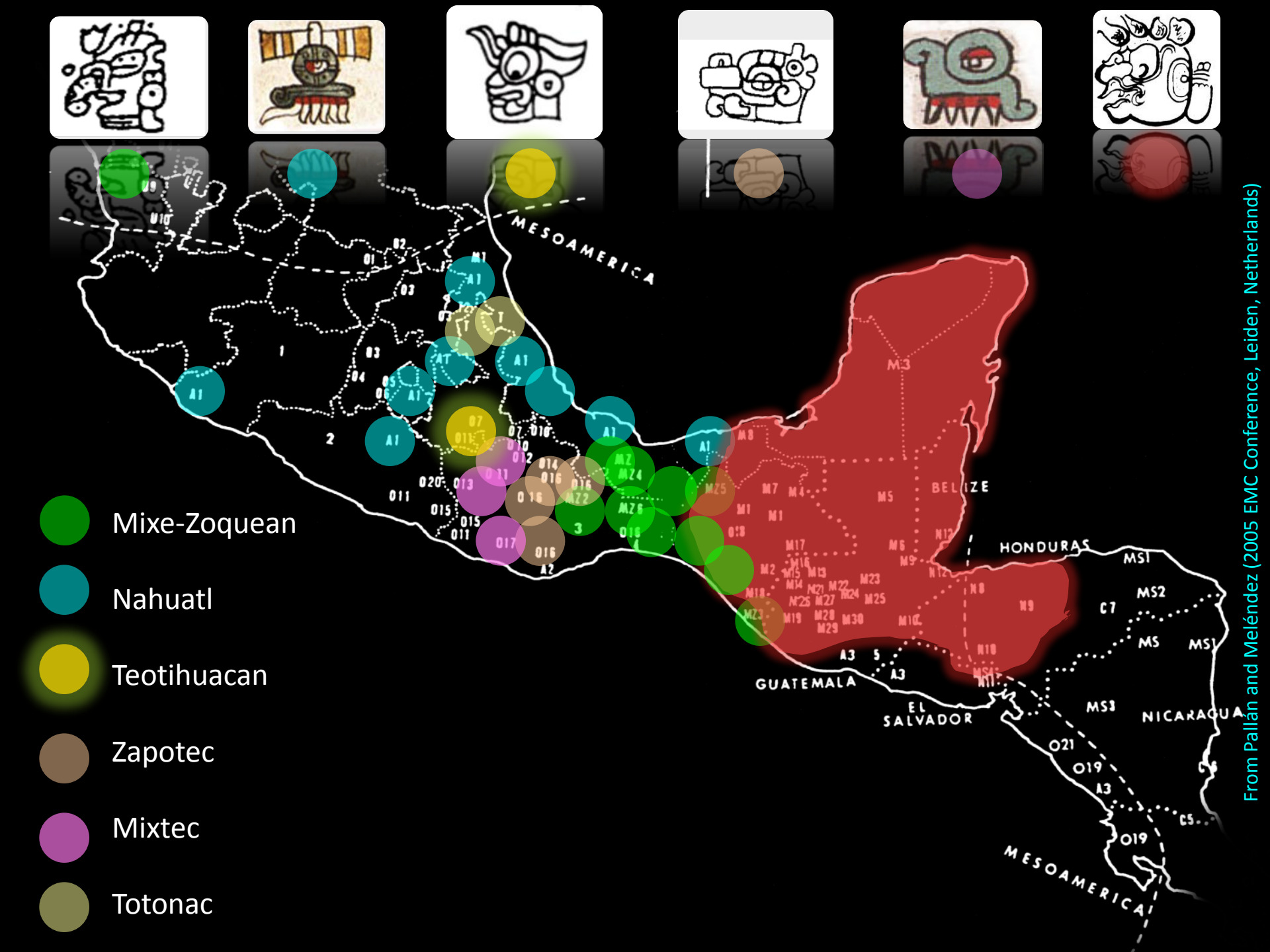



THE ADVENT OF MAYAN SCRIPT ENCODING

MAPPING THE LAST FRONTIERS OF MAYAN HIEROGLYPHIC DECIPHERMENT

Carlos Pallán Gayol,
NcodeX Project (UC Berkeley / Unicode)
& University of Bonn (Department of Archaeology
& Ethnology for the Americas)

Keynote
42 Unicode Conference, September 11, Santa Clara, CA


Mixe-Zoquean
Nahuatl
Teotihuacan
Zapotec
Mixtec
Totonac
MESOAMERICA
BELIZE
HONDURAS
GUATEMALA
EL SALVADOR
NICARAGUA
MESOAMERICA
From Pallán and Meléndez (2005 EMC Conference, Leiden, Netherlands)

Lintels

Photograph: © Ana Lucía Gastelum

Monumental sculpture

Codices

Thompson1972 facsimile

lychromeC eramics

K1440 © Justin Kerr

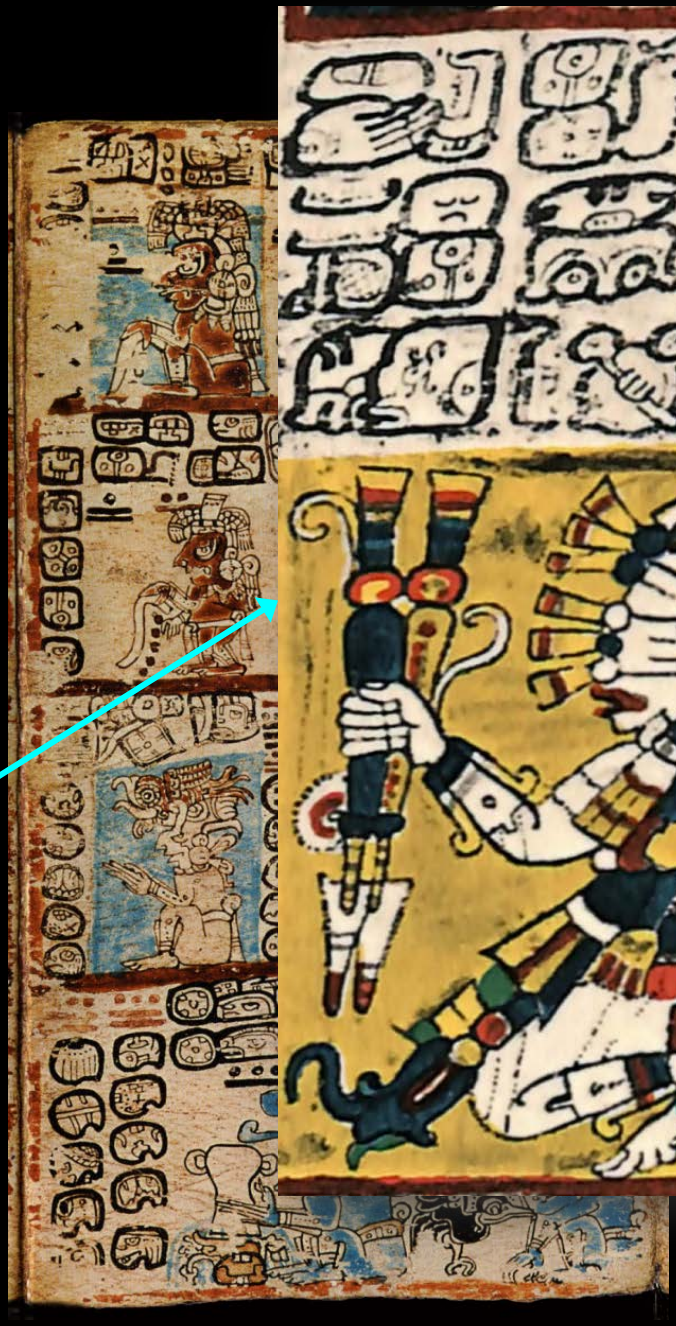
Photo: David Stuart

Mayan Codices

Illustration from © National Geographic Magazine by Terry Rutledge

Mayan Codices

Codex Dresden, p. 50



Codex Madrid, p. 26

Codex Paris, p. 5

18th Century Expeditions into Palenque, Chiapas

Palenque, Palace & Temple of Inscriptions

Lithography by F. Catherwood, ca. 1840

Palenque, Temple of the Sun

Drawing by Armendáriz, 1787

Pioneers in Maya Studies

Jean Frédéric Maximilien from Waldeck
(1766(?)-1875)

Antiquities of Mexico, Vol. I
by Lord Kingsborough, London 1831

ANTIQUITIES OF MEXICO:

COMPRISING

FAC-SIMILES

OF

ANCIENT MEXICAN PAINTINGS AND HIEROGLYPHICS,

PRESERVED

IN THE ROYAL LIBRARIES OF PARIS, BERLIN, AND DRESDEN;
IN THE IMPERIAL LIBRARY OF VIENNA;
IN THE VATICAN LIBRARY;
IN THE BORGIAN MUSEUM AT ROME;
IN THE LIBRARY OF THE INSTITUTE AT BOLOGNA;
AND IN THE BODLEIAN LIBRARY AT OXFORD.

TOGETHER WITH

THE MONUMENTS OF NEW SPAIN,

By M. DUPAIX:

WITH THEIR EXPLICATIONS

SCALES OF MEASUREMENT AND ACCOMPANYING DESCRIPTIONS.

THE WHOLE ILLUSTRATED BY MANY VALUABLE

Inedited Manuscripts,

By LORD KINGSBOROUGH.

THE DRAWINGS, ON STONE, BY A. AGLIO.

IN SEVEN VOLUMES.

VOL. I.

LONDON:

PRINTED BY JAMES MOYES, CASTLE STREET, LEICESTER SQUARE;

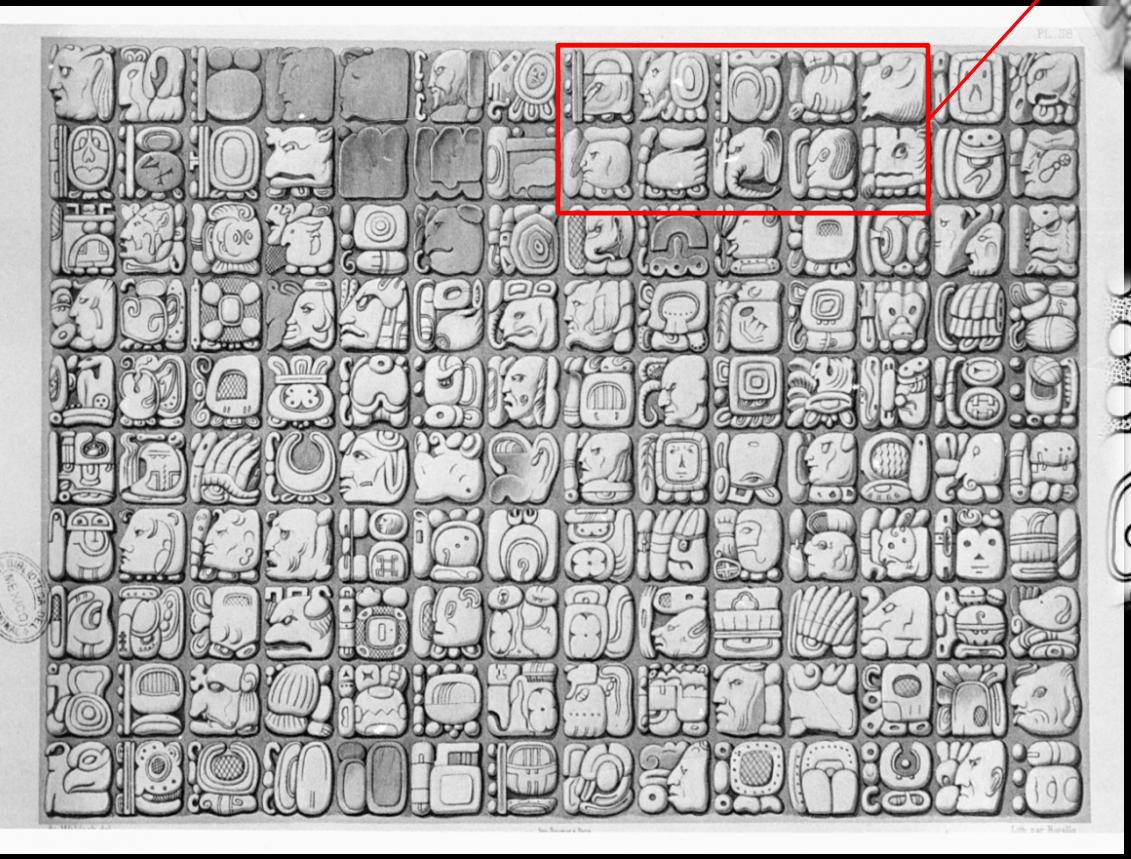
PUBLISHED BY ROBERT HAVELL, 77, OXFORD STREET;

