

The Electronic Journal

Sophisters, economists, and calculators

Michael H. Brooke, MD

"But the age of chivalry is gone. That of sophisters, economists and calculators, has succeeded and the glory . . . is extinguished for ever." (Edmund Burke, 1790; Reflections upon the Revolution in France)

Burke surely knew whereof he spake. Neurology, in particular, seems besieged by sophisters and economists, but the only question that will be addressed here is whether there is a useful place for the calculators, or at least their latter day descendant, the computer, before our glory is extinguished forever.

Thomas Carlyle, who died in 1881, wrote: "these are the three great elements of modern civilization, Gunpowder, Printing and the Protestant religion" (Essays: 'On the state of German literature,' 1860). One might quibble. There are a number of present day contenders to which we pay but little heed. The ball bearing, for example, or on a grander scale, the elevator. Without them we would be trundling to work at our ground floor office. Consider the light bulb. It is an essential part of our everyday existence and yet the only time it intrudes on our awareness is when one fails to light. It is doubtful if Davy, Edison, Swan, and all the other pioneers in incandescent technology could have foreseen where their inventions would take us. Certainly, they would have marveled at the nighttime photographs of earth from space in which towns and cities shine like galaxies. They might also have reflected upon the ruination of backyard astronomy. However, unless they had unusual clairvoyance, it was probably not apparent at the time that their invention presaged more than just a change of careers for the manufacturers of gas mantles, arc lights, and that great favorite of Victorian theaters, the lime light.

To discuss the light bulb and the computer in the same context might seem far-fetched, but the computer is passing some of the same boundaries of public acceptance. Similarly, forecasting its future is limited by our inability to predict the ways in which it will be used.

In its early days, the computer was restricted in its use by size, cost, and the technical expertise necessary to get it to do more than add a column of numbers. Paradoxically, as computers became more sophisticated and their operating systems more complex, they became easier to use, and neither size, cost, nor the required expertise now presents a barrier to their use. The major remaining question is

whether they serve a function that people need. More specifically, are they important enough to the neurologist to make them necessary and constant companions? They will have to fill a need as urgent as the light bulb's illumination of the night to be promoted to this role.

In the early days, computers, at least those that were not used for playing Pac-Man, were employed to manage local databases and as an alternative to the secretary's typewriter. To fill this need, commercial programs such as dBase and Wordstar were developed. Arcane commands brought up puzzling screens and the phrase "computer literate" was heard in the land. The ability to use a computer successfully was admired almost as much as the ability to differentiate a claret from a burgundy.

Then came networking. The effect of the Internet was to place every computer in contact with every database in the world. It was at once Utopia and Babel. For the first time, information could be garnered from remote sources and presented on one's monitor. The enthusiasts likened its importance to that of the invention of the printing press. There was and is, however, an important difference. Gutenberg was secretly developing the printing press with movable type in the middle of the 15th century. When the famous Bible appeared, it ushered in an age in which the common man had access to writings heretofore reserved for scholars and academics. It, in fact, helped to dispel the ignorance and superstition of the Middle Ages. The Internet, on the other hand, permits the common man to publish freely, no matter how superstitious or ignorant the information. Therein lies the rub.

Without doubt, the Internet is the largest repository of garbage in the world. Sorting through the dross to find the gold can be an exhausting process. Yet the potential is there. It may be relevant, then, to tackle the problem from the opposite end and to pose the question as to what information and activities, if present on the Web, would attract neurologists and make the use of their computers inevitable. Some years ago the American Academy of Neurology established a committee to look at the possibilities of using computers and information systems in neurology. After much reflection, a Web site was established by the Academy. The Web site has both a public area and one limited to members. It covers information about the Academy; Academy publica-

tions such as fact sheets, newsletters, and the like; information about the annual meeting, including the program and abstracts; and a list of members. Each of the Academy sections, such as movement disorders and electrophysiology, has its own area. Web leaders were identified in each of the sections and the aim was to provide on-line journal clubs to review the pertinent literature in each area. Bulletin boards were set up for members. In addition, educational courses can be provided on-line. From the beginning, the on-line presence of the *Neurology* journal was recognized as a necessary feature.

It is instructive to look at the results of this activity. The Academy site registers approximately 9,000 hits daily from all over the world. There are approximately 1,500 individual user sessions per day each lasting an average of 7 minutes. Approximately one third of the Academy members have registered on the site. Almost 90% of the abstracts for the annual meeting were submitted electronically.

So much for the good news. Over 90% of the hits are from the general public. The most popular page accessed by the public is the fact sheet on ALS, probably because of its alphabetical precedence, followed by the other disease fact sheets. The typical neurologist checks into the site, accesses the membership list, presumably to look up his or her own entry, and then vanishes. If we allow past experience to dictate the future, the Academy Web site should be redesigned with the general public in mind, making information available about neurologic diseases in an understandable, timely fashion, stressing the need for neurologic consultation. Providing resources for neurologists might, at first glance, appear futile.

