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GOLDEN RATIO INSCRIBED CODE OF BEAUTY IN CROATIAN TRADITION OF GLAGOLITIC CULTURE

ZLATOREZNI KÔD *LJEPOTE* U HRVATSKOJ TRADICIJI GLAGOLJAŠKE KULTURE

ABSTRACT

The Glagolitic culture is instrumental in defining the Croatian cultural heritage, whose identity is rooted in this very culture. In the modern age of intensified and accelerating globalisation, the Glagolitic culture has become the pivotal point of preserving this centuries-old heritage.
This rich intellectual and spiritual heritage can be explored by using varied methodologies and by applying a range of scientific disciplines. This paper will focus on the gold-inscribed code of the Glagolitic culture, which is present in its different expressive means, from artistic features of graphemes, historiographic-literary works, to construction of sacral buildings.
When considering the golden inscription, we will follow the definition (Pejaković 2000, 17) which states that the golden inscription is "the geometric proportion or scale that divides a given length in such a way that any smaller segment is related to the larger one as this larger segment is related to the whole length".
The introductory assumption that 'beauty' was a crucial component of the Glagolitic culture is confirmed in the conclusion, i.e. beauty was part of expressiveness in which "canonical principles of proportion, executed in a certain format, are meticulously observed" (Pejaković 2000, 125). This will confirm the manifestness of golden inscription in Croatian Middle Ages, the age before the advent of Renaissance and its renewed interest in antique tendencies of creation according to the golden code.

Keywords: *golden inscription, 'beauty', Croatian tradition, Glagolitic culture, grapheme, typogram, book, The Baška Tablet, Spovid općena, sacral building*

SAŽETAK

Glagoljaška kultura umnogome određuje hrvatsku kulturnu tradiciju, čini temelje njezina identiteta, a u novo doba pojačanog i ubrzanog globaliziranja postaje uporišnom točkom očuvanja dugostoljetne opstojnosti. Njezino bogato intelektualno i duhovno nasljeđe moguće je izučavati uporabom različitih metodologija i angažiranjem raznovrsnih znanstvenih disciplina. U ovome radu autori će se usmjeriti na zlatorezni kôd glagoljaške kulture prisutan u različitim variranjima njezinih izražajnih sredstava: počevši od likovnih odlika grafema, preko historiografsko-literarnih zapisa, pa sve do izgradnje sakralnih objekata. U promišljanjima zlatnoga reza držat će se definicije (Pejaković 2000, 17) po kojoj je zlatni rez

„geometrijska proporcija ili razmjer koji zadanu dužinu dijeli tako da se njen manji odsječak odnosi prema većem kao što se ovaj veći odnosi prema cijeloj dužini“.
U zaključku se potvrđuje uvodno izrečena pretpostavka kako je ljepota činila bitnu sastavnicu glagoljaške kulture, odnosno, izražajnosti u kojoj se „kanonska načela proporcija provedenih u formatu poštuju do vrhunca obzirnosti“ (Pejaković 2000, 125). Time će potvrditi i očitost zlatoreznog egzistiranja u hrvatskom srednjovjekovlju, dobu koje je prethodilo renesansi i njezinu oživljenom zanimanju za antičke tendencije stvaranja po zlatnome kôdu.

***Ključne riječi**: zlatni rez, ljepota, hrvatska tradicija, glagoljaška kultura, grafem, tipogram, knjiga, Bašćanska ploča, Spovid općena, sakralni objekt*

