Standing at a Critical Nexus in the Evolution of Physiotherapy

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Historians define epochs of history in terms of critical periods, sometimes defined by major natural events, political shifts or movements, major wars, shifts in artistry and aesthetics, or as revolutions and ages. It can be somewhat misleading to do so because progress never really stops, but revolutions are often defined by sudden leaps forward in cognition, techniques, or technology in a certain area. For example, the Agricultural Revolution (200–400 years ago) was a time in which techniques to farm and harvest the land progressed so rapidly that large gatherings of people could be sustained by a relatively small number of dedicated farmers. This, in turn, allowed groups of humans to live in close proximity to one another; hence, populations, communities, and towns were born. It meant that not everyone needed to focus on managing their own food supplies, so large swaths of these townfolk needed new jobs. Thus, the Industrial Revolution (150–250 years ago) led to a rapid advancement in manufacturing and early automation, mostly in the textile and manufacturing sectors, but also in farming and education.

Some historians recognize a Transportation Revolution marked largely by the invention of the steam engine, followed by automobiles and airplanes—making it far easier for people to connect with those in other towns and countries. More recently, many reading this editorial will have lived through the Digital Revolution, which started in the 1960s, when semiconductors and microchips enabled computing power to be achieved in a small package that lived in people's living rooms or offices.

Of course, none of these technologies have stopped progressing simply because a revolution and its ensuing age has passed—anyone who has visited a farm recently will immediately recognize that agricultural technology continues to progress. Also notable, when one scans the timeline of human history, is that the interval between these revolutions appears to be rapidly shrinking. As we stand now and scan the horizon of 2018, while many are

still catching up to the Digital Revolution, recognize that you, I, and everyone around you is currently in the middle of what many historians and futurists believe is the most important shift in human history—the Information, or Data, Age.

THE INFORMATION REVOLUTION

The amount of data being created, captured, and stored daily is staggering, almost impossible for most of us to fathom. It is estimated that, by 2013, Google alone had processed more than 20 petabytes (1,000,000,000,000,000 bytes) of data every day, and if Gordon Moore's law of exponential growth¹ in digital computing power is correct, you can expect that that figure has doubled or quadrupled by now. Most of those data are stored indefinitely. Whether it is your online searches, social media posts, the locations you visit, number of steps you take, photos you snap, your resting heart rate, your Netflix habits, your bank balance, or even when you go to bed and wake up, data have become a highly valuable commodity coveted by private companies, governments, and many other entities.

The Information Age means a lot of things; it means that you currently, right now, have immediate access to the world's collective knowledge, and the means to this access is likely in your pocket. It means that we are all constantly connected to one another, and, perhaps most important, it means that those with the computational power and know-how are able to make frighteningly accurate predictions about everything—from what you will likely enjoy watching next on YouTube to when you are most likely to die.²

Consider that thousands of people every day voluntarily send their genetic material to any one of a growing number of private genotyping companies to learn what their DNA says about their ancestry. This task, as recently as 2003, took 13 years and cost millions of dollars, yet today, it takes a few weeks to receive the results and costs about \$100 (US). Of course, these companies do not dispose of those data after they have been analyzed;

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they add them to their growing databanks to optimize their own machine learning-based, predictive algorithms for the next person. In the process, however, these private companies are building one of the largest databases of intimately personal health information ever created. Truly, the Information Age in which we are currently living is simultaneously fascinating and terrifying.

Technology is advancing in multiple fantastic ways, *fantastic* in this case being used in its literal sense of being related to fantasy. Whether it be gene editing for diseases or designer offspring, nanobots, or virtual or augmented reality inhabited by bionic or augmented humans, it is hard to keep up with it all. More important, perhaps, is that it will not stop. There is no finish line in this race. We are rapidly closing in on the projected date of the singularity (loosely predicted to occur 30–100 years from now), the time at which computers are expected to match, then rapidly surpass, human intelligence. What happens then? The somewhat frightening answer seems to be that no one really knows.³ Several groups around the world are actively working on strategies, guidelines, and policies to ensure a thriving future for humanity, initiatives to which readers in physiotherapy may want to pay attention.

