

Culture–industry interaction in the printing process

M. A. S. Rajan

The electronics revolution has touched the printing industry as if with a magic wand. Besides resulting in a big jump in speed and quality, new printing technology has brought the creative person closer to the printing machine.

But words are things, and a small drop of ink,
Falling like dew upon a thought, produces
That which makes thousands, perhaps
millions, think Lord Byron

To the casual observer, print technology may only mean the stuff that goes into printing machines. What we see most commonly is the roadside printery using some small-size printing equipment and boxes of types. This is the visual image of the ordinary citizen about print technology. But to knowledgeable practitioners and users, print technology is something much wider. In the broadest connotation printing must be viewed as the transfer of ideas and information using symbols on media. But even if it is treated as only producing some 'marks on paper', it would include not only the means of transferring handwritten or typewritten text into something that is applied by ink on paper, in one of several ways, but also the technology of ink itself as well as the technology of manipulating the paper surface. Print technology in this sense is a highly flexible and multifaceted discipline, as variegated as the print product itself.

Extrapolation from a 1982 study¹ and data from a 1988 survey indicate that the printing presses in India—what may be called the in-plant printing establishments as against desk-top establishments—represent an investment of about ten billion rupees, and there are about 90,000 of them, roughly 90% of them small. Since the scene is changing with dramatic rapidity these figures must be regarded as intended only to indicate the dimensions. Apart from its size and dispersion, the printing industry has another facet to it. The print medium has a very special place in the field of human communication. The printed word is intended for successive generations of readers. It is read over and over again and thereby possesses multiplier effects. No function in the daily life

of literate individuals can do without the aid of the printed word in one form or the other. In the case of organizations, a large part of their effectiveness and productivity depends on their documents. One effect of this high position is that the quality of the printed product acquires a supreme importance. Anything that has to be preserved for a long time has necessarily to have, at the least, the quality of endurance. And since the printed word is interwoven in our daily life it has to be aesthetically pleasing, elegant, clear-cut, legible, and functional. Thus traditionally printing technology has given primacy to the quality and permanence of its output. Now an enormous upsurge of innovation is being brought about by the intrusion of the all-pervading computer into the printer's environment.

A brief history of type

In physical terms what we see historically are three broad transformations. The first was from precisely carved metal matrices, which produced solid types, to precisely placed photographs of fonts through which light was flashed to etch metal. Then came the move to use laser light beams to generate characters by way of assemblies of dots. Now, the quality of printing depends on the resolution achieved by the image or type. In each technology there was a limit to the attainable resolution. In the earlier days it was the hand precision of the metal engraver. Later it was the built-in resolution of the photographic emulsion. Both these limits were very high indeed. In the laser technology the resolution is counted as dots per unit length. Present-day high-quality typesetting computers use a resolution of over 1000 dots per inch. The threshold level is put at around 600 dots per inch.

Until this level of resolution was attained by laser-using systems, the earlier technologies held the upper hand. Now electronics is able to provide sharpness of type to equal and even surpass the quality of the earlier technologies.

This leap over the quality barrier is of enormous significance. Earlier, with the change from hand composing to mechanical composing of hot-metal types, the speed of composition rose from about 500 characters per hour to about 5000. The advent of cold typesetting through photomasks achieved speeds of up to about 30,000. Electronic typesetting has taken the speeds to nearly 400,000 characters per hour.

But increased composing speed is only one of the consequences. The use of electronics for printing has produced a truly fantastic transformation. This drastic development has of course not occurred overnight. It has been preceded by many jumps of technology spread over decades; only, those jumps have shown a tendency to occur rapidly in recent times. This trend of more rapid leaps of technology will continue into the future and that is what one would have to be prepared for.

More particularly, the development, in recent times, of the ability to digitize graphics with very high resolution and the entry of technologies to use digitized information for copy production through laser beams is a virtual revolution. Every technology so far, including the modern typesetters using combinations of photomasks and microprocessors, has been constrained by the time and gadgetry needed whenever the text has to be changed or manipulated. But no similar constraints hamper the new technology. Laser beams operate on digitized information to produce dot images. Any character of any shape, indeed any graphic image, can be stored

as digitized information and hence becomes available to the laser. This results in a tremendous flexibility and versatility unheard of in previous technologies. Electronically stored information can be manipulated instantly with enormous ease in a myriad ways: Text can be moved, rotated, compressed or expanded at will, instantly and silently through electronic commands. This transforms all steps of the printing process from the composing room onwards.

