DIGITAL PHILOLOGY, MEDIEVAL TEXTS, AND THE *CORPUS* OF LATIN RHYTHMS, A DIGITAL EDITION OF MUSIC AND POEMS[1]

Francesco Stella *

As you all know, the interest in the application of information technology to the study of philology has greatly increased in recent years: teaching on philological Information Technology has grown in many university institutions, and the web sites of many European humanistic Departments (such as London, Duisburg, Munich, Arezzo or Edinburgh) have articulate pages of advice on computerized philology. A debate has also begun in specialized journals and news-lists on the advantages and disadvantages of digital editions, and from Charles Faulhaber's famous 1991 article in «Romance Philology» to Patrick Sahle's 1997 decalogue to some volumes recently published in Italy there is now a very advanced bibliography on the subject[2].

The experiments in Medieval Studies

In the sphere of medieval studies experiments with digital philology – that is, the production of critical editions with the tools and criteria of computerized data processing – are experiencing a

* stella@unisi.it
Università di Siena.

[1] This text reproduces a talk given as a Loeb Lecture at the Department of Classics of the Harvard University on October 2006. An Italian version of a part of it will be printed in Stella 2007.

[2] Testifying to this are conferences such as the ones organized in Florence by SISMEL and IBM (Leonardi 1998), in Rome by Tito Orlandi's and Raul Mordenti's teams, in Pavia and Florence by Reti Medievali, in Verona by the University group leaded by Antonio De Prisco, the yearly seminars of the CliP group (Computer, Literature and Philology), the latest of which took place in June 2006 in London, the Euroconference Computational Philology held in September 2003 in Castelvecchio Pascoli (http://www.esf.org/esf_euresco_conference.php, proceedings edited by A. Bozzi in 2005), and many other enterprises: an overview up to 2001 in the webliographic dossier for medieval studies by Ansani 2001, and Leonardi 2000.

moment of fervent projects: a movement that is difficult to follow both because of its tumultuous, fragmentary, asymmetric, and inconstant evolution, and because of the until now mostly irregular communication among the researchers in the field. In order to improve it internet reference sites have been developed (such as that of Patrick Sahle at Köln[3] or *Digimed* at the University of Siena), mailing lists have been opened with hundreds of registered users (like *Digital Medievalist*), and online journals have been founded, which deal exclusively with computerized philology and which do not limit themselves only to linguistic or literary studies, such as *Jahrbuch für Computerphilologie* at München. But this beginning of an informational coordination does not prohibit perfectly parallel structures, institutes, and initiatives from being created, each unknown to the other but all equally costly and inevitably competitive. Certainly some projects that are presented *ipso facto* as models do not escape general attention, even outside of its disciplinary sphere. One example is Kevin Kiernan's *Electronic Beowulf*[4], by now considered to be a fundamental work – despite the fact that it is a famous *codex unicus* – both for digital philology, for the first successful experiment of a compact and coherent text-image edition, and for Germanic philology in itself. It gave birth to quasi-mythicizing phenomena of the editor, and to emulative projects such as the *Vercelli Book*, edited by Rosselli del Turco, another unique codex of un-ignorable importance for this history of Anglo-Saxon literature, or the facsimile edition of the San Gallo codex of the *Nibelungenlied* edited by Michael Stolz, who later worked successfully on the new electronic *Parzival* (Fig. 1).

In the same field, Peter Robinson's editions have broken new ground, as he dedicated himself to Chaucer and is now working on two works of minor relief like the *Divina Commedia* and the Greek *New Testament*. As for Romance Studies the *La Charrette* project at Princeton, the French-Italian Corpus of the troubadour codices or the pioneering Spanish anthology *Admyte* with 300 Spanish manuscripts and texts up until the 16th century, while Italian philology can boast of exemplary anticipations such as the *Concordanza della Lingua Poetica Italiana delle Origini*, the edition of which, edited by Avalle, came out in print in 1992 and provides a sophisticated electronic concordance, as well as other projects of similar importance, in Pavia or Florence, concerning manuscripts of Dante's works.

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[3] http://www.uni-koeln.de/~ahz26
[4] http://www.uky.edu/~kiernan/eBeowulf/guide.htm

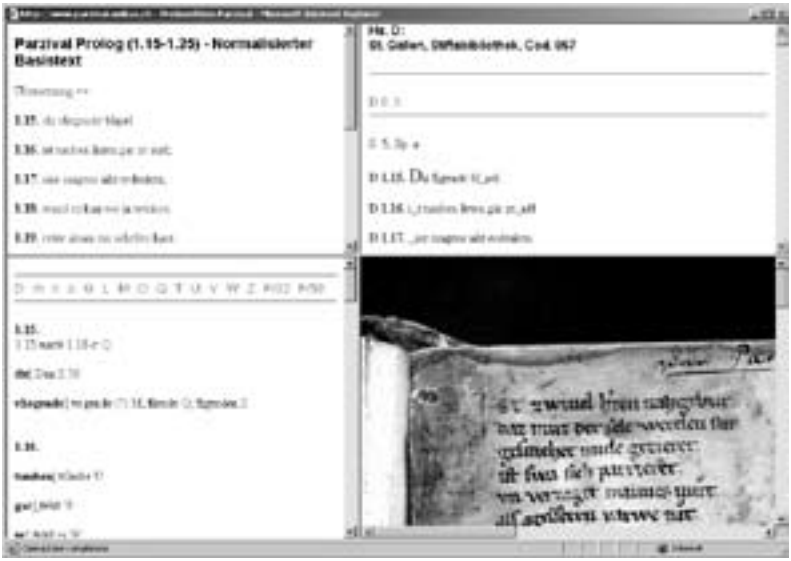

Figure 1 Parzival.

