

The Fractional Horsepower Motor and Its Impact on Canadian Society and Culture

G. LESLIE OLIVER

Coming to Understand Consumer Technology and its Cultural Consequences

Much of what has been written about household and consumer technology, certainly in the popular press, has been of a celebratory nature. Its widespread worship in all its myriad forms has been, in fact, a dominant and significant characteristic of popular Canadian culture through much of the twentieth century.

The arrival of electromechanical based technologies (principally the electric motor) in Canadian households in the 1920s was the beginning of a new era, at least for much of central Canada. The country was moving from the demanding conditions of the pioneer and early settlement years to new aspirations for greater ease, comfort, convenience and fresh human experience.

The promotion of consumer technology has from the very beginning fed on these pressing human desires. Wave after wave of hyperbola, promotion and promise, and the ever predictable commentary that follows in the popular press have served to further build public expectations, while continually redefining, in the popular imagination, the very nature of human progress and that of mass culture, which it continually shapes and reshapes.

Yet, in juxtaposition and sharp contrast to this dominant, evolving popular view of human progress, linking technology to inevitable human achievement and the good life, there has developed a much less voluble, but more inquiring, critical and analytical literature. Much of the literature has been uniquely Canadian in source and flavour.

This literature base warns of the real face of technology and its consequences for Canadian culture, society and the human state.¹ The central message here, although seldom heard in the din of hyperbola that engulfs society on every

hand, is that technology as friend and saviour is one of the most catastrophic ideas of the current century.²

But this literature tends to be of a general nature. It deals with the broader implications of technology for nation, community and individual in matters such as shifting philosophy, ideology, values, lifestyle, personal choice, and equity. Too, it often tends to focus on the large and obtrusive technologies — those associated with industrialization, energy generation, and the automobile — and their implications for human and environmental degradation.

Much less evident in the literature are the results of research into the implications of specific, small and unobtrusive technologies, especially those that enter the home (often by the back door). There is little to help us to understand better what they are, what they do, how they work and their intended, unintended, as well as their unanticipated and unplanned for consequences — those now increasingly evident as the twentieth century draws to a close.

Clearly, technologies differ in their essential purposes, as well as in their effects on Canadian society and culture. Some are inherently more friendly and accommodating to the human state than others, seemingly more beneficial and inherently capable of possible human enrichment, bringing with them less risks to health and safety. Many also have built in safeguards to the potential harm that they might cause.

Household and consumer technologies have been popularly believed to be an example of the latter — generally benign, favourable, advantageous and altogether worthy of a place in the homes of the nation. They have been seen as examples of “true technological advantage,” counted on, yet never really contemplated beyond recognizing their existence and anticipating the utility which they promise.

However, better targeted and more detailed analytical studies are required to test this hypothesis, to come to an understanding of the consequences (beneficial and otherwise) of the many technologies which now shape Canadian culture and society on every hand — starting in the home.

Of interest are two fundamental sets of questions that serve to differentiate and illuminate technologies and their implications. The first concerns questions of culture, the second, of society. Those of culture are cast in such terms as: what is it? how does it work? what does it do? and what are its cultural consequences for us? in such terms as how it effects the way we think about ourselves and others, about life and life's ways, about our values and attitudes and our view of the world around. The central societal questions are concerned, in turn, with the implications of the technology for how we interact with one another, live together, and organize ourselves into groups and communities of particular interest.

Dealing with household and consumer technologies, this paper is intended to help contribute to inquiry in these two areas. It deals with the most fundamental means upon which domestic technology depends: the small fractional horsepower (FHP), unobtrusive electric motor.

In the following sections the nature of popular material culture and its role in shaping Canadian society and its values is examined; the essential conditions for systematic inquiry as they relate to the study of consumer technology as material culture are reviewed; and the fractional horsepower electric motor as an artifact of Canadian culture and its many meanings and their significance for our lives is analysed.

Technology as Material Culture

The interest of the public in the interpretation of its culture, starting with its principal icons, is said to be shifting. Once focussed mainly on the monumental works of the great and the mighty, the "big" events, the power and authority figures, the celebrities and elites, it has moved, at least for some, to include a more populist perspective. The interests of a new generation include coming to understand better the power of the common places of life and their systemic forces that shape life's ways.³ Of particular interest is the social and cultural impact of our popular, all pervasive technologies.⁴

The understanding of history as culture and the many meanings that it brings may be seen

as a mosaic of often small but critical events shaping society and daily life. Thus, understanding one's culture rests on the ability to extract meaning from the complexity of the events and things which surround and press in on every hand; our all pervasive consumer technologies are of this sort.

It has been pointed out that as early as 1850 "America was becoming a world of visual images, of signs and of symbols — in short, a hieroglyphic civilization."⁵ The images were those of mass production and consumption. An understanding of consumption is thus basic to the understanding of culture.

Technology is linked with culture in other ways. Above all, it is a way of doing things; it is about practice and the world of the practical. But much of culture, too, is about socially acceptable practices and the values and end states from which they draw their sense of purpose and acceptability. As the socially acceptable practices within a society evolve, so its culture evolves and changes at its very roots.⁶

But beyond practice, the study of culture also focusses on the understanding of ideas, experiences and feelings, and particularly on the external forms they come to take, such as things and events, as they are made public and thus truly social. Humans, above all, are creatures that strive constantly to make sense of their feelings and experiences, a task which has become immensely difficult in a conceptual field now crammed with a proliferation of ideas and things, each with its special meaning.⁷

The Study of Popular Material Culture

Methodological Challenges

The attitudes held by a people toward the objects of its culture tell much about its values, how it perceives itself and its society. These objects can explain much about a people's sense of the spiritual, as well as its sense of the material and the very practical. Conversely, the artifacts themselves serve to continuously redefine a culture, as values and attitudes towards those artifacts evolve in a complex symbiotic relationship between a people and those things they create for themselves — each influencing the other in a process of dynamic change and cultural evolution.

