

Creativity, originality, and personal contributions in research. Ethics in doctoral research

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Albert Einstein: „Imaginatia este mai importanta decat cunoasterea”

"Imagination is more important than knowledge"

The presented material is based on the followings:

- Personal and collective and international cooperation experience in the elaboration of specific materials for the training of young doctoral students. Parts of this experience are synthesized also in *St. Preitl, R-E. Precup and Zs. Preitl: Structures and algorithms for automatic process control, vol. 2, chap. 16, Ed. Orizonturi Universitare Timisoara, 2009 chap. 16 "Research and scientific reports: Design, drafting, presentation "*, (in Romanian) [3]
- Own experience in conducting very well defended doctoral theses, supported by scientific papers of doctoral students and indirect experience, resulting from participation in numerous "Doctoral Commissions",
- Didactic experience acquired as a Lecture of the course of *Methodology of Teaching in field of Automation and Computers* (1998 - 2009) and Lecturer in a similar discipline at universities abroad
- Experience in elaborating over 200 published scientific papers (about 40 - 50% at Congresses, Conferences, Symposia, listed journals, book chapters published in specialized books) and as reviewer of scientific papers (more than 200)
- Consultation of bibliographic sources specific to the field - very vast but often heterogeneous materials - focused on:
 - (1) Theoretical approaches in domain (basic and pragmatic concepts,
 - (2) Papers and sites (internet, general journals, accessible) oriented towards the idea of research in the field of doctoral training (PhD),
 - (3) Discussions with colleagues on such a topic.

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Creativity, originality, and personal contributions in research. Ethics in doctoral research

Conference

Chapter 1. Introduction. The concept of Creativity and related concepts

Chapter 2. About the "research" concept, and in particular, research in the field of technical sciences: "scientific and technological research"

Chapter 3. Creativity ⇔ creative thinking and intelligence

Chapter 4. Main Characteristic features of "Creative People" and of the "Individual Creativity"

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Appendix 1: Some aspects related to the "Human intelligence" and creativity (reflected in the so-called ***IQ*** coefficient)

Shortly about the author:



<https://scholar.google.ro/citations?user=Lru9mcAAAAJ&hl=ro>

https://scholar.google.ro/citations?view_op=view_org&hl=ro&org=17683800150163044019

Citations: Over 4870 independent citations Cumulative Science Citation Index (SCI) impact factor (December 2021). Other citations are also found in non-registered publication lists

Citation Index	All	Since 2016
<u>Citations</u>	4872	2224
<u>h-index</u>	45	24
<u>i10-index</u>	83	51

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References: A selection from the consulted materials

(Lectures, papers, standard, books, selected bibliography)

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Creativity, originality, and personal contributions in research.

Ethics in doctoral research

Chapter 1. *Introduction. The concept of Creativity and related concepts*

Creativity is an - individual or collective - characteristic that can be cultivated - within certain limits of individual and collective intelligence, and training. The creativity can be manifested in all areas of social life. However, identifying and quantifying the nature of creativity are difficult objectives and is usually it has a specific character.

The **scientific creation** must be seen because of a mental but also social process that involves the generation of new ideas and concepts, or new associations of creative minds between existing ideas and / or concepts. (*Wikipedia*)

The **concept of creativity** can be defined from the perspective of different domains and disciplines: **psychology, social psychology, cognitive sciences, arts, philosophy, science and technology, artificial intelligence, economics, management**, etc. As a result, the CREATIVITY can manifest itself at many distinct levels, with different values: cognitive, intellectual, social, economic, scientific, technic, artistic, literary, etc.

The **difficulty of defining and appreciating the creativity** lies in a multitude of factors:

- Often, from the associations of the concept of creativity with the field of arts - which is but only a field of manifestation of creativity,
- The complex nature of creativity, the act of "creation" and its analysis
- The variety of theories that have been developed to explain it, a.o.

Summarising, creativity - the act of creation - can be considered as "**an imaginative activity adapted so as to produce results that are both new, original and valuable in content.**"

BUT. Creative thinking **IS NOT COMMON TO ALL PEOPLE** and is characterized by a strong ability to generate new ideas based on a combination of "disparate" scientific knowledges and previous technological elements, not put "together".

The creative side of the human species, of human existence ensured both the survival of the species and the evolution of society. In a negative sense, "creativity" will also be able to generate the "death" of the species.

IMPORTANT. 1. The **scientific and technical creation** is often based on a strongly correlated activity of information, training and - on this basis - intense and efficient research.

2. However, the scientific and technical creation **must be supported by an adequate financial and material support.**

Remarks. 1. The efficiency of a scientific or/and a technical research activity is not always measured in "money" (for example, it is also about university research). Often the efficiency "in money" comes (much) later or even never, when the results can be / are collected by "others", by "mastering / managing the results of previous research creation of others". Here may also appear the specific problems of "**intellectual theft" or plagiarism.**

2. The "spiritual" side of research is usually picked up by the researcher, but there are also those "hilarious" situations, well known in the history of science and technology, when based on a "well-managed" presentations, the results have been attributed and even given to others" in the form of international awards, later even withdrawn).

3. In particular, not every "technical innovation" has the character of a "scientific creation" that would constitute a support for the defense of a doctoral thesis / scientific papers.

The **Innovation activity/ innovation process** is the implementation of creative ideas in an - often particular - application in which the creativity can be one of the essential parts of problem solving.

The individual creativity (of individuals or / and research teams) "is a necessary but not sufficient condition for innovation".

A **successful innovation** depends on many other factors, which can come from

- (1) both creative ideas and ideas created elsewhere and
- (2) professional experience (gained through technical / technological transfer).

Figures 1.1 and 1.2. Representative, synthetic images on the integration of creativity, innovation, research results in technical applications: examples of creativity and innovation in the last 100 years in the automotive field.

