Mars and Venus: How Europeans and Americans View and Use Science

Alan I. Leshner
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Serena and Venus: Europeans and Americans are in Similar Boats Together

Alan I. Leshner
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Science and technology are imbedded in every aspect of modern life:

- For people to prosper in modern society, they need understanding and comfort with S&T
- For science to prosper, the science-society relationship must be positive and strong
For nations to prosper they need a strong science and technology enterprise

- Correlation between strength of a nation’s science infrastructure, its economic strength and quality of life
- Increasing policymaker recognition of the relationship
  - In the US and elsewhere
Many countries are recognizing the science-economy (jobs) imperative

- US
- China
- Canada
- India
- Argentina
- European Union
- Israel
- Japan
- Australia
- Belgium
- Sweden
Figure O-20
Current PPP dollars (billions)

OECD = Organisation for Economic Co-operation and Development;
PPP = purchasing power parity

SOURCE: OECD, Main Science and Technology Indicators 2004–07.

Science and Engineering Indicators 2008
Other factors are also influencing the climate for science
Major global contextual trends

- World events
  - Terrorism
    - September 11, 2001
Impacts on science in and with the US

- Visa issues – foreign students & visitors
- Restrictive clauses in grants & contracts (export controls)
- Laboratory security – “select agents”
- Concerns about scientific publication
- “Sensitive but unclassified” information
- New US research priorities
New research priorities

- Biosecurity
- Energy security
- Transportation security
- Cyber-security
- Safety of the food supply
FY 2005 R&D FINAL
Percent Change from FY 2004

DHS  | DHS +20%
DOD "S&T"  | 5%
USDA  | 10%
Commerce  | 15%
NASA  | 20%
NIH  | 25%
DOE  | 30%
DOT  | 35%
NSF  | 40%
USGS  | 45%
VA  | 50%
EPA  | 55%

Source: AAAS estimates of R&D in FY 2005 final appropriations bills.
DOD "S&T" = DOD R&D in "6.1" through "6.3" categories plus medical research.
NOVEMBER '04 REVISED © 2004 AAAS
FY 2009 R&D Request
Percent Change from FY 2008

DOE Science +21%
NSF +16%
DOT
DOD weapons
NASA
NIST
DHS
DOE defense
DOE energy
NIH
VA
NOAA
EPA
USGS
DOD "S&T"
USDA

-15% -10% -5% 0% 5% 10% 15%

Source: AAAS, based on OMB R&D data and agency estimates for FY 2009.
DOD "S&T" = DOD R&D in "6.1" through "6.3" categories plus medical research.
DOD weapons = DOD R&D in "6.4" and higher categories.
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Impacts: world events

- Have made collaboration much more difficult
- Altered US science funding patterns
Major global contextual trends

- World events
- Increase in scientific activities around the world
  - Science is everywhere!
Figure O-18
Scientific and technical articles in peer-reviewed journals, by region/country: 1995–2005

Thousands

NOTES: Asia-10 includes China, India, Indonesia, Japan, Malaysia, Philippines, Singapore, South Korea, Taiwan, and Thailand. China includes Hong Kong.

SOURCES: Thomson Scientific, Science Citation Index and Social Sciences Citation Index; ipIQ Inc.; and National Science Foundation, Division of Science Resources Statistics, special tabulations.

Science and Engineering Indicators 2008
Percent international submissions and acceptances at Science, 1992-2005
Some Americans are getting worried

- Will the US no longer be pre- eminent?
- Is the US losing even its eminence in certain fields?
Trends in Federal R&D, FY 1976-2009 *
In billions of constant FY 2008 dollars

Source: AAAS analyses of R&D in annual AAAS R&D reports. * FY 2009 figures are latest AAAS estimates of FY 2009 request. R&D includes conduct of R&D and R&D facilities. Data to 1984 are obligations from the NSF Federal Funds survey. GDP figures are from OMB, Budget of the U.S. Government FY 2009.
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Major global contextual trends

- World events
- Increase in scientific activities around the world
- Globalization of the research enterprise – international research teams
Figure O-19
Share of scientific and technical articles with international coauthorship, by country/region: 1988, 1996, and 2003

Percent

EU = European Union

NOTE: Asia-8 includes South Korea, India, Indonesia, Malaysia, Philippines, Singapore, Taiwan, and Thailand.

SOURCES: Thomson ISI, Science Citation Index and Social Sciences Citation Index, http://www.isinet.com/products/citation/; IPIQ, Inc.; and National Science Foundation, Division of Science Resources Statistics, special tabulations. See appendix tables 5-47, 5-48, and 5-49.

