

ORIGINAL RESEARCH ARTICLE

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Computerized Psychology in the Era of AI

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Abstract: It is commonly thought that psychology is a social profession, required human treatment. I would like to show that nowadays even such sensitive profession can be in some aspects substitute by a computer. The psychological usage in our daily lives is performed mainly intuitively, but as will be shown herein, computers may assist a lot in human social relationships. First, computers may be used to demonstrate the wide spectrum of psychological tangency with human healthy and pathological lives, as is shown below. The pathology includes symptoms description, diagnostics and psychotherapy. Psychology can encompass not only humans but also other entities such as animals and even robots that substitute humans and assist un their recovery. In understanding the human behavior due the physiological dopamine secretions, a cause because of aesthetic feelings. The article presented is a review of the key terms in psychology it will analyze those terms more in detail to be a model popularizing the subject.

Keywords: Physiology; Intelligence; Emotions; Pathology; Diagnostics; Therapy; Algorithms; AI

1. Introduction

The presented subject is a serious one, however it is given in an amusing way. It was originally given as a part of a series of lectures encouraging popularization of Science Technology and Art.

This series of lectures includes lectures such as: Cryptology, Illusions, Architecture and Mathematics, Game Theory and the Business Competition, Making Decisions in the Uncertainty Guiding Artificial Intelligence Systems Emphasizing Accuracy and more (Ophir, D. (2025)).

Lecture is per definition a dynamic presentation which enables movie clips and a musical accompaniment leading the viewer into an appropriate atmosphere. The clips are

also a scientific tool enabling showing some algorithms and processes *in vivo*. The article, being a static one, forces the author to use other techniques, such as verbal explanations with multi-slightly different pictures, giving a movement impression.

Encouraging the *entrepreneurship* presented in the article is performed on two levels the academic level, students mentoring and popularizing the science and art. Both ways are inspiring *entrepreneurship* in different populations. The science and art popularization methodology is by itself an *entrepreneurship* in addition to the contained text.

Psychology is a large field of knowledge, the article will not cover all its branches, it will show the methodology of threatening some aspects of



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psychology as a model, with advanced visualized methods. The presented classification of psychology will include the following topics:

2. Physiological Psychology

2.1 IQ test

The Wechsler test is a well-known test measuring the population UQ. An example of one of its popular questions is given below (Figure 1). Its computerizing may increase the accuracy measuring considering the solving time by the tested person. The computerization

of the Wechsler test may cause a reform in the whole approach to the IQ person measuring. For example, the tested candidates to some function in the population service may change the reliability of the IQ testing, preparing himself to such test by exercising the solving addition tests computer generated. Whereas the current tests assume that the teste person sees the test for the first time, otherwise the test loses its reliability.

The IQ test may be used as an additional tool admeasuring the reality test (3.2.2)

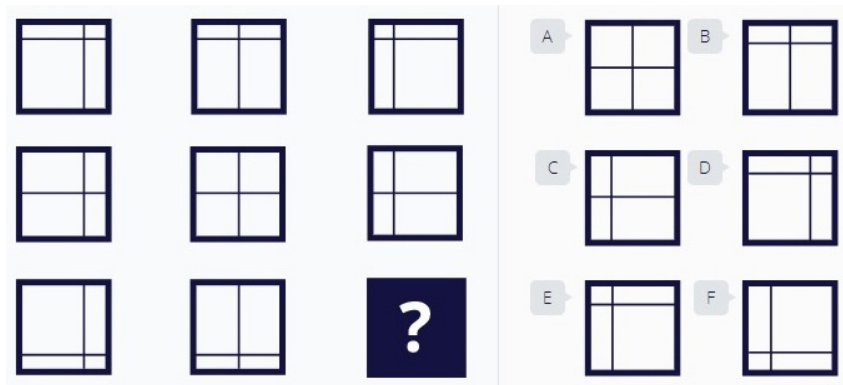


Figure 1. An example of one of the Wechsler Test questions: to choose one of the righthand side options, which suits the location of the question mark.

