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Text-Simulated Paths in the Pyramid of Unas Are Topographically Analogous to the Positions of the Upper and Lower Chamber Shaft Inlets in the Great Pyramid

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Abstract

The original purpose of the four known shafts that uniquely emit from the Upper and Lower Chambers inside the Great Pyramid at Giza, Egypt, remains unknown despite several models that have been proposed to explain it. The principal problem with proving the intent behind their incorporation into only this pyramid's design is that all models thus far rely on circumstantial evidence. No written records of architectural design have been discovered that could unequivocally prove what was intended. Here, I highlight two known Pyramid Texts passages speaking of paths for the soul to rise to the northern and southern sky. They were placed on the north and south walls of the antechamber inside the pyramid of Fifth Dynasty King Unas in such a manner that their distances from the eastern seam of a large lintel stone above the entry into this chamber, and the chamber's east wall, respectively, are analogous to the distances of the shaft openings from the east walls of the Upper and Lower Chambers of the Great Pyramid. This topographically analogous placement of two textual invocations of a ritual path into the afterlife supports the model previously proposed by Alexander Badawy and others before him that the purpose of the small shafts in the Great Pyramid was of a religious nature, arguing against a purely logistical purpose.

Keywords

Great Pyramid, Unas, Pyramid Texts, Shafts, Simulation

1. Introduction

From both known, above-ground chambers built into the masonry of the Great Pyramid at Giza, Egypt, a set of two small shafts about as wide as a woman's shoe box ascends to higher pyramid levels from opposite inlets at the north and south walls (Gantenbrink, 1999; Bergdoll, 2016; Hamilton, 2022). No other Egyptian pyramid is known to have them incorporated. Both their design and construction required significant added resources, indicating that they must have served an important function (Gantenbrink, 1999: Findings). Since their discovery, several explanations have been put forth to explain their purpose; for example: 1) conduits for air flow,[1] 2) communication channels,[2] 3) chemical reservoirs and electromagnetic wave guides (Dunn, 2024: figure 2.3 and chapter 5), and 4) ritual paths to the sky for the soul of the dead king (Badawy, 1964: p. 193). The latter model by Badawy was later extended by Virginia Trimble and Robert Bauval to identify specific stars targeted by each shaft (Trimble, 1964; Bauval & Gilbert, 1994). [3]

The Upper Chamber's (a.k.a. "King Chamber") shaft inlets on the north and south walls are located 2.48 and 2.49 meters, respectively, from the east wall (Gantenbrink, 1999: Findings). The Lower Chamber's (a.k.a. "Queen Chamber") shaft inlets, likewise, north and south, are located 2.90 and 2.88 meters, respectively, from the east wall.[4] Therefore, the two shafts of each chamber are located diametrically opposite each other to within 2 cm. The shafts in the Lower Chamber are circa 40 cm further west than the shafts in the Upper Chamber, reckoning their distance from their respective chamber's east wall.

In the Upper Chamber, the roof of the northern shaft is created by a granite lintel 122.7 inches/3.12 meters wide (Smyth, 1867: p. 109). This lintel makes up the entire distance, and beyond, from the chamber's east wall to the shaft's eastern limit on the second and third courses of the five Upper Chamber granite block courses (**Figure 1**). Thus, the shaft's eastern limit roughly divides the lintel into two conceptual segments, 4/5 (2.48 m/3.12 m ~4/5) and 1/5 (3.12 m − 2.48 m = 0.64 m; 0.64 m/3.12 m ~1/5).

The pyramid of Unas has two chambers: an antechamber and a burial chamber. The former measures 3.71 m on the north wall and 3.75 m on the south wall (Labrousse, 1996: p. 30). Most of its north wall comprises a trapezoid-shaped lintel that measures between 2.94 m at the top and 3.09 m at the bottom (Brabin, 2010: p. 59; **Figure 2**). The distances from the east edge of the lintel to the east wall of the chamber are 0.31 m at the top and 0.26 m at the bottom (Labrousse, 1996: p. 30). The missing lengths from the western edge of the lintel to the west wall are therefore 3.71 m − 2.94 m − 0.31 m = 0.46 m and 3.71 m − 3.09 m − 0.26 m = 0.36 m, respectively (**Figure 3**).