1. Introduction

The golden ratio has been defined by many, and according to Albert van der Schoot (Artman 2006, 46) original representation of the golden ratio was associated exactly with proportions in art, which he documents with an old legend that “Pythagoras’ discovery of numeric relations between consonant intervals and rational numbers ratios was the first known aesthetic cognition that has ever been formulated”. The same author further refers to ancient debates on the golden ratio and highly commendable quote (of the golden ratio) taken from Euclid’s *Elements* - then contemporary ubiquitous mathematical handbook: “5. Its wonderful characteristic: The sum of the squares of the smaller part and the whole is equal to triple the square of the bigger part.” (Euclid, *Elements*, XIII, 4)
With the end of antique period and debates related to Euclid, that is, related to the thesis according to which the beauty can(not) be determined by golden ratio proportions, a long period of silence regarding this matter began. The silence lasted until the appearance of Fibonaccio (Leonardo of Pisa, 1175 - 1240) whose cognitions brought a real turnover in mathematics, and, two centuries after Fibonaccio, fra Luca Pacioli (1445 - 1517) who in his manuscript Divine Proportions (1498, printed in 1509) commendably exhibits properties of the golden ratio.
The starting hypothesis of this paper assumes the beauty a significant component of the Glagolitic culture. More precisely, the beauty will be considered a way of artistic expression where “canonical principles of ratios implemented in the format are respected to the ultimate consideration” (Pejaković 2000, 125). Authors will be using examples to question the presence of the golden ratio (the format of beauty) in written and visual-arts components of the Glagolitic culture since its first days to the days of mature Renaissance when an interest of artists for works standardized by the golden rule comes to life again. This will indicate the knowledge that the authors within Croatian Glagolitic circle had about classical doctrines of harmonic composition (written documents, individual graphemes, sacral objects).

2. Written documents (example: The Baška Tablet)

Without entering a deeper debate on what written documents really are, and the Baška Tablet among them, determination of basic characteristics of the Baška Tablet[16] was taken from the

[16] The Baška Tablet is a stone monument (carved white limestone) 99.5 cm high, 199 cm wide, 7.5 to 9 cm thick and weighing approximately 800 kg. Originally, the Tablet was a left pluteus (partition panel) on a stone church bulkhead (septum, canceli). This bulkhead spatially divided the choir in front of the altar, dedicated for monks, from the church nave dedicated for congregation. With its shape and proportions, the Tablet corresponds to plutea from pre-Romanesque and Romanesque periods in Croatia coastal belt (Istria, islands, Dalmatia). The ornamental motive of vine tendril which extends along the protruding border at the upper edge of the Tablet can

web site of the Institute for Croatian Language and Linguistics (Institute for Croatian Language and Linguistics, http://www.ihjj.hr/oHrJeziku-bascanska-ploca.html, retrieved on 1st June 2011).

The Baška Tablet is one of the most valuable monuments of early Croatian literacy, dating around the year 1100. Originally it was a scripture on a partition panel (pluteus) of a partition that separated the monastic choir from the church nave in the church of St. Lucia in Jurandvor (Baška Draga on the island of Krk). Since 1934 it is located in the building of Croatian Academy of Arts and Sciences.

Source: (Institute for Croatian Language and Linguistics, http://www.ihjj.hr/oHrJeziku-bascanska-ploca.html, retrieved on 1st June 2011)

The inscription on the Baška Tablet consists of:

1.*Invocation*
2. *Writings of abbot Držiha written in first person, who states that the Croatian king Zvonimir „in his days" donated land to the church of St. Lucia, and lists witnesses of this donation*
3. *Intimidation formula against those who would deny the donation.*
4. *Obligation that the monks of St. Lucia shall pray for the donor (and the wittnesses)*
5. *Writings of abbot Dobrovit, also written in first person, which note that this abbot with his nine monastic brethren (monks) built this church, and then personally dates that construction with the time of duke Kosmat, who ruled the entire region.*
6. *An entry which states that "Mikula v Otočcu" and "St. Lucia" were united at that time. It can be concluded from the contents that the text was put together from the parts which didn't originate from the same time period, but in a time span of the rule of at least two abbots, Držiha and Dobrovit. A gradual carving of these component parts of the text on a finished and installed bulkhead canopy is not conceivable. Therefore B. Fučić presumes an existence of a monastic chartulary which served as a contents template to the author of the Baška Tablet.*

Although the exact date of creation of the Baška Tablet is not known, it is unquestionable that it originates from the Middle Ages, that is, late 11th and early 12th century. Anyhow, the Baška Tablet was created before publishing of Fibonacci's famous manuscript Liber abaci (1220). Fibonacci's work brought Arabic numerals to Europe as well as the notion of zero, and at the same time it revived the interest for the antique phenomenon of golden ratio which, as the artistic and literary analysis of the Baška Tablet will show, already existed as an imperative in realization of artistic works in Croatian Middle Ages.

