What Can Epithet Strings Reveal: A Case Study of Regional Variations and Uniformity in the Identity of Isis

He Huang （黄菏）
Ludwig-Maximilians-Universität München

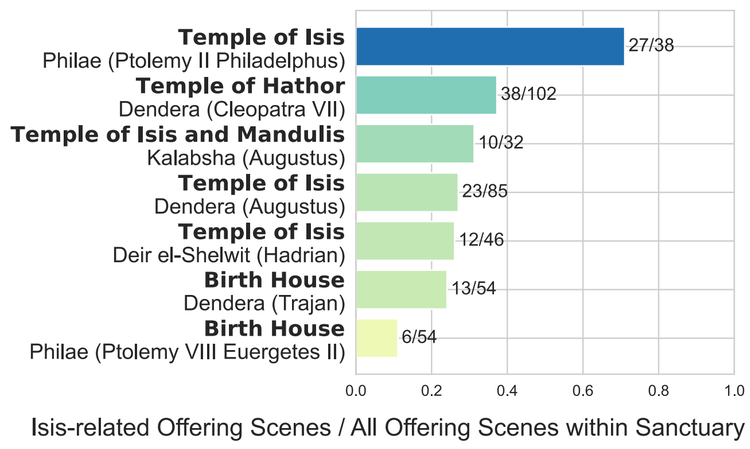
Github link

Introduction

Study object: the epithet strings of the goddess Isis

Materials:

Texts → 1) Next to Isis' figures 2) In divine columns → Offering scenes → Sanctuaries → Greco-Roman temples



Goal: reveal how strings of epithets of Isis varied across temples.

