

# MEDIEVAL LOGIC DIAGRAMS IN BRO CHURCH, GOTLAND, SWEDEN

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**ABSTRACT.** *This article describes the finding, documentation and significance of the set of medieval logic diagrams and associated text, all in highly abbreviated Latin minuscule, sketched on an inside wall of the Romanesque tower of the parish church in Bro, near Visby. The diagrams depict the Square of Opposition, the basic concept to be mastered in introductory logic as taught at medieval schools and universities. A date c.1200-1225 is suggested by their being executed in the earliest plaster*

*when wet (tower built c.1200), while up to 1350 is suggested by palaeography. Dating by textual content is still in progress. Either way the Bro diagrams are among the earliest logic texts written in Scandinavia, and this is the first time for such texts to be found outside a manuscript. They are also the earliest known physical evidence of a teaching session or a discourse in logic. Furthermore they contribute to a growing body of evidence of the high standard of learning that existed in medieval Gotland.*

## INTRODUCTION

This article discusses the discovery and significance of the logic diagrams sketched into the wall plaster of the Romanesque tower (built c. 1200) of the medieval parish church of Bro on Gotland, an island in the Baltic Sea off the east coast of Sweden (Fig. 1). The diagrams, written in highly abbreviated Latin minuscule, belong to a body of medieval graffiti apparently of various dates almost entirely covering the inside of the south wall at ground-floor level. Medieval diagrams are very rare and therefore important to research.

## DISCOVERY

The Bro diagrams were discovered and recorded in 1985 by the present author and Erland Lagerlöf, Gotland specialist, while documenting Gotland's mainly unknown medieval church graffiti for Sveriges Kyrkor, Riksantikvarieämbetet (the Churches of Sweden section of the Swedish National Heritage Board; on that project see Lagerlöf 1993; O'Meadhra 1997). To the best of our knowledge, the diagrams had not been observed before then. They were only partly visible and could not be readily

interpreted. At first all that could be distinguished was repetitive texts in Latin minuscule arranged in rows and boxes connected by diagonals supporting further minute text and surrounded by rows of text of similar size to that in the boxes.

In 1989 and 1994 it was decided to carefully remove the overlying whitewash from the small area that lay accessible. This work was expertly carried out by conservator Marianne Korsman, the leading restorer of church interiors on the island at that time. It was painstaking work, and after exposure the surface was consolidated by a thin coating of limewater.

Conservation work of the gallery floor and ground floor of the tower in 2001-2002 allowed for full exposure of the graffiti. This work formed part of the official restoration of the church interior (cf. Gustavsson-Belzacq 2001, 2002).

The first published mention of the diagrams (as 'minuscule inscriptions within boxes') was made by Lagerlöf in 1993, when publishing the ship graffiti on the same wall (Lagerlöf 1993, 49). Previously, only the ships and a nearby sketch of a horse had been noted by Gotland



Fig. 1. Bro Church, Gotland, south façade showing Romanesque panels of decorated blind arcading, reinserted into the Gothic exterior with its elaborate portal. The *inclusorium* lies to the left, and the south face of the Romanesque tower rises above it. (Photo author)

antiquarian P. A. Sæve (1864, 46). Only the runic inscriptions that also occur beside the diagrams were recorded by runologist O. v. Friesen (v. Friesen 1922). In 1944 these runes could not be found during runological inventory work (cf. GR 1, nos. 256a-b; but see now GR 3, nos. 256a-b).

### SURVIVAL

As is the case with most surviving medieval church graffiti, the Bro diagrams were preserved by a combination of favourable factors. They were ‘out of the way’ in the church tower. They were partly protected by layers of whitewash coating, one with an inscription date of 167(?) and one applied on either side of a thin wooden

partition wall erected in 1723. The text behind the abutting edge of this partition does not contain the second layer of whitewash. This partition effectively cut off the western end of the tower from the nave, putting it in darkness. A more recent dense layer of whitewash totally obscured all markings close to the baptismal font. When the western tower door was open the ship and horse alone were revealed. The diagrams were further protected by being concealed behind an open-backed cupboard containing fuses and switches, which was still in place when we discovered them. The church warden, who kindly assisted our research, was aware of the presence of old markings on the wall and had guarded them well.

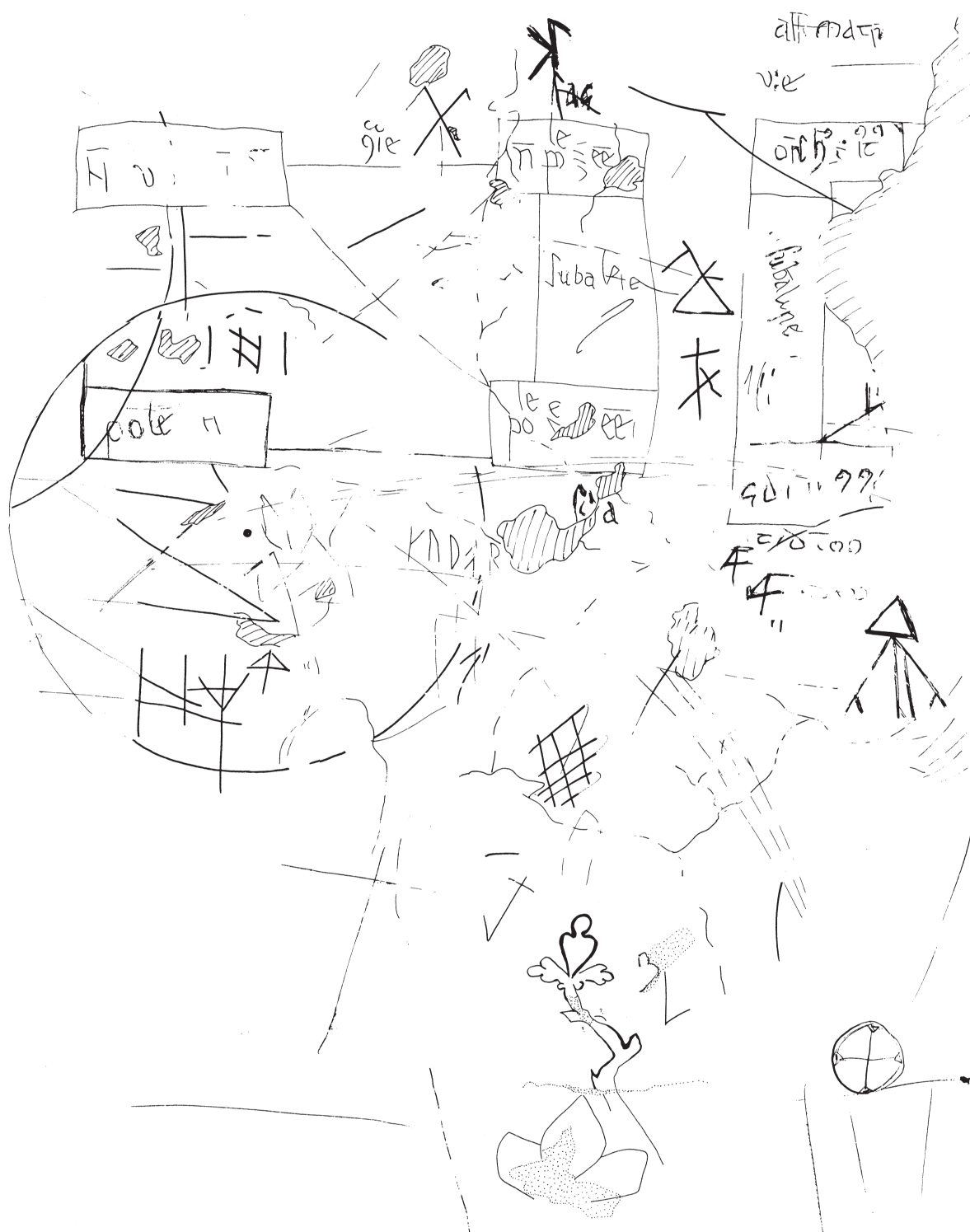


Fig 2a. Bro Church, tower interior, south wall. Preliminary record from 1985 showing the complexity of the graffiti. Scale: large circle 36 cm diam.; circle midpoint lies 1.35 m, and the left diagram (Bro 2) lies 1.39 – 1.66 m, above the present floor level. (Drawing author)





Fig 2b Bro Church tower. General view of the drawings and poor condition of the south wall. (Photo author).

## PRESENT CONDITION

The diagrams are now fully exposed for observation. The wooden upright that held the dividing partition was originally mounted tight against the wall, abutting the diagrams. Now, the supporting upright has been relocated 20 cm from the wall and fitted with a movable flap, giving clear access to the diagrams at that point while still supporting the wall. The surface of the wall over the diagrams has been 'sealed' with a thin coating of diluted lime-wash (limewater).

## DOCUMENTATION

### *Examination of the wall*

Reading and documenting medieval wall sketches demands careful examination and plenty of time. The plaster at Bro contained irregularities and varying layers of

whitewash, which initially made the full extent of the incisions difficult to detect. All marks had to be carefully examined to distinguish surface scratches and structural cracks from incisions.

The overlying whitewash was very delicately removed in critical areas. The technique used was that which is standard for wall painting conservation, i.e. to tap the whitewash close to its broken edge with a fine tool so that minute fragments detached cleanly from the underlying cut marks. Tiny sections of overlay were intentionally left *in situ* for future analysis and to facilitate control checking of the number of layers involved. This is vital evidence for assessing the chronological sequence of the incisions. Rising damp in the wall has caused the original plaster to flake off in places. All observed incisions and marks were examined using 4X magnification in raking light, the angle of which was constantly varied.



### Reading

Extensive areas of surface damage limited full and correct reading. The edges of all repaired surfaces were checked for any traces of surviving text in what remained of the original plaster. In this way, the full extent of the diagrams has been established with relative certainty.

Minuscule Latin lettering is particularly difficult to decipher when lightly incised into wall plaster because of the sequences of repetitive vertical strokes of the minims. This is even more difficult when dealing with marks that are only partly preserved.

The wall was consistently re-examined to ensure correct readings. In some cases new control visits to the church were necessary before the reading became fully comprehensible.

### Recording

All marks were recorded by tracing them at a scale of 1:1 onto totally transparent plastic film; builders' protective plastic sheeting proved best for large areas in excess of 2 x 2 metres. Insoluble ink markers were used, adjusting the thickness of the pen to the thickness of the original cut for a realistic record. Where grooves crossed, the relative order of cutting was documented. Every man-made mark was carefully noted, and colour-coded according to clarity and motif.

The whole wall, separate fields and details were extensively recorded by black and white and colour photography.

The possibility of taking casts as a permanent record of the diagrams for research was considered, but had to be ruled out because of the unstable condition of the surface, which could be thereby damaged. Documentation by laser scanning is now under consideration.

### Deciphering the inscriptions

This was to the best of our knowledge the first time any text of this format and with so many abbreviations had been discovered in a church. In medieval Latin the same abbreviations can have different explanations, depending on the subject (Spade 2007; Capelli 1929; Pluto Abbrevs; Piltz 1977, appendix). The first theory tested was that this was something liturgical because of its occurrence in a church setting. A number of churches on Gotland have wall plaster graffiti of invocations and extracts from prayers though these are of a different sort (documented in GR 1-3, discussed in Gustavson 1991;

1994). The correct meaning of the diagrams became clear when palaeographical research revealed a similarity with the abbreviated wording in the diagrams in logic manuscripts.