The analytical task, then, is to develop an adequate framework for the study of material culture, one which will effectively educe new cultural knowledge and understandings from the many artifacts with which a sophisticated

post-industrial society now surrounds itself, especially artifacts of technology — possibly its most distinguishing characteristic.

As Canadian society moves further and further from its Euro-centred period of early exploration and settlement, so the artifacts of that embryonic and early developmental period seem to hold less and less interest, power and meaning as a medium for contemporary cultural interpretation.

It has, in fact, been pointed out that, to date, much of the work by museums and the heritage movement has been too heavily influenced by a kind of anti-modern sentiment.⁸ Their emphasis has been on shaping contemporary values and a sense of Canadian identity harking back to the founders of nation and community. Also, artifacts for interpretation and the resulting images that have emerged have focussed too sharply on native peoples, settlers and Victorians,⁹ in an attempt to preserve a rapidly, if not altogether disappearing, past rather than on the interpretation of the present cultural reality and the future it heralds.

Yet, museums and the heritage movement in general continue to be seen as the intellectual and spiritual conduits for the stories and moral narratives of the past, in ways that relate it to the present so as to effectively express the depth and true meaning of a people.¹⁰ There is evidence, however, that interest in native peoples, settlers and Victorians has waned considerably. Recent generations appear to see them as largely irrelevant subjects for study.

There have been far too many other powerful intervening events, it seems, each producing its own objects with powerful and quite different meanings, than those coming out of Canada's early settlement and developmental years. These are the new subjects for historic and cultural interpretation required by a post-industrial people.

Among the most powerful Canadian stories of the twentieth century to be told for cultural interpretive purposes are those which concern the events and objects of our now vast popular technology, the central commonplaces of the times. These have shaped Canadian social, economic and political responses to all aspects of national, community and private life; possibly the most pervasive and invasive of these are the technologies of household and popular consumption. Once the door of the home was fully opened to consumer electric technology and its consequences, Canadian life, at its very roots, would be forever changed.

Just who were those that made such critical decisions on the public's behalf in the early part of the century? What were their motives? Were they those of a true technology of human advantage and of the practical, or something quite different? Early trade literature and popular writings of the period suggest that many of its early inventors and advocates had in fact a vision of the ultimate good to which they aspired, while many of course did not. The science of the day was seen as a new source of the good, the newly discovered laws of physics and chemistry were there to be applied wisely and well for the benefit of human enrichment.

Yet, it has been noted that as the twentieth century draws to an end, virtually all urban and most rural sensual experience has been profoundly altered badly by the human hand. The vast majority of human experience of the physical world is now seen through the consequences of twentieth century technology. The only aspects of visual experience of natural origin is the sky and the trees that stand against it.¹¹ But even here the sky is darkened, the landscape cluttered, the trees and much of the land form altered or destroyed, so that nothing is as it was at the turn of the century.

Thus, deep cultural learning for current and future generations of Canadians, products of a now infinitely more complex culture, one which has been laced and dominated by the artifacts of its invasive technologies, will require of the interpreter increasingly more robust analytical interpretative methods.

Analytical Methods

Methodological barriers have plagued the field of material culture as an emerging area of disciplined inquiry.¹² The absence of solid collections-based research leading to new cultural understandings is seen as a barrier to meeting the longer term goals of museums and curators in the production and dissemination of cultural knowledge.¹³

The absence of research data, specifically in the area of household technology in Canada, has been noted as a limiting factor in the development of analytical and interpretive studies. Consequently much of the work to date in this field has been of a general survey nature, more descriptive than analytical, and thus lacking an adequate intellectual dimension.¹⁴

Then too, much of the field of material culture has been caught up in its long tradition of object-based study in which the focus continues to be much more on the extraction of

information from the object in terms of a historical narrative to be produced, than on its social and cultural implications.¹⁵ If the cultural learning needs of contemporary society, flooded with vast new arsenals of inanimate objects and icons, each with its own proliferation of new meanings, is to be met, the focus on interpretative model building must be much more on "material culture" than on "material history," although both terms may continue to be used interchangeably.

Analytical frameworks for work in material culture are in an early developmental stage. Consequently, researchers have few standards to follow and must often construct their models and methodological frameworks as they go. A useful review of these issues from a Canadian perspective was undertaken in 1985.¹⁶

From these studies a number of parameters appear, as variables within a data matrix for collection and reporting of information on material culture. The suggestion is that when such a data matrix is completed a useful analytical report may be made dealing with the object and its cultural significance.

Orthogonally-related variables include, along one axis, such properties of the artifact as: material, construction, design, purpose, function (feature), provenance (place and date of origin), historical narrative and value (as imputed aesthetic value, as perceived value to the society which produced it, as value reflected in the object's historic and cultural associations, as well as its possible market value).

On the other axis are variables related to the kinds of evidence collected or the analytical operations performed, including: observable data (from sensory contact), identifying and physical descriptions, comparative data (compared with artifacts of similar time and place), supplementary data (from secondary written and oral sources — photos, paintings, drawings, etc.). Other supplementary data may also include evaluations, cultural analyses (related, for example, to value) and associated interpretations of social and cultural significance.

But what is at risk of being missed in an object-based inquiry, including the physical and historical profiling of the artifact, is any sense of the object's social and cultural consequences. Yet it is here that understandings, the first glimmerings of true meaning of the artifact for individual, community and nation will likely begin. How did it alter the patterns of social interaction, routine practices and the way individuals came to think of self and others?

For the purposes of the present work an additional data domain has been added to the first axis of the model as described above. It focusses on consequences, here set out in three additional sets of independent variables identified respectively as: ensuing events, changing values and acquired hidden meanings.

Ensuing events are the ones that follow (often indirectly), including the intended results from the application of the technology (usually the anticipated private and public benefits), as well as the seemingly unintended, unanticipated and unplanned-for results, socially, culturally, technologically and economically.