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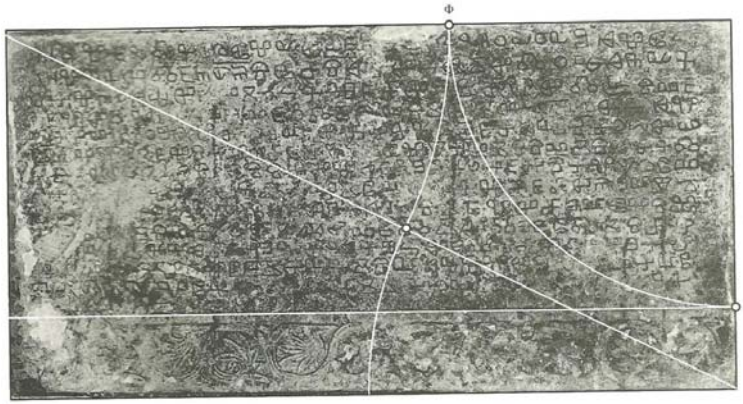
be found in the same style on the decorated parts of church architecture at the Croatian coast in late 11th and 12th century.

3. The Baška Tablet Text as a Work of Art

As it was initially implied, the Baška Tablet intrigues with its form and as a work of art. A valuable analysis of the Baška Tablet's artistic character was brought by Pejaković (2000, 114) who showed that a double square can be clearly distinguished within the Baška Tablet.

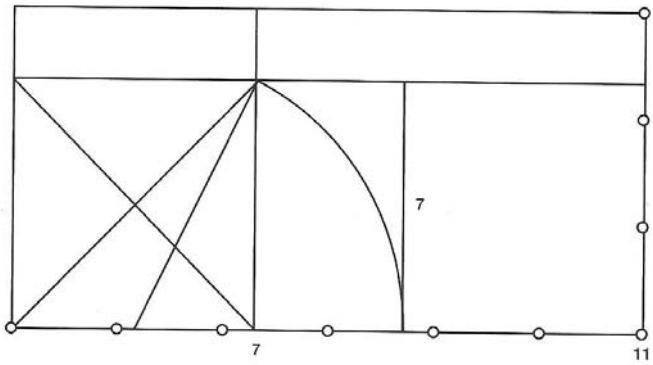


Source: Pejaković 2000, 114.

Pejaković states that „in a double square the construction of a golden ratio is inherent. It establishes a relation between a smaller and a larger side through a diagonal line. The smaller, vertical side of the Baška Tablet transfers to its diagonal, and then the larger remain of the diagonal drops to the basis of the Tablet. Thus the greater length of the Tablet is divided by a golden ratio. The minor in this division then transfers to the vertical of the Tablet. In that way the Tablet is divided in two parts: a narrow zone which is protruding and in which an eleven-part decorative tendril is carved. Under it is a field with carved text. If this division is transferred into numerical relations, then the frieze is two thirds of a foot, and the height of the inscribed field is seven thirds of a foot." (Pejaković 2000, 113-114)

Observing the artistic character of the Baška Tablet, it is clear that elements of Fibonacci's sequence[17] can be found in its golden ratio concept, where ratios of adjacent members make a number *phi* (known as the number of beauty). "The Tablet is three feet high, and two feet wide. If we divide feet on thirds, then the length of the Tablet is 18/3, and the height of the inscribed field 7/3. Numbers seven, eleven and eighteen are members of the golden sequence of numbers. The inscribed field in the Baška Tablet is an image with 7/18 ratio which is a format 1: φ. It consists of a golden rectangle which has been added a square to its smaller side." (Pejaković 2000, 114)

[17] Leonardo of Pisa (1175 - 1240) is known as Fibonacci (that is, the son of Bonacci). In his famous book Liber abaci from 1220, Fibonacci's sequence is a sequence of numbers that starts with numbers 0 and 1, and each following number is given by summation of the two preceding numbers (0, 1, 1, 2, 3, 5, 8, 13, ...). Ratios between the numbers in Fibonacci's sequence (starting with its 9th member) make a golden number, i.e. the number of beauty phi (1.618).



