The Newberry alphabet and the revival of the roman capital in fifteenth-century Italy

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Cultural cross-currents

My purpose here is to introduce the manuscript of an alphabet of capital letters. The making of alphabets has been – and still is – a perennial occupation of letter-designers. This one is different, both because of the time when it was made, and the reason why it was made. In this essay I want to put it in its setting, to examine the intention of the designer, and to estimate his success.

The manuscript is unsigned and undated. It is one of a series of nine alphabets made between 1464 and 1525 and its relationship to these alphabets (to be discussed later) leaves little doubt that it was designed in the second half of the fifteenth century, by an Italian. Its present location is the Newberry Library, Chicago.

In the thirteenth and fourteenth centuries the roman alphabet was obsolete; it was even found hard to read. It had been used and formulated in the heyday of the Roman empire. Thereafter it had been thought of in many different ways, and given many variant forms, and finally in the gothic period had become so altered that a new alphabet may be said to have been formulated, radically different from the roman.

At the beginning of the fifteenth century, the roman letter was revived; its revival was a significant part of the Italian renaissance. At first the promoters were a small band of scholars in Italy, and the letters were used experimentally; by the second half of the century the movement had changed and gathered momentum. The social and technical background in which lettering was produced was about to be revolutionized by the invention of printing, with the consequent supersession of works written by hand. Inscriptions and architectural lettering, however, retained their importance, and it was particularly in this area that the new style was worked out. Such letters had to be large and details had to be exact. The Newberry alphabet is a contribution to this second phase.

The early fifteenth century was a time of criss-crossing cultural tensions, of differing, dynamic movements. In the north it was the period of the final magnificent flowering of the gothic, of Perpendicular architecture and elaborate fan vaulting, and of the great German hall-churches, of painters such as Martin Schongauer, of the limewood sculptors, and, parallel to this, of the invention of new gothic styles of lettering, bastarda and Fraktur scripts. In Italy on the contrary churches were more important as places of opportunity for fresco painters than as architectural conceptions. Italian painting can be seen as a continuous development from the Romanesque to the renaissance, so much so that Giotto has been seen rather as a forerunner of the latter than as a medieval master.

The medieval syntheses of thought and knowledge, the *Summa* of Thomas Aquinas (d. 1273) and the *Divine comedy* of Dante (*c*. 1300) were written at the end of the thirteenth century. Thinkers of the next generation, Duns Scotus (*c*. 1265–1308), William of Occam (before 1300–*c*. 1350), and Marsiglio of Padua (d. *c*. 1340) were developing philosophy in detail but diversifying rather than expanding. The grand conception of a Christian empire directed in harmony by emperor and pope was still alive, but the pope was in Avignon under French patronage from 1334 to 1362. The period of the Great Schism was 1378 to 1409. It was beginning to appear that it was time to explore new ways of thinking. In Italy men like Petrarch turned again to the source which had been the continual medieval inspiration, the classical world – of which evidence was manifest in the ruins by which they were surrounded. But now they approached the past in a new way. No longer was it thought of merely as the ordained precursor of the Christian order, now it was looked at for its own sake. What were they really like, the Romans, and before them, the Greeks? What had they actually written? And what had they built? It was a new way of looking at the past, a new start and it seemed to offer an unlimited vista. In the libraries of monasteries scholars found works of the great classical authors long unread, they found coins and unearthed and collected inscriptions. It is easy to understand that it was immensely exciting.

Antiquarian interest in lettering

Inscriptions had been collected and transcribed and circulated in the early Middle Ages, mainly for the benefit of the many pilgrims to Rome. Now they were collected also for historical reasons and for evidence of linguistic usage, formulas and phrases.[1] The manuscripts which were read and copied were actually Carolingian or early Romanesque, not, as the humanists thought, classical originals, but even so they found in them a lucid script and versions of roman and rustic capitals. In Italy gothic script, like gothic architecture, had been adopted with more reserve than in the North. Instead of the stately textura with its rows of verticals contrasting with the swelling curves of its initial letters, the Italian bookhand was *littera rotunda*, a much rounder script, nearer to the Carolingian hand from which both derived. This was to be superseded by the humanist script evolved by Poggio Bracciolini, of which the earliest example can be dated to 1402/3. This is a lucid hand, the precursor of modern lower-case type design. With it went new roman capitals. The earliest of these show the influence of the rustics which the humanists would have found in the manuscripts they were copying (much used though not so compressed as classical examples) particularly in the forms of N and D. They would also have found roman capitals, of a sort, both in manuscripts and inscriptions.

