CREATIVITY: HUMAN VS MACHINE

Prof. Rajakishore Nath, Department of Humanities & Social Science, IIT Bombay

- What is creativity?
- Dimension of creativity

  (a) Psychological dimension
  (b) Historical dimension
- Are their creative machines?
- Consciousness and creativity
- The concept of machine-consciousness and creativity is derivative

What is Creativity?

- It is creativity, in the very specific sense of the term used here, which distinguishes humans from machines.

- Now the question is: Under what conditions can we say that a human act is creative?

- We can identify two aspects in any act.
- One is the product of the act
- And the other is the process.
- By product, we mean that which is produced by the act.
- The process stands for the way the product is produced. The process, being psychological, is something subjective.

- The judgments on creative act is objective

- What are the characteristics features of a creative product in terms of which the act that produced it is judged to be creative?

Features of creativity

- Novelty
- Originality
- Scientific value
- Aesthetic value
- Social value

- Creativity out of nothing

- Creativity out of nothing

Boden defines, "creativity is a puzzle, a paradox, some say a mystery. Inventors, scientists, and artists rarely know how their original ideas arise. They mention intuition, but cannot say how it works. Most psychologists cannot tell us much about it, either. What's more, many people assume that there will never be a scientific theory of creativity –for how could science possibly explain fundamental novelties? As if all this were not daunting enough, the apparent unpredictability of creativity seems to outlaw any systematic explanation, whether scientific or historical."

Boden, Margaret A., *Dimensions of Creativity*, The MIT Press, Cambridge, Mass., 1996.

- If a creative product has no value, no relevance, no originality, no novelty, and no uniqueness, then it is not new in its creation because there is nothing new in its creation.

- Now the question is: Why should we be creative?

- We are creative because we have to solve our day-to-day problem.

Creativity as Problem Solving

According to Dodd and White,

"problem solving, a frequent human activity, occurs when a goal cannot be achieved directly and a plan must be devised which will permit a goal attainment."

Dodd, David H., and White, Raymond M., *Cognition: Mental Structures and Processes*, Allyn and Bacon, Inc., Boston, 1980.

Mayer defined it as,

"problem solving is cognitive processing that is directed toward

- The definition of problem solving consists of three components.
- Firstly, problem solving is cognitive act that occurs internally in the mind.
- Secondly, problem solving is a process having a definite direction and goal. That is why when a human being solves problem, he or she does a creative, insightful and intuitive act.
- Thirdly, when human beings solve problem, they identify the mental operations, representations, and strategies that they use when they solve problems.

- There are two kinds of thinking
- Convergent thinking (What I do to solve this problem?)
- Divergent thinking (What are the ways of looking at this problem?)

Dimensions of creativity

- **Psychological creativity : P –creativity**
- **Historical creativity: H -creativity**

Psychological Dimensions of Creativity

Boden writes, "A valuable idea is P-creative if the person in whose mind it arises could not have had it before; it does not matter how many times the other people have already had the same idea. By contrast, a valuable idea is H-creative if it is P-creative and no one else, in all human history, has ever had it before."

Boden, Margaret A., *Dimensions of Creativity*, The MIT Press, Cambridge, Mass., 1996.

Historical Dimensions of Creativity

Historical creativity is typically associated with creativity in relation to the entire history of mankind. This type of creativity is not merely psychological but also social in character.

- **P–creativity or psychological creativity depends on H –creativity because by definition all H–creative is P-creative ideas, but not all P-creative ideas are H-creative.**

- **The psychological creativity (P-creative) is concerned with the individual psychology of the person concerned, where as H-creativity is a matter of social evaluation and collective judgment.**

Following this Brannigan writes, “Such value judgments are to some extent culturally relative, since what is valued by one person or social group may or may not be valued –praised, preserved, promoted by another.”

Brannigen, A., “The Social Basis of Scientific Discovery” Cambridge University Press, Cambridge, 1981

Are There Creative Machines?

- This section is concerned with two ideas.
- The first is about the concept of humans as machines, and concerns cognitive science.
- The second is about the possibility of machines being intelligent, and concerns artificial intelligence

- **Now, the question is: Can a machine be creative?**

- **When a machine is creating something, the credit is not given to the analytical engine or computer, but to the engineer.**

- Boden addresses the following questions regarding whether machines such as computers are creative. These questions are:

- Can computers help us to understand human creativity?

- Could computers do things which at least appear to be creative?

- Could computers appear to recognize creativity?

- Can computers really be creative?

- The first question focuses on the creativity of human beings. The next two questions are psychological. The fourth question is a philosophical.

Dartnall writes, “If machines cannot be creative then I doubt there is any significant sense in which they can be intelligent, for they will never ‘have minds of their own’. I do mean this in the weak sense that they will always slavishly do what we tell them, but in the strong sense that they will never be able to generate their own ideas. And I take it as axiomatic that if they cannot generate their own ideas they cannot be intelligent.”

Dartnall, Terry, *Artificial Intelligence And Creativity*, Terry Dartnall, Kluwer Academic

- If X is merely following instructions, X is not being creative. Computers only follow instruction. Therefore, computers are not being creative.

- For example, teacher advises the students to be creative and not mechanical. Therefore, it is possible to be creative and still be following instruction. But the fact is that computers are not like the students in this example.

- If everything that X does is something that it was told to do, then X is not creative. Everything that a computer does is something that it was told to do. Therefore, computers are not creative.

- In this argument the second premise is false, if we do not instruct the computer in every action it they performs. If this premise were true, then we are required to give instruction at every step. But this may not be the case always

- If X is designed to respond in predictable way to its instruction, then X is not creative. Computers are designed to respond in a predictable way to their instructions. Therefore, computers are not creative.

- Still, this is not a strong argument, in view of the fact that creativity of computers cannot be denied just because they respond to the instructions of the designer.

Machine creativity is secondary