Source: Pejaković 2000, 115

4. The Baška Tablet Text as a Literary Work

The twentieth century offered interpretations of the Baška Tablet as a literary work. In this respect, works of Hercigonja and Stamać single out. Hercigonja thus states that „this prose reveals itself as a distinctive rhythmic structure based on different disposition of members: consecutiveness and alteration of specific prosodic constructions, sequences composed of members with same or different number of units" (Institute for Croatian Language and Linguistics, http://www.ihjj.hr/oHrJeziku-bascanska-ploca.html, retrieved on 1st June 2011). Stamać (2011, 6) states that the Baška Tablet with its composition characteristics is a typical document in a literal-genealogical sense, and that it was written according to clear rules *artis dictandi*[18] widespread over medieval (post-Carolingian) Latinity. Stamać, among other things, sees a difference between the messages of Držiha and Dobrovit within 13 (12, 1) lines of the whole inscription. "This difference is multiple and it is a proof, this viewpoint is accepted,[19] of a diachronic "cut" in original chartulary. However, disposition is actualized, with additional intention, obviously thought-out in the "synchronous" carving skills. Namely, while the first message (naturally) shortened by the invocation, extends over 7.6 lines of the text (starting with az, the last word of the first line), the other, belonging to Dobrovit, extends over exactly 4.5 lines: it starts in the middle of the fifth line from the bottom. So, the ratio is as follows: 12.1 (the whole of "gift" and "building" parts of the text) : 7.6 (Držiha's inscription) : 4.5 (Dobrovit's inscription), and that is the ratio between sizes which is almost identical to "golden ratio": the ideal *sectio aurea* is shown as a 13 : 8 : 5 ratio, which is a numerically expressed demand that the whole relates to a greater part as the greater part relates to the smaller part. Therefore, the whole discourse of the Tablet is its 13 lines through which its language structure extends, organized according to the famous antique plastic and architectural instruction! The stonecutter, and surely before him the notary (Dobrovit?), have

[18] The author further explains that it was a skill of making documents which was taught as a separate discipline in notary schools in Italy during the 11th and 12th century. Ars dictandi, Stamać states, emulated the old document models (formulas), nourishing at the same time the style and the rhythm of the sentence. It was actually a remarkable application of medieval rhetoric: dispositio and elocutio of unequivocal and unquestionable invention. From the many contemporary manuals (and the one probably most used in this area was the Aberik's one from the 11th century, created in the Benedictine Montecessaino), other substantially more compliant names can be extracted, such as ars dictamini, ars notaria...).

[19] Compare. F. Fučić, in the work cited, used frequently.

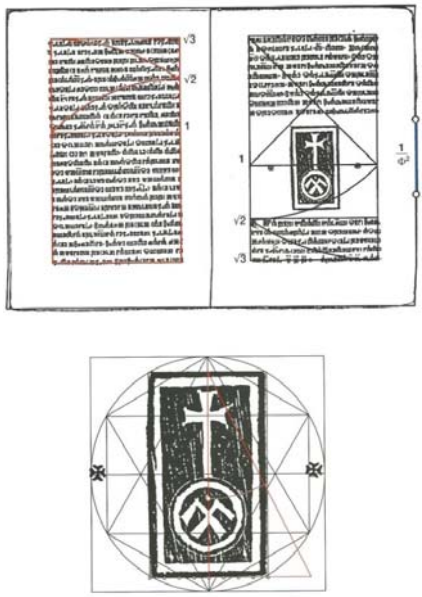
harmoniously “dosed” the graphic symbols of two according but substantially different messages to the descendants. They leveled them and gave them a certain dimension of primarily aesthetic significance!” (Stamać 2011, 7).
To corroborate the importance of the golden ratio noticed in the structure of the Baška Tablet text, it is good to remind ourselves of Pejaković (2000, 130) who states that the golden rectangle is a “rectangle 5 by 8 or 8 by 13, created by using the golden ratio that rules the macrocosm and microcosm.”

5. Grapheme, Typogram and Book (Example: *Spovidi općene* by Blaž Baromić)

Considering macrocosm and microcosm brings up the question of whether the form of *beauty* can reflect in a single letter, typogram, or even in a book as a printed product. Artistic principles of Glagolitic letters and books are brought to our attention via many works of Frane Paro, whose contribution is concisely described by Mladen Pejaković (2000, 115)
“The artistic principles of Glagolitic printed letters and books were very successfully studied by Professor Frane Paro, modern Croatian graphic artist (Typographia glagolitica, MH, 1997). Out of that fine literary work, I present you one character retouched by Paro – the letter U, which represents a very consistently executed composition in golden folio.”

