Expanded Imagination for Ethics Literacy Education

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想像力(Imagination)?

- Imagination is generally regarded as central to scientific and engineering research.
- Imagination is also often associated with care-free thinking without any constraints.
- Imagination is usually taken to be the source of scientific creativity or technological innovation. Imaginative researchers cultivated through proper education are likely to prevail in their academic performance.

Ethics & 科學技術(Science-Technology)?

- Ethics is seldom thought as an a essential element of good research.
- Perhaps, except for the matter of research integrity and the need for public accountability of national funding.
- In Korea, research ethics including IRBs, research misconduct, research ethics education have been gradually accepted as an unavoidable part of academic research.
- But, ethics education other than that?

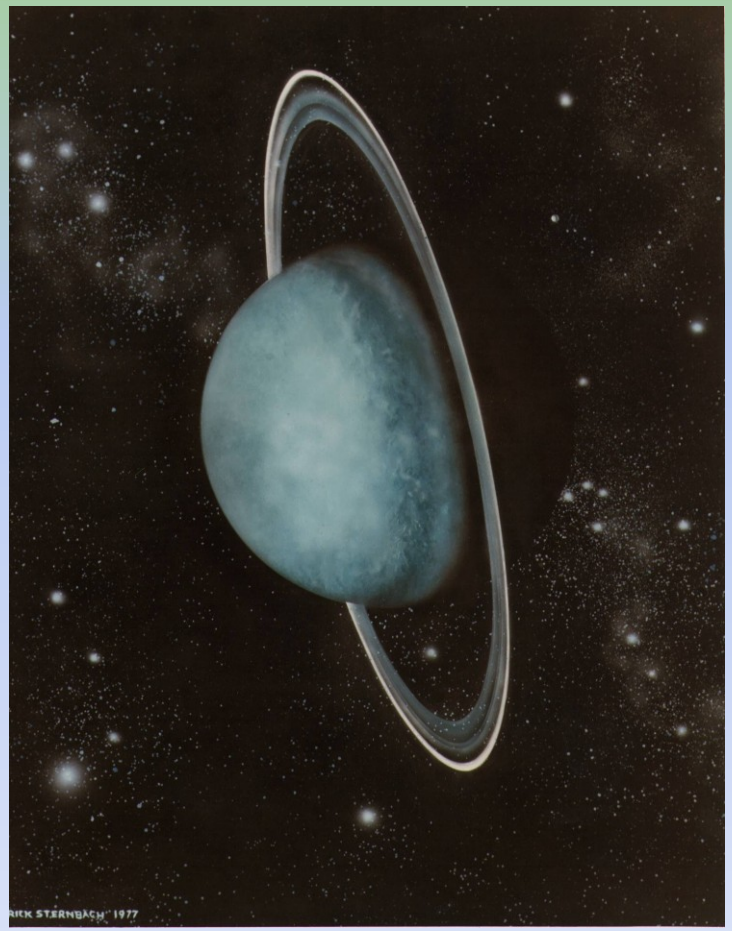
Science and Technology vs. 科學技術

- Particularly, Korean question!
- Science-Technology is different from Latour's technoscience.
- Science-Technology in Korea means in most contexts technology or technological artifacts.
- Why? >> This has something to do with our modern history…
- Science and technology as tools for achieving independence, and later for nation-building, and then for economic development

Thomas Kuhn and Essential Tension

- Divergent Thinking (or imagination): thinking alternatives beyond a familiar paradigm
- Convergent Thinking (or imagination): trying to solve puzzles by accomodating them with modified exemplars
- Both convergent thinking and divergent thinking are essential for normal and revolutionary research
- Essential tension: creativity = successful co-ordination between two conflicting imagination

Imagination and Creativity



- Creativity of Convergent Imagination: Accomodating the orbit of Uranus within Newtonian mechanics >> discovery of Neptune
- Creativity of Divergent Imagination: Explaining the anomaly of Mercurian perihelion by a new, revolutionary theory
- Difficulties lie in how to make a wise decision between two kinds of imagination for a given research question...

Non-Algorithmic Nature of Research

- Urbain Le Verrier (1811-1877): employing the same method he used to predict Neptune to explain the perihelion of Mercury, believing in Vulcan until his death...

- No simple algorithm to follow for successful research >> 'wise' decision is crucial! (i.e. there is plenty of room in research for the considerations other than strictly empirical or theoretical.)