The reintroduction of roman capitals

The gothic style may not have been so pronounced in Italian bookhands as in those of the North, but it was unquestionably established in inscriptional and painted lettering. It is interesting to note that the inscription on the pulpit in the Cathedral at Pisa designed by Giovanni Pisano (finished in 1310) is in gothic capitals although the elaborate figure sculpture is obviously influenced by that of classical Roman sarcophagi. The change came a century later. The font in the baptistery at Siena made between 1417 and 1428 has two inscriptions,

1. Roberto Weiss, *The renaissance discovery of classical antiquity*, Oxford, 1959, ch. 11.

in dramatic contrast, one gothic and one 'roman'. One sees the same abrupt transition in the commemorative slabs on the floor in the Campo Santo in Pisa, and in Florence in the inlaid marble slabs in the floor of Santa Croce.

The early renaissance style

The capitals used in these early fifteenth century inscriptions are varied. Some, like those of the Schiattesi and the Banncozzi-Catenacci families of 1423 and 1424, are almost pure sanserif, but this is possibly due to the difficulties in the technique of inlaying in marble.[2] In Siena there are two epitaphs, to Petro de Ricci, Bishop of Pisa (d. 1418) and to Wladislas Duke of Slezia (d. 1452), both 'roman' but in a different style, rather crude and irregular with wedge-ended strokes; and there are other unformed examples. An early fifteenth century style can however be identified on a number of monuments, many by some of the greatest artists of the time, Donatello, Jacopo della Quercia, Luca della Robbia, Ghiberti. The inscriptions are an important element in the design of these and one imagines that they were designed, if not executed, by the artists; the new letterforms were no doubt an interesting challenge. Nor is this style confined to carved lettering; one sees it also on paintings and on their contemporary frames, on the works of Vivarini, Benozzo Gozzoli, below Piero della Francesca's portrait of Federigo da Montefeltro, in the paintings by Fra Angelico or his school in San Marco, and other works.[3]

Perhaps the most conspicuous characteristic of this early lettering is its sensitivity. Roman confidence is replaced by something more personal. These are one-off pieces of design, not a craftsman's exercise. The letters are usually fairly closely spaced, slightly compressed and slender in proportion; strokes may be wedge-shaped rather than serif-ended. Certain letterforms are characteristic, though not universally used: A often has a flat top, occasionally a bar across the top; R usually has a leg which is like the arc of a circle, curving downwards, not outwards; D may have a pinched top; G often ends in a curl, though many forms are found, as in the pen-made manuscript letters; occasionally C is square. Most conspicuous are N and M. With N the verticals are thick and the diagonal is thin; with M the internal V is normally short and thin, the two outer limbs vertical and thicker; occasionally, however, these limbs are widely splayed.[4] One may note that these characteristics in N and M are more logical than in the classical letters since the verticals are maintained as the thicker strokes.

Sources of letterforms

None of these letters are in fact classical forms. Where did the designers find them? The answer is, I think, that mostly they found them in Romanesque inscriptions. There were of course many of these in Italy, on tombs, in church dedications etc. The style was 'roman' in the sense that it was certainly not gothic, and the language Latin; obviously these letterforms appealed; and they are certainly to be found in early Romanesque examples. At this date humanists had begun collecting Roman inscriptions, but any proper study of the forms of the letters was still in the future. As archeological interest progressed, and when alphabets of roman letters were produced, this early style disappears. The first alphabet is that of Felice Feliciano and is dated 1464. By about 1470 the early style of revived roman letter had been abandoned in Italy, though not in the North, where it changed and developed.

