Beinecke MS 408

A Transcription Based on a Revised Version of Takeshi Takahashi's Transliteration

Alexander Max Bauer

1 Introduction

In Section 2 of this document, mainly to promote easier readability and comparability, a transcription of *Beinecke MS 408* is currently being developed, based on a transliteration by Takahashi (1999).¹ It is then converted back into glyphs using a font by Bettencourt (2019).

Using the manuscript's reproduction in Clemens (2016) and the scans provided by Yale University's Beinecke Rare Book and Manuscript Library (2004), Takahashi's transliteration is compared with what I am able to make out of the manuscript. Changes to Takahashi's reading are highlighted in orange:

- Glyphs that I interpret in another way than Takahashi or that I add to the corpus are printed in orange, showing my interpretation.
- When a glyph has been deleted by me without replacement, this is indicated by \varkappa .
- Removed spaces are marked with \frown and added spaces are indicated by \smile .
- Added paragraphs are represented by ¶.

For the sake of simplicity, places where the writing is interrupted by illustrations are also marked by spaces. Especially the recognition of spaces in running text is sometimes very difficult; therefore, my adjustments in this – just as in any other – regard should be taken with a certain amount of caution. In total, I made changes in 284 places of Takahashi's transliteration.

Each transcription line is preceded by a locator in square brackets, informing the reader about the element a line is part of (i.e., paragraph, title, or label) and assigning the line a number. For example, a line located at [P2, 9] is part of the page's second paragraph (P2) and is counted as the overall ninth line (9) on this page.

Additionally, in Section 3, some basic analyses are presented. First, in Section 3.1, glyph frequencies are counted. In Section 3.2, then, entropy is calculated.

When starting this project, Takahashi's transliteration was obtained in an automatically capitalized version of the European or Extensible Voynich Alphabet (EVA) using the Interlinear Transcription Archive Extractor by Schwerdtfeger (2004). Schwerdtfeger built on an online archive of Voynich transcriptions maintained by Jorge Stolfi (1998). When Schwerdtfeger's website went offline, I switched to use the version Takahashi published on his website. Note that this version incorporates updates that are not present in the Interlinear version. For a general overview of transcription efforts, see Zandbergen (2023).

2 Transcription

Folio 1, Recto

```
Paccos offax ar affarry door doro offeres of 1602 doorso
     Cos Faths Faths are Fath Willam Fill o Fo Faths ofoos
     OS UNIBSOS SSOND OF OBLIVE BOD ON DILO FO OPLIND FINDOS
    Callo 90 GIIA GIIAS 910209 Sooto pooto GIIO
    8017-9 ccca? ctally ctall 6015
    980701259
    920 Fo.2 (1.08) office of the coeffice of the coeffice of the coefficient of the coeffici
    8011 202 ctog 2089
[T2, 10]
    psooff So Gras
[P3, 11]
    Sagabosta obos Proffe osts Sago Prosats Probe Y
    UNDER 629122 Crosoco Collo 20216 CV2/1016 60291 02010
    tog effecy fosarry effect effects arrived the ogsarry s
     Said only cros osand crosand cros offand sad after fos
    8a110 detheog too coop dog coop coop lot cag
    to cros todal lity licy sof crosall to lices
900 flower ochlard the $9898 offer 8aroffer
    Stepths Grasses grants established san etters
     8cca? &cotta 110 olla 117 ccco Pcco tollog ctros 8aoctla
    coll coop crop sand office
[T3, 21]
    GIII 2010
    os os es essent es essenta essentantes essentantes estas
    Feath 2022 Fab Unia Past Sab Rash Unab 2020 Unos
    coso farro coarro offog sarro far ctoog sarro ctoogsar
     gorceg ollag ollg sarry olloreg lollarry otorog llasorg sag
     Soco dos locas effe offers for locg sag colfo?
    To Tox Toll Tollo Tollo
```

Folio 1, Verso

[P1, 1]

Mcco crabarro or orthogo crao ctar ab

[P1, 2]

office, crao or occ, beco shobs oblobar crobs

[P1, 3]

bo ether ether ether des blichers ether hotheroby bas

[P1, 4]

box crolles bar? bab corres crollobs

[P2, 5]
Totlog chos sand ctroas sad creg those offeann chocks

[P2, 6]
crolle cros ctros chos offas sosceres crose sos cre ctros

[P2, 7]
to os croced crees sos ctrees offes sos sose offes so scrose

[P2, 8]
offes chos for flecte cros fle cros ctros crose sann

[P2, 9]
chod offes cros sos fle sad chos scrod offes sad chose

[P2, 10]
that croffers say crose decorate the crose consideration of the crose sad chose

That croffers say crose decorate the crose consideration of the crose sad chose

The croffers say crose decorate the crose consideration of the crose consideration of the crose sad crose say the crose decorate cross say crose consideration of the crose

Folio 2, Recto

[L1, 8] 910a\qc* [L2, 9] ***av

Folio 2, Verso

Folio 3, Recto

[P2, 11]

**Teccos & os Zosz & cos & cos
[P2, 12]

ollabarro folleco? follobo folleco coso
[P2, 13]

folleco foll & cos follobo folleco coso
[P2, 14]

coo? fosar? olleco folleco

[P3, 15]

The coaron took of or or opering the offered of or of offered or of or of

[P4, 18]

Tocogeog coesann totoof totog of coes totog offosog policies to the coesann totog offosog to the coesann totog coesann coesann totogoof and coesann coesann

Folio 3, Verso

[P2, 7]

Theor offeray cror etern 2

[P2, 8]

offero fleor cror eethor offa

[P2, 9]

offercar offer ethosoary cror ethop

offercar offer ethosoary cror offa

[P2, 10]

ocror sann tolletor sann cror offa

from the cross offer theory cross offa

(P2, 11)

cto choeffer etho fleor cross offa

(P2, 12)

oct cross offer fleor fleor fleas

(P2, 13)

ctar chiann tollers offs ethas cells

[P2, 14]

sand chean offers

Folio 4, Recto

```
[P1, 1]

Nosagang atas accor of accor total solve and story office solve and story attemption and story attemption and story according and solve a
```