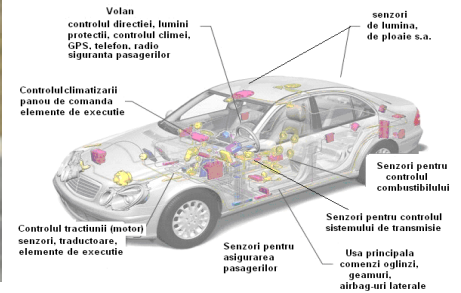
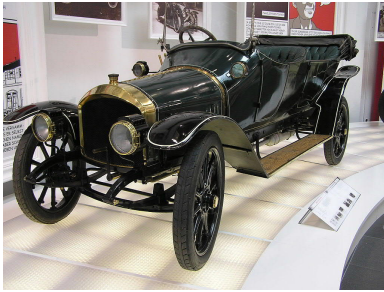


Figure 1.1. AUDI type A,-1911 car, with an engine: 2611 cm², 22 HP, v_{max} 75 km / h and AUDI A-8-2018 v_{max} 275 km / h

Figure. 1.2 The Mercedes C-200 vehicle 2010-2019 model. Overview and endowment with exceptional measuring and execution elements, maximum speed 280 km / h



The Mercedes MBCAN-2019-S coupe-category-equipped with special programs to assist driving and safety

Chapter 2. *About "research" and, about "research in the field of technical sciences": "scientific and technological research".*

Point of Views related to "*scientific research and technological research*" in universities, and doctoral research:

- **The Scientific research** represents a scientific, systematic, controlled and a critical investigation activity on some hypotheses regarding the presumed relations between certain phenomena, processes, states, evolutions, a.o.
- **The Technological research** is a correlated research activity - scientific and technical - aimed at acquiring new "knowledge and contributions" including both, scientific and technical aspects, to support technological developments.
The *technological research* is a creative process, which must be efficient, with directly or indirectly appreciable, measurable, evaluable use value.

SOME IMPORTANT ASPECTS. Universities are ranked (Worldwide, European, and national) based on performance indicators that can be grouped into five - six "areas" to characterize their performance:

1. **Teaching** (the learning environment, and efficiency)
2. **Research activity** (results and reputation, knowledge transfer, volume, income)
3. **Citations** (results and research influence on the domain)
4. **International outlook** (staff, students, research, tradition, ...)
5. **Industry income** based on knowledge transfer)
6. **Other**

In the case of research activity at the level of some groups within a university, it is characteristic (at least theoretically):

- the contribution of individual creativity to collective creativity and / or
- the contributions of individual creativity integrated in the collective.

In many cases, in the technical universities, the general research preoccupation is also oriented towards the completion of the scientific research through the technological implementation (in technologies, products) in collaboration with COMPANIES that have theoretical and applied preoccupations in the field (see for example automotive domain).

Consequently, depending on the field, the solutions brought through doctoral theses contain often results from both categories of research: Scientific Research and Technological Research

2.1. Defining elements behind a creative process

a. The differences that may occur between different individuals manifested in the "efficiency of individual research" and then, in the "results obtained in research", are dictated by several factors:

- genetic factors (individual)
- educational factors and organizational factors (partly collective), often related to and dictated by:
 - environment (society)
 - the environment in which the "researcher" has developed:
 - family, school, including university,
 - work environment (not necessarily, later)

b. Defining elements that can effectively support a creative process and can become the engine and can ensure its efficiency:

- Previous individual experience of the individual, of the collective

- The field and object of the research, oriented on concrete objectives (projects), correctly defined.
- Knowledge, inspiration, and ideas (they can go beyond the initial object of the research undertaken)
- The way and the efficiency of materializing the objectives,
- The mode and level of Communication of research results (listed journals, Congresses, conferences on topics)
- The Management of results and the "financial" management (support) of capitalization of "research product"

In a "modern" formulation of ideas, **individual creativity** is determined and sustained by several factors, of which essential are:

- **"Expertise"** - has become a "synthesizer" term frequently used (abusively, according to some specialists), with an "integrative character", which is attributed or attempts to confirm a person's ability to:
 - **integrative knowledges**, specific to the field (e.g scientific, technical),
 - **procedural and intellectual knowledge** and "Outstanding, special" skills in identifying the important elements of the individual in an approached problem.
- **Competences in creative thinking** (exploitable intellectual resources) attribute that refers to the imaginative, inventive, and flexible way in which the person approaches the problems he must solve.
These competencies depend on personal traits (genetic, but also acquired): independence in thinking, in approaching reality, orientation towards risk acceptance, tolerance for ambiguity, and on the type of thinking.
Creative thinking is also characterized by a strong ability to generate new ideas by combining disparate, gaping elements.
- **Imagination**
- **Motivation** is often fundamental for a creative activity, to creativity. The essential motivating factors can be (1) the intrinsic passion (self-motivation) and (2) the intrinsic interest to accomplish the work (the object of creation). They can also be strengthening, rationalized through extrinsic motivations (rewards, recognition).
- **"Material resources available"** that can (should), must support the research
 - **Access to a high-level bibliography** (literature); the problem largely solvable currently,
 - **Existence / access to laboratories** with properly equipped equipment,
 - **For exceptional results, remuneration** according to the results obtained / capitalized,
 - **The possibility of carrying out exchanges of experience (specializations)** at Research Centers, Universities... with remarkable results in the field,
 - **The possibility to present and support one's own ideas and achievements in front of the community of specialists** (congresses, conferences, plenary sessions, invitations for lectures on given topics, ...
 - **The possibility of collaboration with the "industry" in the field**, to support the activation of research results.

Hence the necessary requirements but also the possibilities of conducting quality research, **high-level doctoral theses**.

In a narrower sense, *it can be said that creative people are often enslaved to their own values and motivations and deal best with problems for which they have a strong emotional affinity.*

However, their integration in the community can be difficult, although - in many cases - it also becomes mandatory.

From the point of view of scientific creativity, restricted to research related to “personal” doctorate - which requires individual creativity, integrated (or not) - the following aspects become of interest:

- The possibility to take advantage of the experience of the research team led / of which the doctoral supervisor is a part
- The creation process must be focused and strictly oriented on the researched object / research topic (without excluding the derived extensions, collateral results).
- The “personality” traits of the subject, affinities, knowledge of specific interpersonal relationships, atmosphere, and influence of the environment / socio-cultural system. They can determine the level and frequency of creative behavior, openness to communication, and here also the freedom of the researcher in approaching the topic,
- The characteristics of the “creation” products. This aspect is of particular importance, as it forms the basis of any assessment of the performance of creativity in the real world. It can open a "window" on other new aspects / stages of manifestation of creativity.

c. Appreciation of research results. For the appreciation of the research results, of the creative process, of the creative activity, and, for the appreciation of the global results obtained in / through doctoral (post-doctoral) research, several indicators can be defined, which can be “selected” but also by “interests” (see “the value” of some doctoral theses).

In this sense, it must be emphasized that the *truth value of the intellectual product* of a “creation” is essential.

This truth value of the research result / can be marked by

- (1) the level of the research “product” and the value of use of the resulting product,
- (2) the value of using the communicated truth, validated by *the value of the publications - marked for example by the level of the publication forum* (magazine, conference, etc.) and of the subsequent citations.

- **Analytical ability.** Is based on critical / analytical thinking and is involved in creativity as the ability to judge the value of one's own thoughts and possible solutions, to assess the strengths and weaknesses of solutions and to suggest ways to improve them.
- **Practical ability.** Is the ability to apply intellectual skills in everyday contexts and to "sell" or "communicate creative ideas" to others. It represents the ability to translate abstractions and theories into realistic applications.

b. "The high level / superior" intelligence is an intellectual quality common to many creative people.

