

such as the 1956 book by D. S. Kothari, only dealt with general principles of nuclear explosions rather than the numbers of casualties that would result from one of them. Later work by K. Sundarji and Rashid Naim were aimed more at advancing the political argument that nuclear deterrence would hold in South Asia than exploring the details of the human consequences of the use of nuclear weapons.

2. While the literature on the effects of nuclear explosions is as old as Hiroshima, there have been significant advances in the understanding of the superflares started in the wake of a nuclear explosion (in particular, the work by Harold Brode and Ted Postol in the 1980s). Since fire effects and blast effects have different scaling properties, the details of the causes of destruction are important, especially when considering the potential use of large yield megaton bombs. I incorporated these advances and used a range of models to

estimate the number of 'prompt' casualties resulting from an explosion. To the best of my knowledge, this has not been done in any other South Asia specific study. Further, I also included current estimates on long-term effects of radiation that can be used to assess the numbers of cancers, etc. that would result from radiation exposure.

3. The last purpose was to remind readers of the horrors of nuclear war, particularly relevant after the May 1998 tests, and to promote a discussion on nuclear policies and programmes. I also deliberately adopted a pedagogical style in the hope that other scientists and students could use the methods laid out in my paper to do their own estimates on other cities.

Ever since the wholesale destruction of Hiroshima and Nagasaki, legions of scientists have elaborated on the devastating effects of nuclear weapons. But the fact that 'such estimates have been

made before and widely discussed' has not prevented other scientists from doing the same in more accurate ways or in different contexts. Neither has it prevented journals like *Scientific American* from publishing numerous articles on the subject. I feel that if *Current Science* does indeed wish to provide a 'forum for discussion of not only science but also policy and issues that concern scientists' then it should not avoid discussing the effects of nuclear war merely on the basis that such knowledge is not new.

Anyone interested in a copy of my report is welcome to write to me at ramana@princeton.edu.

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## Institute of Natural Philosophy and goal of science

The search for truth(s) is the goal of science; harmony, simplicity and aesthetics are the values a scientist seeks in understanding nature. Such lofty ideals have been replaced by treating science as a means to gain (political) power and to satisfy unlimited desires and greed. Since the inception of modern science, its utilitarian aspects and application for developing weapons technology were recognized. However, two events mark almost total identification of science with them: nuclear bomb explosion in August 1945, and TRIPS in GATT-1994. Scientific community debates the role of scientists in society, and there are many concerned and conscientious scientists world-over worried about the misuse and destructive power of scientific knowledge. It seems the fundamental issue has been missed; and it is the institutionalization of defence research and intellectual property rights. If science remains search for truth, there can never be any fear of its misuse, truth can never harm anyone.

I believe ancient Upanishadic wisdom can enlighten us on the value and goal of science. There is no parallel to Nachiketa's quest for truth in the world history of knowledge; he did not fear even death, and could not be tempted by finest of the worldly pleasures; his inquisitive mind was seeking answers to eternal questions, and that was his sole aim. This knowledge now exists in the form of *Kathopanishad*. In *Ishavasyopanishad* we are taught that a balance between *vidya* (atemporal knowledge beyond senses) and *avidya* (temporal knowledge of the physical universe) is essential; *avidya* for worthy and happy living and physical existence, and *vidya* for salvation.

Let us try to learn from this ancient wisdom in the contemporary context: first of all we must revive the idea of natural philosophy for sciences, and then recognize that scientists in their pursuit of knowledge will have to be supported by the society for their basic minimum needs. On the part of scientists, they shall not have ownership on

the scientific knowledge, and shall not work for so-called defence research as well as for commercial purposes. Science in the service of mankind has to be distinguished from science as a trading commodity. If scientists cannot control their temptations for unlimited wealth and stake in political power, any sort of activism against exploitation of science for weapons of mass destruction and unbridled marketism is futile; at the most it may give an illusory satisfaction of having discharged their duty towards society. It was with these ideas in mind that The Institute of Natural Philosophy was founded in September 1998. Though it does not yet have a tangible form, its 'idealistic reality' does exist. I seek advice, help and cooperation in this endeavour from all.

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