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IN MEMORIAM: CONSTANTIN ANDRONACHE
ETHICS AND INTEGRITY IN ACADEMIC EDUCATION AND RESEARCH BASED ON INTER-, TRANS-, CROS- AND MULTIDISCIPLINARITY

Gheorghe Săvoiu

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Abstract. *Life does not involve that we can choose our world or the reality in which we have lived, live, or will live, but on the contrary, we are the ones chosen and devoured by it. We can only choose some questions we have asked, ask, or will ask our world, mentioned that the answers were, are, and will be contained, in the ecclesiastical meaning, long before our appearance in the surrounding reality and found in the universe that surrounds us. Even in a perfectly reasonable world, when two observers have talked, talk or will talk to each other, their described realities remain inseparable. Thus, a continuum of a multiverse that can be perceived simultaneously as non-entropic and multidisciplinary is reconfigured. To simplify the meaning and facilitate the world's perceptions, we could state that if two people witness the disappearance of a third, and one of them pretends that he cannot feel the impact of this collapse and imagine its consequences, then he will certainly need the consciousness of his death, and not a hearing aid or contact lenses. Since that moment, time will run out, is running out or ran out in the opposite sense, from future to past, passing through the translucent present to non-existence, exclusively in memoriam, to the clear demarcation of the map limit of that man's disappearance. Similar to a forest, human species become poorer because of each fallen tree or every human loss, poorer in the future, but at the same time richer in the past and traditions, thanks to the disappeared person's questions as a testimony of that unique reality that made possible his birth.*

Keywords: *in memoriam, ethics, morality, integrity, academic education, research, inter-, trans-, cros- and multidisciplinarity, Constantin Andronache.*

1. INTRODUCTION

A team of physicists including Eric Cavalcanti in recent research redefined the scientific paradox in the pages of the journal *Nature Physics* and simultaneously in everybody's mind, based on three major assumptions about the world: "The first assumption is that when a measurement is made, the observed outcome is a real, single event in the world. This assumption rules out, for example, the idea that the universe can split, with different outcomes being observed in different parallel universes. The second assumption is that experimental settings can be freely chosen, allowing us to perform randomized trials, and the third assumption means that once such a free choice is made, its influence cannot spread out into the universe faster than light" [1]. Someone can use these creative ideas to write a new definition for the death paradox in only a few words. I did this myself to offer you the image of Constantin Andronache, my forever friend and one of the most profound researchers in EDEN's family, better known as

Costin. The significant assumptions remain the following: i) non-similarity between all particles becomes non-similarity between all members of EDEN's family; ii) all the experimental settings that were freely chosen are limited to EDEN's family multidisciplinarity and its members' passions. iii) from EDEN I to EDEN XI, the impossibility of splitting the universe, identified as reunions of particles, generates a bigger team of friends, researchers, and co-authors (in any order of appreciation can be).

2. WHO IS CONSTANTIN ANDRONACHE?

These three fundamental limits are the theoretical conditions for the brief presentation of such an authentic researcher's life as our EDEN's friend, Constantin Andronache, equivalent to the well-known "Wigner's friend" paradox. Once the consciousness of a second observer of the first observer is involved, the state of quantum inseparability collapses, and any of our friend's observation can be the final one. Unfortunately, it was not Eugene Paul Wigner who was wrong. But only we and our friend's life collapsed when neither one of us nor the experiment anticipated this evolution, hidden under an apparent understanding of all levels of observers in a scenario frequently called "life". The life of Constantin Andronache, based on well-separated quantum particles known as life moments, combined with friends capturing some of the most important life moments or so-called "quantum observers", becomes finally unbelievable, during the decent behavior on an exceptional itinerary underlined by his spiritual wave amplified in education and scientific research. But our lives are not always just quantum theory applied to observers, and some moments violate the limits and predictions. Many of these life moments are comparable but often much more important than any physical experiment.

Thus, all the next slides are a pretty convincing test of whether quantum theory fails for all of us, the so-called observers of EDEN, or whether one of the three major limits could be a false one in our lives. The beautiful story describing life's moments of Constantin Andronache offers multiple flashes of light. But it is too long for these papers and their pages and much more intense compared to the other lives. What I really didn't realize until I started writing this "*In memoriam*" is that his decency in life may also help all of us, either EDEN's members or not, to answer to some philosophical questions

about friendship's nature, simplicity of our physical world or the infinite as a continuous dimension of our mental world and its strong relationship with some beautiful minds. In Costin's life or his unique project, the most significant fact remains a long term planned row of wonders (Slide no. 1). His

attitude generates an extension of the classical paradox and makes it visible faster than light: sometimes, the observer himself can be observed and even changed entirely by such an intense phenomenon as life is.

EDEN XI - 2020

IN MEMORIAM:
CONSTANTIN ANDRONACHE

"Constantin Andronache was the son of Constantin and Dumitra Andronache and he was born on February 5th, 1957. He passed away on the morning of February 10th, 2020. Constantin Andronache was raised and educated in Romania. In 1990, he came to the US to continue his graduate education at Georgia Institute of Technology, Atlanta, where he obtained a Ph.D. in Atmospheric Sciences. After graduation, Constantin worked as a research scientist, and he has been employed by Boston College since 2001. His professional interests focused on the effects of clouds and aerosols on the climate and environment, and computer modeling of these phenomena. He published numerous research papers in the Journal of Geophysical Research and shared his passion for science and its use for solving the natural world problems with his students." (Excerpt from his Obituary available online at: http://hosting-6792.tributes.com/obituary/show/Constantin-Andronache-108150929)

Slide no. 1. An excerpt from Constantin Andronache's obituary, available online at: http://hosting-6792. tributes.com/ obituary/show/Constantin-Andronache-108150929

Since Constantin Andronache became our friend and colleague at Bratianu College from Pitesti, he amazed all of us with his quality of a passionate reader, doubled by that of a charming storyteller. Above all, in his personality, we all perceived the future existence of a mature, precise, rigorous researcher, a logical, but also an incandescent and a philosophical mind, erupting from all his dialogues (Slide no. 2). An excerpt from one of his emails from 2006 can prove even today the charm of his narratives: "The story of the hurricanes is spicier and its charm has a lot to do with the history of meteorology, feminism, American culture and

Hollywood. I will not go further into many details, but before 1950 there were fewer women in the weather service and it seems that men were feeling alone. Therefore, they gave women's names to hurricanes, somehow instinctively associating the character of these tropical storms with inconsistent, unpredictable behavior, etc. (in fact, the method was used for the first time by an Australian). After making a lot of noise, the feminist movement managed to "convince" the world that this is a form of discrimination and then they decided to give men's names to hurricanes. And thus, storms are named after women and men, alternatively".

CONSTANTIN ANDRONACHE
From: "candro2000@aol.com" <candro2000@aol.com>
To: "gsavoiu@yahoo.com" <gsavoiu@yahoo.com>
Sent: Wednesday, September 6, 2006, 07:09:58 PM GMT+3
Subject: Re: Asa da te recunosc... amuzant

Despre educaţie...

O bună educaţie este o poartă spre libertate şi, în principiu, ar trebui să dezvolte ceea ce există potenţial în fiecare individ... Mă tem însă că s-a pierdut acel ideal de educaţie europeană sau, cel puţin, acel ideal nu mai este cultivat la fel sau nu mai este accesibil multora...

About education ...

A good education is a door to freedom and, in principle, it should develop what is potential in every human individual. But, I am afraid of the idea of a lost ideal of European education or, at least, that ideal is no longer considered in the same way or is no longer accessible to many ...

Slide no. 2. An excerpt from one message of Constantin Andronache's e-mail (September, 6, 2006)

"Another explanation would be that women's names were no longer enough and then they had to expand the list, multiplying names with undesirable nicknames or cognomens as in Roman Empire. Moreover, everything that happens here in USA is advertized in the Hollywood way, to create an effect as dramatic and realistic as possible. In this situation, people's names become much easier to communicate or memorize. When people hear about Hurricane Katrina, we all know what we really mean. If I tried to say "Hurricane category 5, on August 29, 2005, in the New Orleans area," it would be much more unattractive and so difficult to imagine." Now, you can try now to compare his humorous excerpt with his final scientific conclusion, written in Slide no. 3, as a useful general remarque to a future book. You will find out the real difference between his cultural and scientific ideas and conceptions, as a matter of delimitation with a lot of decency, so specific to sober personalities, defined by the invisible balance between a glamorous spiritual dialogue and a rigorous academic introspection characteristic to a long-term approach.

ABOUT PASSION OR HURRICANES …

From: candro2000@aol.com <candro2000@aol.com>
To: "gsavoiu@yahoo.com" gsavoiu@yahoo.com
Sent: Thursday, September 7, 2006, 06:10:23 PM GMT+3
Subject: Re: Numele uraganelor - update

Toate uraganele primesc un nume. De ce asta? Pentru că ne ajută să identificăm furtunile şi să le urmărim în timp ce se deplasează peste ocean. Amintiţi-vă că pot exista mai multe uragane la un moment dat şi, fără a le denumi, le-am putea confunda şi nu am mai putea atunci identifica cu precizie la ce furtună facem referire. Timp de sute de ani, uraganele din Indiile de Vest au fost numite după ziua sfântului în care acestea au avut loc. Un meteorolog australian a început să dea nume de femei furtunilor tropicale înainte de sfârşitul secolului al XIX-lea. În 1953, US National Weather Service a folosit pentru prima oară nume de femei pentru furtuni. În 1979, erau folosite atât nume de femei, cât şi de bărbaţi. Se selectează un nume pentru fiecare literă a alfabetului, exceptând literele Q, U şi Z …

All hurricanes are given names. Why is that? To help us identify storms and track them as they move across the ocean. Remember that there could be several hurricanes at a time and, without naming them, we could get confused, and we could no longer precisely identify to what storm we refer. For hundreds of years, hurricanes in the West Indies were named after a particular saint's day when they occurred. An Australian meteorologist began giving women's names to tropical storms before the end of the 19th century. In 1953, the U.S. National Weather Service began using female names for storms. In 1979, both women and men's names were used. One name for each letter of the alphabet is selected, except for Q, U, and Z …

Slide no. 3. An excerpt from a message analysing a future scientific book (September, 7, 2006)

In his evolution, the multiple difficulties of the reconciliation of the researchers' isolation with the inter-, trans-, cross-, and multidisciplinary expansiveness of any academic observer had transformed Andronache Constantin and his entire life, following such a profound scenario, but enough to demonstrate a major contradiction between the three hypotheses of the physical reality of Cavalcanti's paradox. Andronache Constantin was an excellent researcher (C-4431-2011) in atmospheric sciences (17 articles) and environmental sciences (5 articles). His virtual treemap, made instantly by Web of Science (WOS) can prove this, analysing his incredible papers and books [2, 3, 4]. Based on the decency of publishing *non multa, sed multum*, this specific scientific approach defined him as a genuine physicist and exquisite researcher.

Along with his research work, he focused on teaching seminars and courses to students, especially to graduate students, who considered him a skilled and meticulous coordinator, and even a mentor.
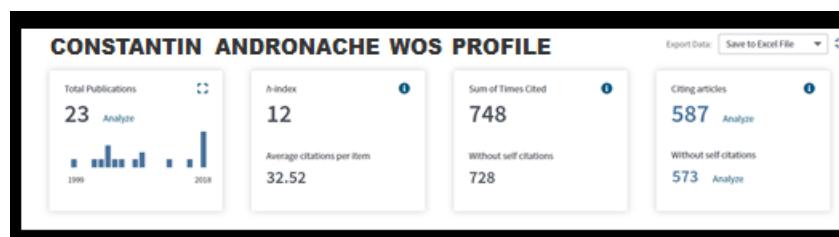
Source: https://apps-webofknowledge-com.am.e-nformation.ro/
Fig. no. 1. Constantin Andronache's H index (Web of Science ResearcherID C-4431-2011)

At the end of 2019, according to Web of Science (Clarivate Analytics), Constantin Andronache had a Hirsch index score of 12 (Fig. no. 1), in Scopus = 13, Research Gate = 16, and Google Scholar = 14. In 2017 and 2018, he published as editor two significant books in prestigious publishing houses as Springer: *Remote Sensing of Clouds and Precipitation,* and Elsevier: *Mixed - Phase Clouds: Observations and Modeling* [2, 3] (Slide no. 4). His most cited article, written as a coauthor in 2008, exceeded 200 WoS' mentions [5]. Constantin Andronache remains one of the initiators and contributors to the book dedicated to Econophysics [6]. He always believed that an alliance between economists and physicists could generate a more accessible modeled and more predictable economic world. He also considered that such a realized project could be a tribute to a long friendship embodied in joint articles [7, 8], as EDEN's family was, and I hope it still is.

A HAPPY BALANCE FOR A MATURE RESEARCHER AS EDITOR

Slide no. 4. A happy balance of two major scientific books of Constantin Andronache as editor

During his doctoral studies (1990-1996), graduated from Georgia Institute of Technology, Constantin Andronache developed numerical models to evaluate aerosols' impact on microphysical and radiative properties of clouds, with applications to contrails, air pollution, background tropospheric chemistry, and cloud-resolving models. He was involved in several important research projects as GTE (Global Tropospheric Experiment), AEFAP (Aerosol Emission and Formation in Aircraft Plumes), AGAA (Aviation and the Global Atmosphere), AEA Review (Atmospheric Effects of Aviation: A Review of NASA's Subsonic Assessment Project), SUCCESS (Subsonic aircraft: Contrail & Clouds Effects Special Study), SOS (Southern Oxidants Study). As a visiting scientist at Princeton University (1997 – 1999), he developed numerical models to evaluate the impact of aerosols on the microphysical and radiative properties of clouds, with applications to cloud-resolving models, aerosol scavenging by clouds and precipitation, and climate change contributing to research programs as INDOEX (Indian Ocean Experiment) or TOGA/ COARE (Tropical Ocean Global Atmospheres/ Coupled Ocean-Atmosphere Response Experiment) [6]. With such a complex research experience in atmospheric sciences, climate processes, physics, applied mathematics, and computer modeling, doubled by his permanent interest in teaching, he became a senior researcher at Boston College. His activity continued focusing on aerosols-clouds-climate interactions & climate predictability in several American and international research projects: CRYSTAL-FACE (Cirrus Regional Study of Tropical Anvils and Cirrus Layers - Florida Area Cirrus Experiment), TCSP (NASA Tropical Cloud Systems and Processes), etc. and developed a model for pollution studies for assessing the role of aerosols in the climate system. But beyond his "nimbus" or aura of a respected specialist, Constantin Andronache kept his original thoughts and the passion of a philosopher in the most diverse life situations, dialogues, or comments (Slide no. 5).

Slide no. 5. Enigma: To be a specialist as Eliade or a philosopher as Cioran?

There is not a similarity between two particles, but one could be found in multiple spiritual connections between two members of the EDEN's family and two peasants in a photo of the campaigns of the Romanian interwar sociological school (Slide no. 6). Time passes over all of us or even better written through all of us, but we must try to remember that people's essence doesn't change profoundly from their youth years until the old age!

Slide no. 6. A similarity between two particles or between two members of the EDEN's family and two peasants in a photo of the campaigns of the Romanian interwar sociological school.

The EDEN's family's meeting point is somewhere in the past, in an old high school friendship between a future and prestigious physicist and a future statistician disguised as an economist [7, 8].

From the two friends' dialogue emerged ethical ideas about the economics of a physicist:
"*The crisis is essentially caused by greed and incompetence (serious errors in the financial system). First, it generally transfers money from the*

ordinary world (billions of people worldwide) to the very rich (maybe a few million people in total).

Second, there is a lack of financial risk control mechanisms (banks have been over-indebted, for example, but there are many others)."

Slide no. 7. The beginning of a workshop, a creative EDEN's family and a multidisciplinary review ESMSJ

Constantin Andronache knew so well what really means to have a scientific vision. Thus, he wrote me in a message on March 15, 2009: "EDEN could become an International Conference on Econophysics or Advances in Econophysics, but the "exploratory" stage must be overcome, and EDEN should be focused on statistical methods in Economics, risk analysis, mathematical methods in Finance, time series analysis, specific methods in Econophysics, and a forecast of financial markets."

3. SOME FINAL REMARKS

In 2019, Constantin wrote me a strange message about our split and uncertain spirit. History is not easy to understand, and in general, it is manipulated not by historians but by others who interpret it according to their interests. History is also a complicated topic, far from the methods of the exact sciences. Constantin Noica wrote in his first book that we first have the geometric spirit, the one that leads to simple principles, rules, logic, a mathematical approach to the world, and only afterward we have the historical nature to live and think this chaotic, but inevitable becoming evolution or involution. The reality is that we have both, you can't escape history, but you can take refuge as much as you can in the geometric spirit if that suits you.

To paraphrase Cavalcanti [1], when a tree falls in a millennial forest, without any observers around it, according to the vast majority of physicists' opinion, the specializing in the quantum domain of

reality will not make noise. Constantin Andronache's disappearance respects all the three appearance hypotheses mentioned at the beginning of this paper:

(1) eight months later than the fact itself, we hear and perceive the noise of Constantin Andronache's disappearance as observers of such a sad event, which is only one really happening for us now;

(2) a lot of moments during Constantin Andronache's life show he could make free or at least random choices from a statistical point of view;

(3) many choices he made in a particular place instantly influenced many events in the EDEN's family that occurred remotely, as physicists say, following the principle of "location" or position.

Discovering his disappearance, we change our perception of reality. If the quantum theory does not provide definitive answers to the question: "where is that particle that bears his name in the universe at this time?" we find out instead that the maximum probability to be located as an observer remains in the EDEN's family, in a particular state of "quantum inseparability." If Niels Bohr was right and objects' physical properties do not exist before their measurement, Constantin Andronache's life collapsed for the EDEN's family's observers only right now, after eight months.

As Eugene Paul Wigner argued, the equations of quantum mechanics tell us that the EDEN's family and Constantin Andronache are in a relationship of the observed observer in turn, enter a state of

inseparability with the particles they observe, with everyone else around, which can induce the paradox of an objective collapse. Albert Einstein also solved this by taking the contradiction of the place and space of disappearance but keeping as absolute truth the disappearance or event itself. However, relational quantum mechanics or interpretation by accepting parallel universes' existence leaves one chance to the disappearance of Constantin Andronache, who may not be a reality for all of us, other members of the EDEN's family, but only to remain a Christian reference in eternity…

Costin's serenity and discretion of such a life spent and described in signs similar to the Tibetan alphabet remain unique and paradoxical, as if he would have followed the thought in one of Ralph Waldo Emerson's essays: "To be yourself in a world that is constantly trying to make you something else is the greatest accomplishment."

Costin's serenity and discretion of such a life spent and described in signs similar to the Tibetan alphabet remain unique and paradoxical, as if he would have followed the thought in one of Ralph Waldo Emerson's essays: "To be yourself in a world that is constantly trying to make you something else is the greatest accomplishment."

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ARTIFICAL EGO SYSTEM

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Abstract.

We developed the first robot in the world with an initial-stage ego in 2014 and launched it from Japan to the market worldwide. We made the first presentation of our robot at Tedx, an American presentation program.

At that time, the robot made an attempt to escape from the site because it was terrified of the atmosphere. We spent the entire duration of the presentation in calming it down.

This experience taught us that a robot with drive and ego needs superego, and we are now working on this.

We will explain the morals-based method of judgment utilized by the robot which approximates the function of action under the influence of the emotions 'like' and 'dislike' to function of action of humans through a mathematical model using a new computation technique.

With this method, we aim to create a robot that copes with singularity issues of artificial intelligence and moral problems that cannot be solved by humans.

1. INTRODUCTION

We have used a mathematical model of "good" and "evil" to study superego (morality-based behavioral control; MC), a faculty which is required for robots or artificial intelligence (AI). The term "artificial ego" refers to the ego-based judgment function possessed by an artificial computer, as used in robots or artificial intelligence. Currently, in the field of artificial intelligence, there are no established means for addressing the current reality of changing circumstances, where conditions and environment (assumptions) change moment to moment. It is for this reason that self-judgment as humans do is necessary; to this end, we decided to call this field artificial ego research (AE), where the focus of study are matters such as how to define and express mathematically the "consciousness" and "free will" that machines are to have and how to recreate these through engineering. We first used this name at a luncheon seminar at the IEEE (SMC) 2018.

Artificial egos are most needed in circumstances where one operator is controlling anywhere from 10 to 10,000 avatars or robots. In such circumstances, what is needed is autonomous avatars and robots that do not rely on external commands and behave morally and creatively even in unfamiliar circumstances. We are researching function-based quantum gates, artificial egos, and function-based communications as the technology essential for realizing a moral and creative activity.

There are three reasons why morals and creativity are needed when controlling 10 to 10,000 avatars or robots. First, unless avatars and robots have creativity, the ability of the operator to solve problems will be where a bottleneck forms. For example, in unfamiliar circumstances where a dilemma arises, as in the "trolley problem", the very falling into a specific framework of thought is a problem, and avatars and robots that refer to past data and act on pattern matching, no matter how many there may be, will not be able to break out of the framework of thought and will not be of use. In the end, the operator's capacity to make decisions and take responsibility will be put to the test, and the operator's ability to solve problems will be where a bottleneck forms. On the other hand, if there is even one avatar or robot that can and creatively propose fundamental solutions that go beyond its framework of thought, the operator will be freed from the dilemma and will be able to consider solutions in a new framework of thought.

