

The Factors of Intelligence Development and Individual Performance

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Abstract

The study presents some approaches to the factors, composition and measurement of human intelligence. Within the psychometric approach, there is clear evidence that intelligence is more influenced by the genetic heritage of the person than by the cultural heritage of society. The conclusion of some research on intelligence assessment is that subjects who get high scores in certain specific tasks have a tendency to respond well to the other categories of tests. On the contrary, those who get lower scores or weaker results obtain the same results in the other tests too.

Keywords: intelligence, factors of intelligence, evaluation, performance

1. Introduction

Any modern society which deliberately aims at developing itself, which opts for progress and a high level of civilization needs intelligent and creative people in the fields of socio-professional activity. In order to reach this objective in all social, cultural, economic, educational, political institutional structures there must be a prevalence of skilful, competent people. As a matter of fact, R. Herrnstein and Ch. Murray [11] have observed, to that effect, the fact that intelligent subjects will set society in motion and will transform daily life, while the less gifted will be replaced by the technological society, therefore by the society of knowledge

2. Studies and research upon general intelligence

There have been a lot of researches, debates, analyses, intercultural comparative studies, experiments, case studies, etc on the topic of intelligence. Thus, certain researchers considered it largely of a hereditary nature (A. Jensen, in 1969 [17]; R. Herrnstein, in 1973 [12]; Murray and others [18]) and therefore the programmes for educational enrichment have been and still are restricted by the genetic invariability of intelligence.

Other authors (Gardner, 1983 [21]) claim that there is no general intelligence (or the *g* factor) [8], as Spearman had stated, and if it really exists it is a statistic product of the way in which tests are constructed (Gould, 1983) [3]. Even if there is an IQ of each person, except in the relation with certain academic problems, this IQ is very lightly connected with social daily life, with practical activity [3] (Ceci and Likert (1986)).

Practically, individual intelligence, as a general mental activity, can be measured by combining the results obtained from the subject for each sub-test or cognitive task from the intelligence test. But the way in which sub-tests results are combined varies from one test to another, therefore the statistical procedure of factor analysis is used in order to provide a systematic formal basis. But, the use of this statistical procedure involves operations to reduce real space to a smaller dimension, therefore loss of information occurs. In other words, a loss is recorded concerning the accuracy of results, a loss which can be measured both for individual results as well as for the results of a group of tested persons. However, in reality there are different kinds of intelligence and thus it is more difficult to identify general intelligence for sure, through test tasks, based on the combination of sub-tests results.

Although researchers always identify a first decisive and indubitable factor, there are also, however, secondary, alternative factors, specific and group skills. As far as the structure of intelligence is concerned, serious and independent analyses have been undertaken by various psychologists or researchers. Thus, according to R. Cattell [2] and J. Horn [13], [14], general intelligence would consist of three types: fluid intelligence (*Gf*), crystallized intelligence (*Gc*) and visual-spatial reasoning (*Gv*). For Cattell and Horn, these forms of intelligence are defined as follows:

- *fluid intelligence* is the person's ability of developing new and unusual techniques for problem solving;
- *crystallized intelligence* is the person's ability of using methods learned in the society's culture for problem solving or for dealing with ordinary, daily situations;
- *visual-spatial reasoning* is the person's specialized ability in the domain of images, spatial representations and understanding Mathematics.

Currently, various methods and new standards are being used in assessing the types of intelligence whose results are pretty consistent and substantial (J. Carroll, 1993) [1]. It has been found that along with the beginning of the individual's period of adulthood, fluid intelligence decreases and crystallized intelligence maintains the same level or even increases over the years through experience or cognitive occupation [13]. [15]. Therefore, it results that human intelligence is influenced by various variables (age, occupation, experience, culture, profession) and is of different types. Being thus circumscribed, intelligence has the merit of determining various levels of performance and success in life. Moreover, it is being demonstrated that there cannot exist only one type of intelligence, be it of a general type, but multiple types, thus overcoming the psychometric conception in the favour of the psycho-cognitive approach.

On the basis of intercultural and statistical comparisons there have been identified data according to which certain social activities which make the best use of certain intellectual skills can influence abstract thinking. The results of certain applicative studies show that improved and varied training—educational programs influence the development of intellectual skills, the abstract capacity of approaching and solving socio-cultural problems.

There is clear evidence that, within the psychometric approach, intelligence is a lot more influenced by genetic inheritance than by the society's cultural inheritance. Genetic studies upon human behaviour have shown that intelligence development is determined by the variations in hereditary inheritance to an extent of 40%-80%. Thus, monozygotic twins who were adopted at birth and raised in different social environments obtain an IQ result in the intelligence test similar to the one obtained by dizygotic twins who grew up together.

