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The Creation of an Egyptian Capital[1]

Ulrike Fauerbach

Not much has been said yet concerning the creation and production of Egyptian column-capitals.[2] The *communis opinio*: "Decorated capitals for columns were produced in the same way as other sculpture",[3] is surely correct for Hathor capitals. But for composite capitals of the Late Egyptian Period it is lacking, as I will try to show. The main difference, in my opinion – and this is my hypothesis – is, that capitals consist of geometric bodies, and therefore are planned and constructed like geometric bodies. Sculpture, showing a human or animal figure, was usually designed using a grid.[4] Composite capitals were not. This has remarkable consequences on the planning process.

My motivation to consider Egyptian column-capitals was the detection of three architectural drawings in the pylon of Edfu in March 2001. These drawings depict the capitals of columns.

The pylon of Edfu (fig. 1) is provided with two staircases and thirty-six rooms. The drawings are to be found in the lower part of the staircases. Later, I found a forth drawing in one of the pylon's rooms, which was used constructing the staircase. So together with the little horned altar published recently by D. KURTH[5] and the well-known cavetto-cornice detected by L. BORCHARDT[6] at the end of the 19th century we have six architectural drawings in the temple of Edfu altogether, more than in any other temple of Egypt. But Edfu is probably no exception. The more we look for these drawings, the more we will find. They are not easy to find, though, which is a result of the drawing technique.

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1 I am indebted to Lindy Divarci and Barney Craven regarding my English and Wilhelm Osthues for valuable remarks to this article.

2 J.-C. GOYON *et al.*, La construction pharaonique du Moyen Empire à l'époque gréco-romain, Paris 2004, 350–351.

3 D. ARNOLD, Building in Egypt. Pharaonic Stone Masonry, New York 1991, 47.

4 E. FEUCHT, in: LÄ VI, 1201–1206, s.v. Hilfslinien; J.-C. GOYON *et al.*, La construction pharaonique du Moyen Empire à l'époque gréco-romain, Paris 2004, 358–363 with fig. 468–469.

5 D. KURTH, Die Texte und Darstellungen in den Eingangskorridoren der Pylontürme, in: Edfu Beihefte 6, (in press).

6 L. BORCHARDT, Altägyptische Werkzeichnungen, in: ZÄS 34, 1896, 74–75 and fig. 6.

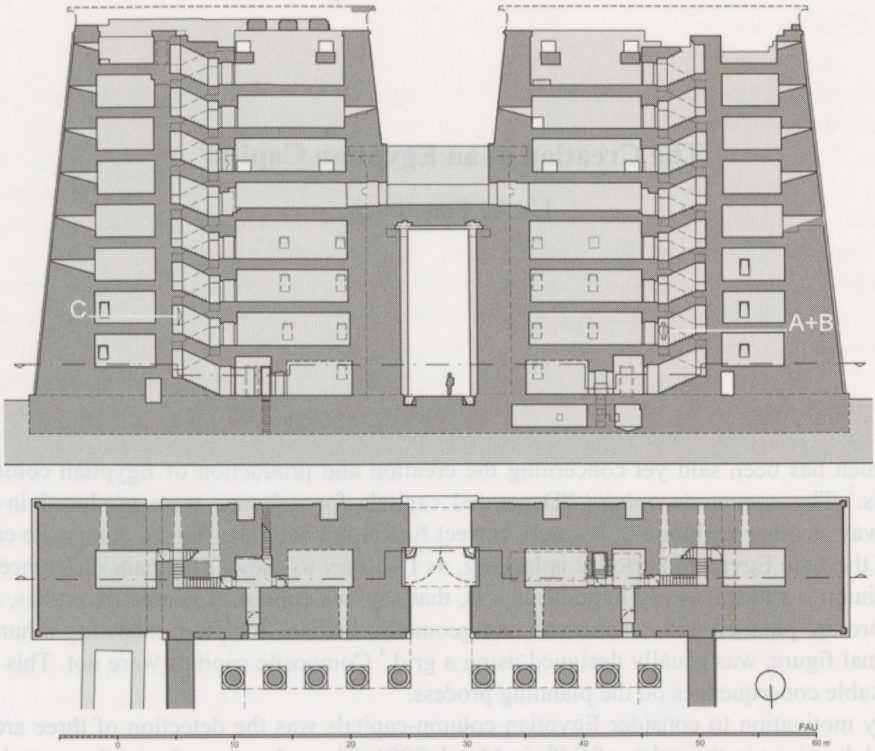
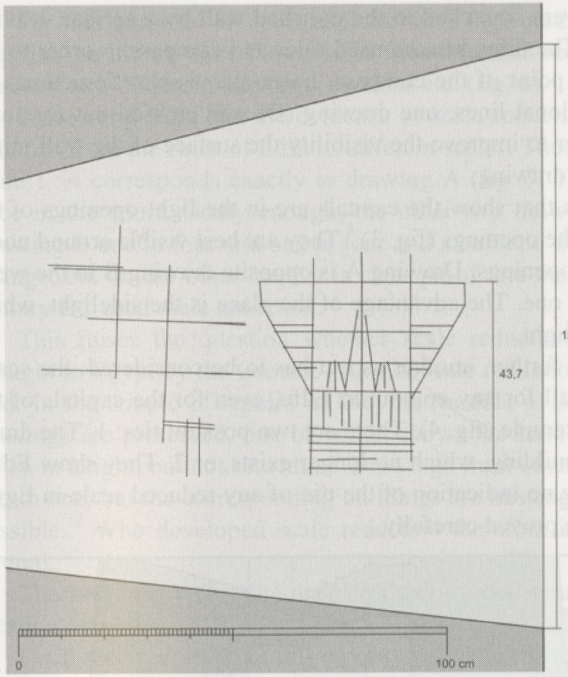


Fig. 1: Pylon of the Edfu-Temple, section and ground plan.