2.2 Aesthetic Feeling

Aesthetics is a good feeling met in the *Physiology* of Psychology. This feeling appears when the human receptors such as smelling sensors and the vision absorb special signals. The properties of these signals are not absolute, however there is a consensus in a lot of cases. These signals will be analyzed in the following two domains: architecture and human beauty.

For example, looking at *Golden Ratio* proportion of two sections creates a aesthetic feeling. The mathematical formula of the *Golden Ratio* is as follows: the quotient of the small section, divided by the longer section equals the quotient of dividing the longer section by the sum of the small and longer sections.

From physiological point of view the pleasant feeling of aesthetical sense is due to the dopamine hormone, which transmits signals between the nerve and the brain. The trigger to these processes is subjective and suits the person’s memory, but generally its absolutely, almost the same for the whole population.

2.2.1 Architecture

The Parthenon, an ancient Greek temple is built,

using the *Golden Ratio* proportion (Figure 2 (a)). The modern building designed by the famous architect Le Corbusier keeps the Golden Ratio rule. proportion (Figure 2 (b)). The sections taking part in the proportions are drawn in the right margin of these pictures. An algorithm may be helpful in finding optimal values satisfying the Golden Ratio formula.

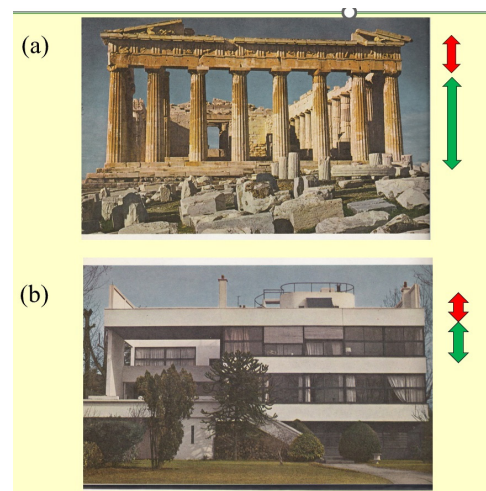


Figure 2. Two structures: (a) Parthenon in Athens. (b) modern building designed by Le Corbusier.

2.2.2 Human body

The human beauty model was widely analyzed by the Renaissance painter Leonardo da Vinci (1452-1519) (**Figure 3 (a)**). Da Vinci has used the Archimedean spiral, in which the radius is growing linearly to express the face proportion of his beauty model: Mona Lisa. The series of radiuses in the same direction are formatting the Fibonacci mathematical series. The consequent two elements in such series or in Golden Ration proportion, which as mentioned in the architecture case, gives the aesthetic impression.

Leonardo da Vinci has also investigated the whole human body proportions. He has concluded that the ideal proportion is represented by a circle (**Figure 3 (b)**), in which the belly button is the center of the circle (red point), which touches the outstretched hands and feet.

The now days painter may be helped by computers to approximate in their works these ideal above proportions.

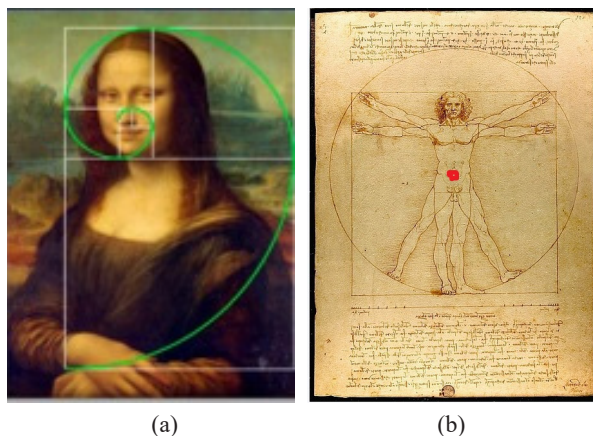


Figure 3. (a) Leonardo da Vinci - portrait of Mona Lisa; (b) Leonardo da Vinci – human body encircled by a circle.

2.3 Spatial Vision

Physiological psychology, being a branch of psychology that studies the biological mechanisms underlying behavior and mental processes investigates spatial vision. The anaglyphs are the method in which two overlapping two-dimensional pictures are precepted in the brain as three-dimensional object. (Ophir, D. (2012) , Ophir, D. (2018))

This process is demonstrated below (**Figure 4**) the two separated pictures in the brain of the observer give the three-dimensional stereoscopic impression. This method might help psychologists to investigate brain

processes during their vision.

