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COMMENTARY

Scientists depend on the power of reason

Damage to science today stems from demand by policy-makers that outcomes of scientific research be evident in advance of the research being performed.

By John Polanyi

This article is an abridged version of John Polanyi's opening address at the recent Polanyi Conference on Science and Social Responsibility at the Munk School of Global Affairs.

SOEREN STACHE / AP FILE PHOTO

As a physicist earlier in her life, German Chancellor Angela Merkel had her thinking shaped by science. Her message to those commemorating the 25th anniversary of the fall of the Berlin Wall on Nov. 9, 2014, was one shared by science: “Dreams can come true. Nothing has to stay the way it is.”

On being a scientist

German Chancellor Angela Merkel, one-time physicist, had her thinking shaped by science. Her message to the million people commemorating the 25th anniversary of the fall of the Berlin Wall was one shared by science: “Dreams can come true. Nothing has to stay the way it is.”

We value science, of course, for its tangible gifts. We rejoice in it and fear it for the power it has given us. Yet, nothing about science is more significant than the manner in which it is done. The enterprise is civilized, its purpose being the pursuit of truth — something all can share.

You can see its civilizing effects in the fact that it supersedes nationality and ethnicity. You can see it even more in the fact that it requires that we tolerate and even embrace dissent. It makes us conscious of our fallibility, since it is often wrong.

The motive force for the individual scientist is egocentric: we each want to be the first to uncover nature’s treasures. But the goal remains worthy, and takes precedence over all else.

You can judge how genuinely scientists value the activity from the fact that they seek one prize before all others: to be allowed to continue to do science.

So, what do scientists do? Despite what you may have been told, science is not a compendium of facts. Our instruments do not write scientific papers, since they have no opinions. Scientists must give them voice.

Any communiqué from the world of science must constitute a story. Science is a collection of stories, linking characters worthy of notice. These characters are seldom new. Even Einstein did not invent space and time; he linked them in a story. But he did more than that. He linked them truthfully.

He passionately believed that there was such a thing as the truth and that his purpose was to uncover it. It is this astonishing belief that unites us as scientists.

How fares this noble undertaking in our country today? Not so well.

We have weakened our science by narrowing its scope. We are not alone in doing this; other countries do it. But, as a prosperous and educated nation we could take the lead in repairing this widespread damage. Canada would then become pre-eminent in science.

The damage stems from the near-universal demand on the part of policy-makers that the outcomes of scientific research be evident in advance of the research being performed. That is absurd and hinders progress. But it has been the guiding principle of our governments, of whatever political stripe, for decades past. It has gone largely unnoticed and unchallenged.

The reason that it has gone unchallenged is evident. The head of the Bank of England, a Canadian, Mark Carney, put it succinctly in a speech decrying what he called "the tragedy of horizons." This high-flown phrase has a down-to-earth meaning, denoting the short-sightedness that afflicts elected governments.

The public, governments argue, is incapable of taking the longer view, whether the subject is science, climate change or peace.

But that doesn't have to be the case, or why would Mark Carney waste his breath inveighing against it? Walls that block the view can be torn down.

Democracy itself is a visionary concept. It contrived the abolition of slavery, in the face of great obstacles. It taught us to banish smoking and may yet teach us to abandon polluting. It has done a little, but too little, to decry the folly of empowering individuals to unleash nuclear Armageddon.

So Mark Carney is right. Our failure to look ahead lies at the root of the present dangers – the present threats to science, to climate and to world peace.

The scientist as citizen

Is humanity set on a course that can be sustained? Scientists, with their form of literacy, have a responsibility to contribute to that greatest of debates.

The most tragic failure of humanity would be to let the world divide into warring camps. We recently celebrated the demolition of such a divide: the Berlin Wall. Its destruction appeared to mark the end of confrontation between the world's greatest nuclear powers.

But at the same time, Russia's Mikhail Gorbachev, who deserves credit for that visionary act, warned that a new Cold War may be imminent.

