

CALCULUS IN INSULAR ARTISTIC DESIGN

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This essay considers a mode of thought and a tradition of composition inculcated by four Latin writers, the translator of Anatolius of Laodicea's De ratione paschali (post AD 283, ante AD 402), Evagrius of Antioch's translation of Athanasius's Life of Saint Antony (c AD 360–74), Jerome's Biblia Vulgata (AD 382) and Sulpicius Severus's Vita Sancti Martini (AD 397), based upon the Life of Antony, and his laterculus (AD 410), based upon the work of Anatolius, all texts known in these islands during the period from AD 410–25 to the seventh century. A simple calculus of literary composition in the anonymous Lindisfarne Life of Saint Cuthbert, dedicated to Eadfrith bishop of Lindisfarne in AD 698, is exhibited in the iconographic elements of the Evangelists' portraits in the Lindisfarne Gospels, written and illuminated by Eadfrith. The same calculus is displayed both in the iconographic designs and in the inscriptions in Northumbrian Old English and Latin on the Franks Casket of c AD 700 and on the Ruthwell Cross of c AD 730–5.

Keywords: *De ratione paschali*; *Life of Cuthbert*; *Life of Antony*; calculus; Franks Casket; Lindisfarne Gospels; modular composition; Old English runic futhorc; Ruthwell Cross

INTRODUCTION

Among writers of the Classical Latin period, the *artes liberales* ('liberal arts') were studies appropriate to *homines liberales* ('free men') and they were not discrete. There were seven of them, and they belonged together.

Cicero, in *De oratore* III 127, about 55 BC, Vitruvius, in *De architectura*, between about 50 and 26 BC and the younger Seneca, in *Epistula* LXXXVIII, around 4 BC–AD 65 all wrote about the unity of the liberal arts, and in AD 428 Augustine referred to the number seven in the *Retractationes*, from which time Christians identified the arts with the seven pillars of Wisdom in Proverbs 9.1: *Sapientia aedificauit sibi domum excidit columnas septem* ('Wisdom has built for herself a house, she has carved out seven pillars').

Four Late Antique authors of the sixth and seventh centuries fixed the canon of seven liberal arts, divided into the *trivium* ('the three ways') and the *quadrivium* ('the four ways'):

- Martianus Capella, in *De nuptiis Philologiae et Mercurii*;
- the senator and consul Anicius Manlius Torquatus Severinus Boethius, AD 480–524, in *De institutione arithmetica* I 1 and *De institutione musica* II 3;
- the senator Cassiodorus, AD 480–575, in the second book of his *Institutiones*; and
- Isidore, bishop of Seville, AD 570–636, at the beginning of his encyclopaedic work *Etymologiarum siue originum liber*, published after his death by his successor Braulio in AD 640.

In addition to the teachings of the eight authorities named above – all of them known in these islands from the early Middle Ages onward – with Vitruvius’s insistence upon the need for both *ratiocinatio* and *fabrica* and Boethius’s insistence upon the unity of θεωρητικη (‘theoretical’) and πρακτικη (‘practical’) knowledge, Insular writers could learn the techniques of combining the literary arts of the *trivium* with the mathematical sciences of the *quadrivium* from four accessible sources.

About the middle of the third century of the Christian era, some time before his death in AD 283, the first Christian scientist, the Alexandrian mathematician Anatolius bishop of Laodicea, composed in Greek a *Liber Anatolii* about lunisolar calculation of the date of Easter. More than seventy years later, after the death of the desert father Antony, in AD 356 Athanasius wrote in Greek a *Life of Antony* with an author’s preface. To the Latin translation of this *Life*, at some time before AD 374, Evagrius of Antioch added a translator’s preface.¹ In AD 382 Pope Damasus commissioned Jerome to translate the Hebrew Old Testament and the Greek New Testament into the Latin of the *Biblia Vulgata*. The Latin Bible and Evagrius’s Latin translation of the *Life of Antony* served as models for the computist Sulpicius Severus, who introduced his *Vita Sancti Martini* with two prefaces and one book in three parts not long before Martin’s death on 8 November 397,² described by my late colleague Professor Richard Sharpe FSA as ‘three sections, describing in turn the events of Martin’s life until he became a bishop, his miracles and the spiritual example of his way of living’.³

In 1985 Professor Dáibhí Ó Cróinín FSA MRIA was the first in more than 1,200 years to recognise the significance of Padua, Biblioteca Antoniana MS 1.27, the *latercus*, an eighty-four-year Paschal table devised by Sulpicius Severus, preceded in this manuscript by a Latin translation, *De ratione paschali*, of the Greek *Liber Anatolii* on which it is based.⁴ He entrusted his discovery to Dr Dan Mc Carthy MRIA, who, together with Dr Aidan Breen, edited, translated and analysed the text, which had been used in Aquileia about AD 402 by Rufinus of Caesarea in his Latin translation of Eusebius’s *Historia ecclesiastica* v 24 and vii 32.⁵ Paulinus of Nola undertook to forward to Rufinus a chronological enquiry from Sulpicius Severus,⁶ who used *De ratione paschali* in Gaul in about AD 410 ‘as the basis for the design of his eighty-four-year Paschal table, which was subsequently used by the Insular churches’.⁷ Both text and table arrived in Ireland between AD 410 and 425,⁸ long before arrival of the missions of the Poitevin Palladius (deacon of Pope Celestine) in AD 431,⁹ and Patrick, traditionally from AD 432. The presence of these texts in Ireland invites reconsideration of the existence of Latinate and Christian communities earlier than previously supposed and of the historicity of the pre-Patrician saints Ailbeus, Chiaranus, Declanus and Ibar.¹⁰

De ratione paschali exhibits multiple examples of modular composition, in which the number of one element in one part of the text signals in advance or confirms in retrospect

1. White 1998, 1–70.

2. Fontaine 1967–9; White 1998, 129–59.

3. Sharpe 1991, 57.

4. Mc Carthy and Ó Cróinín 1987–8.

5. Mc Carthy and Breen 2003, 139–41. This fact, among others, is sufficient to refute the supposition that the text was an Irish forgery of the 6th or 7th century.

6. Ibid, 149.

7. Ibid, 38.

8. Mc Carthy 2011.

9. Ó Cróinín 2000.

