A Numerical Approach For Dating And Localising Glagolitic-Old Church Slavonic Documents On Graphemic Grounds

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1. A conference dedicated to the memory of B. de Courtenay must pay special attention to the field of graphemics. For it was him who first conceived *graphemics* as a parallel discipline to phonemics and the *grapheme* as its primary unit [Mugdan 1984: 83; Kohrt 1985: 168 sqq.; Adamska-Sałaciak 2001: 193; Kelih 2008: 53-54]. In this context he laid great stress on the 'mathematics of the future' which would formalize the relationship between the linguistic entities and thus describe the 'laws of the world of language' [Köhler, Altmann, Piotrovskiĭ 2005: 25sqq.; Grzybek 2005: 58sq.; Kelih 2008: 13-14, 17, 49-54; Kelih 2013]. In [Baudouin de Courtenay 1912: 67] he saw the destination of the relationship between graphemes and phonemes as the pivot of a theory of Graphics and declared that this relationship could be expressed in a mathematical formula. Although several of his students followed this path, it was actually a pupil of F.F.Fortunatov's in Moscow, Nikolaj F. Jakovlev, who in 1928 realised this idea in an article entitled 'A mathematical formula for the construction of the alphabet'[1]. Here, he outlined how to reach the optimal relationship between the number of graphemes and the number of phonemes in a given language.

We will also dwell on graphemics and mathematics, but descriptively and in diachrony. The relationship we want to tackle is the one of graphemic systems in time and space, as observed in a class of historical sources – Old Church Slavonic manuscripts written in the Glagolitic script. As is known, they are preserved in a comparatively small number from the 10th to the verge of the 11th/12th century. The Glagolitic system itself was composed by Constantine-Cyril most likely in 862. During the app. 60 years before the oldest manuscripts set in, it had further developed in the (Great) Moravian Empire (863 – 885), and then predominantly in Bulgaria (from 886 on), although it was also used in the Western Balkans and on former Moravo-Pannonian soil (Bohemia, Hungary).

2. When working out the present approach in 2010[2], our goal was rather practical: In our project devoted to the new Glagolitic manuscripts of Sinai[3] it became necessary to date and localize the new monuments. Since none of the OCS-Glagolitic manuscripts contains any historical information about its origin, this meant to verify the spatio-temporal classification of the hitherto known Glagolitic sources and then to fit the newly detected manuscripts into the resulting classification.

It was clear from the beginning that the basis of this enterprise could only be a graphemic one, as the palaeographic and the phonologic approach had already been applied *in extenso.*

In the OCS period (863 – 1100) the Glagolica underwent numerous changes, giving rise to a similar development of its later Bulgarian competitor, the Cyrillic system. The extant sources provide material to conceive most of them and draw a precise description. Yet, the sequence of changes depends on interpretation, and in many cases the chronology can only be guessed. This applies also to the centres of the changes, as the interpretation can be blurred by the fact that many scribes are influenced by the sources they copy instead of following the rules of their school. Mind that on the basis of graphic data neither

[1] On Jakovlev and the construction of economic alphabets see [Kelih 2008: 54/10, 60-63].
[2] For the first version see [Hürner 2010: 266-280; cf. also *ibidem*: 142sqq.].
[3] Cf. http://www.caa.tuwien.ac.at/cvl/research/completed-projects/sinai/ and http://www.caa.tuwien.ac.at/cvl/research/sinai/.

the origin of a document nor of a scribe can be estimated, but only the (ortho)graphic school of the person responsible for its execution.

3. We based our approach on the material composed or collected over the years [Miklas 1989, 1993, 2003, 2007; Hürner 2010: 281-289 *et passim*]. What was needed was a sufficiently exhaustive list of features and a clear notion of how they are related to each other in the extant manuscripts. Such graphemic features (F) can be complex, consisting of a class of simple or compound graphic units (G) plus/minus graphotactic rules, or simplex, i.e. consisting of only one unit (plus/minus graphotactic rule):

$F_{(x)}=\{G_n\}$, whereby x=(1…20) and n≥1

Since we wish to perform chronological and redactional calculi, we need chronologically (F_t, whereby t stands for 'temporal') and redactionally marked features (F_r, whereby r stands for 'redactional'). Some features are of a double relevance (F_{tr}) such as the presence of *Šta* ѡ or/and the sequence *št* ѿ in the same position. Moreover, the character of certain features speaks in favour of a ternary relationship rather than a binary one. Thus, we will rather speak of one single type of features, but up to three different values.