### TRANSCRIPTION

The Bro inscriptions divide into 7 entities (labelled Bro 1-7) of which only 1-3 are the subject of this paper.

#### Bro 1 (Fig. 3)

This diagram is missing its central part where the wall has a large surface repair. No traces of the original plaster could be found under the repair. The final letter of the upper right corner of the diagram does remain but is indistinct. The diagram is cut into wet plaster, by an identical hand to Bro 2 and 3.

<i>omnis homo est iustus</i>	.....( <i>iust</i> )us
<i>quidam homo est iustus</i>	.....

Together with *subalternae*, *affirmate universale*, and *particulare affirmate*

A short hooked line (similar to a textual truncation symbol) lies at a short distance above Bro 1 and 2 as if thematically linking the two square diagrams.

#### Bro 2 (Fig. 4)

This diagram survives in full, though the words surrounding its perimeter are unclear. Two large hooked lines, here clearly meant as independent truncation symbols, occur in the empty spaces of the diagram below the word '*contrarie*': one central and one in the right lateral field below the word '*subalterne*'. This might indicate that additional text has been omitted in these two places – text that was a standard occurrence here and thus familiar and not necessary to include. Cut into wet plaster. Identical hand to Bro 1 and 3.

<i>non possibile est non esse</i>	<i>possibile est esse</i>
<i>non possibile est esse</i>	<i>possibile est (non) esse</i>

Together with *contradictorie*, *contrarie*, *subcontrarie* and *subalterne*.

#### Bro 3 (Fig. 5)

Bro 3 contains three neat rows of text, aligned on a vertical guideline on the left, which is overlain by the first

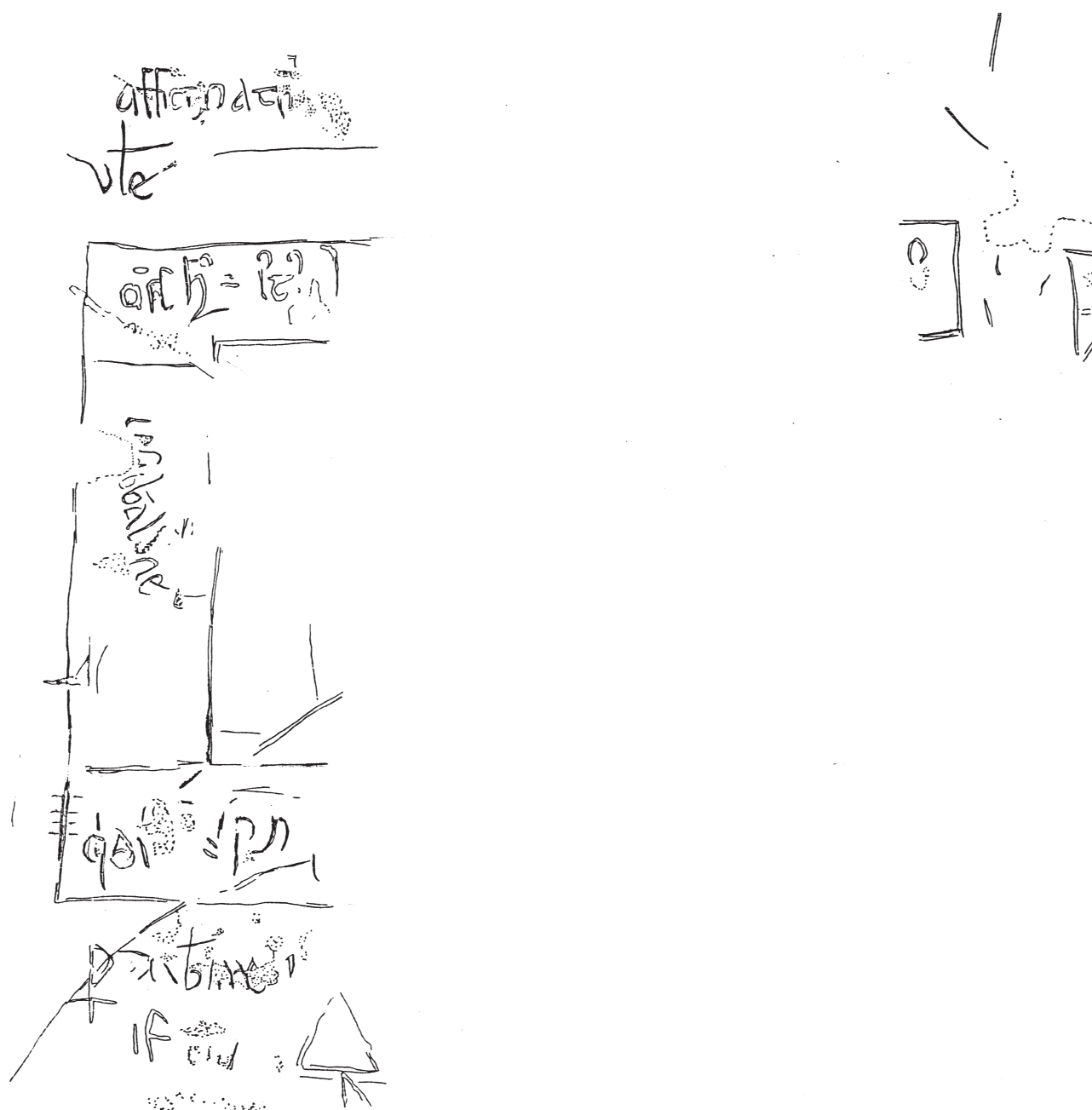


Fig. 3a. Bro 1, traditional square diagram; transcription. Scale: overall size of framework 31x41 cm. (Drawing author)



Fig. 3b. Bro 1, detail of upper left field, showing condition and cutting technique. (Photo author)

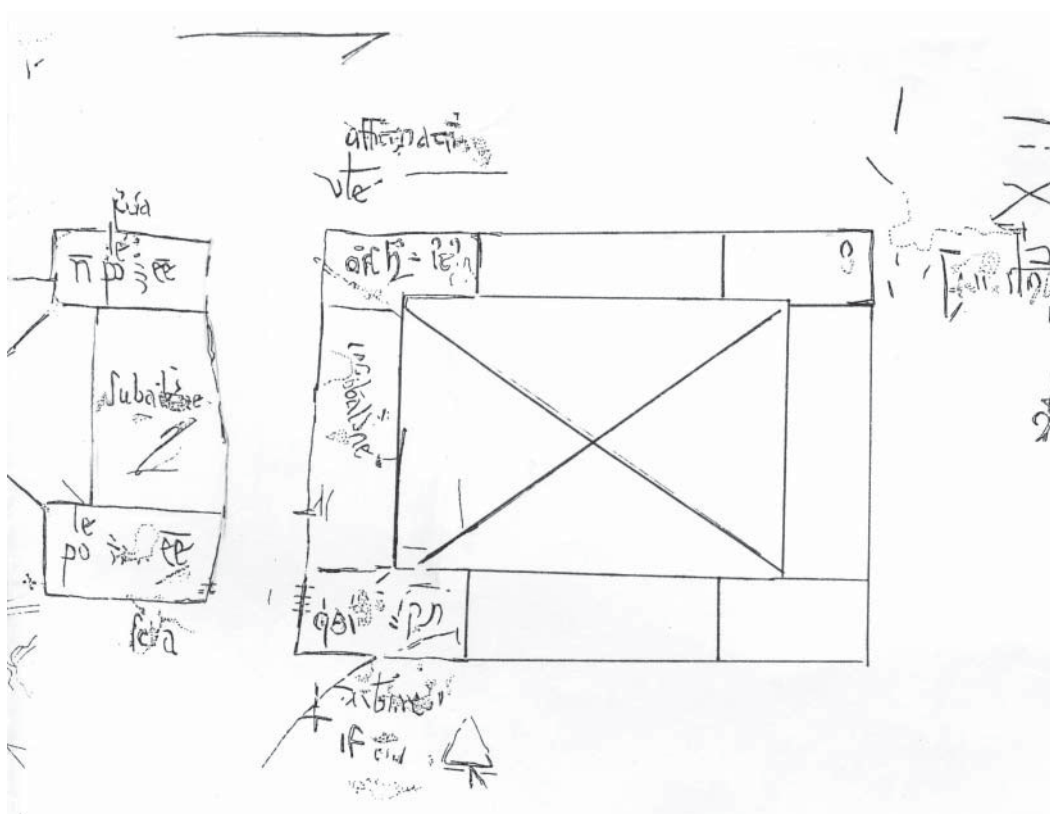


Fig. 3c. Bro 1, reconstructed relative to Bro 2, with Bro 3 starting on right. (Drawing author)





Fig. 3d. Bro 1 relative to Bro 2. (Photo author)

letter, the contraction '9' for 'con'. Cut into wet plaster; identical hand to Bro 1 and 2.

<i>contingens</i>	<i>material</i>	<i>iustus</i>
<i>naturalis</i>		<i>animal</i>
<i>remota</i>		<i>sinus</i>

*Bro 4 (not illustrated)*

One of its letters cuts into the vertical guideline that is associated with Bro 3 and thus is written later than it. Furthermore Bro 4 is cut into dry plaster. It is partly overwritten ('corrected') by a later hand in cursive script. Some parts are by an identical hand to Bro 2.

Bro 4 is treated elsewhere but seems to be examples and commentary text.

*Bro 5-6 (not illustrated)*

Three rows of text to the left of Bro 2 are in the same script as Bro 1-4. Slight differences could be evidence of a different hand but this could be due to surface differences. They lie within horizontal guidelines. Bro 5-6 are treated elsewhere.

*Bro 7 (not illustrated)*

A cosmological diagram of the four elements and their properties, apparently by the same hand as Bro 1-3. Bro 7 is treated elsewhere (O'Meadhra in press).

