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The Third Dimension of the Book: Codicological Aspects of Multi-Textuality

Over the last few decades we have witnessed, in the fields of philology and palaeography, a growing re-evaluation of the book as a manufactured product. This development represents a change from the traditional viewpoint which largely down-played a volume's existence as an object of study, instead reducing it to a mere 'container' of texts, images and scripts. In the now distant past, a conference dedicated to 'miscellaneous' codices would have taken place in a totally impalpable context in which textual content would have been seen solely as the product of intellectual activity and the codex considered a purely abstract entity: at most a useful 'label' to serve as a reminder that a certain number of texts arranged in a specific order happen to be found grouped together in one and the same 'container'.

Assigning to the codex a merely 'virtual' existence also entails relegating it to an intrinsically 'passive' role. In this rather narrow perspective, the codex cannot be viewed as anything other than a dimensionless and unbounded container that slavishly adapts itself to whatever the authors and users of the texts it contains require of it. Moreover, it seems entirely pointless to enquire as to whether or not such an adaptation is always possible, and to what extent and in what ways it might be so.

In a perspective that many years of research have greatly contributed to diversifying by progressively expanding the field of view, the 'ideal box' can no longer be overlooked, and therefore has to become a 'real box'. In this new context, the duty of the codicologist is certainly not to overturn the ideological priorities which have always characterised this area of study and its history: indeed, the text obviously remains the ultimate goal and true driving force behind the production and transmission of culture, even if the book as an object itself is, in reality, the *indispensible* and almost exclusive 'protagonist' in this process.

However, it should be pointed out that the text / book coupling is far more complex than it appears upon first inspection, and that, in particular, the book in

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the form of a codex—definable as a 'volume' not solely on etymological grounds but also through the essentially metrical meaning of the word—is not lacking in its capacity to propose, or even impose, its requirements.

For the 'so-called 'quantitativist', the particular set of problems implied by the title chosen for the conference, *Il codice miscellaneo*, is even more enthralling and far-reaching than one might imagine. Indeed, in this setting, the number and order of texts assembled within one and the same volume, even if these are sometimes the product of pure chance or choices dictated by idiosyncratic and unpredictable needs, will as a rule, and, indeed, necessarily contain information of a recurrent nature which, implicitly, is of relevance to the history of written culture.

When this approach is adopted, the following questions inevitably arise: do all these pieces of information lend themselves to being systematised, in the sense that they can be 'measured' and classified in an objective way; and, should this prove be the case, to what extent is it so? Additionally, to what extent will such information reflect, without excessive aberration, an underlying 'substrate'—succinctly termed the 'cultural fabric'—whose basic components and essential forms, seen in different historical eras and cultural centres, it contributes to clearly delineating? But above all, on the epistemological level we cannot avoid posing a fundamental question: can this 'parametrisation', which is per force simplified, of intellectual activity really prove to be useful for the history of written culture? Or, on the contrary, is it too reductive from the very outset, and therefore unusable, if not actually detrimental to the cause?

The quantitative analysis of the cultural fabric—a vast new area of research—does not, as yet, have at its disposal an exhaustive list of the principal and most pertinent phenomena to formalise, nor is there a complete panoply of statistical methods and indicators which can successfully be applied to the collected data. Also lacking is a well-reasoned, coherent and universally agreed upon terminology. Furthermore, the truth be known, there is no overall classification system that defines the characteristics and aims of the said research with sufficient precision and exhaustiveness—indeed, the usual term 'bibliometry' seems altogether too reductive, inasmuch as it traditionally covers the measurement of book production rates, as well as the analysis of text typologies and the sociological echelon of readers.

However, this is perhaps not the best place to expand on such matters. Instead, here we shall confine ourselves to addressing, in the first place, the interrelationship between the materiality of the book—which is ruled with a firm but sensitive hand by tendential laws—and the multiplicity of texts, which cannot 'live' and survive if they do not assume a tangible form in three dimensions and find their place, either individually or in groups, within the physical boundaries

set by the volume and the page. By adopting the Western Middle Ages as a model case, we shall then briefly examine the different aspects of the phenomena of mono- and multi-textuality.[1]

Our investigation is based on the analysis of two distinct corpora. The first corpus is composed of manuscripts deriving from a broad range of origins, though chiefly French and British, whose dates are scattered across the 9th and 15th centuries. The corpus is for the most part assembled from two different sources, namely the manuscripts held in the Municipal Library of Cambrai,[2] and some of the codices held in various minor British libraries and described by Neil Ker in his *Medieval Manuscripts in British Libraries*.[3]

A full perusal of the Cambrai catalogue together with *Medieval Manuscripts in British Libraries* generated a grand total of approximately 1,600 volumes. The total length of each manuscript, expressed as the total number of leaves forming its constituent texts, was determined.[4] In addition to this parameter, the basic codicological data which characterise, in broad terms, the material nature of the manuscripts were also recorded.[5]

On the codicological level, the descriptions in the Cambrai catalogue, which do not number among the most deficient of the French catalographic series known as 'octavo', are obviously rather concise, although in this particular case the dearth of information turns out to be less of a problem than it would have been in other circumstances, inasmuch as the material characteristics which could interact with the quantity and content of texts do not appear to be large in number. By contrast, far richer, of outstanding calibre, and marked by great observational intelligence of both the textual and material characteristics of the manuscripts concerned, are Neil Ker's descriptions.[6]

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1 The question of the relationship between multi-textuality and the material structure of the codex (i.e. the presence or absence of 'blocks' consisting in one or more quires that coincide with the beginning or end of text units) will not, however, be addressed. This aspect of the problem is in any event examined, at a theoretical and terminological level, in another contribution presented at this conference, Maniaci 2004 [in this volume, 337–375], to which we can also refer for its related bibliography (*ibid*., footnote 2).

2 Molinier 1891.

3 Ker 1969–1992.

4 The titles of the relevant works were not recorded. This would have called for an expenditure of time disproportionate to the declared objectives of the survey.

5 That is: date, origin, writing support, number of volumes, total number of leaves, completeness of volume, dimensions, and text layout.

6 It should be made clear that the collection of data originating from Neil Ker's work was largely facilitated by an earlier survey carried out by Paola Busonero, as part of a wide-reaching research project on the configuration of quires in late medieval manuscripts (Busonero 1999 [in this vol-

To this corpus, assembled from modern catalogues, an additional group composed of 140 volumes originating from the famous Saint-Amand-en-Pévèle Abbey in the far north of France was added. Today, these volumes are held in the Bibliothèque Municipale de Valenciennes and the Bibliothèque nationale de France. This complementary source helped to bolster the number of volumes dating from the 9th to 10th centuries. The codices originating from Saint-Amand constitute the 'sub-product' of a second corpus, assembled in order to tackle the problem from a slightly different angle, perhaps more 'qualitative' than, strictly speaking, 'quantitative'. This second corpus is formed from two different medieval catalogues dating prior to the 13th century, namely that of the Saint-Amand monastery, containing 315 listings (of which approximately 40% are extant), and that of the Cluny monastery, which contains 571 listings. In the case of the latter corpus, both on account of an elevated level of dispersion, and because of the lack of a systematic, focused investigation, up till now very few constituent volumes have been identified. Both of the said catalogues were published by Léopold Delisle[7] in the 19th century. Even if this second corpus was not employed during the first phase of the investigation presented here, it will be worthwhile to explain, in brief, the reasons behind the use of this kind of source in the wider context of addressing issues relating to multi-textuality.

Surveys of medieval catalography have been shaped by three different needs. In the first place, data gathering campaigns carried out on this type of source make it possible to analyse the ways in which the content of manuscripts were described, and therefore to evaluate the way in which librarians of the period perceived and interpreted the phenomenon of multi-textuality.

Continuing in the same vein, such information makes it possible to compare the descriptions of the texts entered into the catalogues with the actual content of the codices. In fact, it is widely known that the number and accuracy of data mentioned in the catalogues are quite distant from the criteria used to shape modern catalography (criteria which, in turn, are a far cry from being consistent and universal), and that a survey's level of accuracy depends in large part on the goals aimed at by the catalogue.[8]

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ume, 205–307]). Our gratitude is owed to Paola Busonero for having permitted us to utilise the collected data.

7 Delisle 1874, 449–458; Delisle 1884.

8 It has been noted that in practice the behaviour of the compilers of medieval catalogues oscillated between two extreme poles in the following way: (a) a count of the books was made in order to implicitly underscore ownership; in this instance it was sufficient to mention only the general content of books in order to identify them, without the need to list, one-by-one, each of the individual texts that each volume contained; and (b) a census of the books on an

Finally, since catalogues can be thought of as 'photographs' of the library's holdings at the time they were compiled, it is possible, up to a point, to travel back through time and 'recover' a less distorted picture of the medieval cultural fabric than can be seen through the prism of codices preserved today, whose survival, as we know, can be attributed to various more or less consciously chosen phenomena.

The corpus drawn from modern catalogues is sufficiently ample to make it possible to highlight the basic components of the book/text interaction and to explain its mechanisms. On the other hand, from the qualitative point of view—that is to say the actual ways in which the phenomenon evolved—the situation is different: on the geographical level, Italian production is very poorly represented, whilst that of the German-speaking countries is practically non-existent. Moreover, on the chronological level, the total number of items dating from the 14th century is rather low.

Finally, the specific characteristics of the two populations brought together in the corpus need to be considered. The library at Cambrai holds the greater part of the codices that originate from the chapter's library, with a large percentage of volumes dating from the Carolingian era (these represent donations to the chapter made over the course of time by church canons from their own collections). For this reason, the group of codices of this provenance can be adjudged as being quite representative of manuscript production in France north of the Loire and in the southern part of the Low Countries during the last three centuries of the Middle Ages. Alongside these codices of urban origin and production, the library also received a certain number of funds originating from monasteries located at Cambrai or in its immediate vicinity, in particular that of Saint-Sépulcre, the seat of a scriptorium that was very active in the 11th and 12th centuries, and again during the 15th century.[9] However, it should not be taken for granted, in this particular case, that the trends observed always represent an accurate reflection of prevailing attitudes in the rest of France.