4. The third value is due to the 'cultural markedness' of graphemes which confers to the system a kind of deep structure. *Lexemographic classifiers* (F_{rc}) such as *Ypsilon* ѹ characterize the elaborated *diastrato-diagraphic redaction*, typical of well educated scribes of the theologico-philosophical literature [Miklas 2007: 8-9].

A similar phaenomenon are *boundary signals*, regulating the syllabic or syntagmatic correlations in pairs or triple sets [Miklas 1989: 84-85; Miklas 1993: 6-7; Hürner 2010: 143]. Because their fate is connected with their homophonic counterparts, they will be treated as parts of the relevant features *i* and *o* (F_i, F_o).

Classifiers and boundary signals can theoretically appear in any *diatopic (sub)redaction*; a distribution which is due to the radiance of cultural centres such as the Bulgarian capital cities Pliska (until 893) and Preslav (893/4 – 972) or the Western centre Ohrid, where the Bulgarian capital was transferred to in 972.

The temporal distribution of these units is also primarily caused by the radiance of large writing centres and/or the impact of local writing traditions. While Constantine's original classifiers were given up in Moravo-Pannonia under Latin influence and reactivated in Bulgaria, boundary-signals were first developed in Bulgaria in order to stabilize the open syllable-structure and easen the reading process [Miklas 1989: 83-84; Miklas 1993: 6-8; Hürner 2010: 143]. As a consequence, until 1100 no significant chronological gradation of the classifiers can be observed, while the opposite is true of the *i*- and *o*-graphs.

5. The value of each feature depends on its place in the given chain and is estimated according to our present knowledge of the historical development of Glagolitic-OCS. It is expressed numerically in the case of the chronological features and via capital and small characters in the case of the redactional features. The following redactions can be divided during the relevant OCS period (c. 900 – 1100):

- West (former Moravo-Pannonia): *A*
- South-East (Balkan): *B*

- Eastern Bulgarian: *Ba*
- Western Bulgarian-Macedonian: *Bb*
- Zeta-Hum/Southern Croatian: *Bc*
- Northern Croatian: *Bd*

For the F_{rc}-values we choose the expression *G*, as the models and the functions of all OCS classifiers derive from the Greek tradition. Since some of the Glagolitic classifiers were only developed during the Bulgarian phase under the influence of the Cyrillica, while the rest was already part of Constantine's original alphabet, the F_{rc}-values have to be further divided into *Gk* and *Gg* (whereby *k* stands for their Cyrillic, *g* for their Glagolitic origin. Now we can skip the class-indicator *c* before the extensions *g* and *k*).

Calculated are the feature-values of all portions written by the same scribe (S) in one and the same manuscript (M). If a manuscript was written by more than one scribe, all portions (P) of all scribes are taken into consideration[1]:

min(M)=S max(M)=S_1, S_2 … S_n, whereby S={P_n} and n≥1

Since we have to evaluate each scribe separately, the number of such operations can vary from 1 to *n*. For a chronological and redactional calculation we have to execute altogether 2 series of counts per manuscript.

6. In order to easen the procedure, we dissolve the ternary relationship into two binary ones. Then we separate the F_t : $V_{i,o}$ and F_r : V_c-relations from the rest and count them separately:

(1) E1=V(F_t)-V($F_{ti,o}$) (2) E2=V(F_t)+V($F_{ti,o}$)

(3) E3=V(F_r)-V(F_{rc}) (4) E4=V(F_r)+V(F_{rc})

In the end the two single results are combined into one complex result, so we get two relationships which we can describe as ″from − to″ (E_t=Time-estimation, E_r=Redactional estimation):

(5) E_t=E1 – E2 (6) E_r=E3 – E4

While (5) already contains a numerical relationship, (6) has to be converted from an alphabetical into a numerical relationship first before being used for a numerical expression. For this we apply our knowledge about the development of the classifiers:

B = 1; *Ba/Gk* = 2; *Bb/Gg* = 3; *Bc* = 4; *Bd* = 5; *A* = 6

Now we can reformulate the above results as follows:

(5a) E_t=X1 − X2 and (6a) E_r=Y1 − Y2

(Read: The age of the manuscript or its part lies between the year X1 and X2, while the redactional distribution of the scribe's system is to be found in the area Y1 − Y2).