Fig. 2: Photograph of drawing B. The lines have been scratched into the polished wall.


EDFU, GR. PYLON
Drawing A
scratched lines on sandstone,
representing capitals.
western staircase,
western splay of the 2nd light-opening.
FAU 3/2002
136,8
43,7
0
100 cm

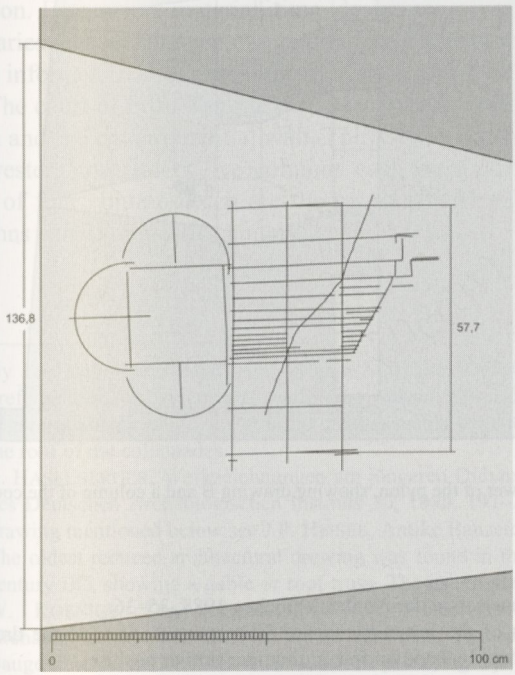

EDFU, GR. PYLON
Drawing B
scratched lines on sandstone,
representing a capital.
western staircase,
eastern splay of the 2nd light-opening.
FAU 3/2002
136,8
57,7
0
100 cm

Fig. 3.

The lines of this kind of drawing were scratched in the polished wall by a scriber, leaving traces 1–2 millimetre fine (fig. 2). The draughtsman used ruler and compass in order to get straight lines; where he placed the point of the compass, holes are visible. Sometimes he corrected himself by drawing additional lines; one drawing (B) was crossed out for some reason, probably discontent. In order to improve the visibility the surface of the wall might have been coloured by chalk before drawing.[7]

Strangely enough, the drawings that show the capitals are in the light-openings of the staircases, exactly on the splays of the openings (fig. 3).[8] They are best visible around noon, when the southern light falls in the openings. Drawing A is opposite drawing B in the western tower, drawing C in the eastern one. The advantage of the place is the sidelight, which shows the lines clearer than full sunlight.

Before discussing the drawings further, another aspect has to be considered: the scale. The drawings are small, far too small for any column in Edfu, even for the capitals of the court, which are the smallest in the temple (fig. 4). There are two possibilities: 1. The drawings show capitals of a very small building, which no longer exists, or 2. They show Edfu-capitals in a reduced scale. We have no indication of the use of any reduced scale in Egypt up to now;[9] therefore its use must be proved carefully.

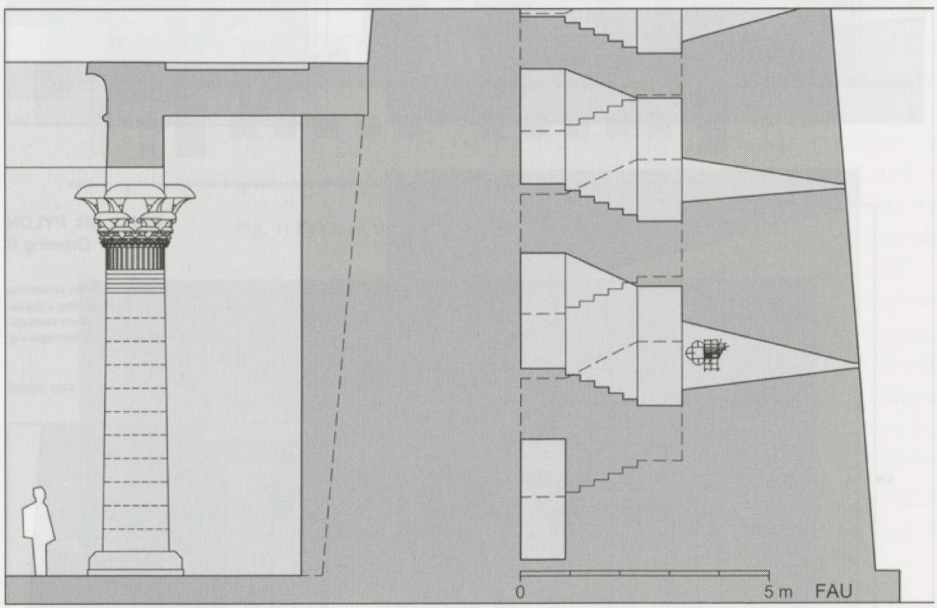


Fig. 4: Cross-section through the western tower of the pylon, showing drawing B and a column of the court.

7 W. MÜLLER-WIENER, Griechisches Bauwesen in der Antike, München 1988, 35–36.

8 The lines are scratched over the joints of the masonry, so the draughtsman executed the drawings squatting in the light-opening. I traced them by hand on foil, sitting in a similar position.

9 C. ROSSI, Architecture and mathematics in ancient Egypt, Cambridge 2004, 83, "ancient Egyptian working drawings were not to scale".

For this purpose the court capitals were measured with a laser total station (fig. 5).[10] The final result are three-dimensional models which reconstruct the original shape and can generate two-dimensional views, sections etc. (fig. 6).

Proceeding from that the evidence of scale reduction is clear. I reduced a selection of columns from the court of Edfu to different scales. The fourth column on the eastern side in scale 1 : 4 corresponds exactly to drawing A (fig. 7, 15). This type of capital occurs only once in the court. Oddly enough, the other two drawings are executed in another scale: Drawing B one to four and one to four and a half and drawing C is one to five! This is very strange, but on the other hand it is clear proof that the Egyptians at the end of the second century BC used scale reduction.

