economist of my acquaintance. "What did you think of it?," I asked. "I didn't understand a word of it.", he said.

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Telecommunications in Canada: Technology, Industry and Government *by Robert E. Babe*
(University of Toronto Press, Toronto, Ontario, 1990), pp. xv + 363, $CAN24.95, ISBN 0-8020-6738-7 (pbk).

Perhaps more so than many industrialised countries, Canada's economic, political and cultural heritage has been understood to rest on the means and modalities of communication. This country's prospects for the 21st century are considered by industrialists, government policy-makers and some in the academic community, to rest on its capacity to shape an information economy in accordance with national cultural economic and political aspirations. Whether because of close geographic proximity to the United States, industrial resource-based growth or other factors, the history of political and economic decision-making which informed Canadian telecommunication development is a reflection of the evolving Canadian State. This history exhibits all the tensions between continentalism (or regionalism) and nationalism which have shaped industrial development in Canada.

Robert Babe's aim is to set out a realistic analysis of the recurrent patterns of decision-making in Canadian telecommunications. He seeks to show that the role of corporate and governmental power has been central to the implementation of advances in industrial devices. These devices include telegraphy and telephony, broadcasting and cable, and service applications such as videotex and Integrated Services Digital Networks. In exposing the locus of power in decision-making the author hopes to establish a foundation for human responsibility with respect to the development of technical systems.

This book is more than a history of telecommunications. It is a much needed illustration of how myths are instrumental in perpetuating and propelling the exercise of political and economic power. The myths which Babe sets out to critique are the following.

First, he attempts to show that Canada as a political, economic and cultural entity "persists despite, not because of, communication media" (p. 7). This view is contrasted with the perceptions of Canadian political figures and policy analysts who have argued that Canadian autonomy has been achieved in large part because of the structure of communication and the successful deployment of technological nationalism. This strategy is often said to have enabled Canadian industry to perform at the technological frontier in the production of systems ranging from cable, to satellites and digital network sytems. Babe challenges the view that technology-push strategies have provided a buffer to the forces of continentalism and the globalisation of markets.

The second myth concerns the technological imperative, i.e., progressive innovations in engineered artefacts are necessary, inevitable, and ultimately capable of explaining human phenomena. The author argues instead that "procedures, machines, and equipment are introduced by *people* — particularly by agglomerations (corporations and governments) — and only in being wielded do they 'shape' our ends" (p.12). Implicit here is the question as to whether

human organisation is simply adaptive to new technologies, or instrumental in shaping technological outcomes.

In his sojourn into the early history of telecommunications, Babe argues convincingly that telecommunication structures and organisations were shaped more by corporate and governmental decision-making than by technical innovations. The early integration between carriage and content in the 1890s and the use of government charters to privilege suppliers are used to show the role of non-technical factors in shaping the industry which emerged. The critical impact of arrangements for interconnection among competing telecommunication systems in the 1880s is shown to have provided a basis for the rise of monopolies. These later came to be regarded as the natural and inevitable result of technical change. For example, the preeminence of Bell Canada, Canada's largest telephone company, was "not thrust on it by its technology, or by superior service, but by government privilege and aggressive and frequently predatory business practice" (p. 89).

In this context, the author takes up a third myth — the doctrine of natural monopoly, i.e., the argument that economies of scale, universality of service, and system integrity required a monopoly structure for telecommunication. This argument was sustained in Canada, and elsewhere, until very recently. It reappears in the industries' defence of a system of privileges that yield protection from the incursions of competitors. Babe shows how predatory pricing, inflated acquisition prices, intimidation, deception, anti-competitive cross-subsidies, refusal to interconnect, vertical integration, public relations and politicking were the main determinants of monopoly.

The fourth target is the myth that Canadian policy-making, and specifically regulation of the telecommunication industry has effectively shaped the industry in the interest of the public. Evidence is brought to show that Bell Canada and its associated companies have been subject to a process of regulation that produced outcomes which differed only slightly, if at all, from those desired by the company.

Finally, Babe considers the view that the forces of technological innovation and entrepreneurial activity are sufficient to protect the public interest from the excesses of monopoly power. In refuting the effectiveness of Schumpeter's 'creative gales of destruction', the author looks to interventionist regulatory policy to achieve control over technical systems.

The analysis of these myths is informed by Barthes' observation that: "Myth deprives the object of which it speaks of all History . . . This miraculous evaporation of history is another form of a concept common to most bourgeouis myths: *the irresponsibility of man.*"[1] The trajectory of the development of the structure, organisation and performance of the Canadian telecommunication industry, like that in all countries, is attributed not to technology and its advance, but rather to choices made by those in positions of political and/or economic power. Echoes of the tradition of political economy represented by Dallas Smythe and William Melody are found in the author's attempt to dispel the magic of technology and to seek explanations in the political economy of institutional change.

Although Babe goes a long way toward his goal of undermining the mythical history of Canadian telecommunication, there are several weaknesses and contradictions in his analysis.

