Table 1. Number of students enroled in M Sc and number of Ph Ds awarded by Indian academic institutions during 2000–2006 in science

Year	M Sc enrolment[a]	Ph Ds awarded in science[b]
2000–01	NA	4616
2001–02	159,393	4793
2002–03	232,142	5988
2003–04	238,439	6638
2004–05	198,719	6437
2005–06	239,285	6744

Source: [a]Ref. 1. [b]www.nsf.gov/seind08 and UGC Annual Reports.

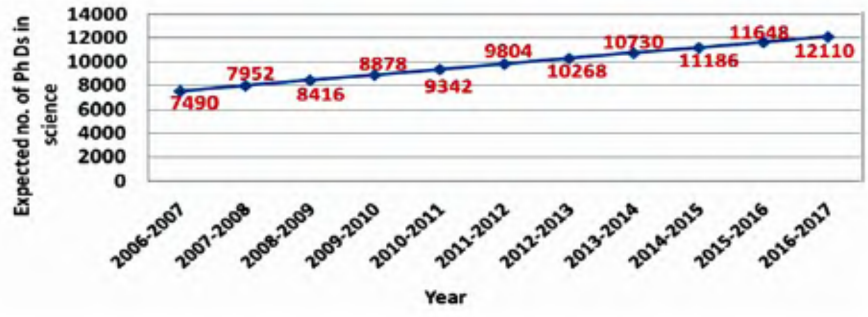

Figure 1. Expected number of Ph Ds in science determined on the basis of current trends using equation of least squares.

period[4]. The strong science and engineering Ph D programmes are a catalyst for the growth in China[5]. China Scholarship Council affiliated to the Ministry of Education provides 12,000 study abroad scholarships per year and 10,000 study-in-China scholarships per year[6]. Student/staff exchange, joint-run schools (programmes), and joint research projects are some of the best practices adopted by the Chinese higher education institutions regarding internationalization. This has been accompanied by a doubling of the gross enrolment ratio in higher education over the last seven years with a corresponding increase in the governmental support for higher education[6].

The 11th five-year plan (2007–12) envisages to take the GER to 15% by the end of the Plan and to 21% by the end of the 12th five-year plan (2012–17) (ref. 7). Emphasis is being laid on both capacity building in terms of quantity and quality by establishing/upgrading state-of-the-art institutions and substantially increasing the number of fellowships for doctoral research. Knowledge clusters which promote necessary synergies, sharing of resources, ideas and facilities are also being established to promote innovation[7]. The projected trends of Ph Ds by the end of the 11th and 12th five-year plans may help to further strengthen Ph D programmes in science to promote knowledge-based innovations and help India emerge as the leading country in terms of economic development.

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The history of 'two cultures': can we bridge the gulf?

The story of 'two cultures', as told by C. P. Snow, in the middle of the last century and the aftermath of it is still haunting the academic milieu. The editorial by Balaram[1], 'Social Scientists, Natural Scientists and Sociobiology' raked up the Snow anecdote, while discussing the issue of sociobiology. The two cultures, emanating from the 'behavioural traits' of the social and natural scientists, are not limited to the peripheral dichotomies of 'sit and stand', 'speak and read' of a seminar. Though Balaram referred to the context of sociobiology and the points raised by Gadagkar's lecture[2], a review of the Snow-phenomenon from a historical perspective may be useful to judge whether 'coalescence' is possible or an attempt to bridge the two is essential. For centuries, humanities like literature, languages, philosophy, economics, anthropology, fine arts and other social sciences had been sheltered under the 'arts' faculty, with an 'untouchable' distance from the so-called mundane sciences. Fine arts were assumed to be a part of divine machination and treated with exclusiveness in academics too, for a long time. However, civilizations flourished, consuming everything good from any source. This eclectic nature of social development was quite apparent when the Oxford University[3], founded in AD 1171, had initially been started with four branches: magic, music, logic and mathematics. A good blend of arts and sciences indeed!

