

DATING FUNERARY STELAE OF THE TEWELFTH DYNASTY:

A STATISTICAL STUDY

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PREFACE

My interest in the dating of funerary stelae arose from two events. The first was my decision to use a stela about which very little was known, belonging to the Nicholson Museum at the University of Sydney, for a study in a subject from the Master of Arts degree in Egyptology at Macquarie University. In the course of the study I found that the stela had been published in French in *Recueil* in 1895 and so I had the pleasure of passing on my findings to the museum, where they were well received. My investigations also taught me a little about the evolution of funerary stelae through time.

The second event, an offshoot of the first, was my finding Bennett's (1941) article and subsequent note (1957) in *Journal of Egyptian Archeology*, where he showed that certain features could be used to date Middle Kingdom stelae to different periods of that era. With my background in mathematics, particularly in statistics, I was intrigued; it seemed to me that it should be possible to develop Bennett's work using more features to refine the dating.

The first steps in my plan of attack, collection of data, were proceeding well before I had any real understanding of how I was going to carry out the analysis. I intended to use my statistical knowledge, but the exact approach was still shrouded in mystery. My wife was to attend a conference in Washington in 1999 and she and I took the opportunity to make the trip a working holiday, when I could visit museums in Chicago, Boston and New York to photograph stelae and to discuss the project with senior members of museum staffs. At the end of 2000, thanks in part to my postgraduate student grant from Macquarie University, I was able to visit England, France and Egypt and collect data in museums there.

In the time between the two trips I had attended a meeting of postgraduate students at Macquarie where Dr David Cairns spoke of a statistical approach used in research in psychology. The programs he described sounded as though they might be the answer to my need and I sought more information. David pointed me to a number of papers, at least one of which was the application of the programs to archaeology; I then found further encouragement from wider reading. But only after a couple of false starts did I find a method that provided the basis that would allow me to analyse the features of an individual stela and so estimate its date of origin. The Introduction describes the approach that I finally adopted and it leads into the detail of the thesis.

INTRODUCTION

Basics

This is a cross-disciplinary study using statistical mathematics in Egyptology to develop a method of estimating the reign of origin of a funerary stela dated to the Twelfth Dynasty without reference to anything except the characteristics or features of the stela itself.

In 1941 Bennett published a paper (Bennett, 1941) in which he pointed out that the text of the offering formula on stelae evolved sufficiently during the period of the Eleventh, Twelfth and Thirteenth Dynasties to enable him to separate those made early in the period from those made late in the period. In 1947 Pflüger produced a similar study (Pflüger, 1947) based on the characteristics of the tableaux depicted on the stelae.

These two publications led me to believe that, by taking into account sufficient features of both the text and the tableaux, it should be possible to assign a stela to its reign without reference to any other sources for information such as family relationships of the person commemorated by the stela or his relations with the king. I realised that this would require tabulation of a large number of features, and a statistical analysis of those features.

The approach that I have taken is to examine as many stelae of the Twelfth Dynasty as I have been able to find that are dated internally with a cartouche, and tabulate their features. It was then possible to analyse the tabulated data to develop a decision tree, based on the features of these stelae, that can be applied to an undated stela to estimate the reign in which that stela originated. The approach is based on the assumption, which Bennett evidently took tacitly, that, despite the fact that the content and style of the inscriptions differ widely from stela to stela, the features of all stelae from a particular period are drawn from a common repertoire.

Incidentally, I believe that the tabulations might be of use to other researchers. The original thesis, which contains photographs and descriptions of the stela (including translations of the text) together with complete tabulations of the data, is held in the Macquarie University Library.

Limitation of Time Frame

By limiting the period of the study to the Twelfth Dynasty, rather than the Middle Kingdom, I aimed at the reasonably long reigns of only eight monarchs. Thus I avoided the reigns of the Eleventh Dynasty before the consolidation of the kingdom and the frequent changes of ruler during the Thirteenth Dynasty.

Restricting the study to funerary stelae, rather than including inscriptions on tomb walls, meant that, because of the relatively small size of a stela, the extent of the tableaux and the amount of textual inscription are limited. Further, it avoided the possibility of confusion if, in fact, the features of inscriptions on tomb walls and those on stelae differ significantly. In the event, because of the limited number of internally dated stela that still exist, it became necessary to confine the study to the reigns of only six kings - Senusret I, Amenemhat II, Senusret II, Senusret III, Amenemhat III and Amenemhat IV. It was further necessary, because of the small number of such stelae from the reigns of Senusret II and Amenemhat IV, to combine the reigns of Senusret II and his successor into a single regnal period and also to combine the reigns of Amenemhat III and Amenemhat IV.

Thus the study allows the date of an undated stela to be attributed not to a reign but, at best, to one of four regnal periods - the reign of Senusret I, the reign of Amenemhat II, the combined reigns of Senusret II and Senusret III, and the time of Amenemhat III and Amenemhat IV.