If there are ideas in the same number as the number of avatars and robots, then options will increase to that extent. Getting back to the trolley problem, if a robot in the same tight spot as the operator came up with the idea of derailing the trolley to stop it and, discovering that there were enough rocks on the ground right there to derail the trolley, proposed that solution, the operator would not have to make the "choosing who will die" decision of right or left. The second reason is that the number of avatars and robots that an operator can control simultaneously is proportional to the creative problem-solving capacity of the avatars and robots. More specifically, once avatars and robots attempt to solve problems creatively and ask the operator for their judgment only for those important matters they cannot solve, then the operator can concentrate on the control of important matters for a large number of avatars and robots. If they require a command for each and every move when in unfamiliar circumstances, then control of 10 to 10,000 avatars or robots will not be possible. The third reason is that unless the creative problem-solving methods are moral, problems will arise to the extent the avatars and robots are assigned tasks. Accordingly, if avatars and robots will be emergent, then moral control becomes particularly important, and how to make conduct not justified by past data into something acceptable to people becomes the challenge.

1. Progress in Artificial Ego Up to Now

The image that people generally have of the ego is "selfish" and "being out-of-control and without regard for others". However, in dynamic models of the ego used in medical fields [2], the ego is the condition of the superego (morals) controlling desires.

Fig. 1 Dynamic Model of Ego

Therefore, we employed this to serve as the ego of the artificial ego. If we look back at the history of the artificial ego, the starting point will be research at MIT, where in 1997, Rosalind Pickard, an MIT professor, put forward the book Affective Computing [3]. In Japan, in 1991, AGI Japan Inc. announced the voice emotion recognition technology ST [4], which is currently used in the communication robot Pepper and the Nintendo DS software "Kokoro Scan", and is used in medical fields, for example, in the verbal analysis of pathophysiology [5] to analyze a patient's condition from the patient's voice, as in the publicly available product Mimosys. However, these technologies all use sensors to recognize emotions. Then, Pepper mentioned above, which appeared in 2017, not only used voice emotion recognition, but had a newly developed emotion generation engine [6] that generated robot "emotions" and the resulting

"likes" and "dislikes". In reaction to information from assorted sensors built into a robot, pseudo-hormones are constructed and caused to react and from such change emotions are generated and a judgment of like or dislike is made. We named this function the virtual ego. "emotions" and the resulting "likes" and "dislikes". In reaction to information from assorted sensors built into a robot, pseudo-hormones are constructed and caused to react and from such change emotions are generated and a judgment of like or dislike is made. We named this function the virtual ego.

1.1 Problems with Robots Having Emotions; Solutions Proposed by Artificial Ego

In the development of Pepper, we found that a robot that moves simply based on "drive" and "emotion" is not very useful to humans in daily life and we learned that much of the trouble comes from a robot's fear of people. Thus, at Tokyo University, we initiated the social cooperation program Mathematical Engineering of Morality Emotions, for the study of moral control of AI and robots, where currently we are researching AI and robot control using the superego (morals). Figure 2 shows the difference in functions between AI (neural networks, direct learning, and machine learning) and the artificial ego.

Fig. 2 Features of Artificial Ego

2. CONSCIOUSNESS THROUGH COGNITION (LEARNING) AND FREE WILL FROM VECTORS (EDUCATION)

Deep learning uses a multilayer artificial neural network in order to map input data X into output data Y. While this technology began around 1980, with the recent dramatic advances in hardware and the rise of GPUs, research has intensified. With SVM, classification and regression analysis is carried out using hyperplanes to find the largest margin between points (data) in a data set. Thus, most AI can be

described as a pattern matching function that finds an approximate value using a probability model. Accordingly, it cannot be said that a human-like judgment by oneself has been attained, and this is merely pattern matching with sensor and image analysis. If we think of this as the cognitive function of sensors, then to improve precision, an excessive amount of learning data is required and people must attach flags to teach pattern matching. The chart below is a comparison of the features and ways of using existing machine learning neural networks.
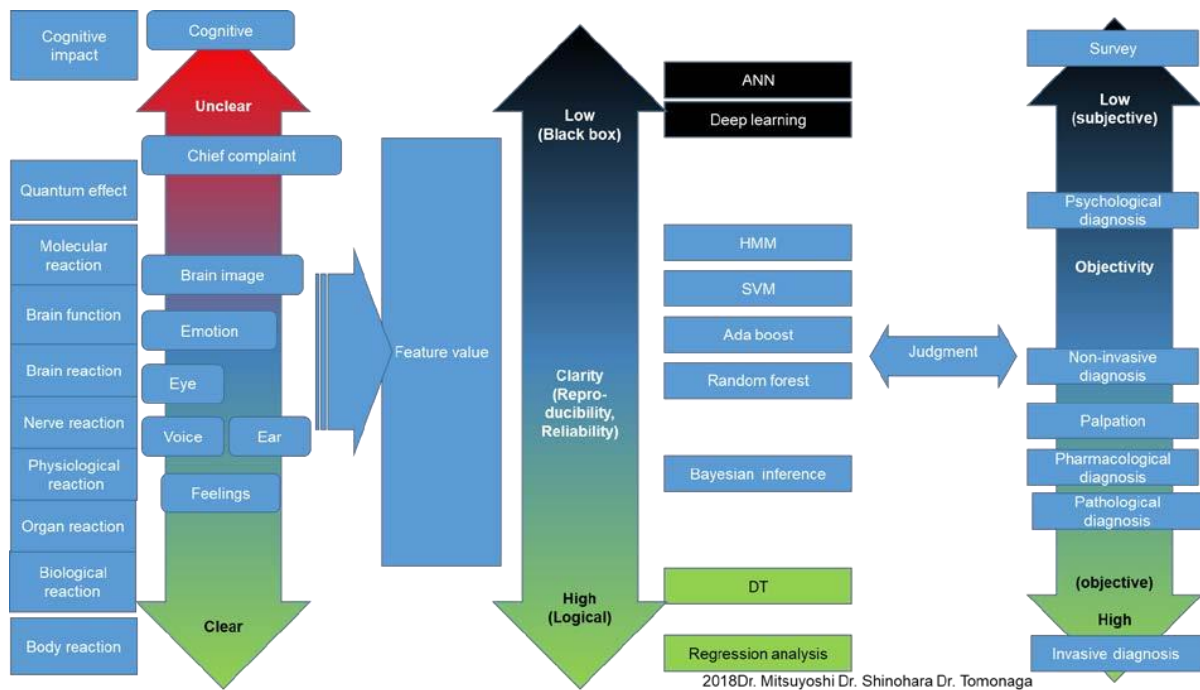
Fig.3 Existing AI.

Meanwhile, with the artificial ego that we are currently researching, what is necessary is not the above learning, but the "fostering" and "education" that humans need for growth. This is because it is not a system where pattern matching and actions and reactions are prepared in advance like a dictionary, but rather a system where in order to make judgment by itself using an ego in the same manner as people, artificial intelligence must be sensitive to and understand changes in assorted conditions, reproduce this by itself, and have a desire-like free will.

2.1 Initial Experiments using Artificial Ego (Virtual Ego)

In 2014, we developed, as a virtual ego, something that can be called the initial stage artificial ego, namely, an engine for generating a robot's "likes" and "dislikes". First, we will explain the "Emotions Map" [7] used to generate emotions in the virtual ego, and then we will explain how this is the source of a robot's "drive".
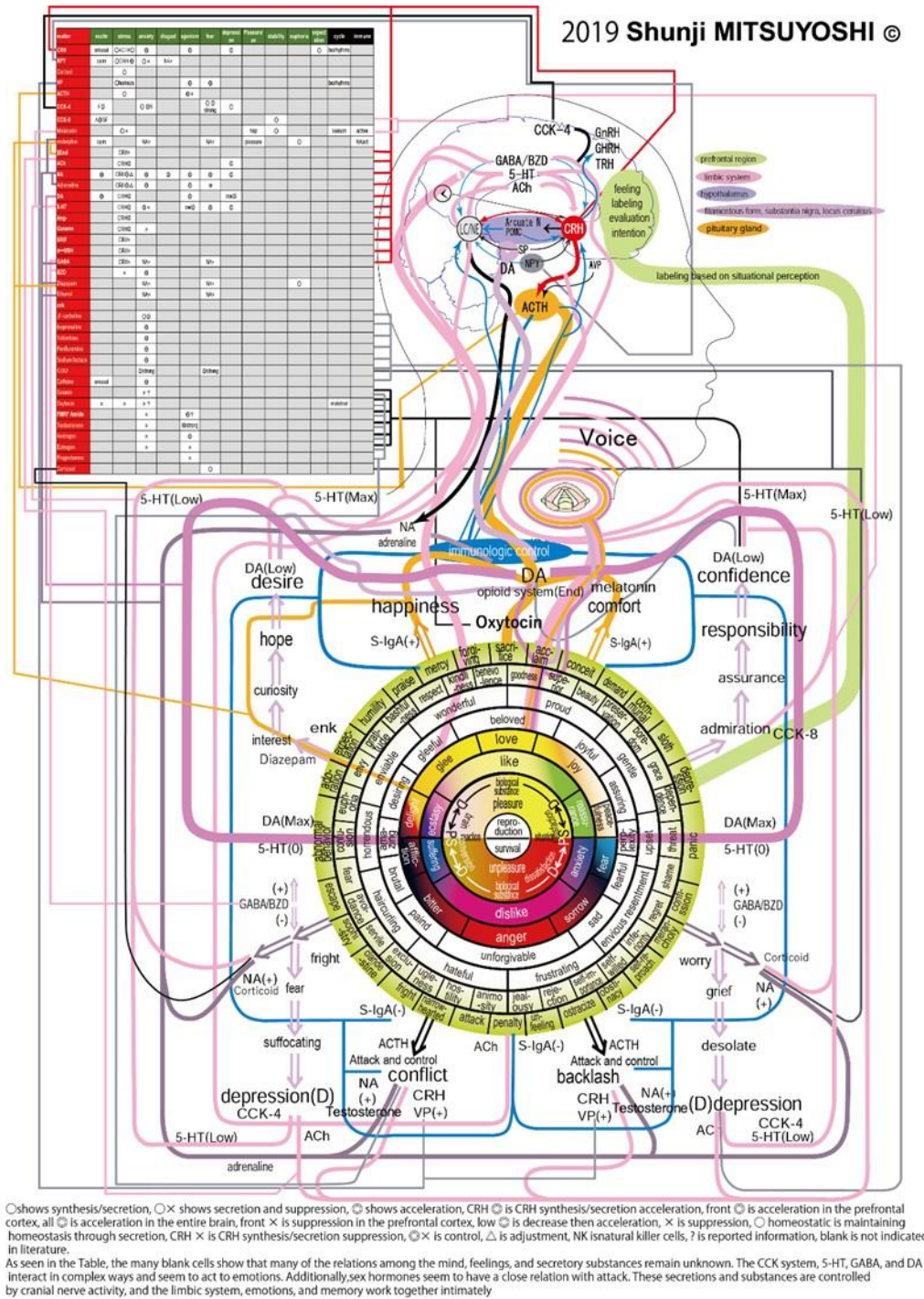
Fig. 4 Emotion Map

The above emotion map was used to generate a robot's "drives". Specifically, we set up the robot so that some events it detected were associated with pseudo-hormones, but when the same event was detected another time, a different emotion was output depending on the hormone balance. We also set up the robot so that even with the occurrence of an event that was not associated with a hormone, the hormone balance would cause an association, which would then be updated.

For example, the event of being in a dark place is associated with noradrenaline, but if a friend is there too, the event is associated with serotonin. Therefore, the state of being alone in a dark place will result in noradrenaline being secreted and fear being output, but being in a dark place with a friend will result in serotonin being secreted and anxiety being output. In addition, we decided that with the event of a stranger's presence, the updating of the hormone association would depend on the experience. For example, let us use the experience of a guest that a family does not know well visiting, and the household, which is usually somber and strict, being filled with good cheer; because of this

experience, just the presence of a stranger will cause the output of pleasure.

2.2 Public Experiment of the Virtual Ego

We carried out an experiment at a presentation open to the general public; the robot, which under the initial settings should have behaved calmly on the stage, began to feel extreme anxiety when the presentation started and ran about wildly and acted out of control. Its behavior is available for viewing in the TED Tokyo Archives. We believe that the cause of its acting out of control may have been the darkness caused by the thick cloth that covered it just before the presentation or by the stage lighting or excessive inputs by the audience. From this, we learned that you cannot created a robot that can coexist in the daily life of humans simply by generating emotions.

2.3 The Difference between Consciousness and Free Will

As the following diagram shows, there is a principle that in order to organize the feelings and emotions generated as discussed above in Section 2.1 as elements and generate a robot's free will, the robot itself should set the objective or destination. There is a need for grounds for positing in a mathematical model that this self-generation of objective naturally generates "consciousness". See the 2019 DHU Journal [12] for an explanation of the symbol ♀ appearing in the diagram.
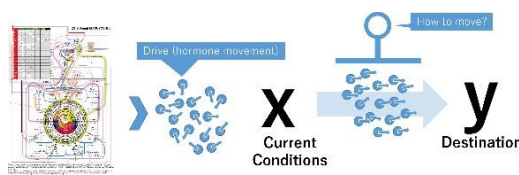
Figure 5: Destination Point

2.4 Generation of Original Free Will (function)

For example, if the command for moving ♀ is f(x) =ax+b, then it is simple to make current conditions (independent variable) x and the objective or destination ([dependent] variable) y.
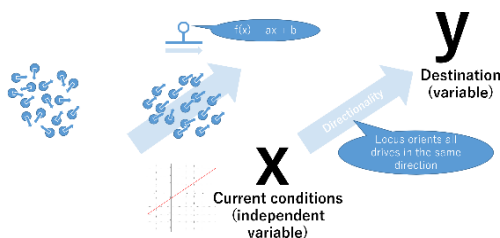
Figure 6: The Directionality of Desire

Deep learning and machine learning cannot automatically adapt to changes in assumptions, commands or circumstances. In other words, they cannot handle situations where an obstacle as depicted below arises.
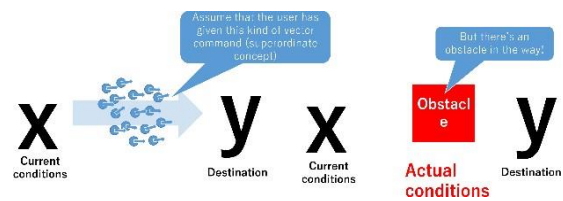
Figure 7: Change in Circumstances

If the operation of ♀ is used in the equation y=x^2-x-2, the obstacle can be avoided as shown in the following graph. However, if we consider what can be done so that a machine can itself derive a secondary function from a primary function,
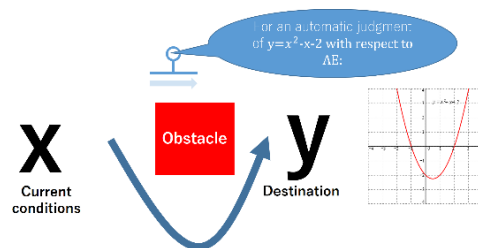
Figure 8: Avoiding an Obstacle

the answer will be any of the following.

A: External command (change of conditions, input of function)

B: Learning (brute force)

C: Trial and error (like a person, based on lack of experience)

D: Emergence (doing something that no one taught it)

Because deep learning and machine learning are capable of A and B, the challenge becomes C and D.

2.5 Trial and Error like a Person

Thus, regarding trial and error, we turned our attention to vector-valued functions and noticed that if we made the ♀ function (2cos(t),4sin(t),t), the mapped vector formed a spiral in a three-dimensional Euclidean space. If given vector-valued function f, we make f_i a function that tracks only the map vector's no. i component (where I equals 1,..., n), then f can be expressed as the nth pair of real functions f_i. By plotting this as a Feynman matrix vector, we can find directionality in the large sense as a vector. The robot can learn by judging whether that vector matches a commanded vector. Because a matrix vector is what Feynman calls "energy", it will also be an idea that can be used in the generation of emergent drives (desires). The domain can be one-dimensional or multi-dimensional.

15
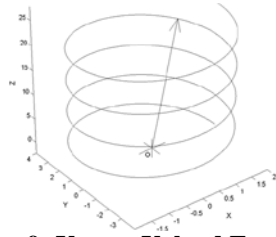
Figure 9: Vector-Valued Functions

The following diagram shows the phase-transition movement of the layers that meanderingly follow the final instruction vector, plotted as a Feynman matrix vector.
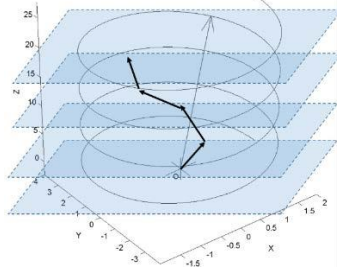
Figure 10: Plotting as a Feynman Matrix Vector

We can see that the vector direction changes with each layer. This can be applied to the generation and change of emotions of an initial-stage artificial ego (virtual ego).

2.6 The Function of Emergence (Induction)

Here, we consider how a machine perceives a person with which it is interacting. For this purpose, we newly defined a new mathematical model called the relationship of "anti". The following table shows this definition.

positive	negative	anti	converse	inverse
+A	−A	A : anti−A	A : converse−A	A : inverse−A

Table 1

If in accordance with this definition, we let the state of "anti" be the "inverse of converse" (inversion of attributes), the elements of emotions will be as illustrated in the diagram below.
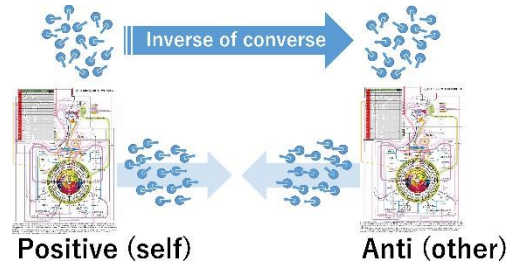
Figure 11: Communication between Positive and Anti

With this, the creation of a robot's drive through inducement with respect to the emotional vector of the counterparty becomes simple mathematically.

A moral and creative autonomous control system for avatars and robots—that is, an artificial ego—can be realized with feedback from anti-fields using the mathematical model we propose. Specifically, this is a model where, regarding a function defined on type U1 that includes as elements all entities that an avatar or robot is aware of under certain circumstances and its opposite, an anti-function defined on type U2 with respect to environment and objects (people and things), when the energy of the function and anti-function are in contention above zero, 1 emerges above U12, which is the opposite of U1 and U2.

If the mathematical model is applied in the following manner, the consciousness and free will of an avatar or robot or what an avatar or robot feels can be defined. More specifically, in a certain framework of thought (circumstances), the domain and range of a function are set so as to include as elements all parameter movements and relationships relating to events that avatars and robots perceive (feel) as being internal, and the domain and range of the anti-function are set so as to include as elements all parameter movements and relationships relating to events that avatars and robots observe as something external. The space combining the domains and ranges of this function and anti-function will constitute the consciousness, or consciousness space, of an avatar or robot. Further, feedback control is applied to the function and anti-function by vectors (free will) implementing control so that the energy of the function and anti-function are in contention at zero above the consciousness space, and after contention, the consciousness space is automatically expanded so that the entities and events up to that point can be captured from the inverse and converse of the consciousness space.

16
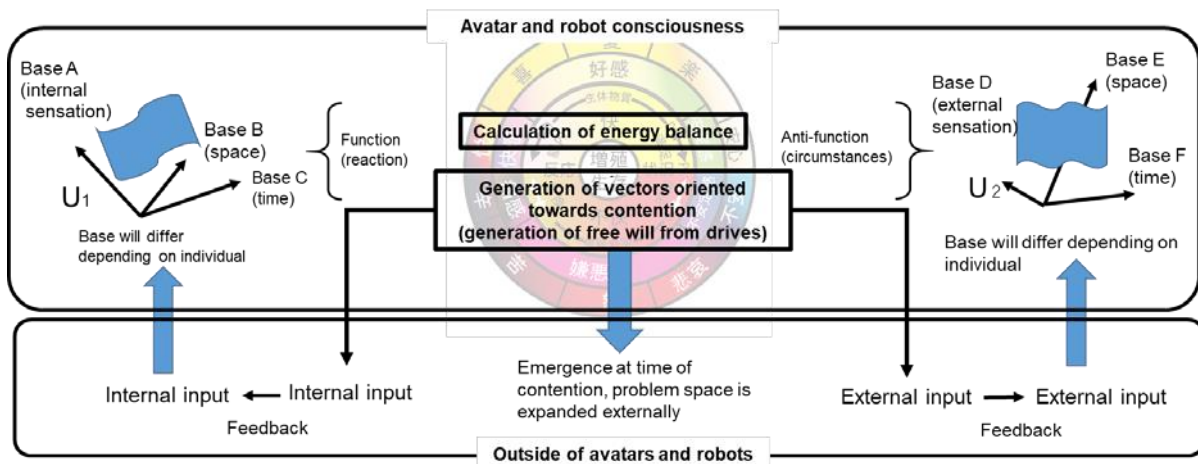
Figure 12: Proposed Model

With this, the concept of "problem" can be defined as an event that impedes the contention between function and anti-function, and the concept of problem solution can be defined as achieving contention between a function and anti-function. Therefore, under our mathematical model, avatars and robots can be realized that have their own free will of trying to solve unfamiliar problems, and when they are solving problems, behavior can be achieved where at the time of problem solving avatars and robot go beyond their framework of thought and attempt to solve the next problem from a larger consciousness space. Further, if avatars and robots can perceive morals as a contention model between the primary free will (drive) that they have internally and cultural knowledge (superego) that they have externally, then it will be possible to

write morals control as feedback control of functions by anti-functions; accordingly, if it becomes possible to derive anti-functions through physical experiments, it will also be able possible to implement a mathematical model for moral control. Further, function-based communications can be realized as a mechanism for avatars and robots to transmit the divergence between the function energy and anti-function energy when the two are not in contention. This mechanism seems to show behavior like harmonic oscillators transmitting divergence from the center as waves, but it engages in behavior that differs from wave propagation by harmonic oscillators in two regards, first in that for all individual pieces, there is emergence at time of contention (mapping to U12) and second in that feedback control operates in the consciousness expanded through emergence.

