

On Human Intelligence

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Abstract— This paper presents some detailed discussions regarding the human natural intelligence, along with various types of intelligences. The authors have also given some important factors on which the intelligence depends. Therefore the authors strongly feel that this information given in this paper may be useful to the researchers who have been working in the area of Artificial Intelligence.

Keywords- *Human Intelligence, Artificial Intelligence, Intelligence Quotient, Spiritual – Intelligence, Emotional Intelligence.*

I. INTRODUCTION

With the rapid development and research in the area of Artificial Intelligence (AI), it has set a major challenge in the research domain to the computing machines. It has branched out into many disciplines and a number of research innovations are recorded in the last 25/30 years. Though AI was primarily evolved to develop and impart an intelligence to machines to make them smarter, AI and its new branches (ANN, GA, Fuzzy etc.) are based on thinking modeling, evolution and uncertainty with information which have strong mathematical linkages. Thinking is seen as a predicate Logic and the generalization ability in an ANN and gradual variation in Fuzzy Logic and accepted systems built with either single or synergic combinations leads to the same mind of intelligence which obviously not in the same way as a human does. But still, the success rate is far behind. This is mainly due to our present understanding of the Intelligence and functioning of the brain.

This article is written in an effort to collect tit-bits and pieces of definitions, related to Human Intelligence (HI) and also to make a comparative study between the human brain and the computer. Incidentally, some discussions on IQ, emotional Intelligence (EQ), spiritual Intelligence / spiritual quotient (SQ), Multiple Intelligence, People's quotient, and lastly, steadfast Intelligence (SFQ) (Propounded by Hindu Philosophy, based on Bhagavat Gita), have also been presented.

A) Basic Definitions of Intelligence :

1. a) As per Webster's dictionary the definition of intelligence is as follows:
 - i) "the power of meeting any situation, especially a novel situation, successfully, by proper behavior & adjustment
 - ii) The ability to apprehended interrelationship of the presented fact, in such a way, to guide action towards, s desired goal.

OR

- a) "Intelligence is the ability to learn or understand by experience or the ability to respond quickly, to a new situation".
- b) "Intelligence is the power of understanding and discerning, power of perceiving, knowing and reasoning without emotions".
- c) "A system is judged to have the property of intelligence on the observation of the system behaviors, if it can adjust itself to a novel situation; has the capacity to reason, and understand the relation between facts to discover errors, and meanings, and to recognize truth. Also one often expects on intelligent system, to learn, to improve from the level of performance, on the basis of past experience".
- d) Some say: "Intelligence is the capacity to handle situation independently. And without any support".
- e) Jensen says that "Intelligence is a physical property of the brain and IQ (Intelligence Quotient) measures the intelligence level".
- f) Stenberg says "Intelligent persons play on their strengths gifted by nature.
- g) "Intelligence is like a potential of the car, whereas thinking is, driving skill".
- h) Intelligence of the brain can be compared to a voice in radio
- i) "Intelligence is the totality of those mental capacities which serve cognition and perception of the logic connections (formatting concepts, proposition and deductions)".
- j) "Intelligence, Justice Potter Steward once said, is like a Pornography; " I can not define it, but I know it, when I see it". Error tolerance is for example, a facet

of intelligence. Take the sentence in printing manual. The die should be read. Human Intelligence would at once read it, for what it should be”.

- k) “Intelligence can be defined as sense of perception, and acting, accordingly”.

B) Etymology of the Word Intelligence

It is a Latin word ‘Legere’, means to gather (especially a fruit), to collect, to assemble, or to choose, and form an impression; Intelligence is finally to understand, perceive, or to know.

