THE ROLE OF CONTROVERSIES IN THE GROWTH OF SCIENTIFIC KNOWLEDGE

M. Dascal
Tel Aviv University, Israel

I was surprised to learn about the realization of this First World Congress on Controversies in Neurology. And I am pleased and thankful for the opportunity to talk to you in the framework of this Congress. I am not here as a neurologist – who I am not, but rather as a philosopher of science. What brings me here is the fact that my research in the last decade has been devoted to the study of the role of controversies in science and other domains. This research persuaded me of the essential role of this phenomenon in the progress of science as well as of the practices associated with science. What I want to convey to you in my presentation is the reasons of why I think controversies, particularly in science, are so crucial, and to propose a different way of thinking about them and taking advantage of them. This of course mandates, in the limited time available, a compact presentation, omitting much of the supporting arguments and necessary elaboration. I will try to compensate for this by providing a selection of relevant references and a sample of examples directly touching upon neurology or closely related fields.

In the present abstract, the best is to put before you the main theses, with a couple of lines of justification each.

Thesis A: *Controversies are indispensable for the formation, evolution and evaluation of (scientific) theories and practices, because it is through them that the essential role of criticism in engendering, improving and controlling the 'well-formedness' and 'empirical content' that grant 'objectivity' to scientific theories and practices is performed.*

This thesis follows directly from the generally accepted Popperian idea of the centrality of criticism to science, to which one should add the realization that criticism is an *activity*, exercised in *actual confrontations* between scientists holding opposed positions – i.e., in controversies or other types of debate.

Thesis B: *The rigorous study of controversies is an indispensable means for providing an adequate description of the evolution of scientific ideas and for the understanding of their meaning. For controversies are, in fact, the natural 'dialogical context' where theories are elaborated and where their meaning progressively crystallizes through the challenge of actual objections.*

As shown by historians of science and technology, progress in these domains is not mainly – and certainly not only – a result of linear accumulation of findings and improvements, but is often a dramatic zigzag process, involving episodes of 'crisis' and 'revolution'. Controversies are symptomatic of the later, but are not absent from the former too. They not only signal a 'crisis', but also may be instrumental to advancing in the direction of solving it either within the predominant paradigm or through the creation of a new paradigm.

Thesis C: *Once started, a controversy has no* a priori *limits as to where it will stop in its questioning of entrenched beliefs, concepts, methods, modes of interpretation, data, criteria of relevance, norms of formulation, acceptance and rejection of hypotheses, and other components of the scientific enterprise. Such an unrestricted questioning may lead to a situation of* radical openness *in a given field, which in turn creates conditions that are favorable – and perhaps essential – to the emergence of* radical innovation.

In order to explain the growth of scientific knowledge, it is essential to account for the possibility of the emergence of really new and revolutionary ideas and approaches – i.e., of radical innovations – in science and its applications. The nature of the particular kind of debate I propose to call, technically, 'controversy', is such that it is a process of criticizing 'established truth' without precluding in advance any of its most 'sacred' components. This is likely to account for the 'clearing the ground' necessary for deeply innovative steps in the evolution of science.

Not all confrontations between scientists display the characteristics that I have been suggesting as useful and positive, i.e., those that are necessary for accounting for the growth of scientific knowledge. Alongside with *controversies* – whose further important properties will be described, I distinguish two other main idealized types of debates, termed respectively *discussion* and *dispute*, which will be analyzed and exemplified in the presentation. These are usually taken to lie at the extreme poles of a staunch dichotomy, the former representing rigorous, objective, systematic and truth-seeking – hence, properly scientific – debate, and the latter, interest-laden, subjective, context-driven and victory-seeking – hence, rather ideological or political in nature.

Many scientific debates approach indeed either the one or the other of the poles of this dichotomy, but this does not justify the usual view that they are the only possibilities, from which it is usually inferred a flip-flop effect: if a debate is not a *discussion*, then it cannot but be a *dispute*, and vice-versa. It can be also a *controversy*, an alternative that differs fundamentally from both extremes in that it is neither purely logic-driven nor exclusively interest-driven. As such, it is able to explain the growth of knowledge engendered through controversy as part of what goes on in *the activity of actually doing and applying science*. I bet that, although no doubt some of the debates in the present congress will be strict *discussions* and others will be stern *disputes*, several of the most significant ones are likely to be acknowledged, under analysis, as *controversies* in their way to contribute substantially to progress in neurology.