Studies related to creativity relationship ⇔ Intelligence have obviously the fact that extreme general intelligence does not necessarily stimulate creativity.

The "Intelligence" is often appreciated based on **intelligence tests**, using the **IQ** (Intelligent Quotient) coefficient (a good question is, in which field).

"The above average / high intelligence threshold" characterized by a 120 + threshold coefficient has been met / proposed by various researchers. It also supports the idea that a high degree of intelligence is a necessary but not sufficient condition for higher level creativity (upper creativity).

Usually, **the correlation of intelligence with creativity is appreciated relative to a (relative) threshold value of the IQ** coefficient that would be between certain limits.

- IQ coefficient below the threshold IQ = 120, creativity is intelligence-dependent
- IQ coefficient over the threshold IQ = 120, creativity may / is independent of intelligence (intelligence level).

Some other remarks: Above the "threshold" level IQ = 120, "intelligence" may correlate less with creativity. Thus, there were also very intelligent people who can have relatively weak results in creativity tests.

Subjects with high performance in creativity tests have - in intelligence tests - at least medium-sized odds, resulting in the need for intelligence for superior creativity.

However, exist appreciations that intelligence is more important in scientific creativity, with a smaller role in arts (painting, music, politics, etc.).

About IQ coefficient (a Relative Appreciation Coefficient). There is a restricted formulation in Annex 1 (presentation after the smartest persons. PDF, Cyril Burt Classification)).

Remarks related to IQ coefficient are inserting in Annex 1 (presentation given by Cyril Burt and other reserchers in field)

Chapter 4. Main Characteristic features (characteristics) of "creative persons" and individual creativity

Creative people have many specific features that significantly differentiate them from less creative or even non-creative people. Of these, in the order of characteristics, there are important:

- **Independence in thinking, action, initiative**, skill correlation of ideas, phenomena, anticipation / prediction based on data / event analysis.
Creative people are usually independent, often nonconformist in thinking and action (mutual attention should be seen with the reserve) and are relatively influenced by others (in a positive sense).
- **Autonomy in thinking, in action**. It is a feature that encompasses social provisions of the type: introversion, intrinsic motivation, self-confidence, desire for solitude.
- **Creative imagination**: is based on certain hereditary predispositions, for the synthesis of new images, new ideas. Creative imagination designates an individual's ability to perform creative activity, often generalized to all inventive capacity. The development of imagination implies a lot of work in the creative process.
Edison claimed that the genius is 99% sweat and 1% inspiration
- **Sensitivity to issues of interest, motivation in relation to the scope of research, curiosity**. It is a feature - and at the same time - and an essential requirement for effectively solving problems. The creative persons can see what is unusual and different, to see unrealized potentials in given situations, to observe similarities and analogies in different experiences.
- **Intuition, inspiration**, ... oriented in the direction of the object / objectives of the research. It is a revelation of a truth, the solution of an issue, etc. in the course of a "learning" by trial and error. An intuitive personality observes relationships, implications, has increased sensitivity to details and patterns
- **The ability to discover / to emit new ideas** and originality in ideas. Creative people present a high degree of originality in thinking and ideas, who are in place in new ways (clothes). Originality is also characterized by the ability to leave the structured and established systems as part of dissolving existing synthesis and to use elements and concepts outside initial contexts, which can provide / create new combinations, new related systems.

Chapter 5. Originality, the main attribute of technical-and scientific research, oriented towards higher professional training, doctoral

Resuming some of the previous ideas, focused on "technical-scientific research" or / and "scientific research", oriented towards technical aspects, we can mention:

About Original, Originality:

Original. (Adjective). unique, singular, sui-generis, inimitable (outside the context of the conference: oddity,

Original (Noun): new, novelty; uniqueness, singularity; individuality, personality; peculiarity, characteristic, characteristic feature, (specific), distinguishing note, specificity, specificity, incomparable, exceptional, extraordinary, special, unusual, unbelievable, personal, particularist (rare) characteristic, distinctive, specific ...

Original (Verb): to individualize, to personalize (rarely); to characterize.

Original (Adverb). Special. Extraordinary, exceptional

What does it mean to "be original" in the realization of a scientific work, product, idea, results (research) (according to DEX):

- as the primary form ("original" of a (scientific) work made, which served or can serve as a basis for copies, reproductions, translations, interpretations, citations, etc.
- something that is specific to an author who creates something new, personal, novel, without using a model made by another
- something that is characterized by - authenticity, a real, undeniable value

In a PhD THESIS, each side of the term ORIGINALITY / ORIGINAL can be found in one or another form by the specific content depending on the nature of the thesis, the reality of the achievements existing worldwide in the field, the requirements of the leading teacher.

For this reason, the structuring of a thesis must respond to many aspects as:

- **"state of art" syntheses on the field"** (as a form of organization, synthesis, highlighting of past achievements)
- **theoretical contributions, specific to the field**, based on realities, interpretations, generalizations, justified simplifications (with proof / mention of justification), mathematical models
- **contributions in practical achievements** (including experimental verifications) highlighting the new compared to what exists worldwide,
- **contributions in new experiments and original experimental results**, interpretations and confirmations of theoretical contributions that support them; they can confirm general theories/aspects or sides of some general theories/aspects
- **others specific** to the field.

IMPORTANT ASPECT. Often the "ignorance" or "deliberate passing under silence" of some information circulated in literature under the motivation that "I did not know about them" are taken as a shield to "justify the originality of some ideas "emanated" (own), ... and by this to justify originality.

Such an approach is unacceptable also because they are easily detectable because there are many conferences, magazines / publishing houses ... which uses to verify the **"originality of the works"** programs of **"anti-plagiarism"**. In this direction, the doctoral supervisor has a special task.

Chapter 6. *Elements of ethics in doctoral research. Professional deontology*

- *Professional ethics and deontology, plagiarism, and self-plagiarism: where does plagiarism begin and end?*
- *Relativity and dynamics of the elements of originality. Plagiarism and self-plagiarism*

Murphy: *Stealing ideas from someone is a plagiarism!
To steal them from many, is a research activity!*

Remark: The chapter can be considered a synthesis of the ideas in the works [s-11] - [s-16] whose consultation may be beneficial for a young researcher. The discussed elements are found - in part - in course notes and will be the subject of discussion.

6.1. The relativity and dynamics of the elements of originality (new truths / ideas are "free" and - unfortunately - often "ephemeral", i.e., what "today is new, tomorrow becomes old") →

- o *Individual originality*, can often be relative, and placed historically in the context of the evolution of knowledge in the field,
- o *the initial stage of the research issue on conceptual*, methodical, and interpretive level and the generalization of the research results in the relevant bibliographical sources (current stage)
- o *the level and evolutionary tendencies of the research issue* worldwide (incipient, affirmation, apogee, stabilization, decrease)

6.2. Plagiarism. Is one of the (not necessarily) "current" problems, always present in the elaboration of scientific papers, elaboration of textbooks, books, and doctoral theses. The discussion of the plagiarism problem is also connectable to the previous point.