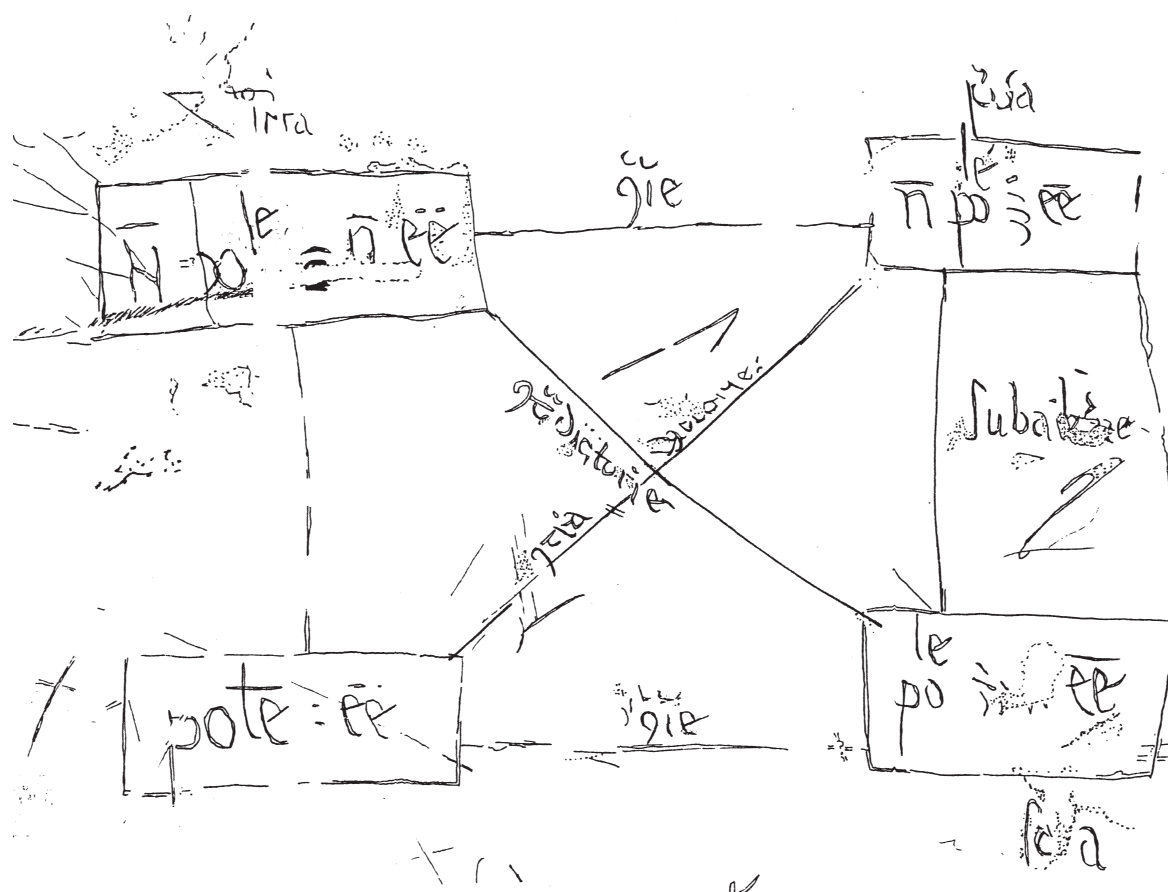


Fig 4a. Bro 2, modal square diagram, transcription. Scale: overall size of framework 26x44 cm. (Drawing author)

## DATE OF EXECUTION

### *Dating criteria*

The dating of the Bro diagrams is still a work in progress. The assessment given here (13th century? outer limits: late 12th – mid 14th century) is based on location, plaster and whitewash stratigraphy, palaeography, textual content, graphic form and other stylistic features.

### *Date by location*

The tower is in Romanesque style and is considered on art-historical grounds to have been constructed at the end of the 12th century, slightly post-dating the Romanesque nave and apsidal chancel, the facade reliefs of which still survive, remounted in the Gothic church exterior of c.1300. The sandstone baptismal font located in the opening of the tower arch is also Romanesque in style, and ascribed to the master carver Sigraf (cf. Lundmark 1929,

256; Roosval 1945; Lagerlöf 1975, 42, 321; Lagerlöf & Svahnström 1991, 101, 103, 168; Svensson 1993, 62-63).

The art historical date for the tower fits the date of 1196 recorded by the 17th century Gotland chronicler Strelow for the consecration of Bro Church. (The relative reliability of Strelow's information has been demonstrated in Kyhlberg 1991, 145-174, 246-248.) This is further supported by the dendrochronological dating of the original wooden floor of the tower which was uncovered in 2002 in situ directly under the present floor. A date of winter 1214-15 was obtained for the felling of its timbers (Lund University, National Laboratory for Wood-Anatomy and Dendrochronology, CATRAS samples 12665-12667 (Widerström 2001; Borgö 2002 and in press, n. 10).

The floor was neatly laid, made from axed planks which were dowelled together and nailed to joists set on the soil and packed around with earth. The fill included a





Fig 4b. Bro 2, the four boxes of the diagram occur at each corner of the photo. Note poor surface condition and cutting technique. (Photo author)

fragment of wood decorated in Viking style. The floor had a tar stain at the SW corner indicating it was still in use when this part of the tower served as a storeroom perhaps from the 18th century? (cf. Borgö 2002).

The Romanesque tower has remained structurally unchanged internally. However the Romanesque apse was removed and the chancel totally enlarged and equipped with a doorway in early Gothic style and a sacristy. This work is attributed to master mason Lafrans and considered to coincide with a recorded consecration date of 1236 for Bro Church (Lundmark 1929, 256; Lagerlöf & Svahnström 1991, 103; Svensson 1993, 63). The nave was subsequently widened first on the north side and then on the south with its nave doorway in full Gothic style.

This rebuilding phase is style-historically dated to c. 1300-1325 and attributed to an influential master architect, termed 'Neoiconicus', considered originally attached to the Linköping cathedral workshop and responsible

for a number of churches on Gotland (Lagerlöf 1995, 46, 206-8, 213). The original wooden floor of the nave from this building phase was discovered intact in 2002 directly beneath the present floorboards. Dendrochronology has provided a date of 1302-1303 for the felling of its timbers (Lund University, National Laboratory for Wood-Anatomy and Dendrochronology, CATRAS samples 12650-12664; Widerström 2001; Borgö 2002 and in press, n. 8). This Gothic phase did not structurally affect the tower interior where the diagrams occur. However an external praying cell (*inclusorium*; discussed further below) was added on the outside of the southern wall of the tower at this time (cf. Fig. 1).

There are many questions that one would like answered regarding the relationship of the tower sketches to the different Romanesque and Gothic alteration phases. We don't know if the church building continued in use while alterations were in progress. Each period





Fig 4c. Bro 2, detail of central section showing condition and cutting technique. (Photo author)

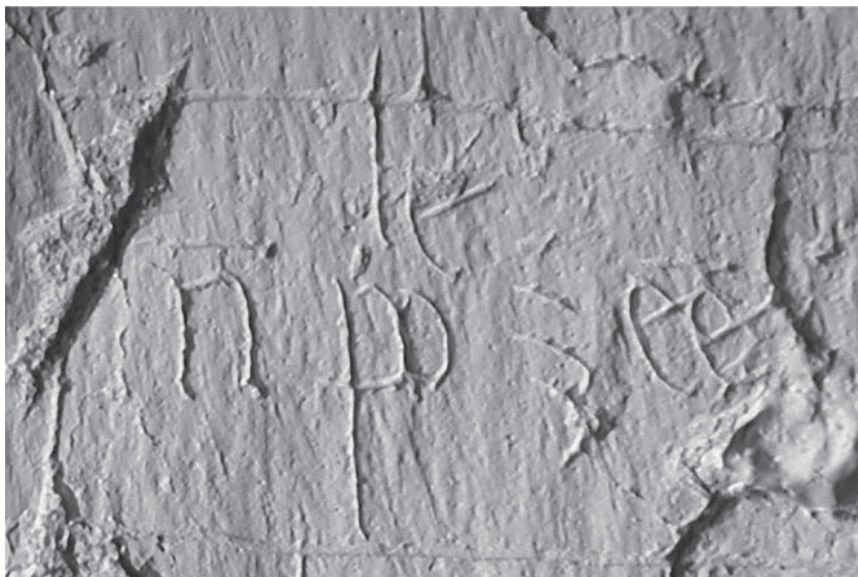


Fig 4d. Bro 2, detail of technique. (Photo author)

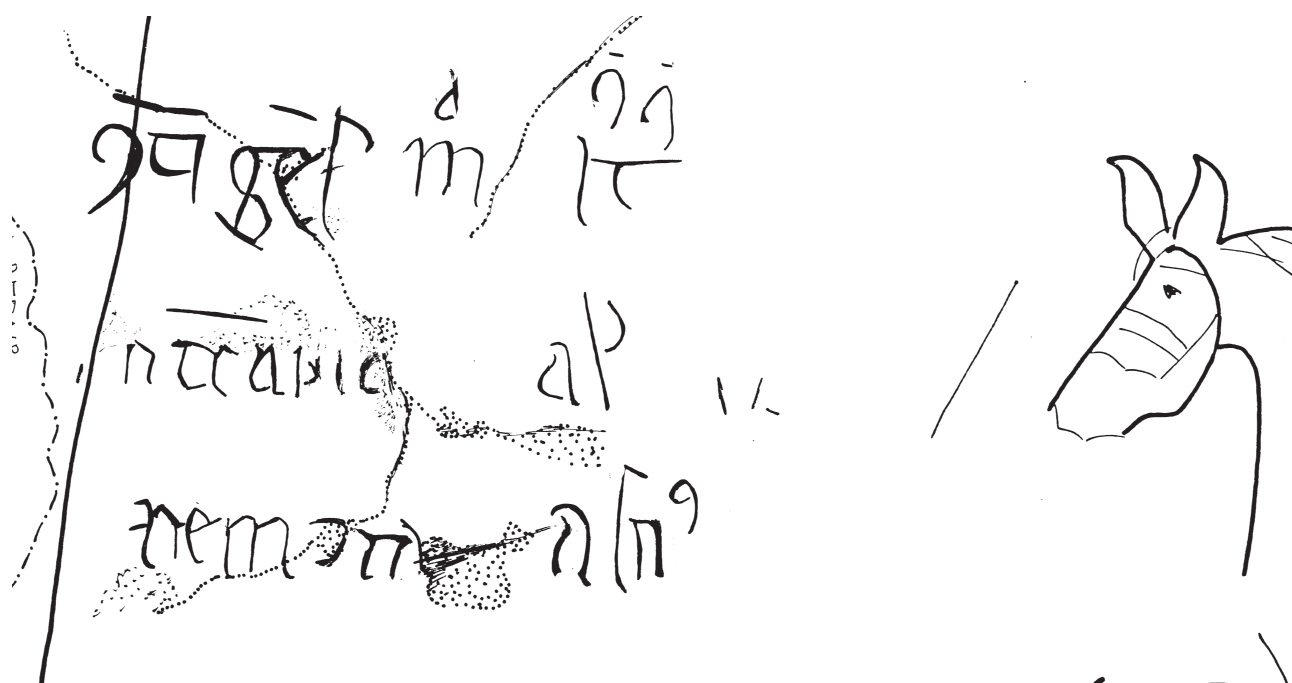


Fig. 5a. Bro 3, on the material of statements. Transcription. Note the horse drawn elegantly on the right seems not to belong, despite the reference to an 'ass' in the third row of text. Scale: overall size of 'diagram' 13x18 cm (Drawing author)



Fig. 5b. Bro 3, details of condition and cutting technique. (Photo author)





Fig 5c. Bro 3, detail of technique. (Photo author)

when the church was being rebuilt might have provided an ideal opportunity for using the wall for sketching on, if the tower was left accessible and empty. Equally, however, the tower might have been closed off at these times and used as the builders' workshop. That church towers often served as builder's workshops in the Gothic period throughout Europe and on Gotland is shown by the occurrence of their constructional drawings in the plaster of their walls or floors (Lagerlöf 1978 with refs.).

#### *Date by wall-plaster and whitewash stratigraphy*

The different layers of wash and plaster on the wall are hard to separate, as they are very thin (c.1 mm).

The stonework of the wall was first covered by a fine grained pink-beige mortar. This was followed by a smooth pink layer of fine plaster that has soaked into the mortar. Over this there is a thicker creamy layer of a beige-yellow tone applied with fine vertical brush strokes. In some places this layer lies directly over the mortar suggesting it could be the first layer of plaster on the wall. It has the same physical characteristics (colour and consistency) as that which is usually considered the original medieval plaster in other Gotlandic churches. Further technical analysis is needed to critically assess this situation.