[1]Reviewed recently by YouTube channels *History for Granite* at URL: https://youtu.be/-Wz1ARwxVGc?si=oR9kq55l0W7dEaiK, and *Ancient Architects* at URL: https://youtu.be/Dr9jjciHqXs?si=LGubuQ2KMaMttSJ9.
[2]https://youtu.be/-z8pX9jX1qI?si=k6i7qZf-z1tTPhAX
[3]J. J. Hurtak also associated one of the shafts with Orion in Keys 108-111 (Hurtak, 1975).
[4]All distances are from the east wall of the respective chambers to the east wall of each shaft.

Figure 1. The granite lintel of the north wall over the entry into the Upper Chamber inside the Great Pyramid. The northern shaft (left) begins 2.48 meters from the east wall (right). Photo from 2021.

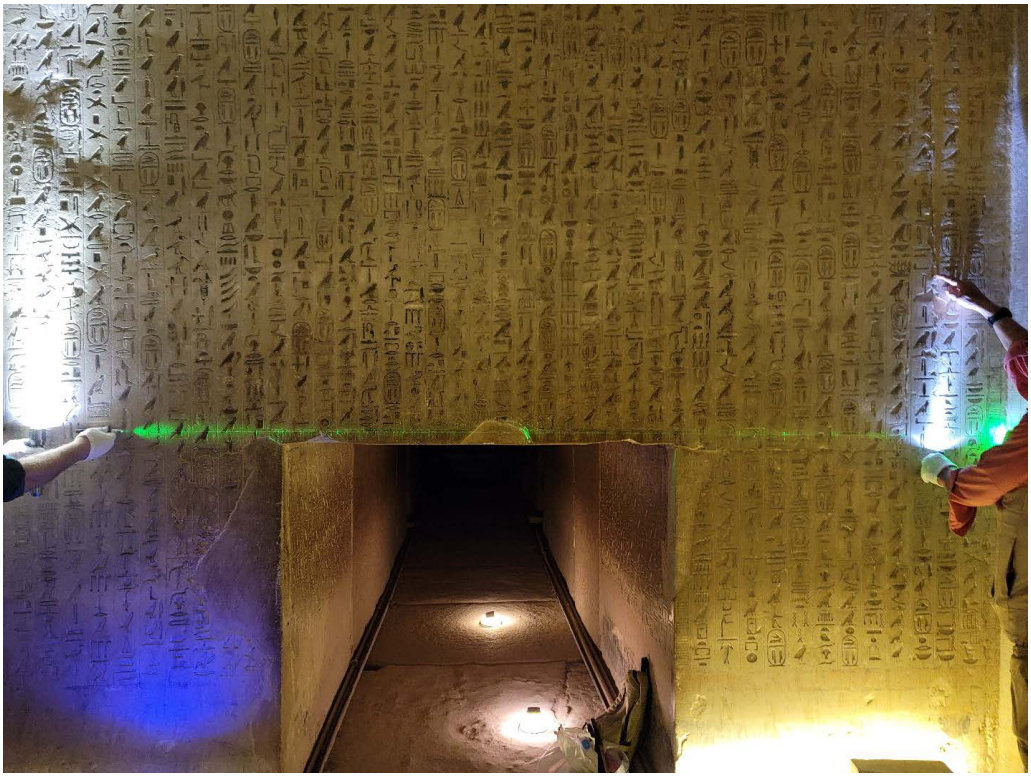

Figure 2. The lintel over the entry to the antechamber of Unas. The white light cones mark its east and west limits, and the green light marks the bottom. Photo courtesy of Erfan Samsamshariat, 2022.