On the other hand, studies upon adopted children have shown that, in the majority of cases, the IQ of the biological parent is a better predictor for the IQ of the child than the IQ of the foster parent. Therefore, it seems that in most cases, the weight of the family, school and social environment has a reduced influence upon changing children's IQ [22]. But, geneticist authors do not explicitly draw a clear-cut distinction between genetic, ethnic, cultural, educational and social factors in their studies concerning intelligence. The differences concerning the IQ results obtained by various ethnic groups are based on both genetic and hereditary variations, as well as cultural, social and educational ones (R. Zazzo, 1960). It has been shown that subjects with a precarious socio-economic status, who live in poverty, usually have a lower IQ than those coming from favourable social environments which offer people proper conditions for living and development. By using statistical techniques and by calculating the IQ regression coefficients for poverty, low economic status and poor education, certain studies show that intelligence is a fundamental predictor for social problems and human failure [11].

For subjects with an average and above-average IQ, the probability of being poor or with a low socio-economic status is very small. On the contrary, persons with an IQ below average (at the most 85) show a high risk of being faced with social, health, education, unemployment, divorce problems. Statistically, the weight of these persons with low intellectual capacities represents 15% of the population. These risk variables, extracted from statistic analysis, predict an expectancy rate, but they cannot tell us to what extent a certain variable acts in each particular case, for a certain person. Obviously, there are individual cases which are an exception to these statistic calculations, where the lack of social, educational proper conditions, cultural opportunities and family support may reduce the individual's cognitive-intellectual possibilities. The human being can succeed in life due to the interaction of certain specific personality factors, the involvement of some motivational variable for achievement and character structures which are individually efficient.

3. Intelligence and knowledge assessment tests

The tests which measure the mental skills of people constantly indicate the existence of a global intellectual factor which is present in all cognitive and problem-solving activities. Also, the “g” factor measured through IQ tests is considered and admitted as a good predictor for the individual’s school and occupational performances. Scientific studies have shown that intelligence allows for the anticipation of several types of individual behaviour, such as: success in life, social status, school drop-out, unemployment, poverty, divorce, illegitimate children, deviance or delinquency. All these results were considered, by the majority of researchers, as trustworthy in adopting social, political, educational, economic decisions.

However, from various reasons and interests, these discoveries have been, most of the time, forgotten or distorted by society, or inadequately applied to social life. The majority of the human population and of the institutions of society misconceive the data resulted from scientific research upon intelligence. A common belief is that all humans are born equals under the aspect of their intellectual capacity and that social inequality springs from an unjust utilization of the psychophysical and cultural privileges.

Regarding the intellectual potential, people are unequal having different levels of skills and abilities, just like in the case of physical features (height, weight, constitution). Not only does nature create differences among skills and personality traits, but society does so as well by the conditions, norms, restrictions and opportunities it provides to the individual. Just like there is no linear relation between intelligence and performance, there is no equivalence between equal chances (allegedly given by nature and society) and equal results. The conflict between equal chances and equal results persists for the simple fact that there are real differences among the human mental skills. No social engineering has been yet found to equalize men regarding intellectual skills, mental possibilities which evolve differently, reaching various quantitative and qualitative levels.

Although intelligence is being studied for more than one century and researchers had different opinions, all tests have classified people in about the same way concerning intellectual skills. The common conclusion concerning intelligence tests is that subjects who obtain high scores in certain specific tasks have a tendency to give better answers for the other categories of tasks. On the contrary, those who obtain smaller or lower scores obtain similar results in other tasks, too. This inter-correlation of results suggests the idea that all types of mental tests measure both general skills, the person’s global intellectual capacity, but also special cognitive skills. Intelligence is the global factor of personality, which accounts for most of the differences between the person’s performances in tests of mental skills, although it is the product of the analysis of different results in specific skills tests. Although specific skills tests (thinking, comprehension, memory, verbal fluency, vocabulary, mathematics, spatial skills, etc.) measure these abilities, they all express different degrees of the g factor.

Recent studies in cognitive psychology ([10], [15], [20], [22]) claim that intelligence can be indeed defined as the individual’s ability to approach and deal with abstract highly complex and difficult cognitive tasks. In daily life, in everyday language, intelligent individuals are associated with the “smart ones” who know, understand, act efficiently, think in abstract terms, learn fast and well, or solve correctly different types of problem – situations. Also, the g factor is often associated with knowledge acquisition; general intellectual ability is univocally linked to the “luggage” of knowledge acquired by the subject. It has been experimentally shown that there is no equality or linearity between the level of the g factor and the knowledge “store” of the human subject (Wechsler, 1965 cited in [9], [19], [1], [4]). But, previous acquisitions, information that has been learnt and stored in memory develop the intellectual skill in terms of learning and understanding new information. The g factor is also the mental ability which differentiates most eloquently normally intellectually developed persons from the very intelligent and the mentally retarded ones.