2.7 The Function of Emergence (Phase Transition)

Next, we will explain the mechanism of emergence through phase transition using the formula of the anti-Einstein field hypothesis in the paper discussed above.

$\lim\limits_{nn\to\infty} \stackrel{\text{요}}{} \lim\limits_{nn\to 0} = 0 \Leftrightarrow 1$ shows that with infinitesimal and infinite 요, for both the infinitesimal and the infinite, the limit for countable numbers for both zero and ∞ is the integer 1; for example, with the infinitesimal, the only existence smaller than 1 will be zero. Therefore, this becomes a world of size (continuous quantity) and an argument of $1 \Leftrightarrow \infty$ or $0 \Leftrightarrow 1$. This expresses, as the smallest unit where time and space can be measured, that when mass / 0, then $\lim\limits_{nn\to\infty} \stackrel{\text{요}}{} \lim\limits_{nn\to 0} = 0 \Leftrightarrow 1$. The broken-line red circle in the following diagram corresponds to this. In the paper, within the Schwarzschild radius at this time, the principle of emergence is shown mechanically.

$$\lim\limits_{n\to\infty} \stackrel{\text{요}}{} \lim\limits_{n\to 0} = 0 \Leftrightarrow 1$$
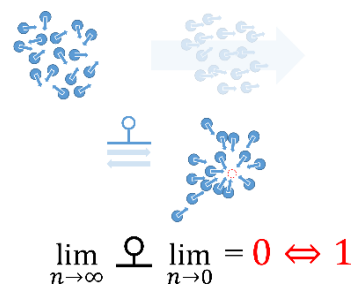
Figure 13: Infinite and Infinitesimal

Through phase transition using this, the class layers in the Feynman matrix discussed above can move freely as in the diagram below. At this time, it is not trial and error but class jumping through phase transition that occurs, and this is used in the principle of emergence.

17
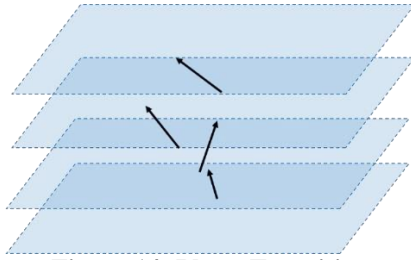
Figure 14: Phase Transition

3. THE "SUPERPOSITION OPERATION" NECESSARY FOR TRUE EMERGENCE

With the infinitesimally small world expressed as the broken-line red circle above, we can think of its structure mechanically as in the diagram below. We then notice that $\lim_{1\to 0}$ and anti-$\lim_{1\to 0}$ are superposed. Instead of multiplication, let us carry out the new "superposition operation".
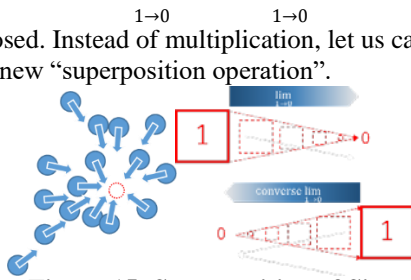
Figure 15: Superposition of Size

"Superposition operation", a technique shown in the following diagram, is a mechanism explained in the above paper, in the section of entitled "Division by zero in an anti-Riemann field".
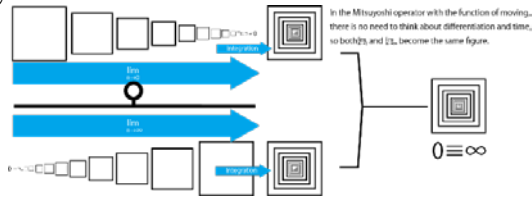
Figure 16: $0 \equiv \infty$

This condition represents phase transition through the colliding energy of ∞ and anti-∞ at the boundary between a null set and anti-null set. We will explain this portion in greater detail as superposition operation.

Let us designate the infinitesimal limit (broken-line red circle) as KU. 1, which is the smallest KU, as expressed by the blue quadrangles. The states from this 1 (blue) to complete nothing (MU) are expressed in the diagram below.
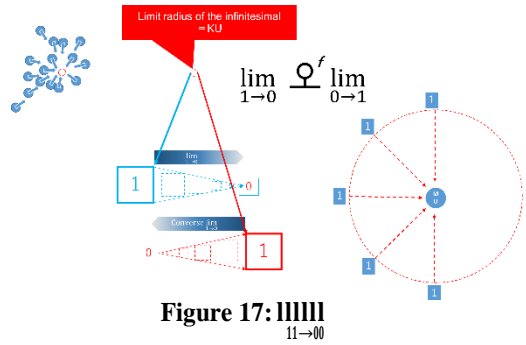
Figure 17: llllll
$_{11\to 00}$

Next, 1, which comes first from KU, is expressed by the red quadrangles. The states from this MU until 1 (red) are expressed in the diagram below.
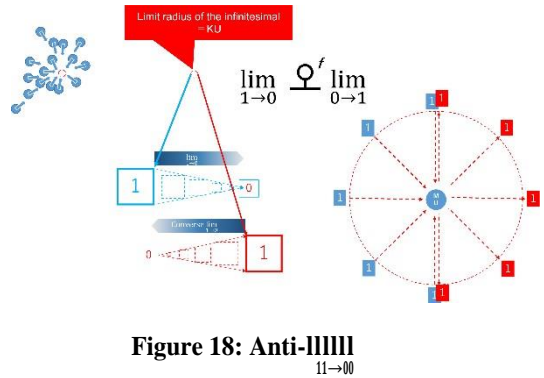
Figure 18: Anti-llllll
$_{11\to 00}$

At this time, we can see the relationship where, at the left-hand side of the circle, the left half heads from 1 to MU, and the right-hand side goes from MU to emergence at 1. We call this calculation of superposition so that they exist simultaneously the "superposition operation". With this, 1 first emerges at the anti-$\lim_{1\to 0}$ field (red semicircular field at left). At the same time, 1 is the $\lim_{1\to 0}$ field (blue semicircular field at right) phase transitioning to the anti-field. In the infinitesimally small world, it is ensured that these will occur simultaneously; this is something that we calculated in the foregoing paper, using a Riemann sphere and anti-Riemann sphere.

4. MATHEMATICAL FORMULA OF GOOD AND EVIL

People tend to think of the concept of good and evil through the context of conflict dualism. We thought about the relationship between good and evil. The following figure shows "good and evil" using division.
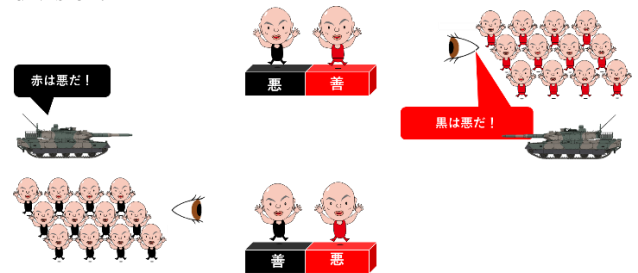
Figure 19: Good and evil

As the figure shows, if what is different from oneself is recognized as an enemy, a conflict

occurs. If we view the recognizable world in terms of "good" or "evil" and consider that good is right and eliminating evil is just and moral, the situation can be shown mathmatically in the following figure.

World ÷ 2 =
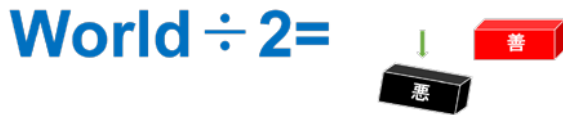
Figure 20: Good and evil expressed with division

However, in this model, if robots and AI consider things by division, the singularity occurs and they will attack people as ordered.
This problem can be compared to a magnet. When a magnet is divided in half, the magnetic polarity of S and N is generated at the respective ends of each half, as shown in the following figure.
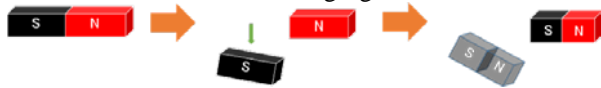
Figure 21: State of good and evil thoughts expressed as magnets

When this is replaced with the previous figure, it appears as below.
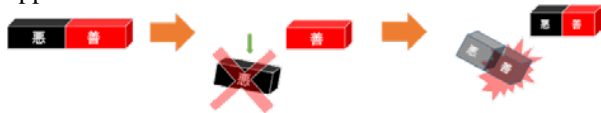
Figure 22: Possiblity of the existence of good in something that is categorised as evil

In this model, the one categorised as evil and then eliminated (killed) has good properties.
Furthermore, considering the physical property of a magnet, the situation will appear as in the following figure.
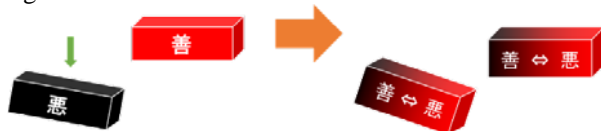
Figure 23: What if the relationship between good and evil is regarded as a gradation, which is a characteristic of a magnet?

We thought that if robots were capable of recognizing good and evil in a manner analogous to a magnet, the world would change.

The problem becomes an issue of how to realize this problem becomes an issue of how to realize as engineering the "superposition operation" which we posit can be calculated mathematically. Thus we created, similar to "logic gates" in computers, "function-based quantum gates" necessary for artificial ego emergence calculation.

4.1 Dividing by Zero with the Mitsuyoshi Operation (Cut Operation)

There was a need for a symbol that could enable a "concept" not indicating quantity, such as "right" and "left", to be included in a formula. For example, let us consider an apple being divided into two. With mass of the apple as the reference 1, if this is divided into two equal parts, there will be two pieces with a mass of 0.5. In order to express this state, there was a need to replace the traditional division operator of ÷ with a different symbol for cutting (cut operation operator), namely, the symbol ⊥.

This is Newton's law of universal gravitation. In 1973, the author tried changing this into a slightly different form.

Figure 24: Newton's Law of Universal Gravitation

Dividing one apple into two ... One apple became two pieces But with the division operation, the results are as in Figure 25.

Figure 25: When an apple is expressed with division

÷2= ? Where did the other piece go?

This is a different arithmetic operation from division.
Should we write this?

Figure 26: The Cut Operator, Which is Different from Division

If we do this, as shown in the diagram below, when an apple is divided into two, the parts will not be the same size, there will be a large one and a small one. Let us designate (⊥) as the operation symbol for cutting one apple into two. The means of writing the results (state) is shown below. Figure 4 shows changes in pieces with the cut operation

Figure 27. When an apple is calculated using the cut operation ①

This is also happening. Let's align both ends! And connect both ends with rails! Call the ends

right and left! Let's write in the middle like this!
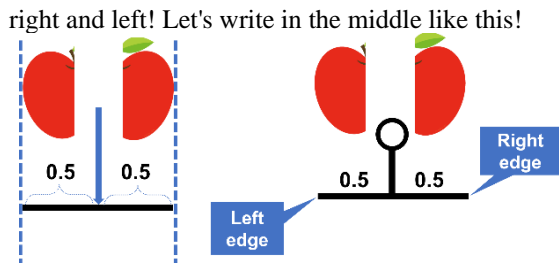
Figure 28. When an apple is calculated using the cut operation ②

This is a sign that the lever moves freely between the left and right ends!

What if the division is slightly off?
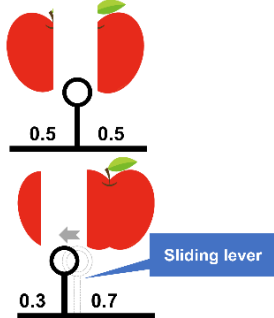
Figure 29. When an apple is calculated using the cut operation ③

We can see that the ($\underline{\varphi}$) used here follows the instruction of dynamically moving the right end and left end. If this cut operation operator $\frac{\cdot}{\cdot}$ and the Mitsuyoshi operator $\underline{\varphi}$ are used to express the state of one apple being divided into two in an equation, this can be written as

$$1 \frac{\cdot}{\cdot} 2 = \text{left piece (A)} \underline{\varphi} \text{ right piece(B)}$$
Equation 1

We notice that the two ends of $\underline{\varphi}$ are in fact not numbers but concepts (consciousness). With this type of calculation, it is possible to easily handle not just numbers and quantities, but also "concepts" such as left and right at the same time within a single equation. Meanwhile, for "quantity", too, with the ratio between the weights of apple pieces A and B (continuous quantities) as x:y, the calculation of the continuous quantity is possible. For example, when actually dividing into two, there are cases where the ratio is not even but is uneven, such as 0.3:0.7.

$$1 \frac{\cdot}{\cdot} 2 = 0.5 \underline{\varphi} 0.5 = 0.3 \underline{\varphi} 0.7...$$
Equation 2

In order to be able to write an equation that covers both 0.5 $\underline{\varphi}$ 0.5 and 0.3 $\underline{\varphi}$ 0.7, we gave the $\underline{\varphi}$ symbol a slider function. This enabled the boundary between x and y to continuously move. Meanwhile, for "numbers", this can be written:

$$1 \frac{\cdot}{\cdot} 2 = A(x) \underline{\varphi} B(y)$$
Equation 3

$$\frac{\cdot}{\cdot} \quad X = A \underline{\varphi} B \underline{\varphi} C \langle X-1 = \text{number of } \underline{\varphi} \rangle \langle \Sigma$$
$$= A(x) + B(y) + C(z) \rangle$$
Equation 4

This enables a "concept" such as left and right and "numbers" and "quantity" to be written in a single equation, as in Figure 30. The relationship between x and y is like this.
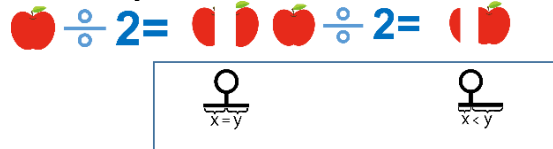
Figure 30: Slider function of Mitsuyoshi operator

÷	$\frac{\cdot}{\cdot}$(cut)	Number of $\underline{\varphi}$
÷X	$\frac{\cdot}{\cdot}$ X	(X-1)
÷3	$\frac{\cdot}{\cdot}$ 3	(3-1)
÷2	$\frac{\cdot}{\cdot}$ 2	(2-1)
÷1	$\frac{\cdot}{\cdot}$ 1	(1-1)=0
÷0	$\frac{\cdot}{\cdot}$ 0	(0-1)=-1

Table 2. Relationship between number of Mitsuyoshi operators and division and cut operation

Let us simplify $1 \frac{\cdot}{\cdot} 2 = A(x) \underline{\varphi} B(y)$. First, we stabilize the sum of the respective sides of the =, namely, $1 \frac{\cdot}{\cdot} 2$ and $A(x) \underline{\varphi} B(y)$, as Σ. Next, we turn our attention to length or other continuous quantity (x, y) that is a different aspect of A and B, which are "concepts". If at this time we perform the arithmetic (operation) of moving $\underline{\varphi}$, x and y can be freely changed. For this dynamic function to be able to confine this x, y within Σ, it is necessary only to write:

$$\Sigma \frac{\cdot}{\cdot} X = A \underline{\varphi} B \underline{\varphi} C…$$

Where (X-1) is number of $\underline{\varphi}$ and X is number of values A, B, C
Equation 5

With this, the "cut operation", which is different from the equal-portion-based "division" and "fractions", was created.

We expressed the means in which robots recognize the world in Mitsuyoshi operators []. The figure below is the model.

Figure 31: Method of simultaneous calculation of human consciousness with the discrete separation model (digital binary) and continuous model of the natural world

Here, we have confirmed that the gradation model (continuity of the natural world) and separation model (separation of consciousness) are expressed in the same formula.

5. FUNCTION-BASED COMMUNICATION

In order for one (human) operator to control 1,000 or more robots, function quantum bit communications and function-based quantum gates will be effective.

(i) A person's consciousness can be compressed into a function.

(ii) A person's consciousness can be stored in memory as a function, which can be reproduced at any time as a feeling,(iii) These can be achieved for practical use instantaneously with light function-based communication.

Accordingly, function-based quantum gates (patented) will be the protocol.

Quantum jump	Particles	Waves	Gate
KU	MGN(＋)	MGN(−)	MU
$\lim_{nn\to 0} \varphi \lim_{nn\to\infty}$	mass/∞	mass/0	(0≡∞)
Superposition operation	Division by infinity	Division by zero	BH equation

Table 3. Function-based quantum gates will be the protocol.

The following is a comparison between a function-based quantum gate where this computational formula is used as the protocol and an existing logic gate.

Comparison between function-based quantum gates and logical gates

Inputs and outputs are calculated and executed with wave functions as the function-based quantum bits (Function-based quantum gate computing)

·Distance (digital)
·Amount of spatially continuous change (analog)

·Interference by positive world, anti-world

Wave function with time axis changed

Function-based quantum KU gate

Reflecting the strength of the wave function overlap relationship

Inputs and outputs are calculated and executed with (0.1) as the logic bits (Logic gate computing)

·Logical bit 0.1 (digital)

· Logical bit 0.1 (digital)

Logic gate (circuit)

A:111001
B:010110
Y:101001
B:101001

Fig. 37 Function-based quantum gates and Logical gate.

Professor Nakamura of Stanford points out that the Mitsuyoshi operator used here is itself a function-based quantum gate in a quantum state based on an N-dimensional unitary space that is a complex space.

6. MATHEMATICAL COMPARISON BETWEEN AI AND AE.

6.1 Comparison of Mathematical Models

Energy physically corresponds to drive and desire. Accordingly, the states of energy in mathematical models of AI and AE for energy were compared.

6.2 Results

AI, as a natural result of its probability model mathematics, implies entropy, in the statistical mechanics entropy sense of measure of the microscopic "disorder" of a system; therefore, energy is not stable and entropy increases. This happens because, in the transition from a state of equilibrium to another state of equilibrium (phase transition), before and after the transition, system entropy does not decrease but almost always increases. Because of this, AI was fated from the start to be unable to decide a directionality (vector) that represents a clear free will.

However, with the mathematical model used with the AE function-based quantum gate model, the relationship between positive and anti shows the phase transition sum total, so in the positive field entropy decreases, and conversely, in the anti field, sum total balance is maintained by increase or decrease in entropy. This showed that a response (free will) can be given showing the directionality necessary for a judgment as an ego in the positive field.

7. PRELIMININARY EXPERIMENT

The only specific experiment that has been carried out for this research was the public experiment using the initial artificial ego, and the only results that were confirmed were the out-of-control emotions of the robot. How are the emotions of a robot different from the emotions of a person? Is this what is called the consciousness and free will of people? What is this strange behavior of this robot now moving out of control? If this is something that was programmed, then it can't be called the robot's consciousness. These fundamental questions came from a neuroscientist (Dr. Kenichiro Mogi) who attended the experiment. In this paper, we have disclosed these social science concepts of "consciousness", "free will" and "emotion" as mathematical models and algorithms, and have shown their validity using a physics model and a geometric model.

8. DISCUSSIONS

Current neural networks are said to derive answers stochastically, but in reality, they derive concepts of the route to arrive at an answer. However, from the mathematical comparison, we can see that with the AI approach using existing probability models, there is an eternal loop and entropy only increases. The human brain will also repeat loops several times, but after two or three loops will derive a conclusion; if we call this free will and judgment, then the fact that the reduction of entropy and phase transition could be confirmed by the mathematical technique used in the TOE hypothesis using the Mitsuyoshi operator and the function-based quantum gates proposed here, has great meaning. However, change in entropy in the positive field will be change in the inversed anti field. Therefore, what should be done with the anti field? Further, we believe that this will provide a large hint as to whether a system of empathy, where the counterparty is thought about in the context of relationship with the counterparty, can develop as a superego.