Folio 4, Verso

Folio 5, Recto

[P1, 1]

Notice of the open open of the op

Folio 5, Verso

[P1, 1]

Notice? The first of the stands of

Folio 6, Recto

```
[P1, 1]

Toar of chox cross core core core contrave offices of the core of the core of the core core of the core of the
```

Folio 6, Verso

```
[P1, 1]

Noa? 9 2a? accila? toa? co? at tag 2 acca? at office
[P1, 2]

occ2 aco? acoffice tocilare? acca? osanni Nacces aco? acon
[P1, 3]

toan? after acos ooccoaftes accilates after ollos ?gaco?
[P1, 4]

9 chaftes offices 2o2 9 sass say say offoss offoss
[P1, 5]

san? cha acosas say offor offs sossos
```

[P2, 6] 1 cost coeffice coeffice octo2 gotog 8a\\V ctrog 80g 9000 000 01000 tolog occo 809 cto7 cto8 S 10 (cc. 20)

tollarod gazar lasg

[P2, 11]

gor arr offar after 89

[P2, 12] officeo2 ctg folfax cfftg 908a110 cttg 2 cto7 occ2 o7 tollof cros effeos floragoso coeffeg S oS crg Savo o? oceg cttar cttar cttar cttag 9 ccarro ctrag ctrosas 39 officer officer and affect octogg fleto etg 807 gocco? coo? octtag

Folio 7, Recto

[P1, 1]
Toodarry the deg tool deeg caroog
[P1, 2]
Souce flood door door door flood deeg caroog
[P1, 3]
occeed accodarry deeg flood to tage
[P1, 4]
toffee ac gover darry gary flood odarry
[P1, 5]
oarry offerry

[P2, 6]

Mctogoctco toffocco collogog officer acoally

Betog affice acog officer day took acoffee

officer decede acoff toffae took flee acoff day

toffee ogacoll acog affee acomp fleed

[P2, 9]

toffee ogacoll acog affee acomp fleed

Catall acof dayl acoffee

Folio 7, Verso

[P1, 1]
Toggico cico fictoso totas officos so sann fictososo
[P1, 2]
crocro ctro sann tollo cretico sann ctros ctro ctros
[P1, 3]
tollos sollos critico licto lo so creco os crecos so
[P1, 4]
croffeced occar crocro sand cho licto chos secce sos
[P1, 5]
secosann tolloso creco ficeo

[P2, 6]

| Maror choos choose \(\) choose \(\) office \(\) store \(\) sore \(\) sore \(\) cos \(\) choose \(\) cos \(\) choose \(\) choos

Folio 8, Recto

```
[P1, 1]
Those crop offices croff offices cross to offices crops
                              .-!
Tallo & lacage do olac 80 8ag 8aW ag
    حده کوم کوم کوم دره کومالی کره الحدم حده کوم الحدم الحدم کوم کومالیک الحدم کرم کومالیک کرمالیک کرمالی
      10162 007 007 2003 8009 2003 001 001 808
                                Office of the only office of the constant of t
                                Took offerers for togget for the court of the formal for the formal formal for the formal formal for the formal for the formal formal for the formal formal formal for the formal for the formal formal formal formal formal formal formal formal for the formal formal
crotto Mcroad croop 8a/V
                                8000 8a118
                              Theort to their party ofters steers tox-sarry too?
                                8avv cocost flocosa os cocostro ostro cos saves
  coop a coosann sann so offeros a colf offerning offerning for the colf of the
  tocoobarry confollobo conformation [T2, 13]
                                olollcross
    [P3, 14]
                                etto etter dos cotos dos coros líces soso cosas
  Screg effect crop etc. flower crop effect crop effect
      . .
gozeg PoroPorg ceSeg Porg Screavid cthaverar ctheg 8ar
[P3, 17]
  crop being follow ere and exade of the crossing crossing
                                olla? Acarra con Poor Ca ranno co ca Pooragonag
                                Zar? cocard officer sar took larry cook larry sarlag
  \underset{[T3,\,21]}{\circ \hat{\forall}} \text{ crolleccy cheg offag crag}
                                Scrop Sars
```

Folio 8, Verso

```
[P1, 1]
cffcos Zoocffc Zoo ctor offor cror officanno offosanno Zanno
[P1, 2]
ctcffcar Zar cror ctcanno ctor cropilers offanno cffg
[P1, 3]
toos cror zo cror ctcar ctor canno ctanno compare
[P1, 4]
schor ctor sar cror cffcar ctcars sanno crars
[P1, 6]
cror cror sar officar cffanno sanno
ctor il cror sar ctor cffcar croffano ro
[P1, 7]
ctor il cror cror cror cffcanno
[P1, 8]
officar croffcar croffano
[P1, 9]
ctor orce cror cror cffcanno
[P1, 10]
Zcrarco occoos il cror fcar cffcaro
[P1, 11]
Zorano
[P1, 11]
```

[P2, 12]

Therefore the content of t

Folio 9, Recto

[P1, 1]

Tookso cross officer orcing 2 deg obann 2arg dor office officer conficer cross officer officers officer officers officers officers officers officers officers officers officers read the conficers officers officers

[P2, 6]
Thoomand officially officially officially official officia

Folio 9, Verso

```
[P1, 1]
Tocco? otology off cool sand totogether totogether sand
[P1, 2]
Seco? toand elland ettor cooperor ettogether soft tology sand
glicy cool gland sand ettogether off occol sand
glicy tology the sand ettogether off off occol sand
glicy they there there off off off
```

[P2, 5]

Took offeely totok offee oxettoxy the at celly salling period offeely the at celly salling period offeely the attention of the attent

Folio 10, Recto

[P1, 1]

The coefficts of offices and colors for the second control of the second colors of t