This raises the question whether scale reduction is an Egyptian invention or was brought to Egypt by the Greeks. Proof of scale reduction in the Greek culture is not easy to find. In the temple of Apollo in Didyma (middle of 3rd century BC) several architectural drawings are preserved, one of which shows the base and the shaft of a column reduced 1 : 16 in height, but not in width.[11] Drawings from other places are too small to be executed one to one, but the corresponding buildings are missing, so no statement relating to scale is possible.[12] Who developed scale reduction therefore is a question that remains to be answered.

The task to consider the drawings themselves remains. What do they tell us about the creation of a capital?

I will try to reconstruct this process based on the example of one of the columns in the court of Edfu. The reconstruction should be taken as such – it does not provide a standard-solution. Dimension, material, time, design etc. all affect the creation process and it probably varies very much from one building site to another. But thanks to the drawings we have much information about the process in Edfu and good reason to concentrate on this site.

The court of Edfu-Temple (fig. 8) was begun one hundred seventeen BC along with the pylon and the circumferential wall. Thirty-two columns surround the court. The eastern and the western rows of twelve columns each were planned from the start; the two southern rows of four columns each are the result of a change of the building-plan.[13] Most of the columns carry composite capitals.

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10 By the author and cand.-arch. Manja Maschke, Dresden. Measuring by hand would have been preferable, but the erection of scaffolding was not allowed. The total station measures with a very high degree of accuracy (±1–2 mm), the measurements were taken from four positions in the court and on the roof of the colonnades.

11 L. HASELBERGER, Werkzeichnungen am jüngeren Didymeion. Vorbericht, in: Istanbuler Mitteilungen des Deutschen Archäologischen Instituts 30, 1980, 191–215. For small reproductions of this and the drawing mentioned below see J.P. HEISEL, Antike Bauzeichnungen, Darmstadt 1993, 171 and 159.

12 The oldest reduced architectural drawing was found in the temple of Athena in Priene, 2nd half of 4th century BC, showing a gable or roof truss. The use of scale is uncertain, the original is not preserved, W. KOENIGS, Der Athenatempel von Priene, in: Istanbuler Mitteilungen des Deutschen Archäologischen Instituts 33, 1983, 165; ders, Pytheos – eine mythische Figur in der antiken Baugeschichte, in: DiskAB 4, 1983, 89–94 [91ff., fig. 1].

13 U. FAUERBACH, Architektur, Licht und Schatten. Pylon und Hof von Edfu als Sonnenkalender?, in: 6. Ägyptologische Tempeltagung in Leiden vom 04. bis 07. September 2002, ÄUAT 33/4, (in press).

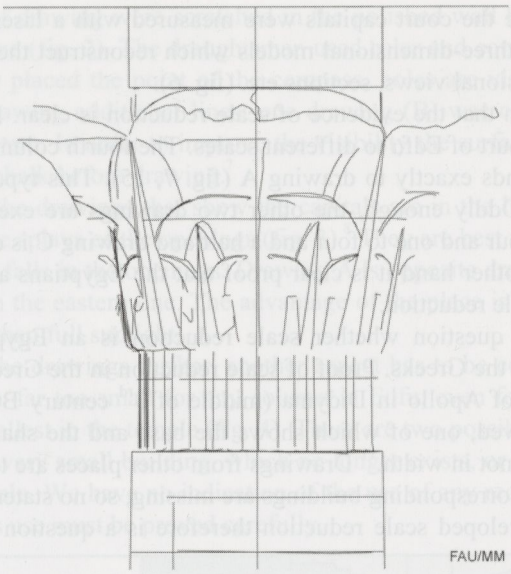

Fig. 5: Total station- and computer-based drawing of the fourth column of the western colonnade in the court of Edfu-Temple.

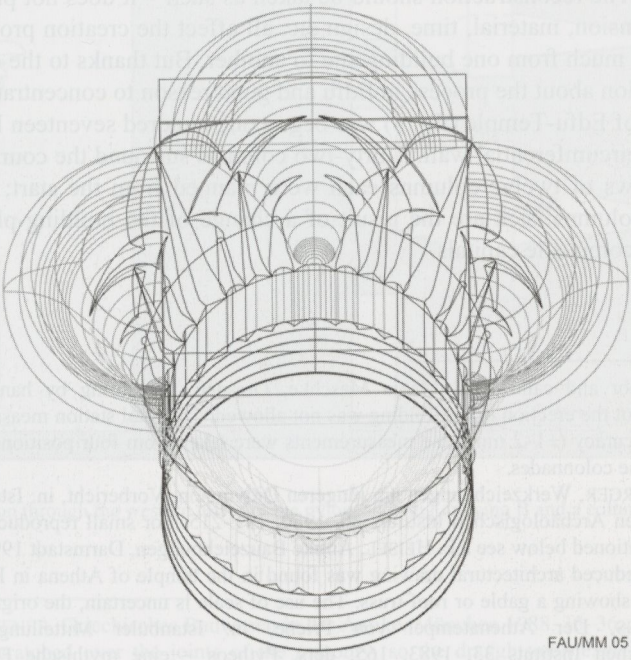

Fig. 6: 3D model of the same column.