2. Illustrated in Nicolete Gray, 'Sans serif and other experimental inscribed lettering of the early Renaissance', *Motif*, 5, 1960, pp. 66–76.
3. Dario A. Covi, 'Lettering in fifteenth century Florentine painting', *The Art Bulletin*, vol. 45, 1963, pp. 1–17.
4. Normally monoline: this letter may also be found in early Roman inscriptions, not normally in Romanesque examples.

The next landmark in the history of the rediscovery of roman lettering is however rather earlier than 1470: it is centred first at Rimini, and concerns the work of Matteo de' Pasti and Leon Battista Alberti. Before we consider this it is however important to clarify the term 'roman'.

The meaning of the term 'roman'

The 'Trajan' letter In English the term 'roman' is used to describe type design in contrast to italic, black-letter and sometimes sanserif. When applied to lettering carved in stone, cast in metal or painted, it often has a more precise meaning, and is used to describe the letter evolved by the Romans at the end of the first and the beginning of the second century AD for imperial and other grand and important inscriptions. Of this style the lettering on the Trajan column in Rome is a typical and beautiful example which has often been used as a model, both in the sixteenth and again in the twentieth century. It was promoted by Giovan Francesco Cresci in his influential book *Il perfetto scrittore* in 1570, and revived in England around about 1900 as the 'correct' form. Copied first from the cast in the Victoria and Albert Museum, it has more recently been revised and corrected by Father E. M. Catich in his book *Letters redrawn from the Trajan inscription in Rome*. In Britain in the twentieth century it was taught in all art schools, promoted in many books, and officially sponsored by the then Ministry of Works.[5] This is a craftsman's letter. Whether the craftsman used a brush or a chisel to define his work is not a question which we need to discuss here – the same man may well have done the layout and carved the letters. The vital point is that for him it is the eye and the tool, not geometry, which are the final arbiters of shape. The bowls of B and R curve to meet the stem, not in a semi-circle but in a movement of resolved tension; S is narrow, O and Q are less than the width of the square; the line is modulated from thick to thin according to the way in which the hand moves. Serifs are fairly long and blunt, derived from the natural turning of the chisel or brush. To avoid confusion, I shall refer to this letter as 'Trajan'.

Other forms of 'roman' It was not of course the only roman letter, as it has not been the only model for roman type design. Apart from inscriptions in 'rustic' letters and the various forms of Roman handwritten script, with which we are not concerned, there were a vast number of Roman inscriptions to be seen or unearthed in the fifteenth century. Many were very poor and incompetent, many a cross between 'rustic' and Trajan in style, but also many executed before the Trajan norm had been achieved, showing rather different ideas and letterforms. In republican inscriptions, for instance, one can see circular O, M formed from two conjoined Vs, B with semi-circular bowls, sometimes even separated; often there is little or no line modulation from thick to thin.

Renaissance Platonism

The humanists must have come across all these varieties of inscription; all were evidence of classical antiquity and they were interested in the content as much as, if not more than, in the presentation. In the fifteenth century an increasing number of pioneers were making collections; their interests were mainly antiquarian, but there was also another side to their involvement. Some were interested in Plato and in neo-Platonism, in the transcendental importance of geometrical ideas and apparent dependence upon these ideas of

5. See James Mosley, 'Trajan revived', *Alphabet*, vol. 1, 1964, pp. 17–48.

letter construction. To begin with, this seemed patent; it was only when both approaches, antiquarian and theoretical, advanced that the divergence began to appear.