In Medieval Latin and Humanistic philology no editions that can aspire to these high standards has yet been produced. Electronic texts are fortunately and precociously present in many collections, and all of us consult them by now on a daily basis: the *Patrologia Latina Database*, the electronic *Corpus Christianorum*, the ALIM site, the *Bibliotheca Augustana,* the electronic *Monumenta Germaniae Historica, Intratext*. But there are very few critical editions that appear for the first time in digital format. With respect to this Giovanni Maggioni has started a self-conscious experiment, introduced by reflections of great clarity, on his site about Iacopo da Varazze. The few complete critical editions of Medieval Latin and Humanistic texts which we find on the internet regard, instead, the *Planctus* of William Longsword, with a good elaboration of the two examples and of the meager literature, some texts of the anthology of *artes dictandi* of Steven M. Wight[5], the electoral treatises of Raymundus Lullus[6] (Fig. 2), the *Tractatus de captione urbis Brandeburg* of Henry of Antwerp (14th c.)[7], the *De ho-*

[5] http://dobc.unipv.it/scrineum/wight/index.htm.
[6] http://www.math.uni-augsburg.de/stochastik/pukelsheim/2001a.html.
[7] http://golm.rz.uni-potsdam.de/hva/Default.htm.

Figure 2 Lullus.

minis dignitate of Pico[8]. Parts of texts in progress also circulate, such as the *Panormia* of Ivo of Chartres[9], the *De interpretatione* of Noker Labeone[10], the canonistic anthologies of Benedictus Levita[11] edited by Hartmann and Schmitz for MGH, and for late Humanism the *De motu locali* of Galileo Galilei, edited by Peter Damerow and Jürgen Renn[12]. A few months ago the much awaited edition of Dante's *De Monarchia* came out on CD-ROM edited by Paul Robinson, but the application still raises some problems. Each of these present different proposals regarding philological choices or organization of materials, which in some cases we will have the occasion to mention later on. Generally speaking, there is a much more marked interest in creating a digital repertoire of already existing data than in the production of critical texts in an electronic format.

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[8] http://www.brown.edu/Departments/Italian_Studies/pico/index.html.
[9] http://www.wtamu.edu/~bbrasington/Pan1.pdf.
[10] www.textkritik.uni-muenchen.de/hsaller/notker.
[11] http://www.benedictus.mgh.de/haupt.htm.
[12] http://www.mpiwg-berlin.mpg.de/Galileo_Prototype.

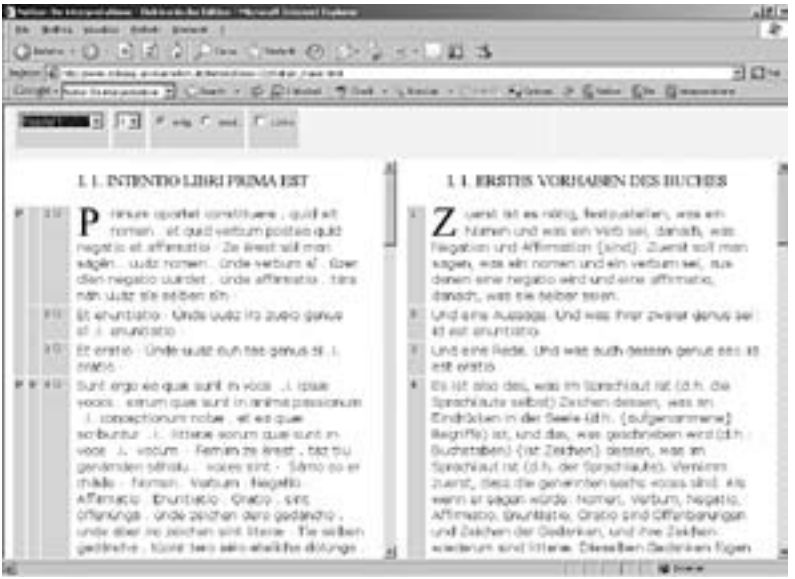

Figure 3 Notker *De interpretatione.*

The edition-archive

The general impression is that the most important results, those in which the specific difference of the digital edition is especially visible, have been reached in cases where the relationship between the manuscripts and the published texts is one-to-one, either because the codex is unique or because the edition proceeds manuscript to manuscript. In this terrain we have been able to open a productive dialogue between digital philology of the texts and digital philology of the documents, or rather the application of data processing to document conservation and archival science, where even today the most visible fruits of the progress in techniques of digitalization are gathered: from the projects on the public documents of Passau[13] to the Norwegian documents to the *Corpus Diplomatico Lombardo* directed by Michele Ansani to

[13] The first of its kind, interrupted however in 1995: see, http://dobc.unipv.it/scrineum/biblioteca/kuhde.htm#.

the *Fontes Civitatis Ratisponensis*[14] of the University of Graz to the *Anglo Saxon Charters*[15] of the Centre for Computing and Humanities in London to the *Liber Matriculae* of Vercelli to the recent editions of French administrative registers at the Ecole des Chartes[16] to the *fondo mediceo avanti il principato* at the National Archive in Florence[17]. The flourishing of digital editions of documents is in a period of full expansion and for this reason is becoming the very terrain of experimentation in new techniques, which in this case are above all techniques of marking the image in order to render it parallel to the text and sensible to the mouse, and to individualize formats of presentation of the textual, historical, bibliographical, and iconographic information about the work, which in some cases advance ambitions to create universally accepted standards. An example of this is the *CIE, Computergestützte Integrierten Edition,* created in about a decade from the experience of the above-mentioned *Fontes Civitatis Ratisponensis*[18] and based on the system of κλείω of Manfred Thaller, which allows each edition to become a part of a network of databases that are correlated among themselves on the web, therefore becoming reciprocally more powerful. The strong point of this system is precisely the progressive creation of a repertoire of non-complementary data from heterogeneous sources. Besides being in an agreeable and practical format for consultation, it also more specifically develops the technology of connecting the manuscript to the transcription and to the edition, with all the information that one wants to connect.