Changing values are taken as evaluative judgements of worth: worth as tool of practical advantage (e.g., mechanical advantage), as tool of convenience, as tool of comfort; of aesthetic worth, as visual object; of spiritual worth, as symbol; of social worth to community in enabling and enriching life; of cultural worth, in the shaping of positive enriching views of self, others and the world beyond; and of possible economic worth in the market place, as capital asset or alternatively as possible encumbrance.

Artifacts of culture, here the electric motor in the home and the myriad pieces of consumer technology that it supports, have significance beyond the mere things themselves. The motor as artifact has immense suggestive power as indicator of important hidden meanings for individuals and community (both positive and negative ones), meanings not immediately evident by direct observation.

The all pervasive FHP electric motor, while largely hidden in the home from public view, has become through the contrivances it operates, a kind of cultural icon expressing many meanings for contemporary Canadian life. These meanings contribute to the motor's social, cultural, economic and technological significance as cultural artifact.

The results of analysis of data in these three additional areas (ensuing events, changing values and hidden meanings) are variously reflected in the balance of this paper, as are the ensuing events related to matters of application, and matters of value and hidden meanings as important attributes of significance.

From the Engines of Industry to the FHP Electric Motor in the Canadian Home

It started with the ear-splitting noise of the engine. By the 1920s the principal cultural

images in North America were said to be those of the engine and the mechanization that ensued.¹⁷ The engine had, in fact, become, in the dominant popular view, the “engine of progress.” It was seen everywhere, on the farm, in industry, in the shop, on the road and then, in a manner once thought not possible, in the home.

A standard Canadian engineering text reported in 1946 that:

Ceaseless change is the keynote of the machine age and society... Machine civilization... differs from others in that it is dynamic, containing within itself the seeds of constant reconstruction...¹⁸

The authors go on to note:

But machine civilization based on technology, science, invention, and expanding markets must of necessity change — and rapidly. The order of steam is hardly established before electricity invades it; electricity hardly gains a fair start before the internal combustion engine overtakes it.¹⁹

Social and human progress was being redefined in terms of the processes and products that “mechanism” suggested to the western mind, allowed, encouraged and drove through the vicissitudes of the market place. The potential of the engine to force a constant rethinking and expansion of the concept of mechanization, and through mechanization, urbanization,

industrialization, progress and the human state itself was viewed even in the 1940s as seemingly without end. Yet much of Canadian society would proceed as if nothing of great consequence was afoot — life would go on much as usual, but just a little easier.

The same authors wrote of technology and the Canadian cultural milieu:

the almost universal desire for mechanisms, appliances, and devices that contribute to convenience, comfort, and entertainment, is a compelling force in the field of science and technology. Inventors, well knowing that a market awaits every “gadget” that has a wide public appeal, redouble their energies to produce something that will at once create a demand and satisfy it.²⁰

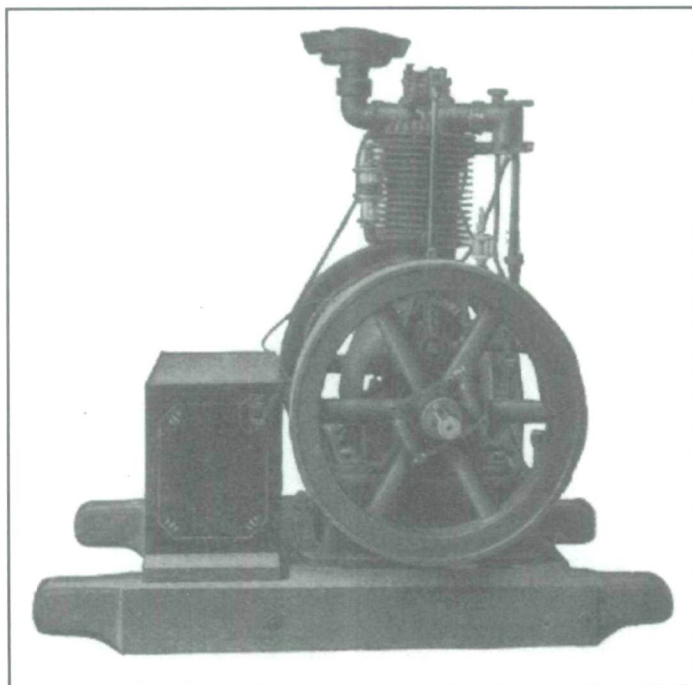
Thus, the true driving principle of twentieth-century economic growth had been discovered. The universal belief in technology as uniquely good had been shattered, and the link between technology and trivia, anything that might sell in a new kind of Canadian culture, had been forged. The motorized tooth brush and can opener were not far behind, as was the “snake-oil” of Silicon Valley.

The engine, in its many forms, as both driver and driven (for the distinction would, in large part, soon disappear) would quickly become a principal object of public adoration — duly propelled by its inventors, advocates and the hyperbole of the marketplace.

The mechanization of home and industry through the introduction of the internal-combustion engine technology and, almost simultaneously, electromechanical and electromagnetic technology, starting in the first decade of the twentieth century, was thus a principal obsession of the times. The focus of adoration included the newly discovered laws of physics, the newly developing engineering know-how, the new materials and processes through which to apply them and the new generation of inventors and entrepreneurs that made it all happen. The obsessions were characterized by those of Henry Ford and Thomas Edison for mechanism, mechanical perfection and the common man,²¹ all mediated by the promise and uncertainties of the markets of the day.

The introduction of the engine into the Canadian home and its ensuing events followed a trajectory of initiatives in mechanization. It started, falteringly, with the short lived, but thunderous blast of the gasoline-powered internal combustion engine and its endless industrial

Fig. 1
The gasoline powered internal combustion engine ca 1915, promoted as the “Woman’s Engine” for use in the home in the early years of the century.



paraphernalia, promoted as the “Woman’s Engine” by its advocates to ease the laborious work in the home, including laundry and water pumping (Figs. 1, 2 and 3).

