Critical Computing:
Lessons learned from pre-industrial Montréal

Historians have long been aware of the complex historical relationship between technology and society. As historians using computers, many of us are also critically aware of the cultural corporate coding that has been imposed on our own computers, where desktops, folders, filing cabinets, control panels, hourglasses, toolbars and clipboards all invoke the hierarchical world of an office, implicitly confirming that we are no longer engaged in an academic quest for knowledge. In the early 21st century, information is the business of business.

This critical awareness has not, however, extended to an appreciation of the potential dangers for historical research posed by computers. Instead, critical perceptions are muted because we tend to think of computers as a temporally neutral, value-free technology, which can be usefully applied to the analysis of quite differing historical periods. At best, as in Pat Hudson's recent *History By Numbers*, we hear criticisms that the default programme settings are inappropriate for historical research, or that the current ease of statistical manipulation might lead to inappropriate applications. At worst, as in the new Mann & Stewart handbook *Internet Communication and Qualitative Research*, we are seriously informed that the Internet is liberating. In contrast to these benign assessments of computers, I think that by their very nature computers pose substantive dangers for historical research. They do so precisely because computers are in history. They are neither neutral nor value-free. They are the product of a very particular time and place.

As the quintessential technology of advanced capitalist society, computers simultaneously define and are defined by the social and gender relations characteristic of contemporary capitalism. It is no mere coincidence that the history of computers is coincident with that of monopoly capital. The founding technological paradigm, embodied in Hollerith machines, provided a gender-based solution to the new problems posed by corporate concentration. It permitted such an unprecedented appropriation of the value created by female clerical workers that it underwrote the early consolidation of finance capital in North America. So it is fitting that the first large-scale mainframe project was the American census of 1950, because there the application of computers transformed this document into crucial data for the social engineering of mass suburban consumer culture. Then, in the laboratories of IBM, AT&T and Xerox located in the industrial parks of these new suburbs, all the key elements of the current technological paradigm were conceived. Meanwhile, back at the Pentagon, scientists were busy developing the Internet as a fail-safe communications system in case of nuclear retaliation. The subsequent quantitative growth in corporate data processing and systems analysis servicing the neo-liberal agenda led to their qualitative reconfiguration as IT. Today, accounting for three out every four dollars spent on computers, transnational corporations rule.

So computers are not a neutral technology, and their uncritical use will be anything but liberating. But what does this mean for our use of computers in historical research? Although I have been using computers systematically since 1982, my answers to this question today will be based on my experience with two large-scale, on-going, computer-based projects on pre-industrial Montréal. So let me briefly outline both the projects and the society they are meant to study.

The first is a pedagogical project that I initiated in 1995. I think of it as a cubist portrait, wherein students view early 19th century Montréal from a variety of differing perspectives. Each viewpoint consists of a discrete database programme based on a separate historical source. City directories, tax rolls, census returns, poll books, apprenticeship contracts, firewood supply contracts and monetary protests lodged by banks, along with a fully polygonized period map of the city, are at present the principal ways students have of looking at this rapidly changing town.

The second is a two year-old collaborative project in historical geography. It involves the creation of a series of geo-referenced maps of Montréal for 1825, 1846, 1880, 1912 and 1949. A detailed historical map from each of these years is scanned, warped to the co-ordinates of the current city planning map and then, through a combination of polygons and points, the differing objects on the map are linked to relational databases based on period sources. The result will be a multidimensional temporal and spatial view of the city that one can inter-actively query for a variety of differing characteristics. I am responsible for the two pre-industrial layers, 1825 and 1846, and collaborate on the 1880 layer.

My work in both of these projects focuses on a 200-year-old colonial society, where feudal social relations on the land coexisted with capitalist mercantile firms, which largely serviced local artisanal production. As town/country relations matured, Montréal's cultural composition was transformed through large scale immigration from the British isles. Meanwhile, abortive anti-colonial and national struggles entwined with an increasingly gendered liberal democratic vision to further subordinate women and create the political context within which quite rapid and precocious industrialisation would occur at mid-century. Explaining change in this society is clearly not a simple task; but as I worked my way through the numerous problems raised, I realised that my primary analytical tool, the computer, was imposing its own set of values on this very different society.