From this universe are born the techniques that later philology applies, for example, to the study of the autograph manuscripts like Boccaccio's *Zibaldone Laurenziano*[19], edited in Rome by the group of Raul Mordenti, who deeply insists on specifically graphic, codicological, paleographical, and iconographical data of the manuscript as an author's creation in which the material element takes on philological relevance.

This development in the techniques and in the projects based

[14] http://bhgw20.kfunigraz.ac.at/.
[15] http://www.trin.cam.ac.uk/chartwww/charthome.html.
[16] http://elec.enc.sorbonne.fr/.
[17] http://www.archiviodistato.firenze.it/Map.
[18] http://bhgw20.kfunigraz.ac.at/.
[19] http://rmcisadu.let.uniroma1.it/boccaccio (and, in this volume, the contribution of O. Feliziani).

on unique or singularly undertaken is bound naturally and more or less happily (depending on one's point of view) with the growth of a sort of movement launched in 1989 by *In Praise of the Variant*, a small volume in which the Romanist Bernard Cerquiglini highlighted the shortcomings of traditional philology and reevaluated the philology of the single manuscript as the only method capable of reaching the mobility, *mouvance*, of a medieval text. Cerquiglini has been highly criticized but has evidently struck a note that is by now ready to sound off in Medieval Studies across the world, if it is true that for more than 10 years it has generated anthologies, conferences, and colloquia from Germany to France, from the United States to Holland and Canada[20]. This debate has favored the coagulation of a future discipline self-defined as *New Philology*, or *Neue Philologie,* which, as is known – basing itself on a mobile, fluid, *unfester Text* – proposes a philology that corresponds more to the real conditions of fruition and transmission of the works, by freeing itself from the idea of the author and text that is inherited from neo-Classical and Romantic culture. In most recent years the concept of the 'unstable' text has become diffused, and was first studied in an American anthology in 1997[21], and in Germany scholars have begun speaking of an 'old' and 'new' philology[22]. In a recent German collection dedicated to the 'unstable' text Jan Ziolkowski applied the concept to the Middle Ages, proposing the definition of the 'transitional' text: «the Middle Ages is an era of what are known as transitional texts – texts that exist in a variegated middle zone between authorial texts and verbatim transcriptions of oral traditional performances»[23]. For Ziolkowski medieval culture, as a culture of the manuscript, juxtaposes the idea of the mobility of writing to the perception of fixity that we acquired with the custom of printing. It is precisely this consideration of the material conditions of production of the text that allows for the reconstruction of its hypertextual and non-linear character, due to the presence of visual inserts, musical notations, glosses, decorations, cross-references. The manuscript offered the reader a plurality of levels of meaning and a capacity for interactive enjoyment, for disassembly and reassembly of the text that printing took away from us and that, however, computerized apparatuses can restore. Aspects of traditional philology are put in doubt, especially those such as the

[20] See also, in this volume, the paper by L. Leonardi.
[21] Cohen 1997.
[22] Gleßgen-Lebsnaft 1997.
[23] Ziolkowski 2001, p. 118.

comparison of value between an archetype postulated and reconstructed by the editor and physical examples, which the method tries to reduce to mere carriers of variants. New philology, however, tends to present these physical examples as objects worthy of study in themselves, because they represent an autonomous cultural project in conjunction with the environment which requested them and produced them, with the public that expected them and with that which effectively read them, with the scribe's and then compiler's system of expression, and so on. The positions of this *new philology* that were somehow anticipated in Italy by Pasquali, and then by Contini, Avalle, Segre and others, have been received, however, in a critical manner in Europe, and especially in Italy. They have, however, been found in recent years in singular and probably not entirely casual consonance with the important push towards historical editions – that is, in archival science – that we have seen flourish almost everywhere on the impulse of the historical research that dominates in the world of medieval studies. From our point of view, the question that arises is if a preferential relationship exists between the digital critical edition and this philological approach. In fact, Cerquiglini recognized in the computer – even if accidentally and in years in which it could have only been a dream – a privileged instrument for the realization of the new philological approach, but he did not follow through with the idea at all. Now, his direct and indirect, or even unconscious, supporters find themselves in the condition of being able to make his prediction come true, and of verifying its usefulness, but above all of recording its convergence with paths that medieval philology as a whole is autonomously taking. One of the points of interest is the relation between digital philology and the reconstruction of an original text or archetype. One often hears people say that digital editions would renounce this kind of reconstruction. This sometimes happens, especially in the field of Romance or Germanic philology, but not as a consequence of the adoption of computerized instruments and methods, rather as a consequence of the philological methods that are dominant in Romance and Germanic philology – even in the realm of print artifacts. Such is the situation for the editions of *Lancelot* and *Parzival*. But this is not the only possible path nor is it the most adequate for digital representation. Rather, Peter Robinson has illustrated with great visual efficacy how an opportunely managed digital apparatus con be much more versatile and functional than a print apparatus. The digital apparatus furnishes on request information on determined groups of codices (Fig. 4),

Figure 4 Robinson 2002 – Apparatus with selected witnesses (2 mss.).

it even presents visually the families that are formed from every copy or group of variants, it helps the researcher to individualize the affinities using color (Fig. 5), it even furnishes examples of the partial relationships between stemma that are created on the basis of one or more textual innovations.

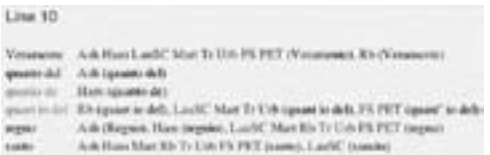

Figure 5 Robinson 2002.

In digital editions a specific form of apparatus tends to be developed, the so-called 'horizontal Kollationspartitur'[24], in two 'complete' or 'interpretative' versions (Fig. 3).

An example of this is in the famous edition of Chrétien de Troyes' *Lancelot*, compiled at Princeton by a Franco-American team between 1997 and 2001 (Fig. 6).