7. All features are equally treated without regard to their complexity. So far we have made use of 20 features, 8 of which have classifier-values, while two consist of the *i*- and *o*-sets. Since each feature can be broken down to different sub-features, we actually have to do with 20 sets of single or multiple choices. In the majority of cases only one choice is relevant, but in a few cases we have also to do with double or triple choices.

As the amount of applications varies from source to source, it is necessary to find a minimum down to which a count can be regarded as valid. Practical studies have shown that the critical mass lies around 10 to 12 features. Less than 10 have to be ruled out as defective, while manuscripts with 10 to 12 features have to be individually treated. In the future, when all the sources will be available in machine-readable format, statistics will help us to get a more adequate picture. Our present results must remain preliminary.

Due to the outlined circumstances the counts can only be compared on the basis of an average. We get it, when we divide the value-results by the number of applications:

$T=\frac{\sum Vt(G(x))}{At}$ $V_t(G(x))$=time-value of applied (sub)feature; A=number of applied (sub)features

(Read: T=result of all F_t-values divided by the number of feature-applications)

$R=\frac{\sum Vr(G(x))}{Ar}$

(Read: R=result of all F_r-values divided by the number of feature-applications)

A similar procedure is necessary for manuscripts consisting of more than one part. Here, the counts of the units have to be added and then divided by the number of the units. E.g.: The Kiev Folia show two original (A, B) and one later scribe (C). For each of their counts we get two results of the type $\frac{(A+B)}{2}$. When we enter the numerical results in the above formula " from − to″, we receive:

E_t1 KB-AB=(1.14+1.25) : 2=1.19

E_t2 KB-AB=(1.25+1.33) : 2=1.29

[1] In the case of convolutes each of the parts has to be evaluated separately.

E_t KB: 1.19 – 1.29
E_r1 KB-AB = (3.00+2.80) : 2=2.90
E_r1 KB-AB = (3.00+3.00) : 2=3.00
E_r KB: 2.90 – 3.00
and
E_t1 KB-C=2.75 E_t2 KB-C=3.00
E_t KB-C: 2.75 – 3.00
E_r1 KB-C=1.50 E_r2 KB-C=1.50
E_r KB-C: 1.50

These figures give us the distance between two or more sources and can serve as a basis for a relative classification.

8. If we wish to receive absolute figures, we have to fix starting points and then to find adequate conversion keys (coefficients) for the distances. As chronological starting point we choose the date of origin of the Kiev Folia as the oldest Glagolitic manuscript preserved. This source is usually dated between the end of the 9th and the middle of the 10th century. We calculate the midpoint between 895 and 955 and receive the year 925 as the lowest finishing date of its original part. Taking up our previous calculation, we can calculate now:

E_t1 KB=1.19=925 E_t2 KB=1.29=X

In order to receive a proper coefficient, we confront these data with the ones received for the youngest source in our classification and convert the results into years. In our first count this source happened to be KB-C. As conversion-key we chose the coefficient 0.10=10 years:

E_t1 KF-C 2.75-E_t1 KF 1.19=1.56x100=156
E_t1 KF-C: 925+156=1081
E_t2 KF-C 3.00-E_t2 KF 1.29=1.71x100=171
E_t2 KF-C: 925+171=1096
E_t KF-C: 1081 – 1096

The result complies with our experiences. If we apply the coefficient 0.10=10 years to the KB, we receive another plausible result:

E_t1 KB=1.19=925 E_t2 KB=1.29=935
E_t KB: 925 – 935

9. For the redactional conversion we have no comparable fixpoint. So we have to find the starting points of major innovations and the most appropriate distances between the redactional groups. Long-lasting starting points during the relevant period were the already mentioned centres Pliska-Preslav and Ohrid.

