PETER SCHÖFFER, FIRST DESIGNER IN BOOK INDUSTRY

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Abstract

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There has been a long-time tendency to attribute the invention of movable type to Gutenberg and crediting him as the sole responsible for the whole process. The purpose of this paper is to prove that this is not quite true.

Our view is that within the Fust-Gutenberg-Schoeffer society, Gutenberg was in fact the 'metallurgist' who worked under Schoeffer's guidance and that it was Schoeffer who ruled, supervised and was in control of both the aesthetic criteria in bibliographic products and the industrial process involved.

To prove this hypothesis, the starting point is set on the calligraphic principles and the interplay between area and stroke governing the *Textur* gothic script. *Textur* was used in the printing of the *42-line Bible* and it was here that all criteria of proportion and harmony which will rule the typographic art to this day were set for the first time.

Therefore it can be asserted that the graphic industry was born and developed not because of a technical innovation but because of the XVth century definition of the graphic designer role as the sole responsible for the industrial process.

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1. Introduction

This paper is based on an original idea by Professor Enric Tormo, who for a long time has been conducting research on Typography at the Department of Design and Image at the University of Barcelona.[1] Due to time and space limitations, the original subject has been shortened so as to present an overall view on the initial hypotheses and the general conclusions that have been drawn till now. As a consequence, this paper will not meticulously deal with bibliographic references and sources that have already been addressed in 'official histories' of Printing, the Book, Typography and especially Incunabula[2]. On the contrary, such data are taken as statements to support arguments presented here.

The purpose of this paper is to hint at a possible shift in the historiographic paradigm in order to understand the origins of the graphic industry through design criteria -or 'design process'[3] criteria- rather than handling and linking historical data in the usual way. Therefore, the most singular aspect of the paper is the shift in the research paradigm for the study of the birth of printing,[4] as it intends to take historical material and documentary sources as the subject of discourse rather than as a manipulating and explanatory object *per se*.

We will use then the same references that the 'official history' has been constantly using, without doubting of their legitimacy or authenticity. But data will be ordered and formulated in a different manner so that other, further links are established between the new technological framework of typographic production based on movable types,[5] and the graphic-operational resolution that made it possible. It is precisely at this point that a shift in the historical tradition is intended, by switching the main role in the invention of printing from Johann Gutenberg to Peter Schöffer. And it is also here that we will point out that a design process took place which made the "typographic reality" possible, and that the movable types technique on its own did not become productive until a solution that co-ordinated graphic system and technical system was met. As we shall see, such a solution could only be provided by Schöffer. The effects caused by the particular invention (the technique of movable types) have led to a uni-causal interpretation that always tends to

[1] Examples of this are the PhD course The Typographic Revolutions (1993-2002) and various research projects around the Bauer-Neufville Type Foundry collection.

[2] As an example, authoritative historians like Harry Carter or Guillermo S. Sosa would refer in their essays to general works which are still valuable, like *Catalogue of Books printed in the XVth Century now in the British Museum* (9 volumes, 1903-1962) or Ludwig Hain's *Repertorium Bibliographicum in quo libri omnes ab arte typographica inventa usque ad anum M.D.* (Stuttgart, 1826-38).

[3] Referential parameters are therefore established in design terms, which are characteristic of design as a discipline: evaluation of necessities, function, utility and use, market, technological determinants, production systems, etc.

[4] The 'invention of printing' is used here in a general sense, meaning the invention of the industrial technique for book production by means of movable type. Even though it is an ambiguous term, it is still used in research and academic contexts as, for instance, in Eisenstein (1994).

[5] Within the graphic production context, 'typography' generically refers to any mould where the printing surface protrudes from 'counters level', or non-printing areas. According to this, woodblock moulds, like movable metal types, are typographic, but the historical relevance of movable types finally restricted the usage of the word to letterpress composition. At present, when typographic production is no longer prevalent, 'typography' is maintained as a concept that involves all that which is related to the discipline of design –type design and its production. In this paper, 'typography' is mostly used as a synonym for letterpress printing.

reductionism and to a technological determinism which is associated to Gutenberg's genius. However, the technical phenomenon could only be settled thanks to a perfect assembly between invention, application and general conditions at the Mainz firm of Johann Fust, Johann Gutenberg and Peter Schöffer.