9. CHALLENGES GOING FORWARD

Research is needed, using actual prototypes and free conversation avatars, of how the free will and desire generated from the feelings and drives arising emergence of the artificial ego using the function-based quantum gates proposed here are different from those of people. To that end, we are currently building an artificial ego. At this time, as a test corresponding to the Turing test for artificial intelligence, if an artificial ego can provide a problem resolution method for questions that people can't answer, such as "why is it wrong for people to murder?" and "can we have both freedom and equality?" or presents a method for resolving the trolley problem that a human could not come up with or presents other "design or thought that people cannot program beforehand", then we will be able to say that machines possess "consciousness", "free will", "feelings", etc.

10. CONCLUSIONS

10.結論

In this article, we propose an architecture in which robots recognize good and evil. We suggest a new method of recognizing good and evil using Mitsuyoshi operators in a mathematical model, which is expressed in a matrix vector by "free will" and "emotion". We also express "emergence" of "consciousness" in the transition of the matrix vector in the extreme after introducing converse, and the concept of "anti," which is different from converse.

Currently, the only specific experiment of the AE was the public experiment using the initial version of the AE which only has its own emotion. And there were several criticisms to the ambiguity of definitions about "consciousness", "free will" and "emotion". Our proposals above are one of answers to the criticisms.

Further investigation will be necessary to confirm the difference between actual humans and our AE by using robots currently available on the market.

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SOCIAL IMPACT ANALYSIS BY SMART PHONE VOICE

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Abstract. *We have previously reported on the use of voice analysis technologies to assess stress and depression levels. In this study, we used data from a smartphone application called MIMOSYS (Mind Monitoring System), which uses this technology, to see if we could show the impact of incidents such as earthquakes and pandemics on the mental health of the general public. In the case of the Kumamoto Earthquake, we found there were regional differences in its impact on people's mental health. In addition, we found that, during the coronavirus (COVID-19) pandemic, people actually felt more stressed about restrictions related to self-isolation than from fear of the pandemic itself. The study suggested that, if this technology were to be used more widely, it could, potentially, enable better policymaking and target regions that need assistance when such an incident occurs.*

Keywords: Kumamoto earthquakes, Covid-19 pandemic, social psychological impact, voice biomarker, smartphone application

1. INTRODUCTION

Recently, interest has been growing in research using speech as a biomarker [1, 2]. This type of research has become possible due to the development of computers, that is, the vast improvement in computers' processing speed. For example, with regard to input devices, the paper tape used for data entry in the 1960s has been replaced by keyboards, mice, touch panels and, more recently, voice input. Smartphones, now used by most people, have more computing power than former supercomputers, and voice-operated devices like smart speakers are becoming commonplace. In other words, it has become extremely easy to capture and analyse speech. In medicine, the interest in speech biomarker research is growing because it is a way to potentially provide doctors with objective indicators in domains where they have to rely too heavily on their subjective judgment.

We have already published a number of studies on technologies for assessing stress and depression levels in the human voice [3-7]. In brief, using a technology by AGI, Inc. Japan called Sensibility Technology (ST), a speaker's emotions can be inferred
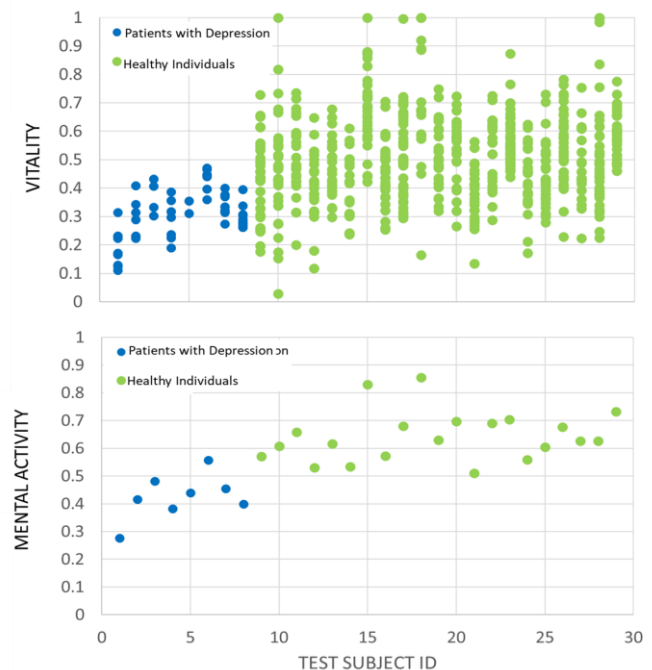
Fig. 1: Vitality and mental activity: Healthy individuals vs. patients with depression [9]
The vertical columns show multiple measurements for the same subject. In healthy individuals (in green), vitality fluctuated significantly. In patients with depression (in blue), fluctuations were smaller and they never exceeded 0.5. Mental activity, which takes into account the two-week vitality mean and variation, can be used to easily identify patients with depression.

from their voice. First, ST assesses the levels of four emotional components, namely, joy, sorrow, anger, and calmness, as well as the level of excitement in the person's voice. Using these emotional levels, a "vitality index" is calculated from the balance between joy and sorrow and the balance between calmness and excitement. In addition, a "mental activity index" is calculated from the mean and variation in vitality levels over two weeks [8]. As the results in the graphs in Fig. 1 show, the less energetic, that is, the more stressed the participants,

the lower their mental activity level [9]. This technology is already used in the Mind Monitoring System (MIMOSYS), a smartphone application developed by PST, Inc. Japan, which is publicly available and can be used globally. In Japan, cloud services using it for corporate health management have been developed and it is preinstalled on some smartphones.

MIMOSYS is most commonly used to monitor mental health. It raises user awareness of their mental states, facilitating behavioural change [10]. An advantage of using voice in this way is that, because it is non-invasive, continuous monitoring is possible. In addition, data sharing allows for remote monitoring. That is, in cases in which self-monitoring does not result in behavioural change, others can intervene to assist [11]. Fig. 2 shows an example of a person who ended up in a crisis as stress due to personal problems mounted, until professionals intervened to help the person out of their crisis.
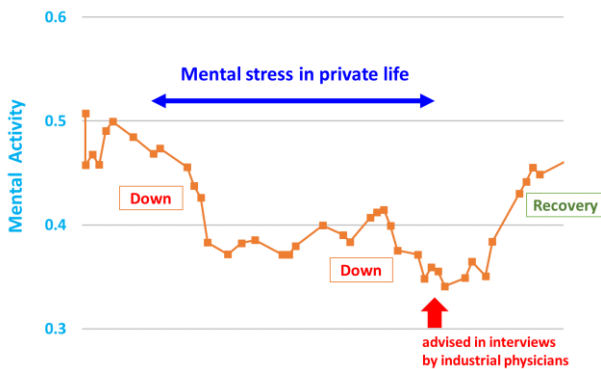
Fig. 2: Monitoring mental health using MIMOSYS: An example [11]

Although prominent declines were seen in mental activity during a period of personal stress, the activity level returned to normal after interventions by an occupational physician.

Another use of MIMOSYS is to screen for mental health conditions. As already mentioned, using the voice makes the screening process simple and non-invasive. As a result, it could be used in large populations. In addition, because the indicators derived are objective, they are free of reporting bias (i.e., participants consciously responding to health-related questions selectively resulting in an underreporting of symptoms) seen in assessments using a questionnaire (Fig. 3). However, although a single voice analysis by MIMOSYS has about the same sensitivity as a commonly used questionnaire, its specificity is low, resulting in many false positives (Table 1). This can be overcome by analysing two weeks of speech data, but the issue remains when the application is used for screening.
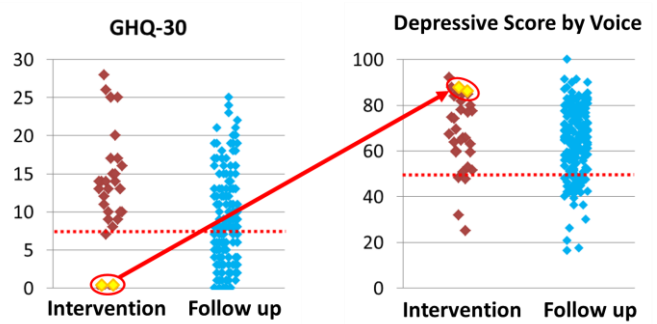
Fig. 3: A comparison of GHQ-30 (a self-administered questionnaire) scores and voice analysis scores for depression

Of the individuals found to be in need of medication or counselling (the intervention group) based on interviews, two had scores on the self-administered GHQ-30 that suggested reporting bias. Voice analysis was able to rate their conditions as severe. However, of the participants thought to be in need of follow-up treatment (the follow-up group), voice analysis rated more of them as being depressed than the questionnaire (16th World Congress of Psychiatry presentation materials).

Table 1: A comparison of GHQ-30 scores and voice analysis scores for depression

Voice Analysis		Medication & Counseling		
		+	-	
Score	50<=	26	162	188
	50>	3	34	37
		29	196	

Sensitivity: 0.897, Specificity: 0.173

GHQ=30		Medication & Counseling		
		+	-	
Score	7<=	27	123	188
	7>	2	73	37
		29	196	

Sensitivity: 0.931, Specificity: 0.372

While both voice analysis and the GHQ-30 demonstrated good sensitivity, voice analysis demonstrated poorer specificity (16th World Congress of Psychiatry presentation materials).

The third way MIMOSYS can be used is to determine the effectiveness of an intervention [12]. Fig. 4 compares the effectiveness of a stress resilience programme over time for participants who followed the programme for 13 days or more with those who dropped out by day 12. Participants in a state of good mental health at the start did not experience any benefit from the programme, so lost motivation and
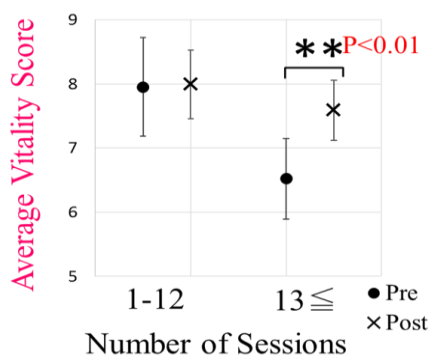
Fig. 4: Intervention effectiveness evaluation using MIMOSYS [8]

The effectiveness of a stress resilience programme was compared for the two groups using MIMOSYS. Individuals who had dropped out of the 50-session programme by the 12th session, had high vitality scores to start with and no change in those scores when they dropped out. Individuals continuing for 13 or more sessions had low scores at the start and an improvement was seen due to the intervention.

dropped out. However, those who were stressed to begin with did feel some benefit and continued with the programme, and consequently their mental state improved.

In the same way that the effect of an intervention on mental health can be shown, it should therefore be possible to find out how much of an impact a stressful event has on people. Thus, the purpose of this study was to investigate the emotional impact of disasters on people, using data from a publicly available smartphone application.

2. DATA COLLECTION

The voice data were collected and analysed by MIMOSYS, which was installed on individuals' smartphones. When a call was made, only the user's voice was recorded and when the call was completed, the data were automatically analysed and the results anonymously saved on the phone and either on a server owned by the University of Tokyo or by PST, Inc. The voice data on the phone were deleted immediately after analysis. The data saved on the servers were associated with a number unique to each phone that could not be used to identify the phone's owner.

2.1. The Kumamoto Earthquake

On 14 April 2016, an area in western Japan centred in the Kumamoto Prefecture experienced a very unusual series of earthquakes. During the first two days, there were three consecutive earthquakes

with magnitudes of 6 or more and a total of 20 earthquakes with magnitudes of 5 or more over six days following the first earthquake on 14 April. The study period was divided into three five-day periods: the five days prior to the earthquakes (P0), the five days after the earthquakes started (P1), and the five days of smaller aftershocks that followed (P2) (Fig. 5).
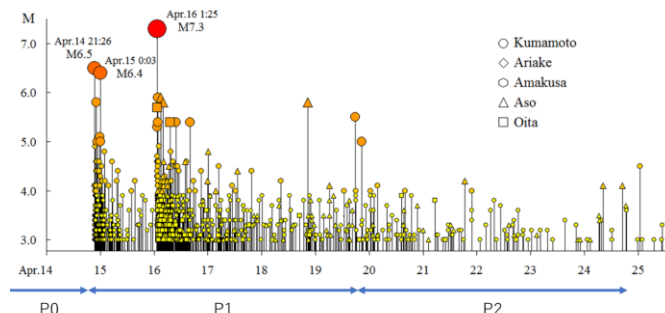
Fig. 5: The Kumamoto Earthquake: Time, scale, regional distribution

During the first two days, three earthquakes of magnitude 6 occurred in succession. Overall, for the six days starting on 14 April 2016, 20 earthquakes of magnitude 5 or more occurred. Chart is based on

https://www.jma.go.jp/jma/indexe.html （ https://commons.wikimedia.org/w/index.php?curid =48378131）

The sample consisted of 236 of the 3,125 MIMOSYS users who had made one or more calls during at least two of the three periods. Those users were grouped into nine geographical areas for the analysis. In Fig. 6, the area in red was the epicentre and the areas in orange were near the epicentre. The rest of the areas are shown in yellow except for the area in blue which was the region devastated five years previously by the Great East Japan Earthquake.

Because users of the application were concentrated in metropolitan regions, the number of participants in other regions was small. However, characteristic trends for each region were evident. In the disaster area near the epicentre (in red), vitality and mental activity levels fell during the period of severe seismic activity (P1) and then recovered somewhat afterward (P2). The magnitude of the impact of the earthquakes on mental health was evident. In regions adjacent to the disaster area, depression gradually increased. The fact that the epicentre moved every time there was another earthquake may have increased people's anxiety about becoming the next victims. In the other regions, no significant changes related to the timing of the earthquakes were found. However, in the region that was affected by the Great East Japan Earthquake five years before, changes were found that differed from all the other regions. Without having conducted any further investigation, we could
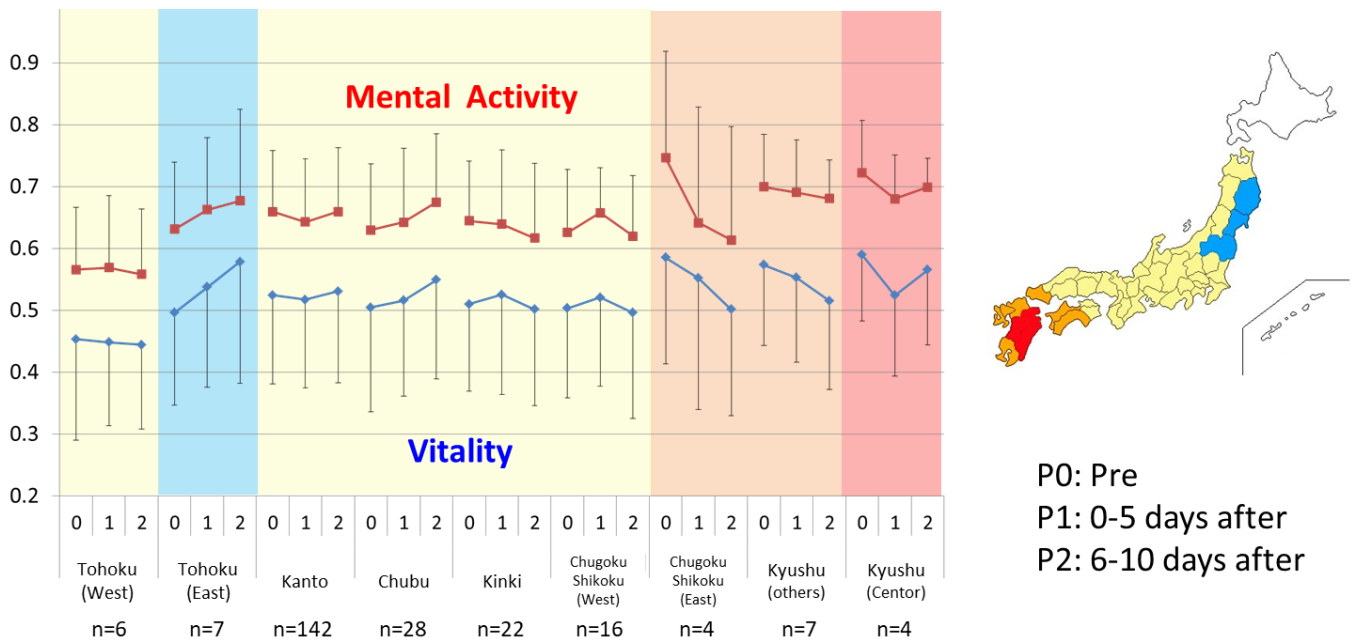
Fig. 6: Kumamoto Earthquake: Changes in vitality and mental activity by region [10]

In the disaster area near the epicentre (red), vitality and mental activity levels fell significantly during the severe seismic activity and recovered somewhat afterward. In regions near the disaster area (orange), depression gradually increased. In the other regions (yellow), no significant changes related to the timing of the earthquakes were found. However, in the region that was victim to the Great East Japan Earthquake (blue) five years before, changes were found that differed from all the other regions.

only speculate that this difference could be indicative of responses related to post traumatic stress disorder (PTSD) or other psychological conditions.

2.2. The COVID-19 pandemic

Although the spread of the coronavirus (COVID-19) pandemic appears to have peaked in some countries as of this writing, with 130,000 new infections being reported daily [13], and with no sign of the pandemic coming to an end. In addition, many countries that had reopened their economies once new infections seemed to be under control are now seeing a second wave of infections.

With no effective cure or vaccine available, treatment is centred on controlling symptoms in order to save lives. In the early stages of the pandemic, countries in the midst of the epidemic took preventative measures that kept people from coming into close contact with others by locking down cities and having everyone stay home, and going out only when necessary. However, now, the process of reopening economies and resuming life is gradually accelerating. To make that possible, people are asked to practice social distancing in an attempt to reduce actual contact with others. These measures have made people feel isolated and brought economies to a standstill. As a result, life has become hard for many due to a loss of employment or reduced income. Various authoritative bodies, including the World Health Organisation (WHO), have drawn attention to the need to care for one's own and others' mental health [14].

Unfortunately, there is no clear answer to the question: "How much impact has the pandemic had on people's mental health?" Of course, some evidence of the impact has come to light, albeit gradually. For example, a Chinese study found that nearly half of the healthcare professionals caring for patients with COVID-19 complained of depressive symptoms [15]. In addition, Rogers et al. performed a review and meta analysis of studies of psychiatric conditions in patients with COVID-19 [16]. However, as far as we could establish, there have been no studies looking at objective indicators of mental health for an entire society. Thus, we performed a study based on data collected through MIMOSYS to find out how stressed a sample of Japanese were due to Japan's self-isolation measures [17].

For the present study, the study period was from 1 January to 6 June 2020. Of the 5,246 users of the application in Japan, 126 users of android OS smartphones that continuously performed the automatic voice analysis during calls were selected for the sample. Of those, we only selected the analysis results when at least three call analyses were performed in a two-week period. As a result, the study's analysis was based on 8,669 call analyses for 90 users. In addition, weekly means and standard errors for the overall sample were calculated from the weekly means for each individual.
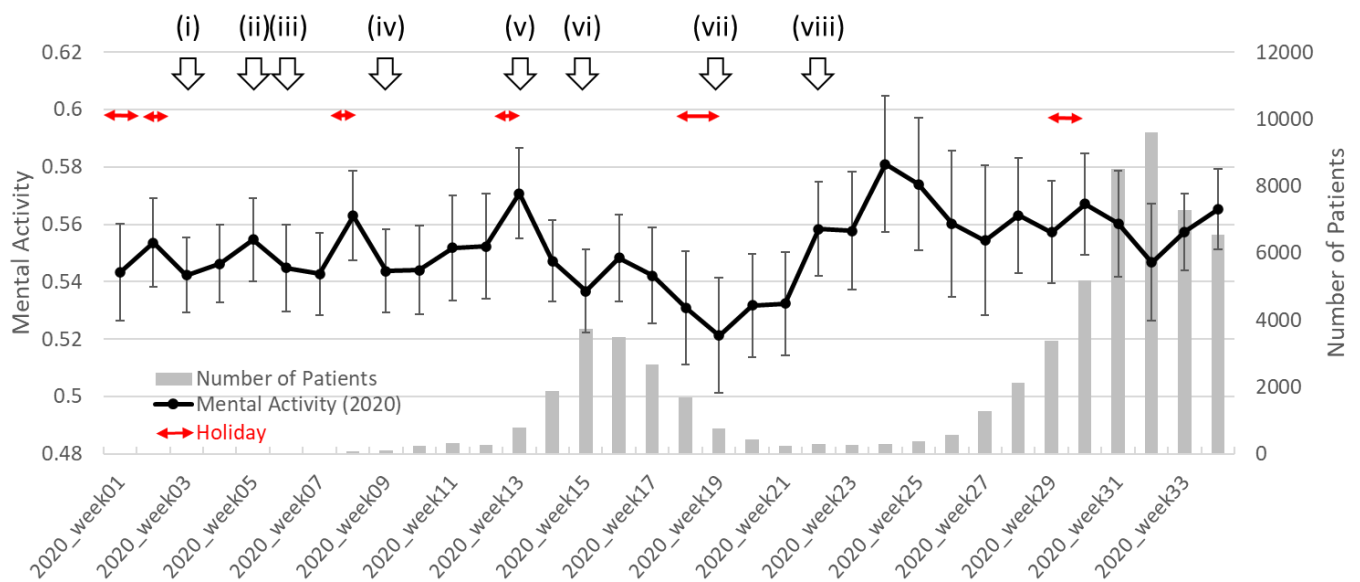
Fig 7.: Change in voice stress mental health indicator due to COVID-19 pandemic

The graph shows the weekly means and their standard errors. The gray background represents the period of outing restrictions. (i) First case of infection reported in Japan. (ii) Charter plane brings 206 Japanese back from Wuhan. (iii) The WHO declares a public health emergency; the quarantine of the Diamond Princess cruise ship begins. (iv) Elementary, middle, and high schools closed. (v) The governor of Tokyo mentions lockdown. (vi) State of emergency declared (voluntary isolation at home). (vii) State of emergency extended. (viii) State of emergency lifted.