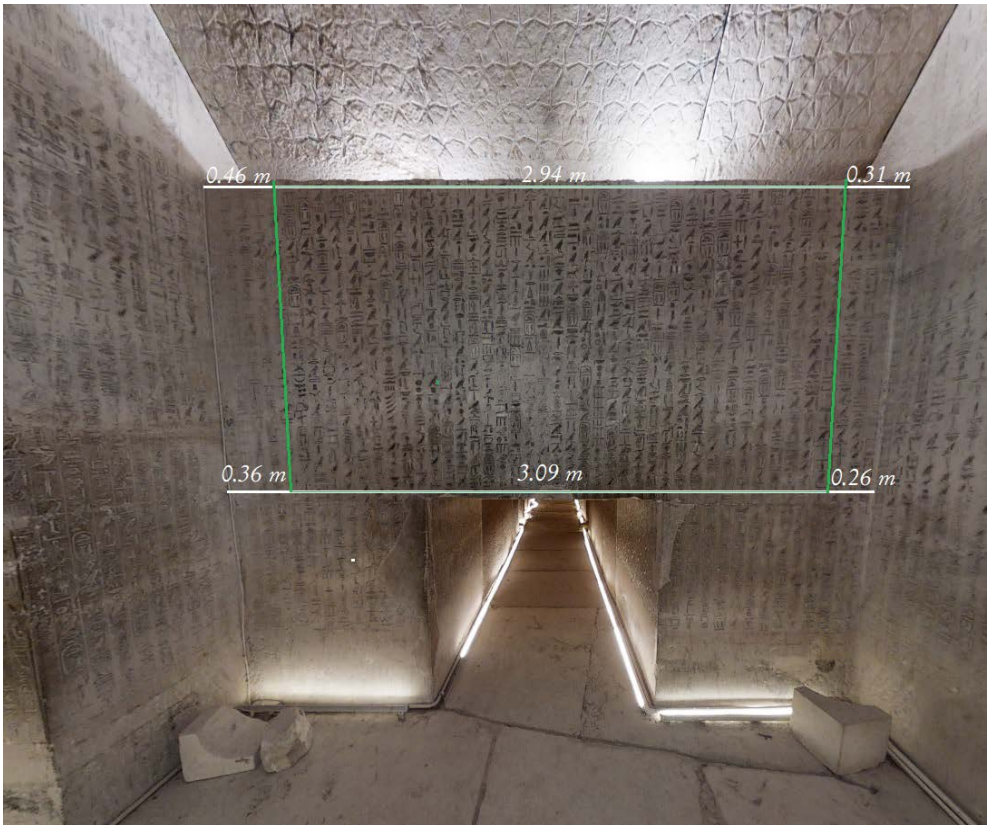

Figure 3. Measurements of the north wall and lintel (marked in green) above the entry into the antechamber of Unas, based on published (Labrousse, 1996: p. 30; Brabin, 2010: p. 59) and computed data. Screenshot of Virtual Unas (https://www.ees.ac.uk/resource/burial-chamber-of-unas--saqqara.html), courtesy of the Egypt Exploration Society; modified.

The Pyramid Texts inscribed into the north wall of Unas' antechamber encompass Utterances 302 to 312. The hieroglyphs spelling them out are incised into forty-three text columns, read from west to east (left to right); each column is to be read from top to bottom. Including the two ornamental columns at the extreme east and west, a total of forty-five columns can be observed, thirty-six of which are fully contained by the lintel, seven (3 east + 4 west) fully outside of it, and two, partially and fully split by its east and west seams, respectively. Therefore, the average width of each column is circa 3.71 m/45 × 100 cm/m = 8.24 cm, slightly wider than a palm of a royal Egyptian cubit. In this paper, the error in computing distances based on column numbers can be estimated to be within ±5 cm, i.e., about one-half of a text column.

2. Observations

Counting from west to east, the tenth text column—eleventh including the ornamental column on the western edge—of the north wall of the antechamber of Unas contains the following hieroglyphic text from Utterance 304 (paragraph numbers 468a-469b), read from top to bottom (relevant passage in boldface, columns in brackets):

Transliteration (Allen, 2013: p. 95):

[…10] j.nḏ ḥr.ṯ z3t jnpw [11] ḥrt ptrw pt ḥnkt ḏḥwtj ḥrt mꜣꜥwj mꜣqt **j.wn wꜣt wnjs swꜣ wnjs** j.nḏ ḥr.k njw ḥrj spt mr-n-ḫꜣ [12] **j.wn wꜣt wnjs swꜣ wnjs.**

Translation (Allen, 2005: p. 57):

[…10] Greetings, Anubis's daughter [11], at the sky's looking, you whom Thoth endowed, at the ladder's uprights!

Open Unis's path that Unis may pass.

Greetings, ostrich at the Winding Canal's lip! [12] **Open a path for Unis that Unis may pass**.

The eastern edge of the eleventh column containing the phrase "Open Unis's path, that Unis may pass" is located at a total distance of 34 (3.5 + 30.5) columns × 8.24 cm/column × 1 m/100 cm = 2.80 m (error range: 2.75 - 2.85 m) from the east wall of the antechamber (**Figure 4**). The same edge is 31 columns × 8.24 cm/column × 1 m/100 cm = 2.55 m (2.50 - 2.60 m) from the lower eastern edge of the lintel stone, and 30.5 columns × 8.24 cm × 1 m/100 cm = 2.51 m (2.46 - 2.56 m) from the upper eastern edge of the lintel stone.

