# MEDIEVAL HISTORY AND THE COMPUTER IN FRANCE

French medievalists have displayed an early interest in the potentialities of the computer, and Michel Mollat probably deserves credit for the first application of the new techniques to medieval data in France[1]. Since then, the National Archives, the National Center for Scientific Research (C.N.R.S.) and several of its laboratories (notably the Institut de Recherche et d'Histoire des Textes - I.R.H.T. - ) and some universities, where computing facilities are available, have sponsored the development of computer techniques applied to medieval data, the specificity of which has rendered the task much more difficult than it was foreseen. It must be added that close contacts with experimented foreign research centres (such as the Centre de Traitement Electronique des Documents Médiévaux - CETEDOC - at the University of Louvain in Belgium) have sometimes smoothed the way to innovation.

Medievalists have concentrated their efforts on documentary and textual applications of the computer. There are many reasons to this situation: lack of satisfying statistical data ready for use, and wealth of archives material extremely difficult to handle are two prominent reasons. In any case, archives is always the first problem which the medievalist meets. The National Archives are conscious of this fact, and their Service d'Informatique (directed by I. Cloulas) is currently developing a program of indexation of the $X^{1A}$ series (the Paris Parliament archives), offering an easy access to the names of all persons and places mentioned in the process files of the Paris Parliament between 1350 and 1363[2].

But useful as it is, this indexation is not a content analysis. A more ambitious project has been elaborated in close connection with the National Archives by the Centre d'Etude d'Histoire Juridique, directed by Pierre-Clément Timbal, Mrs. Josette Metman being in charge of computer processing. The solution adopted to deal with the arrêts (sentences) of the Paris Parliament during the second half of the fourteenth century has been to build a dictionary of concepts summarized by key-words, the thesaurus, the content of each document being described only by words borrowed from the thesaurus. Obviously, the thesaurus has been built in reference to the source on which the Centre d'Etude d'Histoire Juridique is currently working, but it may prove useful to students of law history of later medieval France in general[3]. On the other hand, it is true that the specificities of medieval vocabulary are obscured, hidden behind the updated lexicon of key-words, and that the content analysis, precise as it is, cannot pretend to be exhaustive, for it remains dependent on a selection of facts or concepts: but the programs, derived from the documentary SOCRATE system, are highly efficient, and this project has already produced appreciated results.

In fact, content analysis proves specially difficult for the medievalist, since he can never take for granted the equivalence between medieval and modern words. That is why, if we turn our attention towards texts in which the technical element is not as overwhelming as in juridical sentences, it becomes necessary to have recourse to more sophisticated devices than the use of a thesaurus(4). In this field, Mrs. Lucie Fossier and the I.R.H.T. have made important contributions in pointing out the interest of extracting key-words from the medieval text itself, and of taking into account semantic relationships between words in recording not only the key-words and their attributes, but also syntactic relations between them(5). This method gives very satisfying results when applied to cartularies and diplomatic documents in general, and it is not as heavy and burdensome to use as full-text recording is.

But for documents with a high literary or lexical interest, it remains necessary to record full texts, with all the disadvantages it implies in terms of preparation and input of the data. Being concerned here only with French researches, I shall not deal with the programs of the CETEDOC of the University of Louvain, though French medievalists have made use of them(6). Mrs. Fossier played an important part in the birth of one of the sections of the Centre de Recherches Appliquées à la Linguistique (C.R.A.L.) at the University of Nancy II: this section is devoted to the automatic processing of diplomatic documents of the early Middle Ages and is now directed by Michel Parisse(7). The documents being usually of small length (charters etc...), they are recorded in full text. The first task alloted to the computer is to produce a listing in which each line corresponds to one word of the original document. It is then possible to "enrich" the text in coding several sorts of informations (diplomatical, onomastical, chronological and so on), word by word: these additions need far less time since punched cards have been dropped out, informations being conveyed through a computer terminal with screen and teletype. From the "enriched" text, several types of vocabularies and concordances may be obtained: alphabetical or chronological dictionaries, frequency tables, onomastical repertories and so on. A systematic publication of the results has started already(8).

Convenient for shorter texts, all methods which imply a large amount of coding are to be dismissed for longer texts, except if the historian wants to pay a special attention to philological or grammatical problems. Readymade programs for textual data and concordances generators are available everywhere, most notably in France at the Centre de Lexicologie Politique of the Ecole Normale Supérieure de Saint-Cloud(9). But once again, the medievalist is heavily penalized by the specificity of his data: the total contempt for a regular orthograph which characterizes both medieval authors and scribes makes it difficult to use standard programs. That is why the Equipe de Traitement automatique des Sources du Bas Moyen Age, working at Paris I under the

direction of Bernard Guenée has developed a new concordance generator specially adapted to the difficulties of medieval orthograph, ALINE[10]. It seems possible to combine such an approach with more radical documentary processing, since it remains impossible to apply full-text recording and processing to large archives series: a full-text processing of a sample of documents will allow the extraction of the key-words and will help to define the chief concepts; then the documentary processing may take place in better conditions. This solution is experimented on the JJ series of the National Archives (lettres de rémission, i.e. letters of pardon) by Mrs. Claude Gauvard, with the help of ALINE.