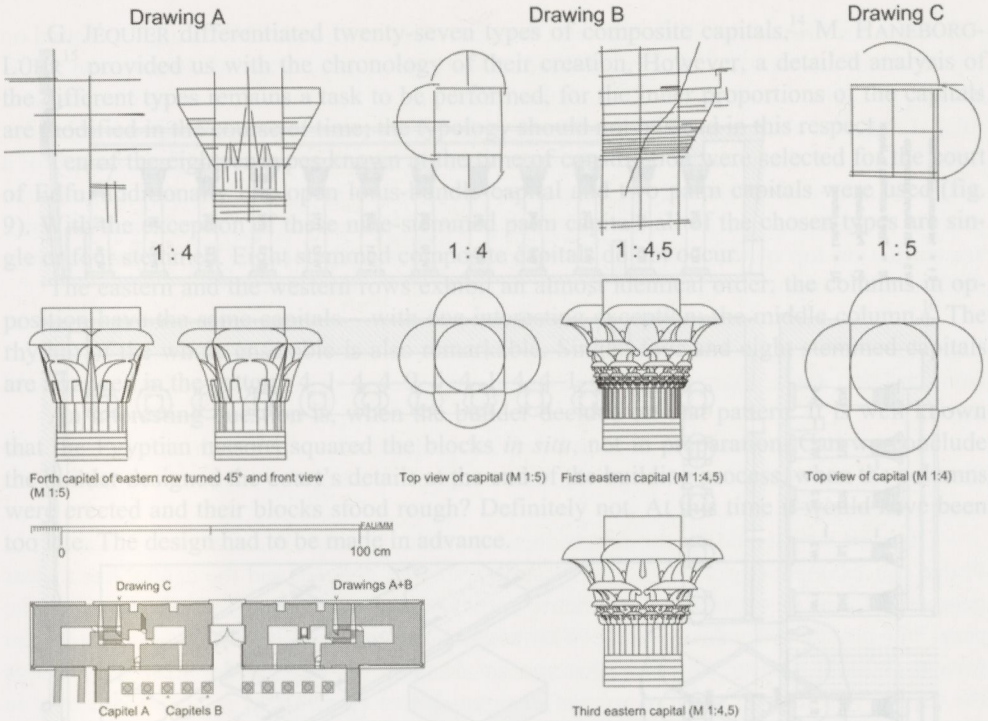

Fig. 7.

Fig. 8: Pylon and court of the Edfu-Temple, seen from the north.

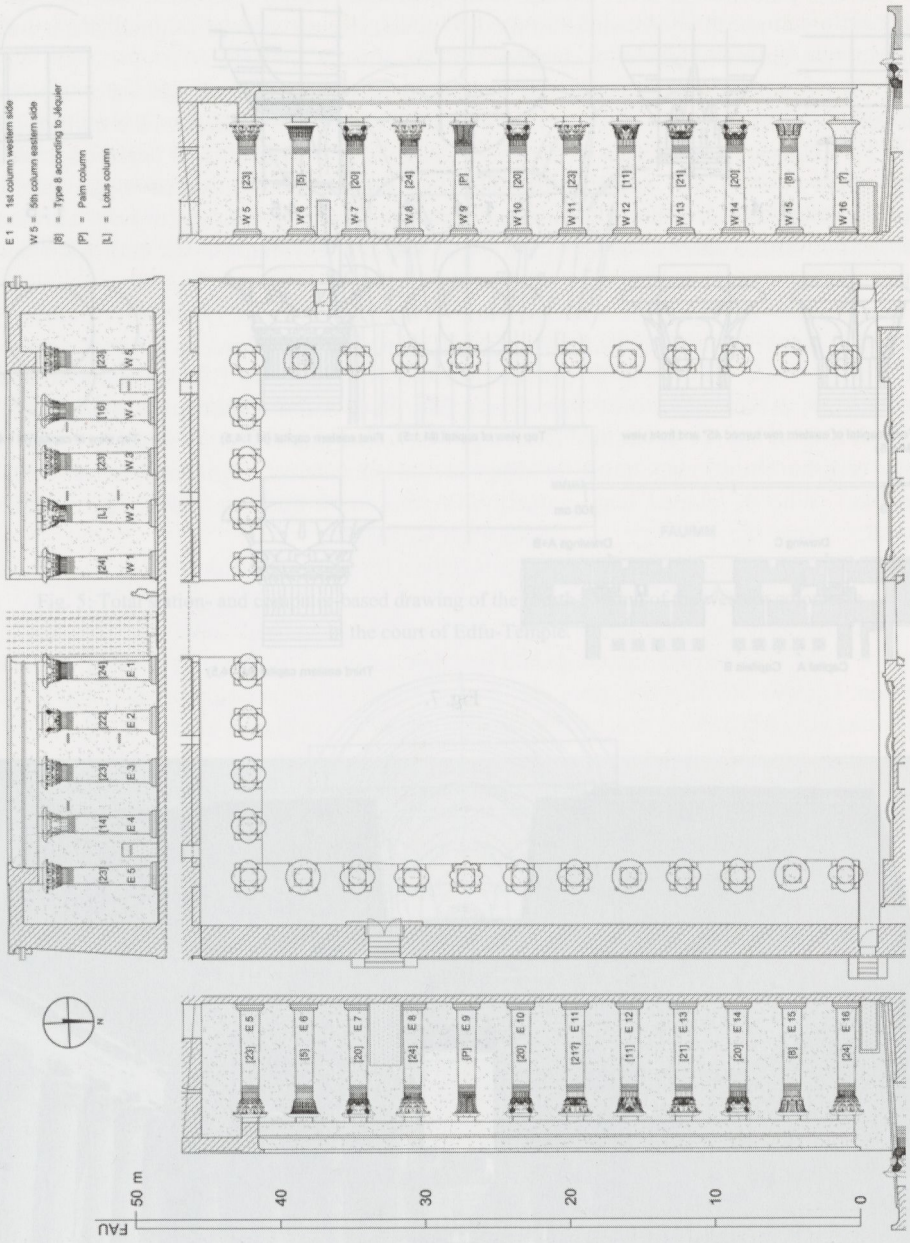

Fig. 9: Ground plan of the court of Edfu-Temple and elevations of the colonnades.