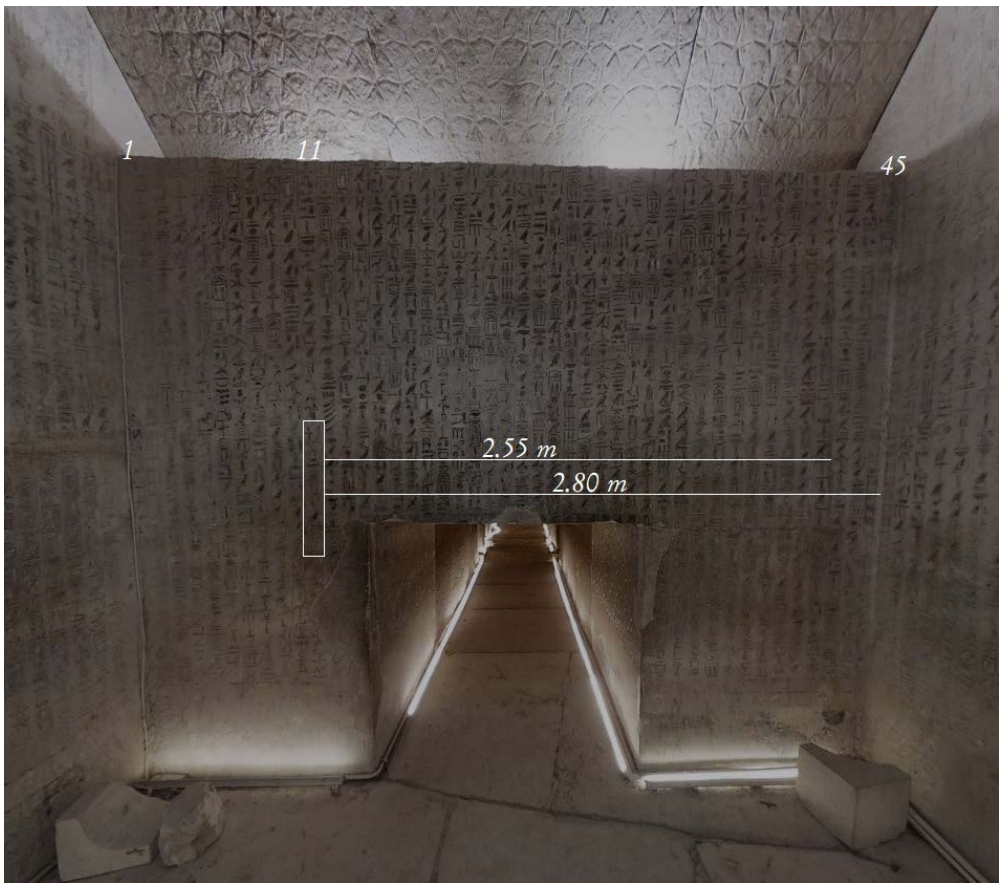

Figure 4. Virtual Unas's antechamber showing the position of the passage on the north wall and its distances from the east wall and lintel edge (right). Column numbers at the top include the ornamental edge columns. There are forty-three text columns in between. Screenshot of Virtual Unas (https://www.ees.ac.uk/resource/burial-chamber-of-unas--saqqara.html), courtesy of the Egypt Exploration Society; modified.

This textual invocation of a path to be opened, when there is none physically present, amounts to a textually simulated path that is to issue from the antechamber. This passage's location on the north wall of Unas' antechamber is analogous to that of the northern shafts in the Upper and Lower Chambers of the Great Pyramid at distances that are topographically equivalent to within a column width, i.e., 2.46 - 2.60 m (Unas-lintel edge to column 11) versus 2.48 m (Great Pyramid Upper Chamber), and 2.75 - 2.85 m (Unas-east wall to column 11) versus 2.90 m (Great Pyramid Lower Chamber).

Since there are a total of thirteen instances of the hieroglyphic word wꜣt for English "path" in the Pyramid Texts of Unas,[5] it is possible that this placement of a textually simulated path in Utterance 304 is accidental and was not intended to imitate the position, relative to the east wall, of the physically real shafts in the Great Pyramid. Evidence of an intentional placement in this position requires confirmation of a similarly positioned, simulated pathway diametrically opposite the south wall of the antechamber, as is the case in the Great Pyramid, where each of the two northern shafts is directly opposite another on the south walls of the Upper and Lower Chambers.