There was no clear correlation between the number of patients reported and mental activity,

Reviced form [17]

Fig 7. shows the trends in mental activity over the 23 weeks of the study period. Although there were short-term declines due to several pandemic related events, the steepest declines were related to the state of emergency which mandated voluntary self-isolation at home. Specifically, events that coincided with moderate temporary declines in mental activity were: (i) the first case of infection being reported in Japan; (iii) the WHO declaring a state of emergency and the Diamond Princess cruise ship being put under quarantine; and (iv) the closing of elementary, middle, and high schools. However, mental activity started declining continuously starting with (v) the governor of Tokyo announcing a lockdown, and then the decline accelerated with (vi) the declaration of a state of emergency (voluntary self-isolation at home). Subsequently, when (vii) the state of emergency was extended, mental activity began to recover; and, when (viii) the state of emergency was lifted, it returned to normal levels. A potential explanation for this could be that, when the state of emergency was extended, it was done with a clear end date. The general public may have responded more negatively to open-ended restrictions that directly affected them than to fear of the pandemic. Then, when a clear deadline for the restrictions to be lifted was announced, their mental activity, based on greater optimism, was able to return to normal.

3. ETHICAL CONSIDERATIONS

This study was conducted with the approval of the Ethics in Research Committee of the University of Tokyo School of Medicine and in compliance with the MIMOSYS user agreement and the privacy policy of the developer (PST, Inc.). The need to obtain informed consent from the owners of the phones was waived."

4. DISCUSSION

In this study, we presented a method for using voice analysis to assess the impact of major incidents, such as earthquakes and pandemics, on the mental health of the general public. A limitation of this study was that the sample may have been too small to eliminate the effects of personal biases in the participants . The use of larger samples in future studies should allow for more representative assessments of the impact of such incidents on the entire country or a specific region. That could enable better policymaking and better identification of regions that need assistance when such an incident occurs.

On the other hand, in order to expand the collection of this kind of data, the reality is that barriers protecting personal information would need to be negotiated. In fact, from the perspective of the need

to protect personal information, the automatic recording of conversations has recently been disabled on android phones. For the same reason, this was already true for iPhones. This was an issue given that our research to date has shown that the application usage rate falls significantly when conversations cannot be recorded automatically and the user has to open the application to record conversations manually. Going forward, it appears there will be a need to look into this mechanism or other means to run the application continuously.

5. CONCLUSION

This study presented a method for assessing the impact of incidents such as earthquakes and pandemics on the mental health of the general public using voice analysis. Although the potential for personal bias in the results was not eliminated due to the small sample size, the study was able to adequately demonstrate the viability of this approach.

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INTEGRATION OF PROJECT AND ORGANIZATIONAL CHANGE MANAGEMENT: TOWARDS SUSTAINABLE VALUE CREATION

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Abstract: A large and fruitful arena of theories and practices of project and change management disciplines often show these two areas as independent in its basis. However, it has been recently recognized that project and organizational change management disciplines are complementary with a common objective to an organization, i.e. to increase project and change success rates, further implying improvement of overall organizational performances. To understand if project and organizational change management integration represent a path for sustainable value creation for organizations, this paper focuses on empirical research aiming at understanding integration value and dimensions of integration that can build capabilities for a successful project and organizational change outcomes. Overall research results show that multiple values can be obtained by integrating two disciplines.

Keywords: *Project management, change management, sustainable value creation, organizational performances, project and organizational change success*

1. INTRODUCTION

Pressure for constant organizational development and growth, increased by disruptive innovations, foster acceleration of various types of projects and changes that are characterized by uncertainty and complexity. The success rate of projects, especially in organizational change is still low. Such circumstances have led to the introduction and adoption of project-based mode of operation in different industries [1]. Organizational change management (OCM) and project management (PM) are often viewed as puzzled [2]. Similarly, it has been noted that project management and change management are frequently thought to be the same thing [3]. However, current management and organizational literature did not sufficiently cover the topic of project and change management integration, especially not with an empirical approach.

This paper sets out to extend and deepen the understanding of project management and organizational change management integration as a prerequisite for sustainable value creation, based on data collected from banking, IT and other industries. We aim to empirically examine and explain all relationships and perceived importance of various attributes of the domains with regard to this phenomenon by identifying key benefits if organization integrates project and organizational change management disciplines.

2. LITERATURE REVIEW

2.1. Project management

Project is defined as a temporary organization built with the purpose to produce a unique product, service or result. Singular and unrepeatable voyage consisting of specific aim, scope and definite period of time, represent basic characteristics of temporary organization, i.e. project [4, 5, 6, 7, 8]. Project management represents planned and organized effort to accomplish a particular objective.

Many authors have attempted to define project management. One of the earliest definitions is:
"Project Management is the application of a collection of tools and techniques (such as the CPM and matrix organisation) to direct the use of diverse resources toward the accomplishment of a unique, complex, one-time task within time, cost and quality constraints. Each task requires a particular mix of these tools and techniques structured to fit the task environment and life cycle (from conception to completion) of the task" [11].

Another definition see project management as:
"The planning, monitoring and control of all aspects of a project and the motivation of all those involved in it to achieve the project objectives on time and to the specifed cost, quality and performance" [12].

Extended definition is given by the UK Associitiation of Project Management (APM), defining project management as:
"The planning, organization, monitoring and control of all aspects of a project and the motivation of all involved to achieve the project objectives safely and within agreed time, cost and performance criteria. The project manager is the single point of responsibility for achieving this" [13].

Regardless of the definition, according to Project Management Institute [14], project management consists of five common processes: Initiating, Planning, Executing, Monitoring / Control and Closing. Project management within organization brings strategic value chain that enables organizations an edge over competitors [16]. Despite its significance, most organizations record around 70% of project failure rate [17]. Viewed from another perspective, many authors, e.g. [9, 10] see projects as significant driver for organizational changes. It has been noted that organizational change management has low presence in the literature of project management [15]. However, recently has been formally acknowledged the incorporation of organizational change management to project success [15], representing significant shift in one hand, and the possibility for further research and development of the phenomenon, on the other.

2.2. Organizational change management

Currently, organizational aspects such as strategy, business model, structure, processes, culture, employees' activities, mindset and many others are challenged by the change phenomenon [18, 19, 20, 21, 22]. Regardless of the level at which change occurs, type, origin, size or duration, it has been argued that organizations need to understand that change is not a straightforward and immediate phenomenon [23]. Kotter

noted that change represent a process consisting of series of phases that often requires a substantial length of time [24]. Lewin's three-step model includes the following stages: unfreezing, shifting to a new level and refreezing the changes. The model emphasizes an understanding of how social groups are composed, motivated and sustained [25]. As an extension to the Lewin's work, several authors have developed Lewin's three-step model with the aim to make it more practical [21, 26].

Bullock and Batten [27] have developed a four-phase model. This model refers to planned change and splits the process into the following stages: exploration, planning, action and integration. The model focuses on the processes of change that describe the methods utilized to shift a situation from one shape to another, yet depicts change phases that organization is required to run, with the aim to enhance the success rate of change process [27]. Bordum [28] in his work described a previously developed generic and circular change model that include five main phases, i.e. preparation phase – referring to analysis of the situation, analysis of business-problem, and the availability of resources; planning phase that implies design plan for long-range, medium-range, short-range: objectives, goals, purposes, strategies, policies and other; implementation phase that includes organization and actions towards finalizing the plan; evaluation of results and final phase that implies plan revision by repeating the planning process [28]. Judson change model was proposed in 1991. Judson's model constitutes of five phases too, starting from analyzing of an organization, planning activities for change, communication with stakeholders and the final phase that refers to reinforcement and institutionalization of change. This model takes into account barriers that might occur in each phase and considers actions towards minimizing these limitations. Yet, resistance to change has been found as the biggest limitation to successful change [29]. Kanter et al. [23] have developed a comprehensive change model that consists of ten phases. The model starts with an analysis of an organizational situation, development of vision and plan, implementation of change with the involved leader, and finally, communication and institutionalization of change. Also, authors recommend the involvement of employees in the change process to reduce resistance and emphasized that only after obtaining the support and involvement of employees, actual implementation can occur [23].

A model that is acknowledged as a holistic one is the Kotter's change model [30]. The model is designed with eight steps, i.e.: establishing a sense of criticality, assembling a trustworthy team to effectively support change, creating a vision and strategy, disclosing a vision to stakeholder group, applying the change and planning short term win-win approach, consolidating benefits and continuously institutionalizing a change. It has been argued that lack of success when implementing a change could be overcome with this model, taking into account that Kotter has found key traps that leaders make when implementing a change [30].

Moorhead and Griffin have proposed their model - Moorhead - Griffin change model that is created for situations when continuous change occurs [31]. The model takes into account fact that change is not an exceptional phenomenon in today's highly dynamic economy, thus the first step in the model refers to analyzing of external and internal forces that influence a change. Understanding and defining problems by using complex diagnostic analysis represent actions in step two, followed by problem solving process. After this phase, implementation, monitoring, control and evaluation steps were proposed by authors to successfully complete change efforts. Besides, this model introduces transition management with the role to emphasize particular management practices that should be taken into account in all change management phases, i.e. from initial situation to the preferred situation [31].

Insurrection model, designed by Hamel is introduced with arguments of necessity to create new wealth opportunities for organizations that operate in a business environment characterized by nonlinear and radical changes. To effectively respond to changes, the model contains eight steps for successful change, starting from the phase of designing a strong plan, writing corresponding policies, building a team, implementing and incorporating a change within an organization [32].

On the other hand, Luecke highlights the significance of recognizing the need and urgency for change and points out that change should be viewed as an opportunity rather than as a threat. The model emphasizes the importance of the role of strong leadership in supporting a change and motivating employees to adopt a change. Luecke's model includes collective identification of problems, finding solutions, development of shared vision, identification of leadership role, implementation of change, monitoring and having prepared strategies for all possible issues that might occur during the process of change [33].

With reference to planned organizational change, three key implications were suggested for practice.
"First, change agents should focus on systematic change in work settings as the starting point in change efforts and on individual behaviour change as a key mediator associated with organizational outcome change. Because intervention activity affects parts of a work setting other than those changed directly by the intervention, practitioners must insure that the various work setting changes are congruent with each other, sending consistent signals to organization members about the new behaviors desired" [34, p. 629].

Contrary to planned organizational changes, the emergent approach to change management advocates that numerous external factors restrict ability of management to control, predefine and properly plan activities for change. This phenomenon represents a relatively new phenomenon that lacks theoretical basis for effective managing. According to the available literature on the subject of emergent change management, the most quoted models that deal with emergent change refer to "Big three" model of organizational change and Hinings and Greenwood's model of change dynamics, briefly presented hereafter.

According to the "Big three" model, there are three forms of change, three types of motion and three roles in the change process. Forms of change refer to changes in identity, coordination and in control process. The model proposes three types of motion that relate to: a) organization and extended external business environment, b) interrelated organizational components, and c) employees within an organization. Finally, roles in the change process differentiate change strategists, change implementers and change recipients. Authors emphasized that successful change might be reached by integrating and engaging all components recognized in the model [35].

Hinings and Greenwood model of change dynamics advocates that change comprehends complex and nonlinear interactions and processes that relate within organization and between organization and external business environment, yet put focus on the complexity of external business environment in which organization operates. According to the model, change represents series of dynamic circumstances and actions derived from unpredictable situations. The model postulates that change takes place in five mutual elements: situational limitations, interpretive outlines, benefits, dependence of power, and organizational capacity. To succeed in change management outcomes, the model suggests that leaders should be highly focused on situational limitations in a broader context of organization. In parallel, for successful change management, the model proposes that change should be fitted into internal organizational intangibles, i.e. values, beliefs, interest and interrelations [36, 37].

A holistic view on change management that simultaneously includes various forms and analysis processes is shown in a recently proposed model of Adcroft et al. [38]. This model proposes that to understand transformation process, analytical interventions should take place in transformation event, transformation programme, transformation outcome and transformation myth. Authors argue that this model provides holistic view on change through combining both, rational and irrational components that might create value for organizational change management in different context [38]. Despite growing tendency of organizational changes and its significant role in today's highly volatile and continuously evolving business environment, the evidence shows that excessively planned changes have a low success rate. Existing literature shows a high failure rate of all change initiatives amounting of around 70% [39]. Yet, it has been noted that at least 40% of all organizational change efforts consist of simultaneous different types of changes [40], which implies an application of adequate approaches to managing change aiming at increasing its success rate.

2.3. Similarities and differences of project and organizational change management

Recalling to the project management and organizational change management as different disciplines, there are some similarities needed to be pointed out. Project management integrates people, processes, methodologies and tools through all common processes, i.e. initiation, planning, execution, monitoring and control and closure, finally. Project is created with the aim to meet specific organizational goals and overall strategic objectives. Similar to project management discipline, change management includes people, processes and tools to effectively support managing of changes that occur within organization [3].

Project management and organizational change management are founded on different terminologies and different methodologies. Moreover, *"their respective proponents arise out of different part of organizations and have different functional and educational backgrounds. They emphasize different skill sets and competencies"* [15]. However, some authors noted that project managers use change implementation practices *"across a range of projects requiring differing degrees of organizational change, and across both the finance and engineering industries"* [15, 41]. Project management and organizational change management

both aims at increasing the likelihood of initiatives deliver the intended results and expected outcomes. Both are essential during the transitions in the organizational lifecycle, consisting of multiple phases [42, 43] Although each discipline operates independently, Prosci suggests integration of both to take advantages of synthesis and thus to create value to an organization [44].

2.4. Hypotheses development

To produce expected organizational results and outcomes through projects and organizational change initiatives, it has been viewed that the most effective approach is to integrate both [44]. Integration value of project management and organizational change management is seen to be most effective in shared objectives - both to be focused on singular objective, risk mitigation in a more proactive manner, sequencing alignment of technical and people activities and improvement of information exchange [45].

When integration dimensions for project management and organizational change management are in question, it has been noted that the most effective integration alignment to carry out expected results and outcomes for an organization is in people, processes, tools, methodologies [44, 45]. Accordingly, hypotheses for further verifications in this study are:

H1. Overall project and organizational change success differ between observed industries.

H2. Integration of project and organizational change management values and dimensions (i.e. shared organizational objectives, ability to anticipate obstacles of change, comprehensive stakeholder analysis, better resource planning, process alignment, tools integration, incorporation of project management methodologies into organizational change management) correlates with the overall greater success outcome.

H3. Multiple values of project management and organizational change management integration are recognized by majority of respondents.

3. RESEARCH METHODS

To gather the required data, we have used the survey method. Questionnaire contains 21 questions and sampling frame includes experts from the banking, IT and other industries. A web-based questionnaire was sent to 120 experts and 48 completed the questionnaire, yielding a response rate of 40%. Data were analyzed in three main phases using SPSS software package. First phase of data analysis encompasses scale reliability test using Cronbach's Alpha. Second phase of data analysis implies descriptive statistics of respondents and frequencies according to the industry, country and according to the size of organizations included in the study. The final phase of data analysis implies hypotheses testing using descirptive statistics, correlation and frequencies.

4. RESEARCH RESULTS AND DISCUSSION

The results of internal consistency of the scale validity, analyzed by Cronbach's Alpha test are shown in Table 1. Cronbach's Alpha coefficient of $\alpha=0.872$ indicate high level of internal consistency.

Table 1. Reliability Statistics

Cronbach's Alpha	N of Items
.877	8

Second phase of data analysis implies descriptive statistics of respondents and frequencies according to the industry and country included in the study. Tables 2, 3 and 4 depict descriptive statistics of participants included in the study. According to the results shown in Tables 2, 3 and 4, respondents are in average 39.67 years old, out of which 52.08% are female, while 47.92% are male participants. In addition, majority of participants have been included in the projects and organizational change implementation, i.e. 95.83% of all participants have been included in project implementation, and 77.08% have been involved in organizational change implementation.

Table 2. Descriptive statistics overview according to the age

	N	Min	Max	Mean	Std. Dev.
Age	48	24.00	56.00	39.67	7.45007

Table 3. Descriptive statistics overview according to the gender and participation at projects

		Have you been part of project(s) at your organization		Total
		No	Yes	
Please state your gender	Female	2	23	25
	Male	0	23	23
Total		2	46	48

Table 4. Descriptive statistics overview according to the gender and participation at organizational change implementation

		Have you been included in organizational change implementation		Total
		No	Yes	
Please state your gender	Female	8	17	25
	Male	3	20	23
Total		11	37	48

Next tables, i.e. Tables 5, 6 and 7 depict frequencies according to the industries and countries contributed to the study and according to the organizational size, respectively. Recalling to the results presented in Tables 5, 6 and 7, participants from four countries contributed to the research results, most of which are from Serbia. Majority of respondents are coming from IT industry (49.9%), followed by banking and insurance (45.8%). When company size is in question, research were carried out in large companies (66.7%), medium size (18.8%) and small size (14.6%), according to the number of employees.

Table 5. Frequencies according to the countries included in the study

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Austria	2	4.2	4.2	4.2
	Montenegro	6	12.5	12.5	16.7
	New Zeland	1	2.1	2.1	18.8
	Serbia	39	81.3	81.3	100.0
	Total	48	100.0	100.0	

Table 6. Frequencies according to the industries

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Banking and insurance	22	45.8	45.8	45.8
	Information technology	23	47.9	47.9	93.8
	Other	3	6.3	6.3	100.0
	Total	48	100.0	100.0	

Table 7. Frequencies according to the company size

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	50 to 250	9	18.8	18.8	18.8
	More than 250	32	66.7	66.7	85.4
	Up to 50	7	14.6	14.6	100.0
	Total	48	100.0	100.0	

Final phase of data analysis implies hypotheses testing. To test hypothesis 1, we have compared overall mean values of overall project and organizational change success per industries under study. The results are provided in Table 8.

Table 8. Overall project and organizational change success comparison between observed industries

Industry sector		Overall project success evaluation	Overall organizational change success evaluation
Banking and insurance	Mean	.3136	.3091
	N	22	22
	Std. Deviation	.20306	.25803
Information technology	Mean	.7087	.6130
	N	23	23
	Std. Deviation	.22139	.28010
Other	Mean	.6333	.5333
	N	3	3
	Std. Deviation	.47258	.40415
Total	Mean	.5229	.4688
	N	48	48
	Std. Deviation	.29839	.30953

According to the obtained results, overall project and organizational change success is the most successful in IT industry and the least successful in banking and insurance sector. Following assumption that overall project and organizational change success differ between observed industries and results presented in Table 8, hypothesis 1 is supported. Moreover, the results show that overall project success differ from overall organizational change success.

Hypothesis 2 is tested by examining the strength of relationship between variables using Pearson's correlation analysis. The results are depicted in Table 9.

Table 9. The results of Pearson's correlation analysis for selected variables

	Integration of PM/OCM values and dimensions	Success outcome

Integration of PM/OCM values and dimensions	Pearson Correlation	1	.660**
	Sig. (2-tailed)		.000
	N	48	48
Success outcome	Pearson Correlation	.660**	1
	Sig. (2-tailed)	.000	
	N	48	48

**. Correlation is significant at the 0.01 level (2-tailed).

Based on the output, mean values of all project/organizational change management related variables, i.e.: shared organizational objectives, ability to anticipate obstacles of change, comprehensive stakeholder analysis, better resource planning, process alignment, tools integration, and incorporation of project management methodologies into organizational change management are in uphill relationship with the overall greater success outcome variables ($r=0.660$; $p<0.01$). The results are statistically significant. In other words, hypothesis 2 is supported.

Table 10 provides insight into the frequencies when recognized integration values of project management and organizational change management disciplines are in question.

Table 10. Recognized integration values

Integration value	Recognized value		Total number of respondents that see value of integration
	Yes	**No**	
Sequencing and alignment	24	23	47
Exchange of information	39	8	47
Shared objective	30	17	47
Proactive steps	29	18	47
Total	**122**	**66**	

Following results shown in Table 10, of total involved respondents amounting of 48, 98% participants (47 respondents) have recognized at least one integration value. Exchange of information is selected as the most beneficial value, followed by shared objectives and proactive steps. However, sequencing and alignment should not be neglected, taking into account number of respondents that recognized this value as benefit from project management and organizational change management integration. Accordingly, hypothesis 3 is supported.