This is the layer into which the inscriptions were cut. Some of the lettering, especially the text of the modal diagram, Bro 2, has been written while the coating was soft, achieving deep and smoothly edged cuts. Since the diagrams were cut into this layer when it was still wet, this could date them to the constructional phase of the tower in c.1200. Alternatively, this may have been an additional coating applied for the sake of drawing the

diagrams as one applies a fresh coat of wax to a writing tablet.

A thin coating of creamy whitewash covered the inscriptions. This layer also retains the marks of brush strokes but of a different sort, being horizontal and widely spaced.

This layer was itself covered by a coating of whitewash that contained the inscribed date '167(?)'. That date, placed centrally on the upper part of the wall and accompanied by a personal name, has all the characteristics of a record of some repair or renovation work in the tower. According to an inscription in the nave, the church interior was repainted in 1686 (Lundmark 1929)

Repairs to the broken plaster behind the partition and a coating of whitewash that completely obscured all inscriptions in front of the partition are of recent date.

#### *Date by Motif Stratigraphy*

Fine parallel lines or scratch marks that do not form any motifs, underlie the logic inscriptions. These seem to belong to the building phase though the possibility that they indicate the wall lay exposed before the diagrams were drawn cannot be ruled out as yet.

The Bro wall also contains an equally rare example of a diagram of the four elements, (Bro 7). Other, more decorative, motifs that are placed as if drawn after the diagrams, include 14/15th century foliage that seems to be an artist's preparatory drawing, two stylized single-masted ships, one identified as a 14th-16th century car-rack (Lagerlöf 1993, 49), an elegant prancing horse with crudely drawn hindquarters that seem to be a later addition, a single runic '*futhork*' inscription identified as 'probably late medieval, 15th /16th century' (Snaedal in



GR: 3 no. 256), a cross-inscribed circle not unlike a miniature of one of the concentration crosses in the church, a lightly sketched animal head, as well as a large damaged area of boxed lines at the base of the wall.

All motifs fall stylistically within the date bracket 1200-1600. The element diagram (Bro 7) that seems to be incised together with the logic diagrams, has good parallels in 12th - 14th century manuscripts (O'Meadhra in press).

The inscriptions do not overlap with one another and so have no internal stratigraphy. However, of the other sketches on the wall, a large arc that surrounds and may belong to the diagram of the four elements overlies the logic diagrams and is itself overlain by a compass-drawn circle. This circle is in turn 'overlain' by the runic *futhark* inscription which seems to be spaced so as to avoid it. Some later, even recent, owners' marks overlie the diagrams without regard for them.

The full significance of these motifs and their relationship to the logical texts is not yet fully understood. Their placement around the diagrams and text indicates that they were added afterwards, though how much later is not indicated by stratigraphy alone.

#### *Date by Palaeography, Abbreviations and Orthography*

The text is written in late Carolingian/early Gothic minuscule. Majuscule was the norm for Latin inscriptions on seals, grave slabs, sculpture and mural paintings until the 15th century (Staecker 1999; Carelli 2001, 258-366; Ström 2002, 98-105, 208). In Gotlandic church art Latin minuscule does not appear until the 17th century. However in scholastic works minuscule is known in parchment documents in Scandinavia and Gotland from the 12th century. The earliest surviving manuscript written on Gotland using Latin minuscule but in Gutnish is a mid 14th century transcript of the 13th century *Guta lag* and *Guta saga* (KB Bibl. Reg. Holm. B 64; for the manuscript date, see Wessén 1945, xi, xxvi; Peel 1999; for the dating of the textual content see Kyhlberg 1991, 234; Peel 1999, xlix-lxiii). Over 100 fragments of late 12th-15th century Latin manuscripts salvaged from Reformation-period bindings on Gotland were recorded by the 1930s. These include the mutilated 15th century Bäl Missal, possibly the only one written there as it includes Danish saints (Schmid 1933, 19). Imported manuscripts were of course in use on the island prior to this and would have been

available to influence writers. One of the earliest of these to survive is a double folio from a mutilated 12th century English missal recycled as a binding in Grötlingbo Church (Gotlands Fornsal C5900. Schmid 1933, 15 no. 112 fig 1; Stolt 2001, figs. 156-158) (Fig. 11).

The Bro script compares well with that from surviving manuscript fragments of the 13th to mid-14th century (Abukhanfusa et al. eds 1993, figs 134-139). A preference for the late 13th century has been provisionally suggested on account of some letter forms (pers. comm. Per Axel Wiktorsson, palaeographer and specialist in early medieval Swedish texts who has kindly assisted my reading of the Bro inscriptions). Since only a limited amount of the Latin minuscule that was actually written on Gotland survives from this period, we might need to be cautious about too precise a palaeographical dating as yet (Schmid 1933, 15). There is also always a possibility of scribal conservatism. Though Scholastic Latin was an international language, it will be interesting if future palaeographical research can narrow the date and identify diagnostic traits to indicate whether this is a local hand or that of an international visitor to the church, as referred to below.

All letters are neatly and competently executed by a skilful hand well-accustomed to wielding a stylus in wax or quill on parchment. The tool used produces v-shaped grooves and some undercutting, suggesting a sharp flattened point, rather than a knife blade. There are minor variations in the handcrafting that while they may be due to the presence of more than one person's work, are more likely the result of the same hand writing at different angles and speeds, or could be due to differences in the consistency of wet and dry plaster at the time of execution, or to distortions caused by an uneven surface. This requires further research.

The handwriting is so similar to that of the diagram of the four elements and their properties that both must have been executed either by the same hand or by a person with the same schooling (O'Meadhra in press).

The abbreviations belong well within the tradition of 13th-15th century Scholastic Latin (Pluto Abbrevs; Capelli 1929). These abbreviations do not occur in the mid-15th century logic texts written in Uppsala (Plitz 1977, appendix). Further analysis here might narrow down the date range further. For example, there is a consistent use of the contraction '*pole*' for '*possibile*' (possible), which is found in manuscript diagrams of the beginning of this

date range such as William of Sherwood, c.1240 and Roger Anglicus, c.1300 (specified below).

### *Date and Cultural Context by Content, Text Formula and Diagram Shape*

The diagrams and accompanying text correspond to the central introductory section in the standard medieval textbooks on logic. Only three major diagrams occur in these logic manuscripts, and the first two are what we find here at Bro, what is known as the ‘Square of Opposition’, traditional (Bro 1) and modal (Bro 2).

The Square of Opposition is a chart of Aristotle’s doctrine on the interrelationships of the four forms of propositions in logical statements. Medieval logic was based on translations and comments on the theories of Aristotle (384-322 BC) (SEP; Marenbon ed. 2007; Gabbey & Woods eds. 2008): Though the idea of a square is presented in Aristotle’s five treatises on logic, primarily *Peri hermeneias*, known collectively as the *Organon* (‘The Tool’, reflecting Aristotle’s view that logic was the tool that served all science). It is a matter of much debate whether he drew a square diagram himself as no original texts by Aristotle survive; all we have are later transcriptions of accounts of his lessons, some of which describe what must be a diagram (cf. Seuren 2007; Spade 2007; King & Shapiro 1995; Parsons 2012; Thomsen Thörnqvist 2008a, 145, 165).

The four categorical statements of *universal affirmative*, *universal negative*, *particular affirmative* and *particular negative*, are depicted as four corners of a square interlinked by crossing diagonals, horizontal and vertical lines that indicate relationship (opposition), where ‘*Contradictions*’ are propositions that cannot both be true and cannot both be false. *Contraries* cannot both be true but can both be false. A proposition is *subaltern* to another if it is implied by it, but does not imply it. *Subcontraries* can both be true, but cannot both be false (Blackburn 1994, 362). In post-medieval texts the four propositions are marked in diagrams by the letters AEIO, a didactic device based on a mnemonic formula that was developed c1200 (de Rijk 1972, xciii n. 4). AEIO does not occur at Bro and I cannot trace its use in diagrams before 1500 (Fig. 6).

The earliest examples of the square diagram that survive occur in French manuscripts are dated by palaeography and style of decoration to the early 9th century AD (O’Meadhra 2011). The earliest surviving diagrams

of Boethius’ *De Syllogismo Categorico* date to the 10th century (Thomsen Thörnqvist 2008a, xli).

### SQUARE DIAGRAMS IN LATIN MANUSCRIPT TRADITION

Until the mid 12th century medieval textbooks in logic were mere transcriptions of the Latin translations and the versions of diagrams considered to have been created or copied by Apuleius (2nd century AD) and Boethius (c. 475-526) from the Greek manuscripts of Aristotle’s works which they translated into Latin and upon which they wrote commentaries (Seuren 2007; Parsons 2012; Londey & Johanson 1987, 108-112; Marebon 2010, section 2; Lee 1984, 69). Thomsen Thörnqvist (2008a, xxxi n. 79) argues that marginal sketches (scholia) were not available in these manuscripts so Boethius hardly copied one for his diagram.

The later western illustrations of the square diagram, the earliest of which known come from the 9th century (cf. below) divide basically into two traditions according to wording and shape: the simple ones of Apuleius or the more elaborate ones of Boethius. The shape of the diagrams in these copied logic texts owe much to the manuscript-decoration tradition inherited by the scriptoria in which they were transcribed. Some slavishly copy the diagrams in the exemplar with evidence of not understanding them, others have mistakes that were noticed and corrected by the transcriber, others, again, seem to be creative products. There are three basic shapes whereby the corner text in the diagram is arranged as tight rows, or boxed or encircled (cf. O’Meadhra in press). The 12th and 13th centuries was a period of development in logic and special handbooks specifically for the purpose of teaching logic (de Rijk 1999, 9) began to develop as new translations from the Greek became available and the so-called Old and New Logic took their place in the curriculum (cf. e.g. Marebon ed. 2007).

#### *Bro 1*

This is a depiction of the traditional square diagram. It is most unfortunate that the lower right corner is missing as this corner was the subject of debate and its wording could assist in dating the Bro diagram and identifying its cultural affiliations. Though the word order differs slightly, Bro follows the typical pre-13th century diagram-use of the example ‘just’ (*iustus*), a use that stems from

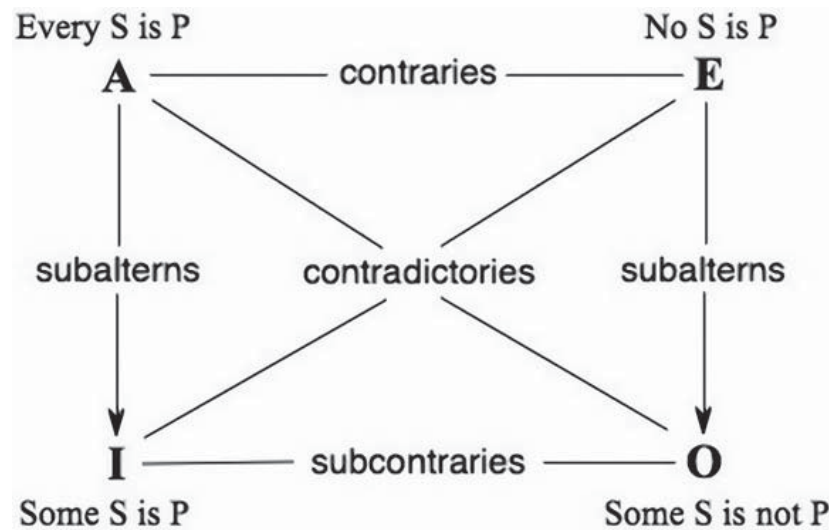


Fig. 6. The standard diagram of the traditional square of opposition where the four forms AEIO represent, in order, Universal Affirmative, Universal Negative, Particular Affirmative, Particular Negative. S=subject, P=predicate. 'Every *S* is *P*' and 'Some *S* is not *P*' are contradictories, 'No *S* is *P*' and 'Some *S* is *P*' are contradictories, 'Every *S* is *P*' and 'No *S* is *P*' are contraries, 'Some *S* is *P*' and 'Some *S* is not *P*' are subcontraries, 'Some *S* is *P*' is a subaltern of 'Every *S* is *P*', 'Some *S* is not *P*' is a subaltern of 'No *S* is *P*'. (After Parsons 2010).