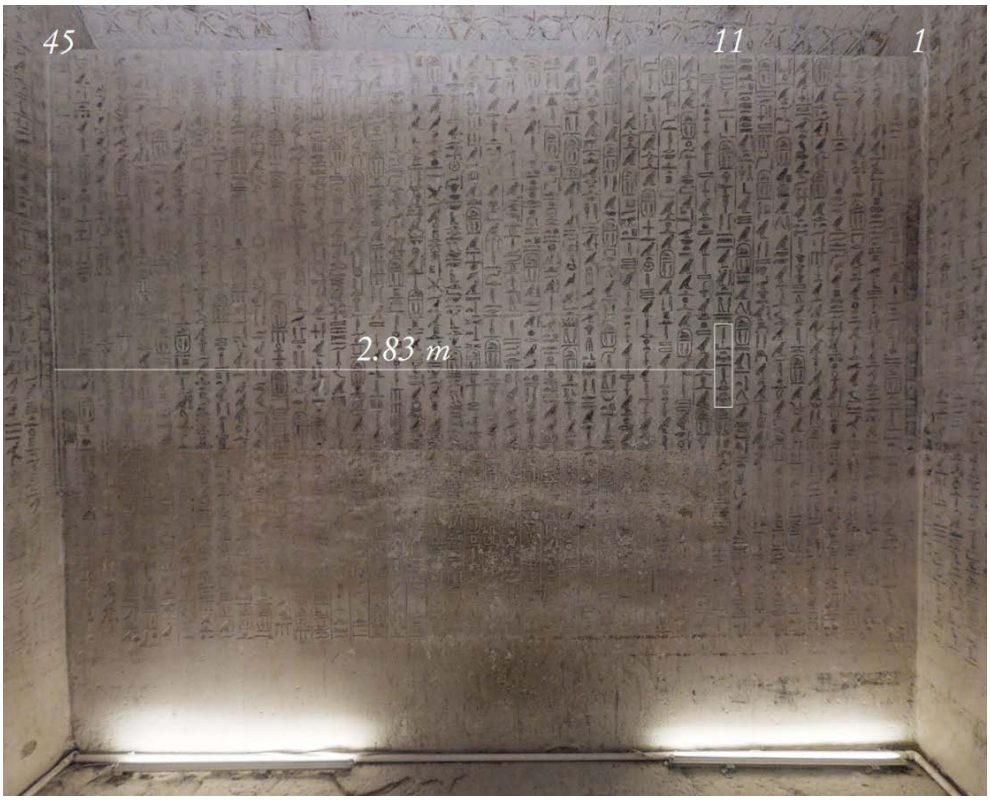

Figure 5. Virtual Unas' antechamber showing the position of the passage on the south wall and its distance from the east wall (left). Column numbers at the top include the ornamental edge columns. There are forty-three text columns in between. Screenshot of Virtual Unas (https://www.ees.ac.uk/resource/burial-chamber-of-unas--saqqara.html), courtesy of the Egypt Exploration Society; modified.

[5]Utterances 81, 222, 251, 252, 254, 273/274, 288, 299, 304 (2×), 310, and 313 (2×).

There is no instance of wꜣt on the south wall of the antechamber of Unas. However, in the tenth text column (eleventh total column including the ornamental column at the western edge of the south wall), the hieroglyphic text of Utterance 261 (325b-326d) reads:

Transliteration (Allen, 2013: p. 80):

[…10] jmw wnwnjt [11] rmnw.sn ʿḥʿ wnjs ḥr gs jꜣbtj n mnw-ḫwt jn.n.f **jʿt n ḥrt** wnjs pj jr wpt nšn

Translation (Allen, 2005: p. 47):

[…10] Those in motion will open their arms to him. Unis will stand up on the eastern side of the hail, having used **the ascent to the above**. Unis is the one who does the tempest's mission.

As is the case for the north wall, the eastern edge of the eleventh column of the south wall containing the phrase "the ascent to the above" is located at a total distance of 34 columns from the east wall of the antechamber. The distance here is longer because the south wall is 4 cm longer than the north wall. It is 34 × 8.33 cm × 1 m/100 cm = 2.83 m (2.78 - 2.88 m; **Figure 5**). By comparison, the southern shaft of the Lower Chamber inside the Great Pyramid is located 2.88 m from the east wall.