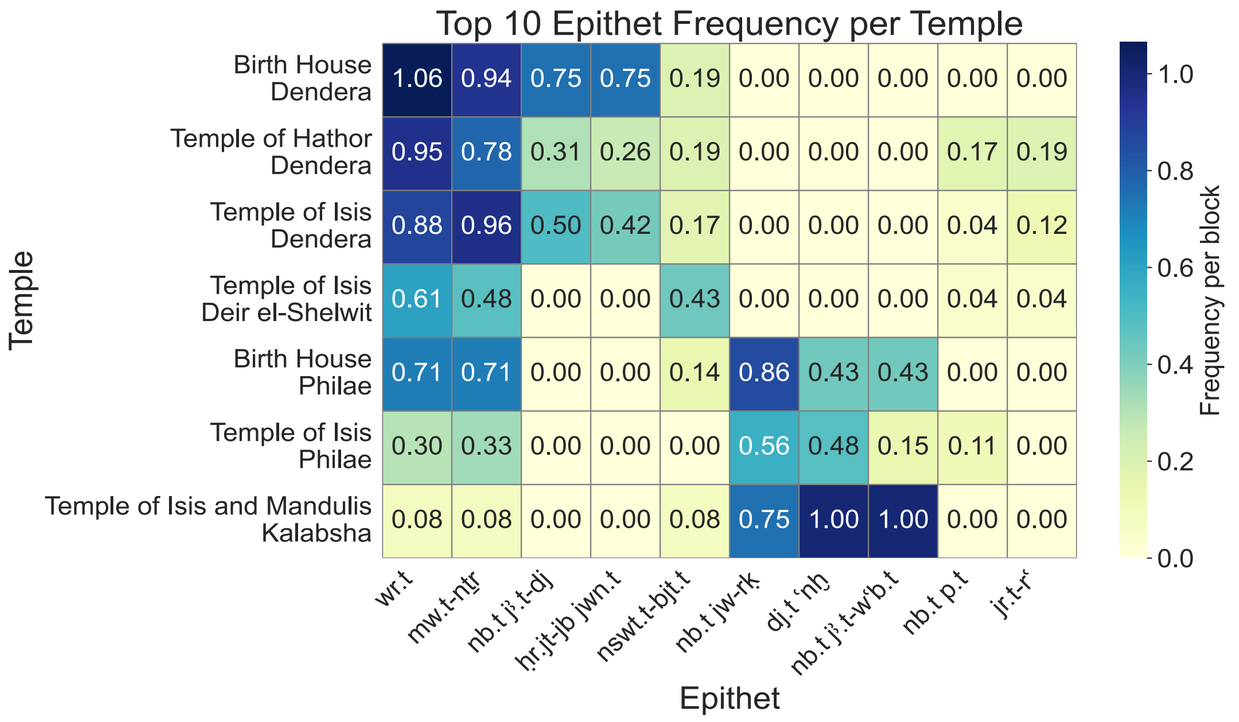
Methods

Epithet strings → Documented into a TXT file → Annotated with Epithets' types and motifs → Converted into a JSON file (*linked via the QR code above*) → Statistically analyzed in three steps

I. Frequency Analysis for individual epithets in each temple

$$Frequency = \frac{n_{epithet}}{n_{block\ (offerng\ scene\ containing\ Isis)}}$$

Purpose: reveal regional preferences of assigning epithets to Isis



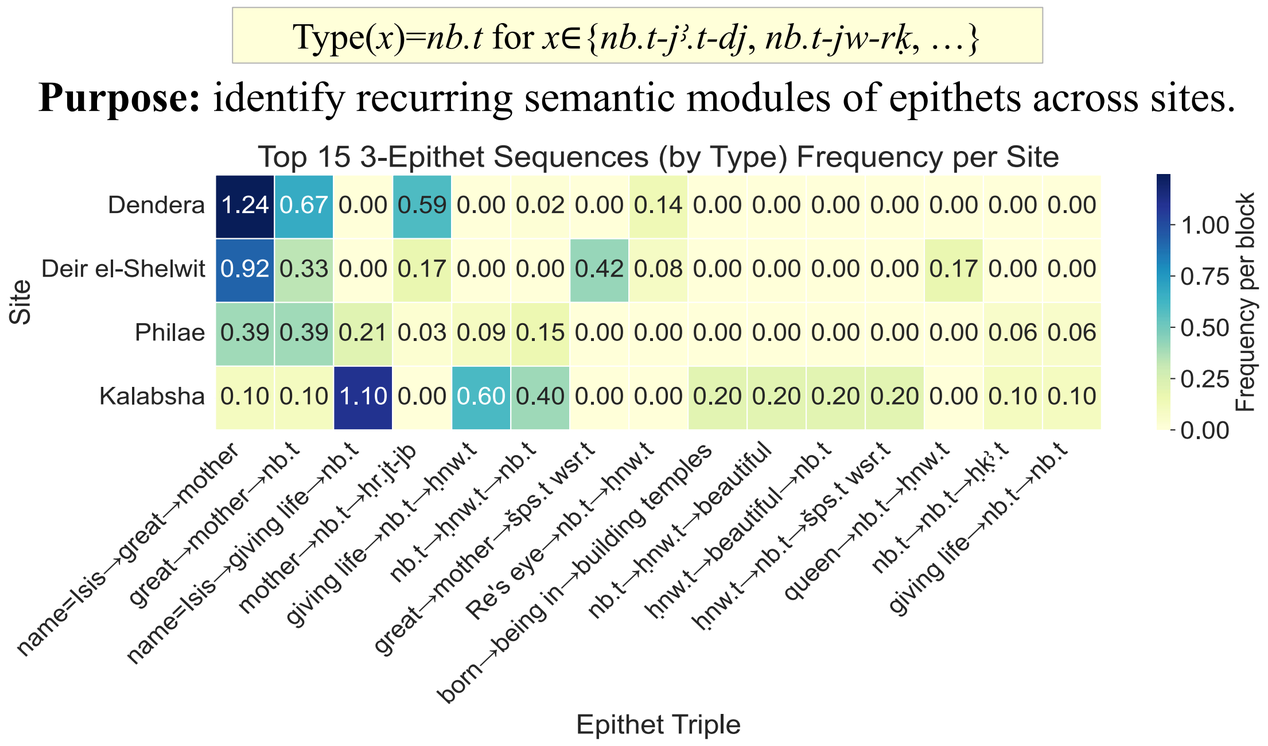
- Most frequent epithets overall**:** ***wr.t* and *mw.t-nṯr*** – reduced in Kalabsha
- Local features: ***ỉ.t-dj* and *ỉwn.t*** (only in Dendera); ***ỉw-rḳ* and *ỉ.t-wʿb.t*** (Philae & Kalabsha).
- Notable patterns: ***ỉ.t-wʿb.t*** peaks in Kalabsha; ***ỉr.t-rʿ*** only appears in Dendera & Deir el-Shelwit; ***dỉ.t ʿnḫ*** is prominent in both Kalabsha and Philae.