Documentary treatments are not necessarily based upon existing texts. It is also possible to collect and store informations and then to ask questions in following syntactic and semantic procedures: this requires the elaboration of a network of connections between the different pieces of information, and, to a certain extent, we reach here the fringes of artificial intelligence research. Such a project has been developed by G.P. Zarri in order to handle data of miscellaneous origins and varied natures gathered by C. Bozzolo on the "love court" of King Charles VI for the Equipe de Recherche sur L'Humanisme Français des XIVe et XVe siècles directed by Gilbert Ouy: this is a very promising project[11].

Statistical methods have not benefited from the same interest. Medieval data with their usual scantiness are puzzling for the statistician, since lacunae mar even the best series of data and impose the recourse to solutions too sophisticated for the value of the results. Besides, no institution comparable to the I.R.H.T. or the C.R.A.L. has given the necessary impulse to researches in this field: these researches are usually conducted by isolated scholars endowed with only small computing facilities. One possible exception is the Ecole des Hautes Etudes en Sciences Sociales, though its computing centre has attracted modern historians (especially demographers) rather than medievalists. It is nevertheless to this centre that we owe what is by far the most accomplished work in this category, the study of the fiorentine Catasto of 1427 (a franco-american project in fact) made by David Herlihy (University of Wisconsin) and Christiane Klapisch (E.H.E.S.S.). It is difficult to give a fair assessment of their achievement, since only partial results are available at the moment[12]. But if they were to be judged from their different papers, their results ought to be particularly important for demography and social history (population mobility, repartition of the working men in different trades etc. ..); they have had recourse to the most up-to-date methods of factorial analysis, and they have paid special attention to automatic mapping.

Large series of archives have often prompted medievalists to engage themselves in computerized treatments. Elizabeth Carpentier used the computer to master the great quantities of informations contained in the Catasto of Orvieto[13], whereas Mrs. Zerner has tried to adapt her sources (census made in 1414 for nearly fifty towns and villages of the Comptat Venaissin) to the constraints imposed by the computer upon its users. Miss Billot is also interested in urban history and is using the OSIRIS package for at least part of her work on the town of Chartres in the later Middle Ages; and Jacqueline Guiral has coded and recorded the data she collected in the customs accounts of the harbour of Valencia for the second half of the fifteenth century[14]: these two researches are still in progress. But results are already on hand for the wills of Lyon in the fourteenth and fifteenth centuries which have been studied by Marie-Thérèse Lorçin[15]: these results are a good example of what may be achieved by a limited but discriminate treatment of such a heterogeneous and bulky source.

But if sources are not easily available or adaptable, it is always possible to build a "metasource" with materials of different origins. This is especially true in the case of prosopography and automatic collective biographies, though the border between documentary and statistical treatments becomes invisible here. Thanks to a close analysis of the suppliques and lettres communes of the Avignonese popes, a group of scholars working under the direction of Bernard Guillemain has been able to apply documentary techniques to the pontifical archives[16]. Part of the efforts and time of the Equipe de Traitement Automatique des Sources du Bas Moyen Age has been also devoted to automatic prosopography. In the course of her thesis on the members of the Paris Parliament in the later Middle Ages, Françoise Autrand has reconstructed the biographies of 676 individuals[17]; and I am working myself on a set of 750 english historians who lived between 1300 and 1600: there is a lot of classifying, cross-tabulation and indexation to be done on such collections, but factorial analysis will also be used[18] since it has produced very interesting results in the study of the biographies of the canons of Laon made by Mrs. Hélène Millet[19]. The same course will be followed for the collections of biographies which are being prepared by Alain Demurger (the baillis of the King of France in the fifteenth century) and by Mrs. Elisabeth Mornet (Danish clerics with a university education). Factorial analysis seems to be a very convenient technique[20] for the historian, for it enables him to depict and to summarize his documentation, as well as it provides him with a secure guidance for interpretation: another successful application of factorial analysis to historical data which deserves notice is Mrs. Françoise Micheau's thesis on translations from the arabic[21].

Surprisingly enough, fiscal history does not seem to have benefited from the computer potentialities as much as other sectors. Nevertheless, a remarkable success has been achieved by Jacques Lefort who has been able to discover the rate of taxation employed in the Byzantine Empire during the fourteenth century by comparing several rolls of imposition (praktika): this is a good example of how the computer may help the historian in bringing to light a part of reality which the traditional historian would have thought lost for ever(22).