Therefore, the antechamber of the Pyramid of Unas textually simulates a path and an ascent in diametrically opposed positions (**Figure 6**) at distances from the east wall that are, within the estimated error, equivalent to those of the four small shafts in the Great Pyramid.

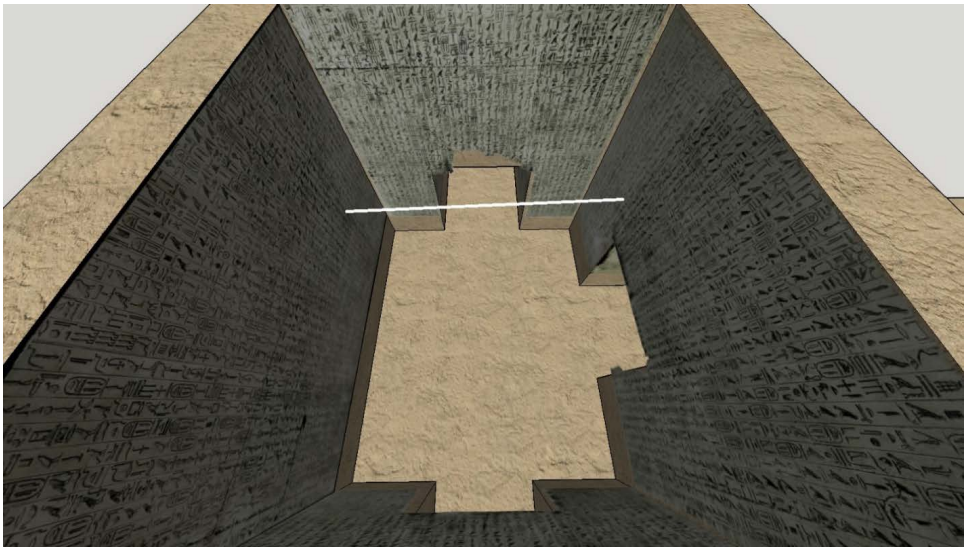

Figure 6. Virtual model of the antechamber of Unas showing the positions of the textually simulated path and ascent on the north (right) and south (left) walls, respectively. The east wall is at the bottom. Isometric model made by Ali Reza Samsami.

3. Discussion

The observations presented in this paper provide new evidence that the shafts emanating from the Upper and Lower Chambers inside the Great Pyramid were

meant to be concrete channels for a deceased king to transfer from the confines of his pyramid to the outside and above, rather than purely logistical conduits for air, communication, chemical ingredients, or any other practical objects, such as guides for ropes, for example.

Alexander Badawy argued against Vyse, Maspero, and Petrie that the shafts were meant to ventilate the chambers or, as argued by Gantenbink, to observe the stars (Badawy, 1964: p. 190). But even though direct sky observation through the shafts is impossible due to their several bends, Badawy nevertheless adopted Steindorff's and Capart's idea that they had a religious function related to the sky. Badawy developed this ritual angle by identifying analogous structures in older funerary monuments and those contemporary with the Great Pyramid. He focused on the star-religion aspect of the Pyramid Texts to explain why these structures were headed north and south instead of east towards the Sun. He concluded that the shafts of the Great Pyramid must have likewise been intended to have an ideological function rather than a logistical one and proposed that they were meant to be paths for the royal soul to reach certain stars important to the ancient Egyptians' afterlife beliefs (Badawy, 1964: p. 193).

Therefore, the argument for logistical conduits and against paths to the stars requires a more nuanced rationale than merely observing that the shafts could not be used to directly see the starry sky from the chambers. This rationale must be based on still lacking positive evidence that contradicts the ritual model supported by the direct textual evidence presented in this paper, and it must explain why the lower chamber shafts were closed off with "doors", a feature also not incompatible with paths for the royal soul that required it to utter an opening spell, such found in the Pyramid Texts.

However, while Badawy made a good circumstantial case for paths to the stars, citing various passages from the Pyramid Texts of the Fifth and Sixth Dynasty kings of Egypt, his compilation of evidence leaves room for doubt because, unlike the later pyramid of Unas, the Great Pyramid contains no religious writing, and the elaborate construction needed to make the shafts appears exuberant relative to a ritual purpose. Furthermore, the absence of similar shafts in other pyramids appears to suggest that their function was unique to the logistics of building Egypt's largest pyramid and not part of a religious belief that transcended generations of pyramid-building Egyptian kings.