In the medieval Latin texts that we mentioned earlier we find ourselves in front of very different solutions: the collection of the *artes dictandi* limits itself to making accessible on the internet in.PDF format critical editions that do not exist in print[25], and even the Ivo of Chartres by Bruce Basington presents on-line texts that represent specific branches of a work's manuscript tradition that are not available in extant collections; the editions connected with Benedetto Levita add the HTML version to the PDF, with a scrollable apparatus at the bottom of the page. The *editio princeps* of the electoral treatises of Raymundus Lullus (1232-1316) edited at Augsburg by M. Drton, G. Hägele, D. Haneberg, F. Pukelsheim, and W. Reif is made, however, of transcriptions connected phrase by phrase to the image of the manuscript evidence and to a modern

[24] Stahl 1991.
[25] http://dobc.unipv.it/scrineum/wight/index.htm.

Figure 6 La Charrette – Apparatus.

language translation (Fig. 2), while the *De interpretatione* of Notker III of San Gallo published by Harald Saller in Munich produces complex apparatuses that allow for the optional visualization of the critical apparatus, or of the commentary, or of the sources or even of the text with the original punctuation (Fig. 3).

Technical innovations and methodological innovations

The new aspects that digital editions are introducing and that can have consequences on the philological method are obviously connected to the technical potentials of the tools, which it is possible to summarize in the four points that we find in any computer manual: the possibility of managing quantities of data that are not publishable in book form; the possibility of making connections between data with a speed, precision, and complexity unreachable by one or more books; the possibility of interaction with the scientific community in times and extensions that a book does not allow for; the possibility of including non textual data. Quantity, interrelationality, interoperability, and multimediality.

a) Let us begin with the first point: **Quantity**

The theoretical availability of materials related to the entire tradition of a text – specifically: transcriptions, and even reproduc-

tions of every manuscript and every printing – produces two relevant effects. It includes in the philologist's sphere of observation phenomena that in the enormous majority of traditional editions are excluded or overlooked, and at the same time, in connection with this change, it renders more and more acceptable – in my experience – editions founded on the choices of the philologist that are not immediately verifiable by the researcher.

The possibility of and the need to stop over each single piece of evidence broadens, that is, the sphere of investigation to elements, like punctuation, graphic variants, the *mise en page*, which today one tends to value much more than in the past, for the linguistic study of the transcriptions or of the comprehension of the real manners in which the public of the epoch read or "performed" the text.

This method, unrealizable in print editions, seems to fulfill the ideal prospects indicated by philologists of an absolutely traditional methodology, like the Italianist Domenico De Robertis, according to whom a good critical edition is only that which furnishes the reader with all of the useful documentation necessary to evaluate it and to induce the production of another, perhaps different edition that is nevertheless based on the same materials. The quantitative availability of the computerized medium tends, that is, to reduce the margins of choice that the limits of print rendered inevitable and therefore tolerable.

The availability of space offered by the digital edition introduces, therefore, a premise of *verifiability of choices as a condition of scientific reliability.*

b) Relationability

The second characteristic is the capacity of relating the data to one another. Digital editions are able, at least theoretically, to connect the management of complex traditions and multiple systems of data to the interest for the history of the reception of each single piece of evidence. In the *traditions with a high number of manuscripts* this can, for example, open means for overcoming the method of sampling that, besides being risky and therefore unscientific for the unsampled passages, is impracticable mosaic works or those of a mobile composition such as Isidore's *Etymologiae* or collections of poetry, and ends up debasing the socio-cultural autonomy of the manuscript evidence since it is valued by the editor as not fundamental for the reconstruction of the text. Even the *texts with multiple editions and with a mobile archetype* about which we spoke earlier can probably be better represented by a digital edition than by a paper edition, especially for editions with a number

higher than what is printable in a book's synopsis – usually two.

In addition, the ability to manage data that is presented in multiple or dynamic formats without imposing page, chapter, or volume changes seems particularly fitting for representing the *chronological dimension* of a text. The conventional edition privileges, in fact, a single stage of the tradition, and since it does not hardly ever allow for the cross-checking of the editor's choices, it creates a potential for falsification for whoever wants to base the study of the reception of an author on that edition. As R.B.C. Huygens had the occasion to write after a close examination of the disasters that were introduced by creative philologists in the editions, "even if you try to reconstruct the oldest attainable stage of the manuscript tradition, which should be your aim, you must nevertheless be aware of the fact that [...] the original itself played much less important a role, if any at all, than its often defective descendents"[26].

In a conventional critical apparatus the necessity to record such a mobility of the text would constitute an almost insurmountable problem, and it would be added to the problem of the stratification of intertexts, for which four separate levels have long been invoked, respectively: quotations, sources, parallels, and fortune. How can all of this be managed by a print edition?

An analogous problem is posed by the representation of the *geographic* dimension of a text. There are texts that have had different elaborations in different regions of medieval Europe, and it is important for the history of a place to be able to establish in what form that text was effectively known[27]. This is a typology of information that the print editor can theoretically accumulate even

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[26] Huygens 2000, p. 39.

[27] Exemplary cases are the Minio Paluello's edition of the Latin Aristotle, which holds the variants in the apparatus and specifies the possible regional connotation, or anthologies such as the Legenda aurea or the Adbreviatio by Giovanni da Mailly, which, as is known, present every redaction, partially reconstructable, with the territorial diffusion circumscribed. A recent article proposes the hypothesis of an edition of the *Panormia* by Ivo de Chartres, the most influential canonistic collection of the 12th century that includes, however, the canons that are absent from Migne, and perhaps in the original, but that are present in part of the manuscript tradition, and as such influences on the canonistic legislation of a specific European region with concrete consequences on the historical and social level. An analogous consideration is made by Arno Mentzel-Reuters about the *Chronicon pontificum et imperatorum* of Martin of Troppau (before 1230-1278), carried by more than 1000 mss., and in general about texts for which it is indispensable to know the form assumed by the text in specific regions, or in different epochs, or phases of transmission, etc.