In advanced capitalism, things and sometimes people appear as commodities. As such, they do not have either intrinsic or absolute value. Instead, the only recognised value is a relative one, established by exchange in the marketplace. This is a radically reductionist view that reifies formal economic relations at the expense of both ethics and culture. It is antithetical to all known cultures before the late 18th century because, as Polanyi long ago pointed out, it is fundamentally corrosive of human society.

Computers impose a similar logic. Digitalised information has no intrinsic or absolute meaning. Expressions and sayings have no value, except inasmuch as a particular number or

character string conforms to externally defined rules of comparability and significance. The primacy of these external rules is guaranteed by the computer's undermining of a text's internal structural coherency. The ordered presentation of information, which is the most important way a text conveys and constructs meaning, not only need not, but effectively cannot be respected in a computerised text. While this radical de-structuring applies to any such text, it has particular significance for historians, because of its epistemological implications. This qualitative transformation eliminates the historical distance between a source from the past and the researcher in the present. The result is that the source is denied the requisite autonomy within a discourse of proof that would allow it to act as an effective check on our own historicity. This non-respect of the historical logic proper to a source, of course, gives free-rein to that old bug-bear of present-minded source mining, but more insidiously, it makes the present look normal, indeed natural, by insinuating the values of advanced capitalism into previous and very different societies.

This imposition of the present on the past takes place at a number of different levels. In the short time that I have today, I will draw on my experience with city directories to illustrate two: 1) how a binary logic reinforces the assumed primacy of the individual; 2) how a content-driven analysis blinds us to the historical significance of form and then I will conclude with a brief reflection on academic barriers to historical understanding.

In the 1819 directory of Merchants, Traders and Housekeepers of Montreal compiled by Thomas Doige there were 55 instances of a day labourer living alongside a skilled craftsperson. It is not easy to establish whether this was a lot or not, because both statistics and computers build on the central cultural assumption of contemporary capitalism, that the individual is more important than the social. Indeed, the individual precedes and explains the social. Concretely, the likelihood of an individual labourer living alongside an individual artisan is mistaken for the qualitatively different question: when are labourers and artisans neighbours? This conceptual slight of hand is in part hidden from view by the ease with which a binary division replaces historical analysis. We ask if a labourer is a neighbour or not? Instead of asking when and where are labourers and artisans neighbours? Database structures reinforce this binary logic because their basic unit of analysis is the individual entry or record.

The potentially distorting effects of this logic are easily illustrated by the contradictory results of an observed by expected test of significance. In the 1819 directory there were 2051 entries where both the street and the street number were given, 612 of these entries were for artisans and 170 were for labourers. So the odds appear to be one in forty[1] and we should "expect" 51 instances of a labourer being an artisan's neighbour. Most people listed in the directory, however, would have had more than one neighbour. Indeed, after accounting for addresses with multiple listings, their immediate neighbours and corner addresses these 2051 people and firms shared 7580 opportunities to live alongside someone with a different

1. The equation is (612/2051) x (170/2051) = .02473.

occupation.[2] So not only would the "expected" number, at 188, be very much higher, but many of these labourers and artisans would have had numerous neighbours. It never was an either/or question in the first place.

The real problem, however, is not this potential for distortion, although this has proved serious enough in the literature,[3] but the inversion of elementary historical principles stemming from the explanatory power accorded the individual entry. The social is not an aggregate of individuals. The individual only exists in the social. Historically the social precedes, creates, informs, empowers and constrains the individual. Where a labourer's family chose to live was based on a large number of primarily social factors including the cost and availability of land, where other family members lived, the styles of vernacular architecture, the availability and location of work, the salubrity of a particular neighbourhood, family size, where they were in the life-cycle and the prevailing wage rates for the various family members. As my late colleague Stuart Pierson once observed, such a family's decision to move was not like the Browning effect of randomly moving electrons, it was much more analogous to a move in a game of Go. To even begin to understand the individual, we must start with the social.