The highest point in its trajectory came at the height of the application of industrial mechanization. Characterized by shafts, belts, and pulleys, with the dripping oil and loud noises of the shop floor, the engine moved into the home in an only slightly attenuated form. All this and more emerged from underneath the refrigerator in the kitchen, as well as the washing machine in the laundry (Figs. 4 and 5).

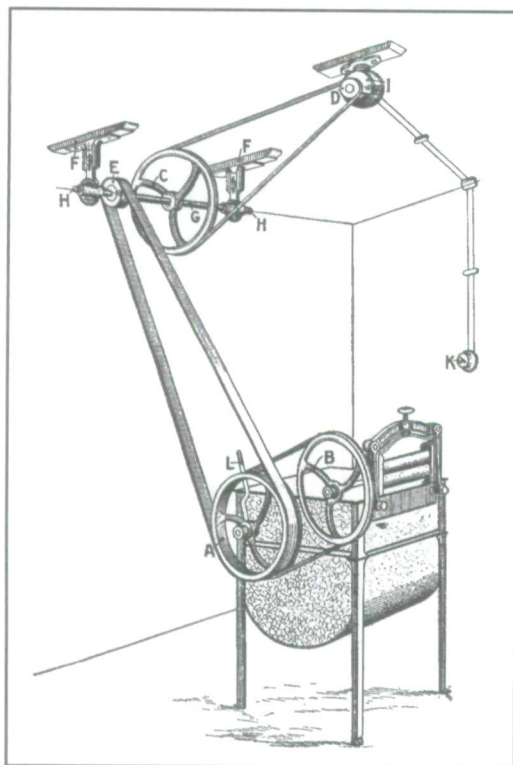
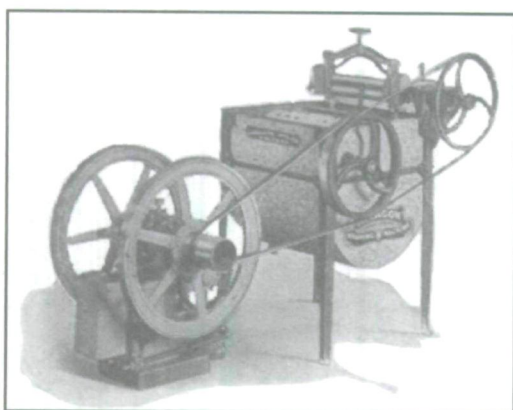
The landing, fortunately, was a softer, safer and quieter one than might have been expected,

given the engine’s hazardous beginnings. The almost silent home appliance with its electric motor, drive shafts, belts and pulleys, and

Fig. 2 (far left)
The mechanization of the laundry was billed as the “New Washerwoman.” Here the gasoline engine is remotely located, connected by belts and pulleys to the appliance, washer and wringer, ca 1915.



Fig. 3 (bottom left)
The electric motor, ca 1915, as first promoted for the home followed the industrial model of the day—remotely mounted with counter shaft on the ceiling, it was to be belt driven to the appliance, without guards or protection for the safety of the operator.



Beatty

There are MORE Beatty Washers in use in Canada than any other.

Always the leading name in WASHERS

Hundreds of the best Appliance dealers in Canada count on Beatty Washers as their “bread and butter” line. They find many prospects in the broad Beatty connection. They find the Beatty name a big help — it represents leadership in washers and many other lines such as Pumps and Water Systems. They have a much broader line to sell than is made by any other washer manufacturer. Beatty dealers have a greater variety of promotional aids to help them get business. They get plenty of sales from Beatty co-operative campaigns — these are consistently strong in pulling power.



CANADA'S No. 1 WASHERS

Beatty

Stainless Steel LINE

Stainless Steel — here's a talking point exclusive to Beatty. No other washer line in the world has this feature.

Beatty washing action is the best. It beats all others in tests well known to all washing machine manufacturers in America.

Beatty service from nearby branches staffed with experienced washer men—the best in Canada.

Beatty Washers, like the Beatty name, have outlasted and will continue to outlast many others.

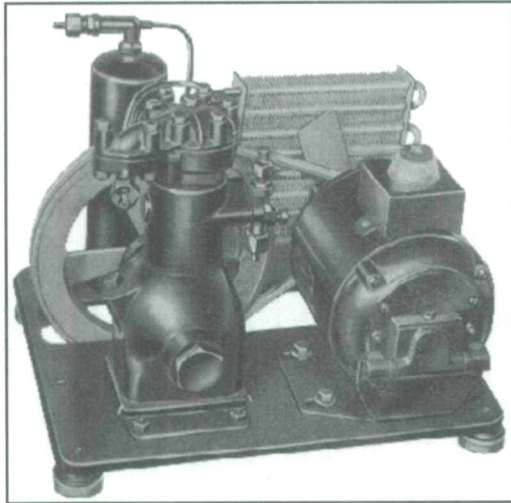
WE'D BE GLAD TO HEAR FROM YOU

Beatty Bros. Limited
Established 1874 Head Office: Fergus, Ont.

BRANCHES
Saint John, N. B., Montreal, Fergus, Winnipeg, Edmonton,
B. C. Representative: McLennan, McFeely & Pitor Limited,
Vancouver

Fig. 6

Domestic refrigeration unit, belt-driven, commonly found in the 1920s and early 1930s. Built by Kelvinator, London, Ontario. The unit could be remotely located, in the basement of the home, or in a compartment in the base of the refrigerator where it would be evident by its noise and dripping oil.



dripping oil would soon disappear from sight, and later largely from mind. At this point the driver and the driven were totally sealed, as well as concealed within the home appliance — generally by mid century (Fig. 6).