Remark. Within certain limits, plagiarism can be considered a "disease of youth" that must be treated! If the "disease" is not treated, it becomes a habit.

After DEX (processed, commented):

PLAGIARISM. The act of plagiarizing plagiarism is the taking over of a scientific, literary or artistic achievement (work) belonging to someone else and appropriated (in whole or in part) and then presented as a personal creation,

THE PLAGIARISM, plagiarism, verb. To own, to copy totally or partially the ideas, the results, the works, etc. to someone, then presenting them as personal creations; to commit a scientific literary or artistic theft,

PLAGIARISM vb. I. tr. Taking, stealing one's ideas, expressions, inventions and presenting them as one's own creations. Further to publish under his name a work (achievement) or fragments of another's work; to commit a literary and intellectual theft.

Murphy: *Stealing ideas from someone is a plagiarism!
To steal them from many, is a research activity!*

Specifically, for the scientific / technical field, plagiarism means:

<http://www.detectareplagiat.ro/en/>,

<http://www.detectareplagiat.ro/autoplaiatul.php>)

an action completed by:

- *to copy in full - or in parts (partially) - a scientific work and present it with the author's name not of the real author but with the name of the one who copied it;*
- *to copy (formula) parts / ideas from a scientific paper belonging to "someone else", in another paper, without specifying where that copied part comes from. Then, to*

present and re-publish with the name of "author" the achievements of another person, deliberately creating the image of belonging as proper to the results.

- *to take a model, a formula, to change the notations, the names of variables, but maintaining the meaning and to present them as "original work / contribution" of the one who made only a "formal transformation" of the previous realization, so that in this not to recognize the initial model.*
- *to take over "everything that can be taken from a book", without making changes: the structure of the book, formulas, examples, pictures, diagrams, definitions, whole pages of text, at most performing a translation in another language. In the end, a contribution results that the one who did the cosmetic operations, attributes it as an author, without indicating in the bibliography the book / work from which what is republished comes.*
- *copy a computer program from a library and make some changes to make it unrecognizable; the names of variables, the names of labels and procedures are changed; sequences are replaced with some equivalents, a translation is made in another programming language.*
- *to use an intellectual product without showing the source of origin, the real author. There are situations in which the use of "contributions", even with the indication of the author, is allowed only if the author accepts this. In this case, the user must prove his acceptance of the republishing with documents or witnesses (see for example original representations or photographs).*

Comment. Throughout the years, there have been situations when results have been published - at very close dates but in distant places - which - although "close in content" - have both been proven and recognized as original. In such situations the suspicion of "plagiarism" is not applied.

For example, it is well known and recognized that the foundations of non-Euclidean geometry were laid in 1830, almost simultaneously, by two mathematicians **János Bolyai** (Hungarian mathematician, related to Timisoara, see also the street that bears his name) and by **Nikolai Ivanovich Lobachevsky** (Russian mathematician), based on his own approaches and in ORIGINAL papers, communicated in the early of 1830s (https://en.wikipedia.org/wiki/Non-Euclidean_geometry).

Attention. What is stated does not refer to the **registration of patents**, where the *"first income" is then the "first recognized"*.

6.3. Autoplagerism (<http://www.detectareplagiat.ro/autoplageriatul.php>). It represents a phenomenon of recent appearance, constituting a "new threat" to good manners in the writing of scientific papers. The "threat" is somewhat ambiguous, interpretable (see also the following). But the phenomenon is not as harmful as plagiarism!

Knowing the content of the idea of PLAGIARISM and SELF-PLAGIATING can be fundamental, both for those who use it and for those who later "attack" - sometimes unjustly the author - without the person in question being able to defend himself.

Understanding and correctly interpreting the concept of "SELF-PLAGIATED" is very important in the first place:

- for those who publish frequently and work in academia,
- for the editors of specialized magazines.
- for those who evaluate the personal activity of a third person (or of an evaluation commissions).

Autoplagerism is present in academia, which is "par excellence" one in which, in order to justify - formally - increase the visibility (personal) and consistency of the scientific message (positive desire, in itself), the author resumes his own ideas and texts from his own works. , in a more extensive or restricted form, and thus slightly modified.

In this case, the intelligent use in **Bibliographic References** of one's own works is particularly important!

The **action of self-plagiarizing** can derive and follow the desire to achieve "an additional score" in the personal CV (as many papers as possible) the target being (pseudo) the increase of the appreciations relative to the own performances.

However, it can be justified by the fact that, at this time, the possibility to disseminate the results of one's own research is very diverse, and often – in certain situations – with limited access.

Referring to phd theses, aspects of self-plagiarism or not-self-plagiarized may frequently occur, such as references to books and / or to (own) papers with previously published own results. For example:

- There are authors, who after presenting their PhD thesis publish it also in the form of a book and / or one or more articles. The problem does NOT refer to the publication of the thesis through the "*Politehnica*" Publishing House or established publishing houses,
- There are authors who after presenting a paper at a Congress, or at a Conference (in domain), ... send the paper for publication 1:1 to a magazine or book; such situations occur frequently by:
 - Situations when the initial work presented is requested to be published by a magazine – with the agreement of the conference organizers – with minimal modifications that resulted from the discussion of the work at the congress / conference; usually at publication this must / is highlighted but distinctly
 - Situations when the initial presented paper is requested to be published by a magazine / collection of papers oriented to an application ... - with the agreement of the conference organizers - with the requirement of modifications of at least 30 – 50%, usually extensions and specifications that resulted from the discussion of the work at the respective congress / conference from the requirements of the extension of the presented results,
 - Derived achievements, created starting from one or more previous scientific works and their modifications into an extensive scientific work that represents an intellectual creative work; the specification in the bibliography and the exact and detailed reference of the own works is strictly necessary (transparency on the previous achievements).
 - other situations.

In last years, there has emerged - mainly in academia - a more careful concern about the presence of self-plagiarism from an ethical perspective.

One can speak responsibly of **self-plagiarism - as academic fraud** - only if there is a claim that the material has already been disseminated / presented 1:1 through (even more) previous publications of the same author in proportion of over 60 - 80% through copy-paste technique without mentioning any previous publication.

However, the situation becomes very serious if over self-plagiarism the concepts exposed / claimed were plagiarized.

To avoid the accusation of "self-proven", it is necessary for transparency to be doubled and ensuring that the "Copyright" conditions are met.