2. On the Mainz firm of Johann Fust, Johann Gutenberg... and Peter Schöffer?

Let us begin with a brief historical summary of the events that took place at the time of the invention of printing. From 1450 Gutenberg had contacts with Johann Fust, a wealthy tradesman from the city of Mainz, to set up an editorial enterprise and to open up a market for books printed with the new technique of artificial writing (*ars scribendi artificialiter*). Fust invested capital in the venture so that Gutenberg could improve the industrial technique, and also managed financial matters[6] for the edition of the first printed work of importance, the *42-line Bible*, "the most important work in Christian culture and a secure market"[7]. Following a lawsuit, the Fust-Gutenberg partnership was dissolved in 1455. The businessman apparently won the trial and took possession of all the technical equipment that Gutenberg had mortgaged. Fust, who does not seem to have had a sound knowledge of book production, took advantage of the situation thanks to the collaboration of the scribe-master Peter Schöffer, and in less than eighteen months they had issued the edition of the Mainz *Psalterium* (1457), which "reflects so much elegance that it seems impossible that it was done with cast type."[8] In contrast, printed works by Gutenberg since 1455 did not have the distinction of those issued from Fust's workshop. His *Catholicon* (1460), for instance, "reproduces a librarian script like that of the *Durandus*, but less artistic and with less competence on the caster's part."[9]

Tradition has it that the first printed book with movable types was the *42-line Bible*, and that this was the technical work of Johann Gutenberg, who is believed to have been Fust's partner, at least when the edition began. It is also agreed that the first works printed with movable types were some Papal Indulgences, printed in Mainz between 1454 and 1455, where some types being used were similar to those of the *42-line Bible* and identical to those used some time later by Peter Schöffer as a printer[10]. It has also been confirmed that it was Fust and Schöffer [11] who finished the edition of the *42-line Bible* in 1456, after the Fust-Gutenberg partnership was over.

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[6] It is to be noted that Fust 'only' managed a financial system for the edition of the *42-line Bible*. He made use of the traditional *pecia*-way of production in order to overcome scarcity of available resources (type-metal), put for sale the first folded sections or signatures of the Bible and with the benefits he obtained, he was able to carry on the production of the rest, and increased the run of the first two once the success of the enterprise was evident. This would answer two questions that historical tradition has not clearly explained: firstly, it would explain the 'strange' circumstance why the first sections in some editions are of 40 or 41 lines instead of the 42 in the rest of the pages, as this would only respond to the natural way of making the most of the material that the printing office had available to continue printing *peciae*. It would also account for the absence of printer's mark and colophon in the book, which would derive from the necessary secrecy of printing a work which 'pretended' to be handwritten and which was produced along the lines of handwritten book production, that is, produced and commercialised in *pecia*-form. The next printed book to be issued from Fust's workshop, the 1457 *Psalterium*, bore both a colophon and a printer's mark, which meant that it had entirely assumed the condition of 'industrial product' by then.

[7] Escolar (1993, 341).

[8] Carter (1999, 40). Quotes have been translated into English from the Spanish version.

[9] Carter (1999, 65).

One can infer from historical data that even though Fust and Gutenberg were responsible for the economic set-up of the business partnership, Schöffer had an active part in the firm. However, there is a series of questions referring to the actual work undertook by Gutenberg and Schöffer which are still not clearly stated; only a few historians have proposed some conjectures: "Schöffer is responsible for striking matrices by means of punches, and movable types cast from them showed a clarity and elegance in print that, with slight modifications, lasted for many years."[12] But these are data that do not clarify the main question: how and why could the typographic system have been definitively resolved within this partnership?