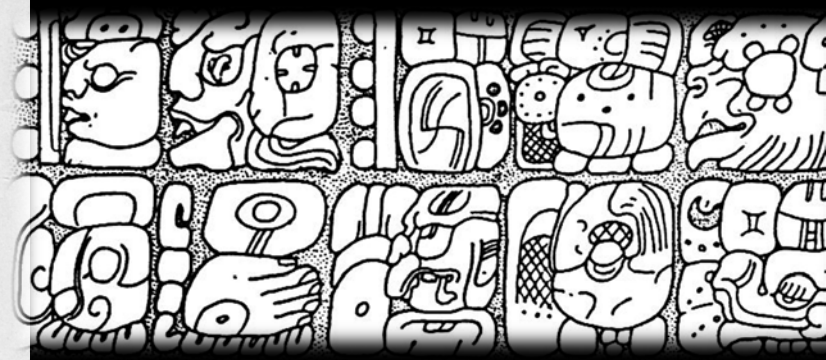
AND

COLNAGHI, SON, AND CO. PALL MALL EAST.

Pioneers in Maya Studies:

Original drawing by Waldeck





Modern drawing by Linda Schele, ca. 1980s

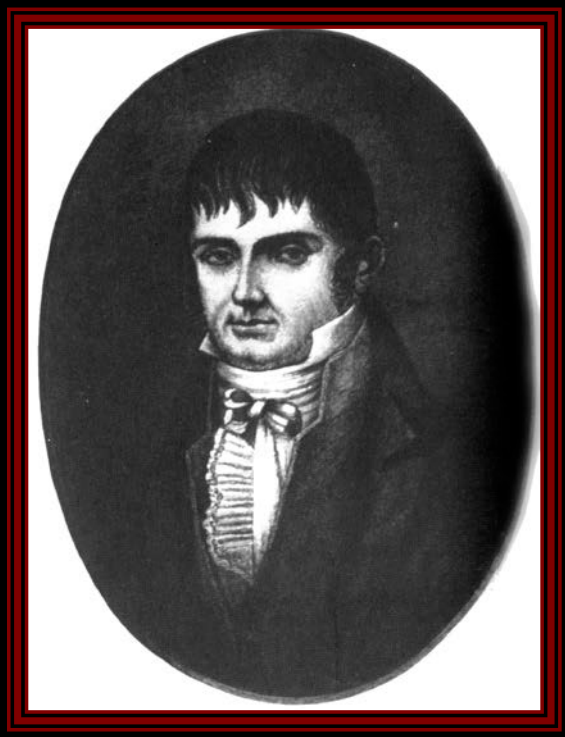
Waldeck's rendition of Palenque, Temple of Inscriptions, ca. 1830

Mid-19th Century: The Age of Travelers and Explorers

The Stephens & Catherwood expeditions

John Lloyd Stephens

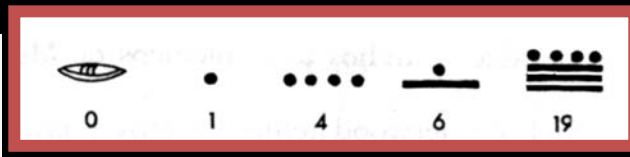
(1783-1840)



Constantine Samuel Rafinesque

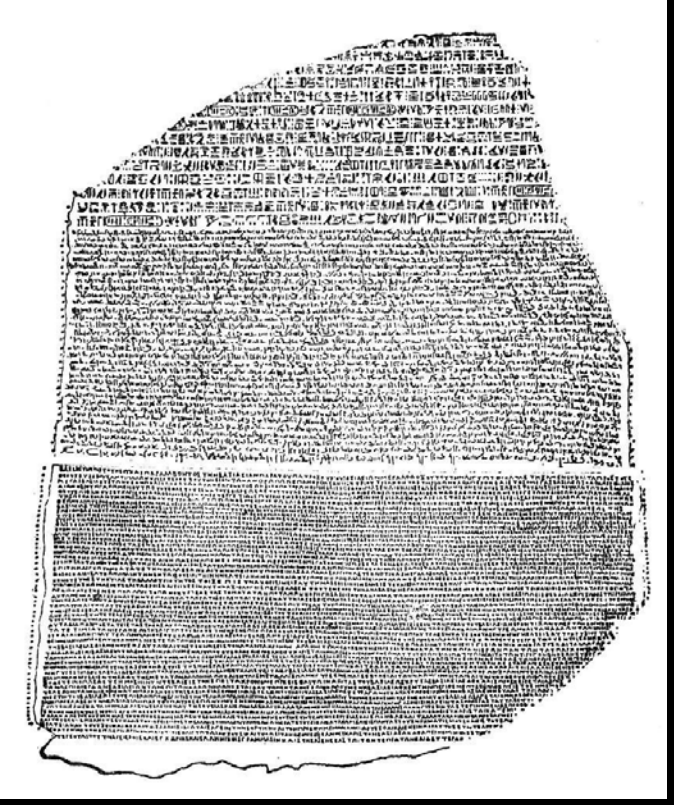
(1783-1840)

Polygraph naturalist who discovered the functionongs of bar-and-dot numerals



" No Champollion has yet thought to them the energies of his inquiring mind. Who shall read them? "

Incidents of Travel in Central America, Chiapas, and Yucatan, Vol I



Rosetta Stone

Egyptian

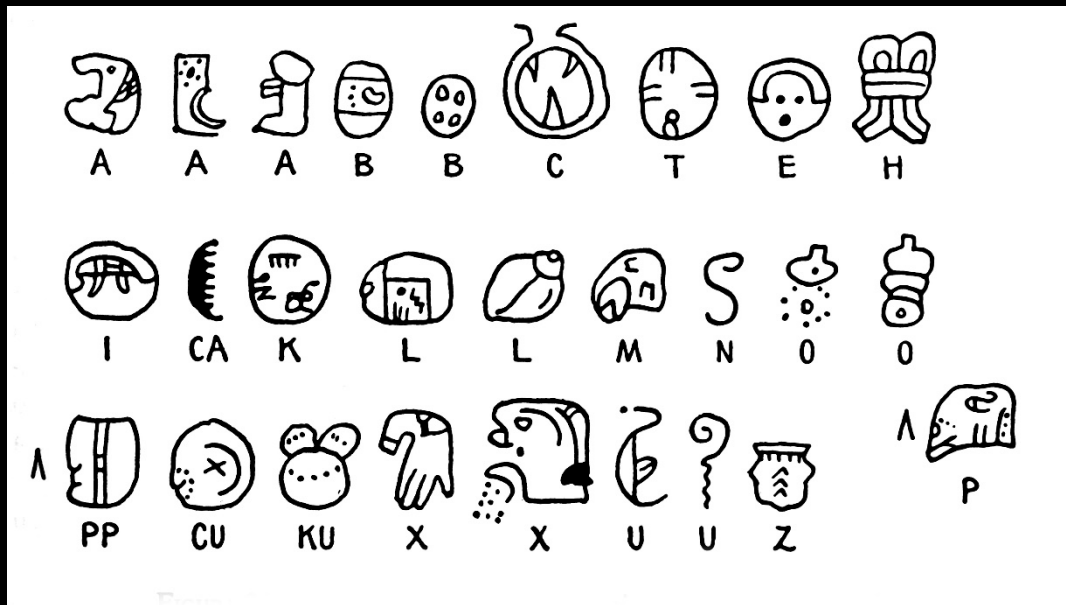
Demotic

Greek

Jean François Champollion (1790-1832)

Friar Diego de Landa (1524-1579)

Landa's "alphabet" (syllabary)

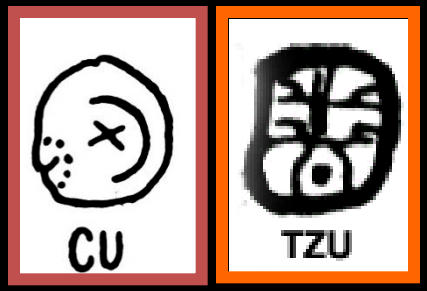


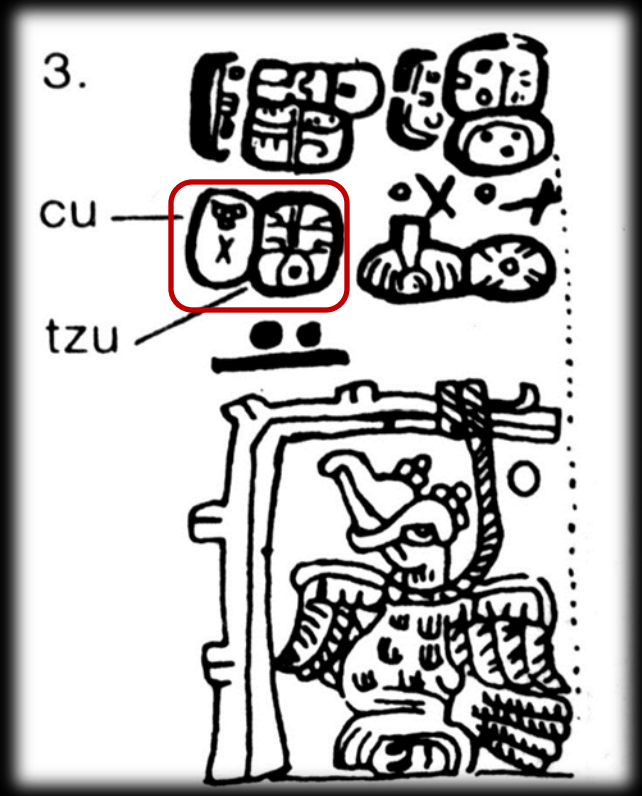
Knorozov's Phoneticism

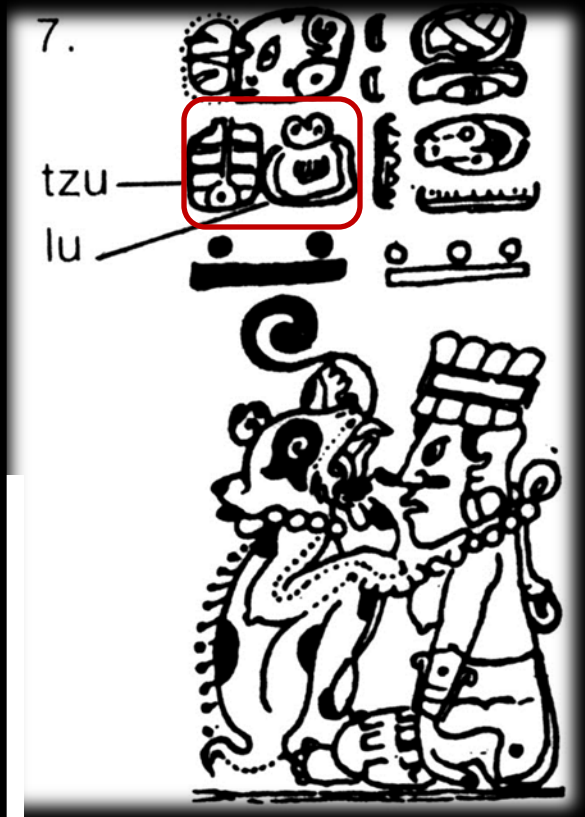
Yuri Valentinovich Knorozov (1922-1999)

at his Leningrad office, USSR 1989

Knorozov's Methodology

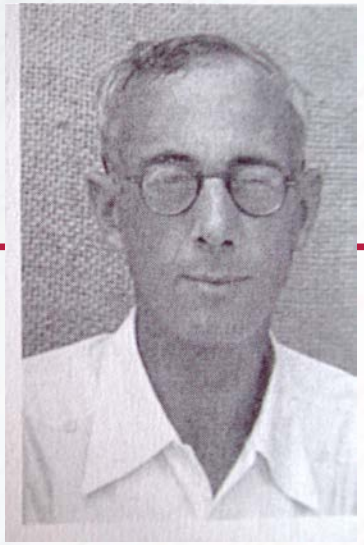






Decipherments for *kutz* "turkey" & *tzul* "dog"