In the case of inclusion in their own papers (books) of the results - in the form of reproduced texts 1: 1 of the previous works, it is necessary / recommends that the new work includes

previously published results and to quote the previous works as they are mentioned Expressly in the new work at the bibliography.

6.4. Elements of Ethics and Professional Deontology

6.4.1. Terms, terminology, and interpretation meanings

a. Professional deontology is:

- (1) "*Science of professional duties*" or
- (2) Doctrine of "*Norms (axiomatic) of professional conduct and ethical obligation of a profession*".
- (3) The whole of the specific duties inherent in the exercise of a professional activity, most often defined by "*the specific regulations of a profession*"

Based on "Axiomatic Norms", "the deontological norms" specific to different professions and activities and - particularly "scientific research" can be drawn up.

b. Ethics and fundamentals. Ethics is a practical and normative discipline that aims to "tell" us "how we have to live and behave." Based on "Axiomatic Norms", "the deontological norms" specific to different professions and activities and - particularly "scientific research" can be drawn up.

General ethics sets out the criteria "in judging whether an action is good or bad and to determine the motivations and consequences of an act or a fact". The "finality of ethics" makes this an eminent practice. In principle, it is not about establishing something new for itself, but "to provide solutions to act responsibly".

General ethics can be perceived as the foundation of applied ethics: - Individual ethics, - social ethics and - of the various forms of specialized ethics, which are facing the normative problems of its own field, in scientific research

6.4.2. Code of Ethics in Scientific Research. This Code comes to regulate *the ethical principles specific to the field of research and development (R&D)*. Such a code is a set of compulsory principles and rules of mandatory moral and professional conduct, which must govern the work of staff working in the field of scientific research of technological development and innovation. In particular, the Code also refers to the elaboration of doctoral theses.

The *Code of Ethics in Scientific Research* has the role of specifying the necessary responsibilities and procedures, so that R&D to take place in accordance with the requirements and ethical norms accepted by the international scientific community.

6.4.3. "Basic" Terms " frequently used in the evaluation of" ethics and professional deontology "in the field of development research. Defining them.

In defining a code of conduct, must be mentioned the content of the basic terms used and the "procedure" the application of which "lifts the fog above their ambiguous use":

- **Scientific product** – industrial product, research report, publication, patent, "computer program", etc. obtained as a result of scientific research activity,
- **Author / co-author of a publication** - any person nominated in the list of authors of a scientific publication; paternity – the quality of author / co-author of a scientific product,
- **"Intellectual property"** – the totality of the forms and means by which an idea is disseminated (book, article, electronic support, etc.), as well as the corresponding copyright. Intellectual property can also refer to the results of doctoral theses. In the case of works signed by several authors, the intellectual property belongs to each of them,

- **Evaluation / self-evaluation of the results** (wrong evaluation, under-evaluation, over-evaluation) – appreciation of the results of scientific research by using qualitative and quantitative criteria, such as the prestige of the journal, journal, etc., the number of citations, the impact on society, or on the environment, etc.
- **Scientific standard** – the norm or set of norms that regulate the good conduct in scientific research. Based on these standards, you can then appreciate the
- **Scientific value of the results** – the quality of a scientific product to contribute to the progress of knowledge.
- **Intellectual probity** – not accepting the falsification of scientific results, the non-acceptance of ideas or results of scientific research.
The non-disclosure of conflicts of interest, etc., to mislead the scientific community and to harm society, constitutes the lack of intellectual probity.
- **Errors in the obtained results. Error:** mistake (often proved minor), due to insufficient information on the most current results at a certain time in the field, insufficient information, professional practical insufficiency, professional negligence or exaggerated scientific enthusiasm; the detection of error imposes on its author the obligation to publicly denounce it.
In the case of published works, it is good that the recognition of the error is made in the same magazine, diary, etc., in which it appeared.
- **"Data making"** – recording and presenting dates (results) from the imagination, which are not obtained by the working methods used in scientific research.
- **Fraud** – the deliberate action of manufacturing, falsification, plagiarism, illicit alienation of the scientific research results, or other procedures that deviate from the practices accepted by the scientific community and which aim to obtain a scientific prestige, of some of its financing.
- **Integrity** – requirement in relation to individual researchers, research and development institutions for respecting human dignity, intrinsic values of science, animal rights and the environment.
- **Plagiarism** – acquiring the ideas, methods, procedures, technologies, results of a person, regardless of the way they were obtained, presenting them as personal creation; violation of intellectual property belonging to other research / researchers by abusively acquiring ideas and results.

6.4.4. The main scientific standards for evaluating the scientific value of the research results

- a. **The standards of positive evaluation of the scientific value of the research results**, exclude
- hiding or removing unwanted results,
 - making false results,
 - replacing results with fictitious data or obtained on the basis of erroneous data,
 - deliberately distorted interpretation of results and distorting conclusions,
 - plagiarism of results or publications,
 - deliberately distorted presentation of the results of other researchers, and "apparent correction of these results"
 - incorrect attribution of the authorship of a paper
 - introduction of false information in grant or funding applications

- hiding, covering, or not disclosing conflicts of interest of scientific novelty, without mentioning the initial source and / or with insignificant additions
- non-recognition of the methodologies and results of other researchers as a source of information
- non-recognition (perhaps even hiding) of one's own errors
- the phenomenon of "inferiority complex"
- dissemination of one's own results in an irresponsible manner, with unjustified exaggerations and repetitions
- often self-plagiarism or multiple publication.

Some representative situations:

- the inclusion in the list of authors of a scientific publication of one or more co-authors who did not contribute significantly to the publication or the exclusion of some co-authors who contributed significantly to the publication; a special situation is the one in which, in the new publication, ideas, exemplifications, applications were taken over, ... whose source no longer appears in the cited bibliography (sometimes intentionally not introduced)
- publishing an article in 1: 1 form in multiple journals; however, the technique can be discovered immediately by "anti-plagiarism" programs; however, it does not consider "sent republication"
- adding small amounts of new data to an already published article ("salami-slicing")

BE CAREFUL. The situation and the accusation of "autoplagerism" must be treated with discernment, with the analysis of the content of the old and new results and of the stages in which it was resorted (consciously or unconsciously) to the multiple publication (e.g., in which the multiple publication was resorted to (consciously or unconsciously).