Let us begin by giving a general idea of the professional profile of each of the three members of the firm, so that their specific task within the society can be conveniently set, and also to unravel the real assembly that led to the invention of typographic printing. Johann Fust is known to have been the capitalist partner who provided the project with the necessary business approach. Johann Gensfleisch, known as Gutenberg [13], was the son of a high-rank official at the mint and a member of the Goldsmiths' Guild of Mainz. Gutenberg followed the family tradition and worked professionally as a goldsmith, by which he had practical knowledge of metalwork, including craft tools, composition and casting of metals. Therefore, the historical reference that attributes the paternity or the technical perfecting of typography to Gutenberg is unquestionable. We have no reason to doubt that he was responsible for the production of punches, the striking of matrices, the casting mould, the improvements of the press, etc, in brief, all technical matters.

However, we should bear in mind that: "discovery often precedes invention, and invention is always followed by development and application. When new paths that invite following are discovered, inventions are often floating in the air. It is not a coincidence that they are really or supposedly undertaken in different places at the same time (...). If we notice tensions between systematic research and coincidence when studying the history of inventions, we should also perceive relations, and differences too, between invention and trial."[14] If we apply this observation to the context being discussed here, we can see that until 1455, Gutenberg and other contemporary individuals (of whom history has provided notice) had only made trials on "the artificial invention of writing without any driving of the pen"[15]

The origins of the invention are often associated to the Dutchman Laurens Janszoon, known as Coster, 'church warden' or 'sexton', who was producing woodblock books and, according to Gerardus Meerman, had been robbed of his invention by Gutenberg, who would later improve it in Mainz.[16] Other documents state that Johann Mentelin –a Strasbourg calligrapher and book

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[10] Schöffer married Fust's daughter and when Fust died (probably in Paris in 1466), he took over his father-in-law's editorial enterprise.

[11] As we shall see, Schöffer was involved in, and even might have directed, the project of this edition from the beginning.

[12] Sosa (1966, 109). In fact, Schöffer had no technical knowledge of metalwork at this point.

[13] He adopted his mother's noble name.

[14] Timm (1971, 108).

[15] Extracted from the *Psalterium* colophon, where a brief description of the art of printing with movable types is given for the first time.

illuminator- and Gutenberg would have been making experiments together [17] on typographic composition during the years that Gutenberg had been in Strasbourg[18]. However, the path of technical experimentation that Gutenberg and other contemporaries of his had been developing, only culminated in Mainz, at the time when Gutenberg worked in a workshop with Fust and Schöffer. It is customary to substantiate this by referring to the preface from the 1505 edition of Livy printed by Johann Schöffer, Peter's son[19]: "In Mainz the ingenious Johann Gutenberg invented the wonderful art of printing in the year of Our Lord 1450, after which it was improved and finished by the industry, expenses and labour of Johann Faust [sic] and Peter Schöffer in Mainz."[20] The official history correspondingly collects data in a way that place Gutenberg at the peak-point of the invention. But a closer look at the facts reveals that in between Gutenberg the technician, and Fust the capitalist, it was only Schöffer who could make the invention actually possible. We should remember what has been mentioned above, that invention always involves both an application and a development, and that Gutenberg had only been trying in the discovery till then. In fact, "Once the mould had been invented, it was not difficult to reproduce (...). The cutting of punches and the making of matrices were operations [Gutenberg] was familiar with. The difficulty consisted in adapting them to the needs of typography. (...) The greatest problem was to divide the signs which are joined in handwriting and take them to the rectangular edge of a metal bar, maintaining the alignment that is characteristic in handwriting."[21] Therefore, there were still a few essential elements to be adressed in order to bring to completion the development of the technology of movable types. And the final contribution was Schöffer's.