The largest difference between the sources calculated amounts to 1.50, since the few lower results are caused by the deficiency of the source. Theoretically, we would only have to divide 1.50 by the 5 local classes and receive the class-coefficient 0.30. But it would be improper to equally estimate the differences of the adjacent Western Balkan subredactions for which we have hardly found reliable criteria yet. A certain amount of experience has to account for the lack of criteria. Four counts have shown that the best distances to be reached under the present circumstances are the following:

Ba: 1.50 – 1.89 (=40); *Bb*: 1.90 – 2.29 (=40); *Bc*: 2.30 – 2.59 (=30);
Bd: 2.60 – 2.79 (=20); *A*: 2.80 – 3.00 (=20)

10. Results:

(1) Calculations overview

Time of origin	Manuscript-part	Temp.1 (coeff. 1.19)	Aver-age 1	Temp. 2 (coeff. 1.29)	Aver-age 2	Terr. 1	Terr. 2	Redaction
1006 – 1023	*PF-A*[1]	2.00		2.17		1.67	1.67	Ba
1006 – 1010	*PF-B*	2.00	(1.97)	2.14	(2.20)	3.00	3.00	A
1023 – 1035	*PF-C*	2.17		2.29		2.75	2.60	Bd – A
925 – 935	KF-A	1.14	1.19	1.25	1.29	3.00	2.80	A
	KF-B	1.25		1.33		3.00	3.00	A
1081 – 1096	*KF-C*	2.75	2.75	3.00	3.00	1.50	1.50	Ba
1014 – 1031	SlužSin	2.25	2.25	2.18	2.18	1.60	2.00	Ba – Bb
1026 – 1031	MissSin-A	2.25	2.25	2.30	2.30	1.50	2.22	Ba – Bb
1106 – 1118	*MissSin-B*	3.00	3.00	3.22	3.22	1.50	1.50	Ba
1046 – 1081	MissSin-C	2.75	2.75	2.50	2.50	2.17	2.29	Bb
1021 – 1031	EuchSin	2.25	2.25	2.20	2.20	1.50	2.33	Ba – Bc
1010 – 1018	PsSin-A	2.20	2.04	2.08	. 2.12	2.60	2.78	Bd
	PsSin-A1	1.86		2.11		(1.33)	(1.33)	*def.*
	PsSin-B	2.00		1.92		2.25	2.25	Bb
	PsSin-B1	2.00		2.20		1.80	2.00	Ba – Bb
	PsSin-B2	2.29		2.44		1.75	2.00	Ba – Bb
	PsSin-B3	2.13		2.00		1.80	1.80	Ba
	PsSin-C	2.22		2.18		2.43	2.56	Bc
	PsSin-C1	1.88		1.70		1.67	2.00	Ba – Bb
	PsSin-C2	2.33		2.80		2.33	2.33	Bc
	PsSin-D	1.88		1.80		1.80	2.33	Ba – Bc
	PsSin-E	2.00		2.25		(1.33)	(1.33)	*def.*
1058 – 1066	PsDem-A	2.70	2.60	2.67	2.62	2.50	2.44	Bc
	PsDem-B	2.88		3.00		2.60	2.67	Bd
	PsDem-C	2.22		2.18		2.17	2.17	Bb
1094 – 1106	PsDem-X	2.88	2.88	3.10	3.10	2.50	2.71	Bc – d
1046 – 1056	MedFol	2.50	2.50	2.50	2.50	1.50	2.00	Ba – b
1081 – 1086	MenSin	2.75	2.75	2.90	2.90	2.25	2.57	Bb – c
996 – 1017	Cloz	2.11	2.11	2.00	2.00	2.29	2.54	Bb – c
987 – 1006	Zogr[2]	2.00	2.00	1.91	1.91	2.00	2.36	Bb – Bc
1046 – 1081	Zogr-2	2.75	2.75	2.50	2.50	2.25	2.38	Bb – Bc
986 – 1006	Ass	2.00	2.00	1.90	1.90	1.60	2.10	Ba – Bb
1063 – 1077	Ass-2	2.71	2.71	2.67	2.67	1.80	2.00	Ba – Bb
1036 – 1044	BojPal	2.38	2.38	2.40	2.40	2.14	2.40	Bb – Bc
966 – 981	OchrFol	1.75	1.75	1.70	1.70	1.60	2.00	Ba – Bb
985 – 1006	MacFol	2.00	2.00	1.89	1.89	1.60	1.67	Ba
985 – 1006	RilFol	2.00	2.00	1.89	1.89	1.50	1.80	Ba
1006 – 1025	*GrigFol*	2.29	2.29	2.00	2.00	(1.33)	(1.33)	*def.*
1146 – 1156	VieFol	3.50	3.50	3.50	3.50	2.60	2.71	Bd
1012 – 1039	Mar	2.33	2.33	2.16	2.16	2.50	2.64	Bc – d

(2) Chronological order: 27 manuscripts with 40 parts

Time of origin		Manuscript-part
1.	925 – 935	KF-A
		KF-B
2.	966 – 981	OchrFol

[1] Cursive=deficient, data unreliable. E.g., in the case of *PF-A*, a second count on the basis of *jers*=2 results in the years 1026 – 1039.