II. Frequency Analysis for 3-epithet sequences (by type)

Sequences were based on **epithet types**, not on **individual forms**

Type(x)=*nb.t* for $x \in$ {*nb.t-ỉ.t-dj*, *nb.t-ỉw-rḳ*, …}

Purpose: identify recurring semantic modules of epithets across sites.



- Most frequent 3-epithet strings: **Isis – great – mother.**
- Absent in Dendera and Deir el-Shelwit: **Re's eye – *nb.t* – *ḥnw.t.***
- Only in Kalabsha: the strings containing ***ḥnw.t.***
- Kalabsha resembles Philae in strings structure, but **frequencies differ** significantly.

III. Visualizing Epithet Sequence Motifs with Bioinformatic Tools

Sequences were further simplified by merging **types** into broader **motifs**.

Type(α)=reign for $\alpha \in$ {*nb.t*, *ḥnw.t*, *nswt.t-bjt.t*, *ḥ³ḳ.t*, …}

Innovation: Based on structural parallels and partial alignment, epithets strings were treated as analogous to **genetic sequences** and analyzed with **bioinformatic tools**, which are seldom applied in textual studies.

Purpose: visualize motif conservation and variation in epithet sequences.

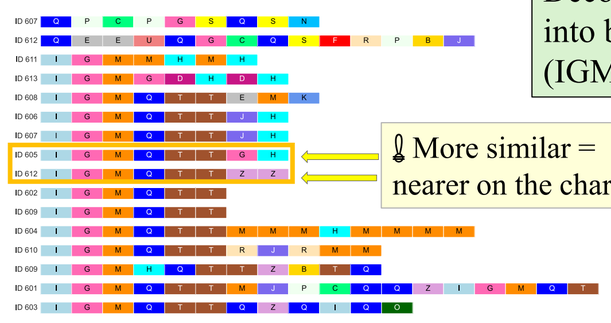
Tool 1: Jaccard-based bigram clustering of Epithet Motifs

Decompose strings into bigrams (IGM → IG, GM) → Compute Jaccard distances → Sort with hierarchical clustering