10. Sharpe 1989; Ó Riain 2011.

the number of another element in another part, often with numbers that are calendrically significant. The Introduction, for example, both announces the subject and fixes the structure of the entire composition: the twelve introductory sentences prefiguring the twelve parts, the reference to the eighty-four-year cycle prefiguring the eighty-four sentences and the 365 words prefiguring the 365 lines of the whole. After the Introduction, parts i and xii (the beginning and the end) confirm again the structure of the entire composition. Part i fixes the beginning of the first month in four ways, as reckoned by the Egyptians and the Macedonians, and by the Romans in two ways: forward from the beginning of March and backward from the beginning of April. The chiasmic pair to part i is part xii, which contains twelve lines, the subject being the four seasons. The number of lines in the Introduction, forty-eight, prefigures the number of lines in part i, thirty-six, added to the number of lines in part xii, twelve.¹¹

With this as a model, in Sulpicius's *Vita Sancti Martini* in the *Salutatio* the number of syllables in the names of the author 'Seuerus' and the dedicatee 'Desiderio', eight, provides the modular number of the eight sentences of the first preface. The address of Severus to Desiderius contains thirty-one letters, which provides the modular number of the thirty-one lines of the first preface. The number of sentences multiplied by the number of lines equals the number of words in the first preface: $8 \times 31 = 248$.

Sulpicius writes about Martin's life in the second preface, which contains 332 words. In sentence nine, beginning in line twenty-seven, there are twenty-seven syllables to *ante episcopatum | uel in episcopatu* and thence twenty-seven letters and spaces between words to the end of the line,¹² coincident with the twenty-seven years of Martin's episcopate from AD 371 to 397. The number of syllables in the names 'Seuerus' and 'Desiderio', eight, multiplied by the number of lines, one in the *Salutatio*, thirty-one in the first preface and forty-one in the second preface, together $1 + 31 + 41$ or 73, equals the number of words in the salutation and the two prefaces: $4 + 248 + 332 = 584$; also $8 \times 73 = 584$.

These multiple infixing indications of structure serve as an error-detection program, guarding the author's original text against careless copying and editorial tinkering. They serve also as an error-correction program, enabling a sensitive reader to restore a text damaged in transmission to its original perfection.

In considering transmission of this mode of thought and tradition of composition to these islands, the four authors mentioned above can be reduced to two. The fundamental authors are Jerome, whose *Biblia Vulgata* was the foundation of study, and Sulpicius Severus, whose *Vita Sancti Martini*, based upon the *Vita Sancti Antonii*, was the primary model, both formal and thematic, of Insular saints' lives, and whose *latercus*, based upon Anatolius' *De ratione paschali*, was the foundation of ecclesiastical computus. Sulpicius was consequently famous among Insular scholars as both quadrivial mathematician and trivial hagiographer. Works in the Insular Latin tradition that exhibit features of composition transmitted by Sulpicius Severus (notably two prefaces or three books or both) include Gildas' *De excidio Britanniae* (published AD 540), three poems by Lutting of Lindisfarne (AD 681), Adomnán of Iona's *De locis sanctis* (AD 683–6), *Anonymi Lindisfarnensis Vita Sancti Cuthberhti* (AD 698), Muirchú moccu Maicthéni's *Vita Sancti Patricii* (ante AD 700),

11. Howlett 2008b.

12. Although the Irish are usually credited with devising the convention of spaces between words during the 6th century, or early in the 7th, Latin speakers before that time were well aware of word boundaries in their native tongue, as one infers from the Latin grammarians and from the points often inserted between words in Roman inscriptions.

Anonymi Whitbiensis Vita Sancti Gregorii (AD 704), Adomnán's *Vita Sancti Columbae* (AD 704), Bede's *Vita Metrica Sancti Cuthberhti* (AD 720), and Aedilwulf's *De Abbatibus* (AD 819).¹³

Beginning nearly fifty years ago the late and much-missed Robert Stevick, in a series of studies of Old English texts, Insular illuminated manuscripts, Irish High Crosses, the Ardagh Chalice and the Tara Brooch, presented brilliant analyses of means by which writers of texts, illuminators of manuscripts, stone carvers and metal workers employed mathematical designs in both literary texts and manuscript illuminations as well as in works of the plastic arts, no two of which are the same.¹⁴ One should note particularly an essay published posthumously in which he suggested reconstruction of a portrait of Matthew missing from the Macregol Gospels after comparison of variant elements in the portraits of Mark, Luke and John that survive in the same manuscript.¹⁵ Stevick opened windows into the minds of designers concerned less with copying formalist templates than with a desire to create form anew in each work. The analyses presented here, though simpler than his, corroborate his perception that disciplines now separated in our studies may be profitably reunited to enable us to appreciate works of literature and art generated by mathematical calculation.

THE LINDISFARNE GOSPELS

Anonymi Lindisfarnensis Vita Sancti Cuthberhti is a wonderfully wrought composition that exhibits many phenomena learnt from Anatolius and Sulpicius. It is introduced by two prefaces, dedicated in 698 to Eadfrith (who became bishop of Lindisfarne in that year), when he was probably already at work as both scribe and illuminator of the Lindisfarne Gospels;¹⁶ AD 698 is also the year in which Cuthbert's body was discovered incorrupt and translated. In designing and executing portraits of the Four Evangelists, Eadfrith practised a calculus of variants, using well-known iconographic elements in ways similar to our author's use of well-known computistic and hagiographic elements and borrowed words (fig 1).¹⁷

Among the Evangelists' portraits:

- (1) three have no curtain, and one, Matthew, has a curtain;
- (2) three have a purplish brown surrounding border, and one, Mark, has a blue surrounding border;
- (3) three depict only one Evangelist, but one portrait, Matthew's, includes the head of another Evangelist, probably Luke, looking from behind the curtain at Matthew's Gospel;¹⁸
- (4) three have ringlets, and one, Matthew, has straight hair;

13. For editions, analyses and infixed dates of texts, see Howlett 1995a, 1996, 2005, 2006, 2013a, 2020, forthcoming, *Modular Composition* (forthcoming).

14. For a bibliography of his works, see *Philological Rev*, Special Issue, Essays in Honour of Robert D Stevick, 34.2 (2008), 223–8 and Howlett 2013b, 129–41.

15. Stevick 2019.

16. Kendrick *et al* 1956, 1960; Backhouse 1981; Brown 2003a, pls 8, 14, 18 and 22, 2003b, 26.

17. For analysis of *Anonymi Lindisfarnensis Vita Sancti Cuthberhti*, see Howlett, *Modular Composition* (forthcoming). For brilliant analysis of other mathematical aspects of Eadfrith's design, see Stevick 1994, 102–15, reviewed by Howlett 1995b.