[2] Not taken into account are the few lines of the assistant scribe because of their deficiency!

3.	985 – 1006	MacFol*[1]
3a.	985 – 1006	RilFol*
4.	986 – 1006	Ass
5.	987 – 1006	Zogr
6.	996 – 1017	Cloz
7.	1006 – 1010	*PF-B*
8.	1006 – 1023	*PF-A*
9.	1006 – 1025	*GrigFol* (*)
10.	1010 – 1018	PsSin-A
		PsSin-A1
		PsSin-B
		PsSin-B1
		PsSin-B2
		PsSin-B3
		PsSin-C
		PsSin-C1
		PsSin-C2
		PsSin-D
		PsSin-E
11.	1014 – 1031	SlužSin (*?)
12.	1012 – 1039	Mar
13.	1021 – 1031	EuchSin*
14.	1026 – 1031	MissSin-A*
15.	1023 – 1035	*PF-C*
16.	1036 – 1044	BojPal
17.	1046 – 1056	MedFol
18.	1058 – 1066	PsDem-A
		PsDem-B
		PsDem-C
19.	1046 – 1081	MissSin-C
19a.	1046 – 1081	Zogr-2
20.	1063 – 1077	Ass-2
21.	1081 – 1086	MenSin
22.	1081 – 1096	*KF-C**
23.	1094 – 1106	PsDem-X*
24.	1106 – 1118	*MissSin-B**
25.	1146 – 1156	VieFol

(3) Redactional order: 32 portions from 30[2] scribes

Redaction		M.-part (scribe)
1.	Ba	RilFol*
2.	Ba	MacFol*
3.	Ba	PsSin-B3
4.	Ba – b	MedFol
5.	Ba – b	SlužSin*
6.	Ba – b	OchrFol
7.	Ba – b	PsSin-B2
8.	Ba – b	PsSin-B1
9.	Ba – b	Ass

[1] Same scribe (*): MacFol and Ril (and GrigFol?); SlužSin (?), EuchSin and MissSin-A; KF-C, PsDem-X, MissSin-B. RilFol and MacFol are parts of the same ms.; whether this applies also to GrigFol, cannot be decided on the basis of the deficient graphemic evidence.

[2] If SlužSin once belonged to MissSin, we have to do with 29 scribes.

10.	Ba – b	MissSin-A*
11.	Ba – b	Ass-2
12.	Ba – c	EuchSin*
13.	Ba – c	PsSin-D
14.	Bb	PsDem-C
15.	Bb	MissSin-C
16.	Bb	PsSin-B
17.	Bb – c	Zogr
18.	Bb – c	BojPal
19.	Bb – c	Zogr-2
20.	Bb – c	MenSin
21.	Bb – c	Cloz
22.	Bc	PsDem-A
23.	Bc	PsSin-C
24.	Bc – d	Mar
25.	Bc – d	PsDem-X
26.	Bd	*PsDem-B*
27.	Bd	PsSin-A
28.	Bd	VieFol
29.	Bd – A	*PF-C*
30.	A	KF-A
31.	A	KF-B
32.	A	*PF-B*

Abbreviations

Manuscripts[1]

Ass = Codex Assemanianus
Ass-2 = Codex Assemanianus, second hand
BojPal = Bojana Palimpsest
Cloz = Glagolita Clozianus
ES = Euchologium Sinaiticum
GrigFol = Folium of Grigorovič
MacFol = Macedonian Folium
KF = Kiev Folia
Mar = Codex Marianus
M(ed)F(ol) = Medical Folia
MenSin = Menaeum Sinaiticum
MissSin = ˝Missale˝ Sinaiticum
OchrFol = O(c)hrid Folia
PbgOkt = Petersburg Oktoechos
PF = Prague Folia
PsDem = Psalterium Demetrii (Sinaitici)
PsSin = Psalterium Sinaiticum
RilFol = Rila Folia
SinPal = Sinai Palimpsest
SlužSin = Sinajskij Služebnik (Sinaitic Euchology-fragment)
VieFol = Vienna Folia
Zogr = Codex Zographensis
Zogr-2 = Codex Zographensis, complementary hand

Other

C = graphemic correlate of consonant
def. = defective
E = evaluation
F = (graphemic) feature

[1] Scribes are indicated by extensions.