Some later scholars who have pondered the meaning of the shafts also tend to prefer a symbolic function but have had reservations about Badawy's theory since the lower chamber shafts are closed off (Monnier & Lightbody, 2019: p. 103). They point out that there may not have been a master plan from the beginning and that construction of the Great Pyramid changed several times, implying perhaps that the shafts could have been an *ad hoc* addition after the pyramid's base was in place. But regardless of whether construction adhered to a master plan, the final layout of the interior of the Great Pyramid must have been known to later generations of architects.

The pyramid of Unas has several features that suggest its architect was familiar with the internal architectural design of the Great Pyramid, thus generating the needed context within which text-simulated shafts to replace physical shafts in an architecturally analogous manner make sense. For example, the height of *Perfect are the Places of Unas* reconstructs to 82 royal Egyptian cubits, the height of the floor of the upper chamber ("King's Chamber") inside the *Horizon of Khufu* (Lehner, 1997: p. 155). The base of the former is 110 cubits, which is one-quarter the base of the latter. The former features 43 text columns on its antechamber north and south walls, the same number as the granite north-south-oriented ceiling rafters that form the ceilings of the King's Chamber and four of the five enigmatic spaces above it, the Relieving Chambers (Monnier & Lightbody, 2019: p. 109). Even an imprint of a king in the harpooning pose, captioned with what is likely the Horus name of Khufu, ḥrw mḏdw, was sculptured into the northern alabaster wall of Unas' pyramid; Unas may have repurposed it from another monument, for example, that of his father Djedkare (Youssef, 2011).

Unas' pyramid is the first known ancient Egyptian monument to have been inscribed with the Pyramid Texts. The placement of these texts on the walls in that pyramid is, therefore, the original layout known to be considered, against which all Pyramid Texts in other, later pyramids must be compared. Utterances were both added to and taken away from the original version of Unas. For example, while Utterance 304 also appears on the north walls of the antechambers in the pyramids of Teti (column 37), Pepi I (column 50), and Pepi II (column 16; Allen, 2013: PT 304), Utterance 261 on the south wall only appears again in the pyramid of Pepi I, beginning in column 32 on the north wall (Allen, 2013: PT 261). The relevant phrase cited here has not been preserved, however.

The evidence submitted here adds two new dimensions to Badawy's model for the function of the shafts: First, it highlights the development of textual simulation to supplant concrete representation. For example, the burial chamber of Unas contains dozens of textual entries that simulate grave goods, predominantly food. These provisions are invoked using utterances that phonetically mimic the sounds of the words of these foods, drinks, and other precious goods (Neyland & Seyfzadeh, 2022: pp. 141-143). This invocation obviated the need to place actual grave goods inside the pyramid. This is the needed context from the same pyramid to be able to appreciate the significance of using text to simulate other things, such as architectural structures, instead of building them, especially when meant for the afterlife.

Second, it matters where texts were placed on the walls of Egyptian monuments. Textual topography means that the writing relates meaningfully to the function of the architectural unit where it is found in the monument. For example, in the first column of the entry's west wall (really the exit based on the sequence of the Pyramid Texts) it reads: "Pull back, Baboon's penis! Open, [sky's door! You sealed door, open a path for Unis] on the blast of heat where the gods scoop water. Horus's glide path—TWICE—will Unis glide on, in this blast of heat where the gods

scoop water, and they will make a path for Unis that Unis may pass on it: Unis is Horus" (Allen, 2005: p. 60).

Such textual topography has also been described, for example, in the fourth and fifth hours of the Amduat in the burial chamber of Thutmose III, where text and placement conspire to create an architectural time-loop during resurrection, again an architectural feature of the afterlife (Richter, 2008: pp. 79-80). Textual topography, as shown here, made it possible to replace a concrete architectural unit by simulating it through invocation. This innovation made the physical construction of such units unnecessary.

Given this added evidence, the replacement of physical shafts with textually simulated paths placed in topographically analogous positions inside a pyramid can be understood to have accomplished two things for the ancient Egyptians of the late Old Kingdom: it expanded the virtual repertoire for marrying physical monuments to imagined places not physically observable, and saved resources no longer needed to build concrete representations of such liminal transits between the physical world and the ethereal realm.