Experiments at Rimini　　But not yet. First came the experiments in lettering made in the mid fifteenth century at the Tempio Malatestiano at Rimini. Here numerous inscriptions were designed by a number of different artists, whose work is not always distinguishable. Some are related to the early style just discussed. They show M with widely splayed legs, N with a thin diagonal, close spacing, and a thin, even, line, and are probably the work of Agostino di Duccio. Others are different, stronger, widely spaced, with very wide letterforms, particularly T, U, A, N and circular O. One sees this style, for instance, on the sarcophagi on the south outside wall of the Tempio and in the first chapel on the right; one example is dated 1465. Giovanni Mardersteig in his article 'Leon Battista Alberti e la rinascita del carattere lapidario romano nel quattrocento'[6] attributes these to Matteo de' Pasti the medallist and architect, together with two important inscriptions, one above the main door and another on the arch inside the church. These use similar wide letterforms as do some of the other numerous inscriptions in and outside the building. All these are still experimental and transitional, but in a new way, rather crude in execution, in some cases sanserif but without the crispness of its modern forms.

One does in fact see the influence of the technique of modelled letters on early medals such as those of Matteo de' Pasti. All his medals were cast, not struck; the letters are created from strips of wax in relief, with soft edges. Some of the early letterforms persist in these medals, though not consistently – M with straight side strokes, and a short interior v, some also with splayed exterior strokes and a deep V, G with a curled termination, S with a flat termination, occasionally A with a flat top and N with a thin diagonal. But none of these letterforms are so prominent in the work of Matteo de' Pasti as in the earlier medals of Pisanello,[7] and the effect is changed by the wide spacing. This style is also surely influenced by the Roman triumphal arch at Rimini – an arch erected by Augustus (BC 27), originally with metal-filled letters designed before the Trajan norm was established. As it now appears, without the metal letters, the sockets are almost sanserif.

Alberti's lettering　　It is, however, when we get to the work of Leon Battista Alberti that we arrive at a new style which seems mature, which has certainly been influenced by classical inscriptions. Alberti was a diligent student of classical remains: his *De re aedificatoria*, written about 1450, is 'the masterpiece of early renaissance architectural literature'.[8] In it he writes that he 'was unable to look at ancient remains without feeling at once compelled to ascertain whether anything worth while could be learnt from them'. Undoubtedly he looked also at inscriptions, and he probably designed that on the architrave of the Tempio Malatestiano at Rimini; certainly it is very superior to the other lettering there. This impression is confirmed by two other inscriptions, both in Florence, which he is known to have designed: that in the Santo Sepolcro (in the Rucellai chapel, San Pancrazio) and the great letters on the facade of Santa Maria Novella. These are very beautiful designs, both inlaid in marble, both using a line finely modulated from thick to thin and

6. In *Italia medioevale e umanistica*, 2, 1959, pp. 285–307.

7. G. F. Hill, *A corpus of Italian medals of the renaissance before Cellini*, 2 vols., London, 1930.

8. Roberto Weiss, *The renaissance discovery of classical antiquity*, Oxford, 1959, p. 107.

terminated with small serifs. These are roman letters but not all of them would be found in Roman inscriptions: O is circular, as in early, but not imperial, inscriptions; the terminations of S curl upwards on Santa Maria Novella; and, most noticeable, the bowl and leg of R do not join the stem. Alberti has created a style of his own.

The need for new alphabets

By this date – the Santa Maria Novella inscription is dated 1470 – the roman letter was established. In the North, gothic inscriptions (as well as type design) persisted, and there was also a development of the early renaissance style which we have identified in Italy, which indeed became stronger and more vivid in Germany, England, and Spain in the sixteenth century; but not in Italy. There the roman letter had taken over as the normal letter. Craftsmen and designers needed models to copy. There had, since the twelfth century at least, been books of gothic capitals for the use of illuminators. Now roman alphabets were needed. Between 1460 and 1530 a number of alphabets were produced, some as models, others perhaps mainly for the satisfaction of the designer. Now that it was not just a question of producing a model of the antique letter, there was also one of demonstrating the relationship of these letters to the principles of geometry and to the ideas of Platonic and neo-Platonic philosophers.