Boethius. Bro uses the word order: '*est iustus*', whereas the Boethian texts state '*iustus est*' (Fig. 7). This is a grammatical change that also appears in the texts but not diagrams of Abelard (1079-1142) Albertus Magnus (1200-1280) and Aquinas (c1225-1274).

*Boethius (including late copies): De interpretatione* ch 7:lines 86-87 (Minio-Paluello 1965; Thörnqvist 2008a).

*omnis homo iustus est*      *nullus homo iustus est*  
*quidam homo iustus non est*      *quidam homo iustus est*

Boethius was 'newly discovered' in the 12th century to then drop out of direct use. However his *Syllogismo Categorico* remained influential to the English philosophers such as Ockham (c.1285-1347) and Burleigh (1275-1337) (Thomsen Thörnqvist 2008a, xli).

The most popular logic textbook in the 12th century was the *Dialectica* written before 1125 by Paris-based Abalard and his important *Logica ingredientibus* (Logic for Beginners) completed before 1121 (King, 2010). Abalard uses examples based on '*homo*' as in '*omnis homo est homo*' (all men are human) (cf. also Marabon 1997).

In William of Sherwood's logical treatise (c.1240) on Boethius' Categories, of which only one copy survives (Ms BnF latin 16617, fol. 2r, diagram closing chapter 1)

we find the example '*currit*' (runs/is running). It is now considered that Sherwood worked only at Oxford (de Libera 1982, 178 n23), not Paris as de Rijk (1972) previously argued.

*Omnis homo currit*      *Nullus homo currit*  
*Quidam homo currit*      *Quidam homo non currit*

every man is running      no man is running  
some man is running      some man is not running

(Grabman 1937, 36 transl. Kretzmann 1966, 44 lines 21-27, 45 (for a revised edition, see Lohr et al. eds. 1983).

The most common handbook of logic in the late 13th -15th centuries was the *Tractatus* of Peter of Spain (composed 1230/1245) who was based in Montpellier and Paris (de Rijk 1972). Over 300 manuscripts of Peter of Spain's *Tractatus* are in existence and since deviations in the order of chapters can occur, (de Rijk 1972, c-ci; Meirinhos 2011) it is possible that deviations in diagrams also occur. The examples in the body of the text use both '*animal*' (animal) and '*currit*' (runs) The only use of '*justus*' occurs in a different context. In his examples in the body of the text preceding the diagram Peter of Spain uses (de Rijk 1972, 6): *omnis homo currit, quidam homo currit, nullus homo currit, quidam homo non currit* (every man



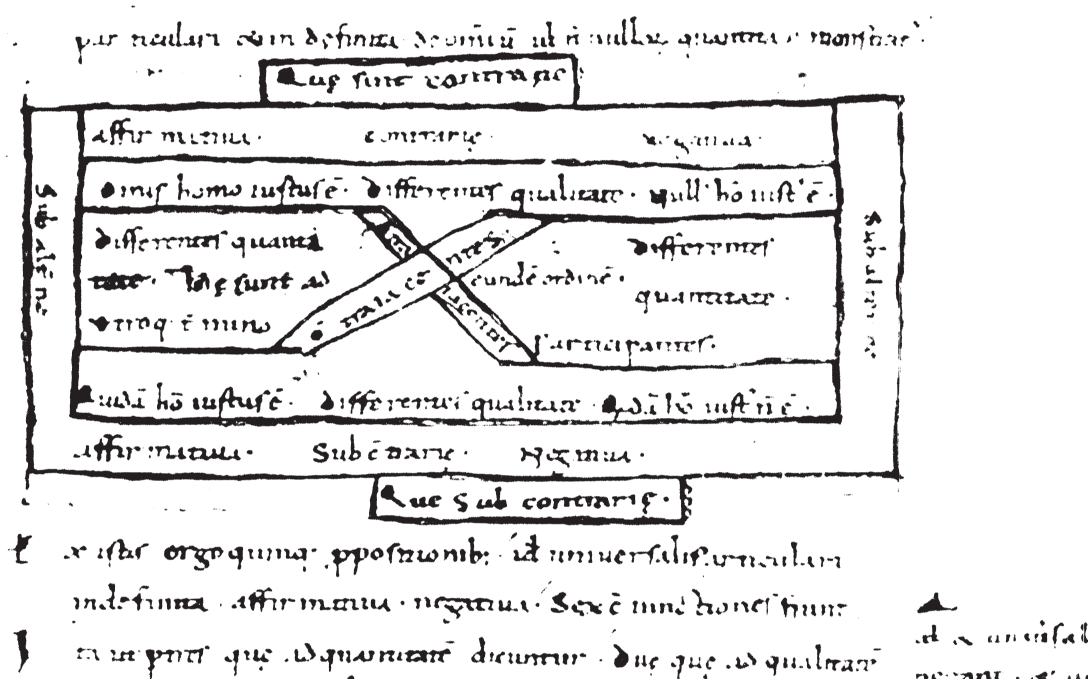


Fig 7. Traditional square diagram as drawn in an 11th century copy of Boethius, *Liber Divisionum*. Leiden University Library, Ms B.P.L. 84, f.1r. (<http://www.leidenuniv.nl/en/researcharchive/index.php3-c=487.htm>)

is running, some man is running, no man is running, some man [men] is not running).

In the diagram in Peter of Spain *Tractatus I*: 12 on *de positione categorica* in the Avenionsis 311, fol. 3r which is conventionally dated to the beginning of the 14th century we find:

*omnis homo est animal, nullus homo est animal,*  
*quidam homo est animal, quidam homo non est animal,*

(Some man is (an) animal, some man is not (an) animal, no man is (an) animal, every man is [all men are] (an) animal.)

Later logicians also tend to use '*currit*', as for example Boethius de Dacia (*Sophisma* 78, composed c.1270s) and Buridan (*Summulae de Dialectica*, 1.4.2, composed 1330-40). Buridan follows Peter of Spain's wording exactly. The two latter authors were used in teaching at Uppsala in the mid 15th century (Piltz 1977).

In conclusion, unlike other 13th -14th century diagrams that we have checked, Bro uses the example of *iustus* as in *homo est iustus* (man is just). This is in the

manner of pre-13th century texts and their diagrams. The example most commonly found in the mid-late 13th century onwards is *animal*. This occurs in the diagrams and texts of Aquinas, Albertus Magnus, and Peter of Spain, which were the most cited and copied works at this time. However, the *iustus* form does occur in the other sections of Boethius Categories, if not in actual Square diagrams (cf. Thomsen Thörnquist 2008a, b). There is one mid-late 13th century case of *iustus* in combination with *currit*. This occurs in William of Sherwood chapter 1 (Ms BnF Latin 16617, fol. 2r).

## Bro 2

The first word at Bro is abbreviated to a majuscule '*N*', which does not occur in any manuscript diagram examined so far. This emphasis on the first abbreviated word as different from the rest, could mean that the word '*necesse*' is intended, but from the rest of the wording in the formula, it is clear that '*non*' is intended.

Abelard's *Dialectica* in the body of the text runs: *Necesse est esse, non possibile est non esse, poss est esse, poss est non esse.*

William of Sherwood, Commentary on Boethius' Cat-

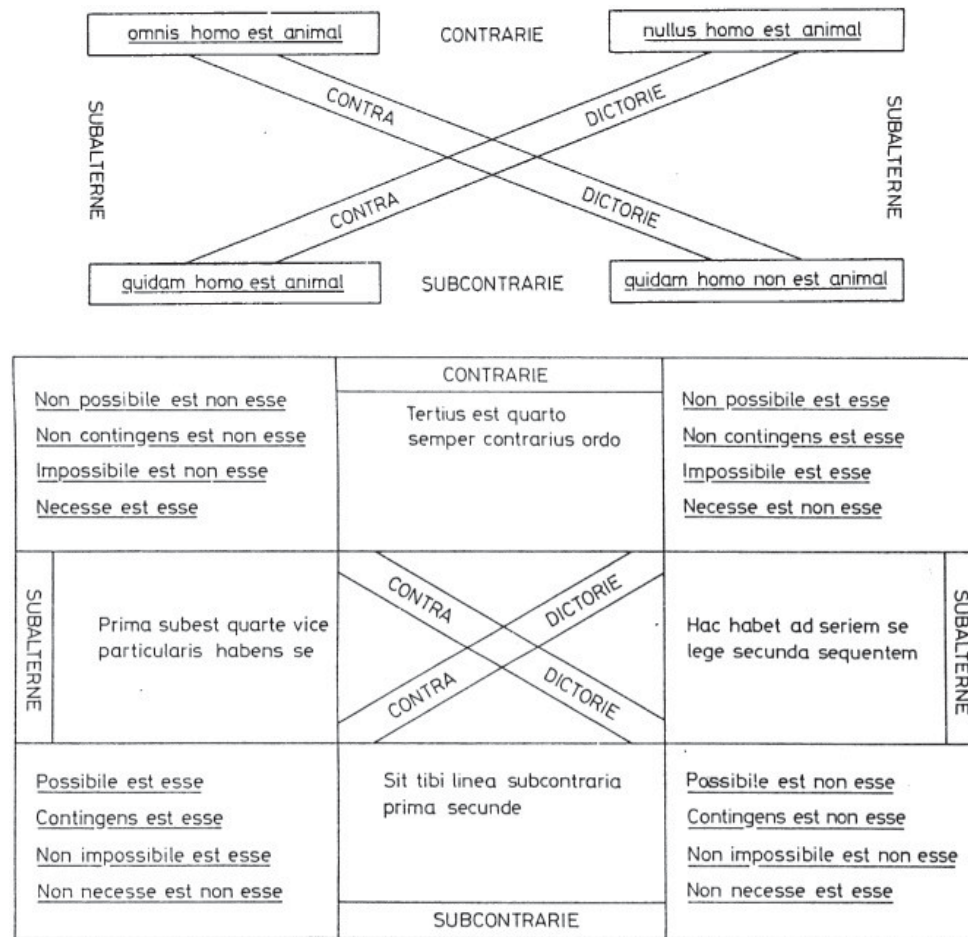


Fig. 8a,b. Official published rendering of the traditional and modal square diagrams in Peter of Spain's *Tractatus* from Ms Avenionsis fols 3r, 5r; written c.1300. (After de Rijk 1972)

egories (Paris, BnF Latin 16617, fol 5v.). His top left field of the modal diagram contains these listed one after another, which when contractions are extended gives: *non possibile est non esse*, *non contingens est non esse*, *impossibile est non esse*, *necesse est esse*; (not impossible is not to be, not possible is not to be, not contingent is not to be, necessary is to be (Kretzmann 1966).

Peter of Spain *Tractatus* I:25. (Avenionsis fol 5r) early 14th century: De Rijk does not remark on any deviations in the wording of the diagram in his other manuscript sources.