The Significance of FHP Electric Motor Technology

The fractional horse power motor was a central driving force in shaping what was to become Canada's dominant culture of the twentieth century, its "culture of consumption." The consequences of the development and wide-spread diffusion of this technology in the 1920s and 1930s were to have a profound impact on Canada's economy, on the patterns of social interaction of its people, as well as on its culture, and the cognition and consciousness of its citizens.

The development and widespread use of FHP electric motors also acted as a great transitional force affecting almost all subsequent aspects of life in Canada. Prior to its arrival, motive power came in large packages. Heavy, costly, clumsy and inefficient, it required specialized operating skills, and was unavailable to most households; it was based on water or steam power or later on the crude internal combustion machines of the late nineteenth and early twentieth centuries.

While a few advocates attempted to introduce the internal combustion engine into the home, they were, fortunately, short lived (Fig. 2). Thus, manually-operated mechanisms, as potential work and energy savers, reigned supreme in the home prior to the mid 1920s.

The principles of electromotive force, on which the electric motor depends, were first

applied to large motor designs for industry. So it was with the advent of small fractional horse power motors that the transition came. Within two decades, from the 1920s through the 1930s, the FHP electric motor would pervade almost all aspects of home, farm and commerce in both urban and rural Canada.

Our purpose here, then, is to move beyond mere historic narrative, in order start the task of bringing into sharper focus the significant implications of the FHP electric motor for individual and family life, for social interaction, and for culture, that is, for what Canadian's value, how they see themselves and each other and the world beyond.

What follows addresses the significance of the FHP electric motor in terms of its hidden attributes and meanings, which helps to explain what it is, and its consequences for society and culture.

The popularly accepted meaning of *motor*, its nominal one, is that of a machine that imparts motion, an electric motor being a particular sub-type, one that converts electrical energy into mechanical energy in the form of rotation. While this has become a generally understood public meaning, the electric motor in the home has come to signify much more. There is a wide range of further attributes, hidden ones, which are the primary subject of this inquiry, including those associated with its technological, economic, social and cultural significance.

Technological Significance

The technological significance of the FHP motor, as it emerged in the mid to late 1920s and spilled over into the 1930s, may be seen in its enabling and foundational attributes; deeply intrusive nature; unobtrusive character; small size, as a technology; and its role as accelerator of technological change.

Enabling and Foundational Attributes

The FHP electric motor technology is first and foremost an enabling one. The electric motor, in its populist FHP form, along with electric power transmission and electric control technology, constitutes the principal underpinning of the electric consumer revolution of the 1920s and 1930s.

The significant impacts of the whole electric mass consumption movement, which was well advanced by the 1940s in Canada, cannot therefore be divorced from those of the FHP electric motor itself. These impacts have been fundamental, because they have produced changes in

► **Fig. 4 (top right, facing page)**

An early development in the evolution of the unitary, self-contained appliance: the motor driven washer and wringer are mounted on a single platform, ca 1915.

◄ **Fig. 5 (bottom right, facing page)**

By mid century the move to the unitary appliance was complete. As well, the electric motor with its intimidating belts and pulleys had disappeared from view. These wringer washing machines, designed and built by Beatty Bros., Fergus, Ontario, are representative of the 1950s.

life's ways never seen in the same way before. They have also proved to be long term in their impact, enabling and putting in place forces which were not transient or cyclical in nature — as is the case with some technologies (technology as fad). FHP motor technology is here to stay, although it has evolved significantly over the course of the century. It has produced, through a process of progressive differentiation, a number of sub-types made possible by the discoveries of science, invention and the applications markets of the day.²²

Deeply Intrusive Nature

Because FHP motor technology is primarily an enabling one, and because what has been enabled is substantial and widespread, the technology is also deeply pervasive and intrusive, affecting almost all aspects of home, farm and commercial life.

Much technology is pervasive almost by definition, making its societal spinoffs difficult to track and understand. This difficulty is magnified many times with consumer technologies, which are populist, also by definition, and is further amplified by “enabling” technologies (such as the FHP motor) which allow much to happen, often quickly. The products made possible by small motor technology are almost endless as were the consequences for life in Canada.

Unobtrusive Character

The FHP motor is now seldom evident; it does not force itself visually on the household; very few people express, or have opinions about it, as for example they might have about the refrigerator or washing machine to which the motor is attached. Yet the FHP electric motor has an identity, an origin, properties, a value, and a life of its own.

Because FHP motors are unobtrusive, they are not popularly understood or appreciated. Few people have knowledge beyond their mere existence; they have no knowledge of specifics, no opinions about trends and their possible societal impacts, little or no knowledge of operating principles and their implications, and have never considered the relationship of the electric motor to Canadian culture and to the world around. This is not the case, however, with other consumer technologies such as televisions and vacuum cleaners, which are often topics of discussion reflecting, for example, on the pride of ownership.

As this century draws to a close, the micro-processor (computer) has taken over the status

that the FHP motor had as the century began. The micro-processor, like the electric motor, now lives inside many household devices, giving them special powers. Yet, paradoxically, we are only aware of its presence when it ceases to function.²³

Small Sized Technology

Closely related to its essential characteristics as an enabling, pervasive and unobtrusive technology is the size of FHP electric motor technology. Taken together, these four characteristics tell much about its power, yet its almost invisible nature.

It is a small-sized technology in comparison to what the public has come to see as the big “gee whiz” technologies of the twentieth century. These are the ones which are seen to have massively altered global perspectives. In the 1920s and 1930s, these were radio and the aeroplane; in the 1940s and 1950s, nuclear energy; in the 1960s, 1970s and 1980s, space travel and the computer; and in the 1990s, the emergence of the global information highway.

Thus, the benefits as well as the issues related to the application of electric motor technology have been further buried in the troughs between the big technologies. This has been reinforced with much “big technology” hype, created largely by the media about what the big technologies are, how they work, and what their impact on human affairs is, and on what it might become. Again, no such attention has been leveled at FHP motor technology, in spite of its power and influence on daily life.