in a traditional manner – that is, in the form of variants and not of whole texts – and then stuff into an overgrown multi-level critical apparatus, or juxtapose in an inconvenient and incomparable manner, two, three, or four different editions of the same text in a single book. But at that point the deduction of the form that the text has taken on in a specific epoch or in a specific region requires an exceptional effort from the researcher, not to mention a sort of eschatological recomposition of the *disiecta membra* into a new organism. The "mobile" apparatuses and the recallability of digital editions, however, allow for the same verification with an incomparably smaller effort and a less threatening visualization.

c) Interoperability

The third aspect evoked by the definition of the characteristics of the computerized edition is that of the *interaction with the scientific community*, which could be named 'interoperability'. Think about the time that the publication on paper of an edition requires, the time it takes for commercial diffusion, for making it available in the library, then for the critical reflection of the reader and the writing of a critical response, for the proposal of the response to a journal, the review of the response by the journal, the publication of the response in the journal, the commerce and distribution and finally, after the necessary operations of the library bureaucracy, making the journal available to the public and the reading of it by the editor of the original publication. A that point a problem is posed: how can the print edition that came out only two or three years before have consideration for the new proposals? For the corrections of the reviewers? For the new manuscript discoveries? With the impossibility of updating a book that is by that time closed if not with the addenda that no one with ever consult it, we let a scientifically overcome work circulate and notes and responses keep being written and reactivate this slow and dispersive circuit. For a dialogue between editor and critical reader years must pass, by means of operations that take only a few minutes in a digital process[28]. An already functioning example are the so-called *pro-editions* that are more and more used for the *corpora* of papyri; for example, those of Oxyrhynchus, which allow for the

[28] Westra 1993. The author describes this aspect in the framework of a «post-textual philology» that elevates the process on the product, or better makes the process the product. It seems to us that the reduction of the dead time of the process of editing to a scientific product improves the quality very quickly.

beginning of a scientific discussion on the basis of an electronic proekdosis, before fixing any definitive decisions in a volume.

d) Multimediality

The possibility of including audio or video in an edition is a promise that on its own would be enough to justify the adoption of a digital version for every print edition. A book is able to sing? The recent reevaluation, from Zumthor on, of the orality and performativity even of prosaic texts, according to the reading instructions of the medieval themselves, has diffused the awareness that sung texts need editions that sing too. If they cannot make an univocal representation of the modalities of execution of the original neumes they can, nevertheless, by limiting themselves to performing the modern transcriptions, help people realize that it was a matter of texts almost always composed for a reading different from our own silent reading. Even this can be defined, as one wishes, as an interpretative consequence of the possibilities offered by the new instruments or rather as the realization, finally possible thanks to the new instruments, of the old demands already made in the most advanced criticism.

Reservations

Since the series of advantages has been exhausted, I would like to conclude now with some observations on the problems that the digital edition presents. It is not a matter of the usual complaint about the duration of computerized formats: those who manage a paper-based library or who have to contribute to supporting the costs of one knows well that even a library of printed volumes doesn't have a duration that is completely independent of the physical construction of the stacks, of the manager's care, of the repairs on the pipes that leak in the walls or in the roof from which water might drip on the books, of the collection of dust and the subsequent cleaning, of the availability of electric light, of the acquisition and cataloging of new volumes, of the refitting of the shelves, of the fire protection system, of the search for financial support and competent personnel, and generally of a series of maintenance projects and long, costly, and not at all automatic operations that can very well be permanently imminent, and with must less expensive costs, even for the electronic instruments.

The problem, however, is another, a problem of knowledge. Computerization in fact offers all its advantages at the price of

a generous employment of resources and energies and of learning and constant updating of competencies that are distinct from those of philology and often not less complex. The high number of textual, linguistic, and cultural data that the digital edition can furnish with greater facility, completeness, and legibility compared to the print edition must nevertheless be acquired before all with the organizing, reading, and collation of materials, just like for the print edition. In a second phase one must add to these operations the burden of digitalization and, in many cases, the labor of transferring the data into a structured archiving program, or, the pain of the marking or SGML, XML or other code, that still keeps far from this sector the people who are intolerant of the huge waste of time that it brings along. And yet, a digital edition is almost never conceivable without the encoding of the data. On the one hand it creates the need of intermediate technicians who substitute the figures of the specialized editors in the publishing houses and who do not yet exist, and on the other hand, a new standard of the critical edition is created, one notably higher in quality and quantity of required work, with which it will be inevitable to measure print editions, which will continue to proliferate as a certainly more accessible and convenient outlet, founded on more familiar and verifiable techniques. They will gradually specialize themselves, I think, on texts for which the digital edition brings no substantial advantage, perhaps following the distinction made by Roger Laufer between *textes à lire* and *documents à consulter*[29].

Fundamentally three theoretical models seem to be useful in making available quantities of data which a printed work cannot manage, and to make this data available simultaneously: these are the hypertext model, the codified model and the database edition. The hypertext edition would connect the critical text to the apparatus, to the contextual documents, to the various types of other texts, to *loci paralleli*, models, sources, to which the principal text is connected: this option would immediately render a poem's plurality of intertextual strata perceptible and usable as if it were an exegetic treatise. These intertextual strata would be connected to the text in question by using hypertext links or graphic instruments such as iconic buttons. On the other hand, the codified edition has to face the well-known problems of creating a dtd and encoding any single text, and is the most popular model adopted

[29] Laufer 1988, p. 117.

by editors of documents from individual sources. The database edition utilizes the resources of Information Technology in order to overcome the problems of many-sided traditions, multiple versions and re-writings of the text. As never before, the three typologies could confront the relationship of these poems which have language and dimensions habitually extraneous with the printed editions, including the music added to many of the witnesses. In this case computing technology would help philology restore the close relationship of gesture and voice with the verse which, as has been shown by Paul Zumthor among others, represents a constitutive factor.