*non possibile est non esse*  
*possibile est esse*

*non possibile est esse*  
*possibile est non esse*

Robertus Anglicus, Commentary on Peter of Spain (c.1300) (Remnant Trust manuscripts, catalogue no. 0894, Ms 26, fol.14r) : This diagram presents only one line of text per box and is thereby compares well visually with that at Bro though differs in wording.

*necesse est esse*  
*possibile est esse,*

*impossibile est esse,*  
*possibile est non esse,*

The main body of text states: *possibile est esse*, *possibile est non esse*, *impossibile est esse*, *necesse est esse* (it is necessary, it is impossible, it is possible, it is not possible) and makes use of the contraction *pole* for *possible*, which occurs also in Sherwood (Fig. 9).

Modal diagrams became very popular after the mid

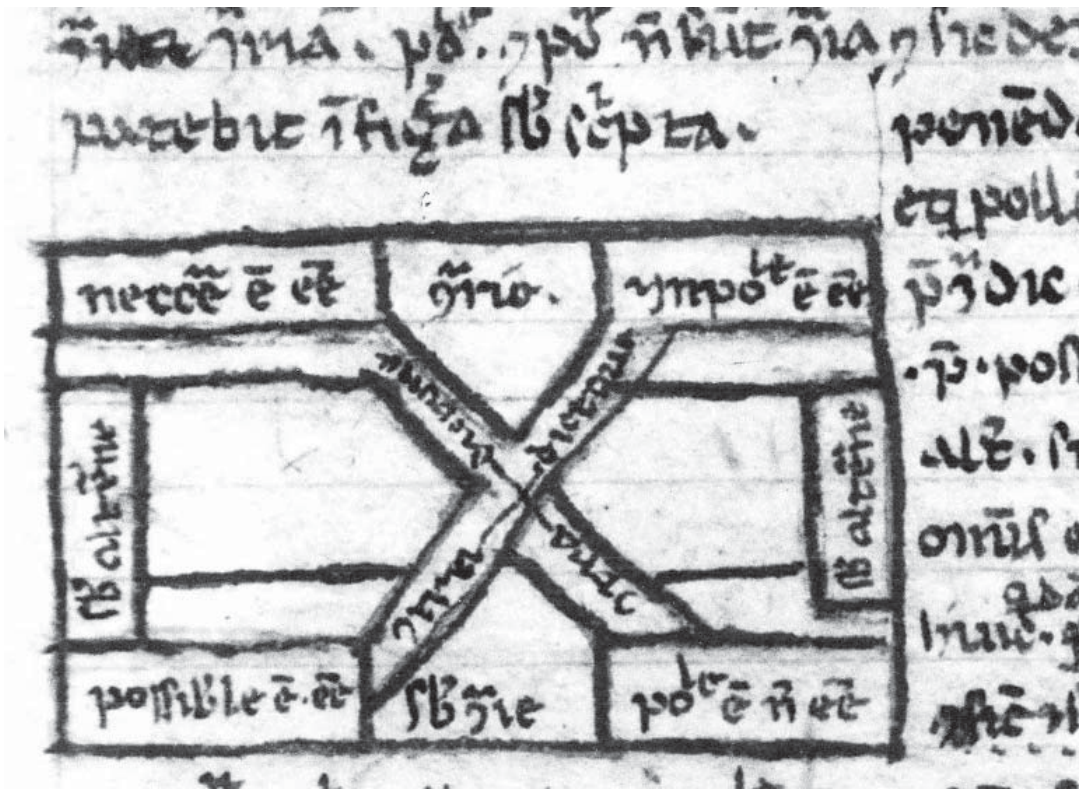


Fig. 9. Diagram of the modal Square from Robertus Anglicus, Commentary on the *Summulae logicales* of Peter of Spain, (drawn Italy, c. 1300). ). Remnant Trust no. 0894, Ms 26, fol. 14r. Photo courtesy of the Remnant Trust Library.

12th century and (Parsons 2012; Lagerlund 2010, 10–11). Bro is correctly formulated (Lagerlund pers comm 2007), but diverges slightly from the known surviving manuscript diagrams in that it does not also contain the examples ‘contingens’, ‘impossibile’ or ‘necesse’ in the one diagram, as occurs in Abelard, Sherwood, Peter of Spain and Aquinas. This means that Bro might follow a different manuscript diagram tradition of only citing the uppermost row or used a ‘shorthand’ version. The Bro diagram has a consistent use of the abbreviation *pole* for *possibile* which occurs in the diagrams and texts of Sherwood, Peter of Spain and Robert Anglicus. The standard abbreviation ‘q’ for ‘con’ occurs also in these and in Albertus Magnus. The truncation symbol that occurs at Bro does not appear in any other diagrams I have studied. It might be an indication of the omitted rows.

### Bro 3

This text neatly summarises the threefold nature of the material of statements (Arist. *An. Prior.* 1, 1–3) which in

text books follows directly after the Traditional Square. John of Salisbury’s *Metalogicon*, Liber IV, cap. IV, written 1159, describes this as follows ‘*quidque optineat in his que modernorum usu dicuntur esse de naturali material aut contingent aut remota*’ (Webb 1929, 168, lines 8–10) ‘... propositions, ... according to present day practice are said to concern what is necessary (natural), contingent or privative (remote) (transl McGarry 1955, 208). Sherwood presents a longer description and cites the examples of ‘a man is an animal’, a man is running’ and ‘a man is an ass’ for matter that is respectively natural, contingent and remote (transl. Kretzmann 1966). Only slight differences to Sherwood’s wording occur in Peter of Spain’s *Tractatus*. Buridan (SDD 1.4.3. *De material propositionum*) follows Peter of Spain almost verbatim. A search through the writings of Albertus Magnus and Aquinas produced no evidence of this passage.

Sherwood ch. 17; *De legibus propositionum oppositarum*: *Notandum etiam, quod enuntiationum triplex est materia scilicet naturalis, contingens et remota. naturalis*



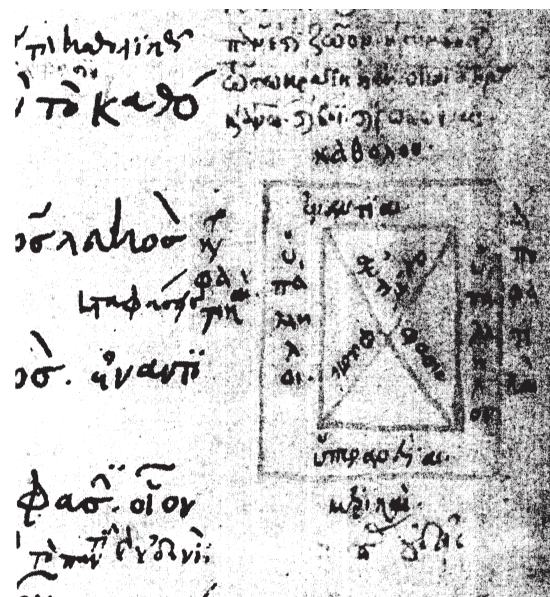
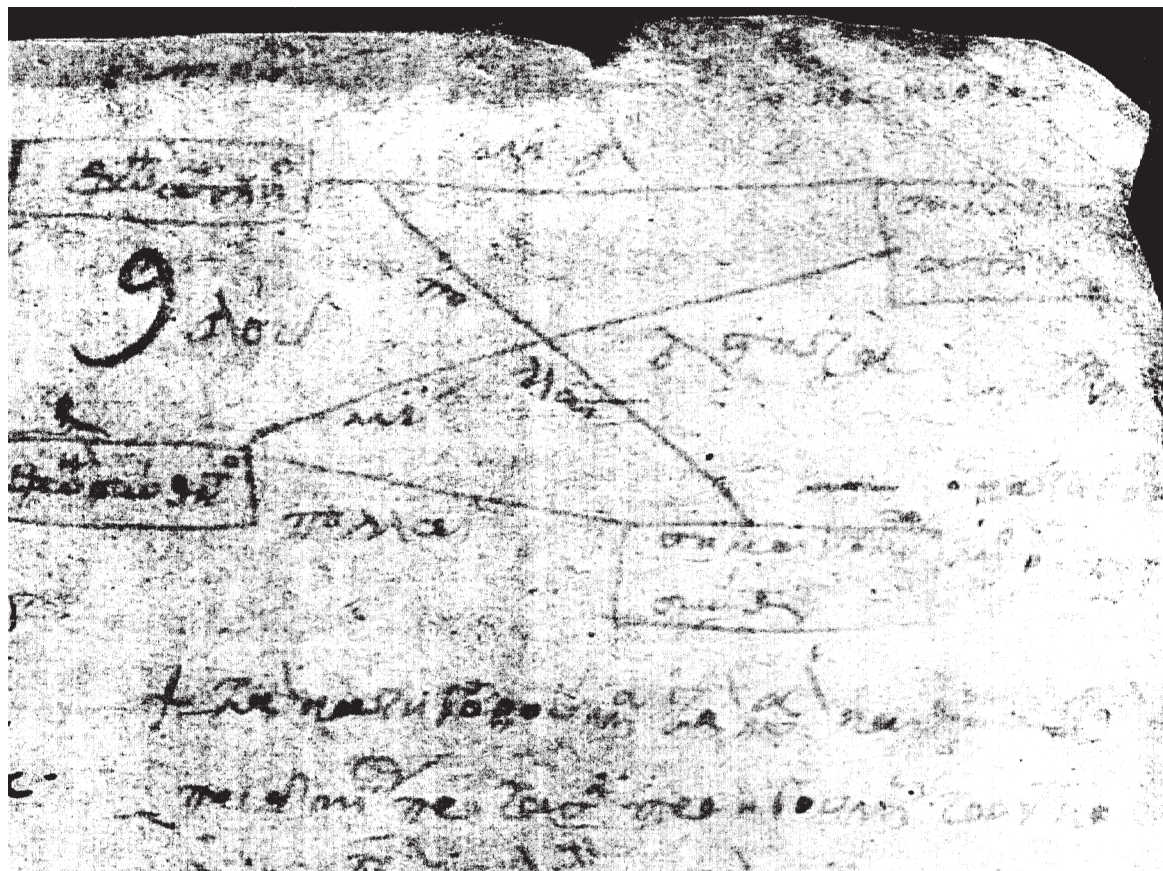


Fig. 10a, b Greek *scholia* diagrams of the square inserted in the 14th century into a late 13th century Constantinople Byzantine manuscript of Aristotle's *Organon* (Princeton MS 173, p.27. Princeton University Digital Library. URL: <http://pudl.princeton.edu/>)

*materia est, quando subiectum per suam naturam recipit predicatum ut homo est animal. Contingens, quando contingenter recipit predicatum ut homo currit. Remota, quando naturaliter remouetur predicatum a subiecto ut homo est asinus.* (Grabman 1937, 36, 1.15-218-37, 1.1-2).

Peter of Spain *Tractatus* I, 13: *De triplici material categoricarum: Propositionum triplex est material, scilicet naturalis, contingens, et remota. Naturalis material est in qua predicatum est de esse subiecti vel proprium eius, ut homo est animal, /homo est risibilis. Contingens material est in qua predicatum potest adesse vel abesse subiecto, ut homo est albus, homo non est albus. Remota material est illa in qua predicatum non potest convenire cum subiecto, ut homo est asinus.* In *Tractatus* I. 14 the order is changed to *naturali, remota, contingens*, but this is still not the order at Bro.