This effect is used by computer technology creating an illusion of reality, called virtual reality, giving psychologists a useful tool for training human behavior in conflicted social situations, this might help patients with post trauma training to overcome traumatic scenarios.

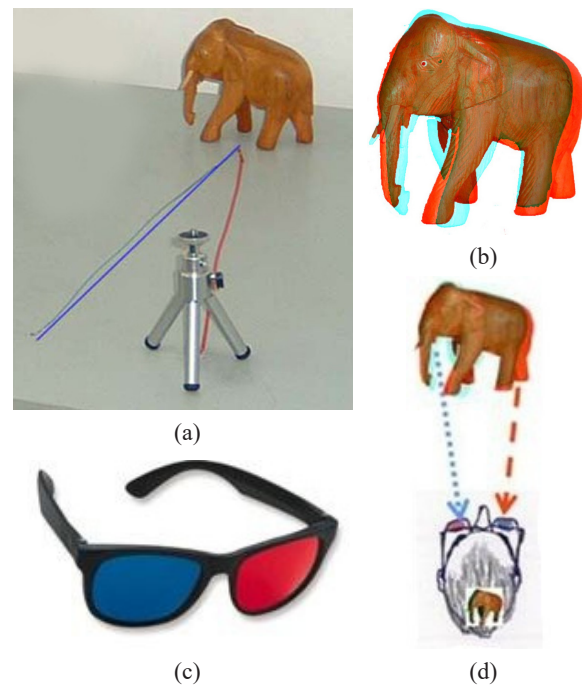


Figure 4. Steps in preparing and precepting the anaglyph: (a) Shooting the object from two angles. (b) The received two pictures are colored in blue (left) and red (right) and then emerged one with other. (c) Two color glasses: red (left) and blue (right). (d) Looking at the emerged picture with philtering glasses, which splits the picture into the original ones, the left eye sees the left picture (blue), the right eye sees the right picture (red).

3. Pathological Psychology

This is one of the important aspects of psychology, justifying its academic approach: to help humans to heal their illnesses. The subtopics of pathology are appearing here in the chronological order of their treatments:

3.1 Symptoms

There are several types of disorder behavior such as Obsessive Compulsive, Post Trauma, Mania Depression, Psychosis, Distorted Thought, Cerebral Palsy, Dementia etc. The article deals mainly with symptoms of hallucinations and nightmares represented

in the works of great artists Vincent Van Gogh and Francisco Goya (Figures 5 - a, b). The hallucination caused by hyperthermia and starvation is shown in the

Charli Chaplin movie (1936) “Modern Times” (Figure 5 c). Another cause of hallucinations may be drugs, as are seen in the trans parties (Figure 5 d).



(a)



(b)



(c)



(d)

Figure 5. (a) (b) Paintings of V. Van Gogh and Francisco Goya – respectively; (c) Charlie Chaplin in “Modern Times” (1936); (d) Trans-party – illustration.

3.2 Diagnostics

The diagnostic made by the aid of computers corresponds to the commonly known test as follows:

3.2.1 Reality test

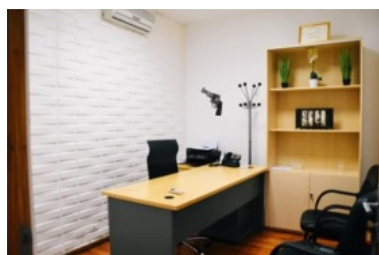
This is a psychological test measuring how well the tested sees reality and does not *suppress* it. **Repression of reality** – living in illusions, indicates, with a high probability, a traumatic situation that the subject has experienced in the past.