The material knowledge and creative faculties travelled together for centuries

until an Athenian genius like Plato (427 BC) kept mathematics in a high pedestal and lampooned the arts like poetry. However, the absence of full knowledge of nature compelled the need for a 'poetic imagination' to complete an understanding. Aristotle (384 BC), a student of Plato, described that the sun is going round the earth and the sun derives the mobile energy from Heaven, the Heaven being the abode of almighty God. Aristotle was later called the father of biology for his brilliant experiments on living organisms. The marriage between the two streams of thought survived in the Christian era too, without any hitch, until the middle of the second millennium.

In the absence of clarity, people were both scientists and artists like Leonardo da Vinci (1452), a musician and a scientist; Erasmus Darwin (1731), a poet and a naturalist, and Charles Darwin (1809), a writer and a master philosopher in the theory of origin of species[4]. The scientific culture also could not make much headway until two major theories of the 'heliocentric nature of the solar system' and 'gravitational pull of the earth' were propounded. The discoveries of Copernicus (1475), Galileo (1564) and Newton (1643) heralded the phase of modern science and led to the inevitable division of sciences as 'natural' and 'social', the latter imbibing all vagaries of human thinking, religious obscurantism and behavioural patterns of groups. The Industrial Revolution of the 18th century, an offshoot of materials science, shook the aristocratic foundations of the artists and social philosophers, when the latter revolted and cursed the 'industries' as black devils. The mistrust and hatred subsided in the 20th century only with a compromising division of arts and sciences as water-tight compartments, both claiming to work for separate 'noble' objectives. However, the extraordinary progress and proliferation of materials science towards the end of the 20th century dwarfed the social sciences and treated them as mere 'heaps of words' of no avail.

In 1959, Charles Percy Snow, a professor in physics and a noted novelist of Britain, ignited a terrible war of words, when he delivered the Rede lecture[5] in Cambridge on 'two cultures'. Snow analysed the scientific and literary activities as 'two cultures' and characterized the behavioural trait of the 'latter' as 'ineffective' and egoistic. It is the science that attended to people's problems like poverty and disease. The literary intellectuals who may be authorities in Shakespeare but ignorant of the second law of thermodynamics become 'natural Luddites', Snow remarked (a Luddite is a worker who destroys the machine because it has made him jobless). The literary circles reacted violently. Scores of writers, journalists and social philosophers condemned Charles, called him names and branded him a 'stooge' of the communist countries. Finally, Bertrand Russell, the octogenarian–Nobel–intellectual, had to intervene and pacify people. 'They are not two cultures but two streams of activity, vital for human welfare but literature, strangely, claims more prominence than science', Russell remarked. 'Literature guides the path of progress, fixes human goals and forbids science from going astray'[6], the literary protagonists proclaimed. It is beyond question now, that science modifies the material conditions around. And, the 'conditions determine the consciousness of people', as Karl Marx remarked as part of social analysis. But the ecstatic nature of the human mind, necessary for the conscience to evolve, is achieved by a song, a poem, a picture, a dance, a drama, a kind gesture, an adventure or a philosophical conjecture. God, an essential part of human civilization, so far, is a stranger to scientific method. Fiction, more often than not, is a soil nutrient for the factual vegetation to grow. 'Science fiction' over centuries revealed the wonders of tomorrow's science today. Science, willy-nilly, has to condescend to embrace the gestures of social sciences[4].

The 20th century towards its fag end witnessed an explosive development in technology, resulting in contradictions like nuclear disasters, acid rains, oil spills, environmental pollution and global warming, threatening the very existence of life on earth. The social philosophers put science 'on trial' for the mishaps. It was questioned for the perceived asocial aberrations like cloning, stem cell research, genome modulation[4] and wanton production of chlorofluorocarbons. Science was admonished for its utter disregard for global peace, sustainable environment and cultural ethos. It was counselled to rehash, and refurbish its contents, imbibe the spirit of human behaviour and innovate the process of growth. There comes Gadagkar's sociobiological relevance and behavioural polymorphism[2].

Hence the need to bridge the two cultures. This need facilitated the hybridization of arts and sciences, even on a limited scale, resulting in the birth of new subjects like environmental economics, geopolitics, industrial psychology, sociobiology, sociology of medicine, agricultural ethics and computer graphics. Even fine arts like music are no more an exclusive performance of human organs, but a joint venture of mind and machine. The process of symbiotic approach demands that social sciences be made an integral part of scientific curricula and the autonomous nature of social and natural sciences be dispensed forthwith.

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