[P2, 6]
gcc20? cffcg cco? cffca\\dagger\dagg

Folio 10, Verso

[P1, 1]

Tand dand coo foces follo dand officer offodo cand
[P1, 2]

dand dand officer ocottoor ocond follo ocodand officer dand
[P1, 3]

does office foces officer ocos do

[P2, 4]

totlogotor conn sand totlog coffees offor sand

[P2, 5]

co offees sand totlog totlor cox sand totlogotor

[P2, 6]

conn cor coffee totlo totlond totlog corand

[P2, 7]

Folio 11, Recto

[P1, 1]

Therog zeroag etg ct goda \ \lambda \ etg ccg theody cooffg

[P1, 2]

Zocthody todo? g they dann offer gotherolly theog dann

[P1, 3]

tothy cros ethy do? gligery crothy dann crann dann ded

derog cry they do? gligery

[P2, 5]

There is the start of the start of

Folio 11, Verso

Folio 12

Folio 12 is missing from the manuscript.

Folio 13, Recto

[P2, 5]

choroso de fleto l'acox staro totaro ottaro de cheox so l'acoroso de cheox so l'acoroso de con tara ottaro ottaro de cheox so l'acoroso de con totaro de controlo de cont

Folio 13, Verso

[P1, 1]
| Noar? cettorry offices office offices
| P1, 2]
| office to flow ceodage offices offices cettoge ceoffs
| P1, 3]
| to flees to flood cess offices offices
| P1, 4]
| oge cecss office oarry offices to office
| P1, 5]
| to flos darry

Folio 14, Recto

Folio 14, Verso

[P1, 1]

Toganon No offodan offodo of offano? Sann log offano?

oliano? Sang that only and attention offano?

oliano? Sang that only and attention offano?

open of offano offano offano?

offano offano offano?

offano offano?

offano offano offano offano offano

(P1, 6)

totto attention offano offano offano offano

(P1, 6)

optano offano offano offano offano offano

(P1, 7)

optano offano offano offano offano offano

optano offano offano offano offano

(P1, 8)

collano offano offano offano offano

sano offano

optano offano

sano off

Folio 15, Recto

[P1, 1]

The cor tees thereof to go offer to go offer to flow offer to flow of the cor offer of the cor offer to flow of the cor offer offer of the cor offer offe

Folio 15, Verso

[P1, 1]
To Por orchy connot offer or so [P1, 2]
**cor or oro or annothing than offer or so [P1, 3]
cftor sand tollor offer offer offand
[P1, 4]
sond collo con tollo tollor offer or offer or cor offer or cftor offer or cftor offer or cftor offer or cor offer or cftor offer or cor offer or cftor or offer or cor or offer or or or or offer or or or or offer or or or or offer or sand
[P1, 8]
offer or cor or or only off cor sand
[P1, 9]
offer or cor cor cor cor cor offand
[P1, 10]
Cor cor cftond cftor tolland
[P1, 11]
Corond cftor cor cor sand find
[P1, 12]
sand cftor cor cor cor

Folio 16, Recto

[P2, 5]

There is the control of the control of the figure of the figure

[P3, 10]

To Po Po Sagger of the force of the office of th

Folio 16, Verso

```
[P1, 1]

Terranno offeror enterox entercy 2 teroetly

[P1, 2]

offeror of the enterox followether tory

pland by enough total end to the end of the end of
```

[P2, 7]
To cotte of the policy of the offer o

Folio 17, Recto

```
[P1, 1]

Thooso saray osarcon otoso otos cot others soso oxsettes
[P1, 2]

osarr collo olicto tosar etheoso sor others tosettes osc
[P1, 3]

crox or cro tosan ollor cror olicron

[P2, 4]

thereon chos tollon tor oxarri others

[P2, 5]

occilica ethe cror chor etheor etheory

[P3, 7]

licteo tollero cronsecto methes

secure soccer reales

[P3, 8]

Secure soccer reales

[P3, 9]

Coo cette o sar coftean

[P3, 10]

sar cecar secer saro sarri

offers, ino sar cettar ollari

sarces secure soccer saro

sarces secure sarces

sarces sarces sarri

sarces secure sarces

sarces sarces sarri

sarces sarri

sarces sarces sarri

sarri

sarces sarri

sarri
```

Folio 17, Verso

occes less ctodas olos obarro ollas 0,000 lloco? Pocos oftos osocios ollocos gcros cros 80scrccg Hcros 8a7 cHzg $_{[P1,\,6]}$ 8 G//210 90 G//210 90 90130 6112 So Fosso S110 Cost post Fos †oliccy licrat of 80 crobsarry 50 general feros erostanos os [P1, 10] ogto7 olco7 ola7 olog 80117a8 †ollaco †ollovi? attacog acog 00 ct09 loarry crefteg of ct07 9 1/co? cros cros ctos ctos cros cto? ctos oro ? officeox crosarry officer ffcro?9 . 90007 cthg accellg acco othor othogo [P1, 16] offercos cros offcos effcos offercosos toand Saf to sox to fearn cottoo Sus fo for cos gos ao follo 8ail ccco toail cttod ccox ccox 9/cc9 offcc9 cco7 ccox co 98a110 Jus Fossits of Eccept Fosos Fosos †016cc 8a7 ccc9 16cc07 cccc09 cffccc9 cffc9 80sllo 9as Fosllo posllo

Folio 18, Recto

```
[P1, 1]

**T87a\789 8a708ct* 90a7 916cox 8a7 0 8 cectes octeo? 8ax

[P1, 2]

otteox tolecox cestes olecax 8a\1) 89 ceox 8\1\0

**Tolecor ceor cettes oreces tolecox 89 9thear 8

[P1, 4]

cor etteor oleor ottoox ola\0
```

[P2, 5]

Theore took effective effective engage engages of the solution of the second effective of the solution of the second effective of the solution of the second effective of the second of the second effective ending the second of the second of the second effective ef

Folio 18, Verso

Folio 19, Recto

Folio 19, Verso

[P2, 8]

Thog there to see to here? sor

[P2, 9]

getor ollo etor offer etor ollo ssor

[P2, 10]

Sann cor sann ollo of ssor

[P2, 11]

totor sor olletor sann effer offer

foffer olletoses sann or offer

[P2, 12]

offer olletoses sann or offer

[P2, 13]

gec offer offer offer offer

offer olletoses off offer

offerogetann offer

Folio 20, Recto

[P1, 1]

Notice of the control of th

[P2, 5]

Throoffig molloanny of meccy of may docanny?