The corpus drawn from *Medieval Manuscripts* is also not without defects: excessive dispersion on the one hand, and excessive concentration on the other. The excessive dispersion is due to the fact that the book funds held in the minor British libraries are almost always the result of a progressive juxtaposition of a

individual basis was carried out so as to enable readers to locate them (i.e. to guarantee accessibility). In this second instance, it became a central rather than peripheral task to list all the individual constituent texts, given that the purpose of the catalogue was to answer the fundamental question 'Which volume has to be opened in order to find a certain text?'

9 Regarding this information, see Muzerelle (ed.) 2000.

large number of private collections, within which the provenance of constituent volumes is in the main heterogeneous. In most instances, an excessive concentration is the result of a pronounced specialisation in preferences vis-à-vis the selection of books, or alternatively can be ascribed to the conformism which not infrequently afflicts the world of bibliophilia.

The end result of the two phenomena is ultimately the same, though: in both instances, statistical analysis is hampered. Indeed, the excessive subdivision of typologies and provenances obstructs the creation of homogeneous groups of sufficient size, whereas the focus on one typology inevitably results in over-represented groups emerging. In the particular case being examined for the purposes of our study, the presence of a very conspicuous number of Books of Hours contributes to the effective 'sterilisation' of the 'terrain' undergoing investigation.

1 The text 'box': characteristics

The set of problems vis-à-vis mono- and multi-textuality does not belong exclusively to the intellectual realm. Indeed, one cannot disregard the fundamental contradiction that places the 'text' and the 'book' (as objects) in opposition, which effectively consists in the difficulty of crystallising the *verba volant* into the *scripta manent*: a 'textual mass' composed of a given number of words that play out in a given order has to be transformed into a sequence of graphic signs inscribed on a page divided into lines, which in turn are distributed over a certain number of leaves which, one laid upon another, constitute a volume of predetermined dimensions.

This superimposition of leaves means that, apart from the two dimensions which immediately strike the eye (height and width), when books are catalogued or the geometric characteristics of the page are analysed, a third dimension has to be considered, namely the thickness of the text block. Indeed, it is contingent on a book's thickness—and therefore, in effect, on the number of leaves it contains—that in a large part it can fulfil its role as a vehicle of written culture, both in functional (i.e. handling characteristics and robustness) and economic terms (i.e. the cost of raw materials, which, for each material, varies in relation to the amount of it used).

Needless to say, the solutions settled on will vary according to the priority placed on one or another of the various requirements. In this connection, the purchasers and makers of codices had at their disposal a full range of regulatory 'tools' that allowed them (in theory) to achieve the best compromise possible.

However, regardless of the reproduction methods employed and the production and distribution systems in place, the problem manifested itself in an almost identical way throughout time and space; therefore, once the objectives, priorities and impossibilities were defined, the search for the best compromise was entrusted to common sense and the experience of those who planned and manufactured the book. In more than a few cases, the height and width of a volume—i.e. the values which are today incorrectly referred to as its 'format'—are for the most part predetermined by the way in which the book was intended to be used (e.g. for consultation *in loco*, for collective or individual readings, or for transportion from one place to another, etc.). One of the considerations with respect to the dimensional categories imposed by a volume's intended use was the interaction between the length of the text and the factor represented by the 'cost of the raw materials' (which is to say the number of leaves that were required to construct the volume, and consequently, given the variations in the thickness of paper or parchment, the thickness of the text block). Minor adjustments in size and, above all, control exercised over the density of the written page (i.e. the size of the written area and the body of characters) made it possible, in most instances, to decide on priorities at the outset, and to satisfactorily fulfil predetermined objectives.[10]

The above having been said, none of the constituent components of the book is *per se* infinitely 'elastic'; indeed, the page cannot expand or shrink to any significant extent: the writing must remain legible, and the text block must not disintegrate. On the other hand, 'virtual elasticity' cannot always be fully taken advantage of: there are instances where per force the volume has to be issued as a pocket-sized edition, hence its text must be contained within a single volume, and so on. When, for one reason or another, the conflict between the length of the text and the material characteristics of the book under preparation starts to become more strained, the manufacture of a book has to submit to artisanal routines and will demand, in some cases, the application of unprecedented, and sometimes even 'experimental' solutions.

The observations made up to this point have the effect that a pre-established element such as the length of a text materialises as a series of physical characteristics which can sometimes differ. The materialisation of a text is as pliable as the

10 In the medieval context, an important factor should not be underestimated, namely the possibility of intervening on the 'graphic mass' of the text, thereby more or less drastically reducing the number of characters through the use of a system of abbreviations. This element is not, however, directly linked to the set of problems being addressed in the present contribution, and can therefore be overlooked.

limits of its abstract existence are rigid. In particular, with respect to the interaction between the book and the text, it should be made clear that, depending on specific requirements and necessities, one and the same text can occupy, in a codex, a greater or lesser number of leaves. Therefore, the quantity of leaves required for the transcription of a given text is a variable and hereafter will be referred to as *volumetry*. Naturally, the volumetry of one and the same text will exhibit synchronic variations because from time to time different solutions were applied, but it will also consistently show diachronic variations, if some of the solutions that were applied became established norms in artisanal practice.

Appearances notwithstanding, here it should be pointed out that the third dimension of a book presents, intrinsically, characteristics which are more complex than its other two dimensions (i.e. height and width). This becomes apparent as soon as the need to furnish a quantitative representation arises. The overall parameter known as 'volume thickness' combines an arithmetic datum of an analytical type (which it is useful and, indeed, necessary to get to grips with) with a 'man-made' datum of a syntetical type whose value is appraised by eye by the book manufacturer or reader. It is highly probable that to the medieval craftsman the number of leaves in a book had a value that its thickness did not have, and vice versa. Based on specific needs, he would reason either in geometric terms (when seeking to harmonise the volumetric proportions of a book) or in numeric terms, which is to say in terms of leaves, or rather, quires: the latter approach was more useful where planning was concerned, in that the number of leaves and quires was objectively assessable, could be established in advance, and above all could be physically 'bound'.

Because a volume's thickness has these two different aspects, ideally one would measure it in two different ways: in millimetres, and in terms of the number of leaves it contains. However, in practice the first solution is not achievable, for the simple reason that no catalogue mentions the thickness of volumes.[11] Therefore, one is constrained to limit oneself to evaluating the third dimension of a volume using the number of leaves as a unit of measurement. it contains. Thus we shall define the *capacity of a volume* as the number of leaves it is composed of.[12]

11 To this we must add the challenge of obtaining a reliable measurement of the overall thickness: the thickness of a volume can, in fact, vary to a surprising extent due to a number of factors which, in the present context, can be regarded as 'parasites', namely the flatness of the support and the characteristics of the binding. Another factor that hampers the possibility of establishing a linear correlation between the measurement in millimetres and the leaf count is of course the thickness of the writing support, which can show considerable variations in different situations and historical periods (see footnotes 25 and 27).

12 This is the *capacity* that, should the need arise, we can define as *conventional*, whereas we can define the *geometric capacity* as the measurement in millimetres of the thickness of the volume.

The problem as regards the book/text interrelationship presents, from the outset, as a conflict between *volumetry* and *capacity*: not only must the 'box' adapt itself to the texts it has to contain, but the texts, in order to attain a material existence, must in turn adapt themselves to the 'box' they are to be accommodated in. Both parts of the contradiction presuppose that both the texts and the 'box' are endowed with a certain degree of elasticity, but it is easy to see that their elasticity cannot be infinite. In particular, we can liken the 'box' to a flexible container whose depth can vary up to a point, and upon which the volume of the text exerts, as it were, a certain 'pressure' (*textual pressure*). If the volumetry is insufficient, the textual pressure will not be sufficient to make it possible for the 'box' to be created. Conversely, if the volumetry is too great, the pressure will be excessive and the 'box' may 'explode'. Here, it should not be necessary to point out that one is speaking metaphorically, and furthermore that the chosen metaphor is perhaps not the most fitting.[13]

In order to ensure that the 'box' came into being, the artisan could be encouraged to increase its volumetry artificially—a not altogether judicious expedient, since it entails wasting space[14]—just as, conversely, he could be encouraged to 'compress' it as much as possible so as to ensure that it was not too thick. The latter solution was adopted per force in not a few instances. When both of these solutions proved to be impractical, the only way forward was to bundle together two or more texts in the same text block, or alternatively to bind one and the same text into two separate volumes. Viewed from this perspective, the multi-textuality of a book can therefore be considered the result of *artisanal necessity* before it can be regarded as an expression of *intellectual free will*, even if, naturally, the two points of view are not mutually exclusive.

The limits which, when exceeded (by excess or by default), mean that a book cannot take physical form, or would result in it being unusable, cannot be predefined in abstract terms. Instead, they can only be ascertained through direct visual observation.

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13 The 'explosion' of a book—which obviously cannot be taken literally as the detonation of a bomb—can be roughly represented by the breakage of sewing threads and / or the splitting of boards.

14 The possibility should be considered, however, that the waste of space—and therefore of material—might become a functional necessity (i.e. the user has little reading aptitude) and / or fulfil a 'social representation' objective (i.e. the ostentatious nature of the waste reflects the financial standing of the purchaser within the social hierarchy). A less extravagant solution, which could be applied when it did not create a conflict with the way in which the book was to be used, consisted in transcribing a text on to pages of small dimensions.