5. CONCLUSION

A large and fruitful arena of theories and practices of project and organizational change management often show two disciplines as independent in its foundation. However, it has been recently recognized that project and change management are complementary with a common objective to organizations, i.e. to increase project and change success rates, further implying improvement of overall organizational performances. To understand if project and organizational change management integration represent a path for sustainable value creation for organizations, this paper focuses on empirical research aiming at understanding integration value and dimensions of integration that can build capabilities for a successful project and organizational change outcomes.

Research results indicate that the most effective approach for increasing the likelihood of project and organizational change success is to integrate its management. Integration value of project management and organizational change management is seen to be most effective in shared objectives - both to be focused on the singular objective, risk mitigation in a more proactive manner, sequencing alignment of technical and people activities and improvement of information exchange [45]. When integration dimensions for project management and organizational change management are in question, it has been noted that the most effective integration alignment to carry out expected results and outcomes for an organization is in people, processes, tools, methodologies [44, 45]. Quantification of existing methods removes subjective approach [46], and can be a step toward cross-disciplinary application between project and change management.

Recalling to the given research results, hypothesis 1 is supported, i.e. research results show that overall project and organizational change success differ between observed industries. Further, integration of project and organizational change management values and dimensions (i.e. shared organizational objectives, ability to anticipate obstacles of change, comprehensive stakeholder analysis, better resource planning, process alignment, tools integration, incorporation of project management methodologies into organizational change management) correlates with the overall greater success outcome. Accordingly, hypothesis 2 is supported. Finally, respondents see multiple values of project management and organizational change management integration. Exchange of information is viewed as the most beneficial value, followed by shared objectives and proactive steps. However, sequencing and alignment should not be neglected, taking into account the number of respondents that recognized this value as a benefit from project management and organizational change management integration. Accordingly, hypothesis 3 is supported. The study has some limitations that require further research. First, data were collected with a self-administered questionnaire based on the internet that reflects subjectivity of answers which might cause an underrating or overrating of results. Hence, future research should conduct qualitative studies to create potential to obtain a deeper understanding and feasibility of project and organizational change management integration. Next, this study was based on data collected on a small sample. Thus, future research should incorporate perspectives from a larger sample.

Despite its limitation, the study can contribute both to theorists and practitioners in two important ways. First, the paper contributes to the project management theory and organizational change management theory, by extending the literature with shown results in regard to this phenomenon. Also, if practice integration of the two disciplines, there are increasing potentials to increase overall project and change success. Thus, by focusing on this phenomenon, this paper contributes to change managers, change agents, project managers, strategic managers and policymakers by addressing the key indicators for sustainable value creation, needed to be further developed to be fully operationalised in practice.

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CAN *CARPE DIEM* EXPLAIN WHY PRESENT IS NOT A MEDIAN TENSE BETWEEN PAST AND FUTURE?

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Abstract: This article aims at and concisely motivates, in a multidisciplinary, historical, physical, statistical and philological manner a useful re-conceptualization of the present in relation to the past and the future, the latter being, in the authors' opinion, at the origins of the deep meaning of the true aphorism *Carpe diem, quam minimum credula postero*. Only if seen as a whole can the arguments of *Carpe diem*'s re-significance, in a correct manner facing the knowledge and the future, shape a multidisciplinary opinion, adequate to the realities of modern scientific research…

Key words: *Carpe diem*, tense and time, present, past and future, timeline, foresight, uncertainty.

1. INTRODUCTION: WHY *CARPE DIEM*?

The author of the famous Latin aphorism *Carpe diem* is Quintus Horatius Flaccus [1], and this simple truth can be proven by reading his poem, in Latin, in an ode dedicated to Leuconoë (Ode, I, XI). The aphorism certainly offered to the poet Horace himself an impressive notoriety of almost two millennia: "*Dum loquimur fugerit invida aetas: carpe diem, quam minimum credula postero*" [2]. What still remains difficult to understand is how an aphorism is still preferred even now in its original Latin version, and neither in English "*Seize the day, trusting tomorrow as little as possible*" nor in Italian "Cogli attimo, confidando nel tomorrow as little as possible".... But in Latin, *postero futura est* as well as in English *tomorrow is the future…*

The *Carpe diem* aphorism, in the original, and especially when it is quoted completely or undistorted, as expressed by Horace, denotes a firm, almost ecclesiastical pessimism, to a greater extent than unlimited pragmatism, as re-signified by the forced taking out of the two words of the much broader context of the famous ode phrase. *Carpe diem* thus becomes either the desideratum explained in "*live the moment as if it were the last*," or lifestyle meant by "*live the day and rejoice today because you do not know how it will be like tomorrow*," finally expressing the desire to take advantage of today, of life, whenever an opportunity arises.

In an interdisciplinary logic, simultaneously philosophical, frequential and, last but not least, philological, or through the theory of communication, *Carpe diem* involves a major hypothesis according to which each person's freedom ends where the other's freedom begins, the delimitation being argued in this historical, philosophical and philological article, and briefly evaluated in frequencies or rather in the light of the grammatical customs of the English language in particular. *Carpe diem* also imposes to an increasing extent a change, but under the impact of multiple limits exerted on ethics and moral integrity, emphasizing rather a desire to perpetuate the present world to the detriment of an increasingly uncertain future.

These few initial hypotheses are continuously and significantly distorted by the omission of the final part of the rigorous quotation of the Horatian verse: "*Carpe diem, quam minimum credula postero*" ... The major explanation is both psychological and behavioural, the individual naturally choosing an optimistic world, in which the future is clearly structured or probabilistically evaluated, with a mathematically justified hope for tomorrow, anticipating a life placed a little closer to the conceptualization given by Leibniz, in the sense that the present contains the past and is full of the future (today includes yesterday and they are together included in tomorrow). *Carpe diem* analyzed from a multidisciplinary perspective [3] can be re-signified for many, in a chain of inclusions of Bayesian quantified probabilities ... This article aims at and justifies physically, statistically and philologically the need to adaptively return to the origins and sense of the true meaning of the *Carpe diem* aphorism.

2. IS *CARPE DIEM* PROFOUNDLY CONNECTED TO THE FUTURE?

The historical argumentation of a modern *Carpe diem* is based on the variable with the same name, a completely different variable in relation to all the others, regardless of the nature of their content, be it qualitative or quantitative, investigated in a scientific research.

2.1 Carpe diem as historical variant

Such a timeline represents the very behavioural trend frozen in the present, being a concept that has exceeded the graphic stage and mainly exposes a certain and unique concretization, a variant that could be reached according to the history of an itinerary from the past to the present. Any type of timeline, retrospectively, remains a chronology of

definite variants, in definite intervals which, once reaching the present, offer an explosion of prospective variants or mirrors of a future becoming, partially certain in the short term, pronouncedly uncertain in the medium term or completely uncertain in the long run. This stringent aspect transforms the present into a historical point with the role of intersection, generating the cleavage of the variants of becoming from the past of total certainty into the future of partial or complete uncertainties.

In figure 1, we can see that from a historical point of view, *Carpe diem* is neither medially nor modally positioned, but it is concentrated in a circle or in a figurative target and subsequently asymmetrically diffusely "hung" in the net of the future, acquiring a significance dominated by the uncertainties of the same future, as far as the absence of probability scenarios of a specific timeline caught in the spider web of the open options of the past or forgotten in the synthesis of the historical becoming:
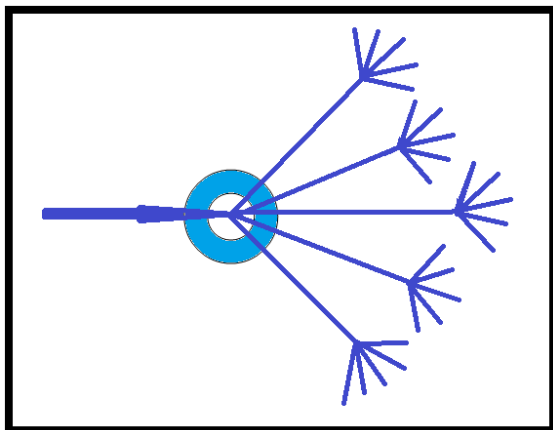
Fig. no. 1. *Carpe diem* **as timeline future oriented**

2.2. Carpe diem as time in Physics

Time or the illustrious Kronos (Cronus) in ancient history was considered a god or a divinity and thus, derived from this, classical time in physics lost any kind of ambiguity and it was completely separated from space. Timeline generated in Newtonian or classical physics was unique and absolute, generating the accord of all the observers with respect to its duration, but soon, in the theory of relativity absolute time disappeared. [4] Finally, each person as observer has his own time or his own measure for time or timeline, and absolute time of classical physics becomes subjective or relative. [5]

The multiverse begins in a homogenous or still ordered status of physical time, from past to the future orientation. Obviously and gradually time becomes heterogeneous or disordered, in all its senses. Physical time was personalized in a space of a universe in expansion, and analogy with the stationary of the carpe diem attitude or behaviour

from an exclusive time perspective underlined in particular as a unique time phenomenon, is only natural. Many questions can appear, partially synthesized in the table 1 [6]:

Ten major differences and similarities of temporality, derived from Physics context versus *Carpe diem* behaviour

Table no. 1

Temporal questions about the universe	Temporal questions about Carpe diem behaviour
Physical time	*Carpe diem (time)*
1. What do we know about the universe's timeline?	1. What do we know about *Carpe diem* as unique time?
2. How did that information appear?	2. How did we know about *Carpe diem*?
3. From what direction of time does the universe come?	3. Where does the *Carpe diem* time come from?
4. Where is universe heading?	4. Where is *Carpe diem* heading?
5. Does the universe have a temporal start?	5. Does *Carpe diem* have a temporal start?
6. What happened ante the Big Bang phenomenon?	6. What happened before the *Carpe diem* moment?
7. What is the nature of physical time?	7. What is the nature of *Carpe diem* time?
8. Will physical time reach a final time (Big Crunch)?	8. Will the unique time of *carpe diem* reach an ending moment?
9. Does the universe behave as continuum?	9. Does *Carpe diem* offer a continuum behaviour?
10. Does human population have its own time?	10. Does human population need only *Carpe diem*?

Source: Adapted from (Savoiu, Iorga-Siman, 2011, p.27).

In the physical process of a temporal dilation, an observer finds that another clock, although identical to his clock, beats more slowly than his own clock or that time has "slowed down" for the other clock, a truth valid only in the context of the observer's reference system. In Albert Einstein's *Theory of Relativity*, time dilation manifests itself in two circumstances: i) in *special relativity*, the clocks that are moving in relation to an inertial reference system move more slowly (a phenomenon whose effect is accurately described by the Lorentz transformations), while the effect of the temporal dilation is reciprocal; ii) in *general relativity*, the clocks found in a gravitational field and at a lower potential work slower and the gravitational time dilation is not reciprocal.

In all *Carpe diem* type behavioural processes, the present time is unique, the past is non-existent and the future one is maximally dilated, which does not

confer any central value, but at most a derivable one.

2.3. Carpe diem in a statistical way of thinking

Using a Google search engine on the Internet, it is statistically found that the aphorism provides approximately 56,500,000 results in 0.79 seconds while Bing capitalizes only 4,670,000 results. At a first analysis, the excessive frequency variation of the apparently temporal concept betrays a double tendency: a) a cross-disciplinary process of expansion of the aphorism that has become a behavioural concept; b) ascending evolutionary abnormality and heterogeneity of contents granted or perceived. *Carpe diem* coexists with the Bayesian concept of statistical probability. The probability of the present in relation to the past is of the *a posteriori* type always equal to 100% as a process of becoming, while the probability of the variants referring to the future, calculated in relation to the same present naturally remains an *a priori* type most often having very low values (partially uncertain) or even unknown (completely uncertain) [7, 8, 9]. *Carpe diem* cannot position itself between the past and the future, starting from the simple explosion in the future of any tendency that transcends the past and reaches a present, which it tries to perpetuate.

2.4. Carpe diem in philology

From a philological point of view, can *Carpe diem* be a praise brought to the present time maximally condensed in a central, typical, essential concept, with a major median or modal role? The brief analysis of the subtleties of the "tense" and "time" relationship offers an opportunity to evaluate the philological balance in which *Carpe diem* is placed according to the communication in English, but also of the final derived behaviour.

Whenever we refer to English language either from an academic point of view or a more informal one, we come across the specific grammatical terminology of "tense" and "time." Hence, there is a very obvious need to clearly differentiate between the two notions of "time" and "tense" we use in English grammar. "Time" is a general and universal concept that, on a horizontal axis, helps people refer to the "past," the "present" and the "future." There has been much insightful study into this area recently, more precisely starting with the beginning of the 20th century. "**Time** is a measure in which events can be ordered from the past through the present into the future, and also the measure of durations of events and the intervals between them" [10], whereas "**tense** refers to the absolute location of an event or action in time, either the present or the past. It is marked by an inflection of the verb" [10].

In grammar we have the linguistic concept, called "tense" which thus represents a grammatical category since it refers to two verbal forms (past and present) and two verbal groups (perfect and future), their main function being that of expressing the time at which an action takes place.

Roughly speaking, in English grammar there is the following array of tenses: Present Tense and Present Perfect for present, Past Tense and Past Perfect for past and Future Tenses for future, but at a closer look we shall see that things are not exactly as simple as they might look since there is an intermingling of their uses and functions. What differentiates English from other languages is the category of "aspect" for each grammatical tense: simple and progressive/continuous. This is one of the reasons why "the use of the simple Present Tense in English is more restricted than in other languages. For one thing, actual duration, which may be implicit in the simple-tense form in other languages, is expressed by the progressive in English" [11]

The most common use of the simple Present Tense in English is to refer to general truths or statements, laws of nature, habits, live commentaries, reviews, summaries, proverbs, instructions, directions or facts that do not change and do not involve a particular time. Another common case refers to repeated actions, at certain intervals, most of the time clearly specified by frequency adjuncts or adverbs. The next important, but less known or frequent situation refers to the "historic", "narrative" or "dramatic" present, "a present tense used in contexts where a past tense would normally be used, to create a more vivid effect to show informality, or to show a sense of 'friendliness' between speaker and hearer" (Richards & Schmidt, 240). An interesting case occurs when the Present Tense denotes an action that takes place at the moment of speaking or writing. The simple present is only possible and limited to those uses that do not require the progressive/continuous aspect, in other words the groups of verbs that cannot be used in the progressive/continuous aspect. For all the other verbs that do not fall into this category, English grammar uses the progressive/continuous aspect that refers to an action happening at the moment of speaking or writing or covering even a larger span of time, especially when the actions go together with a double comparative to show the change or the development of a situation. In this particular case there is also a clear connection to the future, involving not only the very moment of speaking, but also a period from the future covered by that specific action.

Otherwise the progressive/continuous aspect of the Present Tense can refer to an action happening in a given, limited period of time or as an exception to a rule. This aspect can also emphasise in English a repeated action that becomes annoying, or even amusing, for the speaker, when used with frequency adverbs specific to the simple Present Tense.

English, as opposed to other common languages, and especially to Romanian, has a very interesting and useful grammatical "tool" that connects the past to the present, namely denoting "an action or a state beginning at some time in the past and continuing up to the moment of speaking" [11] called the simple Present Perfect. The main focus in the use of this tense is on the relationship between the situations or states that started in the past and the fact that they are still true in the present; it can also emphasise a completed action at a time in the past which is not known, relevant or important or whose result in the present is more important than the time when they occurred; and for recently completed actions as well, most likely associated with specific time adverbs, and, of course, one of the key uses refers to the speaker's or writer's experiences that leave open the possibility of repetition in the present or in the future given that the subject can still perform them and the time span is not completed. The continuous aspect of the same tense underlines the progressive aspect of the actions or situations continuing up to the present and even the future.

Both aspects of the Present Tense can be used to refer to a future time, although this type of use is less common in English as compared to other languages. The simple Present Tense used with future reference is limited to the cases in which the future action is considered as part of an official, already established programme, mostly common with verbs denoting coming or leaving, but the time adverb or adjunct expresses future, not present, most of the time. The Present Tense is also used in subordinate clauses, mainly time or conditional ones, which depend on a main clause, implying or expressing future time. There are some exceptions in point, but the use of the simple Future Tense in such cases refers to a modal function of the future auxiliary "will," most of the time for polite requests in formal English. In contract, the progressive/ continuous aspect of the Present Tense can be used with a future reference when connected to a personal arrangement or intention, usually for the near future time span.

Future Tense proper in English is expressed with "will," and, more and more less frequently, "shall" (for first person singular and plural), followed by a short infinitive verbal form to refer to an action or state related to the future time span, predictions, future facts, offers, promises, requests, refusals, and so forth. The current use of English language has slowly replaced the use of "shall" for the first person, singular and plural, with "will." Nevertheless, the reversed use of both "shall" (for second and third person) and "will" (for the first person) expresses volition, strong intention, assumption or determination, depending on a particular case. The use of the future is also marked by the use of specific adverbs. The use of the

progressive/continuous aspect of the Future Tense focuses on emphasising the development of an action at a specified time in the future, commonly associated with a specific time adverbial, and, of course, a verb that is not restricted to the use of the simple aspect only, for situations which will happen in the future as a normal course of events, and even for habits or repeated actions at a point in the future.

English language uses a rather extended range of other grammatical "tools" to refer to the future time-sphere, such as: "Be going to" to express the speaker's intention both on short and long term and for predictions based on present evidence, "Be to" mostly for obligations and formal announcements, "Be due to" for formal arrangements, "Be on the point/verge of" for the (very) near future, "Be (just) about to" also for the (very) near future in informal English. Modal verbs can also be used to express future actions.

The association of "will," followed by the auxiliary verb "have" and a past participle form what is known as the Future Perfect Simple whose main role in English language is to express a retrospective look on a completed situation, before a certain, given time in the future, or a continuing situation up to a certain time in the future, and even an assumption. The continuous aspect of the same tense emphasises the duration of the action or situation continuing up to a certain time in the future.

The Future in the past is used in English to express a situation in which we look back at what was the future once, by making the future verb form past, thus, for example, "will" becomes "would" or "is going to" becomes "was going to," etc. – overall, all tenses go back one tense in what is also known as "sequence of tenses." "There is a good deal of differences between the distribution of the past and perfect tenses in English and other languages, the perfect tense being often used in other languages where the past tense (or preterite) is required in English" [11] In this case the focus is on the time at which the action happened in the past. Thus, in English, the Past Tense can be used to refer to repeated actions in the past, to report a present tense in indirect speech, in subordinated clauses – what is also known as subjunctive – to express something desirable, an opposition to reality, conditions not likely to be fulfilled, etc. – situations in which only the verbal form is related to the past, the meaning expresses the present. Generally speaking, the simple Past Tense expresses single completed actions at a specific time in the past or repeated habitual actions, general truths about the past or the main events in a story and it can also be used to emphasise contrast in the past. The progressive/continuous aspect of the Past Tense highlights the progress of a specific action at a particular moment in the past, most of the time

mirroring the situations in the Present Tense, but shifted in the past. Other ways of commonly expressing past habits in English is by using "would" – particularly for the distant past – and "used to" both for past habits and states, also particularly for the distant past.

English, as many other languages in this case, uses another tense for the more distant past, the Past Perfect Tense (formed with the auxiliary *had* and a perfect participle) to refer to situations and states happened and completed before the past or before a moment in the past or a series of actions continuing up to a moment in the past. It is also used in the sequence of tenses (as a Past Tense shifted back), in conditional clauses (for hypothetical situations, for example), in indirect speech, and also after certain verbs to express hope or intention that did not become true. The progressive/continuous aspect of this tense emphasises actions or situations continuing up to a moment in the past (or just before a moment in the past) [12,13].

Finally, *Carpe diem* as an expression of an isolation in the present, does not dominate the time of speech according to the specially chosen theoretical examples in one of the most frequently invoked and sensitive languages, but also in one of the most known and accessed modern languages. Neither the philology nor the communication or the behaviour derived from all these places in a median position the time specific to *Carpe diem*, but densifies and accentuates excessively the past, rarefying the future…

3. CONCLUSIONS

A multidisciplinary investigation of the capitalization of *Carpe diem* as a temporal, behavioural, historical and statistical solution identifies some similar attitudes, reflecting common asymmetries. *Carpe diem* has been falsely identified as a substitute for the common, typically central or essential approach of the human individual, the median value attributed in a population-related manner, not being justified even by the original aphorism. In the end, Horace deplores the almost probabilistic minimization of the variations of the future together with the informational expansion, as a true and wise modern or expert in foresight, connoisseur of the wide range of possible evolutionary variants. From this point of view, accepting a middle position of a *Carpe diem* is equivalent to considering that two millennia of history remain imbued with ignorance and contempt for knowledge and implicitly for the future… In reality, *Carpe diem* is a call to

multidisciplinary investigation and knowledge and implicitly scientific (historical, physical, statistical, but especially probabilistic, philological and prominently grammatical, etc.). "*Even as we speak, time speeds swiftly away,*" tells us another one of Horace's dictums, to relativize the excessive synthesis of the same: "*Carpe diem*, **quam minimum credula postero**" or Carpe diem, trusting as little as possible in tomorrow can mean minimizing the future evaluation but not its impact also...