Here again there is innovation in the Bro diagrams. Firstly the arrangement in three rows does not occur in any manuscripts I have studied. Secondly, the order of the three ‘natures’ differs from that in all the manuscript versions checked so far, but the examples cited are the same, even in that the verb used to exemplify ‘*contingens*’ is always the same as that used in the square diagram (*ius-tus/currit/animal*). This will not be further discussed here.

## SIGNIFICANCE IN DIAGRAM RESEARCH

### *Bro and other Square diagrams*

In this introductory paper we will briefly explore the evidence within the outer limits of our date-range, i.e. late 12th to late 14th centuries. The 13th century was a period of explosive developments in logic, owing to the new availability of Aristotle’s works through rediscovery of some of Boethius’ translations and new translations by e.g. James of Venice. Advances in this ‘New Logic’ gave birth to a prolific production of logic textbooks (e.g. Marenbon ed. 2007).

We are here particularly concerned with how the wording of post-12th century logic diagrams was affected by different philosophical trends. A number of different versions of the Square have come down to us in manuscripts from this period; different traditions stemming from different authors and centres of learning whether Cologne, Paris, Oxford, etc. There also seems to have been considerable flexibility in the wording of the

diagrams in the 14th century. Square diagrams for modal propositions became particularly numerous at this time (Lagerlund 2010; Parsons 2012).

Since this study compares the physical appearance of the execution of the diagrams it necessarily requires that the actual manuscripts themselves be examined for their diagrams (rather than merely consulting the published edited transcriptions and translations, which are aimed at philosophical analysis rather than diagram research). However it is no simple task to form a good overview of the form and wording of square diagrams in such a prolific period in the production of logic manuscripts. Much work remains to be done and this paper gives only preliminary indications.

In terms of diagram shape, the Sherwood manuscript uses circles and no enclosing, the Peter of Spain diagrams use boxed rows reminiscent of diagrams in Boethius manuscripts. When the additional rows of text in modal square diagrams are removed as in the case of the modal diagram in the Robertus Anglicus manuscript, we get a diagram very similar to the boxed layout of Bro.

### *Square Diagrams and the Scholia Tradition*

The early Arabic and Greek manuscripts do not contain the diagram of the Square built into the text as in western manuscripts. Instead, numerous simple square diagrams occur in secondary marginal commentaries (Lee 1984, 69-72). It is debated whether Boethius could have had access to such annotations when doing in his translations (Thörnqvist 2008a, xxi n79, xxix). Boethius’ *Categories* contain sections of the main body of text where instead of a defined diagram in a frame, sections of the text are arranged so that phrases or words are connected by diagonal lines indicating association, in the same simple manner found in later Greek scholia. For example, a late 13th century Byzantine manuscript from Constantinople containing Aristotle’s *Organon* contains also *scholia* ascribed to several hands including John Chortasmenos (c. 1370-1430) The *scholia* for *De Interpretatione* include various sketches of square diagrams, closely resembling those at Bro (Princeton University Library. Manuscripts Collection, Department of Rare Books and Special Collections.. Princeton MS. 17, pages 15-30 especially page 27) (Fig. 10).

Perhaps it is because *scholia* are specifically didactic rather than decorative, that they provide such a close parallel to the Bro diagrams, which had a similar immediacy



and was apparently created 'on the spot' in contrast to copied models in manuscript transcriptions. Observe that this similarity in diagrams is not evidence of an eastern influence at Bro, but further corroboration of interchange between east and west. The Bro diagrams belong purely to the western tradition, using the standard abbreviated shorthand of scholastic Latin textbooks. Gotland is however well known to have had Byzantine influence in its early medieval artwork - directly in the 12th century from travelling artists and more diluted in the 13th century over northern Germany and via the artistic workshops in Cologne (Lagerlöf 1999). It should be noted this is the same route as that covered by the medieval international student.

## PURPOSE

The primary function of the logic diagrams and their associated texts at Bro was to illustrate the basics of elementary logic. But why and by whom?

The medieval student curriculum was divided into grammar, rhetoric and logic (the *trivium*) and arithmetic, astronomy, geometry and music (the *quadrivium*), going back to the Carolingian revival of classical learning. John of Salisbury in his treatise on education, which was highly influential at the time it was written c. 1159, calls logic: 'the science of reasoning' and 'the arts and sciences of verbal expression': *quod logica, eo quod uerum querit, ad totam proficit philosophiam* (John of Salisbury *The Metalogican* Bk II, ch I, title (Webb 1929, vi, 60. transl. McGarry 1955, x, 74; for date and terms see McGarry 1955, x, xix, n. 26; also Spade 2007 xxii, n. 39).

## Why Draw Logic Diagrams in a Church Tower?

Medieval church graffiti on Gotland survives predominantly on the ground floor walls of the island's parish church towers (Lagerlöf 1993; O'Meadhra 1997). This room served as a bell-ringing chamber and porch as well as a safe place for storing weapons and tithes. Lying slightly isolated and poorly lit, farthest from the altar at the back of the nave, it offered inviting blank walls and relative privacy (Lagerlöf & Svanström 1991).

It may however seem strange to our modern sense of order and neatness, that wall diagrams were executed and left on view in a location that was in full sight from the baptismal font. But for the medieval man such juxtaposi-

tion seems not to have been an issue. A relevant example where the manuscript tradition is reproduced in church wall graffiti is the musical notation in St Mary's, Lydgate, Suffolk (Pritchard 1967, 144-149, figs. 185, 187-188). Some medieval baptismal fonts were moved to accommodate liturgical changes in the use of the church interior. At Bro the Romanesque font is considered to still lie in its original position since it sits on its original base (Borgö 2002 and in press). This interpretation is supported by the lack of any evidence for it having been originally sited in the nave when this was archaeologically excavated (cf. Widerström 2001, and in press).

## Why Bro Church?

Since Bro lies only 12 km from Visby on the main NE road leading from the town, it might simply have been the closest place to Visby with an available expanse of blank wall on which to draw diagrams.

But Bro Church is unique in many ways and the fact that it was a place visited by many might have been instrumental in why the diagrams were executed there.

Firstly, the assembly (*ting*) of Bro district (*setting*) met in the church during the Middle Ages (Lundmark 1929, 255, n. 1; Steffen 1945, 250; Yrwing 1978, 83-84). The special importance of Bro district is considered to be continuous from the Late Iron Age owing to its geographical position not least on a main route to the north of the island (Hyenstrand 1989, 89; Kyhlberg 1991, 53-55, 237-245; Strömstedt 2003).

Secondly, Bro was the only church on Gotland with the status of pilgrimage church, venerated for its cross, holy well and spring where offerings for atonement, good health or safe passage at sea are recorded from the 15th down to the 19th century (Lundmark 1929, 254 n. 1). The evidence for Bro Church as a place of pilgrimage includes a reference in the account books of Ivar Axelson Tott of Visborg Castle who held Gotland in fief, record that Tott visited Bro twice to place money offerings there in 1485 and 1487 (Lindström 1895). However, the evidence for Bro possessing a relic of the True Cross has been critically explored by Stolt (2007, 14 n.44). The evidence is no older than the 15th century: a reference in *Karlskrönike* (the Chronicle of Charles VIII) and the cast dedication inscription on the tower bell in Bro Church which is understood to state 'the holy cross at/in Bro' (*dat hylge crvce to Bro*) (Wallin 1751, 133). In a study of church bells it has been observed that this group of



bells on Gotland, cast by 'Die Apengeter' of Lubeck c. 1440, have dedication inscription referring to the patron saint of the church for which they were cast, and as such would indicate that Bro was dedicated to the Holy Cross (Rohr 1985, 47-48). However it has recently been argued that Bro Church was instead dedicated to St Bartholomew (Svensson 1995, 40).

The suggestion that a relic of the True Cross was placed in the surviving late 12th century processional crucifix or rood crucifix (for date of the rood crucifix see Anderson 1966, 30) was first put forward by Sävö and often accepted uncritically (Sävö 1873, 4; Lindström 1892, 59; af Ugglas 1915, 317-318). Splinters and larger pieces of the True Cross, were referred to in medieval times as *lignum Domini* (Wood of the Lord) and most often housed in processional or rood crosses (e.g. the Brussels rood crucifix). Stolt is more critical of the presence of a relic and presents a useful survey of the relics of the True Cross that survive in medieval Sweden, of which none are in crosses. Though offerings were made at other Gotlandic churches, none of these developed a reputation for pilgrimage, though have produced large numbers of coin offerings (c. 4600 Visby bracteates from the 12th-16th century were excavated from under the floorboards at Gothem and c.4147 coins of 12th-16th century from around the side alters at Bunge) (Stolt 2007, 12-14).

Thirdly, Bro is one of only a few Gotlandic churches to have an *inclusorium* (an enclosed praying cell) with a *hagioscope* that allowed viewing access to the chancel presumably for the sick or penitents or visitors barred from entering the church. Only five churches, all in the north of Gotland, have this feature and Bro is the largest which suggested to Tuulse (1966, 12, 17; cf. Strömstedt 2003, 17-21, 29) that this might indicate Bro was a pilgrimage church already at an early stage. This annex was built onto the south wall of the tower at the time of the Gothic alterations c.1300.

### *A Teaching Diagram?*

The Bro diagrams have the appearance of having been drawn as an aid by a teacher for his pupils. Logic was the first subject a student had to master. The Square diagram served as a basic teaching aid introducing the student to Aristotelian logic and grammar. The content of the diagrams would have been among the first topics on a young scholar's agenda, and he would have needed to be capable of reproducing it. Would the church tower at Bro have

been a suitable room to hold a school class? The proximity of Bro to Visby and its schools where logic would have been on the curriculum might mean that it simply was the closest parish church which provided a suitable expanse of smooth wall for writing on. One may conclude that the wall was used only once or twice, and not on a regular basis as a school board. Had it been so we would have expected a palimpsest effect and complex superimpositions, rather than the limited superimpositions noted here.

Perhaps a passing pilgrim served as the teacher at Bro, earning his keep as a travelling scholar, and availing of a neutral site such as the church tower rather than an established school in the town of Visby.

The earliest record of a medieval school in Sweden is for the year 1225 when the school run by St. James Church (St. Jakobs) in Visby was granted permission by the papal legate Vilhelm av Modena to accept pupils of all nations. It is considered already in existence in the 12th century (Schück KLNLM, 637; Andersson 1999, 221-31, 283-84; Pernler 1977; Jacobsson 2002; Lagerlund 2003). Schools in medieval Gotland, as elsewhere in Europe, were divided into three stages. The final stage was conducted in a cathedral or town/ church school. In the cathedral schools elementary logic was taught in the final, fourth, year (before the age of 14), while the Dominican schools taught Aristotelian logic (Schück KLNLM, 636).

A small collection of 13th -15th century schoolbooks have survived from Vadstena and Uppsala of which the earliest concern mainly grammatical and lexical topics (Haastrop KLNLM, 643-6). Perhaps most relevant to the Bro sketches are the unique lecture notes by a 15th century Gotlandic student at the newly established Uppsala University, Olaus Johannis Gutho, who left seven volumes of notes on philosophy lectures from 1477-1486, concerning Aristotle's logic (*Cathegories*, *De interpretatione*, etc; Albertus Magnus commentary on Paul of Venice's *logica parva*). Cf. Lindroth 1975, 315, 629; Haastrop KLNLM, 643; Piltz 1978; 1987, 26 with literature; Lagerlund 2003, 30-31, 246).

