

Models of Inspiration – Making of an Einstein

DR. LAXMIDHAR BEHERA

DIRECTOR, IIT MANDI



Synopsis

- Brief Life Sketch of Einstein
- Inspiration – The Key
- Mechanistic Model
- Case Histories
- Non-Mechanistic Model
- Conclusion

Human society and Animal Society



āhāra-nidrā-bhaya-maithunaṃ ca
sāmānyam etat paśubhir narāṇām
dharmo hi teṣām adhiko viśeṣo
dharmeṇa hīnāḥ paśubhiḥ samānāḥ

Mahabharat, Shantiparva, 294.29

Eating, sleeping, sex, and defense—these four principles are common to both human beings and animals. The distinction between human life and animal life is "Dharma"

Human society and Animal Society

*idaṁ hi puṁsas tapasaḥ śrutasya vā
sviṣṭasya sūktasya ca buddhi-dattayoḥ
avicyuto 'rthaḥ kavibhir nirūpito
yad-uttamaśloka-guṇānuvarṇanam*

◦ *Srimad Bhagavatam 1.5.22*

Learned circles have positively concluded that the infallible purpose of the advancement of knowledge, namely austerities, study of the Vedas, sacrifice, chanting of hymns and charity, culminates in the transcendental descriptions of the Lord, who is defined in choice poetry.

Human intellect is developed for advancement of learning in art, science, philosophy, physics, chemistry, psychology, economics, politics, etc. By culture of such knowledge the human society can attain perfection of life. This perfection of life culminates in the realization of the Supreme Being, Viṣṇu.

Life sketch of Albert Einstein

- As a child
 - Parents not genius
 - A slow starter – struggling to even speak fluently until age of 9
 - Parents feared him to be subnormal
- As a Student
 - Developed a sense of strong religiosity
 - Failed in first attempt before making it to Swiss Federal Polytechnic School
 - Relied heavily on notes taken by his friends



Einstein – The Scientist

The annus mirabilis: Papers on

- Light Quanta
- Brownian motion
- Theory of Special Relativity $E = mc^2$

1905

1916

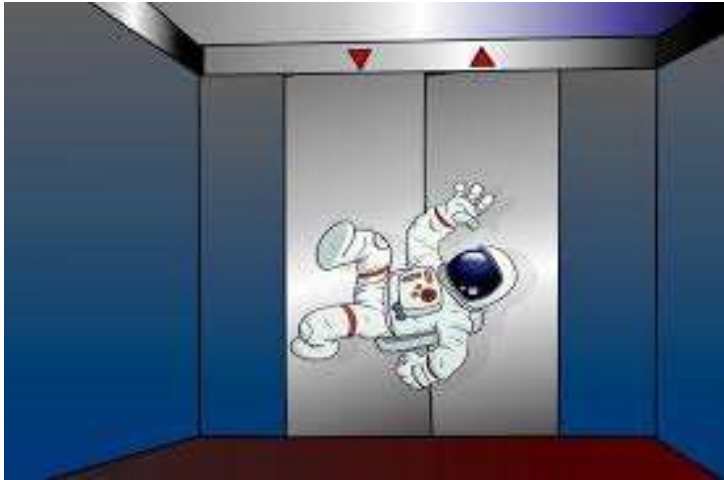
Paper on General theory of Relativity

Awarded Nobel Prize for his research on photoelectric effect

1922

Proposed atomic bomb research

1939



Inspiration is the Key



What makes an Einstein or a Newton?



Music

Mozart (1756-1791)

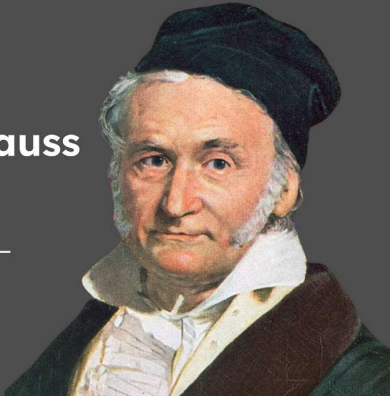
When I feel well and in good humor, or when I am taking a drive or a walk ... thoughts crowd into my mind as easily as you would wish. Whence and how do they come? I do not know and I have nothing to do with it... Once I have a theme, another melody comes, linking itself with the first one, in accordance with the needs of the composition as a whole. It does not come to me successively, with its various parts worked out in detail, as they will be later on, but it is in its entirety that my imagination lets me hear...



Carl Friedrich Gauss

1777 - 1855

The Greatest
Mathematician Since
Antiquity



Science

Carl Gauss

Finally two days ago I succeeded ...Like a sudden flash of Lightning the riddle happened to be solved. I myself cannot say what was the conducting thread which connected what I previously knew with what made my success possible.



Henry Poincare

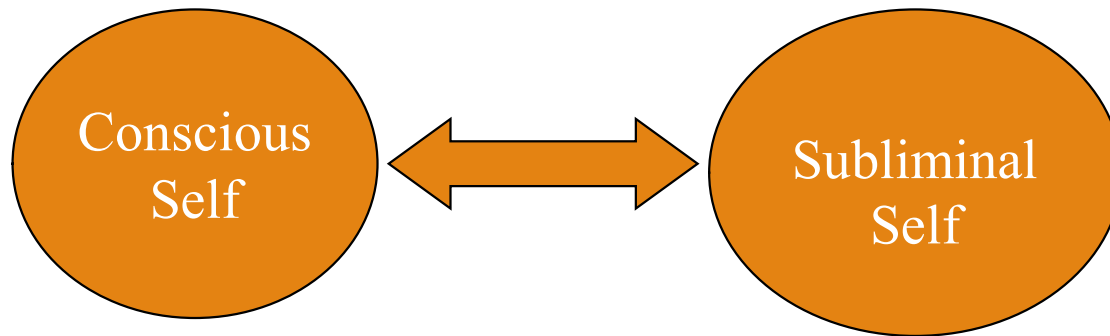
At the moment when I put my foot on the step the idea came to me, without anything in my former thoughts seeming to have paved the way for it, what the transformations I had used... were identical with those of the non-Euclidian geometry.