In the Directory of 1819, the patterns created by artisans and labourers were remarkably different. Artisans were to be found throughout the city. They appeared on all the major streets and on all but five of the minor ones. Nor was this the isolated presence of an occasional artisanal family. Seven out of ten artisans lived beside another artisan. In contrast, in the old city, John Gregg, who shared a rue St Jean address with the mantua-maker Mary Ann Griffin, was the sole labourer listed. Similarly, faubourg St Joseph counted only one labourer and faubourg St Antoine none at all. Just slightly less than half of all the artisans listed were in these three neighbourhoods. Present in faubourgs Ste Anne[4] and St Louis, labourers were most

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2. There were 424 addresses with more than one person or firm listed: 338 had two listed; 64 had three; 13 had four; and eight had five; while an address on St Charles Borrommée in faubourg St Laurent had eight different people listed! These 948 people and firms had 488 immediate neighbours living at single entry addresses. There were another 912 single entry addresses with two neighbours each and 95 "corner" addresses with a single neighbour each.

3. In his highly influential study of class in 19th century England, John Foster based his entire analysis of housing on this binary logic. His method illustrates just how distorting bourgeois ways of knowing can be. Assuming that the order of each household in the census returns corresponded to its actual physical location in space, he compared the occupation of the head of the household to that of the preceding household head in four samples drawn from three towns. Foster's "observed" results were remarkably close to his "expected" because the systematic pairing of adjacent entries in a random sample simply creates a smaller random subset. Nevertheless, since the observed by expected results were closest for his politically active towns, Foster concluded that there a unified working class culture had been created. The slightly greater disparities in what he considered to be the least politically advanced town, Shields, also stemmed from his method. Foster eliminated from consideration all female heads of household, replacing them the eldest working male relative, however, by standardising on men, he introduced a new anomaly of pairing different generations. Being a port, Shields had more female heads of household, so the "observed" result in this town was different because with more exceptional pairs it was not as fully random a subset. John Foster, *Class Struggle and the Industrial Revolution*, London, 1975, 125-31 & 263-4.

4. Doige provided no street numbers for any of the residents in this sparsely settled neighbourhood, but for 29 of the 51 people and firms listed there is at least a street name. These streets were all in the eastern part of the ward, adjacent to Pointe à Callière. So for the other 22 people, including nine of the 10 listed labourers, their address of

in evidence in faubourgs St Laurent and Ste Marie, where, unlike the artisans, they tended to be concentrated in particular areas. More than half of all the labourers listed in the Directory were to be found within in a few minutes walk of each other in the north-eastern corner of faubourg St Laurent. Almost a mile east, along the smaller side streets of faubourg Ste Marie lived another fifth and, if anything, the tendency towards grouping was even more pronounced among the labourers, where better than three out of four lived beside another labourer.

What crafts were practised by those who choose to live alongside labourers? Members of the construction trades, who would have worked alongside labourers, accounted for just under half of these artisans. Other frequently cited trades were shoemakers, saddlers, bakers, butchers and, in faubourg Ste Marie, blacksmiths. Woodworking, the needle trades, tin-smithing, founders and the luxury trades were all conspicuous by their absence.

If, as this suggests, the social should be our starting point, so too should form rather than content. The differences between editions and the eventual fate of the Doige directories illustrate this rather well. In the November 1819 directory, Thomas Doige listed 2446 entries, 720 of whom had no specified occupation, so he simply called them housekeepers. Citing the large number of removals, Doige published a second edition in May of 1820. It had 2798 entries, but only 608 people designated as housekeepers, while the number of people declaring an artisanal occupation rose from 680 to 961. These significant differences suggest that the first edition might have been a rough draft of the second, but upon closer examination such did not prove to be the case. Nominal linkage revealed that only 56% of the entries appeared in both editions. A quarter of those listed in 1819 and a third of those in 1820 appeared only once. In such a rapidly changing city, a reliable directory would clearly serve a purpose, yet both lost money and no new directory would be published for more than twenty years.

Now in reflecting on why the Doige directories proved such a commercial failure, it occurred to me that I had overlooked the historical significance of the directory's form. Understandably, since the computerised version of the directory has a completely different form, content necessarily drives the analysis; but the structure of a directory could seriously affect its content, indeed its viability.