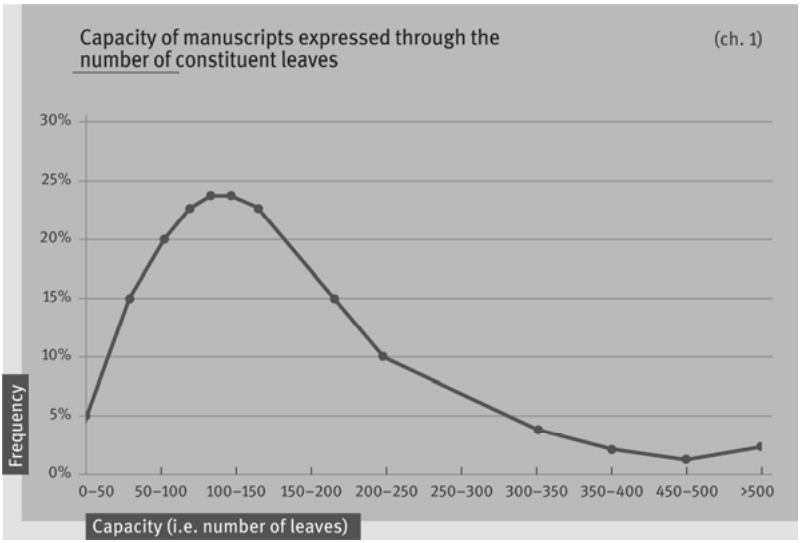

Chart 1: Capacity of manuscripts expressed through the number of constituent leaves

Chart 1 shows the overall distribution of the Western manuscript's capacity from the 9th to 15th centuries. One can immediately apprehend that there is an *optimal zone* where the majority of the codices—composed of between 100 and 200 leaves—are found. Conversely, if one arbitrarily sets as the threshold of viability at the two ends of the distribution a frequency of 5%, the acceptance range where the text block enjoys an independent existence will vary from 50 to 300 leaves.

The picture does not change if the global curve is broken down into centuries, as shown in Chart 2. However, a difference will be noticed between the 'monastic' period and the centuries that followed: at the end of the Middle Ages—and above all in the 13th and 14th centuries—the percentage of codices with a capacity exceeding 200 leaves is consistently higher, and descends to 5% only when the leaf count exceeds 350. During the 9th to 12th centuries, the frequency rate is already nearly 5% when the leaf count exceeds 250, a value greater than that seen in the 13th century in 32% of volumes.

If one 'zooms in' on the codices with a capacity of fewer than 50 leaves at the lower end of the curve (Tab. 1), it will be plain to see that the volumes whose capacity is under 30 leaves are truly a rarity, although they constantly increase in number from one century to the next. Once again, it cannot be excluded that some of these are in fact *disiecta membra* (i.e. scattered fragments) sourced from larger codices.

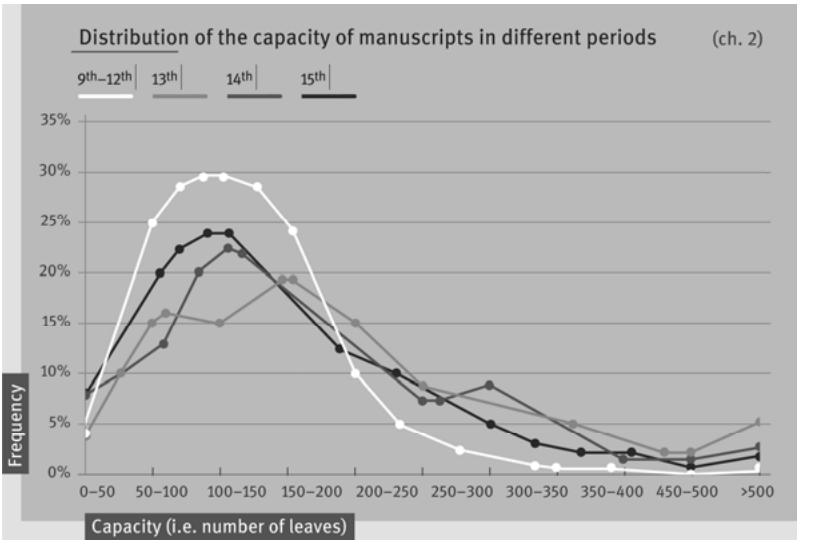

Chart 2: Distribution of the capacity of manuscripts in different periods

Distribution of the capacity of manuscripts (tab. 1)

Capacity of manuscripts	9th–12th	13th	14th	15th
10–20 leaves	0	0	0	10.0%
20–30 leaves	0	8.3%	13.3%	7.5%
30–40 leaves	10.0%	25.0%	33.3%	35.0%
40–50 leaves	90.0%	66.7%	53.3%	47.5%
30–50 leaves	100.0%	91.7%	86.7%	82.5%

Tab. 1: Distribution of the capacity of manuscripts

Concerning the capacity of volumes, once it has been established that the propensity curve is not uniform, one has to ascertain whether or not extra-textual factors (of a material or other nature) exist that influenced the choices made by craftsmen in this regard. One of these factors could be the size of pages. It is known that almost all the elements that contribute to the appearance of a codex are positively correlated to this parameter—above all, the exploitation of the written area, and as a result the volumetry of the texts—owing to the so-called 'principle of propor-

tionality'.[15] One must therefore pose the following question: is the optimal capacity of a book—which is to say the peak of the statistical distribution observed in Chart 1—always the same, no matter what the dimensions of the leaves happen to be?

To answer this question, the population was divided into two size categories,[16] namely 'small' (<400 mm), and 'medium-large' (>400 mm), the respective distributions of which are shown in Chart 3. The two distributions differ significantly: the peak for small codices is located at between 50 and 150 leaves, whilst for the larger codices it is located at between 100 and 200 leaves[17]. The existence of a correlation is confirmed by the evidence furnished by Chart 4, which sets out in parallel, at a global level, the evolution of the manuscripts' capacity, together with that of their size. However, the curve representing all the codices shows an irregular trend among the smaller ones, owing to the (not to be overlooked) presence of volumes that are small but which have large capacities (essentially pocket or so-called 'saddlebag' Bibles and breviaries). Such anomalies tend to disappear as soon as these typologies are eliminated from the sample.[18]

15 For an earlier formulation of this principle, see Ornato 1994, 10.

16 In order to be consistent with previous investigations and established usage, the dimensions of codices are represented by the parameter 'size' (French *taille*, Italian *taglia*), or semi-perimeter, a term which is certainly less well suited than others (e.g. surface area, diagonal) to summarising the concept and representing variations (Gumbert 2001). However, the solution put forward by Peter Gumbert—which is to consider only a volume's height—seems excessively reductive.

17 The divergence seen in the two distributions becomes even more evident if the period spanning the 9th to 11th centuries is considered separately. During this time 'textual pressure' almost never reaches excessive levels.

18 Likewise, one observes a reduction in the capacity of very large codices, which is very likely ascribable to factors of a functional nature (a volume's weight and ease of handling).

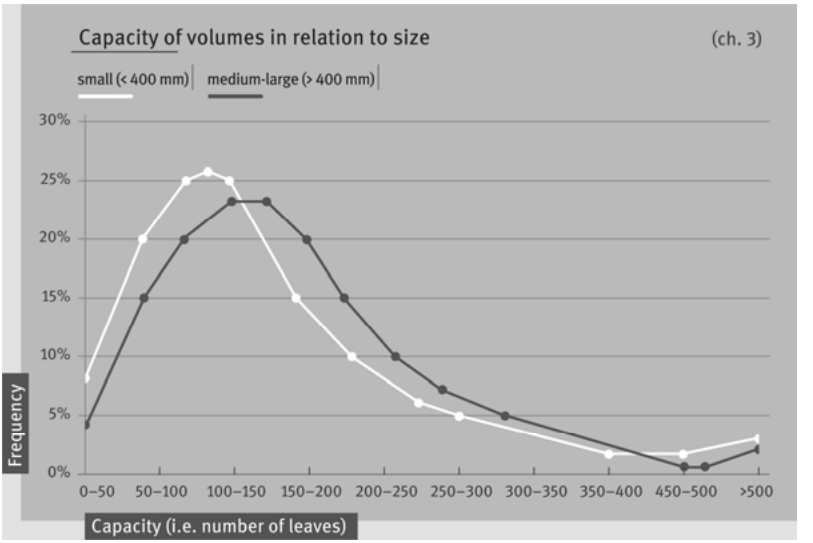

Chart 3: Capacity of volumes in relation to size

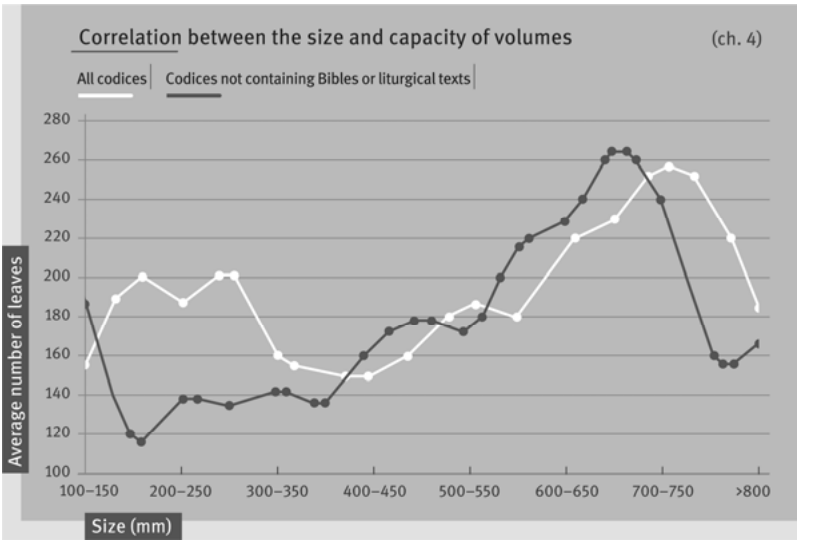

Chart 4: Correlation between the size and capacity of volumes

What, then, is the explanation for the correlation between the number of leaves contained in a book and its size? Two hypotheses can be posited straight away, as follows:

– One is dealing with a mechanical effect exerted by the text block mass: large tomes contain texts of greater volumetry, and therefore the increased textual pressure tends to swell the capacity of the codex.
– The correlation is due to a 'basic principle' effect, which to a certain extent exerted its influence on artisanal practices. Thus, just as in the proportion represented by the two edges of a sheet—which evolves over a small range[19]—one can assume that the proportion of the rectangle formed by the top edge (or bottom edge) of a volume will also be subject to limitations of a not well-defined nature (lying on the boundary between aesthetics and functionality), which prevent the parallelepiped-book from assuming proportions considered in advance to be aberrant. The proportion of the 'edge rectangle', and hence the relative importance of the third dimension of the book, will from now on be termed *bulk* and will be expressed—in the absence of a reliable measurement of the thickness of the text block—by the relationship between the number of leaves a volume contains and its width.[20] Figure 1 illustrates the concept of *bulk* in a clear way: notwithstanding their different sizes, the three volumes shown schematically have the same proportional value and are perceived by the observer as the same object, in the sense that the two larger volumes represent enlarged versions of the small one.[21]

19 In the Western manuscript, the majority of volumes very seldom deviate from the so-called 'invariable proportion' (1/ √2= 0.707). The phenomenon is particularly apparent in paper codices (see Bozzolo / Ornato 1980, 287–318).

20 The numerical value representing the *bulk* will therefore be interpreted as '*N* leaves per centimetre of width'.

21 Needless to say, Fig. 1 cannot illustrate the dual value that represents the concept of capacity as defined above. In fact, just as in the case of capacity, we can distinguish a *geometric bulk*, calculated on the basis of the thickness of the volume, and a *conventional bulk*, calculated on the basis of the number of leaves it is composed of. In this case, too, one is dealing with interdependent parameters, but neither one can be substituted by the other.

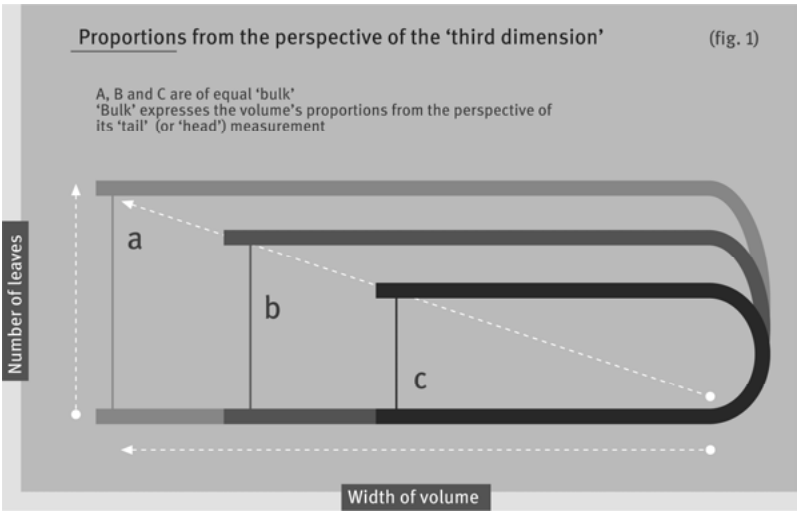

Fig. 1: Proportions from the perspective of the 'third dimension'

If one is dealing with the mechanical consequences produced by exceptional circumstances, the correlation should only occur in larger book sizes, and above all in the 13th and 14th centuries when, as has already been indicated, a remarkable degree of textual pressure can be observed. If, on the other hand, one is dealing with a sort of widespread 'principle', the phenomenon should manifest itself in a linear fashion among all book sizes and throughout all codex production periods.

Chart 5[22] shows, century-by-century, how the phenomenon develops, and confirms the second hypothesis. One can readily see that the period spanning the 9th to 10th centuries stands out owing to a lower capacity value, irrespective of the volumes' sizes. What really counts, though, is the fact that all the curves exhibit the same trend, and above all that their slopes are identical. This indicates that the phenomenon is not dependent on the textual pressure that weighs on the capacity of the volume. If this were not the case, the slope of the curve would be more pronounced for the 13th and 14th centuries, owing to the presence of a not insignificant number of very long texts.

22 In order to eliminate incidental distortions, the chart does not include Bibles or liturgical codices.

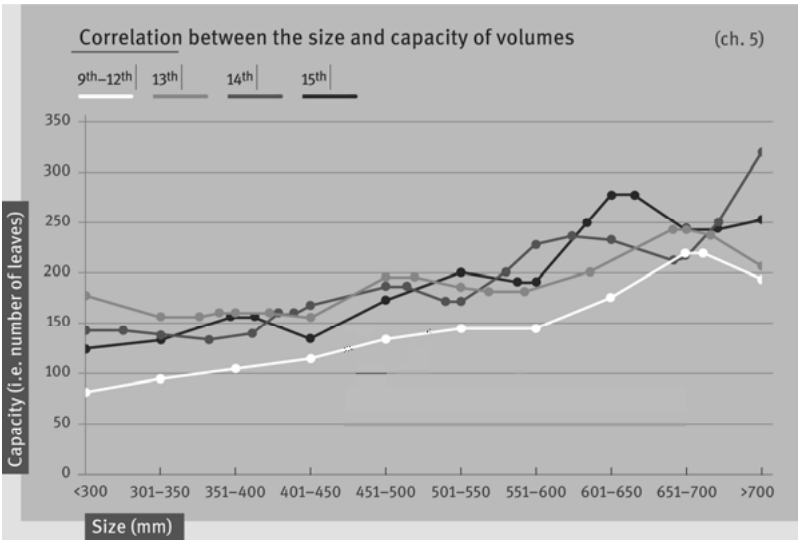

Chart 5: Correlation between the size and capacity of volumes

However, if one is indeed dealing with a principle, what exactly is the 'rule' that had to be respected?

In order to answer this question, it is no longer necessary to verify how a volume's capacity evolves, but instead how its *bulk* evolves in relation to its size.

At first glance, it would seem that the third dimension, despite increasing in its absolute value in relation to a volume's size (Chart 5), decreases in its relative value (Chart 6, lighter line): in other words, a codex tends to be less corpulent as it increases in size. It should be noted, however, that this trend decreases significantly as soon as Bibles and liturgical tomes are removed from the corpus, and that in any event, the *bulk* remains almost constant when a volume's size exceeds 300 mm.

The period-by-period representation (Chart 7) confirms that the excessive *bulk* seen in small volumes is not a result of the 'rule', but instead should be interpreted as an unusual phenomenon arising from exceptional circumstances: the curve corresponding to the period spanning from the 9th to 12th centuries—during which textual pressure was kept within reasonable limits—is, in fact, completely flat, and shows levels that are consistently lower than those seen in the centuries that followed. In essence, one can deduce that in normal circumstances the 'ideal box' tended towards the same optimum proportions, irrespective of its size.

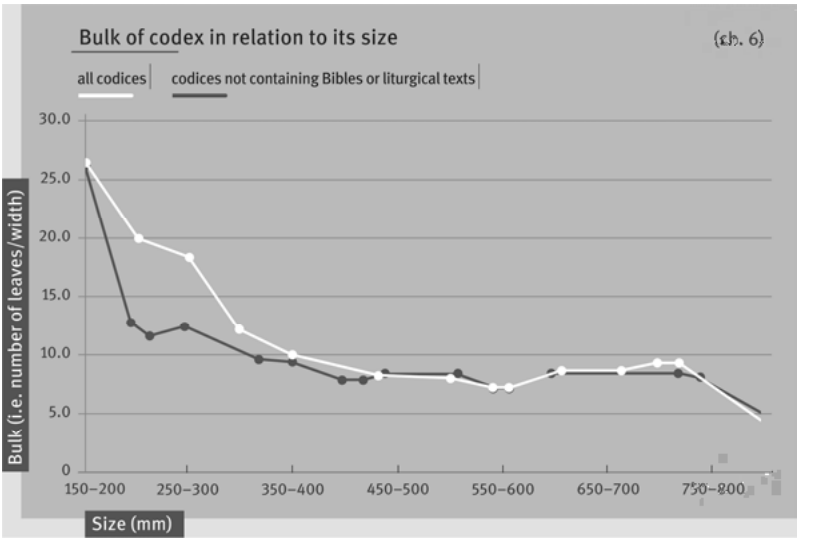

Chart 6: Bulk of codex in relation to its size

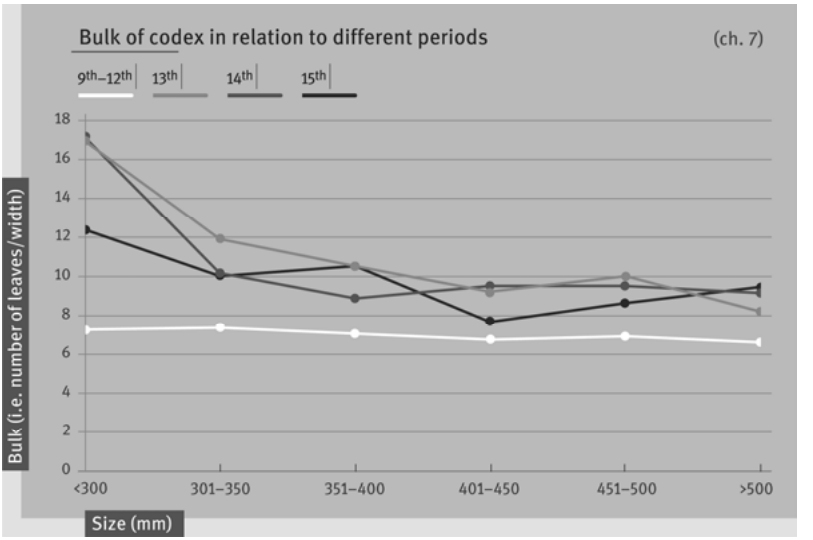

Chart 7: Bulk of codex in relation to different periods

Therefore, the goal aimed at was that of homogeneity (see Fig. 1), tied, however, to relatively low *bulk* values: the constant for the 9th to 12th centuries is, in fact,

roughly 7-7.5 leaves per centimetre of volume width. This means that, for the period in question, a volume measuring 200 mm × 300 mm contains, on average, from 140 to 150 leaves, which is to say 280 to 300 pages, a value that would not seem particularly low or excessively high even in modern times. Thus, the medieval artisan shunned, unless constrained by factors beyond his control, extreme solutions. This is represented in schematic fashion in Figure 2 (i.e. the *blade-form* book, and the *tower-form* book).