Personal interactions

Not very long ago high-grade production of anything utilized the hand skills and the mental capacity of many individuals, in ordered sequence. These skills were mostly acquired, through hereditary occupation or extremely long apprenticeship. Whether it was weaving or printing or garment-making or the making of furniture or jewellery, there were a multitude of human specialists to do different jobs in making the end-product. For example, half a century ago, there used to be tailoring shops of different kinds. Some called themselves cutters. They were a superior lot who disdained the work of stitching which they got done by tailors. Likewise in the domain of printing, there were skilled people who assisted the writer and the book designer in finally bringing out the print product. In an overall sense the intermediary skills are getting abolished by the current technological change. (A much publicized news item of a decade ago described how President Carter used a word processor to publish his book of memoirs quickly. This was very unlike his predecessors, who simply told their story to their ghost writers, and they and a whole crew of printing people then produced the book.) This is a significant feature of the new scene.

The creative component of the tasks that comprise the production of print matter has two subcomponents. One is the purely mental component consisting of ideas, literary and aesthetic skills, imagination and so on. The other is the artistic skill in the area of producing, i.e. manufacturing the print product, say a book. In the earlier period the latter involved a whole lot of human interactions. The creative people on the one hand and the technicians in the different

portions of the production process on the other dealt with each other. If the author wanted his book to be attractive in a particular way he had to go and sit with the compositor, the layout supervisor, and the other people. Spectacular examples are those of the poet who wanted the size of the type to vary from stanza to stanza, and the whole text to have a wavy form, and the author who wanted different amounts of printing on different pages, depending upon the intensity of the text. The poet and the author were trying to pierce readers' minds both through their words and through the texture and shape of the printed work. And this required the technicians' collaboration. By and large the two areas of creativity were separate but dependent on each other, and they also interacted in their own ways directly with the market. The author or the copywriter had his or her own approach to the readers' market, and so did the print creator. All these human relationships are now decoupled. The important change is that human intellectual creativity cannot interact, under the new dispensation, with other human skills. The author or the creative person has to get coupled with a machine. He or she would have to be satisfied with the couplings built into the machine. But that is no disability, because that capability is enormous, and it has flexibility. It is clearly greater than a single human being's capability, though, perhaps, not the combined capability (and versatility) of a chain of human beings. But the associated consequence is more significant. No longer is it permissible for the creative person to remain aloof from technological knowledge. He has now to practise 'do it yourself'. In short he must begin to learn more about technology, and about 'tricks of the trade' and about taking his ideas to market. This is a big change. The end user has to educate himself and acquire the skills needed, some of which will be in the area of fine arts. If he lacks the capacity to absorb these skills, the new techniques will simply be unfriendly to him.

The impact on printing

Just as the new technology has brought the creative person close to the printing machine, bypassing the intermediate

technicians, it has also tended to close another gap typical of the older systems. In-plant printing, that is, getting something printed in a machine-equipped printing establishment, stood in a separate street from typewriting and other forms of copy production, even including xeroxing. The output of the latter lacked the quality and permanence of the former. Now table-top copy-production systems are rapidly improving their quality, versatility and cost-effectiveness. One report has it that 'electronic printing would make the in-plant print shop obsolete by 1994'. Although the technology takeover may not be as dire or as complete as this, clearly the in-plant printing outfits will find it necessary to rethink their investment plans. If customers begin to accept the quality output by cheaper machines, why go for very expensive ones? This would have a profound effect on the structure of the print industry.