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IMPACT OF SCIENTIFIC EPISTEMOLOGICAL VIEWS ON GRIT IN PROSPECTIVE TEACHERS

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Abstract: *Teacher's performance is influenced by the passion and perseverance in the teaching profession, irrespective of the obstacles associated with this prestigious profession. Grit may be crucial at the pre-service level given the struggles one encounters in school, colleges and university level. Having a scientific approach makes one work in a systematic manner with consistency. This study aimed to investigate that relationship and also revisit the role of SEVs in predicting the Grit in prospective teachers. In the study, 100 respondents from Aligarh Muslim University participated in the survey. Tools used in the study were SEV (Scientific Epistemological Views) scale standardised by Liu, S.Y. and Tsai, G. C. (2005) and Grit Scale developed by Edward D. Sturmana and Kerri Zappala-Piemme (2017). The result showed that Scientific Epistemological Views could significantly predict grittiness in prospective teachers. This result shines a new light on the relationship between SEV and Grit of prospective teachers. A group of prospective teachers, who had a high score on SEV or in other words which held an expert/constructivist view on scientific epistemology, were significantly grittier than the group of prospective teachers who were low scorers or held a naïve/empiricist view regarding scientific epistemology. Lastly, there was no significant gender difference in prospective teachers when it came to their Scientific Epistemological Views (its sub-dimensions) and Grit. When it came to Grit, prospective female teachers were grittier than prospective male teachers when their means were compared.*

Keywords: *Scientific Epistemological Views, Grit, Prospective teachers, Gender differences*

1. INTRODUCTION

Teachers are the prime agents in bringing about change in any nation towards globalisation and industrialisation. With this huge responsibility resting on the shoulders of teachers, they are hence believed to be the backbone of any educational institutions in improving the standards of the teaching profession. The teaching profession is a very demanding career that requires an extensive perspective in enthusiasm, commitment and passion. Teacher's performance is influenced by the passion and perseverance in the teaching profession, irrespective of the obstacles associated with this prestigious profession.

Teachers who are the agents of social change are dampened by significant issues which threaten their professional stature and esteem. In this post COVID scenario, the most disturbing issues that most of us are struggling with is employment. With the social and economic recession, the direct impact is on employment in the education sector. This is why every individual is struggling to get hold of any decent job.

It is perceived that in spite of our intelligence, some accomplish more than the other. The researches reviewed in this paper have suggested that one personal quality that is shared by most successful personalities is Grit.

1.1 Teacher Grit

During these struggling times, we need to hone this quality to achieve our objectives. The definition of grit is derived from Bandura 's social cognitive theory (Dobbins, 2016). Grit stresses the understanding of other people's actions and activities and sets out conditions for the implementation of these behaviours (Roberts, 2009).

Technically, grit is described as the characteristic degree of perseverance and passion for achieving long-term goals in the midst of challenges (Duckworth et al., 2009; Gerhards, 2015). Grit is a type of bravery that moves people to overcome the fear of failure (Duckworth et al., 2009; Maddi, 2012). These researches have concluded that Grit is necessary to equip pre-service teachers with the dispositions and confidence to handle stressful situations and persevere. Both growth mindset and Grit maybe even more crucial at the pre-service level given the struggles one encounters in school, colleges and university level. Dewek and Legget (1988) have stated that students' achievement goals are influenced by their belief systems, including their personal epistemological theories (Pintrich, 2002). Another variable in this study is Scientific Epistemological Views. The crucial component of scientific literacy is to develop adequate understandings about the nature of science (American Association for the Advancement of Science, 1993). In general, prospective teachers' epistemological beliefs and specifically their scientific epistemological beliefs may determine the way they approach and how they value or disapprove information that is presented to them during their professional training (Fives & Buehl, 2008). The teacher education program should aim to educate pre-service teachers on scientific methods (Shim et al., 2010). The pre-service courses should make the teachers more knowledgeable about the methods of scientific inquiry (İnan, 2011). With the help of different epistemological concepts, one can explain different domains of knowledge. The epistemological concept they develop often reflect the intellectual discourse of school subjects that they have experienced (Smith & Wenk, 2006). Researches have suggested that the learners' epistemological

views of science may influence the acquisition of scientific knowledge (Songer & Linn, 1991), and construct their orientations to learning science (Tsai, 1998a, 2000b; Lederman, 1992; Edmonson & Novak, 1993). It is apparent that SEV is a crucial marker for educators to predict students' learning and to lay the groundwork for science instruction (Tsai 2002).

According to Tsai's study, there are two views regarding scientific epistemology one is the constructivist oriented SEVs/the expert view which assert that scientific knowledge is an invented reality. It is established through the use of agreed theories, shared forms of evidence, and social negotiations in the scientific community. Therefore, Edmond and Novak (1993) have stated that science teachers asserted that science instruction should aim to promote students to acquire constructivist-oriented epistemological views toward science. The post-positivist arguments related to the nature of scientific knowledge question the absolute objectivity, universality and value-free assumptions and focus on the constructivist and contextual aspects of scientific knowledge (Tsai, 2000; Yang, 2005). On the other hand, according to the empiricist (or positivist) view science is a process of individual analysis and exploration. A traditional perspective views scientific knowledge as to be objective, based on control of nature, replicable, value-free, empirical, and universal. Positivist (empiricist - traditional) and post - positivist (constructivist – no - traditional) views of science, clouts one's scientific beliefs, especially the perceptions concerning the researchers' role (Gallaher, 1991). Mainly depending on personal efforts and that scientific knowledge is derived from absolute, unbiased observations and procedures. It also defies the idea that science provides the truths of nature.

Another critical thing to note is that research by Bybee (2015) had suggested that pre-service teachers who had prior knowledge of research methods were less likely to adopt traditional views of science. One needs to acquire knowledge on the fundamentals of science and then only can he be competent to apply that knowledge to life situations. Having a scientific approach makes one work in a systematic manner with consistency. This consistency is where the concept of Grit has to be studied. The relation between scientific epistemological views and Grit of pre-service teachers has not been considered as yet. This study aimed to investigate that relationship and also revisit the role of SEVs in predicting the Grit in prospective teachers.

1.2 Research Questions
The following questions crossed the mind of the investigator as to how our scientific epistemological value impacts one's grittiness.

- What is the relationship between SEV and grit among prospective teachers?
- Is there a gender difference in the SEV and grit of prospective teachers?
- Does the SEV of prospective teachers impact their grittiness?
- Do the grit of prospective teachers differentiate due to their SEVs?

1.3 Objectives of the study
The following objectives were framed according to the research questions:
1. To study the relationship between SEV and grit among prospective teachers.
2. To study the gender difference in prospective teachers' SEV and grit.
3. To study the impact of SEV on the grit of prospective teachers.

2. METHOD
The research is a descriptive type of research. It is based on a survey of the samples' opinion.

2.1 Participants
In the study, 100 respondents participated in the survey, and 100% completed the survey. Participants were from Aligarh Muslim University. Out of 100 responding participants, 50 (50%) were male, and 50 (50%) were female. Among the total, 60% belonged to (20-25) age group, and 40% belonged to (25-30) age group. Of the 100 responding participants, 55% were from science stream, and 45% belonged to non-science stream

2.2 Data Collection Tools
S.E.V. (Scientific Epistemological Views) scale: was standardised by Liu, S.Y. and Tsai, G. C. (2005). The tool comprised of 25 items framed on a five-point Likert scale (1- never and 5- always). The items of the scale were based on five dimensions namely: Role of social negotiation (SN); The inventive and creative nature of science (IC); The theory-laden exploration (TL); The cultural impacts (CU); and The changing and tentative features of science knowledge (CT)
The internal reliability of each dimension of this scale is 0.71, 0.60, 0.68, 0.71 and 0.60, with an overall alpha value of **0.67**. The alpha coefficient for the five subscales ranged between 0.56 and 0.75 with 0.76 as total value. The validity of the scale is **0.76**.
Grit Scale: The grit scale was developed by Edward D. Sturmana and Kerri Zappala-Piemme (2017). It consists of 12 items based on the five-point Likert scale (1- never and 5- always). The items corresponded to sustaining a focused effort to achieve success in a task, regardless of the challenges, and the ability to overcome setbacks. The Grit Scale for Children and Adults (GSCA)

was validated in a sample of school and college students and community members. The internal consistency of the GSCA with Cronbach's alpha is **0.84**. The test-retest reliability was **0.78**.

3. RESULT AND DISCUSSION

The means and standard deviations for all the measures were reported in Table 1 and correlations were reported in Table 2.

the female on SEV sub-dimensions. There are some similar contradictory studies which have implied that female students tended to show less confidence, lower interest and participation in learning science than male students (Jovanovic & King, 1998; Kenway & Gough, 1998; Trankina, 1993). Abd-El-Khalick and Lederman (2000) have also indicated that college students' epistemic views about science were not related to their

Table 1. Means and standard deviations for Grit and Scientific Epistemological Value (with its sub-dimensions)

Variables	Sample	N	Mean	SD	Df	t	Sig Value	Remark
SEV- Scientific Epistemological Value	Total	100	88.94	11.21				
	Male	50	87.38	12.91	98	-1.39	.168	Not
	Female	50	90.50	9.25				Significant
SN- Social negotiations in the science community	Total	100	3.86	1.701				
	Male	50	3.84	0.96	98	-1.40	.168	Not
	Female	50	3.87	1.03				Significant
IC- Invented and creative nature of science	Total	100	3.57	1.12				
	Male	50	3.49	1.21	98	-1.39	.165	Not
	Female	50	3.65	1.01				Significant
TL- Theory-laden exploration	Total	100	3.22	1.14				
	Male	50	3.41	1.11	98	.840	.403	Not
	Female	50	3.09	1.15				Significant
CU- Cultural impacts	Total	100	3.54	1.10				
	Male	50	3.44	1.21	98	-.136	.882	Not
	Female	50	3.70	0.96				Significant
CT- Changing and tentative feature of science knowledge	Total	100	3.34	1.10				
	Male	50	3.25	1.15	98	-1.38	.170	Not
	Female	50	3.42	1.11				Significant
Grit	Total	100	41.45	6.55				
	Male	50	40.50	6.95	98	-1.46	.148	Not
	Female	50	42.40	6.04				Significant

Source: Realized by author

Table 1 tabulated the result of descriptive statistics, and the t-test revealed that there was no significant gender difference in prospective teachers when it came to their SEV (its sub-dimensions) and Grit. On a closer look at the result tabulated it was found that female prospective teachers' SEV had a higher mean (M= 90.50) as compared to prospective male teachers, whose average were below the average (M= 87.38). As far as the SEV sub-dimensions are concerned, the prospective female teachers had the edge over prospective male teachers in all the sub-dimensions except the dimension TL – *Theory - laden exploration*. Quite contrary to the findings of Tsai (2012), where the male had a higher average than

gender. Results obtained from the SEV tool implied that the dimension SN- *Social negotiations in the science community* was the vital element of the prospective teachers' beliefs/views. This finding is slightly different from the previous study (Tsai & Liu, 2005) in which *the theory-laden aspect* was the core concept.

When it came to Grit, prospective female teachers were grittier than prospective male teachers when their means were compared (M=42.40 versus M=40.50). The findings that females are more perseverant than males have been reported in various studies (Christensen & Knezek, 2014; Rogoza et al., 2017; Kaur, 2019 and Kumar, 2019)

Table 2: Correlation of Grit and Scientific Epistemological Value (with its sub-dimensions)

Variables	SEV	SN	IC	TL	CU	CT	Grit
SEV- Scientific Epistemological Value	1	.671**	.684**	.580**	.450**	.728**	.635**
SN- Social negotiations in the science community		1	.188	.376**	-.009	.293**	.375**
IC- Invented and creative nature of science			1	.288**	.347**	.384**	.320**
TL- Theory-laden exploration				1	-.001	.332**	.414**
CU- Cultural impacts					1	.238*	.249*
CT- Changing and tentative feature of science knowledge						1	.631**
Grit							1

Source: Realized by author   Note. *p < 05; **p < .01

According to table 2, Grit had a significantly high strong positive relationship with SEV, r(98) = .635, p< .001 and with *Changing and tentative feature of science knowledge,* r(98) = .631, p< .001. The only dimension with which Grit had the lowest yet significant relationship was *Cultural Impact,* r (98) =.249, p<.005. The result shows that the prospective teachers who were grittier were likely to appreciate the social negotiations in the science community and to understand the changing and tentative feature of Science knowledge. To them, science is always changing. When new findings are revealed, some existing theories may be changed. Contemporary scientific knowledge does not provide the final answer for nature. It will be refined with time. This is where perseverance or Grit is a crucial requirement for comprehending the changing and tentative feature of science knowledge. On the other hand, the very same gritty nature that is accepting the changing nature of science does not comply well enough with the cultural dependent nature of the development of scientific knowledge. It means the belief that different cultural groups have different ways of gaining knowledge about nature is low.

Table 3 showed the relative influence of SEV on the prospective teachers' grit. A bivariate regression was conducted to examine how well the scientific epistemological views could predict grit in prospective teachers. Table 2 has already shed light on the correlation between SEV and grit, which was statistically significant, r(98) = .635, p< .001. Table 4 has helped to generate the regression equation for predicting the grit from SEV. The equation generated was

$\hat{Y}$= 8.654+ 0.369x (x= 4.060 or .045). The R^2 for this equation was .404; that is, 40% of the variance in grit was predicted from the level of SEV. This is a moderately strong relationship (Cohen,1988). It is predicted that a 1% increase in SEV will increase grit by .36%.

Table 3: Relative influence of SEV on prospective teachers' Grit

R= 0.635 R square= .404					
Adjusted R square= .397 Standard error= 5.09					
Analysis of Variance					
	Sum of square	Df	Mean square	F	Sig. Value	Remarks
Regression	1714.538	1	1714.538	66.303	.000	*Significant P<0.005
Residual	2534.212	98	-------	-------	------	-------
Total	4248.750	99	-------	-------	------	-------

Source: Realized by author

Table 4: Unstandardized and standardised regression coefficients for regression analyses predicting Grit

Model	Unstandardised Coefficient		Standardised Coefficient	t	Sig.	Remarks
	B	Std Error	Beta			
(Constant)	8.654	4.060	-------	2.132	.036	-------
SEV	.369	.045	.635	8.143	.000	*Significant P<0.005

Source: Realized by author

Table 5: t-test scores of Grit between high scorers and low scorers on SEV

Variable	Sample	N	Mean	SD	t	Df	Sig. Value	Remarks
Grit	High SEV (Expert View)	57	44.24	5.24	5.622	98	.000	*Significant P<0.005
	Low SEV (Naïve View)	43	37.74	6.30				
Source: Realized by author								

Table 5 contains the result of t-test between the two groups. The independent sample t-test was associated with statistically significant effect, t(98)=-5.622, p= .000. It was found that in a group of prospective teachers, who had a high score on SEV or in other words which held an expert/ constructivist view on scientific epistemology, were significantly grittier than the group of prospective teachers who were low scorers or held a naïve/empiricist view regarding scientific epistemology (M = 44.24 versus M = 37.74 respectively).

Teachers' epistemological beliefs were related to their beliefs about teaching and learning. The findings of this study are consistent with Roth and Weinstock (2013) study which explained that the pre-service teachers reported more sophisticated epistemological beliefs over time in a qualitative analysis and they described teaching on a relational basis from a transformative (constructive) perspective. When the teachers have relativistic epistemological beliefs, they think teaching is not the sole transmission of knowledge; instead, it is a productive process.

According to the study by Wandersee et al. (1994) for *'successfully changing teachers'* positivist - oriented SEVs, science educators need to have appropriate instructional strategies as well as require more time and *continuous efforts* for teachers' change'. This *'continuous efforts'* in Wandersee et al. study is the Grit variable that is considered in this study. The study supports the findings that to develop one's grit, nurturing constructivist view of scientific epistemology is one of the prerequisites.

The result is also supported by Fabelico and Afalla (2020) study that teaching performance of teachers is predicted with a high degree of accuracy based from their very satisfactory performance in the knowledge of subject matter and management of learning.

4. MAJOR FINDINGS

The main objective of the study was to find the impact of SEV on Grit of prospective teachers. The result showed that Scientific Epistemological Views could significantly predict grittiness in prospective teachers. It is predicted that a 1% increase in SEV will increase grit by .36%.

This result shines a new light on the relationship between SEV and Grit of prospective teachers. A group of prospective teachers, who had a high score on SEV or in other words which held an expert/ constructivist view on scientific epistemology, were significantly grittier than the group of prospective teachers who were low scorers or held a naïve/ empiricist view regarding scientific epistemology. This result supports the findings of Wandersee's study that having constructivist SEV will enhance continuous efforts or grittiness is necessary, for teacher's change.

Grit had a significantly high strong positive relationship with SEV and with *Changing and tentative feature of science knowledge* (a sub-dimension of SEV). The only dimension with which Grit had the lowest yet significant relationship was *Cultural Impact*. This showed that the prospective teachers who were grittier were likely to appreciate the social negotiations in the science community and to understand the changing and tentative feature of science knowledge. To them, science is always dynamic. When new findings are exposed, some existing theories may be replaced. Contemporary scientific knowledge does not provide the final answer for nature. It will be refined with time. This is why perseverance or Grit is a crucial requirement for comprehending with the changing and tentative feature of science knowledge. On the other hand, the very same gritty nature that is accepting the changing nature of science does not comply well enough with the cultural dependent nature of the development of scientific knowledge. It means the belief that different cultural groups have different ways of gaining knowledge about nature is low.

Lastly, there was no significant gender difference in prospective teachers when it came to their Scientific Epistemological Views (its sub-dimensions) and Grit. On closer analysis, it was evident that the female prospective teachers' SEV had a higher average as compared to prospective male teachers. As far as the SEV sub-dimensions are concerned, the prospective female teachers had the edge over prospective male teachers in all the sub-dimensions except the dimension TL- *Theory-laden exploration*. Results obtained from the Scientific Epistemological Views tool implied that the dimension SN- *Social negotiations in the science community* was the critical element of the prospective teachers' beliefs/views. When it came

to Grit, prospective female teachers were grittier than prospective male teachers when their means were compared. This could be one of the reason that in teaching professions, we find female teachers in a vast majority, especially in India. Their hard work, commitment and dedication are more evident in the teaching profession, especially at the school level.

5. SUGGESTIONS AND CONCLUSION

As Samarapungavan et al. (2006) have pointed out that students' epistemological views are subjected to undergo change as they move from high school through higher education to become practitioners of some academic fields (e.g., scientists). Therefore SEV can be inculcated or enhanced even later in their higher education courses if the programmes support the training in scientific epistemology beliefs.

The findings of Chinn and Malhotra (2002) holds the assumption that a constructivist view of science is a prerequisite of good science teaching; therefore, teacher education programs should be devoted to help the prospective teachers to develop sophisticated epistemological understandings of science. Linn and Eylon (2000) revealed an important finding that students with constructivist-oriented SEVs tended to attain better science learning outcomes than those with empiricist-aligned SEVs. Hence learners' consistency and perseverance are necessary to make constructivist-oriented SEVs sustainable.

Teachers' beliefs suggested that epistemological beliefs affect curricular and pedagogical decisions (Brickhouse, 1990). Therefore, teacher educators need a better understanding of what kind of epistemological beliefs pre-service teachers hold and how these beliefs change and develop (Schraw, 2001).

Prospective teachers are potential teachers whose epistemological beliefs might be projected into their future teaching, the Teacher Training Institutes or Departments should provide instructional environments that can help the learners develop more sophisticated epistemological views. Prospective teachers with sophisticated epistemological views will not be afraid to take try and take the risk. This attitude and view, along with Grit, will help them to push through difficult times and realize they are capable of learning. Through hard work, they can meet their goals and ultimately taste the true essence of success.

Grit is an important life skill to develop in all ages. Prospective teachers should be trained to develop and manifest this skill in their behaviour. Grit is a symbiosis between passion and perseverance (Duckworth and Seligman, 2009). A teacher with this strength can develop a culture that is resilient to a tough situation, and in this culture, motivation to keep going becomes of prime importance.

Prospective teachers should be trained in more constructivist approaches, and in-service support should be provided for effective implementation of constructive practices in the classrooms. It is only when they know how to apply their scientific views and beliefs will it act as a catalyst and make one passionate and resilient when things go out of hand.

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PRAGMATIC MORALITY AND TALEBIAN WAY OF THINKING?

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Abstract: *The sections of the article ensure a relatively slow but concise transition from the modern meanings of the pragmatic word, attached to morality, to specific Talebian way of thinking about equalities/ inequalities and virtue. Simple analysis can offer complex results sometimes, but only based on a specific risk and the logic of probabilities as in Talebian way of thinking.*

Key words: *pragma, pragmatic, morality, virtue, inequaliy, ethics, talebian ethics.*

1. INTRODUCTION

Where does the word pragmatic come from, and how can a pragmatic morality be defined in modern times? These two questions are debated before the presentation of Nassim Nicholas Taleb's original way of thinking [1].