The third digital model is proposed for the publishing of the *Corpus of Latin Rhythms 4th-9th Century*, that is to say, the corpus of the first Latin poems in stressed, i.e. non quantitative versification, a collection of texts whose forms and varieties cannot otherwise be consulted in their entirety. In fact, as is well known, less than a third of the texts have been published in a discontinuous manner in the six volumes of the *Poetae Latini aevi Carolini* of the *Monumenta Germaniae Historica* by Dümmler, Traube, Strecker and Fickermann (1891-1953). But a great part, which the *Monumenta* had excluded from their editorial project, was only published in the *Analecta Hymnica* on the basis of philological criteria which are no longer accepted, or in manuscript Catalogues, in academic journals, in single author editions, whilst other texts are still unpublished. Even for the texts already published in the *Monumenta Germaniae Historica*, many manuscripts unknown to the previous editors have been made available during the last thirty years, which in some cases significantly modify the tradition's shape. So the proposal of collecting an entire Corpus of early Medieval rhythmic texts arises, one which would allow the complete documentation of the rhythmic phenomenon through the centuries of its formation, and would consequently permit the collection of homogenous data. Beyond the editing, the scientific objective is the study of the origin of this versification and the utilization of rhythms as documentary evidence of the linguistic transition from Latin to early Romance.

From 1998 to 2000 the research group composed by scholars of various European universities met at three annual conventions: in Arezzo, in Ravello and in Munich and set in place the basis of the first collected edition. The census-taking phase for the texts and manuscripts initiated by Konrad Vollmann and Alessandra Terracina gathered a list of over 700 texts handed down from over

1500 manuscripts which do not belong to a single tradition and even less so to a single *recensio*. The initial explorative transcriptions were carried out with great generosity by Konrad Vollmann, Pascale Bourgain, Peter Stotz, Carlos Pérez González, Edoardo D'Angelo, Paolo Zanna, Corinna Bottiglieri, and the paleography group in Arezzo[30]. Whilst there was a significant increase of texts and manuscripts compared to the number expected, it would have been difficult for the rhythms to recur was made to the traditional so-called Lachmanian editorial model. The objective of this model is the reconstruction of a single archetypal text, if not the actual original text, on the basis of the existing attestations. As is also the case with other medieval text typologies, it is well known that the application of this model in most textual traditions does not suite the conditions of editing and transmitting Medieval Latin poetry. This opens the way to philological methodologies which bring philology closer to paleography and to archives studies where the value is in the document, perhaps thereby distancing it from literary criticism in which the value is in the author's product, an object that we are aware is not accessible for the early Medieval period.

This requirement for historical fidelity is all the more sensitive and justified in a tradition such as this of poetry frequently associated with musical notation, which very often varies from manuscript to manuscript and cannot always be brought back to a common melodic schema. In this way, in an edition of this poetry, the Corpus sets out the first experience of interdisciplinary philology which is both textual and musical. The interest in the musical edition of the text's historical forms (edited by Sam Barrett through work lasting many years), has also brought about the inclusion of the transcriptions of the melody on staff as interpreted in the past by scholars such as Coussemaker, Sesini, Vecchi, etc. Giacomo Baroffio and his choir have recorded the vocal execution of these transcriptions.

Following this line of argument the Corpus proposes a type of "open" edition offering a critical collection of material capable of being re-used in different scientific projects. In fact, the Corpus includes all the textual versions as autonomous entities, furnishing a reproduction of the relative manuscript sources, and associating

[30] For the history of the project see Stella 2002, and K. Vollmann 2002, ibid., pp. xiii-xviii; for the scientific outlines of the digital edition see the forthcoming edition of the Corpus Rhythmorum, vol. I.

it with the manuscript's musical version and sung execution of the relative historical transcriptions. The only way currently known to achieve such a compendium of textual forms in different languages is through Computing Technology. Therefore, a database of the rhythms has been produced, named by the acronym DBR, in which all the text's versions can be consulted – whether verbal or musical – enabling their comparison with the original manuscript document. A model has therefore been constructed in which beside the reconstruction by the editor, which usually is called an "edition", the text is readable in the *real* attested versions on manuscript documents in their autonomous entirety, and so not only in the historically abnormal form of variations of a hypothetical original (so-called "variants"). This process, without giving up the perception of the entire tradition, overcome the distinction between a Text reconstructed by the editor and the many transmitted texts, usually shattered, misrepresented and left unrecognizable in the apparatus of the variants.

The edition therefore presents the texts in seven different forms:

- manuscript reproduction
- diplomatic transcription of the verbal text
- diplomatic musical transcription of the neumes
- alphanumeric musical transcription of the notation
- "historical" transcript on staff of the medieval melody
- vocal execution of the "historical" transcription
- critical edition, in the traditional sense.

The programming of specific software has allowed complete cataloguing of the texts on the basis of their metrical and linguistic characteristics in addition to their musical and philological aspects. This allows the metrical and the linguistic or historical data to be cross-referenced in the consultation. Researchers can select, for example, the VII century Burgundy texts in rhythmical septenaries, or the *e/i* exchanges in the 9th century texts, or the musical typologies associated with a certain metrical schema or literary topics, or the association between a particular lay-out and a certain type of text.

The project's completion has required the elaboration of transcription norms for both the text and the music which are readable by the computer, and has given boost to the research for new systems of linguistic and metrical description. To achieve this end, firstly, interrogative grids have been placed in the DBR, under the

guidance of Peter Stotz, grids which are based on the linguistic standards of classical Latin; secondly, there are experimental grids proposed by Michel Banniard (see infra and Stella 2006); thirdly, cataloguing of the versification according to Norberg's criteria has been included; and lastly, experiments in new classification proposed by Edoardo D'Angelo too.