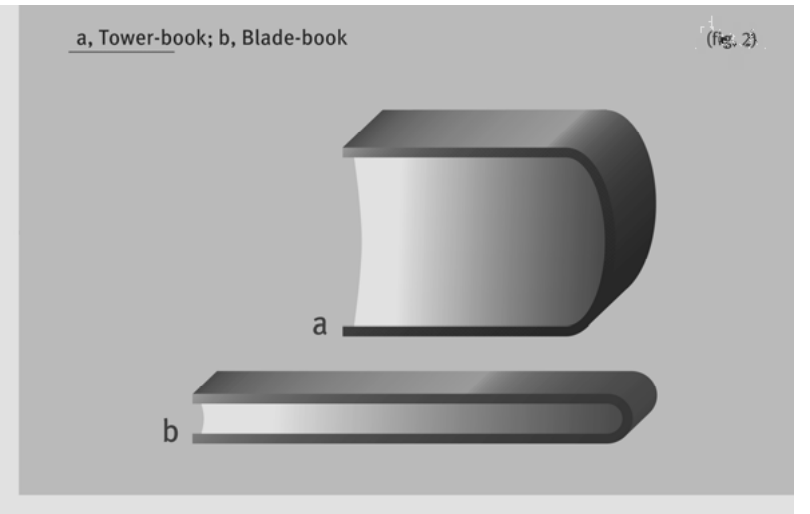

Fig. 2: Tower-book and Blade-book

It is difficult to establish exactly why a volume's *bulk* tended to stabilise around values that to the modern reader seem 'normal'. The simplest explanation—but at the same time the most convenient, and without doubt the most tautological—is based on a sort of 'harmony principle' that is inherent to the aesthetics of the book, and which is ultimately analogous to those which govern the beauty of the human form. In fact, just like our bodies, ideally the book should neither be too fat nor too thin. However, even if it is undeniable that both blade-form and tower-form books do not sit well with the sensibilities of habitual readers or craftsmen,[23] one should also not forget that a blade-form book is not at all cost-

23 Here, the term 'sensibility' is used intentionally in order to highlight the equivocal nature of the users' reaction. Indeed, the line that divides poor taste from an artisan's lack of skill is

efficient (because it unnecessarily increases the number of bindings required) and is inadvisable from a functional standpoint (the splitting up of a long text into numerous volumes increases the risk of their becoming scattered or lost). In the same way, but for different reasons, the fat book (i.e. tower-form) is not well received, since excessive *bulk* increases its weight and has a negative impact on handling characteristics. In addition, an increase in the number of quires certainly jeopardises the solidity of the text block and introduces the risk of splits between the spine and boards occurring. *Bulk* stability can therefore also be interpreted in terms of the optimisation of the book's weight/surface area ratio.

Chart 7 poses a second question: what can we make of the fact that, under the same conditions, the Western codex's *bulk* is consistently greater from the beginning of the 13th century? There can be no doubt that the growth in the number of leaves is attributable to an increase in textual pressure in a straitened economic setting which, simultaneously, is at the root of a far more intensified and carefully calculated exploitation of the written page.[24] However, it is not necessarily the case that the increase seen in the visual *bulk* of volumes was accompanied by an increase in their material *bulk*, inasmuch as it is possible that the parchment used in the 13th to 15th centuries was on average thinner than that employed in previous centuries.[25]

often difficult to identify, and not infrequently even those who make such judgements are unable to distinguish between the two. In any event, it is quite likely that such assessments are made on the basis of a synthesis of aesthetic, economic and technical elements whose individual contributions are no longer clearly identifiable. Also relevant is the fact that aesthetic judgements are often based on a tradition that at one and the same time is seen as a rule and a benchmark of good taste (which those concerned would find 'troubling' to deviate from). In turn, such a rule can itself be the residual product of functional needs, an awareness of which has been lost in the mists of time. A good example of this process is the dimensional hierarchy which can be observed in the four margins of a page (the outer and lower margins are always wider than the inner and upper ones). This hierarchy, in all likelihood dictated by the presence of *lisières* located at the edges of parchment leaves, survived over time and can also be seen in paper codices and printed books, even where it is no longer strictly necessary.

24 See Bozzolo et al. 1984, 197–221.

25 Unfortunately, measurements of parchment thickness carried out (according to the same criteria) on geographically and chronologically targeted corpora are lacking. Nevertheless, the few measurements that are available seem to confirm the hypothesis (see Bianchi et al. 1993, 152–153). On the other hand, it is altogether likely that the use of thinner parchment was motivated by a desire to not increase in an excessive way the visual *bulk* of a volume (see footnote 27).

2 Texts in 'boxes'

Up to this point, we have seen how the text 'box' attempts to adapt itself to different circumstances, either by increasing or reducing its capacity. But we have also seen how its 'elasticity' is far from unlimited, and how, on the formal and functional level, the parallelepiped-book has to adapt itself to proportional rules that it cannot ignore unless compelled to do so by specific cultural imperatives. Needless to say, as has been indicated above, it is more common to see an exception made in favour of a tower-form book than for a blade-form one: only rarely, in fact, does necessity demand the fabrication of large volumes of very low capacity, even if such volumes do in fact exist.[26] On the other hand, it is easy enough to understand that texts which have a very high volumetric value struggle to find their place in the canonical forms preferred by book artisans.[27]

Having carried out a general analysis of the interrelationship between the book and text from the standpoint of the book, it is now time to examine the problem from the standpoint of the text—or rather, from the standpoint of witnesses, given that the volume of one and same text can vary in relation to the material characteristics of the 'box' (i.e. dimensions and *mise en page*), and also because different transcriptions of the same text often exist contemporaneously in different books. (Here, the term 'witness' is borrowed from the lexicon of textual criticism, and is intended to mean any copy of a given text.)

On a more abstract and general level—which does not, to be sure, correspond to the actual dynamic of a process where no space yet exists for planned cultural initiatives—the quantitative increase in the cultural fabric presupposes the production and distribution of a certain number of text witnesses, be they ancient, recent or 'unknown'. But precisely how many? The answer, which is

26 These are choir books which date from later times (the 16th to 18th centuries) which, in order to be within the eyeshot of the members of a choir, make use of very large script and 'super-Atlantic' volume dimensions (up to a metre in height!). Naturally their *bulk* can only be very low, otherwise their excessive weight would make them impossible to handle.

27 The best-known examples are the pocket-sized University Bibles of the 13th to 14th centuries, which often contain as many as 600 leaves. Pocket breviaries can also be remarkably thick, but in contrast to the abovementioned Bibles (which at that time were read, in theory, in their entirety, but not necessarily in a strict sequence, by individuals), these were usually subdivided into two or more volumes (i.e. Santoral-Temporal and / or summer-winter) which could be used separately. It should be borne in mind–even if accurate measurements are still lacking–that the visual 'stress' and physical heaviness of the volume experienced by the readers of such Bibles was mitigated by the use of very thin parchment which, by contrast, was not used in breviaries.

dictated by common economic sense and pure reason, is simple and immediate, namely as few as possible, which is to say only the number that is necessary in order to satisfy needs. Essentially, one is dealing with the difference between already usable volumes—which are kept in libraries or circulate on the market—and the unsatisfied demand at a given time and place. The overall situation is the direct result of individual behaviours: a witness is acquired—and usually only one—exclusively when it is not already possessed.[28]

The situation does not appear to be very different when one no longer considers the problem in textual terms, but instead in material terms. In fact, it is not enough to determine the number of witnesses needed to accomplish a rapid and efficient spread of the cultural message: it is also necessary to define the optimal number of books that make it possible to perform this role at low cost to individuals and to society. However, the problem and its various aspects and are, of course, rather more complex than outlined above.

As is practically always the case, extreme solutions prove to be unfeasible: the fabrication of a quantity of books which is equal to the number of text witnesses would be unviable from an economic standpoint, since it would involve the manufacture of numerous bindings, and raise the risk of their becoming scattered or lost. Such a strategy is also undesirable from an aesthetic perspective, since it would result in a proliferation of blade-form volumes. Equally unsound is the 'Solomonic' solution, which without doubt is the most satisfactory from the standpoint of the box's 'interests'. This consists in placing the total number of text witness leaves into volumes of optimal capacity—a strategy rather similar to the one employed by librarians when they had to jumble together a large number of *membra disiecta*[29] in a miscellaneous codex.