[P2, 6]

mocco offmod toffog meccy sanny may monny sanny

[P2, 7]

omogenos sanny moffeog mog sog etog offanny

[P2, 8]

Comosan mecco of mecos

[P3, 9]

Toodec dodg tollarg tollarg toetig arollogdg

[P3, 10]

octoall aro? Codg taodall arollodg arollogdg

[P3, 11]

datod tollarodg glarg tollarg datall arogodg

[P3, 12]

aroll arollodg ollarg ollarg tollarg tollarg datall

octoll aro? aro? arceg targ

Folio 20, Verso

```
[P1, 1]

tarrow and office of totocco office to to to together office of the control of the cont
```

[P2, 5]

There for to get of the dog to the order of the square for the square fo

Folio 21, Recto

[P1, 1]
Theor occoeffics of gency offeres to the code offer of gency of the code of the co

[P2, 4]

Toology dann offern offern forces for the force of the force

[P3, 8]

The older offor the operation of the objective of the objective ofform office office

Folio 21, Verso

[P1, 1]

Those of a color of the control of the con

Folio 22, Recto

[P1, 1]

To go oxity through those offers offer offers and offers

[P3, 7]

Marox took officed the crooks officed that [P3, 8]

Sacor off sail offices follo croffail continuous soil sacor [P3, 9]

osail sail office officer orally

[P4, 10]

| fccop cco? 3a\\\) cfco\\\) 8cco? ccc9 to fog 39 ofccop og 3a\\
| 80\\\\) goffco39 to fccop offg offg 39 of 8cccq 3a\\\\)
| 80\\\\) goffco39 to fccop offg 30 offg 30 of 8cccq 3a\\\\)
| 80\\\\) cffco39 to fccop fccop 3ccop 3a\\\\)
| 8cco\\\ 393a\\\\) to ffcop offg 3fog offa\\\
| 8cco\\\ 393a\\\\) to ffcop offg 3fog offa\\\\

Folio 22, Verso

```
[P1, 1]

**ToZarrior of car of flee offs 202 ct of tos

[P1, 2]

**Sarrior offs flee offes secor geg

**Sarrior offs flee offes offes offs

[P1, 4]

**Offs flee offs tolfs Zarrior offs

**Political Color offs

**Political
```

```
Theorem the following following the following the following following the following foll
```

Folio 23, Recto

[P2. 4]

tollogog ollariz ollariz ollariz ollariz ollariz ollariz ollariz ollariz

getor tollariz ollariz ollariz ollariz ollariz ollariz

getor tollariz ollariz ollariz

[P3, 6]

Thereographically offs and offs seech sallage say offer george
[P3, 7]

offar operar tally tollerog sar tollerog salvo r og salvy agg

[P3, 8]

tolleroge car salve tollally ogoge toally offers 2 slig offers

[P3, 9]

offoge off to tolloge so soge seech tollerer og salvy offers

[P3, 10]

tollollally effers 2 offerr osage erage so sar offall

[P3, 11]

offollo sagoro

Folio 23, Verso

```
[P1, 1]
Toda ( For oda ) ( ) ( ) coases often off of og cuttes follera? 2

[P1, 2]

totle off of our offerases for foller og offer og cuttes offered

[P1, 3]

gero offa ( ) offere cuc ogsa ( ) offeror say offereg

[P1, 4]

offereg san? Losos ogsas offeror sar

[P1, 5]

sor cucar Lor sog ogsas?
```

Folio 24, Recto

[P1, 1]

107079 cco7 ofca7 &c cco9 8a110 o7 totally of obard offartheas offartheas offartheas 9 cttca? cttcax olfox totta? cttc9 of cectleago ettea? coo? cecce 8a 1807 cro 7 crcg cttg cttc 1608 occco2 ctlco7 otlag toctlcog tollg *162 cc162 ccc02 cttog todog octo7 2 08 toca7 8a110 tollcog 08a110 clicar toda1 the soc dag 7. 07 cta? co? 2 a8 ccotla/10 89
[P1, 11]
[P1, 11]
[P1, 12]
[P1, 1 tollers tollers flog flos effes Soco of S crop croft Saso too ccco too ccar offcas S 208 20 Sosso Sosostao ट्टंबर जीटबर ठवर ठवर ठवर ollo posto pato pollo estis ${\displaystyle \mathop{\mathsf{o}}_{\scriptscriptstyle{[P1,\,19]}}}^{}$ cros cros 8a11) cros 8 909 for crop tog offarteg Sagczoggo

Folio 24, Verso

```
Horosar crockes ofor those crokes of those of the solution of the second of the secon
 ossilo sossilo Sossil
 octtog oscocco occarco ollas coctto
 98ag & olfog olfarry 08arry 890S
                   090 900 110 Accas 090
  [P2, 6]
                  Mocros coo characo
 .
gczcog da\d da? ogog
[P2, 8]
                    Pocly cotty cox Savi
 9009 cros of crofos
offoco? cffcco8 cco9 ffcog
 98a110 ccco? todog oloda110 [P2, 12]
                   lico toa? etto do tolle ollege
 occes acor as odo? Lo do offorodag _{[P2, \ 14]}
 80117 ccco8a8 to to 89
offcog 08a118
```

Folio 25, Recto

[PI, 1]

Tooges cooks sand office toos sand occors ofters of conformation office toos of compassion office office