In order that any technical invention has a tangible value it has to mean an innovation that is ratified by some kind of practical application. This is more so when considering that a technical phenomenon is only the sum of knowledge and abilities/capabilities to reach an aim in the most methodical manner, or to solve a problem in an optimum manner. In this sense, the *ars scribendi artificialiter* was not the achievement of movable types but of the early graphic industry of woodblock books, which were already "written artificially". According to this, metal typography was only a technical improvement on the printing mould, as the wooden block was sectioned into interchangeable pieces made of wood in the first instance, then of metal. But until the middle of the fifteenth century only Mentelin, thanks to his mastery in the art of calligraphy, could conceive that the pieces of the typographic system had to be *cast* so that composition would be easy and with no scarcity of material because of stock of type[22], pursuing the fluency of the handwritten text. While

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[16] Meerman, *Origine typographicae, cum figuris Aeneis, sive Ectypis antiquarum editionum*. The Hague, 1761 (Sosa, 1966, 340). These are conjectures based upon a passage in Adrianus Junius' *Batavia*, that attributes the invention of wooden movable types to Coster and relates that a certain Johann had committed "industrial espionage" and stole his invention. Meerman infers from this that such Johann was in fact Johann Gutenberg.

[17] Sosa (1966, 104); Escolar (1993, 344).

[18] Johann Gutenberg's name is registered in Strasbourg in the years 1439 - 1444. Sosa (1966, 104-105).

[19] Johann Schöffer was in charge of the family printing business after his father died in 1502.

[20] Quoted in Steinberg (1955, 48).

[21] Barker (1990, 64).

[22] This idea on Mentelin's experiments is new, but historical studies confirm that he had already experimented with metal types. The first casting material would imply a necessary ordering in terms of typographic bill and in terms of sorts. Production was no longer conceived in a piece-by-piece manner and had to be organised according to the 'typographic alphabet' so that textual products may be serialised. This obviously implied that both the foundry and the editorial industries developed at the same time. [cf. Moret's paper "The Typographic Order".]

the first experiments had focused on wooden movable types, the first obstacle in their production was that every piece had to be made singularly, and this prevented the editorial industry from prospering. Basically, Mentelin did not develop the invention any further because he could not think of the way to apply it[23]. He did not succeed in adjusting the *rotunda*, which was characteristic of his time, to a combination of pieces (movable types and spaces) that were controllable and consequently applicable with conformance to a system of spatial proportions.

As we have already said, it was in Fust's Mainz workshop that the art of typographic composition was finally solved. When Gutenberg asked Fust for financial support in order to develop the typographic technique, Fust asked Schöffer, a competent calligrapher in Lyon[24], to join in the venture so to guarantee the project results. It is only natural that Fust would be familiar with Gutenberg's notoriety as an "industrial spy" and would have known of his lawsuits against former partners[25] , and so he looked for Schöffer to back up financially the 'research' in the graphic and metallurgic technology that Gutenberg proposed [26]. But as we have seen, Gutenberg was a goldsmith and only had technical knowledge of the stamping of coins and medals, which means that he lacked the notions of "graphic project" that were needed to bring the invention of typography to completion. This implies that, of the three partners, it was only Schöffer who could develop a project along the lines of what we term today as "design project", by articulating successfully Gutenberg's technical knowledge to solve the typographic technique in relation to the area it was meant to be applied to: the composition of texts for industrial production. This means that Schöffer met the solution through the characteristic approach in every design process that is enunciated in form-function criteria.

3. The design project that Peter Schöffer solved.

We assert then that it was Schöffer who meritoriously and definitively solved the movable types technique because it was him who found out the fundamental "rule" in typography. The rule meant that the combination of movable types was not based on the alphabetic forms, but on a system of spatial proportions (occupational, as they are metal pieces) that allowed their interchangeability in terms of economy of use with regard to their distribution/composition in a compact 'polymould'. It is obvious that with this contribution to the concept of typographic space –according to which the graphic elements and the white spaces were no longer subject to formal elaboration as in handwriting, but to an abstract geometric modulation- the technology of cast typography was consolidated. In working the way he did, Schöffer contradicted some remarks collected by 'official histories': "Punch-cutters figured themselves writing and did not worry about minute things."[27] The scribe-master did not cut the punches, but directed Gutenberg to cut them, and he did not subject

[23] Mentelin did not 'find out the solution for typography' before Schoeffer did, but he got very close to it, as his printing of a Latin Bible before 1461 demonstrates.