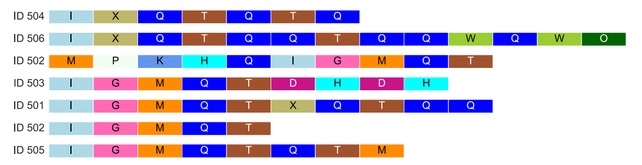
More similar = nearer on the chart

$$d_J(A,B) = 1 - J(A,B) = \frac{|A \cup B| - |A \cap B|}{|A \cup B|}$$

DBh = Dendera, Birth house

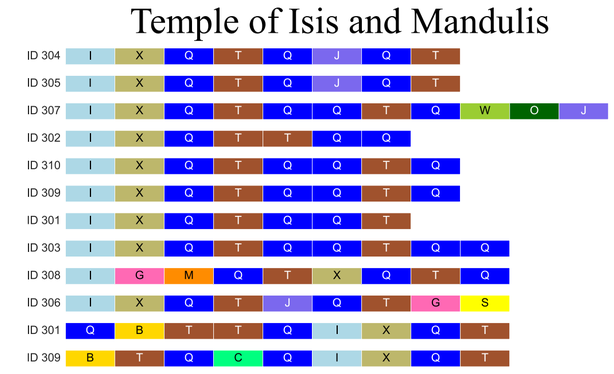


PBh = Philae, Birth house



DsTi = Deir el-Shelwit, Temple of Isis

Ktim = Kalabsha, Temple of Isis and Mandulis



Tool 2: Sequence Logo Visualization of Epithet Motifs

$$Shannon\ entropy:\ H(l) = -\sum_{b=1}^{26} f(b,l)\log_2 f(b,l)$$

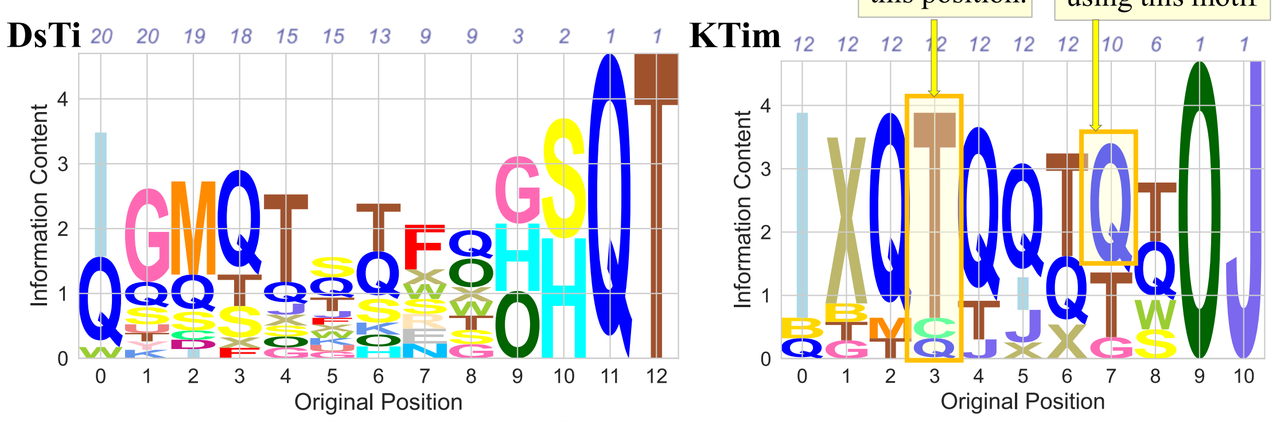
$$Total\ Height_l = Information\ Content_l = \log_2(26) - H(l)$$

$$Height_{b,l} = f(b,l) \cdot (\log_2(26) - H(l))$$

(the correction term e(n) is ignored in this study)

Higher total height, less variation in this position.

Higher character height, higher probability of using this motif



- In DsTi: variated patterns, specifically related to **F (fighting), O (with Osiris) and S (stars)**
- In DBh, DsTi, PBh: the sequence **"IGMQTTX"** is most frequent.
- In PBh and KTim: **"IXQT"** is shared, but sequences in KTim is more conservative and connected with Q, stressing **Isis's dominion** over **foreign lands**.
- In DBh and PBh: both related to **M**, but DBh has stronger connection with **J, H, S, and Z**, while PbH connects more to **W** and **O,** reflecting Isis' **merging with Hathor in Dendera** and **reviving Osiris in Philae.**

Conclusion

1. Isis' epithet strings were **adapted** for each temple, influenced by factors such as **period, temple type, and local theology**.
2. In one temple, **conservatism** in epithet strings was potentially **avoided**, and **variations** were **accepted**.
3. **Temple grammar** was not strictly followed, leaving spaces for **variation and flexibility**.

Limitations

1. This study is limited by the **small sample size** from the sanctuaries. A larger dataset could lead to more reliable patterns.
2. Bioinformatics methods work better with fixed-length strings, and the **varying lengths** of epithet strings may affect the results.

References

1. Nagel (2019). Isis im Römischen Reich, 2 vols. Philippika 109.
2. Schneider & Stephens (1990). Sequence logos: A new way to display consensus sequences. Nucleic Acids Research, 18(20), 6097–6100.