Folio 25, Verso

[P1, 1]
Toccarry tolly deg sarry tollecg offeco tolleco tolleco coc
[P1, 2]
Seco? effeo? ero? sarry 2 offeco offeco tolleco sarry
oreco feco? erox sarry defeo? sarry secto sarry
oreco feco? erox sarry defeo? sarry secto sarry
tollorry tolleco deox sarry effeca? effeox sarry effeca?
[P1, 4]
tollorry tolleco deox sarry effeca? effeox sarry sarry
sar erofleco seco? seco? tolleco tollorax erox erary secarry colleco?
[P1, 6]
tolleco ? oeco tolleco tollorax erox erary secarry colleco?
[P1, 7]
odo erfecy sarrox sarry deethe offecarry

Folio 26, Recto

[P1, 1]

The colly osant top of toos coffees of the so and coffee the so
[P1, 2]

Second sand ascess of ceffees aces of the so so acethers of the so of the solution of the so

Folio 26, Verso

Folio 27, Recto

Folio 27, Verso

[P1, 1]
Tomot mot mo to copy top offeror of more ferore.

[P1, 2]
8 mg mlar offers to to say say stay larg mus say say
[P1, 3]
If may smollers sto say most of the cost of the say
[P1, 4]
offero my flaces my moy hos o offer some call of the some cost
[P1, 5]
tolly these costs they mothers aftersore
[P1, 6]
sto larrer offers smollers call of the some costs
[P1, 7]
to to to show the

Folio 28, Recto

[P1, 1]

Tooda? Los cocto of cox sann officer copto sop
[P1, 2]

officer officer officer officer sor sor called sop
[P1, 3]

tofficann correction officer correction floward
[P1, 4]

coofficer officer officer officer officer officer
[P1, 5]

officer officer conficer officer officer
[P1, 6]

tofficer tosann officers sor sor tofficer officer
[P1, 7]

coofficer tosann officers sor sor sor sor sor sor
[P1, 8]

occofficer sorticer coofficer officers sor sor sor
[P1, 8]

occofficer sorticer flow son sorticer
[P1, 9]

officer sorticer sorticer sorticer sorticer officers
[P1, 9]

Folio 28, Verso

[P2, 4]

The only acor acor of office acor acor sand tothe acor acor sand tothe acor acor sand tothe acor acor sand tothe acor acor sand acord tothe acord a

[P3, 7]

Totog 0117 crog thoo sarry to the cro cetters sar? as

[P3, 8]

ollard crad crard etter sard of con sarry of construction of con sarry of construction of const

Folio 29, Recto

```
[P1, 1]

To2all decorate off off of the profession of the control of the control
```

Folio 29, Verso

```
[P1, 1]

Moon No too? cellers orare togethers offe of togethers to the sand tollerand enough of the sand tollerand enough of the sand enough enough
```

Folio 30, Recto

```
office of acq do racq facosq deg that acr so deg per, 2]

garosq acq affecq the facor acor deg de the cosoq og garosq acq affecq the facor acor deg de the cosoq og per, 3]

acosann acor acq sonn car to facor accq facoq facoq per, 4]

tother tothe tother of acor and tother and acord for acord to form secoq sheer accords no acord accords and acord secoq sheer acords and acord so records and acord so reand attention of acord so reand attention accords and accords and attention accords and accords and attention accords and accords and attention accords and attention accords accords and attention accords accords and accords and attention accords accords and attention accords accords accords and attention accords a
```

[P2, 8]
of trop of the control of the control of trop of trop

Folio 30, Verso

[P1, 1]

cftc2cftca\d &co2a\d cocftcg &co act fag &co? &ca\d d)

[P1, 2]

toffaco? ag &c llaco? aco? llco? og ag &a\d cftco&&g

[P1, 3]

acoffacos &a\d cftcos &o\d d) &a\d collco? &as atforthy

offacog &a\d co? accoftcg toffaco& &a\d d)

[P1, 4]

offacog &a\d doff action offaco&&g

[P1, 5]

&a\d &coffaco? acoffog offo? acog&g

[P1, 6]

toffaco? acoffog acoffaco&g &a\?g

[P1, 7]

cooliag &coffaco faco doco

[P1, 8]

og&g acoffaco? aco? &cog &co

[P1, 9]

toffaco? aco? &cog &co

[P1, 10]

&co &cog&g offaco? &a\d d)

[P1, 11]

Cog acoffaco? &a\d d)

laco&g

Cooliag &coffaco? &a\d d)

laco&g

Cooliag &coffaco? &a\d d)

Cooliag &coffaco? &coffaco? &a\d d)

Cooliag &coffaco? &coffaco? &coffaco? &a\d d)

Cooliag &coffaco? &coffaco?

Folio 31, Recto

offco? arrefteg

```
Probable to the South following the followin
                80000 January Collect S and collect total
tolleg ceco sand tolleg fant cecles Sand seg
tota? ccg 8a? 90? a? ccccg 16ccg ccc89 to16cg [P1, 5]
                90010t 0800055 (1118
                Theolicoso tolicos tolicos ecctar ecoso ? and sag
per of the state o
 [P2, 9]
                80117 Ecco Ecttog offcog
[P3, 10]
               Those and offices tolless tolless tolless sar acording
 oxéccox tollers dax ency decy lety lees offarrid splecy _{[P3,\ 12]}
†οαινθ 9σες ο Μεδο δες σες σεςδαινθ δα?
 obsolo Gilbe obsos so Silos
octobar choog collo ollobar
```

Folio 31, Verso

[P1, 1]
Toda \ ? &ccess offices offices toffogetee 2 a ? a? offices offices age
[P1, 2]
officeo octives officeo eccoss offices focoss sand eccoss focoss
[P1, 3]
officeo sand &csos offices offices offices offices offices
[P1, 4]
san? effices toffoss offices eccoss offices ag octives offices
[P1, 5]
office eccoss a? and

P2, 6]