Throughout the fifteenth century inscriptions had been collected with increasing enthusiasm, partly for their content, partly for their presentation. There is a record of a famous excursion made by Andrea Mantegna, Felice Feliciano (of whom we shall hear more), Samuele da Tradate, and Giovanni Antenoreo to Lake Garda to collect and copy Roman inscriptions. The most famous of the many sylloges made is that of Ciriaco da Ancona (who collected examples also in Greece and Asia Minor). These antiquarians were enthusiastic, but their standards of accuracy were less rigorous than those of today. Feliciano, who seems to have been an endearing character, certainly occasionally added details of sculpture and even fabricated inscriptions in his enthusiasm for antiquity.

Felice Feliciano

Feliciano was, as far as we know, the first person to produce an alphabet of roman letters. The manuscript is in the Vatican Library (Vat. Lat. 6852); it was made about 1464 and was reproduced in facsimile by the Officina Bodoni in 1959. The letters are drawn within a circle and a square and in two colours, as if incised with a V-cut in stone. It therefore seems likely that the work was intended as a guide to letter-cutters, but perhaps also to those illuminators who did illusionist initials in manuscripts, representing letters as faceted or with a flat face and a return, as if free-standing and three-dimensional.[9]

Feliciano's basic principles

Feliciano specifically relates his letters both to geometry and to classical examples. He chose the proportion between the height of the letter and width of the thick stroke as 10 : 1, since 10 is the perfect number according to Vitruvius, who quotes Plato and Pythagoras; and he writes that he has based his drawings on old letters 'by taking measurements from many marble slabs, both in the noble city of Rome and in other places'. The principles used by Feliciano are simple. He uses the points where his circle intersects with diagonals drawn from the corners of his square to establish the position of the main strokes of A, D, H, N, V, X, and, with the addition of one tenth, for E, F, K, L, and also for terminations of C and G. The circle is used

9. See. J. G. Alexander and A. C. de la Mare, *The Italian manuscripts in the library of Major J. R. Abbey*, plates XVII, XXXIV and others.

in the construction of C, D, G, O, Q. Smaller circles (using the central inverted apex of the letter-line to determine the circumference) are drawn within one quarter of the whole square within which the letters are drawn to construct B, P, R, S.

It is possible to construct Feliciano's letters, with the help of his diagrams (but not from his text, which omits essential details). Sometimes he measures from the outside of his letter-line, sometimes from its inverted apex. Terminations of C, and as he himself mentions, the tail of R and of Q, must be made 'more by practice than by reasoning'. In fact, though his alphabet is constructed with compass and straight edge and uses only a few fixed proportions (a half, and a quarter, of the square, plus or minus one tenth), a certain amount of adjustment has been required, based on or necessitated by the variable line-width taken from the Roman practice, in order to make an alphabet which is undoubtedly beautiful. Such adjustments and slight inconsistencies would not, I imagine, have worried Feliciano. His alphabet is a reconstruction of Roman forms which clearly indicates their rational character in strong contrast to the vagaries of gothic design.

Gothic geometrical letter design

One may, however, note that there can also be a geometrical principle in the design of gothic letters, albeit a quite different one. The basis is the counter or interior shape of the letter, which can be round or oval, but is constant for all the letters of the alphabet except I, K and X being constructed from quarter and half circles respectively and H and P being based on rather smaller circles or ovals. The outside contour can then be varied at will. Interior intrusions as with B, R, S are all within the shape of the common counter. One sees this pattern being formed in the thirteenth century (for instance in the Evesham Psalter in the British Library), but it seems to have been given a geometric formulation at the same time as the Roman alphabets – for instance in a manuscript in the Bibliothèque Nationale in Paris (Lat. 8686). The principle governing the construction of this gothic alphabet is however different; the roman letter is a linear form, thought of as primarily standing upright, the lower part heavier, as in B, serifs as giving stability. The gothic letter is a two-dimensional form defined by an inner and an outer perimeter. Its serifs can be elongated and ornamented; their primary function is to enclose the counter and to extend and emphasize curves. Because the gothic letter was a new creation, not tied to any classical precursor, and because it is entirely made up of curves, it was able to be more consistently geometric; and it persists in writing masters' books (such as that of Juan de Yciar) and in the initials of incunabula. On the other hand, perhaps for this very reason, it is less legible than the roman letter; the future lay with the revived letter – and the new broken version of gothic.