The edition's first CD-ROM, which specifically concerns the *musical rhythms transmitted in non-liturgical manuscripts*, is in the final stages of completion on the IT platform now about to be explained, and which should be achieved by 2007. Future issues will firstly concern computistic rhythms, of which a great many musical versions have been found, followed by the rhythmic hymns. This first volume included well-known texts such as the *Planctus* for Charlemagne's death, that for the Duke Henry of Friuli, and of Abbot Ugo, the planctus for the Battle of Fontenoy, as well as moral texts, biblical 'plays', confessions, and poetical songs by Paolinus of Aquileia and by Gottschalk of Orbais. In general, the collection includes some poems amongst the most important and most beautiful of early Medieval rhythmic literature. The aim of this edition is to contribute to the recovery and sampling of their original character of musical lyric, and to study the production of this poetry, sung in a not liturgical context, even if certainly spiritual and ritual, presenting also the edition of *the most ancient medieval texts set to music* which have been transmitted to us.

Various humanistic disciplines are involved by the scientific questions raised by the elaboration of the software. The application of the semi-diplomatic method is a problem in itself, if nothing else for the energy and resources required, in the case of ramified traditions lacking true distinct versions. More specifically, the linguistic cataloguing, which must of necessity be applied to individual transcriptions, involves a certain degree of arbitrariness in defining the observed phenomena. Furthermore, this kind of arbitrary decisions extends still further to the choice of whether or not to record a specific phenomenon as distinct. For example, it is often difficult to establish if *amico suscipit* can be recorded as fading of final *-m* or as ablative pro accusative. For this reason the classification has remained relatively wide, thereby leaving the user a greater margin of interpretation. Problems of statistical standardization of research results arose during the same process of cataloguing. When a linguistic feature is present in 5 out of the 7 transcriptions of a text, but another linguistic feature only goes back to an attested text in an individual manuscript, it must be

remembered that the 5:2 recurrence does not reflect the real distribution of the phenomena.

In an analogous manner should be evaluated the initial results of the "Romance" linguistic and socio-linguistic cataloguing. Whilst the *A solis ortu* rhythm is marked, for example, by a degree 1,09 of Subject/Verb separation, a degree 0, 28 of Noun/Adjective/Participle separation (i.e. the average number of words between S and V), and an absolute frequency 12/24 (0, 5) of prepositional phrases, Paulinus of Aquileia's planctus *Mecum Timavi* produces a degree of Noun/Verb separation of 3, 32, N/A/P 0, 52, which is a 27/35 (0, 306) prepositional locution frequency. This demonstrates that a learned author such as Paulinus of Aquileia kept to, in this rhythm, a more classical syntactic word arrangement and more archaic use of prepositions compared to the *Planctus Karoli*'s anonymous writer, or that the latter adopted a more popular linguistic register.

Still on the linguistic features, the analysis of a text through generic research engines or software for linguistic analysis such as TUSTEP or TAPOR could be inapplicable if, instead of the base-version ("edition"), the analysis is attempted on the individual diplomatic transcriptions: here the presence of conventional signs and incongruous breaking of lines and words that could hinder the readability of the query is disabled by a specific button. A simple linguistic research engine is necessary in order to find the forms in individual transcribed versions; and in base-versions more refined software is required for the study of associations between terms, lexical recurrences, and simile.

The DBR

The *DBR* (*Rhythms Data-Base*) is a piece of software initiated in 1999 by Giacomo Desideri and his GDC (alpha version), developed by Marco Meucci and MARTEK in 2002 and finally brought to fruition (Beta version) by Luigi Tessarolo, the author of *Poetria Nova*, according to a project of mine. Its aim is to contain and sort the data and the materials of the *IV-IX century Corpus of Latin Rhythms,* providing the platform essential to the development of the CD-ROM, which is the first critical digital edition of a Medieval Latin corpus with music. The final product will have a notably different Java interface to the highly articulated one presented here, and will also make possible access to data via multilingual Menus (see ppt file in the enclosed CD-ROM).

The present program's structure is one of a chain of visualizable database tables in a grid of over 150 fields and subfields of observation, articulated in a series of displays which correspond to the edition's scientific setting up. Between them the tables connect the metrical, linguistic, philological and musicological data, the visual files containing the images of the manuscript, and the musical transcriptions (through the XnView program which allows all existing formats to be read), as well as the audio files (in Wave or MP3 format) containing the vocal execution of the melodies. All the tables and data will have to be cross-referenced so that it will be possible to consult them through the Search menus.

In the *general display* the text is classified according to the usual data: author, date, place of origin, ICL number, manuscript number, total number of the manuscripts, manuscripts not used in previous editions, and editing number.

The *Text Menu* is the heart of the program and therefore of the edition, and is based both upon the individual manuscript versions and upon the 'philological' (i.e. theoretical) reconstruction of an archetype.

Figure 7 Corpus Rhythmorum (Transcripts Menu).

The opening of this menu shows the list of manuscripts containing the text in question.

Highlighting the individual manuscript automatically se-

lects the text version and the music associated with that version. Through this it is possible to activate the relevant image and the text transcription, which has been carried out according to specific norms, and this can be checked comparing it with the manuscript's image upon which it has been executed. Two submenus can be brought down and can be activated from the position of a manuscript witness. These are *Language* and *Music*. By selecting the *Language* option a new dialogue box appears which presents the linguistic characteristics of this version of the text, subdivided into areas of interrogation.

These areas of interrogation are: comparison with the 'classical' grammar through the usual divisions Phonetics (consonantal and vocalism) – Accentuation – Morphology – Syntax – Lexicon and Phraseology. Each of these has its own subdivisions as applied using Peter Stotz's handbook of medieval Latin language, but also new fields of observation such as those suggested by Michel Banniard, namely *Absolute nominal locution frequency* and *Relative nominal locution frequency,* or *Idiomatic locution in long segments* and *Idiomatic locution in short segments*. An experimental grid has been provided in order to interrogate the noun/verb syntactical relationships, with observations on the reciprocal positions between subject and verb and between noun and preposition being provided. Furthermore, the sociological statute on authorship and addressee as presupposed from the text's linguistic level can be interrogated: data which should help statistical elaboration on the proximity to the spoken Latin or the early 'Romance' language as used in these poems, and on the social strata of origin and fruition.