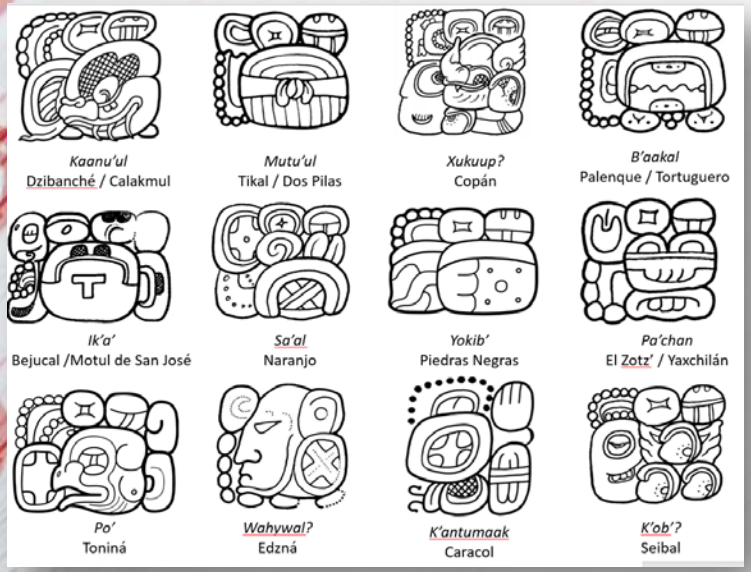
DECIPHERMENT: HISTORICAL AGE, CA. 1960



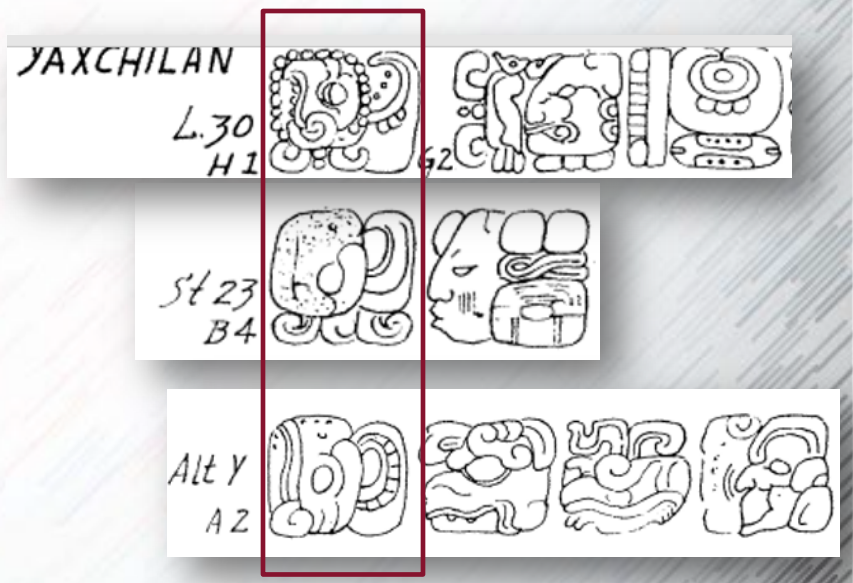
Heinrich Berlin (1915-1988)

Tatiana Proskouriakoff (1909-1985)

EMBLEM-GLYPHS:

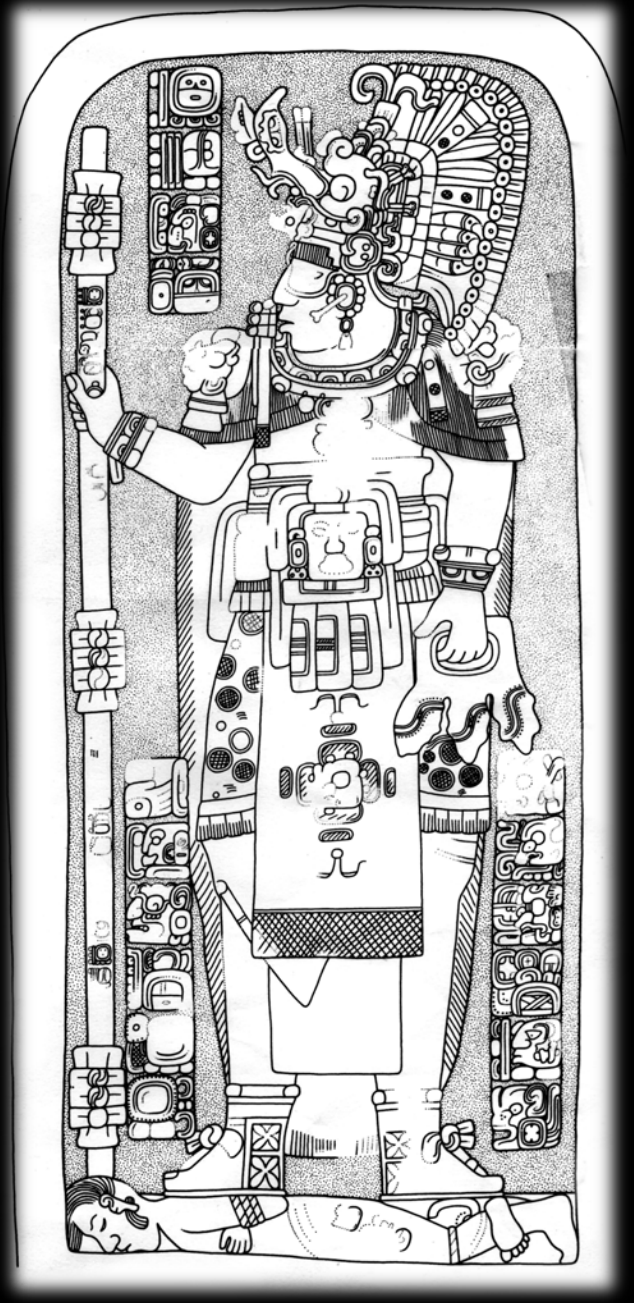


HISTORICAL DATES IN THE INSCRIPTIONS:



Ian Graham (1923-2017):
Corpus of Maya Hieroglyphic Inscriptions (CMHI)

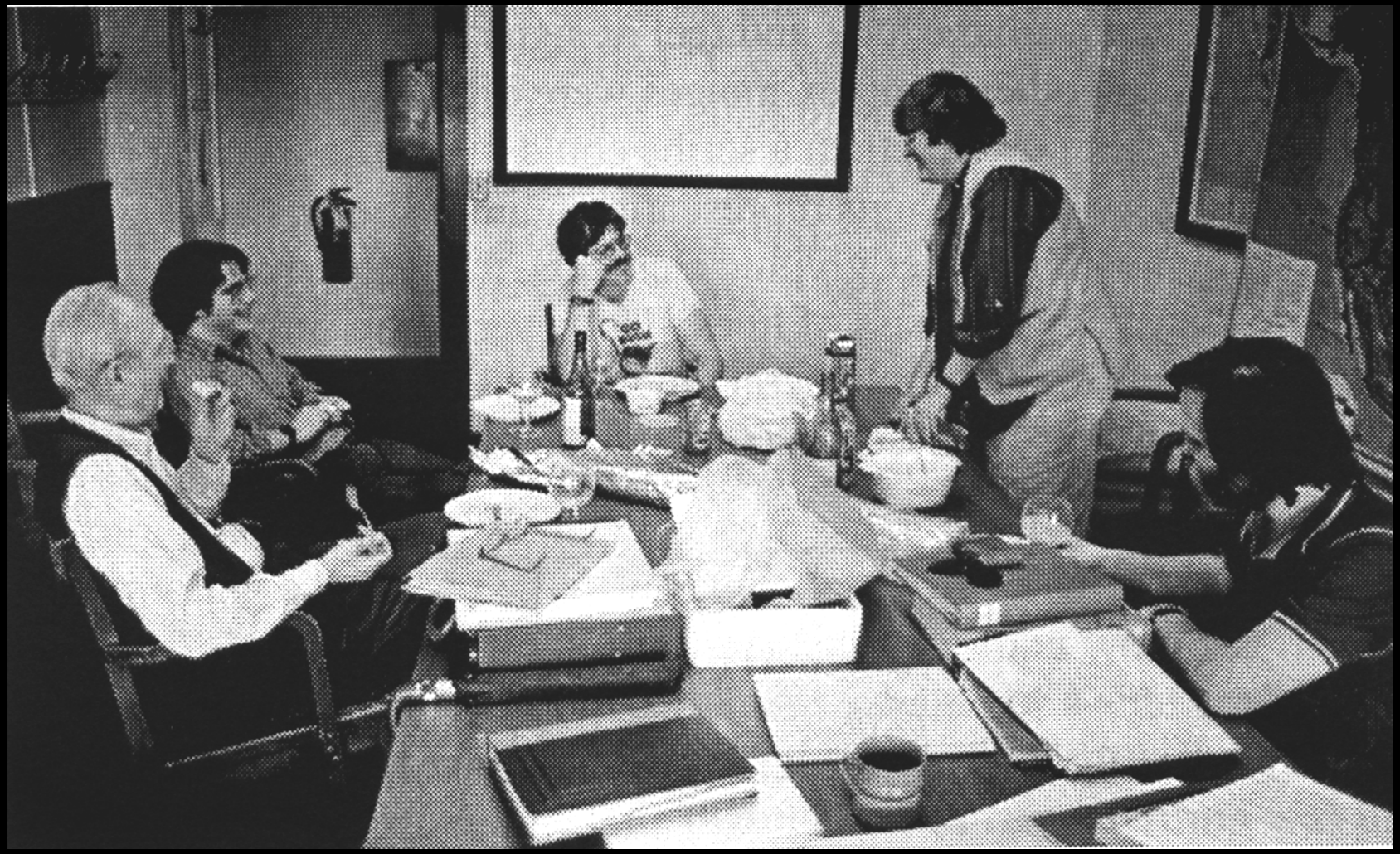
Lintel from Yaxchilán (Mexico)



Stela from Naranjo (Guatemala)