The test is performed with the help of two pictures: one including a fearing object such as revolver (**Figure**

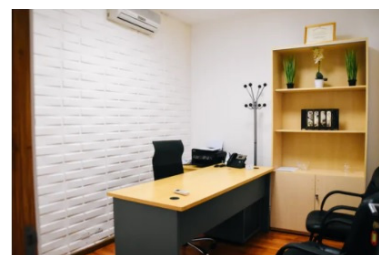
6 – a) and second picture without a revolver (**Figure 6-b)**. The first picture is shown to the patient for 15 seconds, then the second picture is shown, and the patient is asked is something is missing. If the patient doesn’t remember the missing revolver, this is an indication of a damage of his reality comprehension.

In the dynamic version of the article, namely in the corresponding lecture, the waiting time for the patient’s respond is filled with the classic music.

The computer role in the reality test is the construction of various scenarios, representing the above concept.



(a)



(b)

Figure 6. (a) an office with a revolver; (b) The office in which the revolver is missing

3.2.2 The Wechsler IQ test

The difference between the manual-IQ and the verbal-IQ, which are obtained in the IQ tests, may indicate the reality test impairment.

3.2.3 Painting analysis

Painting analysis is an additional tool for testing personality disturbances (Figure 7), due to trauma after a sexual harassment, which were repressed and can be

exposed in a picture. For example, hiding the vaginal area, closing eyes (Figure 7), are some such indications (Ophir, D. (2020)).

There are Computer's Systems such as "Enigma", working with *Image Processing* and *AI*, automatically analyzing the testing pictures in few minutes. Such systems can intervene in developing trust, create discourse, awareness – preventing further sexual assaults.



Figure 7. Examples of children's paintings - 5 and 12 years old figures (a) and (b) respectively, pointing to personality disturbances.

3.3 Psychotherapy

There are several tools in treating psychological disturbances, some of them are mentioned below as follows:

3.3.1 Psychoanalysis

Psychoanalysis methodology was developed by Sigmund Freud (1856-1939). He was a founder of a major school of thought that transformed how we understand the human mind, behaviors and mental illness. The psychoanalytic used a hypnosis (Figure 8) to read and influence human unconscious.



Figure 8. Artists are demonstrating the hypnosis methodology.

The computer may assist in hypnosis, for example by giving advice on how to speak to the hypnotized patient. For example, bringing the patient to his childhood and feeding him the ChatGPT proposes: “A Calm and Positive Mealtime with Children (Ages 3–7)” with the following steps:

- Preparation (Before the Meal)
- Introducing the Meal
- During the Meal
- Encouraging Without Forcing
- Managing Challenges
- Ending the Meal

These steps are described in more detail by the ChatGPT.

3.3.2 Logotherapy

The methodology of this tool is to search and develop for the human aim for living. The father of this methodology is Victor Fraenkel (**Figure 9 (a)**)

The idea of of Victor Fraenkel was that the *human is looking for meaning*, this gives him the human drive to live, in other words: “He who has a 'why' can deal with any 'how'." Meaning in life gives a person the strength to endure.

The model of implementation of this idea can be found in Stephen Hawkings (**Figure 9 (b)**) behaviour who despite his physical limitations has due to the *Macular Dystrophy* was enthusiastic in being able his “small contribution” in the cosmological science.



(a)

(b)

Figure 9. (a) Victor Fraenkel the founder of the “*Logotherapy*” treatment methodology; (b) Stephen Hawking – British famous physicist, investigating cosmology.

In his message to the humanity, before his death, summarizing his worldview he said with excitement that it was a great pleasure and a triumph to work on

the newest scientific discoveries. He recommended “...*Look up at the stars and not down at your feet, be curious, don't give up. No matter how difficult life may be, there is always something you can do and succeed.*”. These words *based on self-experience* illustrate the essence of *Logotherapy*.

Computerization of the *Logotherapy* concepts is expressed in various aspects of human life, two of them are described as follows:

- **Media Networking** – enable the human to develop his potential and to express it among wide population receiving their feedback and encouragement for further activities for the humanity, receiving a lot of satisfaction.

- **Artificial Intelligence** makes communication with his environment, as was in the case of *Stephen Hawkings*. In his case the development of transforming finger signals to human voice, made his life easier, enabling natural scientist conversation contributing to Hawkings' further scientific contribution.