Toccoso tot occos occition of occitions of occit again of a theo offar

[P2, 7]

og ficeday occi occi ficeog occition offag offag offa occided offar

[P2, 8]

off and occided offaces occided offaces occided offag

[P2, 9]

officecog occided offaces and antificed occided occided offaces

[P2, 10]

sar occided offaces occided offaces offaces offaces offaces

[P2, 10]

sar occided offaces occided offaces offaces offaces offaces

[P2, 11]

Zand offaces occided offaces offaces offaces

Folio 32, Recto

```
·4
ollof ollcrof ccof clfrg 8ag 8cco8af follcrog
   tollcrof crof ethor crop dor decrosand sand
  2000 8000 91100 8avi 8avi cco88ag
              toffers toffers sand
[P2, 6]

Laco Hace aces
   offor sox ox sar?
  †oa? 8a\\V 8a8
   8011cco2 8a29
[P2, 10]
ट्टें08a110 ट्रीं08
             office of sand sand cttog
 [P2, 14]

Cocco toll occo sand offer
 tollary tollog 80117 og [P2, 16]

Tollarog acco 2019
   [P2, 17]
  حدهالاده الادمال المراقع المر
los scros sas
```

Folio 32, Verso

[P2, 7]

If to cto? to tecanno officeo? san telles? I osad

[P2, 8]

officeo sand sand toffand offices star

[P2, 9]

toffices the office tecanology sand the sand

[P2, 10]

to look to took took took sand

[P2, 11]

or to tecanology sand

or took took

Folio 33, Recto

P1, 1]

The sar desor detects of costs of orders of the so offeres offeres sand

places to the cells of the sast of the sast of the costs of the cos

Folio 33, Verso

[P1, 1]

That at sann grant colleges of the same of th

[P2, 7]

**Thicks of the so the so offers of sann off of the solution of the s

Folio 34, Recto

[P2, 5]

totlccog accog accog or olice at oxilacog otices and accomp

otices according of according to according of accord

[P3, 11]

Thereo operation ogo offeres are taga?

[P3, 12]

Tolleg & laggarrow are the order offeres are tagas

Tolleg & laggarrow are the order offeres are the order at the order are tagas are the order are tagas are the order are the order are tagas are the order are tagas are the order are the order are tagas are the order are the or

Folio 34, Verso

[P1, 1]
[Pcc39 cc39 ccttcg cc39 totas cc3939 cc3axc39 gtc39 ccttc39 cttc39 cttc39 cttc39 cttc39 cttc39 cttc39 cttc39 ccttc39 cttc39 ccttc39 cc

[P2, 6]
There da? Aca? to licedy to liced encog of the danni encog of are encoded in the control of the control

Folio 35, Recto

```
[P1, 1]

cffcoo ? cross cffcs croffs cra? 39

[P1, 2]

tolccand crolland toffces dand

Becand cffccs toffces fland cffco?

[P1, 4]

toffces deffces cffcos crees dand dand

[P1, 6]

Cocand cra? crad dand

[P1, 7]

choland ffco? crolls

[P1, 8]

tolccs 19 land dand

[P2, 9]

tand crea? and crea? cho? crand
```

[P2, 9]

Tand care and care took cand xx

[P2, 10]

o and cand office of care coores band

checand coop officend greand gray bas band asby d

[P2, 12]

ogod cas cand cas fland forces flogos cofficend

[P2, 13]

toffond cand tofficend gray goodage offices fland

[P2, 14]

office coop and toffice officed band check for toffand

[P2, 15]

occod cond and toffice officed band check for toffand

[P2, 15]

Folio 35, Verso

```
fa? cco? ccocffcg ?oa\\dagger a?
totlarg offaceg llaco? offa
 Boro For collo sally
[P1, 4]
offce folice see offe
Scroller croeffed creffed?
 Los flaces affecces actesive
 The golf os cos for Sarril
00110 Hero? to to the strong 8
9905 9aSon وعدماً
†offceccann ceosann
8000110 80110 8010 809 8
. og cta? oð a? ctca?
 Prica Salt of Par Said
olfog croog offerg ffer
98a110 offices 8a110
 Barry sary cellago crogo
 8 000 Polices Possibot Pinas
 Scrolleg gloog crog sall
80110 CO2 CO2
```

Folio 36, Recto

```
[PI, I]

Totaloan totan contag conn officer dann officer sand officer sand officer sand officer sand officer sand officer sand soperand
```

Folio 36, Verso

```
[P1, 1]
Totalalo totolog coann totolog cretters offand ctral sand
[P1, 2]
Totalal cros sand offand totolog offal octol cretter softal

total cros sand offand totolog offal officer softal

secoffices offal officer offal officer

total officer offal for so sand ctrol
```

[P2, 5]

Thereof effeon dann effecta?

[P2, 6]

Sann effeor sann sag sg2

[P2, 7]

Tolly leog offeror of ero can

[P2, 8]

offer goffer sog offes goff of goff of goffer goffer goff ero ero ero effect goff of ero effect gof

Folio 37, Recto

[P2, 4]

Toolog sann offers sar cros sann 98

[P2, 5]

919 tollog tollog cellos offoss

[P2, 6]

ctor cros tollog tollogoss scros sann

[P2, 7]

207 cros 107 tollor sann

Folio 37, Verso

```
[P1, 1]

| fictody toothey tothogogy croffsand cog [P1, 2]
| 80? crog ctro? o?cro cro? dann)
| folicrod cty crod dann dy decor defined decor decor dann)
| 8ctor defined decor dann
| P1, 6]
| golfor other offcand dann
| p1, 6]
| golfor other cannot othe
| p1, 7]
| totheror dann
```

[P3, 14]

Thosand ctann ctropose

[P3, 15]

20110 ccollog sand sand

[P3, 16]

Tothor sand ccothand

[P3, 17]

201100 tothon dand sand osg

[P3, 18]

office sand sand osg

[P3, 19]

sand thond tothog sand

[P3, 20]

occothacy offor sand ctrope

[P3, 21]

occothacy offor sand ctrope

[P3, 22]