The cost of electronic goods is falling rapidly and so what appears out of reach today will be within reach tomorrow. Secondly and more importantly, the new technology has bypassed some barriers that printing technology met in earlier times. Writing about making and casting of types, Wakankar² points out how, in an earlier age, the technology stream from the West conflicted with the natural grain of Indian scripts. Indian script users declined to subject their beloved inheritance to deformation and mutilation at the altar of technology. This helped to preserve the phonetic efficiency of our scripts, but in the process updating of technology was slowed down. This will not be the case in the next phase. Hereafter technology from the West will not demand any compromises in the script. The advent of laser typesetting has simply swept aside the earlier inhibitions. One can foresee considerable modernization of printing in Indian languages. Since the change comes at a time when vernacular publishing is on a great upswing, the prospects are very wide. Further, desk-top typesetting will promote a more decentralized printing industry than at present and this could be a further reinforcement of vernacular publication of all kinds. Given the will to use the technology skilfully and innovatively, a great future lies ahead for Indian-language printing.

A fallout would be the emergence of a

new class of specialists who are conversant with the fine points of the print process, such as layout, type aesthetics, cost reduction and so on, who would act as consultants to do-it-yourself publishers. Such specialization needs every encouragement. There would possibly be numerous other side-effects, some good and some bad, of the decentralization.

Indian vernacular fonts

Type fonts, that is, complete sets of characters calligraphed in a single matched style, are a key element in the printing process. An important technological snag that faced font development in vernacular scripts was their graphical complexity. Especially in the case of a language like the South Indian Kannada, where there are so many curls in the characters and so many highly involuted auxiliary characters that have to stand by themselves, producing type in metal form created certain problems. Letterpress systems, which utilized monotype casting, presented no serious problems because sufficient time could be used for casting the individual slugs. But the difficulty arose when one went towards faster systems such as line casting. Complex, heavily involuted small types required complex moulds called matrices. They were difficult to make because their construction had to be such that the molten metal could solidify quickly, and when solidified the types could have sharp edges, and were hard enough not to break off at the serifs and curls, and were also able to withstand rough handling. Often this meant new metallurgical materials with greater iron content, which in turn meant higher pot temperatures as well as longer cooling periods or special

cooling materials, and so on. All this raised the cost of production, and discouraged the type foundries. Here one clearly sees how technology inhibited the full flowering of the script in the print medium.

One consequence of the laggard development of type foundries becomes clear when we compare the English and Kannada fonts. The English alphabet possesses a rich endowment of variegated type faces for printing. By way of comparison, if the English type-face scenario is a lush forest, the Kannada scenario is a near desert. This will not do in these days of competition. Any print matter produced for the market has to catch the eye and please the reader. The mood—of joy, sorrow or festivity or whatever—requires type styles to match. Wakankar has estimated that each Indian script needs five different styles, 10 display designs in each, with different weights, intensity and orientation.

That the reason for this scarcity of fonts is purely technological can also be judged from the fact that there is no lack of calligraphic variation or innovation when it comes to posters, graffiti or hoardings, or even some newspaper advertisements. A technological hurdle had to be crossed to extend calligraphic innovation to a broader spectrum, which includes print material. Making new font sets is specialized and creative work. The hot-metal types call for lengthy and painstaking effort to manufacture matrices. We have already noticed the technical snags that bedevil this effort. For the type foundry this is no longer a worthwhile effort. However, the new breed of digitized fonts can provide the answer. As Wakankar says the user can himself design his types under this technology. Even if one does not go that far one can at least initiate

steps in the direction of creating vernacular digitized fonts.

Reflection

Technology has contributed powerfully to culture. Thinkers have bemoaned the fact that several of these contributions have been bad for human values, especially when technological changes have raced ahead before cultural changes have coped with them. Correspondingly there are numerous contributions of technology that have promoted richness of culture, and more widespread appreciation of it. Language is a component of culture and technology's greatest contributions to it are in the promotion of the written word and in the far-flung dissemination of the spoken word and the visual image.

Viewed thus, technology's impact on the printing industry may be seen as a very small segment of its wider cultural impact. But for the individual language, particularly the subnational languages, that impact is highly important. It requires precise understanding. And if it is understood in the appropriate perspective, the benign effects of technology can be enhanced and the negative effects minimized.

1. Shanmugam, A. V., 'Development of Communication Media—Contributions of Indian Industry; Part I; Print Medium', Monograph Indian Institute of Management, Bangalore, March 1982.
2. Wakankar, L. S., 'Past and Future of Indian Scripts in Printing', paper presented at the Mythic Society, Bangalore.

M. A. S. Rajan is at 6/1 12th Cross Road, Rajamahal Vilas Extension, Bangalore 560 080.