[24] Fust, a merchant, would have probably known Schöffer from contacts in the book trade, as Schöffer worked as a calligrapher in the Lyon book market.

[25] Many authors refer to the historical documents that detail the lawsuits in which Gutenberg had been engaged, both in Strasbourg and Mainz, always related to the invention of typography.

[26] This is a particular idea from Dr Enric Tormo.

[27] Carter (1999, 66).

himself to calligraphic forms but worked with *textur* [28] mainly because it was perfectly suited to the proportional control of the graphic area, notwithstanding the fact that, as a script, it had been abandoned except for a few liturgical books[29].

However, Schöffer's design dexterity resides in the way he managed to find this "golden rule" (would "leaden" be more appropriate?). The scribe-master understood that a group of pieces (where each character occupied a space that was determined by its drawing) could not solve typographic composition in an economical manner, so he looked instead for a graphic model that allowed him to systematise and harmonise the typographic area. Schöffer found the solution in *textur,* that had "an extremely rigorous layout: repeated vertical modules form single letters which are distinguished from each other by a few characteristic strokes. To emphasise uniformity, the distance between the vertical stems (1/5 the height) is constant and equal to the width of a stem. The angularity of the letters is increased by the typically diamond-shaped terminals of the vertical strokes." [30] It was built on an orthogonal grid, where vertical and horizontal guidelines are in a 90º angle, and terminal traits were at a 45º slope[31]. It was therefore a script of absolute regularity in which strokes and counters followed a single modular pattern that made it ideal for economising and rationalising the typographic system. These were features that Schöffer took advantage from in order to put the typographic technology into practice. Identical strokes and white spaces in 'm', 'n', and 'u', for instance, meant that counterpunches and punches would be identical too, therefore a single counterpunch would be necessary for both the counters and the strokes: its construction was then possible with a great economy of means. But it had an extra advantage, as it was a script that was perfectly suitable for handwriting simulation: " it can be represented in any medium without seeming that it belongs to another and (...) can be adapted to a variety of purposes in size, weight, width and finesse."[32] Therefore, Schöffer unarguably and successfully solved a good design project in choosing *textur*: on one hand it solved the spatial harmony for type combination; on the other hand, its formal characteristics gave the impression that the printed text was handwritten (at least in the first instance when they feared market refusal[33]). And all this takes us to the *quid* of the dissertation, to underline the fact that Schöffer had succeeded in recovering from the calligrapher's "craft reason" to issue a project in which obstacles coming from scribal practice had been clearly overcome, be it in choosing the script, or in understanding the need to systematise the typographic space/polymould. From our discipline parameters we could say that Schöffer had turned from calligrapher to designer.

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[28] In the first instance, the term 'texture' indicates arrangement and order of the threads in a cloth. Therefore, the term, applied to a kind of gothic script (which only indicates a broad quill-cut for a script that, as some Quattrocento humanists defined it, was 'ugly') indicates its capability of "arrangement and order" in the structure and form of a text written in *textur*.

[29] The type in the *31-line Indulgence Bula* (1454-55), which may be regarded as a typographic 'essay' for the *42-line Bible*, was a *Bastarda*, "a hybrid, the first sign of Italian influence in a German type." (Carter (1999, 63)). *Textur* was the formal script that had been exclusively reserved for Missals and would continue to be so until the end of the fifteenth century (Carter (1999, 57-63)).

[30] Tubaro & Tubaro (1992, 20).

[31] Slope may vary, as examples of the *42-line Bible* show.

[32] Carter (1999, 59).