Drawings: Ian Graham

The Modern Era of Mayan Decipherment



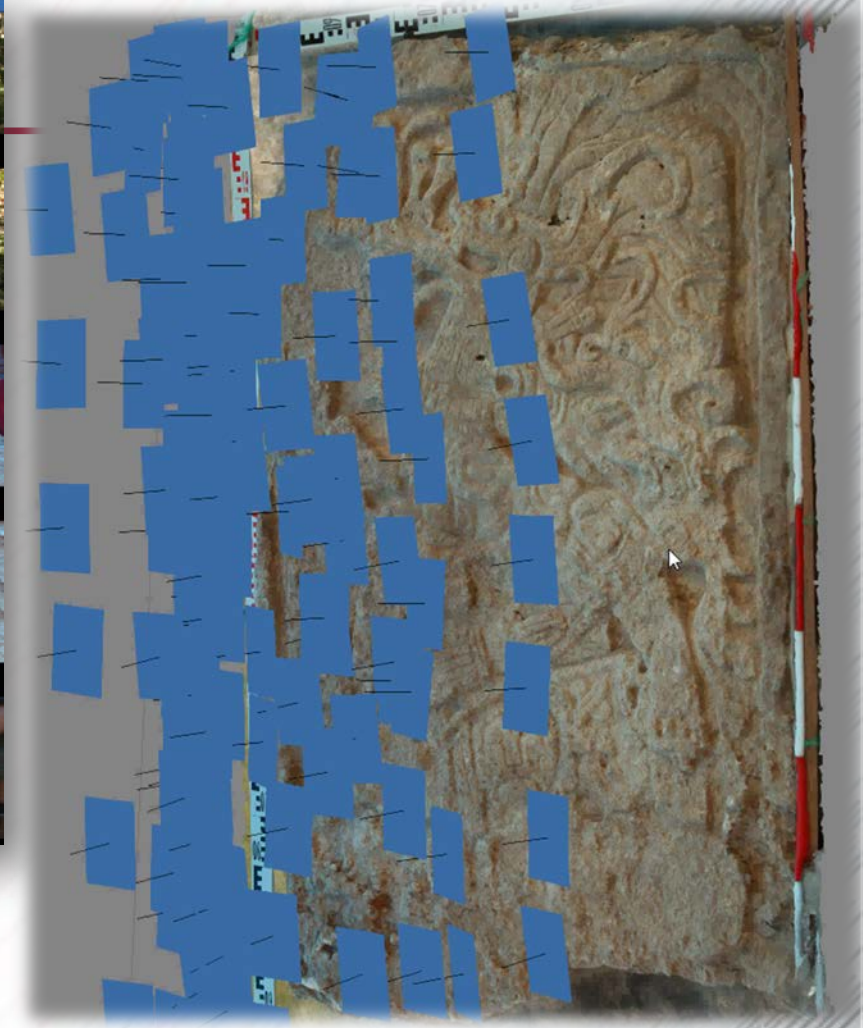
Left to Right: Floyd Lounsbury, David Stuart, Peter Mathews, Linda Schele and John Justeson at Harvard, 1984

Yaxchilán Expeditions 2007-2008 with Ian Graham
collaboration Peabody Museum (Harvard) with INAH, Mexico

Expedition to Yaxchilan. Ian Graham with Carlos Pallan checking Stela 4.

Fieldseason 2013: Manantial, Guatemala
Discovery of Manantial Stela 6

The Uaxactun Archaeological Project
Dr. Milan Kováč with Carlos Pallán and team members



EL MANANTIAL, PETEN, Stela 6,
3D Photogrammetry by Carlos Pallán.
Uaxactún-SAHI Project 2012

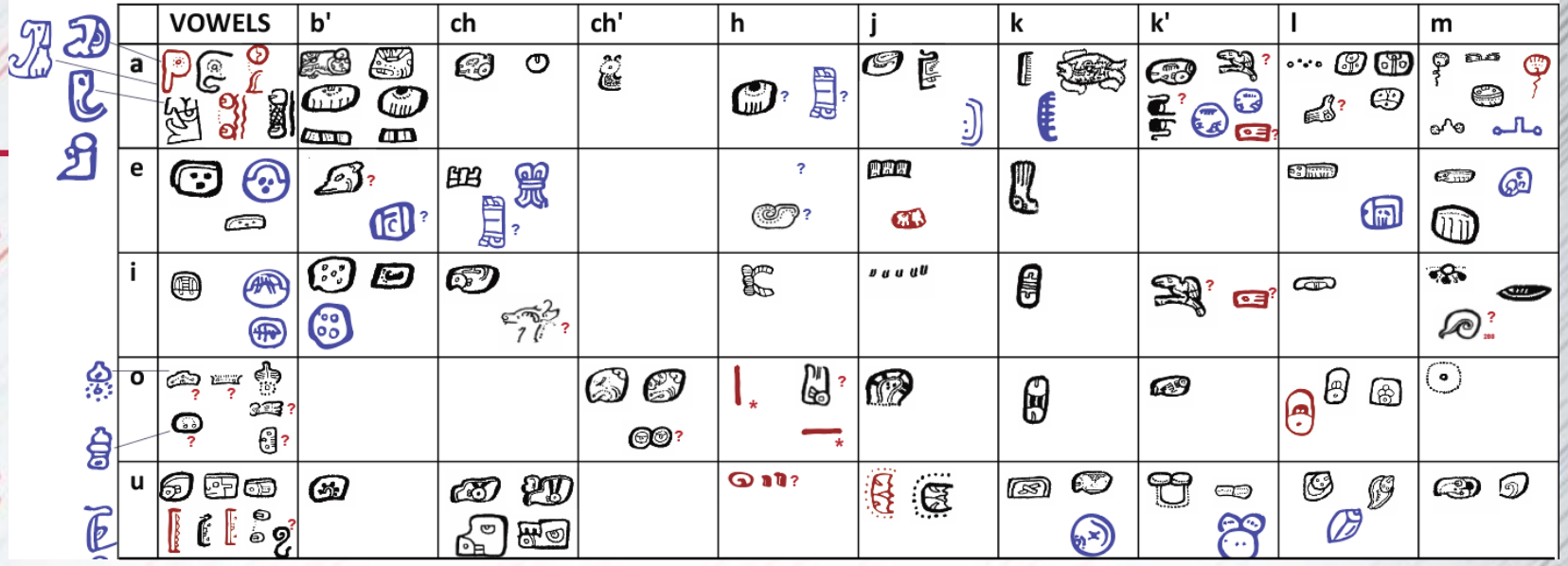
Digital Humanities methods first introduced in Mexico (Edzna, Campeche, 2006)

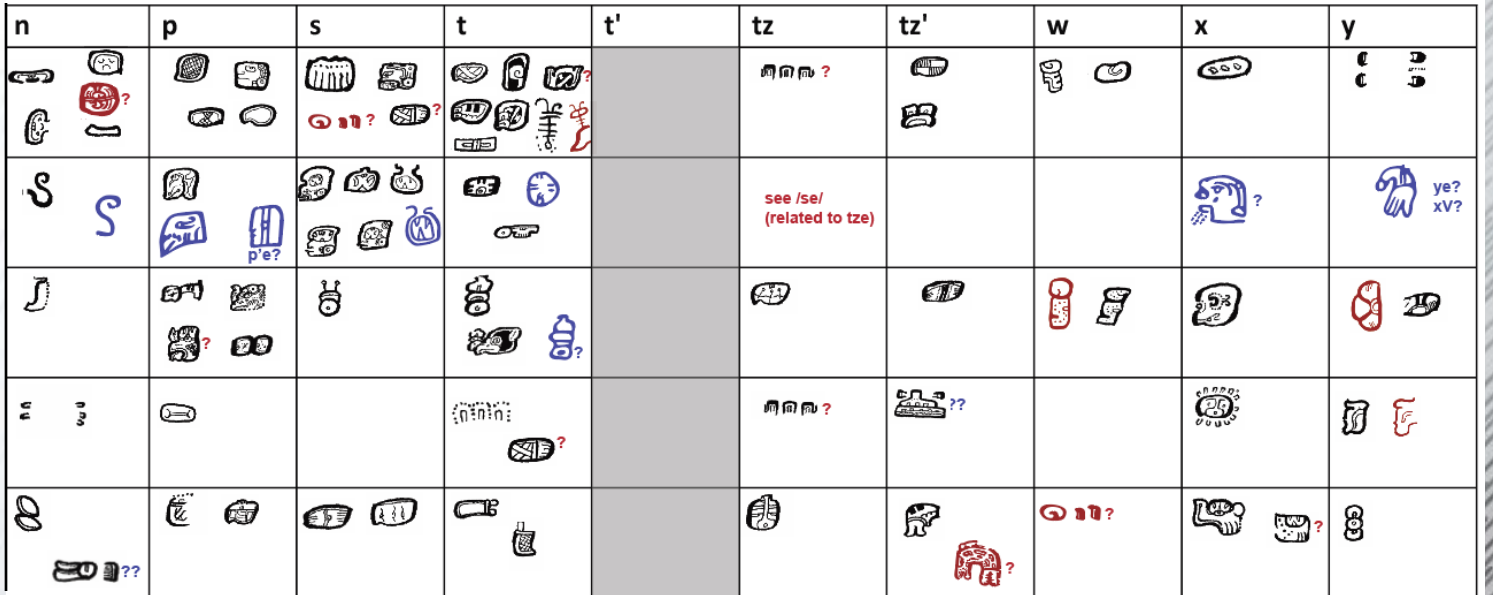
Photos & Drawing: Carlos Pallán
AGIMAYA-INAH 2006

EDZNA ALTAR ca. 657 AD.

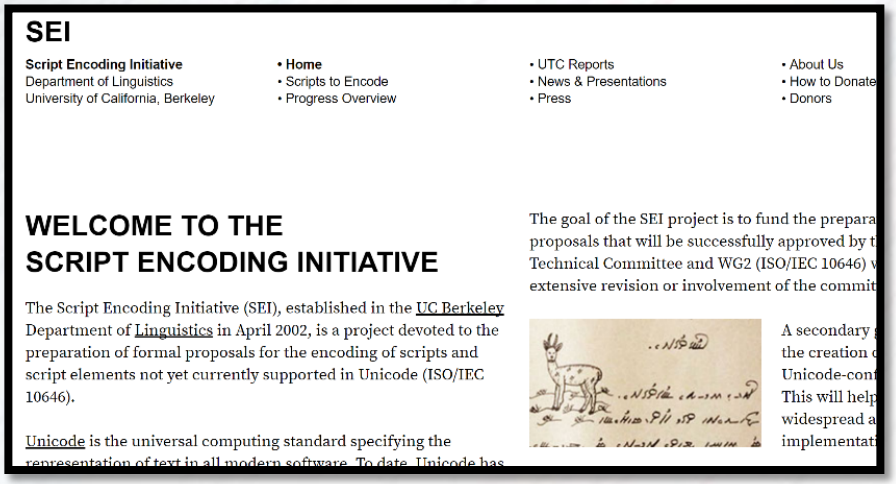
New Syllabary for Codical signs (NcodeX Project 2017-2018)

PROJECT NcodeX: Updated syllabary of Mayan codical hieroglyphic signs (v3)
by Carlos Pallán Gayol (January 17,2018)





SCRIPT ENCODING INITIATIVE AT UC BERKELEY



http://linguistics.berkeley.edu/sei/

Dr. Deborah Anderson

- 2015 – 2017, set up meetings at UC Berkeley between Carlos Pallán and Unicode experts
- Discussed
  - Requirements to generate a proposal for Mayan
  - Ways to handle complex Mayan features in Unicode
  - **Inception of the NcodeX Project:**
- Funding received from **Adopt-a-Character program** of the Unicode Consortium (2017)
- Project supervision by Lisa Moore / Deborah Anderson