This survey is far from complete(23). A better idea of what is going on among French medievalists interested by quantification and computerization will be obtained when the results of the inquiry supervised by Lucie Fossier with the help of Christiane Klapisch, Jacques Lefort and myself will have found their way to the column of Computer and Medieval Data Progressing. The publication of the reports read at the Rome colloquium in 1975 will also provide many new informations on the researches of F.Autrand, L. Fossier, Ch. Klapisch, J. Lefort, M. Parisse, J. Verger, M. Zerner and many others. But much is still to be done: access to machines with good performing capacities remains sometimes difficult, especially in provincial universities, and financial support is largely inadequate: this is partly due to the fact that accounting systems in computing centres have been devised to meet the mathematician's or physicist's needs, and are very unfavourable to historians who are great consumers of reading and printing time, and comparatively small consumers of calculus time. But the most important drawback is still the lack of information, and even more seriously, the lack of formation of most historians: in that respect, if medievalists are not worse than their colleagues working on other periods, they are not better ...

(1) This was a study of the accounts of the harbour of Saint-Malo in collaboration with Jean Delumeau.

(2) "Application $X^{IA}$: fichier des noms des parties en procès devant le Parlement de Paris de 1350 à 1363", Direction des Archives de France, Note d'Information du Service de l'Informatique, 7, 1975, and "Expériences et Réalisations en matière de recherche documentaire", ibidem, 9, 1977, p.6-7.

(3) The description of the project is given in: J. Metman, D. Portal, A. Stiers, "Documentation et Informatique. Une Application du système Socrate aux archives judiciaires (Parlement de Paris)", in: Consilium Magnum, 1473-1973, Commémoration du 500e anniversaire de la Création du Parlement de Grand Conseil de Malines, Bruxelles 1977, p.85-172.

(4) For a survey of the different approaches to content analysis and documentary processing in relevance to medieval data, see L. Fossier and G.-P. Zarri, L'indexation automatique des sources documentaires anciennes, I.R.H.T., Paris 1975

(5) See L. Fossier, "Ordinateur et Histoire Médiévale", in: Linguistica Matematica e calcolatori. Atti del convegno e della prima scuola internazionale, Pisa 1970, Firenze 1973, p.269-298, and L. Fossier and M. Crehange, "Essai d'exploitation sur ordinateur des sources diplomatiques médiévales", Annales E.S.C., 1970 (I), p.249-284.

(6) See for instance M. Mollat and P. Tombeur, Conciles oecuméniques médiévaux: Les conciles de Latran I à Latran IV, Louvain 1974, et M. Mollat and P. Tombeur, Les conciles de Lyon I et Lyon II, Louvain 1974.

(7) L. Fossier, G. Contamine, J. Graff, P. Bichard-Breaud, Le traitement automatique des documents diplomatiques du Haut Moyen Age, (Cahiers du CRAL, 1ère.série, 2I), Nancy 1973. Other projects of the C.R.A.L. are dealing with automatic translation, textual analysis of the Bible etc. ...

(8) Chartres originales antérieures à II2I conservées dans le département de la Meurthe-et-Moselle, (Cahiers du C.R.A.L., Ière. série, 28), Nancy 1977: each volume contains all the charters deposited in one department, but several volumes will be necessary for Paris.

(9) For an example of the highly sophisticated results achieved with the programs of the centre, see Des Tracts en Mai 68. Mesures de Vocabulaire et de Contenus, Paris 1975; and the programs are described in Enregistrement et Traitement automatique des Textes, (Calcul et Sciences Humaines, C.N.R.S.), Paris 1975.

(10) See J.-Ph. Genet, F. Hucher, J. Mondelli and E. Valensi, "Un programme de traitement automatique des textes: ALINE", Bulletin du Centre d'Analyse du Discours de l'Université de Lille III, 1974, p.96-121, and J.-Ph. Genet, "Ordinateur, lexique, contexte", forthcoming in: Actes du Colloque sur le Traitement automatique des Sources du Moyen-Age, Rome 1975, Ecole Française de Rome 1978, p.297-317.

(11) See G.-P. Zarri, M. Ornato, C. Bozzolo, Projet Réséda: rapport sur les recherches éffectuées du Ier. Octobre 1975 au Ier. Avril 1976, C.N.R.S., Paris 1976; and G.-P. Zarri, M. Ornato, A. Zwiebel, L. Zarri-Baldi, C. Bozzolo, Projet Réséda: rapport sur les recherches éffectuées du Ier. Octobre 1976 au Ier. Avril 1977, C.N.R.S., Paris 1977.