Insofar as they do not constitute crimes, deviations from the norms of good conduct in the activity of communication, publication, dissemination, and scientific popularization may be (for example) and

- the inclusion in the list of authors of a scientific publication of one or more co-authors who did not contribute significantly to the publication or the exclusion of some co-authors who contributed significantly to the publication; a special situation is the one in which, in the new publication, ideas, exemplifications, applications were taken over, ... whose source no longer appears in the cited bibliography (sometimes intentionally not introduced)
- the inclusion in the list of authors of a scientific publication of a person without his consent (for example, to increase the value of the work)
- unauthorized publication or dissemination by the authors of results, hypotheses, theories or scientific methods not yet published
- introduction of false information in the grant or financing applications, in the applications for empowerment, for university teaching positions or for research and development positions.
- lack of objectivity in evaluations (overvaluations) and non-observance of confidentiality conditions
- publication or repeated financing of the same results as elements of scientific novelty, without mentioning them as previous published results (in this case, the indication of the previous publication becomes mandatory).

It **constitutes deviation** from a Code of Professional Deology any non-observance of the fundamental norms and of the professional standards of good conduct of the research and development personnel.

Attention: according to the criminal law, through certain details the plagiarism can manifest in the end and "as a crime"!

b. "Ghost-writing technique" – or the technique of "**erasing paternity traces of some research results**" belonging to other persons, has two significant aspects of manifestation (there are also other aspects):

- (1) The situation in which the real author is no longer the one intentionally mentioned in the article, subsequently explained by the new author as an editing error, or inattention, or ... (e.g.
- (2) The cited work, belonging to a real author, is not conclusive for the justification of its own results, for example:
 - the quoted source contains collateral results,
 - the real author has published the results of substance in other works that are not mentioned by the current author
 - other similar ones.

Steps frequently used in applying the ghost-writing technique (to erase traces)

- (1) **Initial work** written by **A** (the one who brought the original contribution) →
- (2) **Further work** written by **A+B** or by **B+A**. The bibliography mentions the work of **A** →
- (3) **Paper +1** written by **B**, paper **B1+** in which the work written in common (point (2)) is also mentioned in the bibliography, **A+B** possibly (more frequently) **B+A**, as "something that contains only collateral results" and does not mention at all the work with the initial, essential contributions, written by **A** →
- (4) **Paper +2** written by **B**, paper **B2+**: only the work **B1+** is mentioned in the bibliography (more rarely the work **A + B** or even **B + A**) →
- (5) **Papers B + +**: From here on in subsequent works **B3+**, **B4+**, ... written by **B** or - for example **B** together with another collective - in which only the work **B2+** (as a basic work) is mentioned in the bibliography, then **B3+**, ... and finally, mentioning only the "convenient" works, written by **B** → →
- (6) And the History continues....

c. Reasons for which fraud is used or scientific frauds occur

- Career pressure, competitive environment, you must maintain your reputation by publishing,
- The phenomenon of "inferiority complex",
- Fear that another group working in the field may publish more quickly similar or even incomplete research results, obtained "at the same time",
- Convenience – the falsification data complements the hypothesis of the work; often the authors believe in the results of the imagined experiment but do not have the time / do not have the possibility / do not have the ability to do similar experiments,
- The ease with which data can be manufactured based on the "achievements of others":
 - some experiments may even be unreproducible for "objective" reasons, for example, from incomplete data definition,
 - manipulation of the "declared experimental" conditions, manipulation of the numerical data, images included in an article
 - it is expected that the falsified data will remain unnoticeable.

These ***negative aspects are regulated and accepted as negative by the deontological norms***, by all scientific publications, which is why the deviation from them is considered "***intellectual fraud***".

The literature cites numerous cases of scientific, intellectual fraud discovered and drastically solved, going – depending on the seriousness of the situation – to:

- Withdrawal by the publishing house of the articles (even from the archive of the journal), after it was proved that they are based on fabricated results
- Dismissal from the company, university, ...
- Withdrawal of the financing / financial support of the research and subsequent research
- Withdrawal of academic titles (e.g., Doctor (PhD) or / or of honors (awards) recognized by professional organizations, etc.

IMPORTANT REMARK. But just as well literature (the scientific world) passes under silence and numerous cases of scientific, intellectual fraud discovered, unsanctioned or, subsequently, even "***hidden under the carpet***".

Chapter 7. Factors that can be determinants for individual creativity and technical for stimulating creativity

a. The determining factors in the manifestation of creativity were mentioned and discussed briefly:

- *Expertise* ⇔ the sum of scientific, technical, procedural, and intellectual knowledge strictly necessary for the manifestation of creativity in a particular field,
- *Divergent (artists) and convergent creative thinking skills and abilities (mathematicians)*
- *Competences and creative thinking skills: divergent creativity (specific to artists) and convergent creativity (specifically in mathematicians, physicists, ...),*
- *Intrinsic motivation (passion and interest) and extrinsic motivation (rewards, public recognition) motivation*
- *The environment in which creativity develops / can manifest itself.*

b. Techniques (or tools) to stimulate creativity. There are many heuristic methods for facilitating and stimulating the creativity of a person or a group of people. Their variety is contained in various works cited in literature and – in part – also in bibliography).

For example, in the EIRMA report (European Association for The Management of Industrial Research, 2004) [12] - [15], there are synthesized tools (techniques) that can stimulate the development of creativity, used by different users:

- *Brainstorming*, on which will be made some observations
- Morphological matrix method (developed by Fritz Zwicky),
- Ishikawa diagram, Pareto diagram,
- Different questionnaires,
- Different schemes with suggestions,
- Methods of metaphorical analysis,
- Method of intuitable "scenarios", etc.

For details, it may be recommended to to read the EIRMA report.

But there are other techniques to stimulate creativity; their enumeration and deepening, however, requires a separate study:

- The Method of Lateral Thinking / Edward de Bono, Sinectica / elaborated by William Gordon),
- The Matrix of Discoveries (Abraham Moles),
- the Method based on the Theory of Solving Inventive Problems and others.

But beware: "It's not enough to want, you have to be able to do it"!

c. A few words about the Brainstorming Technique (techniques). Brainstorming techniques represents a technique (method) of development and stimulation of creative thinking (of creativity), and perceived "as being of the greatest value" in scientific research

<https://en.wikipedia.org/wiki/Brainstorming>.

In essence, brainstorming is a technique of generating new ideas, or even new directions in approaching finding a solution to a given problem.

In practice, the brainstorming technique is outlined in the form of sessions (meetings, seminars) which can be resumed periodically at more and more advanced levels, at which the "moderator" (leader) presents a problem, possibly aspects of beginning, of directing in finding solutions, after which the participants contribute ideas to solve the respective problem.

The *purpose of the brainstorming technique* is:

- to remove the "individual" from the stereotypical types of thinking that we have (we have acquired them, we have used them),
- to go beyond the boundaries of "familiarity" (in which we are used to thinking uniformly),

- to create a set of ideas – interconnectable – of which, later, we will be able to choose in fixing a solution (evaluating ideas).

The *Brainstorming* can be used individually or in a small or wider group (usually, recommended no more than 12 individuals at the same time).