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28 A concrete example of the way in which the said process functioned can be seen in the evolution of library heritage in 14th-century Paris. In the antecedent period, professors and students individually purchased a large number of witnesses of the most 'in vogue' texts that they required in order to carry out their studies. Many years later, the bequest system led to the merging of the witnesses into one reservoir, into which professors and students could dip at their pleasure without having to spend a king's ransom. Very soon, though, the accumulated material exceeded the 'overall reading capacity' of the members of the collective (whose constituent numbers stagnated or diminished due to demographic slippage). As a result, the collective decided to get shot of the surfeit, either so as to purchase witnesses of less well-disseminated texts, or in order to be able to focus on more pressing financial outgoings. The surfeit ended up on the second-hand market, which in fact made it necessary to produce new witnesses (see Bozzolo / Ornato 1980, 89 onwards and 113).

29 Yet, even if it was not feasible at a collective level, this approach was certainly employed by individuals, as is borne witness to by paper codices (above all, those originating from German areas). Alongside the anticipatory planning of a book whose characteristics were defined in

It goes without saying that the relationship between the number of witnesses and the quantity of books can only be the result of a compromise struck among various needs. It also goes without saying that—and it is important to make this point—no matter what dynamic leads to the birth of a book, the filling of the 'box' is not based solely on economic, functional and/or volumetric reasoning, but also on essential cultural needs. The juxtaposing of texts is not a purely random process; rather, it has to respect a certain logic, namely typological affinity and the fulfilment of common objectives, etc. In addition, it should be remembered that the total separation of witnesses results in an excessive fragmentation of the cultural fabric. Conversely, the combination in one and the same volume of related or complementary texts can generate a synergy that would not otherwise exist if the same texts were circulated separately.[30]

The above having been said, irrespective of the pressure they might exert on the book-object, cultural demands cannot overlook the fundamental laws that govern the interaction between books and witnesses. In concrete terms, we can make a simple observation: the overall distribution of the 'number of leaves' parameter (see Chart 1) shows that almost all the texts composed of fewer than 50 leaves were considered of insufficient volume to create an independent codex. Conversely, almost all the texts composed of more than 200 leaves—which is to say those that exceed the optimal capacity of the 'box'—tended to monopolise the entire capacity of a codex, insofar as the addition of further texts would have resulted in a violation of the canons of proportion with respect to a volume's *bulk*. On the other hand, regardless of the degree of affinity or 'attraction' between two texts, it is obvious that two witnesses, each composed of 10 sheets, if put together would not be able to properly occupy an entire codex, just as two witnesses each composed of 300 leaves could only with considerable difficulty be placed together within a single volume. In such circumstances, irrespective

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advance, and which had to contain one or more predetermined works, we can place a concept that views the book as an object *in fieri* composed of quires transcribed at different times (sometimes even years apart), and grouped together—not necessarily in chronological order—once the critical capacity of the 'virtual box' had been reached (either optimal or maximum). This did not simply represent a last ditch practical solution applied by someone who was not able to bear the financial burden of the planned production of a book. As a strategy, it did however have the advantage of modularity, because each text corresponds materially to one or more quires, and therefore the book presents as an object that can be assembled and disassembled according to specific needs.

30 Since the cultural aspects of multi-textuality lie outside the scope of this contribution, we refer the reader to all the other articles published in the proceedings of the *Il libro miscellaneo* conference.

of any cultural considerations, the presence and number of multi-textural codices depends, essentially, on two factors:

– The number of necessarily 'gregarious' witnesses, which is to say ones that cannot enjoy an independent existence. As we have already seen, this effectively means witnesses composed of 50 or fewer leaves. These 'gregarious' witnesses have to be distributed among a certain number of volumes, which results in an increase in the number of multi-textual codices.[31]
– The number of witnesses with volumetric values greater than the optimal capacity of the codices (200 leaves). These tend to stand alone, a9nd therefore give rise to unitary codices. This factor has the opposite effect of the previous one.

The rate of multi-textualism will be as high as the percentage of the first category is large, and in the second category as small as the percentage is low.

What, then, in the Western Middle Ages, does the distribution of the length of witnesses look like? The rather telling answer can immediately be apprehended in Chart 8. The curve refers to the 9th to 12th centuries, but its shape is almost identical to that seen in all the other periods: the number of witnesses with a volumetry of fewer than 50 pages always exceeds 50%, whereas that of codices of equal capacity is lower than 5%.

Such a preponderance of short texts is rather surprising and defies common sense, insofar as scholars of intellectual history and text editors are generally inclined to focus on the most well-known works, which as a result are more widely disseminated and have text masses that are quite large. However, as is often the case, the reality is very different from one's expectations, and regard-

31 Once the need to bundle together short texts within a single volume had been established, their agglomeration could be accomplished in two different ways. Either the short pieces could be bundled together to form one volume, or alternatively they were distributed among several codices containing relatively long texts. The choice between either of these two options did not depend purely on chance, but was also contingent on the content of the texts in question. Indeed, not only could the texts be considered 'gregarious' from a material point of view, but also culturally 'subordinate', if they were regarded as being unsuitable for independent circulation (such texts could also be seen as 'semi-subordinate'; for example, the biographies of authors presented in their works). Any evaluation of 'multi-textuality' should take these somewhat hazy distinctions into account. Here, it should be mentioned that the choices described above were often determined by a number of concurrent reasons, and that the material aspect always exerted its influence: for example, analytical indexes were treated in the same way as 'subordinate' texts, and are normally found agglomerated with the main text. However, if such indexes happened to be particularly large, they tended to take up an entire codex (more often than not this was the case with concordances).

less of the subject being examined—be it the craters of the moon, the volume of gold nuggets, or the length of texts—and regardless of causes, the principle of *minimum frequentius* never ceases to impose its universal rule.

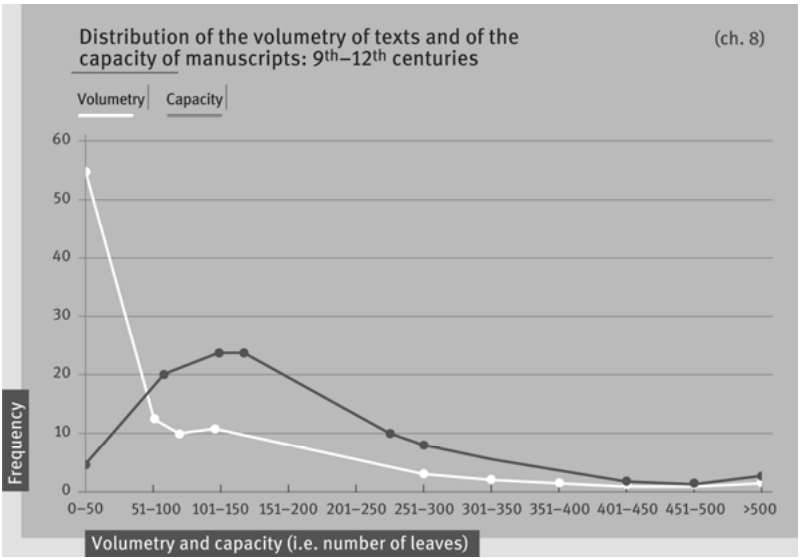

Chart 8: Distribution of the volumetry of texts and of the capacity of manuscripts: 9th–12th centuries

However, an important issue has yet to be clarified: to what extent does the phenomenon observed reflect fundamental tendencies in intellectual output, or instead basic trends in manuscript production? In other words, is the superabundance due to the fact that there was an overall preference for the production of short texts, or instead to the fact that short texts were copied more frequently?

This question leads directly to the practically 'virgin' terrain represented by textual statistics.[32] Up till now, nobody has bothered to evaluate in statistical terms the textual mass of the writings handed down to us from Antiquity and

32 Still lacking, unfortunately, is a foundation of data that would make it possible to carry out a methodical exploration of this terrain. For example, it would be indispensable to have at one's disposal a fund of reliable statistics relating to textual mass (i.e. number of characters) and volumetry (i.e. distribution of the number of leaves in manuscript witnesses) of several representative works originating from different historical eras and contexts.

the Middle Ages. In theory, this is not an impossible task. However, it would be impossible to fulfil the objective by counting one-by-one all the characters in each and every work. One is therefore constrained to substitute a comprehensive count for faster (albeit less accurate) methods, using already available statistical indicators.

The less imperfect solution consists, according to us, in surveying the space occupied by all the texts in a single collection which is as complete as possible, and which has a high degree of typographical homogeneity. Thus, the number of columns occupied by a large number of texts was measured in the *Patrologia Latina*. The *Patrologia Latina* certainly has the drawback of being partial in chronological terms, in addition to being increasingly less complete with the passage of time. Furthermore, the global count is not without distortions. However, these shortcomings are not sufficiently severe as to be detrimental to the validity if the estimate.

The results of the complete survey of the writings of quantitatively significant authors—in the sense that their complete works occupy at least a hundred columns of the *Patrologia Latina*—for a total of approximately 2,000 texts are shown in Chart 9 and reproduced in a more complete form in Tab. 2. The selection was based above all on practical considerations and was aimed at eliminating from the outset the large number of texts whose status has not been clearly defined (such material represents texts, but not 'works' in the true sense of the word).[33] The choice therefore reflects, in its totality, the output of fully fledged authors, rather than mere occasional writers. The exclusion of 'occasional writings' inevitably generates a distortion. However, it should be noted that the inclusion of (whether rightly or wrongly) rejected texts, far from reversing the observed trend, would have disproportionately amplified it, given that they all belong to the category which encompasses short texts.[34]

33 The *Patrologia Latina*—which comprises a total of about 6,000 texts—contains, as is commonly known, a not negligible number of acts, public epistles and other archival documents.