(12) D. Herlihy, "Vieillir à Florence au Quattrocento", Annales E.S.C., XXIV, 1969 (6), p.1338-1353, "Editing for the Computer: the fiorentine Catasto of 1427", American Council of Learned Societies Newsletter, XXII, 1971, p.1-7, and "Mapping Households in Medieval Italy", The Catholic Historical Review, LVIII, 1972 (1), p.1-24; Ch. Klapisch, "Fiscalité

et démographie en Toscane (1427-1430)", Annales E.S.C., XXIV, 1969 (6), p.1313-1337, "Household and Family in Tuscany in 1427", in P. Laslett and R. Wall, Household and Family in past times, Cambridge 1972, p.267-283, and Ch. Klapisch and M. Demonet, "A uno pane e uno vino". La famille rurale toscane au début du XVe siècle", Annales E.S.C., XXVII, 1972 (4-5), p.873-902. The general survey of the results will normally appear in 1978.

(13) Mrs. Carpentier's thesis is still unpublished: see a valuable report by Ch. Klapisch on the formal soutenance in Revue Historique, 517, 1976 (1), p.244-247.

(14) Cf. Y. Aufray and J. Guiral, "Les péages du Royaume de Valence (1494)", in: Mélanges de la Casa de Velasquez, XII, 1976.

(15) See M.-Th. Lorçin, "Pratique Successorale et Conjoncture démographique", Bulletin du Centre d'Histoire Economique et Sociale de la Région Lyonnaise, 1975 (4), p.39-62, and "La Pratique Successorale en Ville et au Village", ibidem, 1976 (4), p.55-74; also "Retraite des veuves et filles au couvent", quelques aspects de la condition féminine à la fin du Moyen Age", Annales de Démographie Historique, 1977, p.86-94.

(16) This project is presented in B. Guillemain, "L'informatique aux Archives du vatican", Compte-Rendus de l'Académie des Inscriptions et Belles-Lettres, 1977, p.86-94.

(17) See her report in Actes du Colloque ..., op.cit. supra, forthcoming 1978.

(18) For general remarks of the method of collective biographies, see J.-Ph. Genet, "La biographie collective des micropopulations: une méthode de traitement, l'analyse factorielle", forthcoming (in German) in: Franz Irsigler (Hrsg.), Quantitative Methoden in der Wirtschafts- und Sozialgeschichte der Vorneuzeit, Stuttgart 1978 (= Historisch-Sozialwissenschaftliche Forschungen, Vol. IV). Classifying and cross-tabulations are being done with the BDP4 package, a package specially designed for a small computer (Philips P.880): see X. Debanne, BDP4: système de programme, Paris 1976.

(19) H. Millet, Les chanoines du chapitre cathédral de Laon, 1272-1412, 2 vol., Paris 1977, typ.

(20) The best introduction to factor analysis is J.P. Benzecri, L'analyse des données, 2 vo., Paris 1973.

(21) F. Micheau, Traductions imprimées d'oeuvres arabes en Occident, Paris 1974, typ.

(22) J. Lefort, "Fiscalité médiévale et informatique: recherche sur les barèmes pour l'imposition des paysans byzantins au XIVème siècle", Revue Historique 1974 (4), p.315-356.

(23) Let us mention briefly important projects such as the inventory of French medieval libraries (I.R.H.T.: Miss Genevois), automatic edition of the catalogue of Saint-Victor (Veronika Gerz von Buren) etc. ...

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## CONFERENCE REPORTS

### The Use of Quantitative Methods in Economic and Social History (ZiF, University of Bielefeld, November 5-6, 1977)

In their opening adresses Paul J. Müller from QUANTUM and Franz Irsigler (University of Trier) stressed that the conference was planned to achieve two goals. First, to overcome the analytical deficiencies and the problems of often faint research questions within quantitative history as had already been outlined at the earlier ZiF conference in 1976 and proved by the QUANTUM documentation published in 1977. Second the sections aimed at presenting new developments in sociological research which could be applied in historical social science too.

In the section on "Methodological Developments as Foundation for a new Encounter between History and Sociology" (chair: Wolfgang Bick, QUANTUM) two papers were presented: Theodor Harder (University of Bielefeld) on "Data, Theory, and Model: A Dynamic Perspective", Manfred Küchler (University of Frankfurt) on "Complex Data Analysis in Practical Research: Multivariate Analyzing of Nominal-Scaled Data". Theodor Harder gave a paper on theory, data, models, and real world. Harder portrayed a wide range of dynamic non static models and theories of social science phenomenon. He stressed the potentials these new models have for historical processes. But these methods have not yet been widely used within historical social science. Manfred Küchler presented a paper describing his DIEC-model for analyzing nominal scaled data. This approach combines the Goodman and Harder models and makes it possible to explain variances in a dependent dichotomous variable by the combined effects of more than one dichotomous independent variables. In the discussion it was stressed that especially historical data are often available only as categorical data and that therefore models based on low levels of measurement would be very appropriate for historical research. Examples from historical research mentioned by the audience made apparent the potentials of this kind of data analysis techniques.