18. I owe to Dan Mc Carthy this identification, which is consistent with evidence that Luke wrote later than Matthew and with the Canon Tables that represent Matthew's and Luke's Gospels as having the largest number of passages in common.



Fig 1. Portraits of the Four Evangelists depicted in the Lindisfarne Gospels: (top left) Matthew, (top right) Mark, (bottom left) Luke, (bottom right) John. Images: reproduced courtesy © British Library Board (Cotton MS Nero D IV).

- (5) three have brown hair, and one, Matthew, has grey hair;
- (6) three look askance, and one, John, looks straight at the viewer;
- (7) three have feet pointing sideways, and one, John, has one foot pointing forward and one pointing sideways;
- (8) three have right arms stretching forward, and one, John, has his right arm in his garment with only his hand showing on his breast, illustrating perhaps the Irish tradition of *Eoin bruinne* 'John of the breast';¹⁹
- (9) three have platforms for their feet, and one, John, does not;
- (10) three have anklets on their feet, and one, John, has ankles not seen;
- (11) three are shown writing their Gospels, and one, John, is shown not writing his Gospel;
- (12) three have their Gospels on their laps, and one, Mark, has his Gospel on a table;
- (13) three sit on stools of which two legs are visible, and one, John, sits on a stool of which four legs are visible;
- (14) three are described as *agios*, and one, Mark, is described as *agius*;²⁰
- (15) three have legends in three blocks of script, and one, Mark, has a legend in five blocks of script;
- (16) three have legends divided on two sides of their bodies, and one, Mark, has a legend on one side of his body;
- (17) three have legends written plainly, and one, John, has a legend in a coloured frame;
- (18) three have backgrounds lightly tinted, and one, Mark, has a background more darkly tinted;
- (19) three have symbols called *imagines* that face right, and one, Mark, has an *imago* that faces left;
- (20) three *imagines* hold green Gospels, and one *imago*, John's, holds a red Gospel;
- (21) of the three Evangelists depicted writing, two are writing books and one, Luke, is writing a scroll, 3:2:1;
- (22) two are writing on their laps and one, Mark, is writing on a round table, 3:2:1;
- (23) of the three Evangelists who have platforms for their feet, one platform, Mark's, contains three colours, one, Matthew's, contains two colours and one, Luke's, contains one colour, 3:2:1, 3:1 and 1:1:1;
- (24) two Evangelists, Matthew and Luke, have beards, and two, Mark and John, do not;
- (25) two, Matthew and Luke, sit on orange cushions, and two, Mark and John, sit on blue cushions;
- (26) two, Matthew and Mark, wear garments with a yellow hem and two, Luke and John, wear garments with a beige hem;
- (27) two, Matthew and Mark, hold books and two, Luke and John, hold scrolls; the two scrolls unroll downward to the left off the right knees of Luke and John; of the two books one is depicted on Matthew's leg and one on Mark's table, both 2:2 and 2:1:1;
- (28) two *imagines*, Matthew's and Mark's, have trumpets made of horn against their mouths and two, Luke's and John's, do not;
- (29) two *imagines*, Matthew's and Luke's, have titles divided on two sides of their bodies and two, Mark's and John's, have titles on one side of their bodies;
- (30) among the horned devices at the four corners of each portrait, two, Matthew's and John's, are three-coloured and two, Mark's and Luke's, are two-coloured;

19. Allen 2017. I owe thanks for reference to this article to Colin Ireland.

20. *Agios/agius* 'holy'. For a comparable phenomenon on the contemporary Franks Casket, see below.

- (31) two *imagines* are two-coloured, one is three-coloured and one is one-coloured, 3:2:1, 2:2 and 2:1:1;
- (32) two *imagines* have two-coloured halos, one *imago* has a three-coloured halo and one *imago* has a one-coloured halo, 3:2:1, 2:2 and 2:1:1;
- (33) two *imagines* have legends written contiguously, one has a legend written in two parts and one has a legend written in three parts, both 2:2 and 2:1:1;
- (34) two Evangelists, Matthew and John, sit on stools with legs squared at the bottom and two, Mark and Luke, sit on stools with legs otherwise shaped, one with trapezoidal bases and one with a swelling above the bases, both 2:2 and 2:1:1;
- (35) two Evangelists, Matthew and John, sit on stools of three colours and two, Mark and Luke, sit on stools of two colours;
- (36) one, Matthew, wears a green outer garment with brown stripes and a brown undergarment with blue stripes; reversing this, one, John, wears a brown outer garment with blue stripes and a green undergarment with brown stripes.
- (37) one, Mark, wears a brown outer garment with blue stripes and a blue undergarment with brown stripes; reversing this, one, Luke, wears a blue outer garment with light brown stripes and a light brown undergarment with light blue stripes. This might illustrate a ratio of 2:2 and of 1:1:1:1.

A consistent form of this calculus distinguishes John in ten ways from the three Synoptic Evangelists, Matthew, Mark and Luke:

- (1) John is the one Evangelist who looks straight at the viewer.
- (2) John's right foot points forward.
- (3) John's right arm is in his garment, with his right hand on his breast.
- (4) John's feet do not rest on a platform.
- (5) John's ankles are not visible.
- (6) John is shown not writing his Gospel.
- (7) John sits on the stool with four visible legs.
- (8) John's legend is in the coloured frame.
- (9) John's eagle has the red halo.
- (10) John's eagle holds the red Gospel.

Each of the other Evangelists is also distinguished. Mark from the other three in seven ways:

- (1) Mark's portrait has a blue surrounding border.
- (2) Mark's Gospel is on a table.
- (3) Mark is described as *agius*, as distinct from the *agios* of the other three.
- (4) Mark's legend is in five blocks of script.
- (5) Mark's legend is on one side of his body.
- (6) The background of Mark's portrait is more darkly tinted than those of the other three.
- (7) Mark's *imago* faces left.

Matthew is distinguished from the other three in four ways:

- (1) Matthew's portrait contains a curtain.
- (2) Matthew's portrait contains another Evangelist.

- (3) Matthew has straight hair.
- (4) Matthew has grey hair.

Luke is distinguished from the other three Evangelists in two ways:

- (1) Luke is depicted writing a scroll.
- (2) Luke is depicted in the portrait of another Evangelist.

That makes four ways and twenty-three examples in which each of the Evangelists is distinguished from the other three. According to the distinctions numbered 1–37 above, the Evangelists are paired in six ways: Matthew and Mark in 26, 27 and 29; Matthew and Luke in 24, 25 and 30; Matthew and John in 31, 35, 36 and 37; Mark and Luke in 31, 35, 36 and 37; Mark and John in 24, 25 and 30; Luke and John in 26, 27 and 29.