3.3.3 CBT – Cognitive Behavior Therapy

The CBT – works on the assumption that there is a correlation between the expression oneself and the behavior, therefore the change in the self-expressing style will cause the change in the behavior, and in the chain reaction self-feeling will change. The argument behind this concept lies in the assumption that in real life the extreme situations are relatively seldom, and the people for whom everything is in Black White are often people without hope, and are not looking for a compromise, giving some hope. (Ophir, D. (2013), Burns, D. D. (1999)).

This linkage points the to improve the human feeling, the human should control his expressions – treasures usage, namely it must be moderate rare usage of extreme terms.

To achieve this target the following computerized method is proposed (Ophir, D. (2012) CBT). The semantics of the language divides the sentences according to their meaning. It was classified into ten different categories (**Figure 10**), in which exaggeration appears, namely, extreme terms. The sentences in each class are built according to the BNF rules (Hopcroft John E., Ullman Jeffrey D. (1969)).

The contribution of in the CBT treatment lies in the text which is said by the treated person during the conversation meeting. The computer substitutes the problematic expressions by the moderate ones. In

this way the patient learns how to correct his form of expression, which causes moderate behavior, which influences the patient feeling.

- a. All-or-Nothing Thinking
- b. Overgeneralization
- c. Mental Filter
- d. Disqualifying the Positive
- e. Jumping to Conclusions
- f. Magnification and Minimization
- g. Emotional Reasoning
- h. Should Statements
- i. Labeling and Mislabeling

Figure 10. Extreme sentences classification.

The computerized technique substituting suitable texts is based on a special infrastructure prepared a priori, which consists of a classified language thesaurus, in which each word is associated to its family of words with a degree in the scale -10-10] of its extremity.

The substitute algorithm of the verbal sentences uses a syntax analyzing method developed by Noam Chomsky. This method is using the BNF notation [Figure 11] in syntactic sentences [Figure 12] and its transformation presented in derivation tress [Figure 13].

```
<digit> ::= 0 | 1 | 2 | ... | 9
<number> ::= <digit> | <digit> <number>
```

Figure 11. An Example of using the BNF notation, defining the recursive “number” using the “digit” definition.

```
<sentence> ::= <noun phrase> <verb phrase>
<noun phrase> ::= <adjective> <noun-phrase> |
<adjective> <singular noun>
<verb phrase> ::= <verb> <adverb>
<verb> ::= <singular verb> | <composed verb>
<composed verb> ::= <auxiliary> <verb>
<adjective> ::= the | best | dramatic
<noun> ::= student | revolution |
<singular verb> ::= feeling | be
<adverb> ::= awful
```

Figure 12. An example of syntactic derivation of the sentence: “The best student is feeling awful”

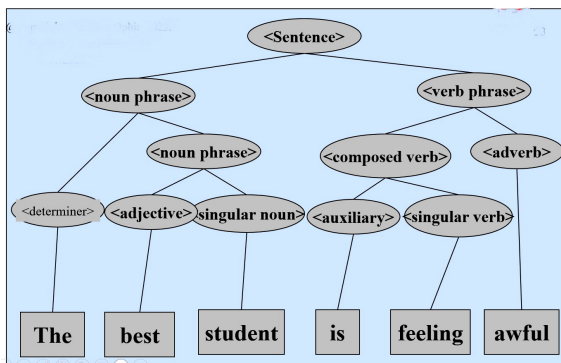


Figure 13. Transformation of the Derivative Sentence presented in a [Figure 12] into a Derivative Tree

There are two modes of treatment:

- Opposite the human psychologist who interviews with the patient asking him questions and instructing him, how to make the sentence more moderate.
- Autonomously opposite a computer – an AI system, which takes the role of mentor-tutor. This mode may be extended by using the Robot-Humanoid as a character controlling psychotherapeutically the patient, using the additional modern AI tools (Figure 14), (Ophir, D. and Zheng Z. J.(2015)).