Source: Pejaković 2000, 115

Besides the golden ratio composition embodied in the letter U (and other letters, too), adeptness in gold format is manifested in Blaž Baromić’s typogram – the first typographic character in the history of Croatian printing, carved into wood with dimensions 22 by 37 mm. Blaž Baromić’s typogram “is printed in just one copy of final sheet above the colophon *Spovidi općene*, printed in Senj in 1496, as Paro informs us in the beginning of his discussion titled *Angles and caliper of Blaž Baromić...* height of the typogram is determined by the spacing between the golden dividers on the longer border of the book. Lower part of the text is placed under the lower border of page’s square. The blank part between upper and lower syllable represents a doubled hexagon. We also make out a high level of attention and consistency put into preservation of triangulation principles reflected in the disposition and size formatting of the elements. The height of the typogram, as mentioned, was $1/\varphi 2$ the height of the book’s page. If we take into consideration the fact that the ratio $1: \sqrt{3}$ is approximately equal to 4:7, it becomes easy to numerically and geometrically decompose Baromić’s typogram...the use of golden dividers is also apparent in the character’s rectangle. The point above the circle’s angles represents the character’s golden dividers.” (Pejaković 2000, 115-17)



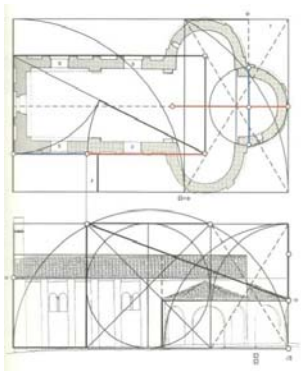
Source: Pejaković 2000, 116-117

As witnessed by the presented schemes, as well as the words of Frane Paro (2008, 159), Baromić's golden ratio inscribed code implemented *beauty* consistently and purposely. What present analysis has documented was that the Baromić's auronic approach was implemented in all dimensions of *Spovidi općene* (1496): graphemic, typogramic, and the final one – typographic, which combines figure, as well as gnoseological message emitted via its *beauty*.

6. Sacral Object (St. Martin's Church in Prigrada near Novigrad and the 9th Century Altar Barrier Plate – Archaeological Museum in Zadar)

Omitting the search for fresh examples, one's attention will be directed to examples of medieval sacral architecture listed by Pejaković in his work *Golden Ratio* (2000). One of the leading examples is the layout of St. Martin's church in Prigrada near Novigrad, dating from the 6th century. "This building is, in its layout and elevation, a well-devised aesthetic project with clear-cut proportional program. The church's nave and trefoil sanctuary form an ideal golden rectangle. This rectangle was generated very spiritedly. The nave is a double square whose longer borders are defined by golden ratio segments, which are also used for scaling of trefoil sanctuary, thus creating a golden rectangle. The minor of the double square serves as the diameter of apse rings, while its major links them to the nave. This determines the centre of the main apse that is the location of the altar where Latin cross is sited, whose borders are determined by the golden ratio code, thus achieving a great symbolical value of this proportional project. Reciprocated golden rectangle serves for inscription of the sanctuary, in a way that the nave's double square is indented to its diagonals, which represent the centres of side apses. The drawing itself demonstrates these simple, beautiful and symbolic links within the layout. Church's elevation also demonstrates the environment of golden ratio. Ratio used was 1: √5. Smaller diagonals of the centre square are laid along the horizontal, thus creating two golden rectangles which overlap by a half of a square. The length of the church to its

main apse is determined by the division of reciprocated golden rectangle. Sizing and other elements of the church's cross-section are co-modulated in an equal manner.
With the arrival of Croatian people to their new homeland and their christening, all those experiences will be projected in formation of various types of sacral buildings during Pre-Romanesque period in Croatia. The leading role in this period belongs to priests and Benedictine monks. Golden ratio code will prolong its life span through new sacral objects, their luxuriant wicker furniture, and it will be especially expressed in monastery scriptoriums and the production of medieval hand-written books. (Pejaković 2000, 118)