We may understand this calculus of iconographic variants, this shifting combination of ten forms of elements of design of Evangelists' portraits, as a pictorial comparand of the ten categories of numbers in the Eusebian Canon Tables that show what stories are found in one, two, three or four Gospels.²¹

We may see this as part of a group of phenomena found in early Insular Gospel books: portraits of the Evangelists, representations of the Evangelists' *imagines* or symbols, columnar arrangement of the numbers of the Eusebian Canon Tables and Ailerán's poem *Canon Euangeliorum* about the Canon Tables, in which the Evangelists are referred to only in terms of their *imagines* or symbols. As Ailerán's disposition of the numbers differs slightly from that of Eusebius, one infers that the manuscripts that contain Ailerán's poem followed the Aileránian, as distinct from the Eusebian, disposition. Whether the calculus of these phenomena was devised by Insular designers or developed from earlier sources remains to be determined.

About two hundred and fifty years after Eadfrith's election as bishop, probably between AD 950 and AD 970, Aldred the provost added an interlinear gloss in Northumbrian dialect to the Gospels, concluding with a colophon admirably wrought in modular composition,²² in which he accounts for the origins of the four Gospels and for the contributions of four men to the Lindisfarne Gospels: Eadfrith, the bishop who wrote the book; Æthilwald, the bishop who bound it; Bilfrith, the anchorite who smithed the shrine, the satchel or book box; and Aldred, the priest who glossed it, with his distinct intentions for each of the four glossed Gospels.

THE FRANKS CASKET

Almost exactly contemporary with the Lindisfarne Gospels is an artefact carved from whale bone, the Franks Casket,²³ that survives in the British Museum in London and the Museo Nazionale del Bargello in Florence, dated by philologists, runologists, palaeographers and

21. Brown 2003a, pls 6–7, 2003b, 20. For Hiberno-Latin texts about the Canon Tables, see Howlett 1996, 12–20, 2001, 22–6, 2010b, 162–71, and 2013a, 356–9.

22. Howlett 2005, 216–20.

23. Napier 1901, 362–81; Vietor 1901, pls III–IV–V; Dobbie 1942, opp 116–17; Elliott 1959, 96–109, figs 44–6; Okasha 1971, no. 6, 50–1, pl 6; Robinson and Stanley 1991, no. 46; Howlett 1997, 276–84 and 2005, 204–8.

art historians alike to about AD 700. As the characters belong not to the Common Germanic futhorc of twenty-four runes but to the expanded English futhorc of thirty-two runes, the inscriptions must have been carved after emergence of the expanded futhorc about the middle of the seventh century.²⁴ One infers from the Northumbrian dialect of Old English in the inscriptions, slightly later than the language of *Cædmon's Hymn* (AD 657–80) and the *Leiden Riddle* (c AD 685) and slightly earlier than the language of *Bede's Death Song* (AD 735) and the *Ruthwell Crucifixion Poem* (c AD 730–5),²⁵ that the Franks Casket was conceived and executed near to Lindisfarne in space as well as in time. Certainly its designer shared with Eadfrith a calculus of design.

The front panel of the Franks Casket is divided into two parts, each read from the centre outward (fig 2). On the right side are three magi, two advancing and one genuflecting to the Virgin Mary and the infant Jesus, who are depicted within a structure with two levels of two columns on either side that support on three-stranded capitals a two-stranded rounded arch, above which are two balls. The two columns on the left rest upon three-stranded bases; those on the right rest upon one two-stranded and one four-stranded base. Behind the first bending magus is a *triquetrum*, from early Christian times a symbol of the Trinity. All three magi bear gifts, the first a long object with a knob at each end, perhaps a branch of a thorny tree from which the aromatic gum *murra* 'myrrh' oozed, the second a long-stemmed object, a plant with four stylised leaves at the top, perhaps the plant from which the aromatic gum *tus* 'frankincense' oozed, the third a long-stemmed object with three balls at the top, perhaps *aurum* 'gold', in honour of three aspects of Christ as prophet, priest and king. Although the magi are usually depicted as presenting boxes or caskets, the arboreal appearance of their gifts here may allude proleptically to the account of another Epiphany in Matthew 21.8: *alii autem caedebant ramos de arboribus et sternebant in uia* ('others however cut and strewed on the way branches from trees'). Above the heads of the second and third magi is the only incised, as distinct from relieved, inscription on the casket, reading  *mægi*, 'magi'. Between the heads of the third magus and the Virgin is a circle round the Star of Bethlehem, that may suggest with its thirteen rays the number of lunar months that occur in a solar year – this is a single representation of three sources of light: two, the sun and the moon, created on the fourth day in Genesis 1.14–19, and one, a star, mentioned in Matthew 2.1–12. Before the genuflecting knee of the third magus is a right-facing bird, perhaps a dove, representing the Holy Spirit.

On the left side of this panel are four left-facing birds, two being strangled by a right-facing small boy – one of two sons of King Niðhad of the Old English poem *Deor*,²⁶ Niðuðr of the *Vǫlundarkviða* in the Old Norse *Poetic Edda*²⁷ – who is collecting their feathers. Behind him is a left-facing woman – his older sister Beaduhild of *Deor*, Bǫðvildr of the *Vǫlundarkviða* – wearing a double-folded hooded cape, *fagrvarið* ('bright-robed'), and carrying a bag that contains a bottle, presumably filled with a drugged liquor made from the two stylised plants, one to the right and one to the left of her head. To her left she is depicted again, receiving a goblet containing a drugged drink:

24. Parsons 1999, 109–19.

25. Howlett 1997, 262–74, 285–95; *Modular Composition* (forthcoming).

26. Krapp and Dobbie 1936, 178.

27. Dronke 1997, 244–54. All texts in and translations from Old Norse are from Dronke's edition. Other translations are mine.