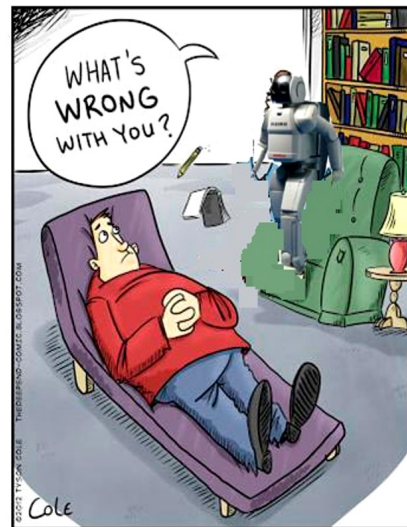


Figure 14. An illustration of Psychotherapy managed by a Humanoid equipped with the modern AI systems.

3.3.4 Games

There are a lot of games kinds, they are classified according to their properties, for example competition games – number of players, complexity, determinism, purposes,

Games are an effective therapying tool. It may give the patient an occupation and divert his attention from intrusive thoughts. The games supply amusement, develop social proficiency, Emotional Intelligence and more.

One of the aspects of games is postponing the development of dementia, by training the patient’s mental proficiency such as abstracting and generalization (Figure 15). The games level might be adopted respectively to the patient IQ level.

For example, in the quiz of Figure 15, the answer to the question: which of the three pictures above is extraordinary, and why? The answer is picture (a). The analysis of the number of the primitives’ properties of the figures in the picture is as follows:

- (a) Has **one** common property – the color.
 - (b) It has **two** common properties: the shapes and the color
 - (c) It has **two** common properties, shape and color
- The conclusion is that the picture (a) is extraordinary

having one common property, whereas other pictures) b) and (c) have two common properties.

Similar games were defined in (Ophir, D. (2010) Logical ...)

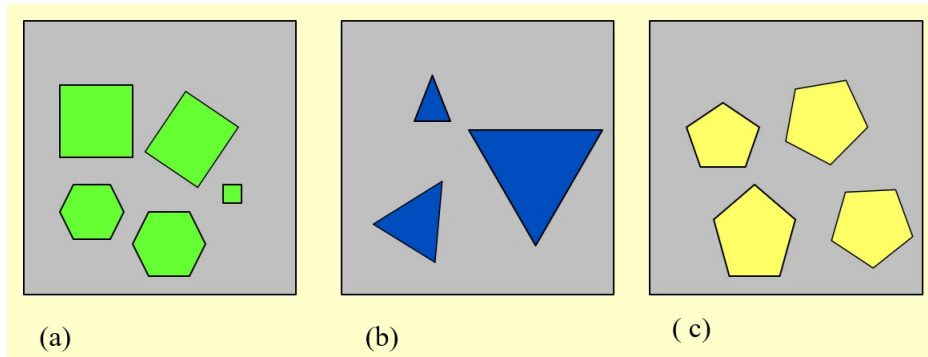


Figure 15. Demonstrating training abstraction and generalization – brain activities. The relevant **question** is: which of the three pictures above is extraordinary, and why? The **answer** is included in the text.

4. Social Psychology

The article demonstrates the computerized socio-psychological cases among the following types of societies:

4.1 Humans

Social psychology describes the behavior of society. One of the fields investigated of social psychology is social consolidation, the intriguing question is the estimation of social polarization. The term *Index of Polarization* enables finding various tendencies in society.

There are suggested four methods to estimate this index using statistical and linguistic computerized methods (Ophir, D. (2023)).

- Computing the surfaces and the density of the occupied population in a demonstration (**Figure 16**)
- Linguistic computerized analyzing of the social media style of expression, using similar analysis used in computerized CBT treatment (**Figures 10-13, 3.3.3 CBT – Cognitive Behavior Therapy**)
- Statistical analysis of the questionnaires of a random sample of the population.
- Using *Game Theory* analysis (Ophir, D. (2026)).



(a)



(b)

Figure 16. Demonstrations representing polarization among the population: (a) estimated hundredths of participants; (b) thousands of participate.

4.2 Animals

The species that have highly developed social living have

also developed psychological behavior like mammals, octopus, ants, bees and the whole animal world.

The evolution theory is some kind of psychological approach, let's pay attention to the genetical rule of the *Natural Selection*. It is a psychological approach. The mimicry - comanage is another commonly met biological phenomenon, expressible in the psychological terms.