Damianus Moyllus and Hartmann Schedel

The next known alphabet book after Feliciano is that printed by Damiano da Moyle about 1483, of which only one copy exists. It differs from Feliciano in taking the proportion 12 : 1 instead of 10 : 1, but is otherwise similar. Damiano or Damianus Moyllus was a printer, also a calligrapher, working mainly for the monastery of St John the Evangelist in Parma. It is not clear whether the alphabet was his own work or whether he was only the printer. The book seems to have been intended, and used, as a model.

Similar in design both to the Moyllus and Feliciano alphabets, but identical with neither, is that included in an unpublished compilation made by Hartmann Schedel, doctor and collector of manuscripts.[10] His work includes Greek, Hebrew and several gothic alphabets, as well as roman. It appears to be intended as a model book, conceived primarily for calligraphers, though it does include geometrical principles of construction in the drawings of roman letters. They are drawn within a square; then, according to the particular letter, circles, diagonals drawn from corner to corner, and vertical and horizontal dividing lines may be included. The proportion is 10:1, but serifs and some curves are drawn free-hand; the measurements of line-width and of the intervals between dividing lines is erratic. One has the impression that this may be a copy of some unknown original. It is certainly Italian. The compilation seems to have been made by Schedel between 1498 and 1507. The text is in Latin.

The Newberry alphabet

The alphabet which is probably next in date – it is not actually dated – is the one which is reproduced here. It differs from that of Feliciano in that the interest of the designer is not in the provision of a practical model, but instead in the working out more precisely of the bases upon which the roman alphabet was, or should have been, constructed. The manuscript has no text.

The letters are not drawn with meticulous accuracy, but this is compensated for by the fact that they include measurements. These do not correspond to modern units of measurement: it should be noted that the smallest measure is given the largest figure. We do not know the name of the designer; it has been suggested that he was a friend of Leonardo da Vinci, or of Piero della Francesca, because of his evident interest in mathematics and geometry, but this is only speculation. That he knew or was known to Fra Luco de Pacioli is however patent in the work of both.

New principles of construction

The principle upon which the anonymous designer constructs his letters is new. He does not start with the square and circle but instead divides his square vertically into nine equal parts. Nine and its factors are his basic units. The width of the thick stroke of the letter is equal to one section, the thin stroke is a third of this in width. The proportions are therefore 9 : 1 ; 1/3. The construction of the letters is simple for E, F, H, I, T, L. They are built up from vertical and horizontal lines, the only complication being in the size and tilt of the serif. These are defined by circles the diameters of which are 6, 12, 12 minus 48 and 24.

Other letters introduce diagonals: V, X, Y, Z are controlled by the chosen widths of each, which are respectively 9, 7, 6 and 5 units. An extra size of serif is introduced by the tilt of the termination of Z (12 plus 24). The other letters introducing diagonals are A, M, N, K. Each is shown in two versions, of which one shows the construction and the second seems to modify and improve the design.

In the simplest version of K the diagonals meet in the centre of the main stroke; in the second version the join is moved to breach the stem, starting two-thirds of the way across it. Letters N and A are drawn first with a pointed apex where diagonal and upright meet. When the serif is added the diagonal is moved so that it is at a more acute angle, and the letter better balanced. Letter M is always the

10. Bayerische Staatsbibliothek, Cod. Lat 451.

most difficult letter to design if the roman convention of thickening alternate strokes is followed, and it is the least successful of all these designs. The designer first tries a version based on the V with its centre point in the middle of the bottom side of the square, this version being without serifs at the top. In the second version the centre point is shifted to the right to allow for the top left serif, but the slope of the two outer verticals is decreased, and the lack of symmetry emphasized. New diameter measures are introduced for the serifs, 12 plus 24 and 12 plus 24 plus 45.