NcodeX

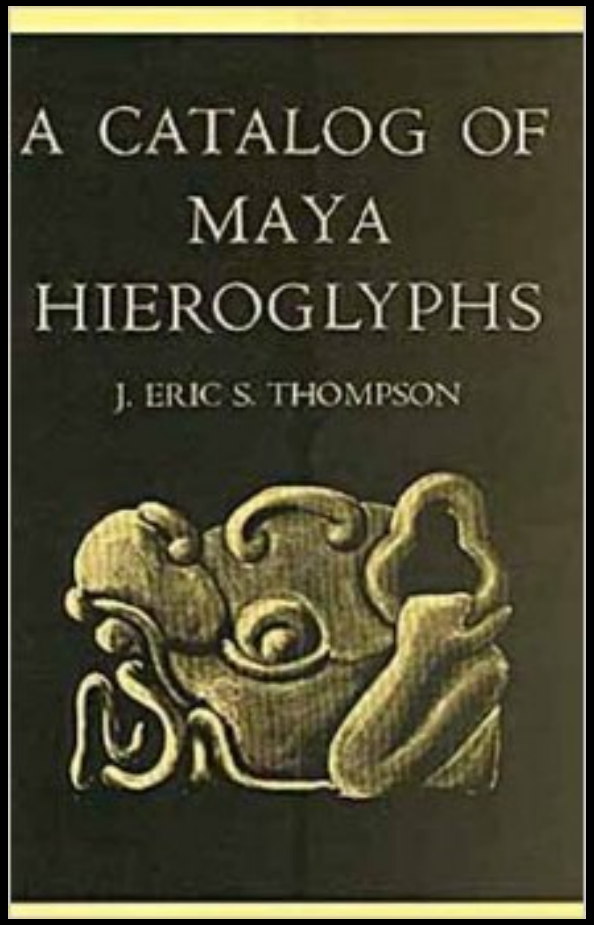
UNICODE

Universität Bonn Abteilung für Altamerikanistik

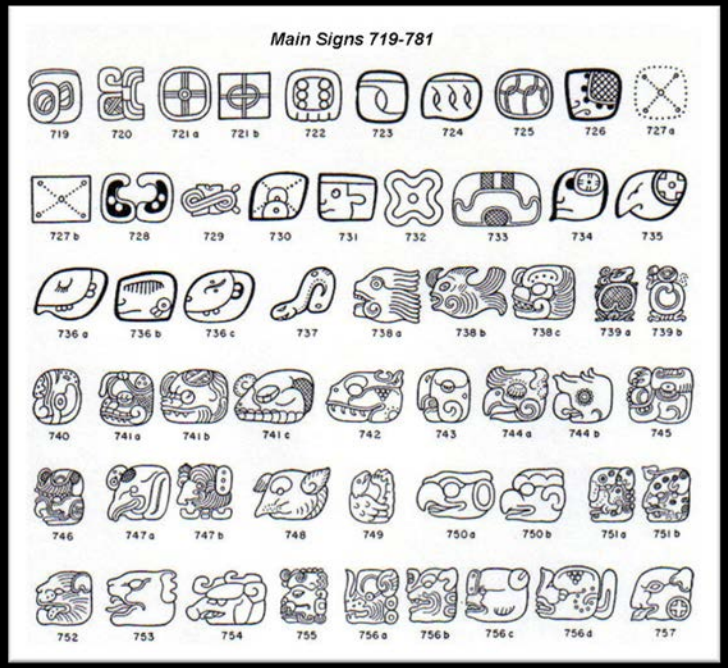
WHY UNICODE?

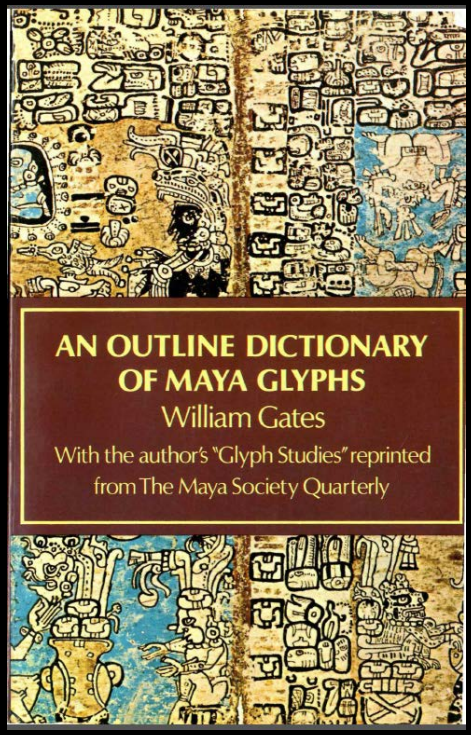
- Stable format - international standard
- Allows copying and pasting text
- Search capability both within documents and across Internet
- Provides long-term access
- Aids in discoverability

Previous Mayan Glypharies & Catalogs



Thompson, J. E. S.
(1964). *A Catalog of Maya Hieroglyphs . University of Oklahoma Press.*



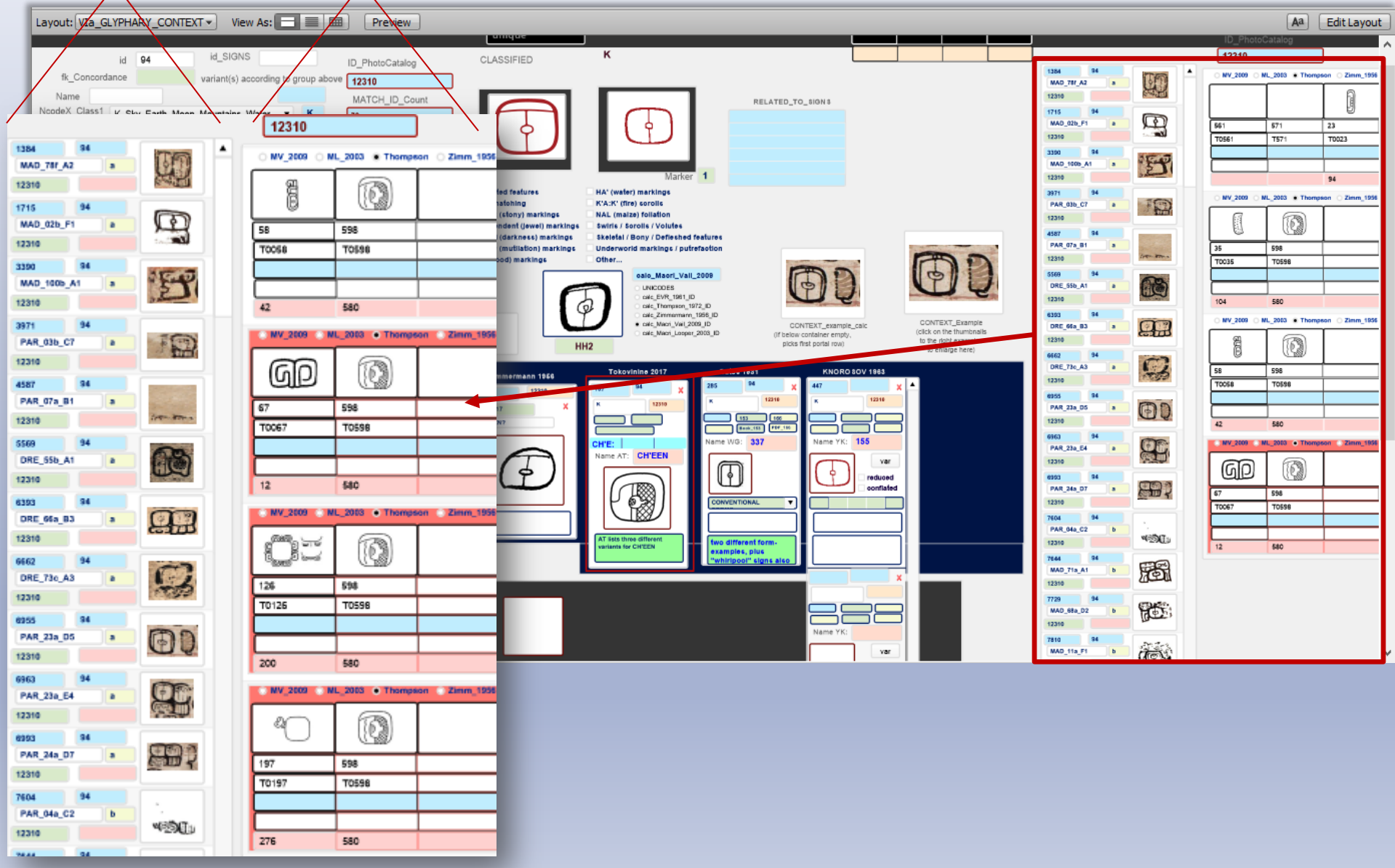


Gates 1931
"An Outline Dictionary of Maya Glyphs"