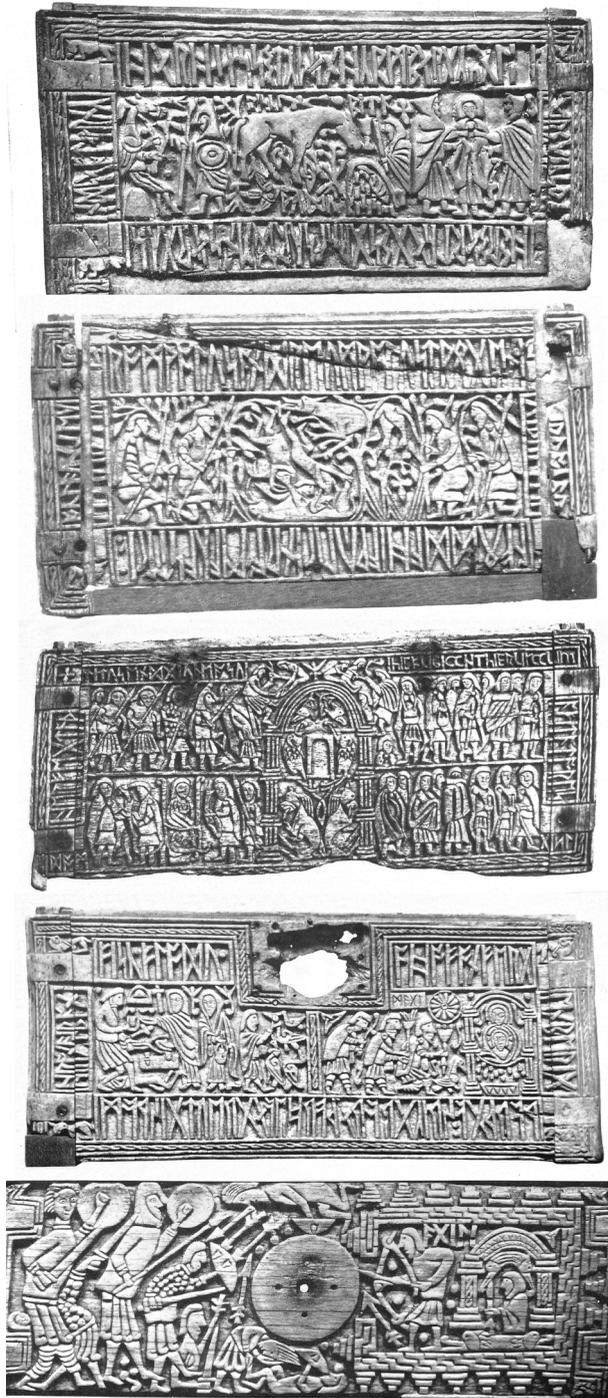


Fig 2. The Franks Casket, showing different views from top: right side, left side, back, front, lid.

Images: Elliott 1959, figs 43–6.

Bar hann hana bióri, þvíat hann betr kunni,
svá at hon í sessi um sofnaði.

He bemused her with beer, for he was more knowing than she,
so that on the couch she fell asleep.

The man who gives her the goblet with his right hand is Weland the Smith, of whom the Old English translation of Boethius' *De Consolatione Philosophiae* asks in prose 19.16–21:²⁸

Hwær sint nu þæs foremeran and þæs wisan goldsmiðes ban Welondes? ...
Hwær synt nu þæs Welondes ban oððe hwa wat nu hwær hi wæron?

Where now are the bones of the eminent and wise goldsmith Weland? ...
Where now are Weland's bones or who knows now where they were?

and in Metre 10. 33–43:²⁹

Hwær sint nu þæs wisan Welandes ban
þæs goldsmiðes þe wæs geo mærost?
Forðy ic cwæð þæs wisan Welandes ban
forþy ængum ne mæg eorðbuendra
se cræft losian þe him Crist onlænð. ...
Hwa wat nu þæs wisan Welandes ban
on hwelcum hlæwa hrusan þeccen?

Where now are the bones of the wise Weland,
the goldsmith, who was formerly most illustrious?
Therefore I said bones of the wise Weland
because for any of the earth-dwellers
the craft that Christ lends to them cannot be lost. ...
Who knows now in which of mounds
the bones of the wise Weland cover the earth?

Anglo-Saxons named an ancient burial site near the Uffington White Horse in Oxfordshire *Welandes smiððe* ('Weland's smithy'). His name is the first word of *Deor*, *Welund him be wurman wræces cunnade* ('Weland knew in himself of persecution of the snake-sword'), and he is *Vǫlundr* of the *Vǫlundarkviða*, hamstrung, imprisoned on an island and forced to make treasures for *Niðuðr*: *er het Stævarstaðr. Þar smiðaði hann konungi allz kyns gørsimar* ('which was called Seastad. There he fashioned for the king treasures of every kind'). In his left hand Weland holds a pair of tongs that grasp a skull or bowl above a table. Below Weland's feet lies the body of *Niðhad's* son without the head from which the bowl was made. Between the heads of Weland and *Beaduhild*, within a frame is an inverted

28. Godden and Irvine 2009, I, 283.

29. Ibid, I, 427.

bowl made from the head of Niðhad's other son. Below the bowl are two objects, brooches made from the boy's teeth, and on either side of Weland's head two other balls, gems made from the boy's eyes:

Sneið af höfuð húna þeira
ok undir fen fioturs fœtr um lagði.
En þær skálar, er und skõrom vóro,
sveip hann útan silfri, seldi Níðaði.
En ór augom iarknasteina
sendi hann kunnigri kono Níðaðar.
En ór tõnnom tveggia þeira
sló hann bríóstkringlor, sendi Bõðvildi.

Cut off the heads of those young cubs,
and beneath the mud of the forge-well laid their feet.
But those bowls, that were beneath the bobbed hair,
he enclosed in silver, gave them to Níðuðr.
And from the eyes pure gems
he sent to the wise wife of Níðuðr.
And from the teeth of the two of them
he forged brooches, sent them to Bõðvildir.

Between the bowl and Beaduhild's head and below Beaduhild's left arm and Weland's right arm are two swords. Of one of these, in *Waldere* 1.2–4, Hildegund says:³⁰

Huru Welandes worc ne geswiceð
monna ænigum ðara ðe Mimming can
heardne gehealdan.

Indeed Weland's work does not fail
any of the men, of those who can
hold hard Mimming.

Weland's other artefacts are described as Beowulf's coat of mail in *Beowulf* 454–5,³¹ *þæt is Hræddan laf, Welandes geweorc* ('that is Hrædda's relic, Weland's work'), and in *Waltharius* (965) as *Wielandia fabrica* ('Welandish work'). After Weland killed Niðhad's sons and raped his daughter Beaduhild – leaving her pregnant with Wada, Wudga or Wade, mentioned in *Widsith* 130,³² *Wudga ond Hama* and *Waldere* 2.9: *Niðhades mæg, Welandes bearn Widia* ('Niðhad's kinsman, Weland's son Wudga')³³ – he flew away on wings made from the feathers collected by Niðhad's son.