Source: Pejaković 2000, 119

Although there are many examples to be named, for the purpose of this paper we will name just one more – the altar barrier plate dating from the 9th century, currently kept in Archaeological Museum in Zadar (Paro 2009, 233)

Source: Paro 2009, 232

Among other analyses, Paro states that "at first glance at the photo of the wicker one can notice that the smaller and larger circle make a whole, a ring – a circular wreath – defined by the outer rim of the larger and the inner rim of the smaller circle. The rim that is the diameter of the inner circle within the circular node is somewhat larger than, usually unavoidable, diagonal root module tendered by the cross-section points of the circle and the base square

diagonals. One can assume there are two possible causes of the craftsman's constructional "unprincipled" act that is the deviation from geometrical punctuality. One cause could be the need for more space for transposition of nodes within the smaller circle, while the other could be the adaptation to the size of the circular wreath, so that the width of one of the two braids would achieve the length thirty-three times longer than the length of each of the base square borders – thus representing the years Jesus Christ spent on Earth. Close comparison shows that the width of the braids within the wicker varies, and they represent 1/32 or 1/34 of the wicker's total width. Two dominant diagonals of the angular braid (was this for pragmatic or geometric reasons?) do not represent the diagonals of the base square. Upon leaving the larger circles, they do not point the corners of the base square, but the corners of a rectangle that is created when the area of the square decreases by the width of the circular wreath of the wicker rosette. In this particular case, the decrease approximately equals 1/10 x 2 that is 1/5 of the base square border. It is necessary to point out that this refers to the ideal layout value. The points in which the tips of wings of two turtle doves touch the upper border of the wreath confirm that the craftsman who made the wreath maintained the measures from the ideal layout. The length (together with the tip of the lily in the middle) determined by the tips of the wings is in fact the length of the border of the square which encircles the four smaller circles within the circular wreath. Discretely and "poetically", the craftsman points out to the border of the smaller square, which represents 4/5 of the base square border. This 4 : 5 ratio is a rational expression of an irrational double golden rectangle – the *biauron* layout. Therefore, the two cross bred dominant diagonals mark the golden rectangle but they also, which is easy to notice, form a letter X – Jesus Christ's first initial. Thus we have Christ's first initial in a golden rectangle determined by the wings of two turtle doves whose beaks "kiss" the tip of a lily – a symbol of light and purity..." (Paro 2009, 241)

This example clearly confirms the golden ratio approach in sacral expression, in this case the visual formation. The manner in which the aurons construct the visual text, its variations in space and co-significance with other elements within the composition, gives an opportunity for further interpretations, but it also confirms the starting hypothesis of this paper – the presence of code of beauty in medieval art of Glagolitic culture.

7. Conclusion

Considering and illustrating the presence of golden ratio code of beauty in medieval art of Glagolitic culture, the authors tried to obtain a confirmation of the starting hypothesis that the beauty represented a significant component of the Glagolitic culture. More precisely, they tried to show that beauty was way of artistic expression where "canonical principles of ratios implemented in the format are respected to the ultimate consideration" (Pejaković 2000, 125). By reviewing the Baška Stone Tablet as an artistic as well as literary work; Blaž Baromić's written work *Spovidi općene* with special retrospect to his approach to grapheme, typogram and typography of the entire book, and finally the two pieces of sacral architecture (St. Martin's church in Prigrada near Novigrad and the 9th century altar barrier plate – Archaeological Museum in Zadar), the author concluded that all examples of artistic expression listed above were based on golden ratio code of beauty. Considering the fact that these examples are closely tied to Croatian tradition of (pre)Glagolitic culture, the authors dare to conclude that the culture itself was based on foundations and postulates of the code. In other words, the examples confirm a clearly and exactly defined code of beauty in Croatian Middle Ages, the age before the advent of Renaissance and its renewed interest in antique tendencies of creation according to the golden code. This conclusion leads to new deliberations which could give answer to the question whether the golden ratio code was systematically inherited, but also gives an opportunity of possible decoding of its symbolic

messages which were obviously implemented within the forms of graphemes-typograms-texts/typographs-sacral buildings.

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