• NEW GLYPHARY TOOL. Mapping of signs & contexts

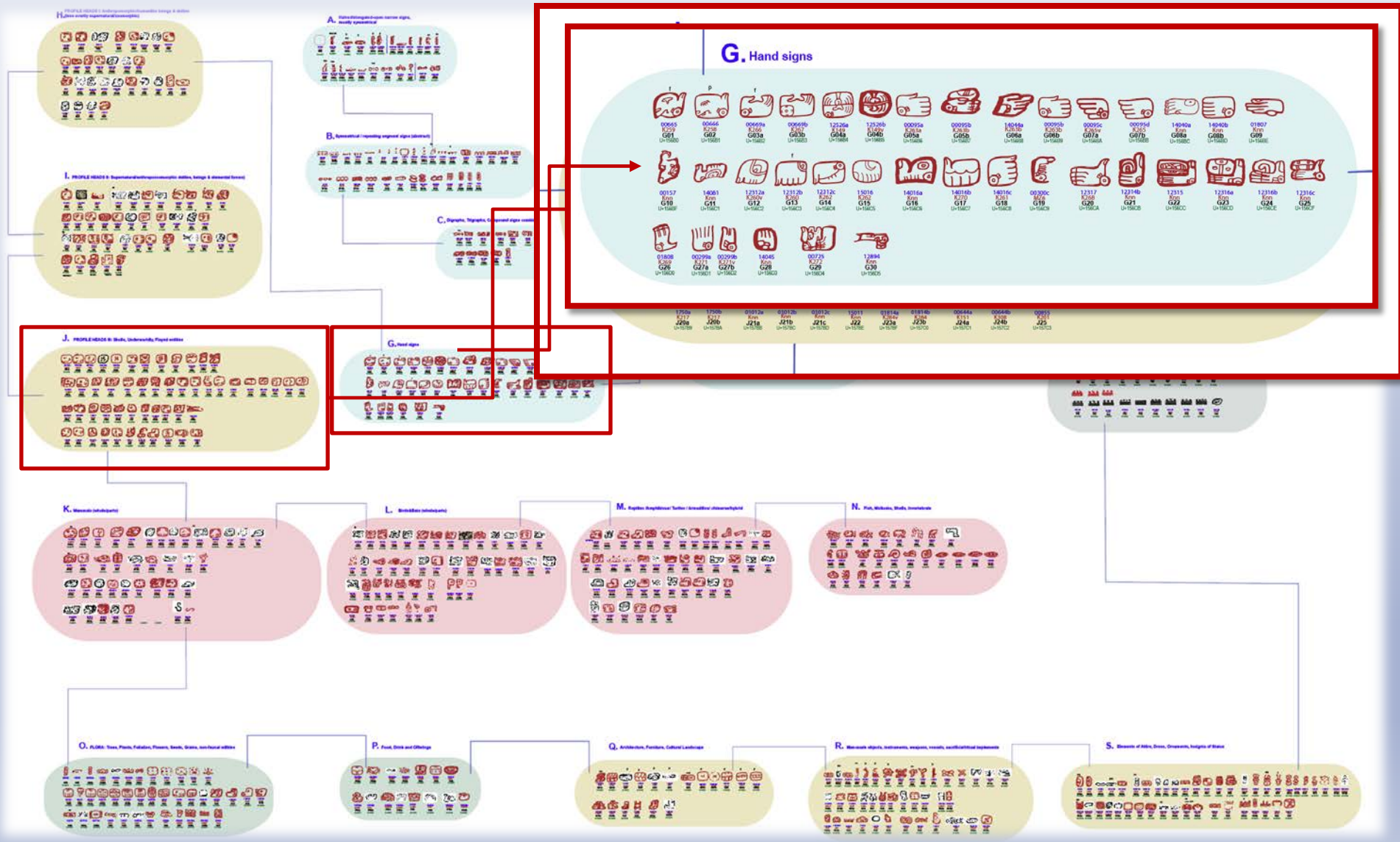
CODICAL CONTEXTS

CLASSIC-PERIOD CONTEXTS

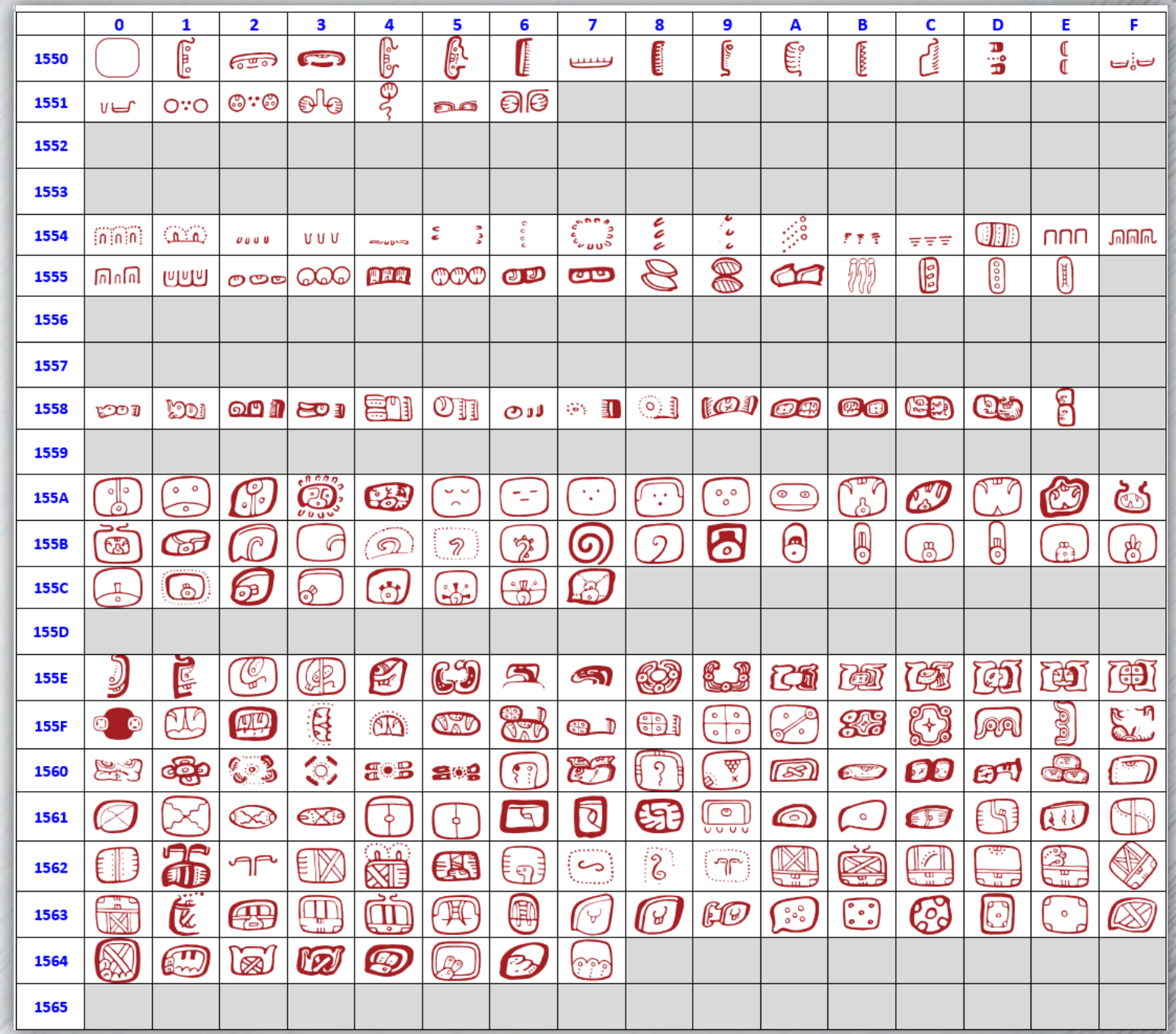


- GLYPHARY tool

NEW TAXONOMY FOR CODICAL SIGNS. EXPAND TO CLASSIC DATASETS

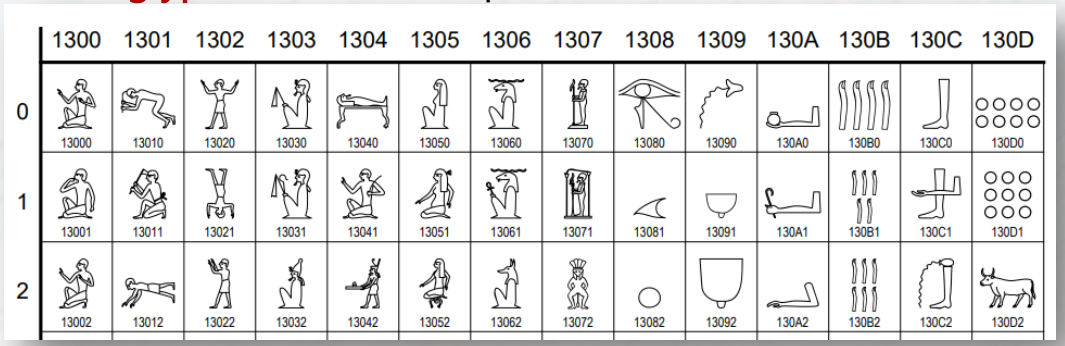


SIGN-REPERTOIRE LIST. UNICODE CODE-POINT CHART



OTHER HIEROGLYPHIC SCRIPTS IN UNICODE

- **Egyptian hieroglyphs** (1,071 chars. published in Unicode 5.2, 2009)

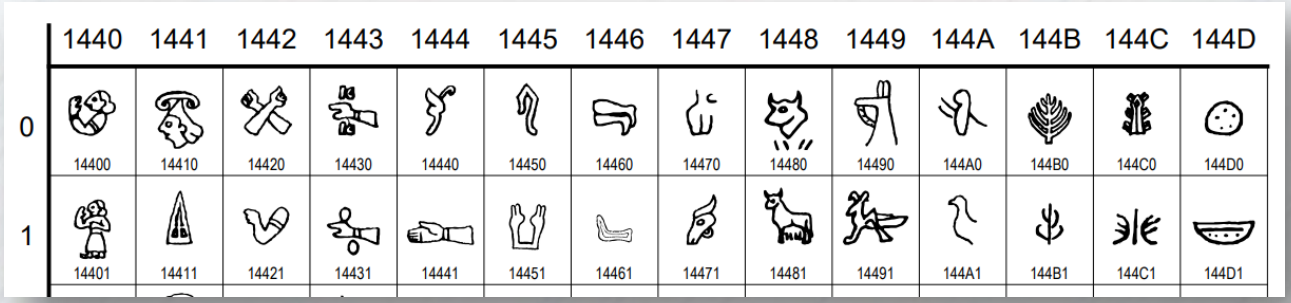


http://unicode.org/charts/PDF/U13000.pdf

- **Meroitic hieroglyphs** (published in Unicode 6.1, 2012)

https://fonts2u.com/meroitic---hieroglyphics.font

- **Anatolian hieroglyphs** (published in Unicode 8.0, 2015)



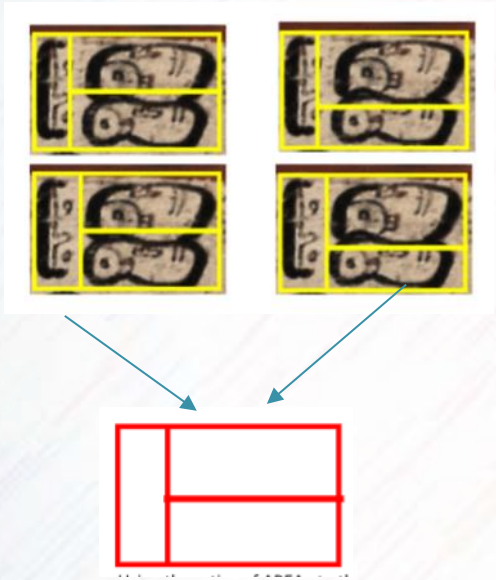
https://www.unicode.org/charts/PDF/U14400.pdf

Unicode approaches relevant to Mayan:
Chinese-Japanese-Korean (CJK) descriptors

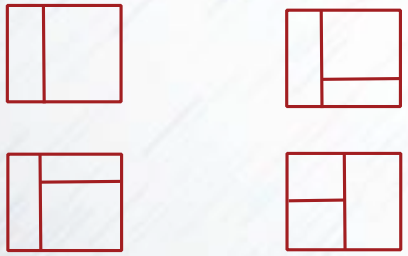
Pattern	U+2FF1	U+2FF0	U+2FF8	2FF4	2FF3	2FF2	not available	not available	not available	not available	not available	not available
	D1 D2	D1 D2	D1 D2	D1 D2	D1 D2 D1	D1 D2 D3	a b	a c b	a b c	a c b	a b d c	a d b e c
CJK	矣	俱	匈	圏	答	衒	not attested?	not attested?	not attested?	not attested?	not attested?	not attested?
Mayan												

LIST OF *QUADRATS*

New, more advanced *Quadrats*
(being created by Carlos Pallan, in collaboration with Stephen White and Andrew Glass)
Manually created bounding-boxes:



Auto-generated *Quadrat* abstractions



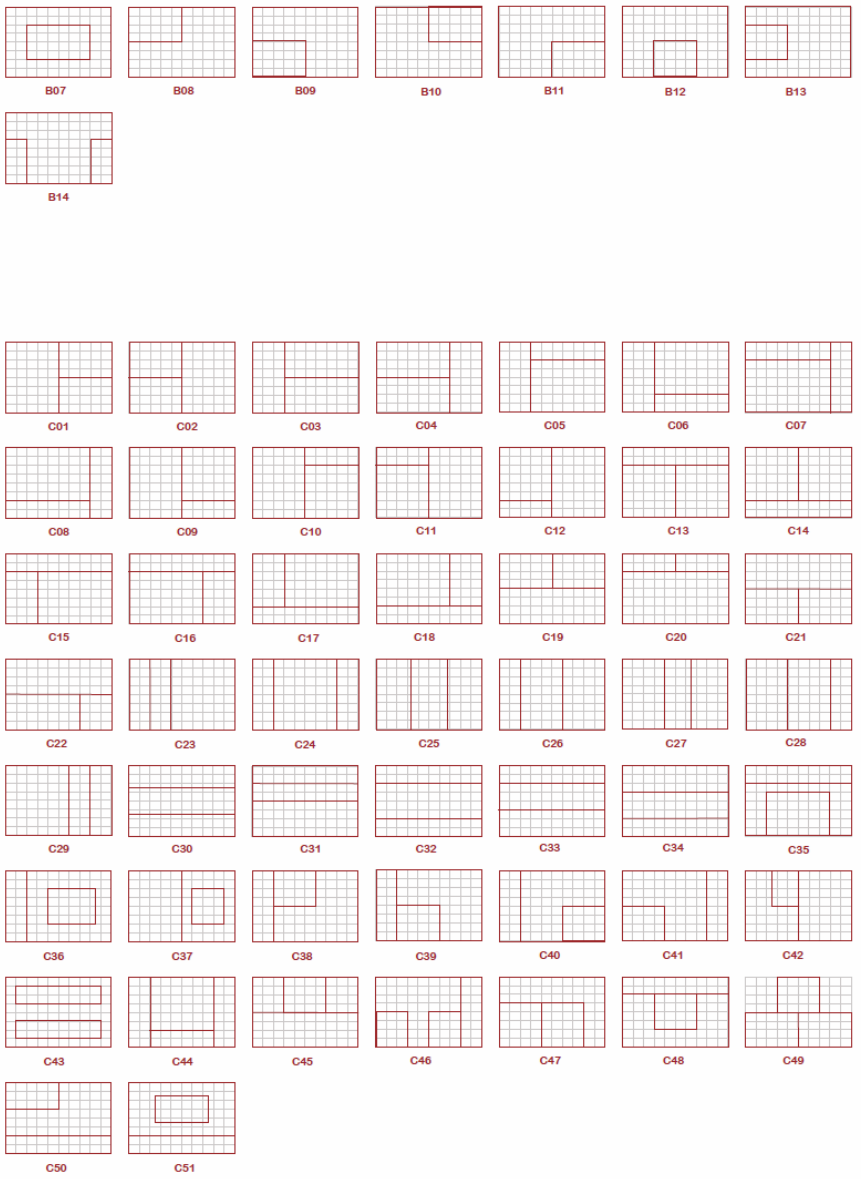
A. CLASS	B. RANKING	C. QUADRAT DIAGRAM	D. EXAMPLE FROM CODICES	E. NUMERIC GENERAL DESCR.	F. LETTER GENERALDESCR	G. LETTER SPECIFIC DESCR.	H. NUMERIC SPECIFIC DESCR.
Class	SQL_...	Quadrat_type...	Quadrat_exa...	Joiner_repre...	Joiner_st...	Joiner_repr...	Joiner_str_calc_p...
1.01	340			1	a	A	11
2.01	668		1.1a	1H2	a.b	a.B	1H22
2.02	248		345.5	1H2	a.b	A.b	11H2
2.03	105		17.	1H2	a.b	A.B	11H22
2.04	112		34 6	1V2	a:b	A:B	11V22
2.05	97		M.p36d.18	1V2	a:b	a:B	1V22
2.06	68		50.1	1V2	a:b	A:b	11V2
2.07	11			1H2	a.b	(A°).B	(11R)H22
2.08	16		142.10	1L2	a[b	A«B	11II22
2.09	2		427.4	1L2	a[b	A¨B	11SI22
2.10	2			1L2	a[b	A¨B	11SI22
2.11	26			1L2	a[b	A¨B	11S22
2.12	6			1L2	a[b	A«b	11II2
2.13	2			1L2	a[b	A¨b	11SI2
2.14	1			1L2	a[b	a»B	1I22
2.15	3			1H2	a.b	(A).((B))	(11)H))22))
2.16	2			1L2	a[b	a»B	1I22
2.17	2			1H2	a.b	a.∞B	1HDI22
2.18	2			1V2	a:b	A:(B°)	11V(22R)
2.19	0			1V2	a:b	(A°):(B)	(11R)V(22)