Attention: in a brainstorming session

- the atmosphere to be one based on the confrontation of ideas, opinions, ... and no-way paternal,
- the active involvement of all participants is required/ requested,
- a prior training of the participants is required.

The *brainstorming technique* can be successful when it is connected to a specific well-defined problem and not to a general concept. The technique is relatively widespread in the activity of research teams (see in PhD training).

The number (quantity) of „generated ideas” must be as much as possible as possible, and, provide the possibility to combine ideas and the opportunity to choose from a wide range. However, the generation of ideas should not be confusing.

A few recommended steps in conducting brainstorming sessions:

- Limitation in time of the duration of a session (about 30-40 minutes to an hour, followed by the break of free discussions of about 20 minutes),
- Appointment of a moderator specialized in the topic, willing to accept the conflict of opinions,
- Establishing a person responsible for writing down all the current ideas discussed, which must be visible by the participants (e.g., on a board),
- Creating a working atmosphere, loose,
- And - finally, but strictly necessar - the correct evaluation of the generated ideas.

Chapter 8. Doctoral research: a real chance for the development of creativity and originality. Some synthetic ideas

ADENDUM. The here presented ideas may appear in other courses, seminars of the discipline in forms that may be different

8.1. Doctoral schools

The doctoral schools are meant to create/provide creative workshops in which the "individual" is put to integrate into scientific and technical creation groups of level, with results with originality content. In the current form of organization, phd studies aim at completing the basic trainings acquired through the two basic cycles "bachelor" and "master" and creating the skills of research and development and of experimentation. As a result, the nature of the research and their completion will be heterogeneous.

The **defining elements** necessary for the creation and integration within efficient research teams and then the realization of "efficient research" by the PHD student can be synthesized by (after [1], [2] processed):

- The existence of an efficiently organized doctoral school, which can provide the source of funding and the research framework,
- The existence of a Scientific Community (collectives, research centers) with confirmed results, of leaders who can take over the role of creating the doctoral school with well-defined topics.
- Creating a Magister Couple (scientific leader) <= > disciple / disciples (PHD students), as homogeneous and efficient as possible in achieving the individual and collective goals pursued.
- The existence of Research Laboratories with adequate equipments, and oriented towards the efficient completion of research with concrete, publishable and highly appreciable results,
- The possibility of approaching and accessing national and international research projects. In this context:
 - the reputation of the research team, confirmed by the results is / can be very useful
 - the existence of the international relations of the team based on which it becomes possible and the efficient exchange of experience (training stages)
 - the existence of international research programs, inter-university links (for example, the doctoral programs offered by ERASMUS a.o.).

8.2. Creative activities in doctoral research

The entire activity related to the elaboration of a thesis must be one with strong creative and original valences; it is based on several important pillars, supported by the permanent bibliographic study. This study can have both an informational character, permanent information, and substantiation of own research.

The activities in the doctoral training must be efficient and "productive". In this context, a special role is played by:

- Choosing a / the well-defined research theme and orienting the research based on previous experiences; the individual initiative of the young researcher is not excluded, on the contrary, it must be stimulated; Initial bibliographic study, justifying the theme, the way to choose
- Setting as clear as possible the priority objectives, staging the research within the program; the problem is delicate but useful, even if in a first phase, it will not be exactly outlined; exploring the bibliography and on this basis defining (redefining) – step by step – as clear as possible the objectives. Bibliographic *study* to deepen the achievements of the theme field and the orientation of the steps to be followed
As a result, the student should not believe from the first phase that he will solve – then in the final phase – that he has solved "everything" because this is only rarely possible.
- Designing the research programs and defining/redefining the research stages and completing the program. Continuous bibliographic study on the stage of achievements in the field of the theme, possibly related problems
- Strategic and daily management of activities, management of perspectives for publishing partial, intermediate results considering the partial value level, in accordance with the character of the publication (conference, symposium, ...) which must be of strict specialty, bibliographic study on the stage of achievements in the field of the theme, orientation and exploitation of bibliography at hand.
- Interpretation and continuous evaluation of the results and Integration of the results in the dynamic structure of the future thesis. Bibliographical study on the achievements in the field of the theme
- Structuring towards Communication of the results obtained in research. Detailed bibliographic information
- Tracking the impact of research in international scientific life (in the field of research).

8.3. Communication of research results. Possible products of creative activity in the field of scientific research.

The main ways/ variants of synthesizing and communicating the research results are (see for example [1], [2] and [4]):

- Periodical research reports,

- Discussing the evolution of the research within specialized **scientific seminars** that must function within a research teams.
- Selecting Ideas and Developing Scientific Articles, Patents, Software, Physical Models, Prototypes, ... technological systems, etc.

Defining elements in the assessment of research results can be [1]:

- The “multitude of ideas”, connections or alternatives in appreciating and solving themes,
- Including the value of "new" in the research objectives: - efficiency, utility, openness to the future, supporting the evolution of research in the field, etc..; efficient, accessible, and pleasant communication of the news,
- The continuous (public) value in publications, to be confirmed by the "international community of specialists in the field"; it can / must be appreciated by the ratings drawn up by the expert company in the field.
- The “new published values” must be confirmed by the "international community of specialists in the field". It can / must be appreciated by the ratings drawn up by the scientific community expert in the field.

Remark. The (unwanted) practice of "communicating" the results on "*omagional scientific sessions*" with a "*mass character*" such as "**25 years since ...**", sessions in which all possible and impossible sections coexist, has also spread, less that representative of the field. Such presentations have - as a rule - very low scientific value, but they can ensure the realization of national and even international collegiate connections.

8.4. Personal contributions made by the doctoral thesis.

CONTRIBUTION - (DEX): Part of an achievement, which contributes to a joint action; personal contribution to the "field of interest".

- Correct identification of personal contributions based on objectivity, observation, and clairvoyance; it is frequent the situation in which in the contributions “pseudo-contributions” are claimed
- Discretization, systematization, and clear highlighting of personal contributions
- Public scientific and technological capitalization of significant results; these capitalizations can be partial and - finally - synthetic. The problem of self-plagiarism must be seen and treated with discernment.
- Analytical / realistic presentation of the personal contributions brought by the doctoral thesis, during the doctoral program and finally highlighted in the conclusions.

We must not forget that very few research results “put an end” to a subject, or more, “to a direction” of research!