Tothog offord coothacy

[P3, 23]

Folio 38, Recto

[P1, 1]

Thoso? croctes one crown offers ore ore offers of crown offers ore offers of crown offers ore ore offers offers offers croffers c

Folio 38, Verso

[P1, 1]
 office of the control office office of the control of the control office of the control of the control of the control office of the control office of the control of the contr

Folio 39, Recto

[P2, 6] Tocos in the san to tocos of tocos of the san of the san to tocos of the san of the san to the san to the san of the san of

[P3, 10]

**Tecolor decolor are anterested and anterested anterest

Folio 39, Verso

[P1, 1]

#8a\? cc89 #8911a\D o? a\? &c911a\\\D o#c09 11a? o? a\\D &ox 119 o&&9

[P1, 2]

20? &g 110? cc0x totto 11cc89 ox 119 80? cc89 of 1a? ox 11c8a\\D o&9 89

8a\\D cc0? of 1a\D of 1a\\T cc089 2a\\D o? a\\D to 1a\\D of 1a\\D of 168a\\D of 168

9 of 1cc9 cc089 ccc0? a\\D of 1689 cc08ax of 1c89 to 1c89 8ax o? a\\D &f 1689

of 1c89 110? o? &c19 11a\D of 1a? o? a\\D of 1a\\D of 1a\\D of 1689

x 11c89 of 1cc9 &o? \tag{10} 1a\ \D of 1689 cc0 cf 1689

x 11c89 of 1cc9 &c0? \tag{10} 1a\ \D of 1689 cc0 cf 1689

x 11c89 of 1cc9 &c0? \tag{10} 1a\ \D of 1689 cc0 cf 1689

x 11c89 of 1cc9 &c0? \tag{10} 1a\ \D of 1689 cc0 cf 1689

x 11c89 of 1cc9 &c0? \tag{10} 1a\ \D of 1689 cc0 cf 1689

x 11c89 of 1cc9 &c0? \tag{10} 1a\ \D of 1689 cc0 cf 1689

x 11c89 of 1cc9 &c0? \tag{10} 1a\ \D of 1689 cc0 cf 1689

x 11c89 of 1cc9 &c0? \tag{10} 100 \ta

Folio 40, Recto

[P1, 1]

Taco floodar assoss to fo offax asso offace ar ordanno
[P1, 2]

to far offar offar sara sar offace flanno offar araso

[P1, 3]

As to far asso active offor and offar offar offar offar

or and actives sar to for offan offar offar offar offar

[P1, 4]

or and actives sar to for offan offar offar offar offar

[P1, 5]

soffar to far offar offar of a active ar ar or sar

[P1, 6]

floor or ar and offar offar offar offar active ar ar or sar

[P1, 6]

floor or ar and offar offar offar active

gand active offar o

[P2, 8]

| fletco fletcy sat any fletco etesy orani etetax sann sy
| flann or oxann or sand offand offand offand satay
| F2, 10]
| Zann oxercy etsy getcy flatat offy glessy offant osy
| F2, 11]
| float glann org sax

Folio 40, Verso

```
[P1, 1]

Tocosand occtand ogsg
[P1, 2]

Tosar tolland og arag
[P1, 3]

2 and and olland ollan

Tharand olland occtand
[P1, 6]

Tocosand ollar ogg occtag
[P1, 6]

tocosand ollar ogg occtag
[P1, 7]

chosg tollog occsg 2 ar
[P1, 8]

coosand oclas glicsg ollag
[P1, 9]

Though tocos tocos tosar
[P1, 9]

Though tocos tocos tosar
[P1, 10]

Thouland tocos tolland olland
[P1, 11]

Coccs tollog occsg sago? attog
[P1, 12]

gocccliccy sand olland
```

[P2, 13]

Thocco cross hose of cross to hose sand cross
[P2, 14]

Canno o garco hares of to hare so so to hore as as as a cross

To hares to so garco hares of an indicate as a cross

To hares to so garco to so and to hare to hare a cross to so to so garcos to hare of the constant and the c

Folio 41, Recto

[P1, 1]

3 Analysis

3.1 Glyph Frequencies

Jaces of a traderiteration by thetaeace (ce dection 1), a treet Jace anagoric of tretaeners can be tertorges, by continue continue cathor setting of the traderition. The continue to the traderition of the traderition. The continue to the traderition of the continue traderities and the continue traderities and traderi

Letter	Glyph	Count		
	<i>J</i> 1	Takahashi Takahashi/Ba		
0	0	25,468		
е	С	20,070		
h	ح	17,856		
У	9	17,655		
a	а	14,281		
С	σ	13,314		
d	8	12,973		
i	`\	11,660		
1	۶	10,518		
k	ľ	9,996		
r	5	$7,\!456$		
n	Э	6,141		
t	11	5,968		
q	1	5,423		
S	උ	$4,\!501$		
s	ተ ሪ የ	2,886		
p	#	1,406		
m	В	1,116		
T	Ħ	976		
K	ff	938		
f	₽*	425		
P	₽	224		
g	ያ ያ	96		
F	₽	80		
I	τ	72		
x	ᆽ	35		
v	٨	9		
z	М	2		

Table 1: Letter frequencies in Takahashi's transliteration.

settergy did great coadite as one grote, theoage, is no some cases an intertrettation action the second statiformans to assign the attention and a are one grote (i.e., ce). gillender, of and a coage of intertrettes as another grote (i.e., ce). assign through one gight intertrett instances of other, other, of the or offer as retresenting as another grope. The or the or offer as retresenting as and the standard of the order of the o

Letter(s)	Glyph	Count		
		Takahashi	Takahashi/Bauer	
ch	α	11,008		
Sh	ટે	$4,\!501$		
\mathtt{cTh}	c lf c	950		
cKh	clfc	906		
cPh	c t° c	216		
cFh	ctc	74		
С	c	143		
со	CO	9		
су	c 9	7		

Table 2: Glyph frequencies in Takahashi's transliteration for several σ combinations.