SEI
Script Encoding Initiative
Department of Linguistics
University of California, Berkeley

LIST OF NEXT-GENERATION *QUADRATS* (ARRANGED BY COMPLEXITY)

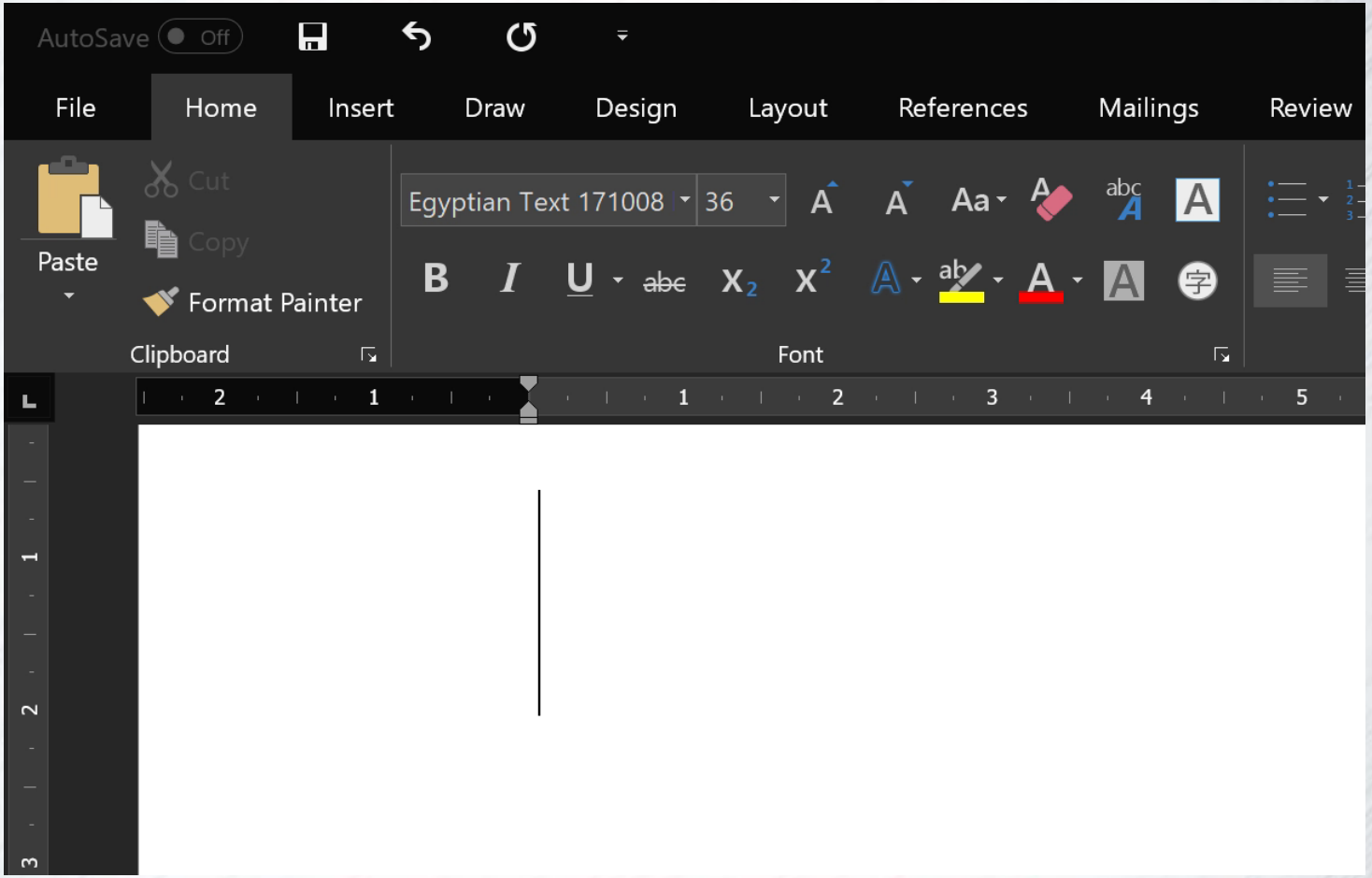
Previous List of Quadrats (2017). Total count: 164

New & simplified List of Quadrats (2018). Total count: 142



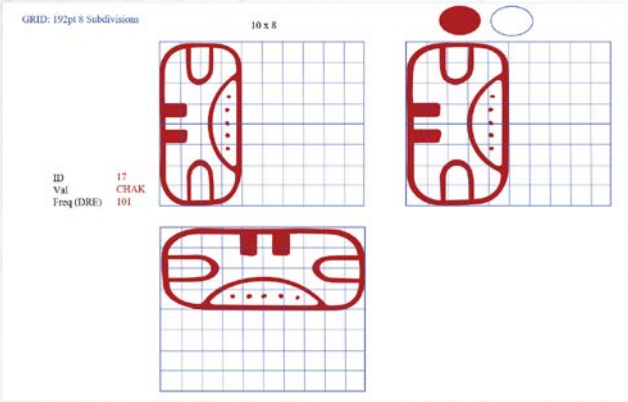
Unicode approaches relevant to Mayan:

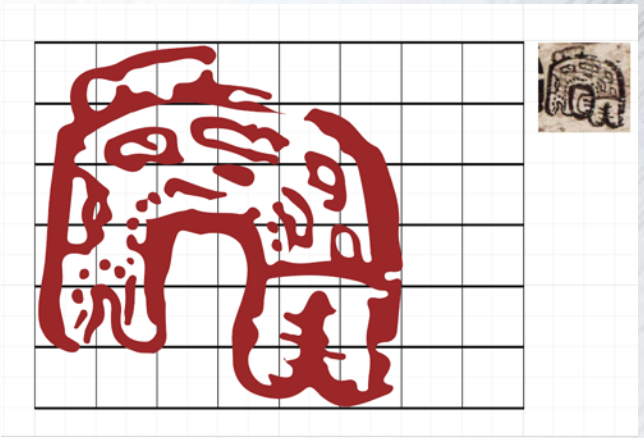
Egyptian hieroglyphs clustering (by Andrew Glass, Microsoft)



- User types sequences and presses a conversion key to convert to the associated Hieroglyph
- Structuring is dynamic based on internal font logic for the signs and joining controls
- Prototype font is fully Unicode conformant, anticipating quadrat controls that will become official in Unicode 12

MAYAN FONT DEVELOPMENT





Visualizations for Open-Type Mayan font

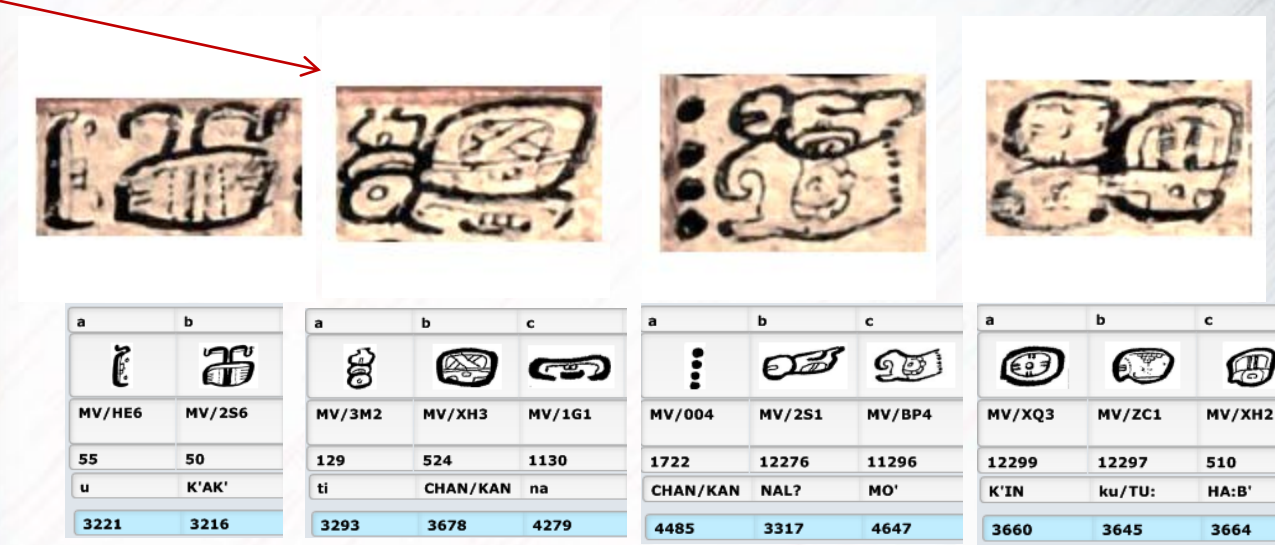
(by Carlos Pallan, in collaboration with Andrew Glass, Microsoft)

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
155E																
155F																
1560																
1561																
1562																
1563																
1564																

Special thanks to Adobe Inc. & Matthews Rechs for supporting our Project with complimentary Creative Cloud licenses

ENCODING MAYAN TEXT:
NON-LINEAR RENDERINGS OF GLYPH-BLOCKS

DRE_A61_VIII



a	b
MV/HE6	MV/2S6
55	50
u	K'AK'
3221	3216

a	b	c
MV/3M2	MV/XH3	MV/1G1
129	524	1130
ti	CHAN/KAN	na
3293	3678	4279

a	b	c
MV/004	MV/2S1	MV/BP4
1722	12276	11296
CHAN/KAN	NAL?	MO'
4485	3317	4647

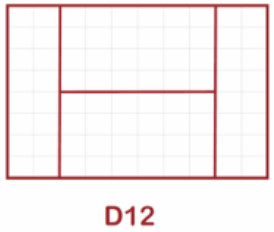
a	b	c
MV/XQ3	MV/ZC1	MV/XH2
12299	12297	510
K'IN	ku/TU:	HA:B'
3660	3645	3664