G. JÉQUIER differentiated twenty-seven types of composite capitals,[14] M. HANEBORG-LÜHR[15] provided us with the chronology of their creation. However, a detailed analysis of the different types remains a task to be performed, for the inner proportions of the capitals are modified in the course of time; the typology should not mislead in this respect.

Ten of the eighteen types known at the time of construction were selected for the court of Edfu, additionally one open lotus-bundle capital and two palm capitals were used (fig. 9). With the exception of these nine-stemmed palm capitals all of the chosen types are single or four stemmed. Eight stemmed composite capitals do not occur.

The eastern and the western rows exhibit an almost identical order: the columns in opposition have the same capitals – with one interesting exception: the middle column.[16] The rhythm of the whole ensemble is also remarkable. Single, four and eight stemmed capitals are arranged in the pattern: 4–1–4–4–9–4–4–1–4–4–1–4–4–1–4.

An interesting question is, when the builder decided on that pattern. It is well known that the Egyptian masons squared the blocks *in situ*, not in preparation. Can we conclude the builder designed the court's details at the end of the building process, when the columns were erected and their blocks stood rough? Definitely not. At this time it would have been too late. The design had to be made in advance.

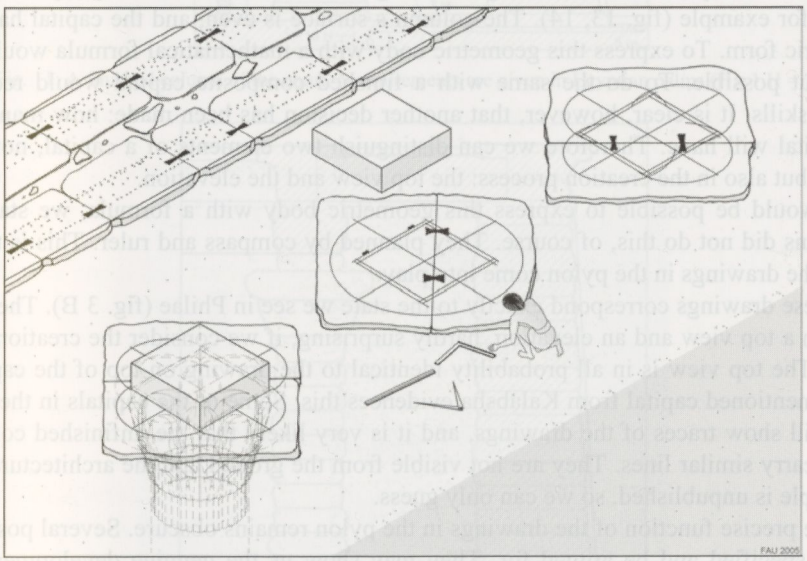

Fig. 10: The western colonnade of the court under construction.
The wall and the columns are covered by construction ramps. The builder is drawing guidelines on the surfaces of the columns, before the next layer is shifted on top.

14 G. JEQUIER, Manuel d'archéologie égyptienne. Les éléments de l'architecture, Paris 1924, 230–274. See also D. ARNOLD, Lexikon der ägyptischen Baukunst, Zürich 1994, 127–128; L. Borchardt, Die ägyptische Pflanzensäule. Ein Kapitel zur Geschichte des Pflanzenornaments, Berlin 1897.

15 M. HANEBORG-LÜHR, Les Chapiteaux composites. Étude typologique, stylistique et statistique, in: Amosiadès. Mélanges offerts au Professeur Claude Vandersleyen par ses anciens étudiants, Louvain-la-Neuve 1992, 125–152.

16 The 11th on each side, see fig. 10

When the mammisi of Kalabsha was dismantled, an architectural drawing was found on top of one of the capitals.[17] The block is unfinished and shows a stage of construction that is usually lost. The drawing demonstrates the developing of the four stems using compass and ruler. Later, the abacus covered this drawing. In other words: The drawing had to be finished before the abacus covered it. And before the drawing was executed, the decision for a single, four or eight stemmed capital had to have already been made. In this stage of the process the columns are still covered by the construction ramps (fig. 10). Before the abaci are shifted on top of the columns, the builder draws the top view of the capitals on their surface. The compass is inserted at points later covered by the abacus.

What else had to be decided upon in advance? The dimensions of the column, of course (fig. 11). With a capital, this means the upper and lower diameters and the height. The decision for a two, three, four or five story capital could theoretically be altered later, as we will see.[18]

The result was a column with the defined proportions, with rough surfaces and the drawing on top of the capital (fig. 12). This stage of construction is preserved in the first court of Karnak.[19]

The next step would be the rough dressing of the column. We can study the result in Philae, for example (fig. 13, 14). The column's surface is even, and the capital has a clear geometric form. To express this geometric body with a mathematical formula would not be easy, but possible. To do the same with a finished composite capital would require far greater skills. It is clear, however, that another decision has been made: how many stories the capital will have. Therefore we can distinguish two elements of a capital, not only in design, but also in the creation process: the top view and the elevation.

It would be possible to express this geometric body with a formula, we stated. The Egyptians did not do this, of course. They planned by compass and ruler. This is the point where the drawings in the pylon come into play.

These drawings correspond exactly to the state we see in Philae (fig. 3 B). They are divided in a top view and an elevation, hardly surprising, if we consider the creation process so far. The top view is in all probability identical to the drawing on top of the capital, the above-mentioned capital from Kalabsha evidences this. Some of the capitals in the court of Edfu still show traces of the drawings, and it is very likely that the unfinished columns in Philae carry similar lines. They are not visible from the ground and the architecture of Philae temple is unpublished, so we can only guess.