$_t$ = temporally relevant
$_r$ = redactionally relevant
G = content of graphemic feature, sub-feature
S = scribe
M = manuscript
NV = graphemic correlate of nasal vowel
(O)CS = (Old) Church Slavonic
S = graphemic correlate of sonant
V = graphemic correlate of vowel; value
$_j$V= Eta-ligature, graph(em)ic correlate of the type . - [jǫ]/[rǫ]

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Appendix

Graphemic features, underlying the approach

Feature		Content (sub-features)	Chronological value	Redactional value
1.	*Jers*	2 *jers*	1	
		Jor and exceptional *Jer*	2	
		Jor only	3	
		Jer only	3*[1]	B
2.	*Jery*-variants[2]	2 combinations	1	
		3 combinations	2	
		1 combination ѣѲ	3	
		1 combination ѣѳ	4	
		1 combination ѣѳ	4*	B
3.	*u*-graphs	*ou*-digraph	1	
		ou-closure	2	
		u-ligature	3	
		Ik for /u/	4	Bc
		Ypsilon for /u/	4*	Bc
4.	NV-graphs[3]	3 ѣ ѣ .	1	
		4 ѥ ѣ ѣ .	2	
		3 ѥ ѣ .	2	
		(2 defective combinations)	(3)	
5.	Line-endings	V/[4]		Ba
		V/ ~ C/		
6.	*Dzělo*	c		Bb
7.	*l*-epentheticum	+ (e.g. *zemlě*)	1	
		+/- (e.g. *zemlě ~ země*)	2	
		- (e.g. *země*)[5]	3	not Bc-d
8.	Rendering of **(k)tj*	-*c*-reflex	1	A
		ѡѵ	1	B
		ѕ ~ ѡѵ	2	B
		ѕ	3	B
9.	C*Ь*V vs. C*i*V	CѢV[6]	1	
		CѢV ~ C*i*V	2	
		C*i*V	3	Ba
		CѢV	3*	
10.	Refl. pronoun *sę*	ѯѣ	1	
		ѯ ~ ѯѣ	2	
		ѯ	3	
		ѯѣ[7]	4	Bd

[1] * marks repetitive value.

[2] Not included is the complete lack of *Jery* in later sources such as VieFol, because it is untypical of the OCS-period. In a chronologically widened classification to be counted as 5/*Bc-d* (=4.5).

[3] Not included is the lack of back NVs as in VieFol (to be counted as 4/*Bd*) and the complete lack of NVs (to be counted as 5/*Bd*) in later Croatian sources. The same applies to the non-digraphic treatment of *Jǫs* (ö) in the new Service-fragment from Sinai, detected and communicated by Nina Glibetić.

[4] Read: Vocalic graph at line-ending (= /).

[5] Entire lack in OCS sources is usually due to a deficiency of material.

[6] Imitation of Cyrillic *Jer*-redaction!

[7] Exceptionally in Mar, together with c®; CS usually in Croatian mss., where to be counted as 4/*Bd*, if NVs appear in other positions. In the absence of front NV or of any NVs feature no. 10 becomes irrelevant!

11.	Unmarked soft sonants	SV (vs. S_jV/*ě*), e.g. A.sg. *volǫ*		Bc
12.	*i*-graphs	ѳ ҁ	1	
		ѳ ҁ ѯ	2	B
		ѳ ѯ	3	B
		ҁ ѯ	3*	B
		ѳ	4	
13.	*o*-graphs	ҙ ѻ	1	B
		ҙ ѻ ҙ	2	Ba
		ҙ ҙ	3	Ba
		ҙ	4 (east only)	
14.	*Omega*[1]	ѻ		Gg
15.	*G´een'na*	ᴎ		Gg
16.	*Sunny Cher*	ѣ		Gg
17.	*Frt*	⊪		Gg
		ⱷ		Gk
18.	*Thita*	⊖		Gk
19.	*Ypsilon (Izhica)*	ꙩ		Gg
20.	Jesus-abbreviation	ѳ_, _ꙩ(_)		Gg

[1] Relevant just in case of classificatorical distribution (usually in Greek loanwords)!