I came to political consciousness at the dawn of the nuclear age. I was 17 when I entered Manchester University as a student in chemistry. I found myself editor of a student newspaper trumpeting the arrival of the nuclear era.

On arrival as a faculty member at the University of Toronto, I was recruited by a group planning to see the new prime minister, Mr. John Diefenbaker. They wanted to urge him to renounce possession of nuclear weapons by Canada. After wide debate, Canada committed itself to that act of self-denial.

That gesture was not an empty one, but helped define the country. This was a nation willing to take risks for peace. That image has become blurred, but is recoverable.

In an intervening sojourn at Princeton University I came to know scientists who had built the atomic bomb a decade earlier. They invited me to join them in Moscow in 1960 for a meeting on arms control. We discussed two topics, both still relevant.

The first was reducing the nuclear arsenal to a few weapons, and the second abandoning the hope of building defences against them.

Arms reduction goes to the heart of what is called “minimal deterrence.” Abolishing nuclear weapons should be our goal, but this would be a step on the way.

Why do we need such dramatic measures? Robert McNamara (defence secretary for presidents John F. Kennedy and Lyndon B. Johnson) gave the reason: “Nuclear weapons are totally useless — except to deter one’s opponent from using them.”

Why useless? Because of their appalling destructive power, as each generation needs reminding.

Nonetheless, the U.S. and Russia, possessing 95 per cent of the world’s 17, 000 nuclear weapons, are planning to modernize their arsenals at a cost of hundreds of billions of dollars over the coming decades.

What about the second goal: abandonment of defences against ICBMs (intercontinental ballistic missiles)? The reasons for this are as valid today, despite the fact that a recent report of the Canadian Senate urged that we partner in U.S. deployment of missile defence.

How can one object to defence? That was the question the Russians asked us 50 years ago, before coming around, strongly, to our view.

There are two reasons. The first is that the defence can never be complete enough to protect us from hydrogen bombs. The second is that even leaky defences — say 50-per-cent effective — encourage the opposing side to take the precaution of doubling their arsenal. So defences manage to be at the same time ineffective and provocative.

This was acknowledged as long ago as 1972, when the U.S. and the USSR signed the Anti-Ballistic Missile Treaty renouncing defences against ICBMs. The treaty remained in force till 2002, when president George W. Bush abrogated it. That was a major blow to arms control. Today the main forum for arms control, the Geneva Conference on Disarmament, has come to a standstill.

Why do we continue to embrace these awful weapons? Commercial interests play a major part. But more important, they confer status. The five original nuclear-weapon powers — the U.S., Russia, the U.K. France and China — sit, as of right, on the highest world body, the UN Security Council. Still worse, along with the remaining four nuclear powers, they make nuclear weapons the centre-piece of their military doctrine; simultaneously planning to use these weapons and not to.

There is an imperative for change: the existence of a global bargain to which the major nuclear powers are committed, the Non-Proliferation Treaty. This is a solemn agreement with 185 non-nuclear weapons states to “pursue negotiations in good faith (to achieve) nuclear disarmament.”

But the momentum has been lost. Deterrence, it is widely thought, offers a surer path to peace than disarmament.

Nuclear threats, it is true, contributed to a peaceful outcome of the Cuban missile crisis of 1962. We owe our hairbreadth escape from catastrophe to the spectre of nuclear war.

But no one in a position of responsibility at that time would for an instant have contemplated its repetition. Yet, we are in danger of doing just that today.

The danger stems from this: deterrence requires for its success making real the possibility that it might fail. But we cannot responsibly play nuclear roulette with our future.

As scientists we depend on the power of reason. Angela Merkel, no naif, permitted herself to exult, “we can change things for the better.”

So we can. But it will require that science make us aware of the miracle of our continued existence on this planet. And in this, scientists have an important part to play.

Source: The Star

John Polanyi *is a Nobel Laureate and faculty member in the department of chemistry at the University of Toronto. The Polanyi Conference on Science and Social Responsibility was organized by undergraduate students in the department of physics at U of T and sponsored by nine contributing groups.*