The precise function of the drawings in the pylon remains obscure. Several possibilities can be specified and be argued for. They may show us the genuine development of the master builders design. They may as well be copies of the original design for the use of the mason; he could then copy the drawing on the capital from the drawing in the light-opening. In that case the pylon would have been cleared of its construction ramps, when the column was under construction, otherwise the pylon would have been not accessible.

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17 K. SIEGLER, Kalabsha. Architektur und Baugeschichte des Tempels, AV 1, 1970, 37, 62, fig. 114–115.

18 It is very likely, that the full design of a capital was fixed when the column was erected.

19 J.-C. GOLVIN/J.-C. GOYON, Karnak, Ägypten. Anatomie eines Tempels, Wasmuth, Tübingen 1990, fig. on p. 118 or J.-C. Goyon *et al.*, La construction pharaonique du Moyen Empire à l'époque gréco-romain, 350 with fig. 453.

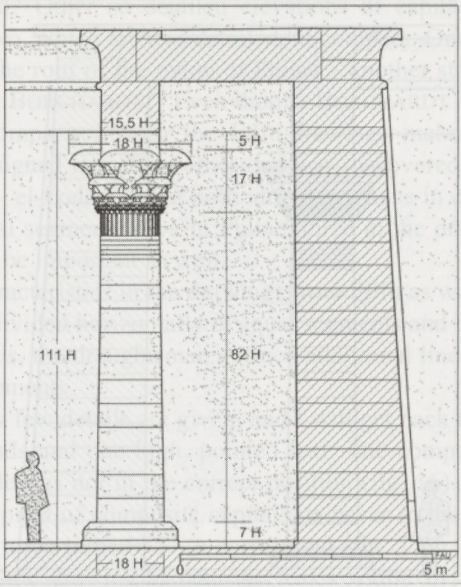

Fig. 11: A finished column of the court. Measurements are given in Egyptian palms (H); 1 H = 7,5 cm.

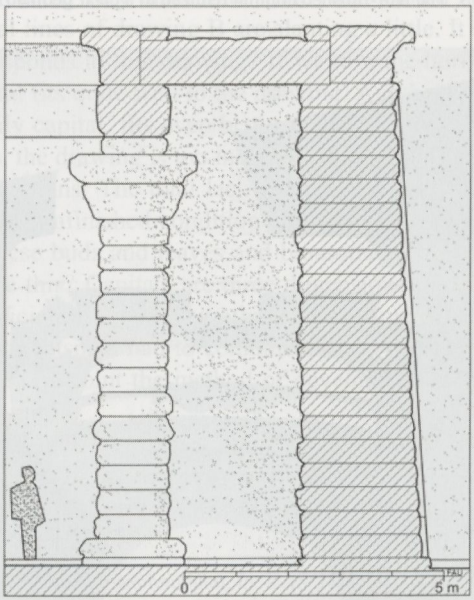

Fig. 12: The same column in a rough state.

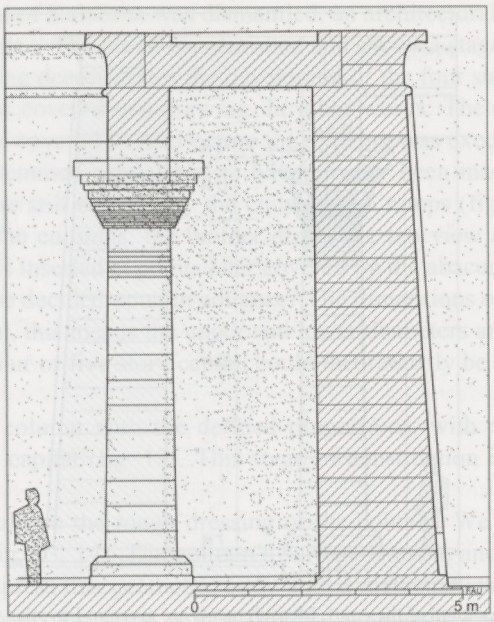

Fig. 13: The half-finished column reduced to a clear geometric form.

Fig. 14: Half-finished column of the court on Philae.

What about the elevation? Other so detailed elevations of capitals from Egypt are not known, but we do have two, which are less detailed, to compare. One is part of a one to one drawing of a column on the roof of the pylon of Philae – another strange place to draw, by the way – published by L. BORCHARDT.[20] Even though BORCHARDT identifies it with a four-stemmed column, the comparison with the Edfu-drawings makes it clear that a one-stemmed column was designed here. The other one was discovered by the French expedition in the quarry of Abu el-Foda.[21] What both drawings have in common is the division of the capital in horizontal segments: five in Philae, three in the drawing from the quarry. The median line seems to be important as well.

We do find these characteristics in the drawings from Edfu as well. Both drawings with elevations, A and B, are divided horizontally in equal segments and both have a median line (fig. 15). Starting from this, the draughtsman defined additional lines. They defined mainly heights of the capital's elements.

It is striking how very few details are given, and I will get back to this later again. Only drawing A shows two buds and one high, pointed leaf. The comparison with the capital, however, shows that the leaf is not in the correct position (fig. 16). The long, pointed palmetto leaf, which is so typical of composite capitals, is never in the position shown by the drawing. The capital has to be turned 45° to correspond (fig. 7 A). Doubtlessly the mason knew that when he used the drawing to take the leaf's width. In a proper side view the width would have been shortened, so this depiction was the better solution.[22]

The drawings are executed very inaccurate. Lines that should be parallel to each other are not, and all horizontal lines of drawing B are slanting a little. It seems uncertain, therefore, which capital corresponds to this drawing? If we turn the horizontal lines a little (fig. 16) a five-story lily capital fits quite well to the drawing. Another capital from the court we measured, a four-story lily capital, fits even better, but then one line is superfluous. So we cannot be sure about this, the drawing is too inexact.