A01.B12 N02.B04:A03 N04.J06:G05 B21:B07.N22

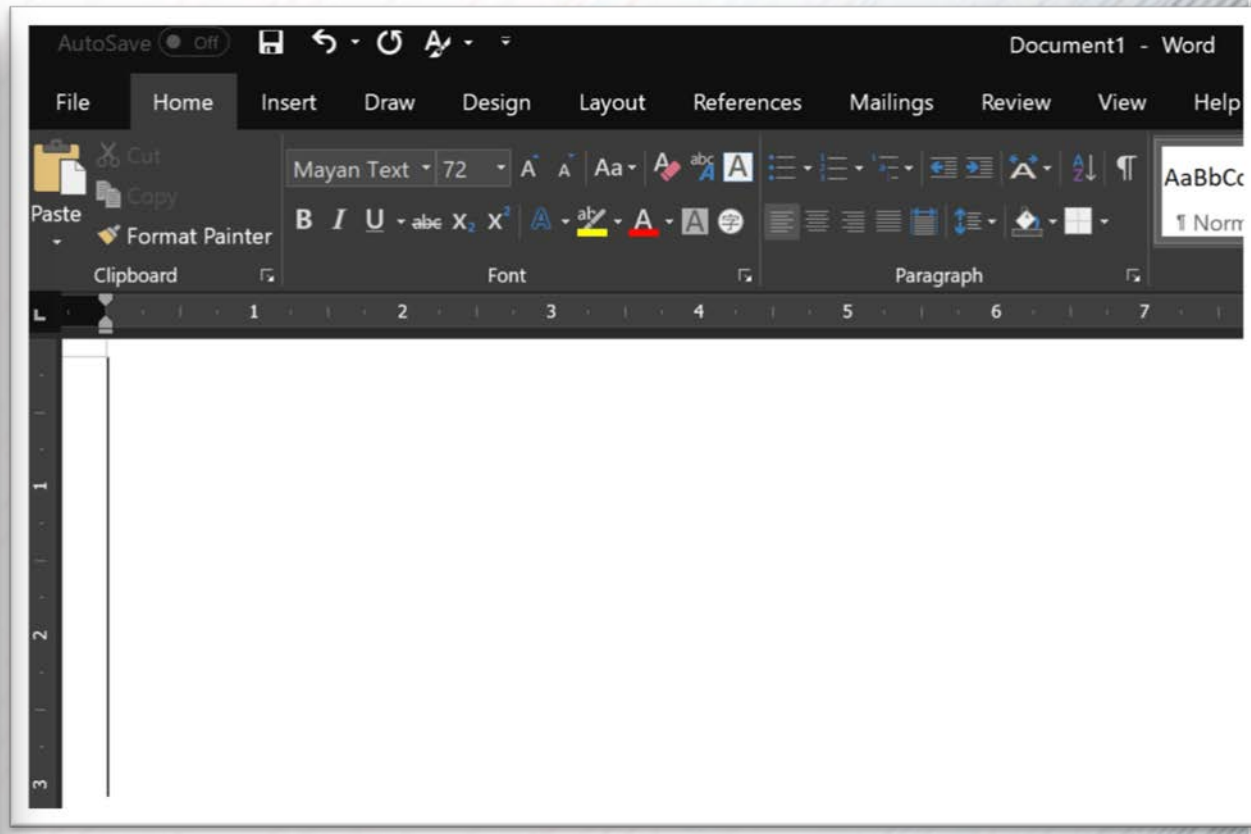
Result: vectorial font correctly rendered non-linearly with the above *quadrats:*

New Mayan Font in Practice

Foundational data (by Carlos Pallan)

	Transcription: **u-te-k'a-ja** **Context:** DRE_08c_D1
	Associated quadrat: D12
	**F09** ID: 1110 U+1566F Phonetic value: u
	**F12** ID: 1500 U+15675 Phonetic value: te
	**G02** ID: 666 U+156B1 Phonetic value: k'a
	**E01** ID: 260 U+155E0 Phonetic value: ja

Mayan hieroglyphs clustering (by Andrew Glass, Microsoft)



- User types sequences and presses a conversion key to convert to the associated Hieroglyph
- Structuring is dynamic based on internal font logic for the signs and joining controls
- Prototype font is fully Unicode conformant, the required quadrat controls not yet official, but will be similar to those already being implemented for Unicode 12

TEXT REPOSITORY:
CODICAL TEXTS SELECTED FOR ENCODING

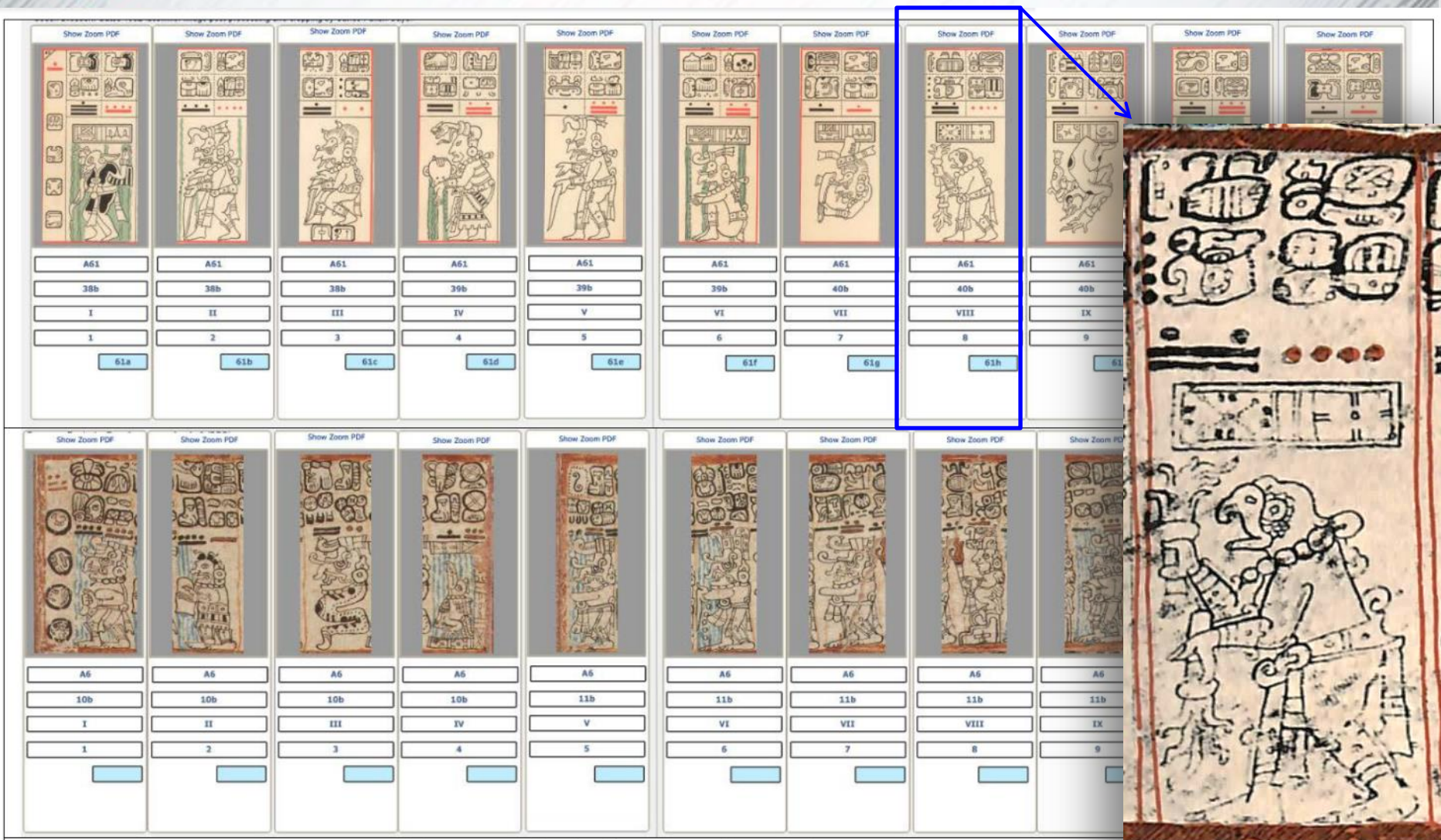


Figure 5a. Preliminary pre-processing and alignment of both selected texts for encoding purposes:
TEXT 1 (top): Dresden Codex (Almanac 61, pages 38b-41b, 11 frames)
TEXT 2 (bottom): Madrid Codex (Almanac 6, pages 10b-11b, 9 frames)

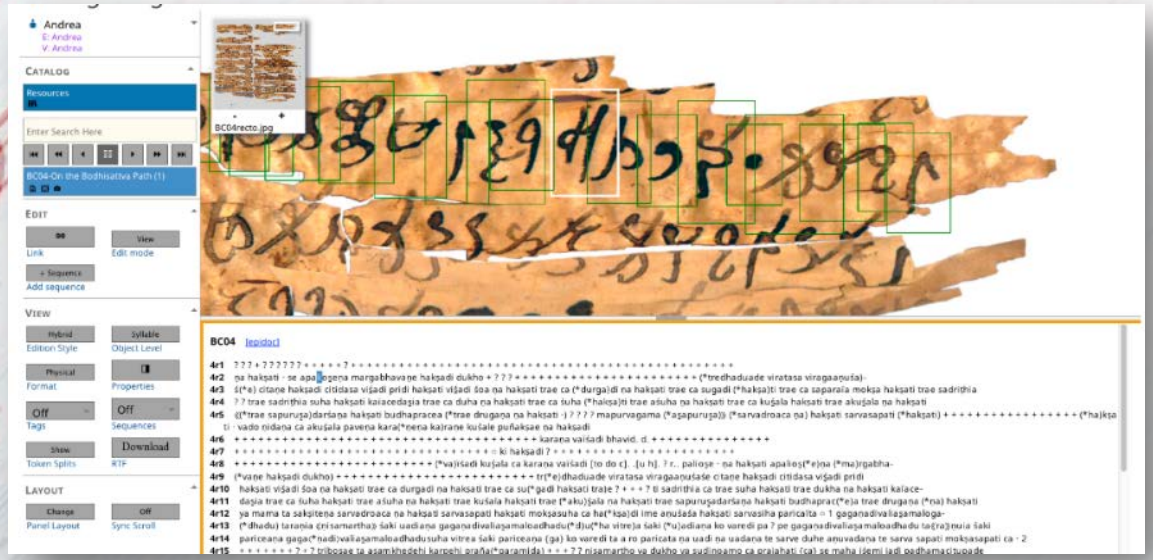
- CLOUD-COLLABORATIVE RESEARCH & DISSEMINATION OF PROJECT OUTCOME
- MAYAN-READ (Research Environment for Ancient Documents)

- Work towards implementing online Mayan-READ with Andrew Glass & Stephen White since 2017
- Planned to continue into 2018-2020

- Auto-generated Palaeography charts:

https://github.com/readsoftware/read/wiki

- Advanced text-image annotation & markup



https://github.com/readsoftware/read/wiki

EXPANDING INTO THE CLASSIC-PERIOD CORPUS

Potential team members and collaborators contemplated for 2018-2020 activities:

- Dr. Gabrielle Vail
- Holly Neville
- Céline Tamignaux

- Mayan-READ:
- Andrew Glass
- Stephen White
- Ian McCrabb

- INAH & Mexican DH experts:
- Dr. Diego Jiménez Badillo
- Dr. Edgar-Román Rangel

Vessel K1440. Photograph: © Justin Kerr. Courtesy: Dumbarton Oaks Research Library and Collections, Washington DC

Copán , Honduras, Stela A
Photograph: © Ana Lucía Gastelum

Concluding Remarks:
Bringing our vast Ancient American Heritage in the Information Age

Illustration from © National Geographic Magazine by Terry Rutledge

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-Acervo Jeroglìfico e Iconográfico Maya (Ajimaya-INAH)
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-Project "Codices"
-Project "MAAYA"
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Seibal, Guatemala (Carlos Pallán 2012)

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