Finally there are the letters which include curves: C, D, G, O, Q, and B, R, S, P. These appear more complex than they are. Letters O and Q are based on a diagonal which bisects the circle starting 12 plus 24 from the edge of the square each side. This gives the point where the thick line is widest, and thus the tilt of the letter. The outside contour is circular, the interior counter oval. The tail of Q is a curve which crosses the inner letter line at the seventh unit and meets the top edge (notionally) at the second unit. Letter C, for which there are two drawings, is based on the same diagonal, but the inner outline grows nearer to the outer from the fourth unit onwards to form the upper serif. The lower serif projects slightly below the outer outline of O. Letter G is based on C but ends in a spur, one unit in width.

The remaining four letters are all based on six circles: 24 plus 96, 4 plus 24, 4 minus 48, 4 minus 96, 4 minus 48, and 6. The short joining lines are indicated by short arcs of extra circles, as is also done with D. Letter R has a short, narrow straight line (one-third of a unit), joining the bowl and leg to the stem.

Everything is drawn with compasses and straight edge, and all measurements are related to one another. The alphabet can be called geometric, but it must be noted that fairly complicated geometry is required to construct these letters. The fact that several letters are drawn twice, and that in some places (C, G, D, S) circles are crossed out or drawn a second time on a slightly different axis suggests that the alphabet is an experimental, not a final, work. The outlining of the serifs with circles which end in a point again suggests that the purpose of the designer was to establish a method of construction rather than to provide a model for craftsmen. In places where the drawing is ambiguous, as in O which is very slightly wider than the square, it is, I think, most reasonable to assume that this is intentional.

Luca de Pacioli A further step in the imposition of geometrical ideas upon the roman letter was taken by Fra Luca de Pacioli, who included an alphabet in his book *De divina proportione*, published in 1509. The friar was himself a mathematician, and he repeatedly wrote that his letters were based on the circle and the square. He also wrote that they were intended as models for carved and architectural inscriptions, and even for manuscript painters. The serifs which he draws are, however, defined by circles, a mathematician's rather than a craftsman's convention. In this he is following the example of the Newberry alphabet's designer. A detailed comparison is needed.

Comparison of Pacioli's and the Newberry alphabets Both designers used the proportions of 9 : 1, with the thin stroke one-third of the thick, and horizontal strokes still thinner. The principles on which they have chosen to work are, however, different.

Whereas the Newberry alphabet's designer divides his square into nine equal vertical sections, Pacioli draws diagonals from corner to corner for all letters except B, so locating his central point. The Newberry's designer is more consistent. All his measurements are multiples of three. Pacioli has 'a fourth more than a third'. He is in fact surprisingly inaccurate for a mathematician. He writes of 'a little lower than the junction', about half a ninth; and he gives the tail measurement wrong for Q and writes of eight circles for S whereas only six are drawn (the Newberry's designer has eleven).

All the same, the resemblance between the two alphabets is close. Where the Newberry's designer has drawn two versions of a letter, as for K, M, A, N, Pacioli seems to have profited by his experiments and opted for the letter where the detail is more satisfactory: the heavy top serif to A is reduced, M is better balanced, a compromise between the two versions of K is chosen. But the basic forms are the same; so also are the complex forms of R, B and S. In both cases O is fractionally wider than the square, presumably intentionally so. The difference in the letterforms are in details: in the slope of the serifs of S, C, E and T, and movement of the tail of Q. Pacioli's X and Y are wider.

The Newberry alphabet appears experimental; one wonders whether its designer was satisfied and really wanted to try again to get a little nearer to perfection. Is the Newberry alphabet really the work of Pacioli, and is the alphabet of the latter just a second try? It seems to me that the differences are too great for one to assume that the designer of both alphabets was the same person. On the other hand the similarities are so great that it is clear that the work of Pacioli is closely based on the experiments of the Newberry's designer.