In fact, intelligence is a product of genetic inheritance and environmental opportunities, which provide the individual with the possibility and the ability to acquire information, form skills, learn and develop competences within a socio-cultural context. Testing different social-ethnic

groups proves the same continuity of the general intelligence, which is manifested in all people, irrespective of their cultural and knowledge content and background. Studies in genetic psychology have found correlations of about .4 between general intelligence, measured through IQ, and certain biophysical traits of the person (sex, size of the brain, etc). The studies conducted in the USA and Europe have found correlations from .5 to .7 between different characteristics of the nervous influxes in the brain (energy, speed) and characteristics of the IQ. It was observed that during problem solving, the brains of the capable (smart) subjects use less nervous energy than those less gifted. Also, the nervous influxes of subjects with high IQs give quicker answers and more productively responses to simple sensorial stimuli.

4. How can human intelligence be developed?

In the current state of the scientific research, it is still not known the way in which human intelligence can be increased by medical, nutritional and socio-educational methods. That is why, the problem of the scientific community is to identify, as accurately as possible, the cognitive skills, the functioning mechanisms and development means. All these initiatives of study strategically aim at improving adaptation, increasing efficiency, enhancing performance and the personal development of the learners. Since most of the studies confirm the existence of a significant correlation between cognitive skills and the tests results (IQ scores), it is possible that a carefully monitored quality educational program may contribute to intensifying the intellectual performances of those who study. A proof in this sense is Levidow's study (1994) which was carried out on a group of high-school students who were faced with a fluid intelligence test. The tested subjects had been learning for a year topics in Elementary Physics within a course which focused upon problem solving and took into consideration the IQ of each of them. By the end of the study year, the subjects were tested again (with the same fluid intelligence test). The results of the study show that the subjects had the same IQ, but their cognitive competence in solving Physics problems had increased.

Other studies concerning the influence of certain educational programs have been carried out in the USA on sample groups of intellectually competent students with grades of 10 in Science classes. The results of these studies show a doubling of students who successfully completed the classes compared to 1993 and an increase in the failure rate from 13% to 25% in 1994. These experiments show only an enhancement of *cognitive competences*, of school results at the end of completing the learning-specific programs, and not a modification or improvement in IQ scores also. Successes and better results are obtained by students with an average and above-average IQ while few successes are recorded by below-average students, with a low IQ (Herrnstein and Murray, 1994).

These experimental data support the fact that there is no linear relationship between intelligence and academic performance or professional success. These variables are interconnected through complex, multiple relationships by which intelligence in connection with educational, differentiated programs influence the development of specific skills and cognitive abilities.

The approaches of cognitive psychology claim that general intelligence is a result of the interaction among several mental skills, from knowledge, retention, concentration, information processing to strategies of problem solving. It is clear that in order to deal with an abstract academic theoretical field, a certain level of intelligence as well as of motivation is required, voluntary effort, perseverance, attention, awareness, proper psycho-social environment. Although the correlations between the IQ and other psycho-social variables (motivation, cognitive skills, leadership skills, initiative, and experience) do not disappear, performance is also based upon non-intellectual, social, educational factors. Therefore, success in life, a person's educational and professional success can be anticipated based on general intelligence, personality factors and socio-educational factors. At the same time, it is obvious that people are different from others in terms of mental skills and cognitive abilities.

5. Conclusions

Certain researchers claim that despite the efforts made for more than half a century to increase the *g* factor by means of biological, medical and educational programs, these have not succeeded effectively. And this is because being intelligent is not the same with being informed, although a person's intelligence depends upon learnt and acquired information.

To that effect, scientists keep on carefully analysing whether gains in IQ reflect in fact gains in general intelligence resulted from informational, educational, medical, cultural, economic and social improvements. No matter the truth for each person, differences in intellectual skills among people are obvious for researchers but not for educators too, therefore the argument between equal opportunities and equal results, objectified in the same socio-educational environment, still persists.

In conclusion, the directions of general intelligence development, the routes of mental skills cannot be so easily modified as most educators seem to believe. It has been demonstrated that mental development is possible since childhood up to adolescence [18]. The IQ level tends to remain constant, relatively unmodified from adolescence until old age, irrespective of the sex, age, curriculum, socio-economic status ([17], [5], [6], [7]).

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