30. Dobbie 1942, 4.

31. Klaeber 1922 [repr 1950], 18.

32. Krapp and Dobbie 1936, 153.

33. Dobbie 1942, 6.

‘judgement’, the upper right depicts Jews fleeing and the lower right suffering as *gisl* ‘hostage’.

Seven parallels of motif and idea connect the back panel with the front. The birds on the front are balanced by the winged and feathered cherubim on the back. The structure that surrounds the Virgin and Child on the front is paralleled by the structure of the Temple on the back. The *triquetrum* behind the head of the first magus on the front appears again behind the heads of the creatures atop the Ark of the Covenant on the back, representing again the Divinity. The bag carried by Beaduhild on the front resembles the bag carried by the Jew seventh from the upper right corner of the back. Weland’s captivity is comparable with that of the hostage. Both the Epiphany and the destruction of the Temple are scenes from the Holy Land, so linking the front and back panels. The front panel illustrates pagan and Christian history, both in the juxtaposition of Weland and Jesus and in the Epiphany of Christ to the pagan magi. The back panel illustrates the destructive interaction of pagan and Jewish history.

According to Elliott:³⁶

‘*giuþeasu* . . . is a most abnormal form for the nominative plural Jews’; *giuþeas* might have been expected, perhaps even intended, the *u* having been added in error, or as Souers puts it ‘merely arbitrarily appended’. Bradley suggested that the carver possibly meant to write *giuþea sumæ*, ‘some of the Jews’, but had no more room for the two final runes.

According to Page:³⁷

for the Titus side . . . he [sc. the carver] was probably copying, but not doing it exactly. I suggest that he had an original which was in Latin and in some form of Roman script. He translated and transliterated as he went. Halfway through he forgot to do either, and copied direct. Noticing his error he finished his sentence necessarily in Latin but returned to runes, using a pronunciation spelling which he thought more appropriate to a vernacular script. This could also explain ‘end’ where we would expect ‘and’ or ‘ond’, for he may have begun to cut *et* (after the Latin name *Titus*) and realised his mistake in time. It may also explain ‘giuþeasu’, a form that has caused much debate since its ending is etymologically impossible. The final vowel has been accounted an arbitrary appendage to a normal plural *Giuþeas*, ‘Jews’, but adding *-u* to an existing inflexional ending, even as a space-filler, is most unlikely. Alternative explanations given require the addition of some letters between the two bits of the inscription: *Giuþea su<mæ>*, *su<nu>*, *su<m>*, ‘certain, sons, one of the Jews’, and even *her fegiap Titus end Giuþeas u<t> hic fugiant Hierusalim afitadores*, ‘here Titus and the Jews fight with the result that here its inhabitants flee from Jerusalem’. All these assume that the carver was careless, which in general he was not, and that he divided words between his text panels, which in general he tried not to do. My own suggestion is that ‘giuþeasu’ is a confused form of Latin *Giuþæus*, a form of *Iudæus*, ‘Jew’. With the emendation to *fugiumt*, the text now means: ‘Here Titus and a Jew fight: here its inhabitants flee from Jerusalem’.

36. Elliott 1959, 102.

37. Page 1973, 179–80.

depicts not birth, but the destruction of the Temple and the end of Jewish life in Jerusalem, 3:1.

Sixth, among the unusual begettings, three – those of Wudga, Romwalus and Reumwalus and Boe – involve rape and one, that of Jesus, does not, 3:1.

Seventh, three panels, the front, back and right, exhibit *triquetra* and the fourth, left, does not, 3:1.

Eighth, three of the panels depict two figures twice, on the front left Niðhad's son and daughter Beaduhild, on the back panel Titus fighting and judging and the Jew being judged and led away as a hostage and on the right panel Baldur's mound and Woden, each represented twice, as well as two *triquetra* and two ravens. On the left panel, though there are nine doublets, there are no repeated depictions of the same person, 3:1.

Ninth, three of the panels depict vessels: Beaduhild carrying a bottle in a bag on the front, a Jew carrying a bottle in a bag on the back and a chalice below the word **bita** on the right, 3:1. But there are also two subsets, bottles in bags on the front and back, but a chalice on the right, 3:2:1, and possibly drugged or poisoned drinks on the front and the right, but an indeterminate potion on the back, 3:2:1.

Tenth, three of the panels, the front, right and back, contain feathered creatures and one, the left, does not, 3:1.

Eleventh, three of the panels, the right, left and back, depict animals and the front does not, though the surrounding inscription refers to a whale that is not depicted, 3:1.

Twelfth, of the three unusual births, two are of single sons, Jesus and Wudga, and one is of twin sons, Romwalus and Reumwalus, both 3:2:1 and 2:2.

Let us consider next epigraphic play. First, three of the panels, left, right and back, contain inscriptions that refer to the scenes depicted. One on the front does not, but relates instead the origin of the material from which the casket is made, 3:1.

Second, three of the inscriptions entirely in relieved runes, on the front, left and back, contain two lines of text followed by two words, and one inscription, on the right, contains three lines of text with three words inscribed within the depicted scene, 3:1.

Third, three of the inscriptions, on the front, left and right, are entirely in Old English and one, on the back, is partly in Old English and partly in Latin, 3:1.

Fourth, in the uniquely Latin inscription, three of the words are in Roman script and one is in runes, 3:1.

Fifth, three of the panels, on the front, back and right, contain alliterative verse and one, on the left, does not, 3:1.⁴⁵

Sixth, three of the panels have continuous inscriptions on the lower borders, the front, left and right, but one, on the back, does not, 3:1.

Seventh, three of the panels, on the front, right and back, have words inscribed within the interior scenes and one, on the left, does not, 3:1.

Eighth, three of the panels, on the left, right and back, contain the word 'and' and one, on the front, does not, 3:1.

45. Although the first two lines on the left panel conform with Old English verse types, they alliterate unusually between the lines on *Rom-*, *Reum-* and *Romæ-*, as well as on vowel alliteration on *oble* and *unneg*, perhaps also on *afæddæ*. If one reckoned the lines on the left panel and the first line on the back panel not as unalliterating verse but as prose, there would be two panels with prose inscriptions and two with verse inscriptions, with a subset of 2:1:1, if the second line on the back panel should be scanned as verse.

Ninth, three of the panels, on the front, left and back, exhibit ordinary vowel runes and one, on the right, exhibits encoded vowel runes devised from variant forms of the last rune in the name of the vowel it represents, 3:1.