It was shown above that the animal world has its own psychological behavior. The computerization of animal psychology is demonstrated on the example of the evolution rules of this world. These rules are simulated by computers' algorithms called *Genetic-Algorithm*. This Algorithm is an extension of the statistical computations in (Ophir, D. (2014)).

The *Genetic-Algorithm* is an optimization algorithm. Similarly to the *Evolution* improving the species from one generation to another, the *Genetic-Algorithm* upgrades its target from one iteration to next iteration. The evolution is based on three simple rules: *Mutation*, *Selection* and *Cross-over* controlling the animal's DNA. Similar rules are implemented on a computer's data – part of a memory being optimized.

The analogy between the DNA components and the computer's data components are expressed in **Figures 17** and **18**. The whole data is in computers terms an array of computer words, containing six bytes, each byte contains four bits. The analogy is as follows:

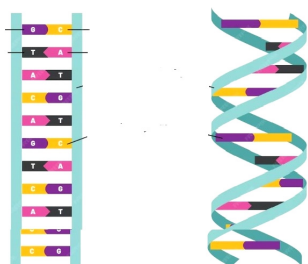


Figure 17. Example of a DNA strip showing in a schematical way its Nucleotides, using the first letter of the name of each Nucleotide: Adenine (A), Thymine (T), Cytosine (C), Guanine (G).

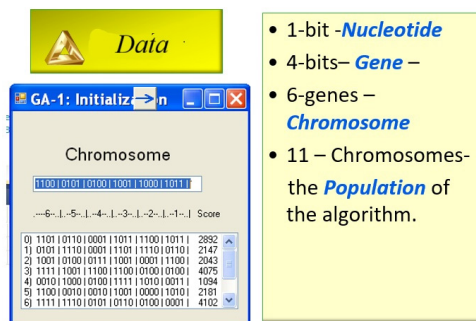


Figure 18. Data in its computer's memory representation with its analogical terms corresponding to genetic terms.

The collection of the one species' population's chromosomes corresponds to an array, in which each word corresponds to a chromosome of one member of this population. The byte of the word corresponds to a Gene, and each bit corresponds to a *Nucleotide*.

The evolution operations and their algorithmic counterparts are as follows:

- *Mutation* – corresponds to random changing some of the data bits.
- *Selection* - corresponds to sorting of the array word according to the word score which is a function of the word value *Cross-over* – is simulated in the computer's terms by pairing each two neighbor words, and then by joining the head of one word with the tail of its partner.
- *s-over* – is simulated in the computer's terms by pairing each two neighbor words, and then by joining the head of one word with the tail of its partner.

4.3 Robots-AI

Now days Robots are based on highly computerized AI systems, that controls them according to the Human commands or autonomously. Some of the AI principles are demonstrated in (Ophir D., Samuel H., IShmuclov I., and Reychav I. (2018)), In the future the Robots might be an independent entity having their social life, which may be integrated with human ones (**Figure 19**). Possible algorithms simplify the human way of thinking (Ophir, D. (2010)).



(a)



(b)

Figure 19. Robots embodied in appropriate character: (a) dogs; (b) humanoid – imitating the human way of thinking.

There is an opinion, however, till now as science fiction, that in the future robots will be independent of human controls, and will behave according to their built-in data, which will motivate them like humans. Being an independent entity, they will have their own psychology which enables due to self-learning to upgrade themselves, as the evolutions do in the human-animal world.

5. Conclusions

Despite its advantages, computerized psychology raises significant ethical concerns. The collection and analysis of large-scale psychological data introduce risks related to privacy, data security, and informed consent. Algorithmic bias is another critical issue, as computational systems may reproduce or amplify existing social inequalities (Obermeyer et al., 2019).

From an epistemological perspective, the increasing use of opaque “black box” models challenges traditional standards of theory building and explanation. While predictive accuracy is valuable, limited interpretability may restrict theoretical insight and clinical trust. Addressing these challenges requires transparent model development, interdisciplinary collaboration, and clear ethical guidelines. Some of these issues mentioned in (Minsky, M. (2007)) and (Voiskounsky, A. Y. (2013)).

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