C) Some definitions of intellect:

- a) Intellect is the totality of mental phenomena, serving the purpose of thinking in abstract sense, the totality of such phenomenon of thinking, in which the influence of emotion is not manifested, or at least, is not conspicuous.
- b) Intellect depends upon thought processes (it is material process, and it is the outcome of memory, stored in cell), experience, and knowledge.
- c) Intellect is a name given to series of individual thoughts and it is composed of endless sequence of thoughts, series of ideas, concepts, and memories

D) More on Intelligence (based on human interactions)

- a) Intelligence is adjudged using the concept “what is useful to the organism”
- b) Intelligence is relative term and possesses a sense of degree of Intelligence (similar to a capacity of 60-W and 100-W candle bulbs).
- c) (I) Intelligence is at both theoretical and practical levels.
 (II) Intelligence can also be at, constructive / destructive levels.
- d) Although intelligence is generally a gifted quality; but it can be acquired.
- e) Intelligent person, are those who can understand advanced concepts, but can explain to a layman, in a simple way.
- f) Work towards the general advantage of the society.
- g) Are those, who can handle, human beings, around him, or who can extract useful work from that set of people, for the betterment of public, in an efficient manner, taking into consideration, their weaknesses.
- h) Use their intuitive power of understanding things.

E) Intelligence depends upon the following factors:

- 1. Quick grasping and understanding abilities, and responses, mental alertness, and readiness, and to receive and express.

- 2. Possessing sufficient IQ level, where IQ is a physical property and is measured as

$$IQ = \frac{\text{Mental age}}{\text{Chronological age}} * 100$$

Note : This can’t be defined quantitatively. It has a fuzzy value(Ref. Pioneer of IQ test; Dr.Lewis M Terman (psychologist) 1921 at Stanford).A typical IQ test by M.M.Bangard (Sovier Scientist) is described below.

A	B	C
4	2	8
9	3	27
5	5	5
2	4	x

Fig.1

In the above fig.1, x term is 1, since there exist a relation

$$A^2/B=C, \text{ amongst } A,B \ \&C.$$

The IQ test of Terman classifies two categories of Intelligent people: A’s to be sure, on average had IQ’s seven points higher than the C’s: 157 versus 150. A’s were in professionals, like law and mechanic, or were university professors, or business executives. The other group C’s were in occupations like sales clerks, far below their intellectual potential:

A’s at an average of 11, already showed greater will power, perseverance, and desire to excel.

From childhood on, the C’s showed a lack of persistence in pursuing their goals, whether in school, or at work.

A’s were more motivated from the start; they skip more grammar in school, and went further in their education, than the C’s.

As youngsters, A’s are rated lively and than the C’s.

- 3. Learning abilities, both at perceptual and cognitive level. with broad-based spectrum of well-informed, global and comprehensive knowledge.
- 4. Good motivation, ability, to persevere, controlled impulsive-ness, and knowing, one’s own limitations.
- 5. Inhibition and reflexes, spoil the intellectual level.
- 6. Power of thinking is based on good experience.
- 7. Power of analyzing and synthesizing of a given problem, in a given situation coupled with quick response and reasoning abilities.

8. Criticizing power and a faculty of independent thinking.
9. Power of judgment and discriminatory power, with all round development, and integral in character.
10. Expertise in particular domain, with genius qualities.
11. On sociological, bio-chemical, neurological conditions, environment, cultural root, and heredity.
12. Long and good memory with retentive power.
13. Resolving and quick decision taking abilities.
14. Discerning information (Information processing abilities).
15. Looking at the problem, in an objective way.
16. Minimum ego. Unselfish nature, less eccentricity and adamancy, with minimum level of emotions.
17. Remaining cool under stresses.
18. Good power of expression with resourcefulness and liveliness.
19. Avoiding personal likes and dislikes.
20. Social adaptability.
21. Dr. Bono's "Lateral thinking" concept plays very important role, in the development of an intellectual abilities. Intelligent persons are creative persons.
22. Our goal, desires, joys, ambitions are limited, since they are the projection of the mind. So 'conditioning', affects the intelligence.
23. Brain cells, and their functions, are totally affected by passions. And hence intelligence level goes down.
24. Intelligence person possesses confidence and a sense of curiosity.
25. Intelligence works like interface.
26. Figel of California Institute of Technology (M/C constructor) defined Intelligence is the ability to predict, and react to one's environment.
27. Wiseness and maturity play important role in developing an intelligence.
28. Is intelligence a concept like of a gravity ? Is it to be experienced or felt? Or difficult to define?
29. Intelligent persons find alternative solution to any problem and they take challenges.
30. Intelligence is nature blessed and environment plays important in developing the Intelligence.
31. Intelligent person are practical and tactful.
32. Intelligent person must be useful, and they should be able to extract the best that is in man.
33. Intelligent person are not only good in grasping the subject, but also good, in expressive power (both orally and in writing), and effective communication abilities.
34. Abundant common sense
35. Basic sincerity
36. Intelligence is a subjective thing
37. Intelligent people should work with the limited available little data.
38. Intelligent person possesses learning abilities.
39. They learn from mistakes (corrective action).
40. Intelligent persons are good at perception, and also, good at deductive/Inductive reasoning. They can think in a abstract way.
41. The speed of grasping of any subject decides the level of intelligence.
42. A person placed under constraints, still reaching a goal is called an intelligent person.
43. A person who is capable of abstracting general principles from a body of knowledge, and applied to the similar situations.
44. One might say that thinking is an information processing, learning the accumulation of information, and the intelligence is the ability to do both.
45. Human Memory, classification and Languages are basic to Intelligence.
46. In decision making intelligence persons will not listen to a third party