Post Follow-up Technological Innovation

- Samsung vs. Apple
- Economic growth from succssfully adopting fast follow-up strategy
- Widespread recognition that Korean technological development is now at its critical juncture.
- Not just 'studying' other 'advanced' countries' experience, but suggesting promising scenarios for future innovation
- Challenge: How to do the trick?
- We should be ready for the 'failure' cost and for trial-and-error experience. << unfamiliar situations for the government as well as scientists and engineers

'Two-Culture' and Trans-disciplinary Research

- Recent trends in Trans-disciplinary research in Korea
- Particularly serious 'Two-Culture' problem in Korea is suggested as a major barrier for successful trans-disciplinary research.
- It is interesting to remind that C.P. Snow was also discussing 'Two Culture' in the context of the alleged decline of British industry (and technological superiority)
- It is debatable whether Snow's diagnosis of British industry was correct, but his solution is convincing in Korean context.

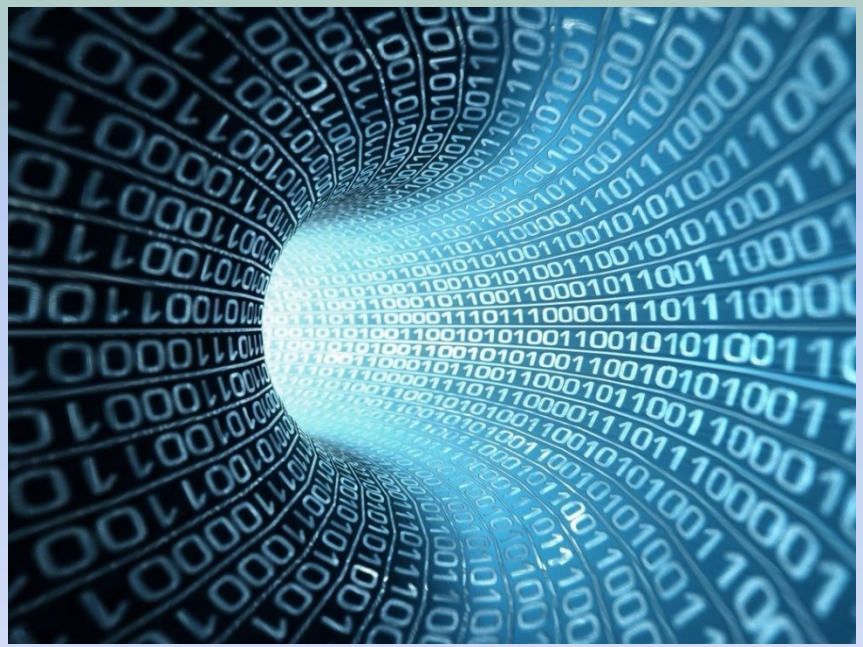
Rachel Carson, a 'scientific' critic of science

- Fashionable 'meeting' events between science, engineering, humanities, and arts
- Are they effective?
- Rachel Carson's approach in her 1962 *Silent Spring* is more telling.
- Combination of elegant and easy-to-read prose with scientific correctness >> showing vividly the unexpected consequences of contemporary research practice (i.e. focusing on a single causal chain from chemical pestcides)
- We have to go beyond the simplistics divide between science and humanities (for instance, ethics) to come up with 'effective' solutions to our complex problems.

What 科學技術 means to Us?

- Common misconception: ethical considerations of science or technology just mean anti-science or anti-technology.
- We can have more 'reasonable', selective attitude other than simple 'love' or 'hate' ones.
- Amish technology: Kevin Kelly discusses how Amish engineers achieve their technological 'innovation' in cosistent with their religious and moral views.
- We can deliberate what sort of society we want to live in first, and then try to develop technology to suit the vision.

Expanded Imagination for 科學技術



- Expanded Imagination(EI): enriched imagination with social and ethical awareness
- In order to be effective and successful in current East Asian context, scientists and engineers should be able to expand their research imagination beyond conventional 'discipline-bounded' imagination!
- EI is essential for the productivity of scientific and technological research in the post 'follow-up' context.
- Example) Korean Technology Assessment for 2012 on 'Big-Data' technology

Implications for Ethical Literacy Education

- <Philosophical Understanding of Science and Technology>: liberal education course offered to Hanyang univ. students since 2003, annually about 400 students are now taking the course
- We have developed more 'advanced' optional courses, including <Imagination and Science-Technology>.
- Distinctive response from the students with different backgrounds
- Challenge is to make students (and their teachers, if possible) appreciate the value of ethical discussions...

Thank You!