It is evident, then, that much of the significance of the FHP motor stems from its insignificance. True measures of its power, potential, and pervasiveness are difficult to find and assess, as are its unintended side effects on society and the culture of the twentieth century.

Accelerator of Technological Change

With the advent of FHP electromotive power, and the home appliances, farm and commercial equipment that followed, came new prospects of economic gain. With these also came an accelerated rate of technological transfer — the speed at which new scientific knowledge is pushed into the marketplace.

Science and technology have traditionally been described as serving quite different fundamental purposes, the first dedicated to the creation of new knowledge, the second to turning it to practical advantage. Yet this simple distinction has become blurred, as the economics of the marketplace itself start to drive scientific

investigation in order that the results may be quickly translated into profits.

By the 1860s the most elementary principles of electricity and electromagnetism had scarcely been discovered by Ampere and Faraday, and the field of electrodynamic scarcely defined as one worthy of scientific study. The modern theory of the nature of matter and of electricity did not emerge until the closing years of the nineteenth century.

By the 1920s, however, the demand created for FHP electric motors had already greatly accelerated work in magnetic circuit theory. Steinmetz demonstrated the theoretic possibility of a capacitor-start motor only a few short years before it would be a dominant form of motive power in Canadian homes, farms and other places of work.

Thus, FHP motors were among a class of leading technologies (like radio) which would greatly reduce the time for technological transfer, by bringing market forces to bear. The process would speed up, moving to the 1980s, when computer-based technologies would be declared obsolete, sometimes within months.

Economic Significance

In addition to these technological impacts, and also among the important events ensuing the introduction of the FHP electric motor were a number of uniquely economic spinoffs, including the role of the FHP motor as driver of industrial innovation and change, contributor to manufacturing methods, cause for industrial design, and economic catalyst.

Driver of Industrial Innovation and Change

The significance of FHP motor technology also lies in its positioning within the broad field of business and industrial activity, variously defined by invention, engineering and manufacturing in Canada.

With the availability of small affordable motors for home, farm and commerce came another wave in Canada's industrial revolution. FHP motor technology moved Canadian industry from the manufacture of uniquely mechanical devices to include a wide range of electromechanical (a term that has been used interchangeably with electromagnetic) consumer products.

The manufacture of electromechanical equipment was well established in Canada by the 1930s, including the manufacture of electric motors themselves, as well as the appliances and equipment they operated. A whole new manufacturing sector had opened up. As the

century progressed, subsequent waves of industrialization would be driven by electronic, solid state, and digital technologies. They would all co-exist with electromotive technologies in a delicate, dynamic, economic balance, well before the end of the century.

Contributor to Manufacturing Methods

FHP electric motor production in Canada and the product lines, such as home appliances, which it enabled also made significant contributions to the development of new Canadian manufacturing methods.

Techniques for mass production, introduced into the auto industry in Canada in the 1920s and 1930s, would be expanded. New techniques would be developed for small parts production and the assembly of small, more precisely controlled electric and magnetic devices. The development of specialized steels, the production of copper, brass, and new alloys, wire drawing, and specialized quality control methods followed.

Cause for Industrial Design

The economic spinoffs were not restricted to matters of hardware production alone. The birth of consumer electric technology, and the "midwife" role of the FHP electric motor also led to the emergence of new soft services for business and industries, including industrial design.

The home appliance quickly became "art form," as well as (and almost in preference to) simple function and utility, in the rush for consumer appeal and market share. Engineering design requirements, including utility, reliability, and maintainability considerations affecting form and function would, almost from the very beginning, have to compete for attention with the "stylistic" in the race for consumer appeal, through marketing, advertising and sales promotion. The industrial designer quickly became a central player in the development of electric consumer goods.

The FHP Motor as Economic Catalyst

Technological innovation had become a significant driving force of Canada's economy by the mid 1930s. And because electric motor technology is itself largely an application driven and enabling one, its natural consequence was to open up many more new and widely diversified economic opportunities. Appliance and equipment manufacturing flourished in Canada, with many firms well established before World War II and with many more to follow, prior to

the vast restructuring of Canada's electrical manufacturing sector starting in the 1960s.

The economic, as well as technological, role played by the FHP electric motor was as subtle as it was profound. It made possible, for example, massive markets for automatic heating, mechanical refrigeration and motorized laundry equipment. These and many other electric products would soon be considered basic requirements for every household in the country.

The development of consumer markets, opened up by the availability of small reliable electric motors, let loose its own unique period of economic technology-based optimism, helping to end the general economic depression of the late 1920s. The optimism was also fed by the new "electronic" driven technologies (e.g., radio), also emerging. This kind of technology-based optimism would not be repeated, in quite the same way, until the boost to the manufacturing and service sectors provided by the computer, solid state and digital technologies of the 1970s and 1980s.

Social Significance

The social impacts of consumer electromotive technology, driven by the FHP motor, on the way people live together, and the way they deal with one another, in the home and workplace and within the broader social and civil societies, have been massive. Now, at the end of the twentieth century, it is difficult to imagine the conditions of home, community and civic life in its first two decades. Included in the social changes over the period are thoughts of home, social optimism, and views of social progress.

Thoughts of Home

The contemporary home is conceived and realized within a complex n dimensional space; and these dimensions are interactive, mutually supporting and confounding.

This dimensionality altered significantly, starting in the 1920s. During the pioneer period and that of early urban and rural settlement, the home was simply defined around matters of shelter and warmth with the functional requirements for sitting, cooking, eating and sleeping superimposed.

Witold Rybczynski points out, however, that this dimensionality has been greatly altered in contemporary Canadian society.²⁴ He demonstrates that our concept of home and its configuration in reality is now shaped by such basic factors as convenience, comfort, efficiency,

privacy, ease, domesticity and decor, and most fundamentally by technology itself. Each of these individual factors has been profoundly altered by the extraordinary level of technological intrusion into common domestic life, an intrusion triggered by the FHP electric motor that has affected almost all else.