The following things undermine Intelligence:

- (a) Lack of motivation
- (b) Inability to persevere
- (c) Uncontrolled Impulsiveness
- and lastly (d) failure to know one's own limitations.

F) Emotional Intelligence (EQ)

It is the real source of Intelligence. Psychologist, Deniel Goleman, is the author of EQ. Emotional Intelligence is more powerful than Academic Intelligence, but IQ is not everything. EQ plays very important role at the work place. Driving ambition and high IQ might give the people head start in the race of the top but Emotional Intelligence is essential for medium and long-term success. At the managerial level, EQ is important rather than cognitive abilities i.e. life vicissitudes. At the age of four, marshmallows tests proves twice as powerful as a predictor of later academic prowess than IQ. A key set of characteristic makes up intelligence has been identified, precisely, by Dr. Malcolm Higgs and Prof. Dudewicz Management College, in the following seven core skills

Awareness of your feelings and ability to control them

- Emotional resilience-the ability to perform consistently, under pressure.
- Motivation of drive and energy to achieve results.
- The ability to take other people's need into account.
- Influence, persuasive skills.
- Decisiveness to arrive at clear decision and drive them through. Conscientiousness display commitment to a plan of action and match words and deeds.

Conclusions : A man who possesses a high IQ, lacks essentially EQ. If he desires to be a good administrator, he must-develop the quality of Emotional intelligence and academic intelligence coupled with practical experience, to the benefit of society and world at large is needed.

G. *Spiritual Intelligence (Spiritual Quotient) :*

Concepts borrowed from a new book on “spiritual Intelligence” by Dana Zohar. the British guru Nick willimes’s book. The work we were born to do, would be a self help companion to zohar’s spiritual Intelligence :

The ultimate Intelligence.

This concept is advanced by the American born Zohar (while teaching oxford strategic Leadership programme at Oxford University, and while working with blue-chip companies such as shell and philip Morris.

In the mid-1990’s, high IQ people were considered intelligent; afterwards EQ, emotional Intelligence concept was developed. However, mere cleverness and empathy are not enough, so Zahar says spiritual Intelligence (SQ) is necessary for the effective use of IQ and EQ.

Neurologists have identified a ‘God-spot’ in our brain that triggers our mind to search for meaning in life. Zohar believes that people with spiritual Intelligence have the ability to assess whether the course of action or life path is more meaningful than another and plan their future and solve problems in a way that adds value to their lives.

As per this, you should develop a set of principles and apply it for example, artistic people should center around creative work. An academician doctor , should concentrate on “solution to the problems”, The enterprising people should possess loyalty and leadership qualities. Finally computer operators accountant should work towards building kinship “within a group”. SQ has several dimensions, compassion wholeness self-esteem, gratitude, spirit of surrender, and service and the ego. Handling of the ego is one of the critical dimensions of enhancing EQ. The journey from IQ to SQ is moving from grass to subtle, finite to infinite, and the tangible and intangible.

Computer – IQ ; Emotional – Animals; spiritual – Human beings.

H) Multiple Intelligence:

(Contributor : DR. Howard Gardner, Professor of education at Harward university developed the theory of MI, in 1983. It suggests that the traditional notion of intelligence, based on IQ testing is far too limited. Instead, he proposes different intelligence to account for a border range of potential in children.