[33] Fust tried to sell exemplars of the *42-line Bible* in Lyon as handwritten copies, but abundance of the product revealed the fake and so he had to move to Paris to carry the venture forward.

Let us now see how Schöffer studied and determined, from *textur*, the system of typographic proportions in order that the combination operations with movable types were successful. Following calligraphic tradition, he would have determined modular progression from 'm' and its divisions, or minimum modules, like that of 'i'. The establishment of 'm' as the module that generates the spatial proportions in typographic composition is of crucial transcendence as it represents the origin of the typographic 'em'-quad . "Curiously enough", geometric decomposition of the *textur* 'm' results in the usual subdivisions 1/12, 1/10, 1/9, 1/8, 1/6, 1/5, 1/4, 1/3, 1/2, that still normalise quad portions in thin space (1/5), mid space (1/4), thick space (1/3) and nut (1/2). If the analysis is applied onto the text composition of the *42-line Bible*, one can see that Schöffer controlled its production to the slightest detail, and confirms that there was a remarkable calligrapher behind the project. The body size was 18 point, which is 1 and 1/2 typographic lines, corresponding to 3 inch-lines,[34] a measure unit that since the Middle Ages was being used in both paper size and calligraphic grid. Another matter is the use of different models for a single character, which gave the printed text the formal appearance of handwriting: irregularity in print would be a 'cheating device', or it was part of the experiments to find out the graphic forms that were perceptually the most optimal for proportional relationships. The use of elements set outside the measure also reflect the concern for the graphic form, together with Schöffer's technical ability, as he had to set and justify through 'whites' by leaving a 1/2 space at the end of each line, that would be replaced by the hanging element when necessary. There are other substantial details that evidence skill in the project: the proportion between the 'm' module and the body size is 12:18[35], or 2:3, the same proportion that is followed in both the type area in relation to paper size, and in depth (42 lines in 18-point body size) in relation to measure (42 'm'-modules, not taking into account the hanging elements); also, medium-width characters like 'n', 'o' or 'u' are exactly 2/3 of 'm', strokes and counters are 1/6 of 'm', spaces between words are thick (1/3 the body size), etc.

In all, the measurement analysis makes clear that the graphic proposal responds to an excellent typographic solution. It is also beyond doubt that *textur* was the only script that could act as a bridge between calligraphy and typography, the only one that could solve the technical essence of typography without any formal alteration in the script[36]. Finally, let us insist in that it could only have been Schöffer who undertook such a project in the rigorous way just mentioned.

4. Why history gave Gutenberg the merit of typography and left Schöffer out.

We can venture to give a simple answer: there is a difference between to register a design project and to patent a technical invention. In the context of the invention of typography, the most visible changes with regard to previous, handwritten products were movable types, the type-casting mould and the adaptation of the press, all of which were really Gutenberg's make, and this would confirm Johann Schöffer's account in the aforementioned preface. On the other hand, the referential product was still the same that had been around for centuries: the book. This is why it was rather unlikely that the invention was attributed to an intangible 'design process', but to a tangible, material invention, as history has transmitted it up to this day. But it is also worth mentioning that in order

[34] An inch is divided into 12 inch-lines.

[35] The referential measurement unit here is the Didot point. However, the unit is not significant in absolute terms; it is the proportions which establish ratios that count: 12:18 = 6:9 = 2:3, ...

[36] The typographic jargon (at least in Spain) defines script typefaces as "lithographic", because lithography is the only technique that allows the preservation of the characters' *cursus*. This is why *textur*, a script that was made of autonomous modular elements, allowed a 'piece'-construction that could be applied to typography.

to unravel Schöffer's role in the Mainz partnership, we have had to revise historical data from a design-discipline perspective.