The mendicant teaching orders emerged in the early 13th century and were renowned for their theologians and philosophers. The Dominicans, known until the 16th century as *Ordo Praedicatorum* (Order of Preachers) were established in 1216 and founded their northern, Dacian, province in 1228. The Visby convent was in existence by 1230 at the latest, being the first after Lund. Dacia em-



Fig 11. A contemporary philosophical discussion. Graffiti drawing in margin of 12th century English missal reused as a binding, from Grötlingbo Church, Gotland. (After Stolt 2001)

braced Denmark, northern Germany, Norway, Sweden and Gotland. The latter held special importance as the gateway to the conversion of the Baltic lands (Nilsson 1998; Pernler 2003). The Franciscans, known as the *Ordo Fratrum Minorum* (Orders of Friars Minor) were also involved in teaching, if to a lesser degree, and produced such leading medieval philosophers as Jon Duns Scotus, William of Ockham and Roger Bacon. The Franciscan Dacian province founded a convent in Visby in 1233 which maintained close contacts with its sister convents in Denmark (including Scania) and Schleswig. It was formerly held that Bro Church was connected with the Franciscans in the mid 13th century on the grounds that the Franciscan convent in Schleswig had supplied expensive wooden sculptures for the new chancel rood in Bro in the early 13th century (af Ugglas 1915, 366). Recent research instead places its origin in a Scanian workshop attached to the diocese of Lund (Andersson 1966, 64 n 1). It has been suggested that the administrative area of Bro

ting was under Danish control in the late 12th /early 13th century (Markus 1999, 134ff.).

### *A Discussion in Logic?*

The Bro diagrams may also be the result of a discussion between two philosophising scholars debating the logic formula (Fig. 11). These may have been visiting clerics or educated locals displaying their latest knowledge. Bro lies only 12 km from Visby with its schools and intellectual life. If Bro was already during this early period venerated as a place of pilgrimage and regularly visited by pilgrims from Gotland and abroad, any of them could have wished to discuss recent trends in elementary logic. Though philosophy was considered by the Church a means to understanding theology (for medieval Sweden, see e.g. Piltz 1987, 22-24), it need not have been the exclusive realm of the clergy or religious orders (Gustavson 1991, 556). Many medieval laymen were highly educated, some were even known to be collectors of texts. The

learning of the international language of Latin (as French or Spanish) was encouraged for merchants to facilitate their trading prowess (Öberg 1994).

The life of the scholar in medieval Gotland is clearly exemplified by that of the island's most famous medieval Dominican, Petrus de Dacia (active 1267-89). A teacher and mystic he was equally known for his theological as literary adeptness. According to his autobiographical writings, he began his education as a boy student in the Dominican school at Visby. On completion he was sent to Århus, then in 1267 to the newly created *studium generale* in Cologne where the great philosophers Albertus Magnus (d.1280) and his famous pupil Thomas Aquinas (d.1274) were teaching. After further studies at the University of Paris from 1269, Petrus returned to Sweden in 1271. He was first appointed to Skänninge, Sigtuna and then Västerås, before returning to Gotland and the Dominican church of St Nicholas in Visby, in 1279. As the first prior of the Dominican convent in Visby from 1286, he died in office in 1289. (Asztalos 1982; Gallén KLNLM; Lagerlund 2003, 19).

Another highly influential Dominican who may have had an influence on the late 13th century intellectual life of Gotland is the Scandinavian philosopher and modist Boethius de Dacia (Ebbeson 1996; 2002; Lagerlund 2003, 20; Roos KLNLM, 625). Various considered Danish or Swedish, or both, he was possibly associated with the Linköping See – to which Gotland belonged from the 12th to 16th centuries (Pernler 1977, 60ff. Lagerlöf 1975, introduction). Boethius taught at the Sorbonne in Paris, 1270-1277, from where he was banned in 1277, ending his days in Italy.

The *canon*, or their substitutes, the *vicarious*, were required to have university education in theology which they obtained mainly in Paris and law in Montpellier, Bologna, Orvieto, and Orléans (Lehmann 1937; Andersson 1999; Pernler 1999; for a good recent summary of the sources for Swedish students in Paris, Orleans, Montpellier, and Bologna, see Jacobsson 2002, 63-66, and for the later medieval period, see Ferm 2007).

Many Gotlandic priests received their education in Linköping and Gotland was visited by Linköping bishops and archbishops, who themselves were educated abroad, for example Archbishop Nils Allesson studied in Paris c. 1278 (Pernler 1981, 79, n. 74).

It is not impossible that an educated priest of Bro or a building master during one of the rebuilding phases of

the church executed the diagrams. The priests of a parish were responsible for their church upkeep. The parish priest together with parish representatives seem to have been responsible for commissioning building enterprises and funding came from a rich local patron or church collections. (Lagerlöf 1975, 36-44. Cf. also Jacobsson 2002, 60). The costly and responsible work of creating the mural and sculptural programs with which parish churches were decorated for didactic purposes would have required an educated individual. Plans and proposals would have been drawn up in collaboration with the *magister operis*, who led the building workshop. He was often not only a skilled master builder but also an educated layman or cleric. The early Gothic nave doorway at Bro church, from c.1300, has an elaborately carved frieze that is the result of an intellect knowledgeable in theology and sacred literature. This master, who has been named 'Neoiconicus' by Roosval, is thought to have worked on the Linköping cathedral building project before he came to Gotland, and with introducing pictorial programmes into the Gotlandic stone sculpture; Bro being his last work. (Roosval 1911; Lagerlöf 1975)

Some Gotlandic medieval scholars are known by name or reputation. A 'brother' Laurentius from Visby was in Cologne in 1282 (Lindström 1892, 270ff), and a *frater* Folquinus is mentioned in 1279 as a friend of Petrus de Dacia (KLNLM). The Dominican Sigtuna library has left an impressive range of philosophical manuscript of the 13th-14th centuries, and Vadstena for the 13th-15th centuries (Uppsala University Library. Mss philos. C620, fol 3r. Cf. also mss C594-651). These include an early French commentary on Peter of Spain by Stephani 'plzchpt', bequeathed in 1296 by 'karoli erlendson canonici upsalensis' (de Rijk 1972, xlix, xcvi. *Stephanus. Magister. Commentarius in Summulas Logicales Petri Hispani*. Uppsala University Library ms C620, fol. 3r-81r.).

In 1291 an Uppsala collegiate existed in Paris (Lagerlund 2003, 19-20). Paris was especially popular among Swedish students in the early 14th century where university records from 1333 ascribe them to living in the English section (Jacobsson 2002, 60). But we are mainly interested in evidence for medieval Gotlandic scholarship with special regard to logic. The university library at Erfurt records a transcript of Ockham's *Logica* by Arno Petri de custodia Norwegia in Wysbi anno 1339, and a *frater Albertus Wysbyconsis* who copied numerous logic manuscripts (Roos KLNLM 15, 625). In the 1460s, a copy



of Albertus Magnus *de natura animalium* was available to be purchased by Marinus de Fregeno, papal legate and book collector. Further evidence is to be expected when the manuscripts reused as book covers in the Reformation period are fully analysed (cf. *Medeltida Pergamentoms-lag (MPO) Catalogus Codicum Mutilorum (CCM)* in e.g. Abukhanfus et al. eds 1993, 151-183).

The Medieval Gotland in which the Bro diagrams were created should be understood as a cosmopolitan intellectual environment. The island had supported an artistically and economically vibrant community from the Viking Age and earlier. Situated in the Baltic Sea it was exposed to cultural traits from Byzantine Russia, mainland Sweden as well as the native Gotlandic community. It experienced Danish and north German influence in matters of administration, economics and ecclesiastics (the treaty between the German Duke Henry the Lion and the Gotlanders in 1161, Danish rule in 1361 until 1645 with intermissions; St Mary's Church inaugurated in 1225 was the main church of the German merchants). Building on its commercial roots in the Viking period, Visby became a major commercial and intellectual centre of the Hansa together with nearby Lübeck in the late 13th–14th century. The island's many parish churches indicate a vibrant and educated church-going community of farmers, fishermen and traders that included wealthy individuals well able to support the building and maintenance of over 90 parish churches with state of the art decoration and iconography, employing highly trained masons and their workshops. Influence has been traced from Östergötland (Linköping), Scania (Lund), Denmark, France, England, Northern Germany, Northern Italy and Byzantine Russia (Roosval 1911, 187; Rasmusson 1945; Andersson 1966, 35f, 63; Andersson 1975; Lagerlöf 1975, 27-35, 46, 117, 213; 1999; Svensson 1997; O'Meadhra 2001, 76 nn 15-17; Gerhards et al. 2010). The philosophical trends that were followed in medieval Sweden and Scania were state of the art have (Piltz 1998; Lagerlund 2003).

## OTHER MEDIEVAL GRAFFITI ON GOTLAND

Gotland has 92 medieval churches still in use. More than half contain secondary sketches (church graffiti) of medieval date. This is the richest area of wall plaster graffiti in Scandinavia. It is matched only by the wealth of graffiti of slightly different character that survives incised into the

wooden walls of the stave churches in Norway (Blindheim 1989). The Gotlandic church graffiti encompasses mason's architectural measured drawings, invocations in Latin minuscule or runes, sketched symbols, weapons, ships, human figures and the occasional pictorial scene. Bro is the only church so far identified as containing didactic diagrams (Lagerlöf 1993; O'Meadhra 1997; Lagerlöf & O'Meadhra forthcoming. For the runic inscriptions in wall plaster see e.g. Gustavson 1991, 551-562).

## CONCLUSIONS

### *Late 12<sup>th</sup> or Mid 14<sup>th</sup> century?*

So far, the best parallels found in terms of wording and boxed layout come from a mixture of manuscript traditions that are well-anchored within late 12th-early 14th centuries. However, in exact wording, Bro differs from the standard texts. By the 14th century Peter of Spain's *Tractatus* had become the most common logic textbook throughout Europe, with the exception of England (de Rijk 1972, xcvi-xcix). Yet that text was not followed in the Bro diagrams, though it may have served as one source of influence. The Bro diagrams appear to draw on a number of sources. One interesting factor to look out for in further analysis is whether the logic at Bro follows English, French or German models. In a study of how Danish ethnicity was expressed in medieval scholasticism, Ebbesen (1996) has demonstrated how the international character of scholasticism probably would have led scholars to suppress local characteristics. Distinctions between English (Oxford) and French (Parisian) logic in the 13th century are argued for by de Libera (1982), but there may be insufficient discursive text at Bro to avail of his evidence.

### *Unique Evidence*

The Bro diagrams are important in several ways. A provisional dating to the 13th century places them among the earliest Scholastic texts with a provenance to Gotland. It also places them among the earliest logic texts surviving from Scandinavia. Unlike all hitherto surviving examples of the square diagram, which only occur in copied manuscripts, the Bro diagrams are original creations reflecting current theories at the time they were created. They offer a rare insight into early medieval didactic diagrams and the circumstances in which logic was discussed. They are



Fig. 12. Bro Church, south portal. Detail of rich figure sculpture, executed c. 1300; note the typical use of majuscule rather than miniscule in the angel's inscription band. (Photo author)

a major contribution to our knowledge of early medieval logic in Scandinavia.

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