Doige listed his people alphabetically. So, for example, the Lady Grant, Baroness of Longueuil, appeared sandwiched between a Mrs Graham, trader, and two other people with the surname of Grant, an attorney at law and a cooper. As this suggests, day labourers could be interspersed throughout the directory in a way that, as we have seen, they never were in the daily life of this highly segregated city. Not only was social rank not respected, but Doige's decision to call anyone without a specified occupation a housekeeper meant that, if you did not work for a living and bourgeois gentlemen and ladies rarely did, how were you to be distinguished from a domestic servant? Significantly, not a single entry for rentier, the term

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St Anne's suburb may have meant just that, but more likely it meant that they lived on one of the seven newly opened streets to the west.

used to describe the social group who controlled the landed wealth of the city, appeared in either directory.

Alphabetical listings impose a potentially democratic order based on individual equality rather than social position, wealth or merit. We may think it normal, even natural, but a number of elements suggest this way of ordering information was novel and deeply offensive to many in positions of power in late pre-industrial Montréal. Particularly revealing was the social geography and subsequent history of the 331 addresses known to be missing from the 1819 directory. Those absent from both editions were heavily concentrated in the western suburbs of the city. Listening to these silences in the source, we can hear a debate about fundamental values.

To be sure, debates over the legitimacy of bourgeois individualism are not what historians expect to find when they computerise city directories. Our expectations, however, are precisely what needs to be tested. And yet, by treating certain sources as "routinely generated series", we impose a standardisation by default that is the antithesis of historically grounded testing. We are drawn to exploit sources that fit the computer, without asking why is it they are so compatible? If there are no user-friendly machines, only machine-friendly users, then one might say the same for sources. The census returns, tax rolls and city directories that I computerised were all attempts to impose order on a rapidly changing society. The machine-friendly nature of these largely novel forms of social ordering can easily lead to their highly malleable contents being mistaken for the past. The past was, however, made of much sterner stuff. No matter how normal these categories may now appear to us, we must realise how temporally and socially grounded that normalcy is. Historically-grounded critiques of these sources and their categories are necessary, if for no other reason than they were both the result of social struggles, and so have a lot to tell us about the nature of social change.

Since the pioneering work of Marc Bloch in the 1920s, this more holistic view has often been associated with the need for greater interdisciplinarity. But, what was once seen as common ground has since been enclosed through a process increasingly driven by corporate expropriation of university research. The divisive disciplinary structures of the academy have become a defining characteristic of contemporary capitalism. These divisions impose a socially constructed set of values and assumptions on understanding the present, which distort the past and thereby structurally limit our future. As the examples in this paper suggest, however, intellectuals living in advanced capitalist societies tend to take for granted, indeed assume as natural or at least normal, quite fundamentally bourgeois categories. As a result, the conceptual bases of key techniques, analytical categories and tools are profoundly a-historical. So, uncritical borrowings from the social sciences will not allow the type of interdisciplinary work we so desperately need.

My experience with the mapping Montréal project that I mentioned at the outset illustrates a further dimension of this problem as it relates to history and computing, while offering a way forward. The project links historical sources to period maps and so brought together historians with their databases and geographers with their mapping software. As this

project was initially conceived the temporal data would come from the sources, while the spatial representations would be based on the maps. Any opportunity for properly interdisciplinary research was greatly limited from the outset by this academic division of labour reinforced by expertise in conceptually distinct software.

Now, as we have seen with the city directories, historical sources can bear witness to significant spatial dynamics. While, for their part, period maps contain not only substantial historical data, but embody historically-specific ways of seeing. Like the Doige directory and many other "routinely generated" sources, the Adams map of 1825 was created by someone attempting to make sense of a rapidly changing society. Here, John Adams, a surveyor in the Royal Engineers, chose to distinguish dwellings from other types of buildings. This particular attempt to impose order prefigured a division between home and work characteristic of gendered industrialisation. Although such a division might then have made sense in parts of Britain, it would not be common in Montréal for at least another generation. As this suggests, instead of considering period maps as the necessary key to spatial understanding of the past, it would be far better to unlock the varied dynamics and characteristics inherent in each source. Since this would mean respecting the differing historical logic of each source, it does require a critical transformation in historical computing. It will be a difficult task; but the late 20th century triumph of capitalism has made urgent such a radical change in our historical praxis, for I think critical computing is essential if we are to understand how and why people successfully constructed societies very different from our own.

Robert C.H. Sweeny
History Department
Memorial University of Newfoundland