Schöffer's work as a designer and his transcendental binding role in the partnership would also explain the reason why Fust sued Gutenberg before the printing of the *42-line Bible* had been completed. It is likely that once the technical invention was solved, and which Schöffer had conducted with great mastery, Gutenberg's collaboration became unnecessary from that moment on, and Fust decided to part with the 'troublesome' partner[37]. Fust and Schöffer finished the edition of the Bible, which "has been considered as the most beautiful printed book and its printing was really uniform and its composition accurate in the just separation between letters in each word and between words. The humanist Francesco Filefo wrote about this Bible that notwithstanding its *aeris literis* and the fact that it had been written with no quill, it seemed the work of a good calligrapher."[38] And then, while Schöffer was entirely in charge of the printing workshop, Fust distributed the printed work in the market. The existing harmony between Fust and Schöffer, both in business and family terms, also confirms that this was a partnership with clear interests from each part, where each one of them could develop his specific task while sharing a production aim.

5. On Peter Schöffer's profile as a designer.

We can finally propose a few connections that would help us prove what has been presented in the paper and agree on the fact that Peter Schöffer was the first graphic designer in the book industry era that began in the fifteenth century.

Actually, two circumstances met in Schöffer and contributed to his task as a designer. The first one is that he had studied at the University of Paris; the second one, that he had worked professionally as a scribe in the first half of the fifteenth century in Lyon, an important book industry centre. The first circumstance leads to believe that he had notions of the seven liberal arts of *trivium* and *quadrivium,* which were being taught at the main universities in Europe[39], and this would mean that he had a sound knowledge of Geometry and of Pythagorean systems of proportions[40], that had already been applied to architecture long ago. The second circumstance leads us to think that he would have a sound knowledge of the "art of writing" and, as a consequence, of the morphology of calligraphic letters, specifically of those in common use in Europe at that time: the *bastardas* or 'Italianised' gothics, and also the older scripts that could be used in books he was working on.

Therefore, Peter Schöffer would have the ideal profile to articulate a proposal that modulated the graphic area in a simple and economical manner to be applied to the art of typography, basically because it was perfectly correspondent to the synthesis of his knowledge. It was just a question of

[37] It could be possible that Gutenberg did not participate in the edition of the Bible, as between the years 1450 and 1455 he might have only developed the typographic technology alongside Schöffer, and that Fust would have got rid of Gutenberg to prevent sharing benefits from sales.

[38] Escolar (1993, 341).

[39] The University of Paris was mostly acknowledged because of the faculty of Arts, where along with Philosophy, auxiliary disciplines from the *trivium* were complemented with those of the *quadrivium*.

[40] Schöffer would be familiar with notions of Geometry, so he would be acquainted with the Pythagorean simple proportions derived from the *tetractys* (1, 2, 3, 4 and 10 as the total sum of them). Music harmony proportions in Pythagorean theory were found in the numbers 12, 9, 8 and 6, equal to those of 1, _, 2/3 and _, which result from the *tetractys* numbers.

finding a system that was subject to the needs to create a compact polymould by means of an assortment of pieces (characters and spaces) which was controllable in its variable dimensions, and also to a graphic system which was economical in terms of formal repertory (strokes and counters). The achievement which is shown and demonstrated in graphic rigour in the *42-line Bible* could only be conceived thanks to the intellectual capacity and practical knowledge that Schöffer had.

In any case, the merit of what is known as ‘the invention of typography’ will always be Gutenberg’s, but only on the generic technological determinant: the creation of a casting mould for producing movable types and the improvement of the printing press. But as there is no significant invention without innovation, this is, without an application that carries with it a proven development in culture, we can assert that the determining contribution to book production was Schöffer’s, when he established the system of harmony relations between typographic modular pieces (rectangular prisms) and graphic modular pieces (those of *textur*) which from then on could be applied, thanks to their abstract-geometric concept, to *any* alphabetic form or character. At the same time, there was definitively established the typographic production system as well as its inevitable control under measurability criteria, a system that was more or less normalised through metric rules until the twentieth century.

Figures

Figure 1
2:3 ratio in ‘m’

Figure 2
Body size: 18 pt

Figure 3
Type measure in ‘m’ modules

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