An apparent trend from concrete building to textual simulation, however, does not preclude the possibility that captions were used to enhance the physical structure's role in the afterlife. Other than quarry marks by the workers in the Relieving Chambers that reveal something about the logistics of construction, no inscriptions related to the belief system have been discovered inside the Great Pyramid. The writing on the exterior walls of the pyramid was just as mundane, according to Herodotus and his Egyptian source.[6]

Here, I would like to report an as yet unrecognized caption that may have been written in black ink onto the limestone slab that terminates the northern shaft of the lower "Queen" chamber (**Figure 7**). These markings have not yet been recognized as writing, but a message written in hieratic could be paleographically reconstructed as follows:

st3 wj dpt pt - "Pull me, the sky boat..."

What looks like a logogram of a figure holding a rod that extends towards the right copper "handle" of the slab is an imagery supported by the discovery of two of the "Dixon relics" (co-discovered By Waynman Dixon and James A. S. Grant) found in this shaft, the hook and the wooden stick (Dixon, 1872).

The paleographically most convincing match in the phrase, the sign for Gardiner A1/Möller A33 transliterated "j" in the Egyptian first person dependent personal pronoun "wj," makes an ideological interpretation of these markings, if they are indeed writing, almost a certainty, since no one alive and able to self-identify with "me" would have fit into this shaft.

[6]"On the pyramid it is declared in Egyptian writing how much was spent on radishes and onions and leeks for the workmen, and if I rightly remember that which the interpreter said in reading to me this inscription, a sum of one thousand six hundred talents of silver was spent;" (Herodotus of Halicarnassus in Histories II, *Euterpe*; *AN ACCOUNT OF EGYPT*; translated into English by British classicist George Campbell Macaulay.)

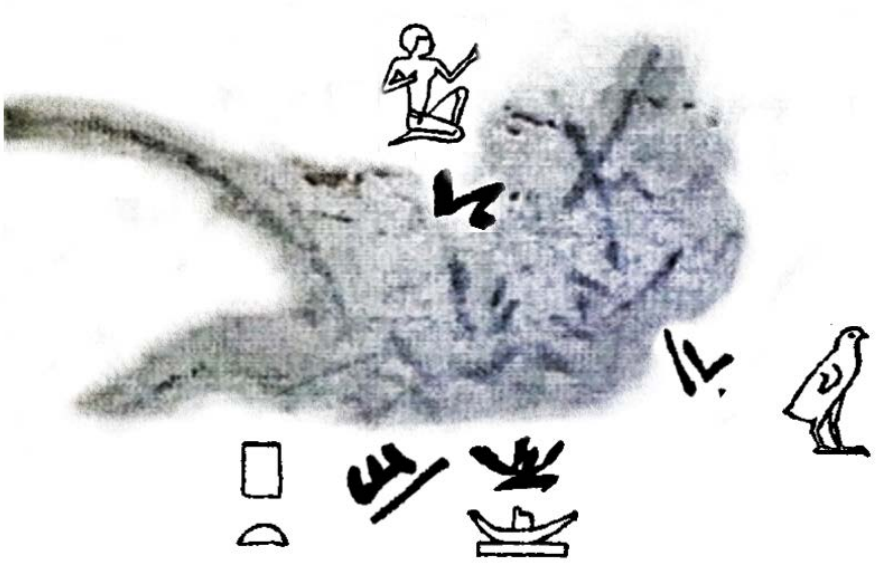

Figure 7. Markings on the limestone slab at the end of the northern shaft that emits from the lower "Queen" chamber inside the Great Pyramid. Reproduction of contrast enhanced images, cropped to the relevant area, originally produced by National Geographic during the 2012 Pyramid Rover robot exploration and released into the public domain in 2021 via Ancient Architects YouTube channel (https://youtu.be/NGK5_2C_ZtM?t=899). The interpretation of these markings as hieratic hieroglyphic writing is that of the author. The interpretation is based on similarities with authentic hieratic hieroglyphs shown here above and below the corresponding markings in thick black strokes along with their hieroglyphic icons as published by Möller (1909).

4. Conclusion

Proving architectural intent in ancient monuments becomes a difficult exercise when conflict arises as to whether a design feature had a logistical or an ideological function. In the case of the four shafts inside the Great Pyramid, this task becomes even more important because their construction cost significant additional expenditures of labor, materials, and time, suggesting their function was important to the overall function of the monument. Mechanistic or ideological biases on the part of modern scholars further complicate the analysis, which ultimately requires weighing of all the evidence, not only a subset thereof. The new textual evidence presented here adds to the considerations needed to distill intent. Text is a powerful indicator of such intent and should caution us against the premature conclusion that these enigmatic conduits had a practical rather than a religious purpose because they do not easily conform to our modern sense of pragmatism and efficiency.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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