Later alphabets
After Pacioli there are other alphabets – those of Sigismondo Fanti (1514), Francesco Torniello (1517), Giovan Battisti Verini (1526), Albrecht Dürer (1525), Geofroy Tory (1525). Writing masters also often included alphabets of capitals in their books. But the attempt to prove that the Romans founded their alphabet on geometrical principles remains elusive. The Newberry's designer and Pacioli came nearest to establishing this thesis, but thereafter the incompatibility between geometrical theory and any precise Roman practice becomes clear.

Criteria by which alphabets may be judged
One is left with the question, is there a perfect (capital) letter? If not, are there other forms of satisfactory letter? If so, upon what criteria are they based?

Certainly there is an affinity between the human mind and the perfect shapes of the circle and the square and their sections. It is not, as Stanley Morison would have it, just 'a fad'.[11] Architecture founded on the module is satisfying; so is the monoline Greek alphabet of the fourth century BC. The single-alphabet geometric type[12] designed by Jan Tschichold in 1929 is consistent and rational – but one notes that he found it necessary to use and mix both upper and lower case letters in order to arrive at his 'single' alphabet. The roman letter had to be modified; in fact, as they found in the renaissance, it was not formulated to make a perfect letter.

It is possible to hold that a letter such as Trajan is perfect in the sense that the craftsman's hand and tool have, after constant experiment, created forms which are as balanced and satisfying as possible. This is a craftsman's, not a mathematician's, conception. Is this

11. Introduction to Verini's *Luminario*, 1947, p. 7.
12. Reproduced in Herbert Spencer, *Pioneers of modern typography*, London, 1969, p. 152.

perfection? Some people would say yes. But in that case why are we not satisfied? Why do we go on producing new designs? Some of these are half-baked, some are disastrous, but some are good. The roman letter has surely a very much wider potential than this way of thinking envisages.

In this essay I have been dealing with examples in which proportions are often defined by just two measurements, the height and the maximum width of line; and basically these are linear letters, alphabets in which each item is primarily considered for its own particular perfection of form. These are letters which stand in a stately row on a building, or on a tombstone, or on a title page. They are designed to be stable; the lower part is heavier, as in B; R and K step forward; serifs are thought of as feet upon which to stand.

As we have already seen, this is not the ethos of most gothic lettering. There the third proportion, the relation between the width of the thick and that of the thin stroke can be diverse and important; the spacing between letters can be positive, letters can lie on a page, creating a two-dimensional pattern. Or again, as we have seen with early renaissance inscriptions, letters can be linear in conception but irregular in width. Circular O can, for instance, be combined with other forms which are very narrow, so creating a design which is a unique pattern. These are variations in the formal characteristics of letters. Beyond this, there is the whole range of expressionist potentiality, from the spare elegance of some modern face type design to the ebullient fantasies of Victorian invention. Beyond this, letters can reflect contemporary mood, and interest, and changes in outlook.

The letters of the Newberry alphabet are examples of this last approach to lettering. They show in a particularly clear-cut way the change in attitude between medieval and renaissance ways of thinking. At the same time, they also reveal more subtly the attitude of their designer, both to antiquity and to mathematics. The letterforms which the Romans invented were rather like themselves: practical, disciplined, but not dogmatic; capable of being used in a remarkable number of ways and for purposes no doubt beyond those envisaged by their creators. Such flexibility was not the approach of the Newberry alphabet's designer; his aim was clearly to find perfection of form. He failed in this – a failure proved by the neglect of his manuscript, ignored and unpublished until now – because his search was based on the combination of two beliefs which did not coincide: in the supreme importance of the legacy of antiquity and in the infallible relevance of geometry. In particular he failed because of his faithful adherence to the craftsman's use of a modulated line, moving from thick to thin on a tilted basis (as the hand moves), not logically between vertical and horizontal. His unsolved problem was the letter M. His attempt is a vivid demonstration of the courage and of the ambiguities of renaissance thought.

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AA   AAAAA   P

BB   QQQ

CC   RRRRR

DDD   SSS

E   EEE   TT

F   VVV

G   GGGGGG   W

H   XXX

KK   Z

LL

MH   MMMMM

NNNNN

OO