#artheeryore, yeige theere are idellated of a sidge i, it is not exear yeetheer idellates gite in all in or cogoidations yith i gite in or in refrescit setarate grates. Hadge 3 gives tretaeneres tor severage of theose i cogoidations. assaying theere are theree grates i, in, all in, it is of coarse siftically the settery in yeer theore arthagy is a in or a in.

Letter(s)	Glyph	Count		
		Takahashi	Takahashi/Bauer	
i	١	590		
ii	\\	195		
iii	111	10		
n	Э	148		
in	61	1,752		
iin	611	4,076		
iiin	1119	154		
iiiin	61111	2		

Table 3: Glyph frequencies in Takahashi's transliteration for several χ combinations.

then dends dans, the diffatiness distinguished a cert of 22 groted. Hadee 4 gined the factorial to the description of the descr

- Her grotes a, 8, c, 9, τ , 9, 8, 0, \uparrow , 7, 8, λ , λ , and 9 are significant as defore. Ecoloc, triples are installed and λ with the significant λ
- the grote to is could be shown that can consecutions.
- Her grote to 12 coalites encry 11/80 to all e atteat collection nergy as in tacke there is the the theory.
- Hec grote I is coalles encro Ilige I of I attears.
- · Hec grote 11 12 coadities energ 11/80 11, If, or in atteats.
- · HEC goote & 12 coalles ever the for & affears.
- Hec grote t 12 coalles energ three t or t attears.
- the grote in is counted energy three is all affect consecutioners of the out
- the grote in it coalities enero thige in it all affear consecutioners.

• the grate i is coalited energy things it is don't to the or in as greage as id idetalless of t.

Letter(s)	Glyph	Count (Percent)		
()	0.1	Takahashi		Takahashi/Bauer
0	0	25,468	(15.636)	
е	С	20,070	(12.322)	
У	9	$17,\!655$	(10.839)	
a	а	$14,\!281$	(8.768)	
ch	cc	$13,\!154$	(8.076)	
d	රී	12,973	(7.965)	
k	ľ	10,934	(6.713)	
1	9	10,518	(6.458)	
r	5	$7,\!456$	(4.578)	
t	11	6,944	(4.263)	
q	1	$5,\!423$	(3.329)	
Sh	ત્ત	4,501	(2.763)	
iin	611	4,232	(2.598)	
s	S	$2,\!886$	(1.772)	
in	G'	1,752	(1.076)	
р	₽	1,630	(1.001)	
i	\	1,240	(0.761)	
m	В	1,116	(0.685)	
f	₽	505	(0.310)	
g	දු	96	(0.059)	
x	ᄌ	35	(0.021)	
V	٨	9	(<0.001)	
		162,878		

Table 4: Glyph frequencies in Takahashi's transliteration

3.2 Entropy

Vext, gett'? Italic a gool all the gavalet this could be the corrections, the theorem is a constitution of the same of the correction of

$$H = -\sum_{z \in Z} p_z \log_2 p_z \tag{1}$$

The cascalgatic tiec entitle of τ and τ and τ are considered as a subsection of the cascalgraph of th

- the grate to 12 retresections of sh in cha. For carefrathing the entirety, chery things and hatter consecutioners, they are retracted to 1
- the grote or 12 retresevites do ch 10 ena. enero tinge e ado h attear consecutionero, they are retraces do 2. torroy the adone strates raged tor grote coaditions, or 12 areo deriences to de tresevit year or ado e are setarates do th, th, th, or th, retresevites do th, poor find ena. To theose

calcl, if it legions that if, if, f, or f are ages freezible. Here are refreezibles do t,k, p, or f it can teles, they are refraces do 2t, 2k, 2p, or 2f.

- Her grote in, Petrescottes do z in car, is coditted as it, retrescotted do k in car. Therefore, early z is retreated by k.
- the grote in it can come the in it is als nattear consecutions, they are retraces by 3.
- Here grote in it can care fligs i and n after consecutives, they are retraced by 4.

cascasating the entropy to the connective control entropy in the 3.866. at containing the entropy in the connective the entropy in the control entrol entropy in the control entrop

Corpus	Н
Takahashi	4.021
Takahashi (converted)	3.866
Takahashi/Bauer	
Takahashi/Bauer (converted)	
Random text	4.459

Table 5: Entropy (H) for different transliterations.

References

- Beinecke Rare Book and Manuscript Library. 2004. "Cipher manuscript (Voynich manuscript)." Accessed February 14, 2023. https://collections.library.yale.edu/catalog/2002046/.
- Bettencourt, Rebecca. 2019. "Voynich unicode." Accessed January 30, 2023. https://www.kreativekorp.com/software/fonts/voynich/.
- Clemens, Raymond, ed. 2016. The Voynich manuscript. New Haven and London: Yale University Press.
- D'Imperio, Mary. 1978. The Voynich manuscript. An elegant enigma. Maryland: National Security Agency/Central Security Service.
- Schwerdtfeger, Elias. 2004. "Voynich information browser." Accessed January 30, 2023. http://voynich.freie-literatur.de/.
- Shannon, Claude Elwood. 1948. "A mathematical theory of communication." *Bell System Technical Journal* 27 (3): 379–423.
- Stolfi, Jorge. 1998. "Reeds/Landini's interlinear file in EVA, version 1.6e6." Accessed February 12, 2023. https://www.ic.unicamp.br/~stolfi/voynich/98-12-28-interln16e6/.
- Takahashi, Takeshi. 1999. "Voynich manuscript-transcription." Accessed January 30, 2023. http://www.voynich.com/pages/index.htm.
- Tiltman, John. 1967. "The Voynich manuscript. The most mysterious manuscript in the world." NSA Technical Journal 12:41–85.
- Zandbergen, René. 2023. "Text analysis. Transliteration of the text." Accessed February 2, 2023. http://www.voynich.nu/transcr.html.