Through the *Music* menu option a new dialog box appears on the screen that presents all the included information about the music accompanying the specific version of the text under examination. The manuscript's *image* appears along with the neumes, the traditional *musical transcript*, and the *alphanumeric transcript* according to Sam Barrett's system (see Barrett 2003). This system converts the notes and other characteristics that the musical signs communicate into numbers and letters thereby making these readable by the computer and so queries can be run on them. Furthermore, there is essential data on the features of *notation* and its dating, and a synthetic analysis of the melody's relationship with the text, along with comparison (*concordance*) with the transcriptions of other melodies referring to the same text. Reproduction of the *historical transcript on five lines staff* produced by nineteenth and twentieth

century musicologists is also available, and these are connected by a simple mouse click to one or more recordings by Giacomo Baroffio of the *vocal execution* of these historical transcriptions.

An *Edition* button brings a legible philological reconstruction up on the screen. Clicking on each strophe number activate the apparatuses-frame on the right: philological apparatus (*variants*) and Intertext-apparatus (*sources, comparisons with contemporary texts, afterlife*).

The display is ready to show *more different* (*reconstructed*) *versions* of the same text (Fig. 9).

Figure 8 Corpus Rhythmorum. Apparatuses.

Figure 9 Corpus Rhythmorum (Synopsis of the versions).

The *Edition* Menu contains an Introduction file where the user can find the stemma, or tree, of the relationships between the witnesses: the sigla of the manuscripts are pointers, so when clicked on the program opens the relative textual version tramsitted by that manuscript.

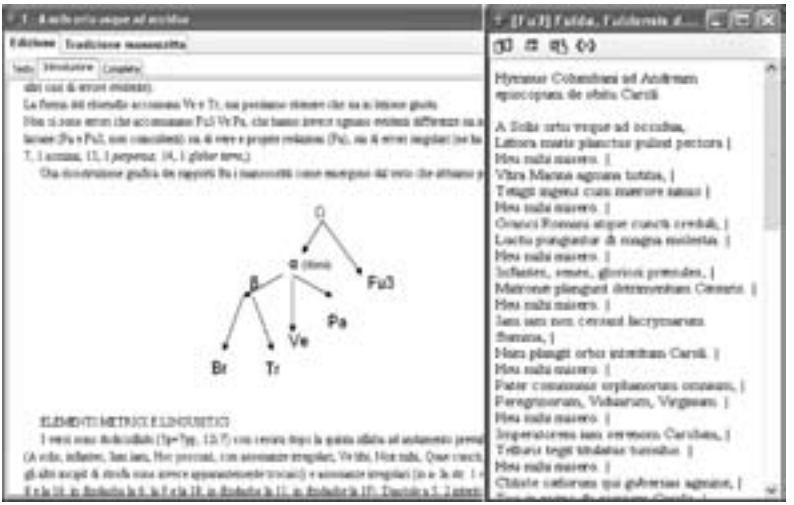

Figure 10 Stemma codicum with pointers sigla.

The *Versification Menu* displays the rhythmic-metrical data according to differentiated analysis grids. Firstly, the verse scheme and strophe scheme are analyzed according to Norberg's criteria. Then they are analyzed according to the new criteria elaborated by Edoardo D'Angelo and illustrated in D'Angelo-Stella 2003. In addition, this menu records the absence or presence of hiatus, elision, aphaeresis, synaeresis, rhyme, alliteration, hypermetrical or hypometrical lines, etc. A further benefit of this menu (to be consulted only in the web version: http://opera.maldura.unipd.it/ritmi.htm) is the analysis of the text according to the sequence of grammatical accents (SAG), that is to say, the series of unstressed and stressed syllables based on the prosaic prosody compared with the sequence of metrical accents (SAM), which are the successions of stressed-unstressed syllables according to those expected from the rhythmic verse pattern used in the text. The objective of this double indexing is to allow the analysis and comparison of the

'rhythmic' prosody and the linguistic prosody, about which there is much discussion[31].

Therefore seven different forms of the selected text can be consulted by viewing one single screen: the reproduction of the manuscript, its text transcription, the philological reconstruction, the transcription of the neumes, the alphanumeric transcription, the musical transcription on staff, and the latter's vocal execution (see ppt in the enclosed CD-ROM).

The *Paleographic Menus* are accessed from the Text Menu by using the line relating to every manuscript. The Paleographic Menus give information on shelf-mark, dating, origin, format, support, codicological characteristics, and more specifically on layout, graphics, and further links to the reproduction of the page containing the 'rhythms' in question, as well as the names of the scholars responsible for the collation.

There is also a *Studies and Notes* menu (bibliography and comments by the editors).

A *Search* can be initiated by using the same Menu, allowing a data search on any element in the entire DBR cataloguing/indexing. For example, a search can be made for the ninth century texts which contain "hiatus" and are of Italian origin, or where and how many times a certain melodic sequence occurs and which associated metrical structure is preferred, or which themes most often occur in association with them. The search is activated by selecting the three elements of data-hiatus-location: after a few seconds the resulting list of matching texts appears on the screen. Any textual search can be made not only on the reconstructed (= critical edited) texts, but also on all or any single transcript.

This structure, planned for the data's introduction, will be simplified for the final CD-ROM. The philological approach of the *Corpus* aims at recovering the plurality of the text forms and their linguistic forms, their musical dimension, so nearing the original orality and original qualities of the performance: features these, that a printed edition is not capable of restoring. Therefore, the utilization of multimedia support in order to apply a philological approach intends to adhere more closely to the historical reality, to the hypothetical fruition context and to experiment techniques of interdisciplinary analysis.

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[31] See Klopsch 1991.

Data of the first CD-ROM:

28 texts in 140 manuscript versions
80 manuscripts or prints pro manuscripto
Approximately 4000 lines of verse comprising the base texts, 568.000 lines of the transcriptions
32 new mss. compared to the previous editions (published by 9 different editors)
141 musical transcriptions
Approximately 150 searchable indexed and cross-referenced fields

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