Science and Engineering Indicators 2006
The broader, societal context for science and its uses is equally (or more) important.
We have a problem

- The science-society relationship is experiencing significant tension
  - Not just in the US
On the one hand

*We are living in the best of scientific times*
On the other hand....
Other issues *within* science are not going so well

- Incidents of scientific misconduct
- Human subjects concerns
- Animal welfare issues
- Conflict of interest problems
These are factors *internal* to science

- There are problematic *external* factors as well
People generally still respect science and technology….
Figure 7-10
Public assessment of scientific research: 1979–2006

- Benefits of scientific research strongly outweigh harmful results
- Benefits of scientific research slightly outweigh harmful results
- Benefits of scientific research are about equal to harmful results
- Harmful results of scientific research slightly outweigh benefits
- Harmful results of scientific research strongly outweigh benefits
- Don’t know

Source: Science and Engineering Indicators, 2008
European Optimism Regarding Contributions of S&T to Quality of Life

- S&T have improved the quality of life for your generation
- S&T will improve the quality of life of future generations

Source: Eurobarometer, 2005
They have little understanding of what is and is not science

- 60% of Americans believe in extrasensory perception
- 41% think astrology is somewhat scientific
- 47% still do not answer “true” to the statement: “Human beings developed from earlier species of animals”

Science and Engineering Indicators, 2004
What do Europeans consider as scientific?

- Medicine – 89%
- Physics – 83%
- Astronomy – 70%
- History – 34%
- Astrology – 41%
- Homeopathy – 33%

Source: Eurobarometer, 2005
Some Americans have reservations about science

<table>
<thead>
<tr>
<th>Agree</th>
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We depend too much on science and not enough on faith

50 45

Science and Engineering Indicators, 2006
European Views of Science and Faith

We depend too much on science and not enough on faith

Percent

Source: Eurobarometer, 2005
Much science-society tension results from conflicts between scientific findings and

- Political/economic expediency
- Core human values
Political/economic issues

- Climate change
- Alternative energy sources
Figure 7-15
Public priorities for environmental protection versus economic growth: 1984–2007

Percent

NOTES: Responses to: With which one of these statements about the environment and the economy do you most agree—protection of the environment should be given priority, even at the risk of curbing economic growth (or) economic growth should be given priority, even if the environment suffers to some extent? Poll conducted in 1984, 1990–92, 1995, 1997–2006; other years interpolated.


Science and Engineering Indicators 2008
Current scientific issues that abut against core values

- Embryonic stem cell research
- Studying “personal” topics
  - Sex
  - Genetics of behavior
- Neuroscience – mind/body issues
- Teaching “Intelligent Design” versus evolution in science classrooms
“Conflict” with politics and values has consequences for the science-society relationship

- Creating a growing divide between science and the rest of society
- Society wants to influence what science is done
Why do/should we care?
Scientific agenda can be significantly skewed or constrained

- Inadequate research on alternative energy sources
- No US Federal funding for embryonic stem cell research
  - Limits ability of US scientists to do research
Origin of Embryonic Stem Cell Papers

The purpose of science is to tell us about the nature of the natural world

- Whether we like the answer or not

Cong. Rush Holt, AAAS Carey Lecture, 2005
Only scientists are stuck with what science says/shows

- The public and/or policy makers can ignore or distort science at will
Ignoring or distorting science undermines public policy

- Environment
- Energy
- Health care
If governments choose to ignore scientific advice, they do so at the peril of their people.

Sir David King, Science Adviser to UK Government
at AAAS, Sept. 2005
Ignoring or distorting science undermines the general public’s ability to use science for their own benefit

- Science is imbedded in every issue of modern life
- Lower quality US science education can mean a weaker labor force
What is the prospect for the future?

- US **will** have a new Administration
  - Will have to face a very broad array of science-related issues
  - Both Obama and McCain seem “science friendly”
    - Climate/energy policy
    - Space policy
    - Science and math education
    - Embryonic stem cell policy
    - Agriculture issues

- **Funding?**
  - Depends on both Administration and the Congress
AAAS and others are working on the broader science-society relationship

- Moving from public understanding to public engagement strategy
  - Catching up with Europe
- Dialogues between science and religion
  - Environment
  - Teaching evolution in the schools
Public sentiment is everything. With public sentiment, nothing can fail; without it, nothing can succeed.

Abraham Lincoln
AAAS and Europe have wonderfully close ties

- Serve the globalization of science
- Advance the progress of science
- Promote the worldwide science-society nexus