According to Gardner, the implication of the theory is that learning / teaching should focus on the particular intelligence of each person. For example, if a student has strong spatial or musical intelligence, he/she should be encouraged to develop these abilities. Gardner believes that each individual has nine types of intelligence: Linguistic (word smart); Musical (music smart); logical – mathematical (number/reasoning smart); spatial (picture smart); body –

kinesthetic (body smart); interpersonal (self smart), and interpersonal (people smart);

Naturalist (environment smart) and existential (life-smart)

(Borrowed from the article (appeared in the Times of India of 05/03/2002) entitled, “Every child is intelligent, you just have to discover it”).

I) People Quotient (PQ)

Time has come to develop ‘people Quotient’, a skill which helps in developing better interpersonal relationships. What is PQ ? PQ is the ability of people to relate effectively with other people, both at work and home. PQ forms the basis of ‘team work’ , More importantly, it reflects the adjustment of the individual with the environment and can have an important bearing on the stress carried by the individual.

Empathy : Means to put oneself in some one else’s shoes it is genuinely looking at other shoes. It is genuinely at other person, through that persons view point

Resilience : The other aspect of people skills is to ensure that you have sufficient resilience not to be swayed by, how other persons interact with you.

J) Stead fast Intelligence (SFQ)

The word *sthita* steadfast Intelligence is the translation of Sanskrit word borrowed from Bhagawad Gita, a religious tenet, from Hindu scripture. Steadfast Intelligence has the property of good quality mind, along with a good power of judgement, and awareness. SQ also consists of the negative (rooting out all desires) and the positive (contented oneself from within) It can be gradually developed by practicing the three qualities viz., effort, knowledge and surrender to God. Wisdom acquired through experience and practical worldly wise, also belongs to the property of stead fasts Intelligence. Generally the mind must obey the dictates of the Intellect.. Elimination of the following qualities, leads to stead fast Intelligence.

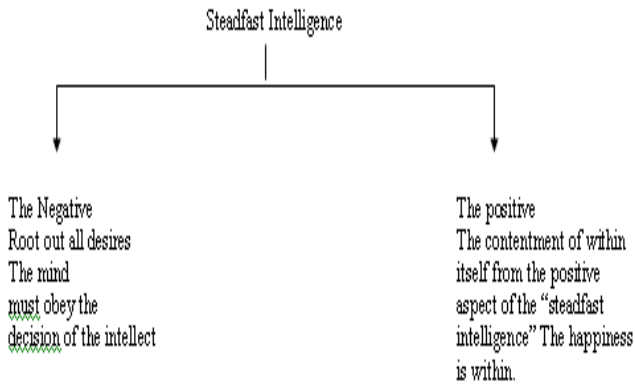
- I. Greed
- II. Anger and fear
- III. Lack of control of senses, and desires
- IV. Wavering of mind, crookedness, and passions.

More about steadfast Intelligence;

The Gita scripture speaks of the steadfast Intelligence. (Steadfast mind) / steadfast Intelligence :

Sthita - not wavering
and

Prajna - Enlightened decisive Intelligence, which transmits true knowledge



With the help of steadfast Intelligence, we must control our desires.

In mathematical formula –
Effort + knowledge + surrender to God = The steadfast wisdom.

K) THE QUESTIONS RAISED ARE

1. What is Central Intelligence ?
2. What are the domains of intelligence ?

L) Finally some thoughts on intelligence from Hindu Philosophy

- a) Nyaya theory says : Intelligence is the property of the soul.
- b) Intelligence is cognition and understanding.
- c) Intelligence is the instrument of knowledge.
- d) Intelligence is *Jnana*.
- e) Intellect – Soul’s own ability to discriminate, judge and meditate.
- f) Intelligence is normally referred to as *Buddhi* has function to resolve, determine, and take proper decisions.

2. Conclusions:

In this paper, we have discussed the various definitions of intelligence along with various types of human intelligence.

Along with this some concepts, regarding the human intelligence from Hindu Philosophy have been presented aiming that, the researchers working in the area of Artificial Intelligence can think of building these faculties in the machine for their possible extent.

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