Finally, the personal contributions must be evaluable ("measurable") and appreciable compared to other achievements on the same subject. The extent of these contributions is often brought by the level at which communications are made (conferences, congresses, prestigious magazines) and - subsequently

Appendix 1. Some aspects related to intelligence (IQ coefficient) and creativity

Main references: <https://ro.wikipedia.org/wiki/Creativitate> , <https://ro.wikipedia.org/wiki/Intelligen%C8%9B%C4%83>

I. About Intelligence and Creativity (see chapters 3 and 4, in a reformulated replays)

a. Intelligence. Represents the intellectual capacity to discover the properties of the objects and the surrounding phenomena, as well as of the relations between them, doubled by the possibility to solve new and complicated situations. It is characterized by:

- Ability to learn from one's own experiences,
- Ability to adapt to new situations,
- Ability to correctly designate intrinsic connections and relationships between knowledge, phenomena, feelings, which supports solving new problems and guidance in new situations.

Intelligence is one of the most important quality indicators for assessing individual abilities and one of the most studied skills recognized by modern psychology. Intelligence is an intellectual quality common to creative people.

b. Creativity. Is a mental and social process and is manifested by "the ability to do, to produce something new, which can be either a new solution to a problem, or a new method of investigation, or a new technological procedure or a new device / equipment / system or a new "artistic object" or a new artistic form (here in the more general sense of artistic value).

Creativity involves the generation of new ideas or concepts, or new associations of the creative mind between existing ideas or concepts. In any case, individual creativity can be determined by three main factors:

- **"Expertise"** (as a synthetic concept, frequently called recently, but debatable) is the *"basis of creative activity"*; it provides a person with the technical, procedural, and intellectual knowledge to identify the important elements of any problem.
- **Creative thinking "skills"**: refers to the imaginative, inventive, and flexible way in which the person approaches problems; these competencies depend on personal traits (independence, risk-taking orientation, tolerance for ambiguity) and the type of thinking. Creative thinking is characterized by a strong ability to generate new ideas by combining previously disparate elements.
- **Motivation** is generally accepted as fundamental to creativity, and the most important motivating factors are intrinsic passion (self-motivation) and intrinsic interest in performing the work (object of creation), which are more effective than extrinsic motivation (rewards, recognition). In a such sense, creative people are at the discretion of their own values ⇔ and motivations and deal best with problems for which they have a strong emotional affinity.

The IQ coefficient, Intelligent Quotient, is a "score derived" from standard test results. An average value for the IQ coefficient, the average IQ is around 100 (between 90 and 110) and characterizes about 50% of the world's population.

The "threshold of intelligence" hypothesis - with an **IQ of 120** - circulated / proposed by various researchers as a value that supports creativity, states that *"a high degree of intelligence may be a necessary but not sufficient condition for superior creativity"*.

c. Summary correlations. The value of the IQ index correlated with "creativity" allowed the definition (vague, but often very conclusive) of the following two conclusions.

- IQ below the IQ = 120 threshold: creativity is dependent on intelligence.
- IQ above the threshold IQ = 120: creativity is / can be independent of intelligence.

Above the "threshold" level IQ = 120 intelligence often correlates relatively weakly with creativity; in other words, there may be very intelligent people who may have poor results in creativity tests but vice versa.

The subjects with high performances in the creativity tests have - in the intelligence tests - quotations at least at values above average, from where the conclusion of the necessity of intelligence for a superior creativity can result.

However, it is important to remark the relative unanimity, according to which **intelligence is more important in scientific creativity**, having a smaller role in the arts (painting, music, politics, etc.).

Remarks. 1. Under the action of external factors, people classified in a certain category according to the IQ coefficient can behave above but well below the characteristic value (120).

2. A "Positive education" can influence the value of the IQ at least in terms of behavior in relation to the outside,

3. The "% appreciation" of the world's population is a "crude appreciation", vehiculated in different sources with different percentage variants, which considers the tests performed and the results obtained / manifestations in the actions undertaken / performed.

4. "The laws of the country do not forbid anyone to be an imbecile", Grigore Moisil

II. Some details regarding the IQ coefficient. An informative appreciation, based on the presentation of "the most intelligent people" (the % -s of world population are based on a classification given by Cyril Burt and other experts) - and the correlation with human behavior

The value of IQ quotient	Categorization of people	They can be distinguished by the fact that	% of world population (estimate)	
IQ over 150 characterizes Exceptional Intelligence	> 200	Exceptions	Exceptional creative ability: 1 in 1 billion	
	180– 200	Cele mai mari genii	Garry Kasparov 190 Benjamin Netanyahu 180 Boby Fischer 167 Einstein 165) and Nobel-Prize laureates, in general	
	160– 180	Mari genii 165- 180 Genii > 160	up to 0.025% of the population	
	150 – 160	exceptional intelligence, brilliant	Capacitate creativa absoluta up to 0.15 – 0.25 % of the population	
Intelligent genius	145 -150	smart "brilliant"	Extraordinary capacity for creative activities up to 2 % of the population	
"Smart" people	130 - 140	Much above average intelligence	Special ability for creative activities, finishes university studies easily, at the maximum level up to 5 - 6 % of the population	
	120 - 130	Above average intelligence	Very good capacity for creative activities, special work capacity, finish university studies easily, up to 10 (12) % of the population	
	110 - 120	Higher average intelligence	Good capacity for creative activities, very good work capacity, finishes university studies without special problems up to 20 % of the population	
	100- 110	Average intelligence	Able to carry out creative activities, good working capacity, finish university studies harder, helped, guided up to 25 % of the population	
	<100 (90)	Intelligence slightly below average	Can conclude secondary education (usually assisted), adaptable but controlled with localized creativity, the ethical level of behavior often questionable up to 10 – 15 % of the population	
"Normal" people with a degree of intelligence and behavior "normal, usual" However, normality decreases with the decrease in IQ	80	Intelligence at the bottom limit	Poate incheia studii elementare/ medii, adaptabil dar controlat, nivelul etic al comportarii adeseori discutabil, up to 10 – 15 % of the population	
	People with problems of behavior, manifestation, and adaptation to society	70	Low Intelligence, Stupid	Behavior difficult to control, the ethical level of behavior reduced, hardly adaptable, with a relatively low degree of discernment (often unpredictable) on the actions taken and the consequences of the actions taken up to 7 % of the population
		50	Very low intelligence, Idiot, Idiotenia	Very difficult to control behavior, the ethical level of behavior very low, unsuitable, with a very low degree of discernment on the effects of the actions taken and the consequences of the actions taken up to 2 -3 % of the population
		20	Extremely Low Intelligence, Imbecile, Silliness	Uneducable, unsuitable, indiscriminate on the actions taken and the consequences / results of the actions taken up to 0.2% of the population

III. A final remark. In synthesis, the intelligence of an individual is characterized by and is manifested by:

- (1) Memory capacity to process and interpret information
- (2) The ability to focus / focus on the topic
- (3) Attention, ability to follow a discussion, chain of ideas
- (4) Focus on the topic, focus on the topic
- (5) Flexibility in taking over and processing information
- (6) The speed of positive reaction to the unfolding of events

The figure is one taken from a general article



Personal notes