Thus, with the appliances of the 1920s and 1930s was begun a process that would fundamentally alter the way people would think about their home, its basic configuration, their own space requirements within it, and their psychological needs and wants, which the home was built to fulfil. The electric motor in the home altered what people did, the rhythm of daily life, how they discovered the news, the sources and resources of human diversion (as in entertainment), and the proportion, use, and distribution of leisure time, work and sleep.

Then too there came, with the advent of potential time-saving appliances, optional lifestyles for men, as well as women. These were styles that were undefined and unthought of in the first quarter of the century, prior to FHP electric motor technology and the home appliances that resulted.

Social Optimism

With the popularization of science and the consumer electromotive technology of the early part of the century came a new social optimism; an optimism that would become the subject of much rethinking as the century progressed. But in the 1920s and 1930s people rejoiced in their increasing "scientific" understanding of the world around them; most particularly they rejoiced in the many promises of science, touted as the great good of the period, and in the technology that soon surrounded them in the home, street and in the workplace.

There was, in fact, a new kind of personal knowledge, new information in which to rejoice and with which to plan for the future. Science, it was thought, had the power to see more deeply into the nature of things. People rejoiced, too, in the new technologies of the day, not merely for what they did but also for what they promised for the near future. The ability of the new consumer technology (spearheaded by electromotive devices) to turn the findings of science to "surprising advantage" in the day-to-day lives of people seemed, for now, almost endless.²⁵

Redefinition of Social Progress

With the electromotive technologies of the 1920s and 1930s came not only a new social

optimism but also a significantly altered concept of the nature of social progress itself. To be surrounded by these new technologies of the twentieth century was to begin to define social progress in more materialistic, humanistic and in less naturalistic and spiritual ways. This, too, would be the subject of considerable rethinking as the century moved on.²⁶

Cultural Significance

As mentioned previously, culture is defined much more by the distinctive material, intellectual, spiritual and emotional features characterizing society than it is by great masterpieces of philosophy, art, and science.²⁷ The culture of a people is the way they tend to see and order their world, set priorities, organize themselves and conduct their affairs.²⁸

Yet, culture is seen not as mere "substance" (as in physical artifact, literature, music or drama as cultural form), but as a continuously developing cluster of structures which through their interrelationships produce meaning and affect the values of people.²⁹ It is precisely these structures that would be so inexorably altered by the advent of a powerful, enabling, all pervasive, yet largely unobtrusive, electromotive technology, and the movement to mass human consumption that would quickly follow.

The cultural significance of the electric motor, beginning in the Canadian home of the 1920s and 1930s, may then be described in terms of the level of fundamental cultural change which it let loose, its impact on human cognition, and its implications for changing human consciousness.

Fundamental Cultural Change

As the century advanced, insights into the deeper meanings of mass consumption, triggered by an exploding electromotive household technology, also advanced. It soon became clear to the older generation watching the young that what was evolving was quite a different kind of Canadian culture.

The new culture was different to the core than the one which existed in Canada in the 1920s and early 1930s. It would become evident, for example, that the culture of the 1960s was not the same as that of the 1930s, with some added comforts and basic life needs better satisfied.

Within three decades mass consumption, triggered to a significant degree by the FHP electric motor and electromotive products, had substantially altered popular Canadian culture where it starts: in the home, in the street and

in the workplace. The changes would be evident in matters of both cognition and consciousness.

Human Cognition

What was triggered with the advent of the dominant consumer, pop and commercial cultures, were fundamental shifts in human cognition, popular ways of knowing and perceiving.

The "human mood" was fundamentally altered, our thoughts, our sweeping views of the world, our perceptions of self and others, our judgements and attitudes, and the way we interpret the events around us.

No longer, for example, would citizens see themselves as living out their lives in known environments where cultural patterns changed slowly because existence was linked primarily to, and controlled by, natural forces operating within relatively stable cultural settings. Now, people would increasingly see themselves not embedded in nature, but in a rapidly changing material environment of human creation.³⁰

The effects on human cognition of the greatly accelerated pattern of consumption, and of the material culture which followed, starting in the first quarter of the century, would be the subject of much study, as the last quarter of the century came to an end.³¹ A central question being explored was, "what have we learned, and how can we do better?"

Human Consciousness

Finally, massive changes in consumption, culture and cognition, triggered to a significant degree by the advent of consumer electromotive technology, brought with them quite a different kind of human consciousness. There emerged a new awareness of the world around. The totality of human thoughts and feelings shifted during the last half of the century, as a result of massive cultural shifts that were well underway in Canada by the 1940s.

It has been pointed out that:

nearly everyone agrees that life has changed in our technological society, whether the contrast is with early stages in Western culture or with non-Western cultures. "Modernization" is just one of various terms that have been applied to the process by which we have arrived at the peculiar lifestyle typical of our age; whatever the term for the process, almost all analysts agree in finding "technology" to be one of its key ingredients.³²

Another observer of the changing Canadian consciousness points out that there is evidence that significantly new ways of understanding

and interpreting reality are emerging and being woven into the fabric of Canada's cumulative culture.

It is widely recognized that, as an advanced Western society, a number of realities now co-exist in Canada in a dynamic cultural mix. Included are a "traditional" culture and an "industrial" culture, among others. The traditional culture is one in which harmony between humanity and nature is the overriding value, and timeless truths are what guide life's decisions. In an industrial culture the primary value is the acquisition of the conditions for individual prosperity; truth is relative and largely subjective, depending on the individual purpose being pursued.³³

On a similar note, Arthur Kroker observes in his discourse on Canadian technological consciousness that in the Canadian mind there is:

...a restless oscillation between the pragmatic will to live at all costs [like] the Americans and a searing lament for that which has been suppressed by the modern, technical order...At work in the Canadian mind is, in fact, a great dynamic polarity between technology and culture, between economy and landscape...The Canadian mind may be one of the main sites in modern times for working out the meaning of technological experience.³⁴

The fractional horse power electric motor born of the 1920s profoundly altered the technology of home, farm, and commerce in Canada and with it human consumption, culture, cognition and consciousness.