Tenth, of the three panels that have continuous inscriptions on the lower borders, two, on the left and right, exhibit runes upside down and one, on the front, exhibits runes right side up but retrograde, 3:2:1.

Eleventh, of the three panels that include texts inscribed within the interior depicted scenes, one, on the right, exhibits three words, one, on the back, exhibits two words and one, on the front, exhibits one word, 3:2:1.

Twelfth, on the same three panels, two, the right and the back, exhibit relieved runes and one, the front, exhibits incised runes, 3:2:1.

Thirteenth, of the three panels that include the word ‘and’, on the left it is spelled *and*, on the back *end* and on the right *ænd*, exhibiting the sequence *a-e-æ*, both 3:1 and 1:1:1.⁴⁶

Fourteenth, only one panel, the right, exhibits a bind-rune, in *sefla*; the other three panels exhibit only single letters, 3:1.

Fifteenth, the left side is the only one of the four side panels that exhibits an inscription around the borders but no internally inscribed words, 3:1:

Romwalus and Reumwalus	twægen gibroþær
afœddæ hiæ wylif	in Romæcæstri
oplæ unneg	

It contains twelve words, twenty-eight syllables and seventy-eight runes and spaces between words. We might infer from the two boys, two wolves, two armed men approaching with two spears through two trees on the left, and two armed men approaching with two spears through two trees on the right that our designer was playing iconographically with the number two; but he was also playing epigraphically. The twelve words divide by duple ratio, 2:1, at eight and four, the twenty-eight syllables at nineteen and nine, the seventy-eight runes and spaces between words at fifty-two and twenty-six, all at exactly the same place, at *twægen* | *gibroþær*.⁴⁷

As the front panel exhibits an inscription around the borders containing fifteen words, the back panel nine words, the right panel seventeen words and the left panel twelve words, the four side panels together contain fifty-three words. As the front panel exhibits one word inscribed within the borders, the back panel two words and the right panel three words, together six words, regardless of the direction one follows, from left to right with 1:2:3 words, or from right to left with 3:2:1 words, the total number of words inscribed on the four side panels is fifty-nine. Beginning at the front panel and including only those words inscribed around the borders, the fifty-three words divide by duple ratio, 2:1, at thirty-five and eighteen, at *twægen* | *gibroþær*. Including all the words inscribed on the four side panels, the fifty-nine words divide by duple ratio, 2:1, at thirty-nine and twenty, at *twægen* | *gibroþær*.

There is further play on duple ratio, 2:1, in that the Latin inscription contains twenty letters in Roman script and ten characters in runes. Also, two of the panels exhibit words split between different borders, **ferg** | **enberig** on the front and **æ** | **nd** on the right. These

46. Compare the spellings, three of *agios* and one of *agius*, in the Lindisfarne Gospels. Compare also the vowel sequence *æ-a-o* below.

47. For an earlier example of this, division by 2:1 at words for two in a computistic poem published by Mo-Chuaróc maccu Neth Sémon in AD 640, see Howlett 2013b, 115–19. For a slightly later example of division by 3:2 at the word *duo*, see the Ruthwell Cross section below.

seven epigraphic plays on duple ratio, five on the left panel and one on the back, may be compared with the eight iconographic doublets in the Weland scene on the front panel, the nine iconographic doublets on the left panel and the seven iconographic parallels between front and back panels.

Whether the designer and carver strove for other forms of balance is less clear. On the front panel the sixty-eight relieved runes and four relieved points total seventy-two; on the left panel the sixty-nine relieved runes and three relieved points total seventy-two. On the right panel in the inscription round the borders there are seventy-four relieved runes, but as one is a bind-rune **f/a**, the total may be seventy-three. On the front panel the inscription round the borders contains twenty-three syllables, and the word inscribed in the interior contains two syllables; on the back panel the inscription round the borders contains twenty-three syllables, and the words inscribed at the bottom contain two syllables. On the left panel the inscription round the borders contains twenty-eight syllables, and on the right panel the inscription round the borders contains twenty-nine syllables.

If in the inscription on the lid the *giefu* rune represents palatal *g*, as in *giswom*, *giuþaeus*, *gisl* and *twægen gibroþær*, the **Ægili** depicted is Egil, brother of Weland, and the scene on the lid is connected with the Weland scene on the front panel and the Northern scenes depicted on the right panel; but if it represents velar *g*, as in *gasric grorn*, *greut*, *unneg*, *harmberga*, *æglæ drigiþ*, *sgræf* and *sorga*, the **Ægili** depicted is Achilles, and the scene derives from Greek legend.⁴⁸ Roman legend and history connect the left and back panels. Northern legends connect the right and front panels. Christian and Jewish legend and history connect the front and back panels. The casket presents scenes from Greek, Roman and Northern as well as from pagan, Jewish and Christian mythology, legend and history. We see here, as in the Lindisfarne Gospels, play both iconographic and epigraphic on 3:1 with subsets of 3:2:1 and 1:1:1, and on 2:2 with subsets of 2:1:1 and 1:1:1:1, and of 2:1.

The art historian who described the Franks Casket as a monument to the 'aesthetic muddle' of the Dark Ages may want to think again.⁴⁹

THE RUTHWELL CROSS

The Ruthwell Cross preserves the longest extant series of Anglo-Latin inscriptions, the longest extant Old English runic inscriptions and the longest and most beautiful poem in the Northumbrian dialect. It also exhibits the fullest epigraphic display of the expanded futhorc, which is a doubly triumphant illustration, both of phonological acumen and of efficient and elegant graphic design. All the new runes added to the Common Germanic futhark of twenty-four runes are designed from elements of the original stock to illustrate the distinctive English sound changes they represent.⁵⁰ The fourth rune of the older futhark, **ansuz**, represented *a*. In the new futhorc, given the new name *æsc*, it represented *æ*. With one upward stroke added to the upper of two strokes slanting downward to the right it became **æac** and represented *a*. With one upward stroke added to each of the two strokes slanting downward to the right it became **æos** and represented *o*, illustrating both visually and aurally a sequence *æ-a-o*.

48. Vandersall 1972, 2–37.

49. Beckwith 1972, 17.

50. Howlett 2005, 197–204.

The twenty-second rune of the older futhark, \mathfrak{X} **ingwaz*, changed its shape to resemble two of the seventh rune \mathfrak{X} **gebo* *g*, one atop the other, \mathfrak{X} *ing* as *gg*, like Greek *digamma*, representing η .

