so as to fit the right side of kleroterion (following Dow's drawing), I attached on the surface. I selected the lowest points and polygons of the new formed tube and I deleted them, so there would be no edge anymore. At the point from where the balls would fall, I tried to make front side of the tube without a polygon, so as to highlight this feature. So, I selected the front polygons and deleted them and then moved the points of the polygons of the back side, so as to give a harmonic shape to the ending of the tube (**I changed later this feature**, after checking the bibliography again, see report on the 2nd of November). Finally, I noticed that the polygons of the body of kleroterion model didn't let the tube to look through. Using the spline tool, I draw the polygons meeting the interior of the tube and cut them using the line cut tool and pressing control. To be able to do so, I changed the "cover" from a cube to an editable object. After deleting the extra polygons, the tube looked through. Some of the main body of the model were visible in the interior of the tube. Thus, I used the scaling tool in order to make it fit better.

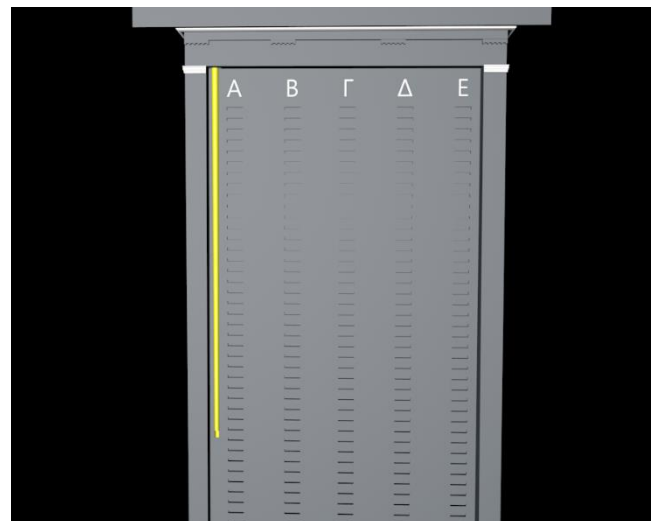
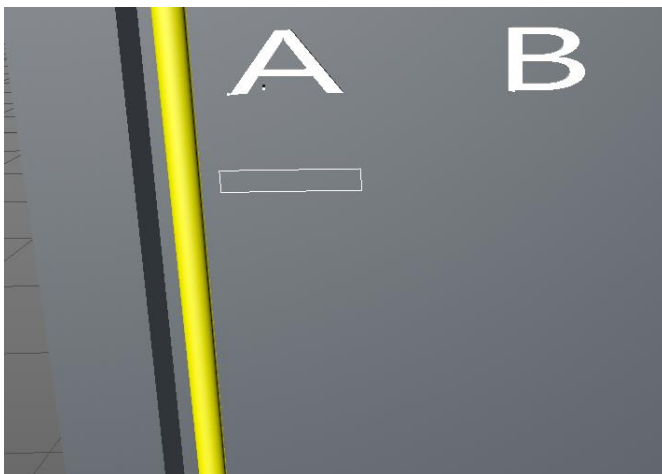


Gutta/drops, architrave and rescaling 25.10.22: I deleted the reference object and then I edited the depth of the whole 3D-model once again because the main function of kleroteria seems to concern mostly the front side of the stele and to that point was the depth of the model unnecessary big. The depth differs among the fragments preserved and there are no specific dimensions concerning it on the drawing. This was the reason why I had to adapt the holes/polygon cuts, where the tube and the cone opening go through. With *points* on I adapted the size and closed the polygons that didn't have to be open. The architraves were made with the *spline* tool and the *lathe* tool (at the lathe settings I chose subdivision 4, so as for the result to look more like a square). Then I put it on the model on the right height and changing it into an editable object, I selected the polygons which I didn't need and deleted them. Then I used *close polygons* tool to close the architrave object. In the case of the main body, for the making of the two architraves I also used the *mirror* tool after making the first one so as to make an exactly same copy of it. In the end, the guttae/drops were added using a *cube* and smaller ones for the drops. I made the objects editable and then melted the drops and the main part of a gutta in one object. Then I copied and pasted 3 times and I adjusted everything on the bottom of the second layer of the top.





Front surface with letters and slots + corrections (cone opening and tube, cover layer, pedast and base) 31.10.22: it was noticed checking the models, the other reconstructions and the bibliography once again that the cone opening wasn't a part of the tube, but a part of the cover layer. So, I had to split the first cone-editable object, from where the tube was also made into 2 different objects. I adapted the changes, concerning again the polygons and the holes/polygon cuts of the top of the 3d model, where the tube and the cone opening go through. The letters for the columns were made with the tool MoText. I decided not to change the letters to an editable object, since they split to each letter and the hierarchy might seem complicated at the end. After adjusting the letters with an appropriate distance so they fit on the surface of the front side of a kleroterion, it was time to make the rows of the slots below each letter. I used a rectangle spline for that and I adjusted the size of one slot. I copied it ten times below the first one and then I selected all splines, copied and pasted four times below, so they will be in total fifty for the alpha column. I selected then all splines of the first column and copied and pasted it below beta column. I repeated the same procedure for the rest letter-columns. Then with cut tool, I cut the surface where the slot splines were and with extrude tool, I moved inwards all cuts, resulting into the slots. Finally, I deleted the splines and the main stele had the slots wished. In the end of the day, I scaled again the base and the pedast, as they looked way bigger than the final size of the cover layer.



Normal textures 2.11.2022: I changed the ending of the tube, as we do not really know how it looked like, giving simply the form of a cylinder like the main part of the tube. Then, I searched for textures: marble and bronze. I decided to apply a texture of pentelic marble since it was the main marble source of

ancient Athens. Thus, I cropped an image of parthenon from Wikimedia commons and used it as texture. I added it in all parts of the kleroterion, except the tube and the letters. Afterwards, I changed the texture settings necessary, so as to scale and move the texture of each part (Mode>Tag>Projection: cubic). I made a new object for the slots, as they seem to be darker, because of the light, so as to add a darker marble texture (not needed; I finally deleted it, because with the light object the problem was solved). I tried to insert some bronze texture and apply it on the tube and the letters, but not all of these changes were saved.



Addition of light and shades 14.11.2022: I made the bronze texture using the settings menu of the material tool and add it on the tube and the letters of the model. Finally, I added a floor, a sky, a light and a camera object. After setting the right directions of the light and the camera, testing with the render view option proved that the model is ready.



Bibliography

- Bishop, J. D. (1970). The Cleroterium. *The Journal of Hellenic Studies*, 90, pp. 1-14.
- Dow, S. (1939). Aristotle, the Kleroteria, and the Courts. *Harvard Studies in Classical Philology*, 50, pp. 1-34.
- Taylor, C. (2007, April-June). From the Whole Citizen Body? The Sociology of Election and Lot in the Athenian. *Hesperia: The Journal of the American School of Classical Studies at Athens*, 56, 2, pp. 323-345.