This, in a roundabout way, brings me to the main thesis of this editorial and provides context for the Physio Moves Canada project. It is a grand idea that was intended as a starting point to answer a critical question: Where does physiotherapy fit into this unpredictable future, and are physiotherapists moving fast enough to remain relevant?

HOW ARE CANADIAN PHYSIOTHERAPISTS PREPARING FOR THE FUTURE?

In 2016, I dreamed of a project with a narrowly defined research question: What are clinicians doing today to prepare for tomorrow? The intention was to explore unique or innovative practices—partly as a physiotherapy academic interested in how clinicians were preparing for the future and partly as a former clinician who was becoming increasingly aware that practice had very likely changed in the nearly 7 years since I had been in routine practice. This was also an opportunity to reconnect with the realities of front-line practice and ensure that the research questions being asked were important. Some personal reflection at the time also revealed that I had no good sense of what it was like to provide physiotherapy care outside my own little bubble in southwestern Ontario, including care to marginalized populations, Indigenous communities, and military personnel; in remote and rural settings; and in other unique practice settings and populations.

Thus was born the idea of a cross-Canada-focused ethnography of unique and innovative physiotherapy practice. I pitched this idea to key stakeholders, including professional physiotherapy associations in Canada, look-

ing for someone to decide the idea was too outlandish or crazy. Although some indeed thought I may be crazy, almost all said it was necessary and timely. Their support was critical as this was a project that would not have gotten off the ground through traditional tri-council research grant competitions.

As often happens, the project grew from encompassing a narrowly focused ethnography to include other questions and methodologies: a phenomenological study of the lived experience of physiotherapy clients receiving care for mobility impairments and a series of clinician focus sessions for a pseudo-SWOT (strengths, weaknesses, opportunities, and threats) analysis, which was adapted slightly to be an analysis of threats, opportunities, research, and training priorities.

After nearly a full year of planning, with invaluable support from a dedicated team both locally and at the Canadian Physiotherapy Association and its branches, the project travelled from Norris Point, Newfoundland, to Whitehorse, Yukon, mostly by car, through summer and fall 2017. During that period, I visited 26 unique clinical sites; engaged directly with 116 clinicians, 30 clients, and numerous other stakeholders (administrators, inter-professional colleagues); collected hours of video and audio recordings; and took copious notes. Preliminary findings have been shared with radio audiences, print media,^{4,5} television stations, and the leaders of national and provincial physiotherapy bodies. The entire experience will not only influence my own research programme but has also changed me as a person.

Now the hard work begins. Those hours of recordings and pages of notes need to be analyzed, and I and my local team are doing just that. Over the coming year, we anticipate several publications arising out of this project, focusing (respectively) on threats facing the practice of physiotherapy in Canada; opportunities for physiotherapy in Canada; research priorities, as described by Canadian physiotherapists; training and educational priorities, as described by front-line clinicians; the meaning and importance of mobility to Canadians; and a focused ethnography of innovative physiotherapy practices in Canada. The first of these publications is nearing completion.

The hope is that these publications, and related outputs through other avenues, are not frightening and do not induce pessimism or hopelessness. The world around us is rapidly changing, and while some of these changes may threaten traditional models of care, many will offer opportunities for professional evolution. I hope the outputs lead to deep introspection and meaningful actions to prepare the physiotherapy profession for the coming years. What comes after the Information Revolution? The term “Deus Revolution,” has been proposed, which will see humans intervening in the very processes and meanings of nature and reality in the ways that early humans believed only a god could. Is

physiotherapy living up to its full potential now, in the Information Age, and are physiotherapists adequately prepared to leverage what comes next and use it toward further professional evolution? In the words of Louis Pasteur, "Fortune favours the prepared mind." In addition to the ongoing work of several tremendously passionate and visionary thinkers in leadership, academics, and clinical practice, I hope that Physio Moves Canada represents one additional step toward ensuring that we are, indeed, prepared.