NOTES

1. Arthur Kroker, *Technology and the Canadian Mind: Innis/McLuhan/Grant* (Montreal: New World Perspectives, 1985); Ursula Franklin, *The Real World of Technology (CBC Massey Lectures)* (Concord: House of Anansi Press Limited, 1992); Heather Menzies, *Fast Forward and Out of Control: How Technology is Changing Your Life* (Toronto: MacMillan, 1989); J. Ellul, *The Betrayal of the West* (New York: The Seabury Press, 1978), *The Technological Society* (New York: Alfred A. Knopf, 1964); Paul T. Durbin, ed. *Technology and Contemporary Life* (Boston: D. Reidel Publishing Company, 1988), *Guide to the Culture of Science, Technology and Medicine* (New York: The Free Press, 1980); Donald MacKenzie and Judy Wajcman, eds., *The Social Shaping of Technology: How the Refrigerator Got Its Hum* (Milton Keynes: Open University Press, 1985); P. L. Bereano, ed., *Technology as a Social and Political Phenomenon* (New York: John Wiley, 1976).
2. Niel Postman, *Technology: The Surrender of Culture to Technology* (New York: Vintage Books, 1993).
3. Mary Tivy, "Museums, Visitors and the Reconstruction of the Past in Ontario," *Material History Review* 37 (Spring 1993): 35-51.
4. Franklin, *The Real World of Technology*.
5. Warren Susman, *Culture as History: The Transformation of American Society in the Twentieth Century* (New York: Pantheon Books, 1984), xvii.
6. Franklin, *The Real World of Technology*.
7. Ulf Hamnerz, *Cultural Complexity: Studies in the Social Organization of Meaning* (New York: Columbia University Press, 1992).
8. Tivy, "Museums."
9. Ibid.
10. Ibid.
11. Henry Petroski, *The Evolution of Useful Things*. (New York: Vintage Books, 1994).
12. John Summers, "Towards a Material History of Watercraft," *Material History Review* 40 (Fall 1994): 6-18.
13. Robin Inglis, "Editorial," *Material History Review* 39 (Spring 1994): 1-3.
14. Shane O'Dea, "The Development of Cooking and Heating Technology in the Newfoundland House," *Material History Bulletin* 15 (Summer 1982): 11-18.
15. Inglis, "Editorial," *Material History Review*.
16. "Towards a Material History Methodology," *Material History Bulletin* 22 (Fall 1985): 31-39.
17. Susman, *Culture as History*.
18. C. P. Young, H. A. Innis, and J. H. Dales, *Engineering and Society with Special Reference to Canada* (Toronto: The University of Toronto Press, 1946), 111.
19. Ibid.
20. Ibid., 58-59.
21. Susman, *Culture as History*.
22. These sub-types, and the market forces and inventions that created them, from 1920 through to the 1960s are documented in the T. H. Oliver Collection, a special study collection for which the author is currently the custodian. Included are single phase alternating current motors of the following types: series commutating motors, repulsion motors, repulsion-induction, split-phase induction, capacitor-start induction, and shaded-pole induction motors.
23. Christopher Dede and Robert Olsen, "Twenty-first Century Learning and Health Care in the Home," *Futures Research Quarterly* 11, no. 2 (Summer 1995): 41-56.
24. Witold Rybczynski *A Short History of an Idea - Home* (New York: Viking, 1986).

25. Michael Polyani, *Personal Knowledge: Towards a Post Critical Philosophy, Science and Technology* (Chicago: University of Chicago Press, 1964).
26. Michael Wallach and Lise Wallach, *Rethinking Goodness* (Albany: State University of New York Press, 1990); Christopher Lasch, *The True and Only Heaven: Progress and Its Critics* (New York: W. W. Norton, 1991).
27. Andre Brink, *The Language of Culture* (n.p.: Unesco, 1984).
28. D. Paul Schaefer, "Canadian Culture, Key to Canada's Future," (World Culture Project, Markham: unpublished, 1992).
29. Brink, *The Language of Culture*.
30. Robert Theobald, *Turning the Century: Personal and Organizational Strategies for Your Changed World* (Indianapolis: Knowledge Systems Inc, 1992).
31. Peter Russel, *The White Hole in Time: Our Future Evolution and the Meaning of Now* (San Francisco: Harper, 1992), and D. H. Meadows, D. L. Meadows and J. Randers, *Beyond the Limits: Confronting Global Collapse, Envisioning a Sustainable Future*, (Toronto: McClelland and Stewart, 1992); James B. Twitchell, *Carnival Culture: The Trashing of Taste in America*, (New York: Columbia University Press, 1992); Robert Sheldrake, *The Rebirth of Nature: The Greening of Science and God* (New York: Bantam Books, 1991).
32. Durbin, *Technology and Contemporary Life*, vii.
33. Ruben Nelson, *How Then Shall We Live: Exploring and Contrasting the Consciousness and Culture of Traditional, Industrial and Post-Industrial Societies* (Canmore: unpublished, 1989).
34. Kroker, *Technology and the Canadian Mind*, 7-8.

ILLUSTRATION REFERENCES

- Figs. 1, 2, 3, 4. Xeno W. Putnam, "The Gasoline Engine on the Farm: Construction, Management, Application, Operation and Repair," chapter xxvi in *The Woman's Story* (New York: The Norman W. Henley Publishing Company, 1913). T. H. Oliver Collection: private.
- Fig. 5. *Radio, TV, and Appliance Trade Builder* (September 1994): 7 (Toronto: Hugh C. McClean), T. H. Oliver Collection: private.
- Fig. 6. *Kelvinator Manual*, Form 3510, issued 15 October 1930 by Kelvinator of Canada, London, Ontario. T. H. Oliver Collection: private.