A general problem remains: The total lack of additional details. As I have stated, the drawings correspond to the unfinished condition of the Philae capitals. How did the mason know where to put all these buds and leaves and blossoms? The drawings didn't tell him. But could they have done this? Capitals are three-dimensional objects. A two dimensional drawing is always insufficient to show something three-dimensional. Drawing A demonstrates this, where the draughtsman had to combine two views in order to give clear information about a detail. At this point the method of developing a floral capital from circles and lines clearly hits its limit.

Here another group of artefacts comes into play: the sculptor's models (fig. 17, 18). They have been investigated comprehensively by N. TOMOUM recently.[23] She showed clearly that at least not all of these models were votive objects but had a practical purpose.

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20 L. BORCHARDT Altägyptische Werkzeichnungen, in: ZÄS 34, 1896, 70–74, fig. 3–4.

21 Red ink on stone, Description de l'Égypte, Paris 1809–28, 2. éd. Paris: Pancoucke 1821–26 IV, 62, copy by D. ARNOLD, Building in Egypt. Pharaonic Stone Masonry, New York 1991, fig. 2.26 on p. 48. New measurement by W.M.F. PETRIE, A Season in Egypt 1887, London 1888, 33, fig. 25, copy by J.P. HEISEL, Antike Bauzeichnungen, Darmstadt 1993, 144.

22 The combination of different views in one depiction is evocative of the traditional Egyptian art.

23 N. TOMOUM, Sculptors' Models of the Late and Ptolemaic Periods: a Study of the Type and Function of a Group of Ancient Egyptian Artefacts, Diss. München, al-Qahira: SCA Press, 2005.

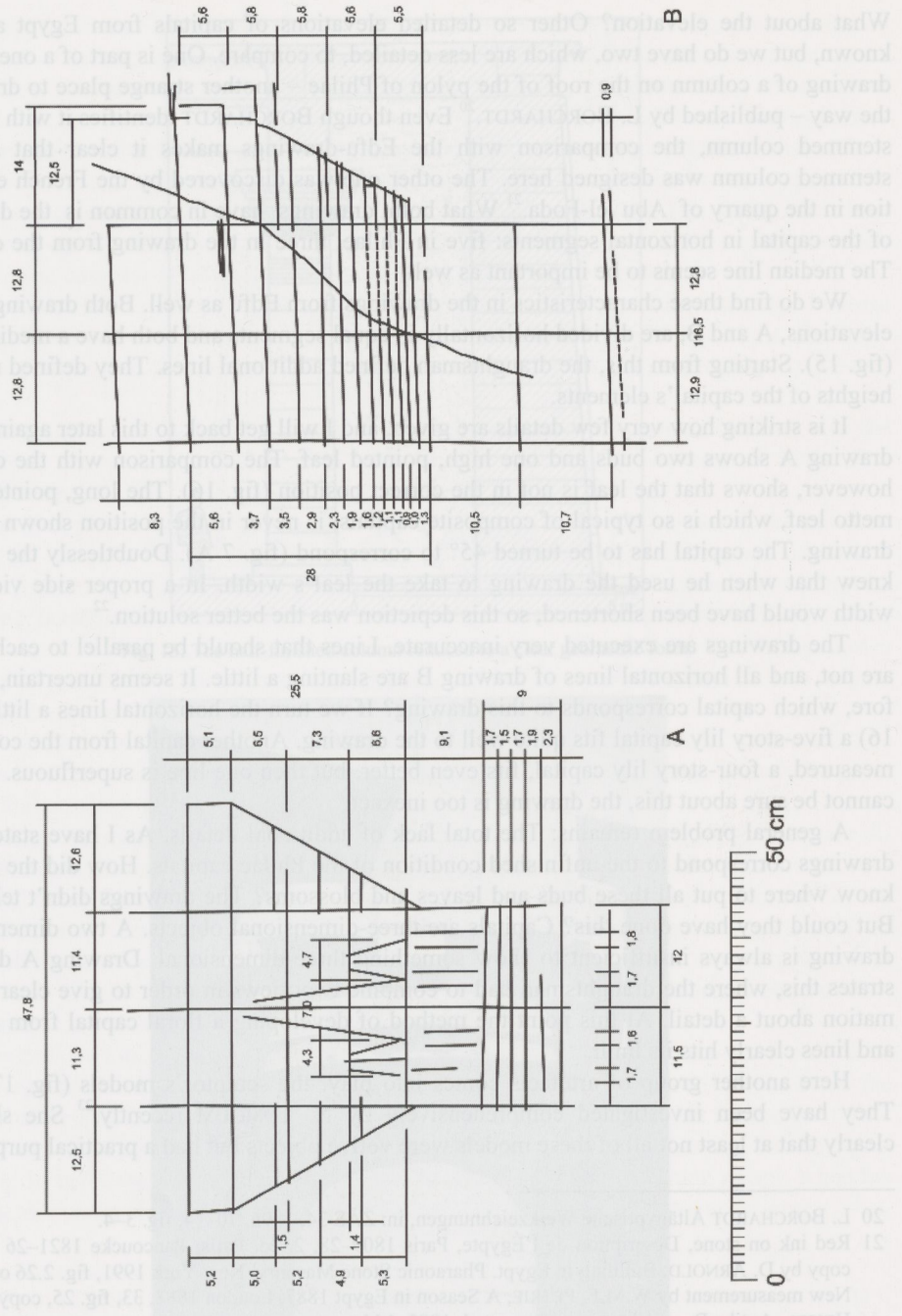

Fig. 15: Both drawings A and B are devided horizontally in segments of about 5,1 cm in drawing A and 5,7 cm in drawing B. Starting from this, additional horizontal lines were defined.