As a philologist describes *y* as the *i*-mutation of *u*, a runemaster created the new rune \mathfrak{Y} *yr* by placing the older eleventh rune \mathfrak{I} **isa* inside the older second rune \mathfrak{U} **uruz*, so that *ur* plus *is* = *yr*, $\mathfrak{U} + \mathfrak{I} = \mathfrak{Y}$, *u* + *i* = *y*.

He created the new rune \mathfrak{E} *ear* by placing the older nineteenth rune \mathfrak{M} **ehwaz* inverted above the upper part of the new rune \mathfrak{A} *ac*, so that inverted *eh* plus *ac* = *ear*, *e* + *a* = *ea*.⁵¹

By adding the sixth older rune < **kenaz* to either side of the older seventh rune **gebo* *g*, he made \mathfrak{G} *gār*, < + \mathfrak{X} + >, that is *c* + *g* + *c*, a velar \bar{g} , freeing *giefu* \mathfrak{X} to represent palatal *g*.

After changing the shape of the older sixth rune **kenaz* from < to new *cen* \mathfrak{C} , he added a reversed new *cen* to a straightforward new *cen*, reversed $\mathfrak{C} + \mathfrak{C}$, *c* + *c*, to produce new \mathfrak{K} *calc*, *k*; and he combined new *calc* \mathfrak{K} with inverted new *calc* \mathfrak{K} and added old **kenaz* < and reversed old **kenaz* > to make \mathfrak{K} , *c* + *k* + *k* + *c*, representing a hard velar *k* before a front vowel.

This reform of the old futhark to the new futhorc, implying intelligent systematic thought about unique phonological developments in the Old English language, occurred at the same time as an evolving sense of ethnic identity, of the English as a distinct people, a *gens*. This is implicit in two statements in chapters ii–viii of the *Vita Wilfridi* by Eddius Stephanus (or Stephen of Ripon) that Wilfrid should promote the growth of our nation, *gentis nostrae*, and in a chiasmic pair that he should benefit our nation, *genti nostrae*.⁵² The same idea is explicit in the very title of Bede's *Historia ecclesiastica gentis Anglorum* and throughout that work. This association of ethnicity with language may owe something to the foundation legend clearly expressed in the Old Irish *Auraicept na n-Éces*, that Fenius Farsaid created the Irish language from the most beautiful parts of the seventy-two tongues dispersed at the Tower of Babel⁵³ and the *tres linguae sacrae*, the three sacred languages, Hebrew, Greek and Latin. He also devised ogam with which to write it. One is Irish less by descent from a common ancestor than by virtue of speaking this language.⁵⁴ On an adjacent island, perhaps slightly later, one sees development of ethnic identity simultaneously with systematic thought about a common language.

Thirty years ago, in *The Ruthwell Cross*,⁵⁵ I published an analysis of the design of this four-sided monument, suggesting that each panel relates directly to the panel immediately above it and simultaneously to the parallel panel on the opposite side. The scenes follow a demonstrable order of the liturgical calendar and exhibit calendrical numbers. I confirm the earlier analysis, making one correction to the grammar of the poem and one change to the translation. On the east side and north border of the Cross at the first half-line + *Ondgeredæ Hinæ Gōd Almeztig* for 'God Almighty stripped Himself', read 'God Almighty girded Himself as an adversary',⁵⁶ and on the east side south border in the last half-line, changing a supplied \mathfrak{A} *æsc* to \mathfrak{A} *ac*, for *siþþan He His gāstæ sendæ*, read *siþþan He His gāst asendæ*.⁵⁷

51. An understanding of this is consistent with the sequence *and–end–ænd* considered above.

52. Howlett 1997, 150.

53. Might this number be associated with the apparent striving for the number 72 in the inscriptions?

54. Calder 1917 [1995].

55. Howlett 1992.

56. Howlett 1998a, 223–6.

57. Howlett 2008a, 255–7.

Here one needs to note only a possibility that the designer of the Cross played with *duo* as the designer of the Franks Casket played with *twøgen*. On the third panel of the north face, an inscription recorded by Okasha as:⁵⁸

+SCS:PAVLVS:
 ET:A[...]
 FREGER[.T]:PANEMINDESERTO:

may be reconstructed as

+ SANCTVS:PAVLVS:
 ET:ANTONIVS:DVO:EREMITAE:
 FREGERVNT: PANEM IN DESERTO:

+ Saint Paul and Antony; two hermits broke bread in the desert.

The inscription would contain ten words, twenty-four syllables and fifty-seven letters (fig 3). The ten words divide by *hemiolus* or sesquialter ratio, 3:2, at six and four, at | *duo*; the twenty-four syllables divide by the same ratio at fourteen and ten, at *du|o*; the fifty-seven letters divide by the same ratio at thirty-four and twenty-three, at | *duo*.

It will be remembered that, of the four side panels of the Franks Casket, three do not contain Latin and one panel does contain Latin, of which three words are carved in Roman letters and one word in runes. Similarly, on the four-sided Ruthwell Cross one panel, the fifth on the south face, depicts two women embracing, surrounded by a four-word inscription in Latin, carved in runes:⁵⁹

left	upper	right
⚔⚔⚔⚔	⚔⚔⚔⚔⚔ ⚔⚔⚔⚔⚔	⚔⚔⚔⚔⚔
Marþa Maria mr [sc. merentes] dominnae		
‘Martha, Mary, meritorious ladies’		

Martha and Mary, sisters of Lazarus, represent the types of the active life and the contemplative life, opposite the panel depicting John the Baptist carrying the *Agnus Dei* as the type of the ascetic or eremitic life (fig 4).⁶⁰ Although writing Latin in runes is rare, we see here two four-sided artefacts that illustrate the ratio 3:1, on both of which one side bears a four-worded Latin inscription partly or wholly in runes.

The calculations involved in design and execution of these three artefacts, made in the same dialect area within about forty years of each other, though simpler than those analysed brilliantly by Robert Stevick, are nonetheless consistent with them and they expand the range of mathematical artifice. Recognition of these calculations confirms the correctness of the texts as presented, without emendations, and it rescues the designers and executors

58. Okasha 1971, 110; Howlett 1992, pl 24.

59. Howlett 1974, pl b opp 333.

60. Howlett 1992, pls 11–15.



Fig 3. The Ruthwell Cross, north face depicting Saint Paul and Antony breaking bread in the in the desert. *Image:* Wikipedia Commons, CC BY.

from every error attributed to them by modern scholars, enabling us to understand the coherent beauty and sophistication of their thought.

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Fig 4. The Ruthwell Cross, south face depicting Martha and Mary. *Image: author.*

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