34 So pronounced is the phenomenon that it is not at all easy to represent in graphical terms. In fact, in order to obtain a readable graph, it was necessary to subdivide the length of the texts, expressed as columns of the *Patrologia Latina*, into several logarithmic classes. In practice, this means that the extension of the length classes is not constant, thus the first class includes all the texts of 1–8 columns in length (extension = 8); the second includes all the texts of 9–24 columns in length (extension =160), and so on.

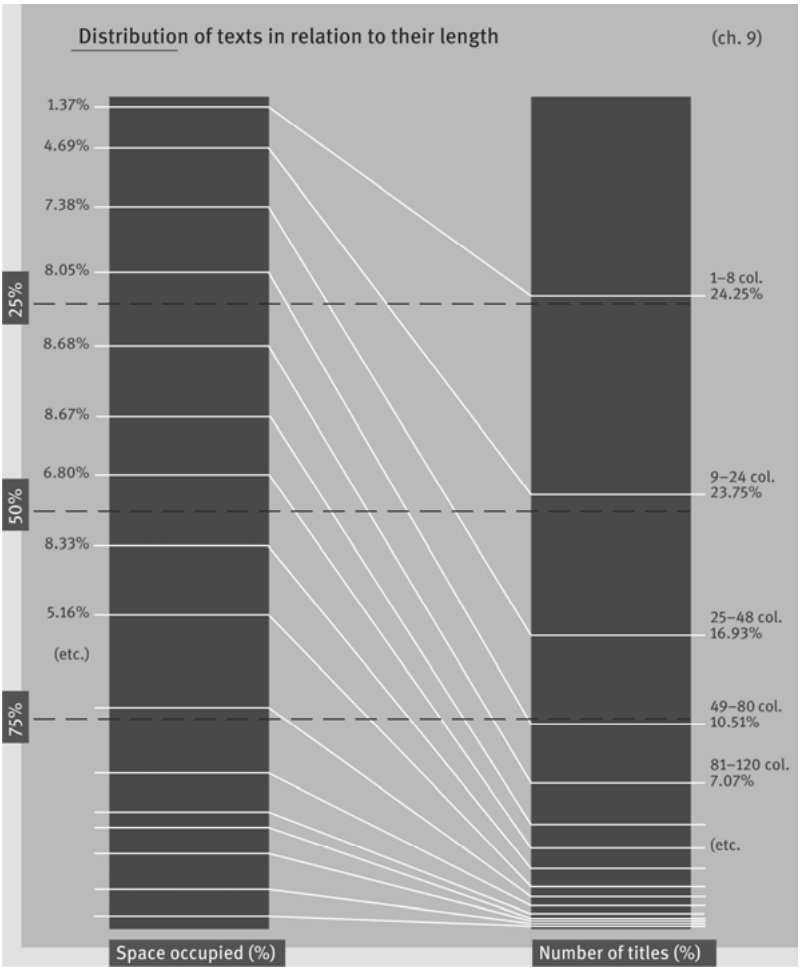

Chart 9: Distribution of texts in relation to their length

The upper sequence in Chart 9 represents the distribution of works in relation to their textual mass. It can be seen, in this connection, that the class of texts which occupy fewer than eight columns constitute, on their own, some 25% of the total.

Distribution of texts in relation to their length (tab. 2)

Length of texts (Columns in the *Patrologia Latina*)	Number of texts		Space occupied	
	% per class	Cumulative %	% per class	Cumulative %
1–8	24.3%	24.3%	1.4%	1.4%
9–24	23.8%	48.0%	4.7%	6.1%
25–48	16.9%	64.9%	7.4%	13.4%
49–80	10.5%	75.4%	8.1%	21.5%
81–120	7.1%	82.5%	8.7%	30.2%
121–168	5.0%	87.5%	8.7%	38.8%
169–224	2.8%	90.3%	6.8%	45.6%
225–288	2.7%	93.0%	8.5%	54.1%
289–360	2.1%	95.1%	8.3%	62.4%
361–440	1.1%	96.2%	5.2%	67.6%
441–528	1.1%	97.2%	6.2%	73.8%
529–624	1.1%	98.3%	7.5%	81.3%
625–728	0.6%	98.8%	4.7%	86.0%
729–840	0.2%	99.0%	1.9%	87.9%
841–960	0.0%	99.3%	3.3%	91.2%
961–1088	0.4%	99.7%	4.3%	95.5%
1089–1224	0.2%	99.9%	2.9%	98.4%
1225–1368	0.1%	100.0%	1.6%	100.0%

Tab. 2: Distribution of texts in relation to their length

When combined with the successive class, which includes texts that are necessarily 'gregarious', one arrives at a figure of almost 50%. The lower sequence represents, on the other hand, the space taken up in the *Patrologia Latina* by each of the classes of texts in the upper sequence, thus one can see that the two previous classes—which are the most numerous by far—occupy only 6% of the total space.[35]

35 In reality, this discrepancy is not at all surprising: it is far quicker and easier to compose a text consisting of only a few pages than to plan, compose and perfect a work of considerable length. In order to invert the distribution presented in Chart 1, it would be necessary for the vast majority of authors to have produced only medium to long texts, which, needless to say,

The large number of texts of low or very low volumetry found in our corpus is in any event a faithful reflection of the fundamental trends seen in intellectual output when viewed from a quantitative perspective. Such trends obviously had repercussions for manuscript production. Indeed, the superabundance was sufficient to render multi-textuality a necessity, rather than merely the result of a free and premeditated choice.

The data presented in Tab. 3 confirm the validity of the two previously defined criteria, namely that the respective number of witnesses that tend to be 'gregarious' and of those which tend to be 'solitary' determines the percentage of multi-textual texts. Indeed, in the 9th to 12th centuries, where one observes the maximum number of witnesses that are necessarily 'gregarious' and the minimum number of 'solitary' ones, the highest degree of multi-textuality is reached, whereas the 14th century, where the situation is reversed, presents the lowest percentage of multi-textual volumes.

It is plain, however, that the percentage of multi-textual codices dating from the 13th and 15th centuries does not coincide with one's expectation: the value for the 15th century should be greater than for the 13th, and this implies that the result obtained is in part attributable to the contribution of factors besides the two already defined basic criteria.

In reality, if multi-textuality is above all an inevitable phenomenon, it cannot be reduced to a mere arithmetical problem.

represents a rather unlikely scenario. To this it should be added that the difficulty of producing and publishing long texts is not proportionate to the number of characters they contain, but certainly increases more rapidly: the more the amount of time to produce a work increases, the more likely it is that circumstances within or beyond the control of the author will intervene and hamper its completion.

Percentage of multi-textual codices and factors which exert an effect on the rate of multi-textuality (tab. 3)

Volumetry of witnesses	9th–12th	13th	14th	15th
'Secondary' (< 50 sheets)	77.3%	60.5%	55.9%	62.8%
'Solitary' (> 200 sheets)	4.5%	21.0%	22.2%	15.3%
Predominance of 'secondary' (variation in the percentages)	72.8%	39,5%	33.7%	47.5%
Percentage of multi-textual codices	44.0%	23.2%	17.2%	21.5%

Tab. 3: Percentage of multi-textual codices and factors which exert an effect on the rate of multi-textuality

In fact, a propensity exists to group together two or more witnesses in one and the same codex that cannot be explained simply by the way in which the 'boxes' and texts interact. This propensity is most apparent in a sort of 'liberty zone', which is to say in codices whose capacities make it possible, in theory, for a not necessarily 'gregarious' witness to either monopolise an entire volume, or to be agglomerated with other witnesses.

The phenomenon can be seen in Tab. 4,[36] which relates to the 9th to 12th centuries. The first column represents the number of codices in the corpus whose capacities are shown in the second column. The third column represents the number of witnesses in the corpus whose volumetry is indicated in the second column. The fourth and final columns show, for a given volumetric value, the number (total and percentage) of witnesses which monopolise an entire codex or which, conversely, share space with other witnesses.

36 The total number of codices in the classes that exceed 300 leaves is too low, for which reason the corresponding percentages were not calculated.

Use of texts in the 9th–12th centuries[36] (tab. 4)

Codices	Leaves	Witnesses	Witnesses forming a unitary codex		Witnesses assembled into multi-textual codices	
11	0–50	687	9	(1.3%)	678	(98.7%)
81	50–100	122	42	(34.4%)	80	(65.6%)
111	100–150	92	58	(63.0%)	34	(37.0%)
89	150–200	73	54	(74.0%)	19	(26.0%)
36	200–250	24	20	(83.3%)	4	(16.7%)
10	250–300	10	9	(90.0%)	1	(10.0%)
3	300–350	3	3		1	
1	350–400	1	1		0	
1	400–450	1	1		0	
343	Total	1014	197	(19,4%)	817	(80.6%)

Tab. 4: Use of texts in the 9th–12th centuries

Clearly, the contradiction between textual volume and 'box' capacity at the opposite ends of table is, for one reason or another, too extreme, so the degree of liberty is practically non-existent. However, in the intermediate classes, where the volumetry of witnesses coincides with optimal capacity, or is at least compatible with the 'elasticity' of the 'box', the choice between mono-textuality and multi-textuality is not automatically determined: over 100 leaves, all the witnesses could be contained within a single codex. Now, this is not in fact what we see: the artisans who created the codices never utilised to the utmost the theoretical leeway they enjoyed to create a mono-textual codex for each of the witnesses whose volumetry would allow for this. Certainly, as the volume of witnesses gradually increases and coincides with the optimal and maximum capacity zone of the volumes, the percentage of mono-textual codices increases, but in any event there remains a fringe element of multi-textual codices that could have been mono-textual volumes but which are not.