There is, however, another aspect. It is kin to the question as to whether winter precedes summer or follows it. Neurologists can only be expected to use a Web site if there is enough activity on the site to make it useful. There will only be enough activity on the site when neurologists are actually using it. Some neurologic sites have broken through this barrier. Examples include Neurosciences on the Internet (<http://www.neuroguide.com./index.html>) and the neuromuscular disease home page (<http://www.neuro.wustl.edu/neuromuscular/>) at Washington University, among others.

Parallel, but unrelated, to the development of the Web is a change in the way in which physicians obtain information. Some decades ago, when biochemistry texts were a mere 100 pages slim and the adjective molecular was only heard in the context of physics and chemistry, medical students were required to house all the necessary information in their own brains. In order to give them something to learn, it was necessary to examine them on the small print in *Gray's Anatomy*, a fact weird enough to bring a smirk to the face of the average PGY1. True, those of us with brains too limited to remember the dosages of the twelve drugs then being used in internal medicine were told that we could always look them up in the PDR (was there a PDR in those

days?) but, by and large, one was required to know everything. Times are changing. Knowing all the individual mutations in mitochondrial diseases is probably a sign of neurosis, if not an outright break with reality. Being able to find out what they are when you need them is essential. Curriculum committees may debate whose course is more important in a crowded curriculum but this is really an irrelevance. It is the technique of information retrieval that is about to provide the cornerstone for the education of the medical practitioner as Medicine itself undergoes a paradigm shift.

There is an additional requirement in information retrieval needed in the doctor's office. The information must be provided immediately and not 6 weeks or even 6 hours after it is needed. If one accepts the coming need for timely information retrieval to control the information explosion, there is really only one medium that will do this: the Internet.

What, then, are the impediments to using the Web for this purpose? They are both physical and cognitive. On the hardware side, most computers are tethered. They are restricted to one physical location either by size or by the need for the connection to the Internet. Developments on two fronts may make this objection obsolete. Computers are being reduced in size. The new palm top computers have many of the features of their bigger cousins. Secondly, the development of wireless technology may sweep across the computer industry as it has across the telephone systems, freeing the user from the computer's tether.

Cognitively, there are more difficulties. Reading information on a fluorescent screen has none of the satisfaction of turning over a glossy page. Furthermore, the actual search for any useful information can be frustrating indeed and the searcher can get mired in a thousand irrelevant paths. When found, the information may even be erroneous.

If these problems could be dealt with, it is not impossible to imagine a future in which a pocket computer will switch on instantly, in the office or at the bedside, and access a site that provides comprehensive information ranging from disease management to CPT codes, from meeting schedules to billing and insurance information. On-line consultation would be available for difficult cases. All information would have been reviewed for accuracy by the professional organization. Utopia? Perhaps, but, technically, it is already possible to do this.

What role should *Neurology* and the professional organizations play? One possibility is to try to predict what the neurologist's future needs will be and to establish the framework for this now. It will include information gathering for the neurologist as well as information dissemination to the public. This is the "if you build it, they will come" approach. The other approach would be to follow trends as they occur and to develop information systems in neurology only when similar approaches in other areas have proven successful: "if it works, we will get one." The risks involved in the first approach are consider-

able. Failure will be expensive in time, money, and credibility. The risks of the more conservative approach are probably greater. We are surrounded by sophisters and economists. Neurology, as a separate discipline, is under scrutiny. A clear presence is needed in what is likely to become the most important communication medium of the next century. We have to plan now to develop the model for 10 years hence.

The editorial staff of *Neurology* has taken steps in this direction. The journal will appear on-line this month in a full-text version identical to the printed form. This will be available to Academy members. The advantage of the on-line form is that it can be searched for keywords to provide almost immediate access to the relevant pages. Other features will be added as time goes by. A monthly review of the literature in neurology and related fields is planned. This will be fashioned after a Journal Club format. Such a review is particularly suited to electronic publication because it will not be subject to the publication delay that is inevitable in a printed version. Additionally,

contributors to *Neurology* will be able to include data on the Web site that cannot be included in the journal because of space limitations; detailed data from clinical trials, for example. Electronic submission of papers will be possible. There are also plans for a forum that will allow for very rapid discussion of papers appearing in the journal. In the distant future, it seems inevitable that papers will appear only in electronic form. Before this happens there are some thorny issues of copyright and citation to be solved, but it is unlikely that these details will delay the process for very long, and it is likely that *Neurology* will be in the vanguard of these efforts.

“To complain of the age we live in, to murmur at the present possessors of power, to lament the past, to conceive extravagant hopes of the future, are the common dispositions of the greatest part of mankind.” (Edmund Burke, 1770; *Thoughts on the Cause of the Present Discontents*)

Right on, Edmund!

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