Myth Number One. Babe concludes that Canada exists despite the role played by telecommunication. This observation is derived mainly from analysis of the

control and ownership of the means of communication. For example, Bell Canada did not fully extract itself from control by its United States counterpart, A&T, until the mid-1970s. However, this does not answer whether the Canadian State could have survived in the absence of countervailing tendencies to the north-south pull of continentalism and economic integration. The author does not succeed in showing that, at the margins, the relative autonomy of industrial development in Canada was not influenced by the existence of east-west communication linkages.

Myth Number Two. In moving away from a technology-centric analysis, Babe succeeds in dispelling the myth of the technological imperative. Still, he asserts that the rapid development of the telegraph and other means of communication helped propel Canadian industrialisation (p. 40). It is but a short step from this statement to the conclusion that the latest advance in technology, e.g., fibre optic transmission and switching technologies, will have a similar effect. The rhetoric of the technological determinist appears in his amazement at the history of Canadian satellite technology. That this history was one of accommodation to prevailing institutional structures rather than one of the use of a new technology to ameliorate disparities in communication should not surprise if the author's thesis concerning the recurrence of historical patterns in the institutionalisation of technical innovations is correct.

Myth Number Three. Babe dispels the notion that convergence between broadcast and telecommunication systems is determined by technical characteristics. However, he goes to an extreme in his assessment that these issues should be understood as "being quite independent of the state of the mechanical arts" (p. 18). The real challenge to policy-oriented research is to integrate analysis of the forces shaping innovation and the implementation of technical systems — not to set aside the issue of technical change.

Myth Number Four. The treatment of regulation and the wider political decision-making processes instrumental in the extension of monopoly is weakened by the author's failure to suggest how alternative market structures might have significantly changed the role of telecommunication in Canada. It is unclear whether the author contends that greater awareness of historical patterns and choices would lead simply to better informed choices in the 1990s, or to a radically different institutional structure and development trajectory.

Myth Number Five. Many illustrations of the economic and political decisions which supported the interests of entrenched actors in telecommunications are uncovered. However, Babe does not clarify just whose public interest might be served had these decisions been different. He fails to show how regulatory agencies which failed historically to control the evolution of telecommunication in the public interest might do so in the future. The reader is left simply to consider the author's call for greater human responsibility for the exercise of political and economic power.

In this sense the conclusion is disappointing. Just why is it that these myths have carried the weight and influence that they have? Babe responds that they have been useful to decision-makers. In his reluctance to address the issue of contradictions within the process of technical and institutional change his case for a radically different industrial structure is not as strong as it could be.

The value of this book lies in the uncovering of the power struggles that shaped the development of telecommunication. The detailed expression of these struggles has changed over time. But critical choices on how innovative technical systems are to be institutionalised and controlled continue to be made. This book will

provide much needed insights for policy-makers. In Canada, and internationally, choices are made which shape the evolution of global telecommunication systems and services. These choices have political, economic, social and cultural consequences. Babe's analysis must force the reader to recognise the mythical character of the technological determinism cover story and to see that it does not aid in assessment of these consequences.

NOTES AND REFERENCES

1. R. Barthes, *Mythologies,* Hill and Wang, New York, 1972, p. 151.

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Making Science Our Own: Public Images of Science 1910-1955 *by Marcel C. LaFollette*
(University of Chicago Press, Chicago and London, 1990), pp. ix + 260, $US17.95, ISBN 0-226-46779-1 (pbk).

Exhortations to improve the scientific literacy of the Australian public are often made in a science-centred context. That is, scientists are called upon to explain their findings clearly to the public, and the public is urged to listen and learn in the interests of a fully participatory democracy. (This is what Bryan Wynne has termed the 'cognitive deficit' model of the public understanding of science).

In this welcome new contribution to the literature of science and its publics Marcel LaFollette argues persuasively that science communication is much more than a one-way process in which science is packaged by scientists for the passive consumer. She takes as the object of her study the public images of science in the US mass market magazines published between 1910-1955, magazines such as *The Saturday Evening Post, The Atlantic Monthly,* and *Cosmopolitan.* In the era before television, she argues, these magazines provided images of science which both helped shape the role of science in American life and in turn influenced political support for research. Initially, images of a benign and benificent science might have encouraged an approving public response, but later, events such as the creation and use of chemical and nuclear weapons meant that writers and readers could no longer accept uncritical adulation. LaFollette traces the shifts in the images of science and the changing stereotypes of scientists both male and female. Her chapter on "Women in the Laboratories" is particularly revealing of the kind of crazy double standards rampant in this kind of writing about science. If a male scientist was absent-minded, that was only to be expected, and his family made allowances for him, and forgave him his eccentricities; the woman scientist not only had to prove herself as a scientist, she was also asked to provide an image of herself as a 'real' woman, a good mother, and a superwoman homemaker. An article on Margaret Mead described how she could make "corn fritters with crocodile eggs"; male anthropologists were not expected to have domestic virtues in addition to their scientific credentials.

LaFollette argues that what Americans believed about science determined what they expected of it. The messages conveyed in the American popular magazines had to fit with the reader's beliefs about science, even if the beliefs were inaccurate. The messages did not simply assert what science was, but predicted