No word can readily include both the characteristics of a stela (such as size and shape) and its contents (like text and offerings depicted), and I have used 'features' or 'characteristics' in various places to cover either or both.

Approach

In order to select and record the features of the stelae for statistical analysis it was necessary to examine the stelae (or illustrations of them) and to provide translations of the hieroglyphs. For reasons of copyright, the individual stela data are not included in this document. The statistical approach, which is the basis of the thesis, does not require detailed descriptions and only statistical information is required for each stela.

The steps which I have taken in the course of the study are:

- I carried out a literature survey of publications in which stelae are described and their characteristics related to reigns. In this way, the evolution of the features of funerary stelae can be traced and the features that appear to be significant tabulated in terms of the reigns within the period of the study and to Dynasties or, at least, to historical periods outside the Twelfth Dynasty. This survey is described in Chapter 1 and a summary of the evolution of the features is given in Chapter 2 .
- I found references to as many as I could of funerary stelae that can be dated to a specific reign in the Twelfth Dynasty. Such stelae must either include the *rnpt N hr hm nswt bity X* phrase (where N is the year number of the reign and X is the name of the ruler) in the inscription or contain a cartouche in or near its upper border and context that implies that its owner lived during the reign of the king mentioned, as suggested by Freed (1996).
- I examined the dated stelae (physically, in photographs, illustrations or other publications) in the light of the literature survey and personal observation and recorded the features (or characteristics) that appeared to be important. For convenience of presentation the database thus developed was divided into four: a Pattern Database describing the general appearance and content of each stela, a Text Database concerned with the textual inscriptions, a Tableau Database describing the inscribed scenes, and a Miscellaneous Database with biographical information and prayers as defined by Barta (1964). The databases derived from them are described in Chapter 3 of Part I; Table 1 contains a selection of the data, chosen to include the features that were found to be statistically significant in the final analysis and others that were present in most of the stelae. In the event, none of the features from the Miscellaneous Database proved to be significant, and none are shown in Table 1 (though they are included in the thesis itself).
- After some trial and error, I found statistical techniques capable of developing tests to estimate the reign of origin of a Twelfth Dynasty stela that has no internal dating. I then used these techniques to analyse the recorded data from the internally dated stelae to develop a test or tests which can be used to make that estimate. The analysis also provides the level of confidence that can be assigned to the estimate. The test finally developed is a decision tree that can also be presented as a decision table. The work leading to the Twelfth Dynasty Decision Tree and the Decision Table developed from it are described in Chapter 4; the Decision Tree is shown as Chart 1
- I checked the applicability of the tests by applying them to the dated stelae to ensure that the results that they achieve are acceptable. Because the features on which the tests are based evolved over the period of the Twelfth Dynasty, this does not mean that

every stela is necessarily dated by the tests to its known reign of origin. A feature might continue to be used in one workshop when it has been replaced in another workshop by a different feature. Further, because the results are statistical estimates, the possibility of errors is present, though limited. The test and its results are described in Chapter 5, these are supported by a Table 5.

- Because the statistical tests have been developed from stelae known to originate in the Twelfth Dynasty, they cannot be expected to yield sensible results when applied to stelae from other dynasties. A method was therefore required to assess whether an unfamiliar stela might be dated to the Twelfth Dynasty. Using the summary of the literature survey in Chapter 2, I devised a test, the Preprocess Decision Tree and Decision Table, to exclude stelae from other dynasties from testing by the Twelfth Dynasty Decision Tree. This decision table is shown in Chapter 6, and the Decision Tree as Chart 2.. This test is not refined to the level of the Twelfth Dynasty Decision Tree; to do so would be a much larger task, requiring the detailed examination of far more stelae from other Dynasties than was feasible in this study.
- As a last step, aimed at demonstrating the usefulness of the approach, I selected a sample of stelae selected randomly but including:
 - ✓ Internally dated stelae from other Dynasties, to show how applying the Twelfth Dynasty Decision Tree alone can lead to nonsensical conclusions;
 - ✓ Stelae in which the offering formula begins $\text{Ⓜ} \text{Ⓜ} \text{Ⓜ}$ not $\text{Ⓜ} \text{Ⓜ} \text{Ⓜ}$, to check whether some could (like CG20702) be dated to the Twelfth Dynasty;
 - ✓ Stelae dated by specialists to the Twelfth Dynasty on the basis of their specialist knowledge, as another check on the Twelfth Dynasty Decision Tree;
 - ✓ Other stelae from Lange and Schäfer (1925), simply as an exercise in dating undated stela from the Middle Kingdom.
- I then used the Preprocess Decision Tree and the Twelfth Dynasty Decision Tree to estimate the date of each of the sample stelae. The tests are discussed in Chapter 7 and the corresponding data are shown in Table 6 and Table 7. Where possible, the results are compared with dating given by others; Table 8 summarises the comparisons.
- The conclusions drawn from the study are given in Chapter 8.

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