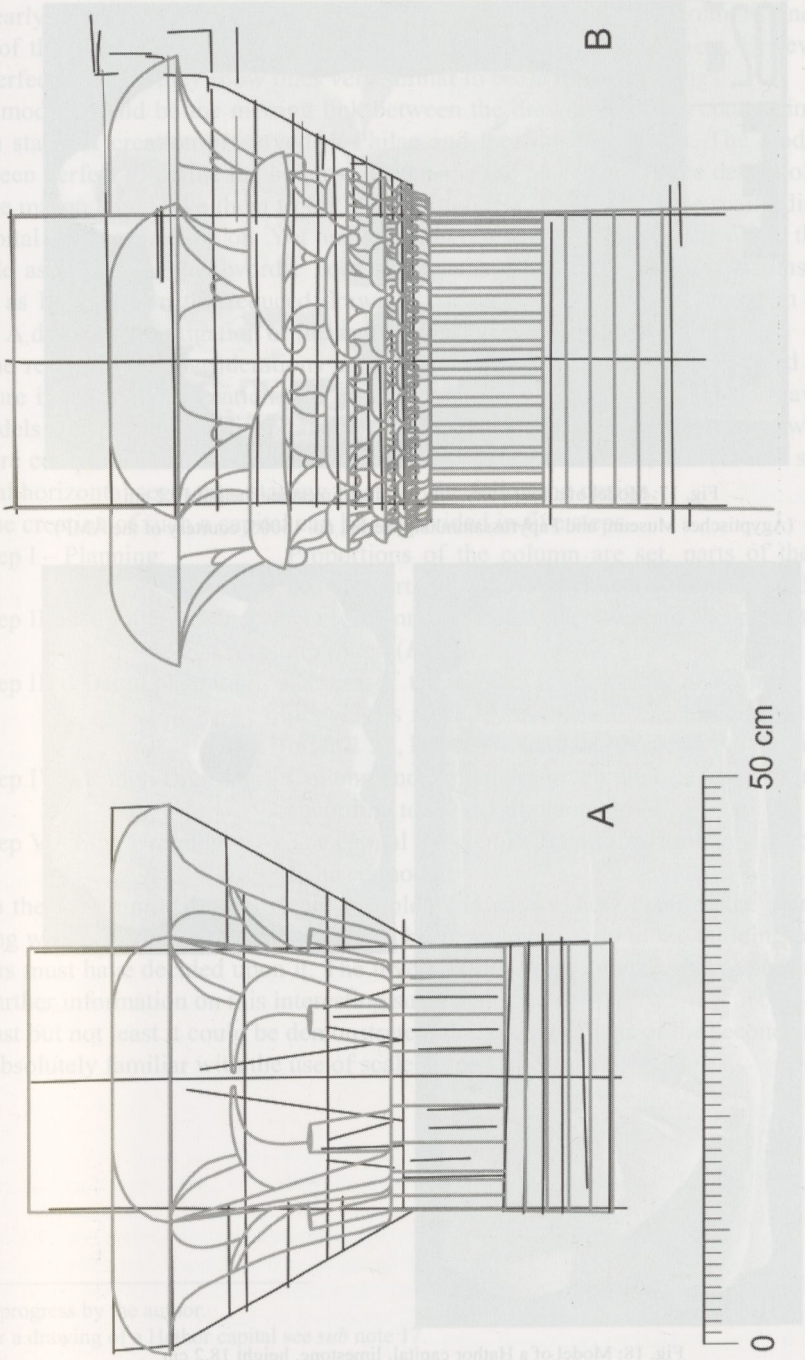

Fig. 16: The drawings with the corresponding capitals.

Fig. 17: Model of a four-story 'lily' capital, limestone, height 10,2 cm
(Ägyptisches Museum und Papyrussammlung Berlin, no. 15005, courtesy of the ÄMP).

Fig. 18: Model of a Hathor capital, limestone, height 18,2 cm
(Ägyptisches Museum und Papyrussammlung Berlin, no. 20352-1, courtesy of the ÄMP).

Nearly all of the models showing architectural pieces represent columns and capitals. Some of them are badly made and probably the works of pupils. Others, however, are of high perfection. And they show lines very similar to those in the drawings.
These models could be the missing link between the drawings, which content information for the stage of creation preserved in Philae and the finished capital. The models would have been perfect to define the heights, widths and the placement of the details of the capital. The mason could take them to the construction site, literally: on the scaffolding next to the capital he was working on. Yet one question remains to be answered: Were the models to scale as well? In other words: Took the mason detailed heights and widths from the model as he did from the reduced drawings, or were the models examples in a broader sense? A detailed investigation of the models might answer this question.[24]

The result of my considerations is as follows: Hathor capitals were treated like other sculpture indeed. Their creation was based on grids. We find these grids on drawings and on models (fig. 18).[25] Floral capitals on the contrary were based on drawings, which were far more complex. They were divided in top view and elevation. The latter was subdivided in equal horizontal segments, starting lines for the following design.

The creation of such a capital can be subdivided in five steps.

Step I – Planning:	Proportions of the column are set, parts of the capital's design, particularly the number of stems, is fixed.
Step II – Building:	The column is erected according to the plan, the blocks are rough (*Bosse*).
Step III – Detail planning:	Design of the capital is drawn in an abstract plan. The drawing is more or less near to the building site, scale is often 1 : 1, but can be reduced 1 : 4, 1 : 5 or similar.
Step IV – Rough Dressing:	Column and capital are given their geometric simple form according to the detail planning.
Step V – Fine Dressing:	The capital is given its final form, probably according to a reduced model.

So the whole process was rather complex and shows, how detailed the planning of a building with composite-capitals must have been, and how early in the building-process the builders must have decided upon it. The investigation of the models shows promise to provide further information on this interesting subject.

Last but not least it could be demonstrated, that the Egyptians of the second century BC were absolutely familiar with the use of scale reduction.

24 In progress by the author.
25 For a drawing of a Hathor capital see *sub* note 17.