It is unnecessary to dwell on the fact that the quantitative analysis of multi-textuality, if one places a stress on material factors of not negligible importance, does not represent an exhaustive treatment of the entire set of problems being addressed. Multi-textuality is a phenomenon which is neither—and indeed cannot be—entirely constrained, nor is it entirely arbitrary; nor, indeed, is it a totally chance phenomenon: in fact, texts obey, in some sense, a sort of 'gravitation-

al force' that generates an attraction, if not a symbiosis, based on affinities of various kinds. If, from a material standpoint, it was necessary to group together texts that were too slim to occupy a full volume, or expand the space available to accommodate a very substantial witness, cases also exist where the agglomeration of texts occurs for purely cultural reasons. Providing an explanation for when, how and why the liberty to group together multiple texts was or was not exercised is the province of historians of intellectual life.

Tab. 5, which presents, for all periods and volumetric classes, the percentage of witnesses that are collected in a mono-textual codex, clearly shows the effect of the freedom to choose: for the two volumetric classes (highlighted in the table) where textual pressure does not spur mono-textuality, nor, indeed, compel it, the 14th century nevertheless presents a higher rate of the same.

Percentage of witnesses that form mono-textual codices (tab. 5)

Volumetry	9th–12th	13th	14th	15th
0–50 sheets	1.3%	2.8%	6.1%	4.9%
50–100 sheets	34.4%	35.5%	45.5%	50.2%
100–150 sheets	63.3%	60.0%	81.1%	74.4%
150–200 sheets	74.0%	71.9%	91.9%	77.3%
200–250 sheets	83.3%	75.0%	85.2%	86.5%
250–300 sheets	90.0%	82.1%	80.0%	80.7%
300–350 sheets	75.0%	95.0%	95.0%	79.4%
350–400 sheets	100.0%	100.0%	100.0%	100.0%
400-450 sheets	100.0%	90.0%	100.0%	92.3%
450–500 sheets	—	100.0%	80.0%	100.0%
> 500 sheets	—	100.0%	100.0%	100.0%
Total	19.4%	33.9%	43.8%	35.1%

Tab. 5: Percentage of witnesses that form mono-textual codices

Before reaching a conclusion, it will be useful to pose three further questions with respect to our corpus. The first question no longer concerns the overall spread of the 'multi-textuality' phenomenon, but instead has to do with how it presents in individual manuscripts. For historians of culture, in fact, the term 'miscellaneous' often conjures up an image of a codex containing a wealth of texts whose grouping together is the product of an individual who was very committed, often actively so, in the cultural sphere. This rather whimsical notion—which we could call a 'Zibaldonesque' syndrome—is thoroughly demolished by quantitative analysis. In Chart 10, the curve described by 'textual diversity' can be seen, which is to say the distribution of the number of texts contained in a single volume. Overall, half of the multi-textual codices—which are already in a minority in relation to the total number of surviving codices—contain fewer than 5 texts and, in the best of cases, the percentage does not fall below 40% (in the 15th century). As for manuscripts that contain more than 10 texts, their numbers range from 11% (in the 9th to 12th centuries) to 16% of multi-textual codices—a real paucity of instances, then.

The final two questions to pose regard the ways in which multi-textuality manifests itself when viewed from two different standpoints.

The first standpoint concerns the concept of *volumetric equilibrium*: a codex can contain *N* texts that each have an almost equal volumetric value, or alternatively it might contain the same number (*N*) of texts, whose volumetric values are unequally distributed, in the sense that there is a *dominant* text (which occupies more than 50% of the available space), or a *prevailing* text (which enjoys a relative but significant majority position).

The second perspective concerns the concept of *textual gravity* in the codex; in other words, if there is a dominant text, one must ask whether or not it occupies a preferential position (i.e. at the beginning, middle or end of a volume), and if so, which.

The answer to the first question can be found in Tab. 6, which shows the average percentage of the rate of occupation in a codex by the majority text and the two successive texts it contains in terms of length in descending order.

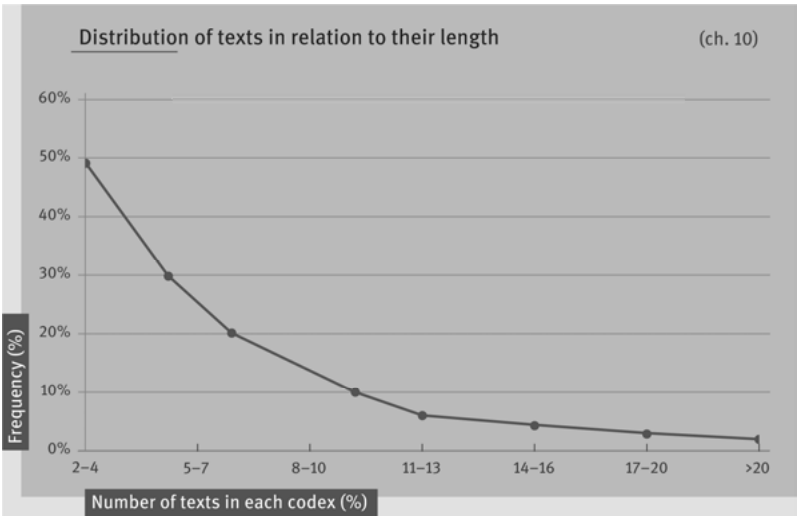

Chart 10: Distribution of texts in relation to their length

In all the periods concerned, multi-textuality is associated with the presence of a dominant text, which reveals a codex's degree of content diversity. A less clear trend is seen only in the 9th to 12th centuries. Indeed, this phenomenon merits being subjected to a more in-depth investigation, but our corpus is not large enough to permit one.

Percentage of space occupied by the three texts of greatest volumetry (tab. 6)

Volumetry	9th–12th	13th	14th	15th	Totality
Predominant text	57.9%	81.3%	77.5%	78.9%	78.9%
Second text	27.2%	40.2%	36.7%	43.7%	37.1%
Third text	11.9%	17.5%	14.2%	15.4%	14.6%

Tab. 6: Percentage of space occupied by the three texts of greatest volumetry

Tab. 7 allows us to verify whether or not a codex really has a 'gravitational centre': the longest text precedes, predominantly, the second in order of importance, and the second precedes the third. The dominant text is *princeps* in all

senses, inasmuch as a volume's textual gravity is in most cases positioned at the beginning of the codex.

Average 'rank' (i.e. hierarchical position) of texts of greatest volumetry (tab. 7)

Volumetry	9th–12th	13th	14th	15th	Totality
Predominant text	1.7	1.4	2.0	1.2	1.4
Second text	2.4	2.2	3.0	2.4	2.4
Third text	2.8	3.1	2.3	3.1	3.0

Tab. 7: Average 'rank' (i.e. hierarchical position) of texts of greatest volumetry

The Western Middle Ages are therefore characterised by hierarchical multi-textuality, which often presents in the form of a 'flagship' text associated with several 'satellite' texts. However, even if the evidence for, and stability of, the phenomenon leaves one in no doubt, the fact that the hierarchy not only of the first, but also of the three principal texts affected their rank within a codex is rather perplexing. We could go so far as to say that when the makers of a codex were filling the text 'box' they were in a sense playing a game of Black Jack, or alternatively they were acting on a spontaneous impulse which induced them to transcribe the texts in order, based on decreasing length. Could it also be possible that the hierarchy observed is simply a reflection of other factors which continue to elude us? Only an analysis of the nature of the texts or the way in which they are associated would allow us to shed more light on this aspect of the problem.

The highly variegated nature of the corpus assembled for the purposes of the current contribution makes it impossible to proceed any further. In particular, the sampling is not qualitatively and quantitatively sufficient so as to penetrate a very treacherous 'swamp' of textual typologies. Indeed, as soon as a sample has been subdivided into chronological, geographical and typological classes, the number of items within each of these declines precipitously, and therefore any inference made becomes questionable. Added to this problem is the difficulty of defining, in advance, a series of fully pertinent typological categories.

The analysis carried out has been quite revealing in a number of unexpected ways: in the Western world, the pinnacle of multi-textuality can without doubt be placed in the centuries preceding the 13th, and very probably—irrespective of the fact

that their effect on the corpus is rather feeble—in Carolingian codices as well. Seen from this perspective, the 14th century seems veritably monolithic. Even if the phenomenon is facilitated by the relatively low volumetric value of component texts, the centuries preceding the 13th represent the focal point of fully fledged multi-textuality, in the sense that the hierarchy among agglomerated texts is not very pronounced. At first glance, this finding is rather surprising, given that on the typological level the cultural fabric is a lot more 'monotonous' than it would be in the following centuries.

One would have thought that by adopting new linguistic, literary and scientific horizons, and by introducing new areas of interest, urban culture, in contrast to the cultural fabric, should have given rise to a proliferation of relatively short and precise texts. Rather, the 13th and 14th centuries are dominated by the birth of new knowledge and the development of new centres of learning which, in addition to centralising the production and transmission of culture, resulted in an *ex nihilo* cultural renewal, based on the production of long or very long texts, a phenomenon that constituted the foundation of a university education system. This state of affairs is perfectly represented by the *pecia* system, which not by chance was born of a necessity to rationalise the concurrent availability of an *exemplar* for high volume texts which otherwise, on account of having to be transcribed into hundreds of apographs, and therefore requiring very long copying times, would have been pointlessly monopolised for months on end by a single copyist.

On the other hand, far more surprising is the relatively contained rate of multi-textuality that characterises the 15th century. However, we must remind ourselves that the population analysed in our corpus is almost exclusively composed of French and British volumes. It is likely that a large presence of Italian and, above all, German codices would have created a rather different landscape. Since this initial phase of the investigation was essentially aimed at exposing the fundamental properties of the third dimension of the codex and its impact on multi-textuality, the poor representativeness of the corpus on a geographical level does not constitute a great problem. Needless to say, the situation would change radically if one sought to frame the evolution of unitary or miscellaneous manuscript production within a historical perspective.

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