Inspiration has two features

- Its source lies beyond the subject's conscious perception.
- It provides the subject with information unobtainable by any conscious effort.

Subliminal Self – The Source of Inspiration?



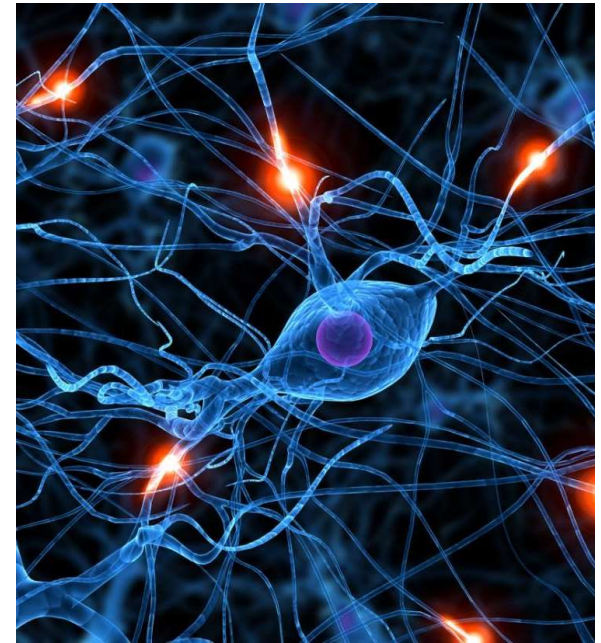
Poincare's Observation:

The subliminal self is in no way inferior to the conscious self; it is not purely automatic; it is capable of discernment; it has tact, delicacy; it knows how to choose, to divine. What do I say? It knows better how to divine than the conscious self, since it succeeds where that has failed. In a word, is it not the Subliminal self superior to the conscious self ?

Poincare's Mechanistic Model

Assumptions

- All mental phenomena are response of neural networks in the brain results simply from the interaction of macromolecules within the nerve cells according to the known laws of physics
- Consciousness is purely described by external behavior
- Disregards the individual person's subjective experience of conscious self



The Model



Conscious mind desires



Subliminal self is capable of forming enormous numbers of combinations in a short time



Subliminal self puts together many combination of mathematical symbols by chance



The conscious mind remains unaware of the many useless and illogical combinations



It immediately becomes aware of a satisfactory combination as soon as it was formed

Validity of Poincare Model

Human brain has an average size of $1300 \text{ cm}^3 = 13 \times 10^{-4} \text{ m}^3$

One Cubic Angstroms = 10^{-30} m^3

No of Cubic Angstroms in the brain = 13×10^{26}

Let one billion of combinations take place in one cubic Angstrom of brain per second

Number of operations that will take place within the brain per second = 13×10^{35}

Number of operations per year = $31 \times 10^7 \times 13 \times 10^{35} = 4 \times 10^{44}$

Number of operations in 100 years = 4×10^{46}

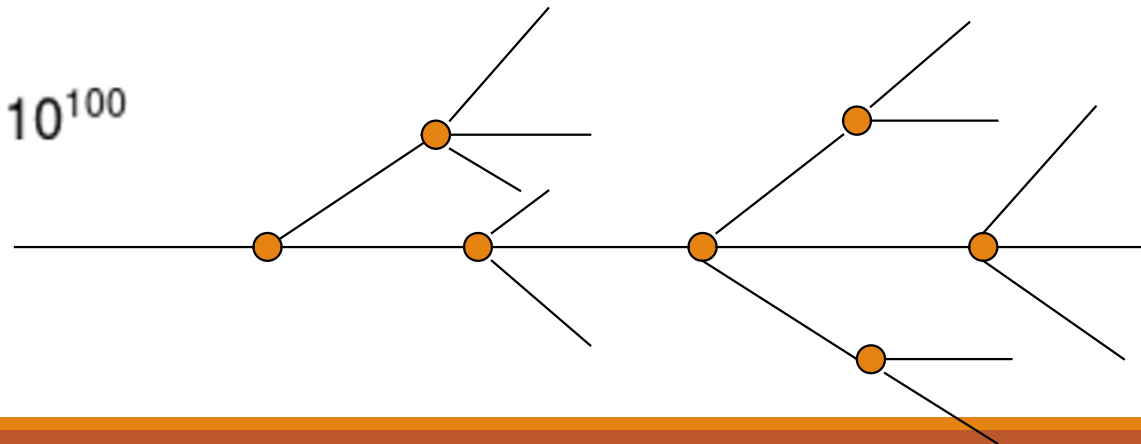


1 Cubic Angstrom

Random Combinations

- Example: Writing sentences in some symbolic language of 333 symbols in length
- Assumptions: The rule grammar allows us an average of two choices for each successive symbols.

$$2 \times 2 \times 2 \dots = 2^{333} \approx 10^{100}$$



Randomly hitting a proof!!

- Total no. of grammatical sentences = 10^{100}
- One has to live for 10^{54} years for his brain to strike the right combination
- Any mathematical theorem requires much more than 333 symbols to prove.
- Randomly hitting a proof seems impossible.