REFERENCES

1. Moore GE. Progress in digital integrated electronics. Proc Int Electron Devices Meeting (IEDM '75). 1975; 21:11–13.
2. Avati A, Jung K, Harman S, et al. Improving palliative care with deep learning. In: Hu X, Gong Y, Shyu C-R, et al., editors. Proceedings of the 2017 IEEE International Conference on Bioinformatics and

Biomedicine; 2017 Nov 13–16; Kansas City, MO. <https://doi.org/10.1109/BIBM.2017.8217669>.

3. Baer D. Nine crazy things that could happen after the singularity, when robots become smarter than humans. Business Insider [newspaper on the Internet]. 2015 Dec 18 [cited 2018 Mar 8]. Available from: <http://www.businessinsider.com/predictions-for-after-singularity-2015-11/#everything-is-going-to-change-1>.
4. Sher J. Physiotherapy strides spurred by adversity. The London Free Press [newspaper on the Internet]. 2018 Feb 8 [cited 2018 Mar 8]. Available from: <http://lfpress.com/2018/02/08/physiotherapy-strides-spurred-by-adversity/wcm/58f3ad8e-a75f-a0b9-0aae-7d0007f31f9d>.
5. Mayne P. Tour answers physio's questions, raises more. Western News [newspaper on the Internet]. 2018 Feb 8 [cited 2018 Mar 8]. Available from: <http://news.westernu.ca/2018/02/nation-wide-tour-answers-physios-questions-raises/>.

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À la croisée des chemins dans l'évolution de la physiothérapie

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Les historiens définissent les diverses époques en fonction de périodes cruciales de l'histoire, caractérisées par des événements naturels majeurs, des bouleversements ou mouvements politiques importants, des grandes guerres, des changements artistiques ou esthétiques ou des révolutions et des âges. Il peut être quelque peu trompeur de fonctionner de cette façon puisque le progrès ne s'arrête jamais, mais les révolutions sont souvent définies par des bonds soudains dans un domaine de la cognition, des techniques ou de la technologie. Par exemple, la Révolution agricole (il y a 200 à 400 ans) reflète une époque où les techniques agraires ont évolué à une rapidité telle qu'une vaste population pouvait être nourrie par un nombre relativement modeste d'agriculteurs. Ce phénomène a permis de vivre plus près les uns des autres, ce qui a favorisé la formation de populations, de communautés et de villes. Puisque l'ensemble de la société n'avait plus à cultiver ses propres aliments, de larges pans de la population ont dû se trouver de nouveaux emplois. C'est ainsi que la Révolution industrielle (il y a 150 à 250 ans) témoigne des avancées de l'industrialisation et de l'automatisation, surtout dans les secteurs du

textile et de la fabrication, mais également dans les milieux de l'agriculture et de l'enseignement.

Certains historiens attestent d'une Révolution des transports, marquée en grande partie par l'invention de la locomotive à vapeur, suivie de l'automobile et de l'avion, qui facilitent les déplacements entre les villes et les pays. Si on avance dans le temps, bien des lecteurs ont vécu la Révolution numérique, qui s'est amorcée dans les années 1960 lorsque les semi-conducteurs et les microprocesseurs ont permis d'emmagasiner une grande capacité de traitement dans de petites machines installées dans des salons ou des bureaux.

De toute évidence, aucune de ces technologies n'a cessé d'évoluer à la fin d'une révolution ou d'une ère donnée. Quiconque a visité une ferme récemment sait que la technologie agricole continue de se transformer. Par ailleurs, lorsqu'on examine la ligne de temps de l'histoire humaine, on constate que l'intervalle entre les révolutions semble s'amenuiser. Et maintenant, en 2018, alors que bien des gens tentent encore de s'adapter à la Révolution numérique, il faut admettre que vous, moi et tout notre entourage sommes actuellement au cœur de

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