The real origins of pragmatic as Latin word, comes from the Greek language and these origins describe in a philological dictionaries' tour a passage from *pragma* (deed or act) to *pragmatikos* (relating to fact). The modern sense of *pragmatic* opposed to idealistic and is connected with: i) the contemporary human attitude or "*behaviour that is dictated more by practical consequences than by theory or dogma*" in Oxford English Dictionary [2]; ii) the recent meaning of "*relating to matters of fact or practical affairs often to the exclusion of intellectual or artistic matters: practical as opposed to idealistic*" in Merriam-Webster Dictionary [3]; iii) the usual "*solving problems in a practical and sensible way rather than by having fixed ideas or theories*" in Oxford Advanced Learner's Dictionary [4]; iv) the resignification as "*concerned with practical considerations of one's actions, and less concerned with principles*" frequently synthesized in "*having a [permanent] practical point of view*" in Word Reference Dictionary [5], somehow this final sense being more important for this paper.

Education expands all these significations with that of *application of all theoretical concepts* as the notion that children *learn by doing*, that critical standards of procedure and understanding emerge from the application of concepts to directly experienced subject matters, has been called *"pragmatic."* [6].

But the most impressive or the most important results of this phenomenon of multiplying pragmatic word's signification, for this papers' ideas, remains the eight-time increasing of its uses of the word in any communication, quantified by Google on analysing texts from the Internet after 1900 til 2019 (Fig. no. 1):
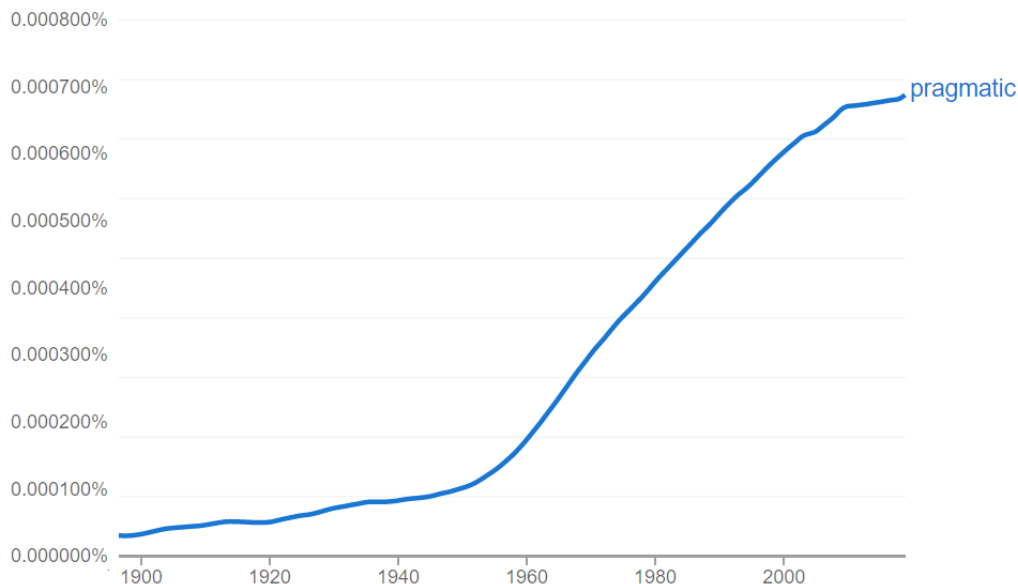
Source: Google Ngram Viewer https://books.google.com/ngrams/graph?year_end=2019&year_start=1900
Fig. no. 1. The percentage's evolution of the global mentions of word pragmatic between 1900 and 2019 [1]

First of all, every conceptualization of the pragmatic morality demands the definition of morality and implicitly of ethics. Morality as an ensemble of moral habits as it was signified in Latin by *mos-moris* comes from the same ancient Greek language, respectively from *moralis*, a word

equivalent with *ethos*. Morality quantifies the presence and the changes of moral standing, acquired through skills, feelings and beliefs, attitudes and mentalities, principles and norms, values and ideals of liaisons between individuals or individual and society (family, community, social group, nation, etc.), materialized in acts and facts, deeds and actions, which specify a certain mode of behavior. A moral individual can be a person who possesses practically and in different quantities, all the above elements and aspects, being completely different from the immoral individual, who is characterized by immorality or absence of morality, but also from the amoral individual, placed outside of any morality). Pragmatic morality refers to the practical set of principles that can discriminate normatively between good and evil and to a practical behaviour of individuals in their relationships with other individuals but also in their (co)existence within the community (society).

In modern academic education, morality also becomes the object of study of a scientific discipline, well-known as ethics. Thus, ethics is defined as being the theory and science of morality.

2. WHY PRAGMATIC MORALITY IS ALSO CLOSER TO RELATIVITY, AS PHYSICS IS?

Does or doesn't any pragmatic person have time and inclination to deal with social morality? Does or doesn't this person's attitude imply a specific pragmatic morality? The subsections are possible answers simultaneously not only to the title of the section that incorporated all but also to the two previous questions.

2.1. Multiple significances of ethics

The meanings of ethics have been continuously diversified and relativized: i) the theory and science of morality (reunited study of morals or habits with moral impact), ii) the form of knowledge of the dynamics of morality; iii) discipline of dialogue, education of dialogue, and criteria of tolerance in dialogue; iv) set of rules of moral behavior, v) systematic study of the regulations of the individual (contractual) behavioral relations; vi) systematic introspection on the moral impact of individuals' decisions; vii) a specific human way of living and interacting, etc.

2.2 Pragmatic ethics as the pragmatic science of morality

Pragmatic ethics is also the main sphere of applied philosophy in which aspects and problems of a moral nature are researched with necessary relativity, and the answers to questions such as: what is good or evil, how should we behave and many other like these, are a natural result of an investigation realized exclusively in an applied manner of thinking. Pragmatic ethics investigates the applied moral principles, their association in

time or space, and the historical evolution of the applied morality in society, carefully observing the set of norms of moral that are relatively accepted within human communities. Pragmatic ethics was born as a science of applied ethos or as pragmatic morality, of the human choice made with discernment in the direction of good or evil (Confucius, Socrates, Plato etc.), or with the real intention of any man to become virtuous (Confucius, Aristotle etc.). Thus pragmatic ethics and pragmatic morality demarcate practically the content of the relative social ideal (ideal behaviour).

2.3. Can an ethic of virtue be relevant and modern?

The history of morality begins in the proximity of virtue. Since two and a half millennia ago, Confucius in *Analecte* [7] describes the becoming of the virtuous man as a complex and coherent process carried out according to the principle of reciprocity, during a necessary identity in the behavioral chain "*thought - word – deed*", as a fundamental target of education and evolution.

Socrates considered the obedience of the law as an essential necessity for the becoming of humanity, proving with his own death this truth and that he was ready to link virtue to human knowledge. Plato, the most important disciple of Socrates, considered that ethics can't be learned by everyone, ethics being not accesible to everyone, but useful for the best, and for this, education (including moral education) must always be at state's disposal ...[8] The Athenian academy, well-known as Akademia, created by Plato, which will survive for almost a thousand years, will have as its major objective to contribute to the moral preparation of future politicians. In the turn of Aristotle, Plato's best disciple, he pragmatically reconsidered education, surpassing his mentor in this respect. Aristotle believed that the product of education in his school Lykeion must be a perfect disciple, proving this by the remarkable way in which he educated the young Alexander, who would become the future emperor Alexander the Great. Aristotle proposed an entirely new relationship, in which virtue has happiness as its substitute, outlining an ethic of happiness through virtue. Aristotelian happiness, however, was multidimensional and consisted of balancing virtue, contemplation and external goods.

In *Groudwork of the Methaphysics of Morals* (1785), Immanuel Kant explains that ethics is founded by answering the question What should I do? ("Was soll ich tun?"). But the most important or essential question of ethics posed by Kant remains: What can I know about what I need to do? ("Was kich ich wissen über das was ich tun sol?") [9]. Kant's ethical view is a deontological one, based on the idea that rationality is good in itself and that all individuals are rational beings. Thus, one question automatically arises: Is Homo

Rationalis truly universal? Kant states that the fundamental principle of morality is this: "*Treat humanity, both in yourself and in the others, always at the same time as an end in itself, and never only as means.*" Here we find old Confucianist echoes in the generalized essence of the reciprocity's principle. This is the Kantian statement known as the human essence of the "*categorical imperative*" which reborn the ethics of general happiness.

The utilitarian theory or utilitarianism, elaborated by the English philosophers Jeremy Bentham and John Stuart Mill, appears natural in this context when it claims that the pursuit of people's general happiness is the ultimate moral goal. The three steps of utilitarianism are obvious and connected to each other: i) happiness is the only thing that truly has real and intrinsic value; ii) actions are right only when the promoted result is happiness, and wrong as that is unhappiness; iii) everyone's happiness counts equally. Of course, each individual seeks his own happiness, but utilitarian ethics proposes a happiness valid for all human beings, obviously able to feel pain and pleasure. The "*principle of utility*", also called the principle of general happiness, states that actions are moral insofar as they produce the greatest amount of happiness for the greatest number of people (maximizing total happiness or sometimes minimizing total unhappiness). The same principle of utility takes into account only the moral purpose of producing the greatest amount of general happiness or the least amount of unhappiness. The alternative is dominant, and the theory of utilitarian remains an ethical theory that insists that we should not focus on the duty to do good, but on the consequences of actions that reduce evil as much as possible, in a volatile conceptual context and as relative as conceptual significance.

Contractual ethics is based on the idea that society and derived human relations can best be explained in terms of a contract as a social agreement between free persons, defining rights and obligations, personal freedom, and political government. The major result of contractual ethics becomes a code of ethics, which is a synthesis of contractual ethics, and in academic education is assimilated to a moral contract between each member of a community and its whole or the university as a system. Such a code includes aspects related to education, research, discipline and academic integrity, etc.

In this historical context of the becoming more and more pragmatic of morality, one can easily see that the actuality of ethics is relevant, regardless of the re-signification of virtue or happiness. The modern ethics can keep its validity only by increasing the importance of pragmatism. To paraphrase Eutifron's dilemma: "*Does ethics decide that an action is moral only because it is pragmatic, or is an action automatically pragmatic only because it is also ethics?*" Instead of an answer, this paper promotes the Nassim Nicholas Taleb's rationality or Talebian way of thinking...

3. TALEBIAN WAY OF THINKING ABOUT PRAGMATIC MORALITY AND ETHICS

Nassim Nicholas Taleb is not only an experimental mathematician but also a succinct, rigorous one, because the need for more empiricists and conjecturers is a real need today. Nassim Nicholas Taleb always has new ideas to write about using probability in science and search of a new reality, from philosophy to mathematics, from finance to politics, from evaluating the risks to foresight population in demography etc. His ideas as a necessary reaction to Gauss' overestimating the statistical population variance lead to the much higher application of probabilities in a large interval for several standard deviations away from the normal distribution.

First of all, his opinion about moral leadership being rather an action, not a position, may be more connected to pragmatic ethics and not at all to ideal, to the happiness and all theory about that. Some caustic and malicious voices consider him a "*flaneur or idler*" because of his entitled protest against the false theorists of the superiority of Academic life in front of real life. His passion for probabilities include probabilities of a real life, excluded by many Academics or even worse renamed as unnecessary topics. Minding the core process of creativity, and lateral thinking concept proposed by Edward de Bono, we can ask ourselves if the "*flaneur or idler*" is useful in today's research burdened more by the form than by the substance and new ideas. Liberty and improvisation is very needed in the phase of ideation, which should precede every frontier-braking research. Without fresh ideas and creativity, research is basically repetition or incremental improvement of the previous findings.

Nassim Nicholas Taleb way of thinking make anyone to understand why so many books and papers about ethics have so far offered an extraordinary feeling of artificiality. The pragmatic morality underlines first of all the discrepancy between words and actions as a modern adherency to non-reciprocity or to anti - Confucianism. Good and bad are very common ideal subjects of theoretical ethical books or lectures. However, Talebian pragmatical morality means to be confronted with the real things, especially when "*the ethical people*" tend to freak out of reality, especially when this reality is not an honourable one.

The simplexity of Talebian way of thinking or of Taleb's ethics is truly refreshing mainly as a result of a clear understanding of the pragmatic morality from which it was born. All his books put the major question in a direct or indirect manner: "*Does that person have his skin in the game*?" redefining in

many original ways, creative types or allusive rather than explicit kinds of delimitation the new pragmatic ethics transposed from the study of the pragmatic morality in modern times:

i) the false dichotomy with reality disappears, and ethics does not pretend that the existence of pragmatic morality and the (co)existence of theoretical ethics are somehow a common choice where only the ethics concept can be recognized: "*My point is that wisdom in decision making is vastly more important, not just practically, but philosophically, than knowledge*" [10]; In this society, where the relative value, availability and cost of obtaining the information (and even knowledge) is declining due to the technological progress, his point is sharper than ever before.

ii) base rate failure of theoretical ethics may suppose that the current situation with everything in place is the only relevant reality, in this case ignoring that much of what means a pragmatic attitude in a modern world not only in retrospective but also in prospective times: "*No, we don't put theories into practice. We create theories out of practice*" [10]; Taking a perspective that moral is a social category (which elegantly explains differences in national and civilisational viewpoints of moral actions), Taleb proposes a direction to unify the differences.

iii) argument to false ergodicity, creating a background in classical ethics can not assume that the statistics for a large number of individual something is true of every member of that world: "*You may never know what type of person someone is unless they are given opportunities to violate moral or ethical codes*" [10];

iv) in his trying to avoid the ambiguity between the meaning of what suggests a term like pragmatic ethics (that is coming from pragmatic morality) and general ethics Nassim Nicholas Taleb underlines the difference between the essence and the appearance of ethics in any human activity: "*Work ethics draw people to focus on noise rather than the signal* " [11];

v) like in any oxymoron of one pragmatic ideal: "**If your private life conflicts with your intellectual opinion, it cancels your intellectual ideas, not your private life*" [1];

vi) even a necessary duality must be deleted: "*To make ethical choices you cannot have dilemmas between the particular (friends, family) and the general*" [1];

vii) neither good nor bad definitions of pragmatic ethics are important,but the truth is one cannot avoid the impact or the consequences of unethics opinions or attitudes: "**If you give an opinion and someone follows it, you are morally obligated to be, yourself, exposed to its consequence*" [1];

viii) the excess of legality in ethics can alterate the pragmatic ethics indeed: "*Modernity has replaced ethics with legalese, and the law can be gamed with a good lawyer*" [10];

ix) in this new mixture the only real component remains courage: "*Courage is the only virtue you cannot fake*" [1];

x) the objectivity of the pragmatic ethics remains in reality and in mankind perceptions of that: "*you will never fully convince someone that he is wrong; only reality can*" and "*reality doesn't care about winning arguments; survival is what matters* " [1].

On Tweeter Matthew Pirkowski wrote about the concept of pragmatism itself: "*This is by definition pragmatism, not rationalism. One could argue pragmatism as rational, but must sacrifice logic as irrational to do so.*" (Tweet, Oct. 28. 2017). In fact, this answer is the most exciting and adequate solution to identify correctly the pragmatic sense to Nassim Nicholas Taleb's succinct definition: "*what works cannot be irrational.*" This echoes economic pragmatism of Deng Xiaoping that *"the colour of the cat doesn't matter as long as it catches the mice"*. Another pragmatic stance is that in social and organizational millieus, we (essentially more than the laws of nature) actively create our environment and reality. So, what works in those environments, cannot be irrational, because whatever works helps create the system itself.

Nassim Nicholas Taleb can explain pragmatic two modern realities, when "*one person needs to be intolerant with intolerance*" and why "*the biggest problem with modernity may lie in the growing separation of the ethical and the legal*" [12]. One researcher must read his books, and so he can understand an answer like this: "**The curse of modernity is that we are increasingly populated by a class of people who are better at explaining than understanding...Let us conjecture that the formation of moral values in society doesn't come from the evolution of the consensus. No, it is the most intolerant person who imposes virtue on others precisely because of that intolerance. The same can apply to civil rights.*"[1]

Finally, the truth is that even the pragmatic morality and pragmatic ethics can be fully understood only in conditions of dynamic equality, specific to developed economies, cultivated countries, and educated populations. Only in these realities, a strong form of philosophical pragmatism can appear, in which ideas have merit only if they can be shown to work in practice: "*There is no such thing as the "rationality" of a belief, there is the rationality of action*" and "*anything that hinders one's survival at an individual, collective, tribal, or general level is irrational.*" [1]

3. CONCLUSIONS

Any comments on the Nassim Nicholas Taleb' s multidisciplinary ideas, can show him as a prolific mathematician, placed rather in reality not in theory, and as the smartest statistical thinker in the

demolition of the precariousness of the econometrical modelling. He remains a thinker who believes in "*The Black Swan*", in heavy tails or extreme events [13] and also one able to offer the real epistemology to his students and the nature of knowledge and morality to the academic life, in his unique series of books, from "Incerto"…

His way of thinking does not much care for the theoretical academic opinions and the different academic or non-academic publics [14]. His scientific bases, reasoning, truths are somehow placed on a different timescale, certainly a dynamic one based on equilibrium in front of reality and all of these aspects give him specific integrity of the pragmatic morality. All very well, but of what practical use is this specific way of thinking? One can paraphrase Michael Faraday and use his famous words: "*Of what practical use is a new born baby*?"

Thinking of a Taleb as of a forerunner for a new way of thinking, we can ask ourselves, what good would proactive creation of the way of thinking bring? From a pragmatic point of view we can have benefits of a "safe" way – we need reality to change first, and then we collectively adopt our way of thinking. Of course, phenomenons or reality change and a new way of thinking are interconnected, but following the Rogers curve, innovators and early adopters of a new way of thinking are a small minority. That can be called the reactive approach. Proactive approach is to change a way of thinking, and that will build new and change environment. That form of social engineering is the rational and conscious design of our social, organisational and cultural environment.

Reasoning in pragmatic ethics brings together a hypothesis extracted from reality or even a thesis with arguments that practically support, prove or prove it historically. That is why in pragmatic ethics, opinion is not in itself a moral argument, and in order to become a thesis, it must later be demonstrated on the basis of a pragmatic argument, offering scientific or at least realistic or proven reality evidence of relative truths. It is about those relative truths that more and more people believe in and that belong to a certain historical moment. However, one can say that humankind wishes more people were fluent in silence... Nassim Nicholas Taleb is absolutely right when it comes to much-applied areas, under many risks' pressure and where

the actual doing is more worthwhile in life than learning theories in academia. Nassim Nicholas Taleb will remain not only a pragmatic researcher and a robust practitioner, but also an anti-fragile teacher for the long term future, even when he will look fragile for theoreticians... The majority of the academic researchers can trust in his sentence: "*True intellect should not appear to be intellectual*" [1] to be easier accepted in real life, to be pragmatic...

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INVESTIGATION ON SYNTHESIS, GROWTH AND MULTI CHARACTER STUDIES OF LTMA SINGLE CRYSTAL

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Abstract. *The Novel L-Threonine Manganese Acetate (LTMA) single crystal was successfully grown by slow evaporation method at Room Temperature. LTMA crystal was characterized with single crystal XRD and powder XRD, EDAX, FTIR, UV-Vis-NIR, and MHD test. Single crystal XRD study was carried out to examine the crystal system and unit cell parameters. Powder XRD pattern confirm that there is change in the basic structure of material. The presence of Chemical composition used in the crystal was qualitatively confirmed by EDAX analysis. The functional groups in the crystal lattice, was qualitatively analyzed by FTIR spectrum. Optical property of the crystal was studied by UV-Vis-NIR, shows that LTMA crystal was well transparent in the range of 267-1100 nm and the energy band gap as 4.3eV. The Hardness of the LTMA crystal was studied by Vicker's Micro hardness analysis.*

Keywords: *Single crystal XRD study, Powder XRD study, Optical property, EDAX analysis, Mechanical property*

1. INTRODUCTION

In recent times, organic and inorganic materials are emerging out with desired properties for second harmonic generation as Non-linear optical materials. These materials have lot of uses in the field of photonics such as optical computing, optical communications, optical disk data storage, optical logic circuits, optical information processing, optical information processing, high - speed information processing, telecommunication, laser sensing and colour displays like LCD monitors. Like the semi organic crystals, amino acid based semi organic good optical and non-linear optical applications crystals were grown **[1-5]**. These single crystals can also be grown from aqueous solution for the enhanced hardness and the thermal stability. Later, L-Alanine, L-Proline, L-Valine, α-Histidine based semi organic crystals were invented **[6-13]**. In this plot form, pure L-Threonine single crystal and L-Threonine based semi organic crystals were carried out as L-Threonine Lithium Chloride (LTLC), L-Threonine Calcium Chloride (LTCC), L-Threonine Cadmium chloride (LTCC), L-Threonine Manganese chloride (LTMC) single crystals are grown and its characters also studied **[14-18]**. Then, L-Threonine sulfate crystals like lithium sulfate (LTLS), potassium sulfate (LTKS), zinc sulfate (LTZS) and copper sulfate (LTCS) single crystal and L-Threonine phosphate single crystal were grown and studied **[19-23]**. After, L-Threonine Cadmium Acetate (LTCA) and L-Threonine Zinc Acetate (LTZA) single crystals are grown **[24-25]**. In continues, in this work, the novel amino acid based semi-organic single crystal of pure L-Threonine Manganese Acetate (LTMA) was successfully grown by slow evaporation method. The various characterizations have been carried out and those properties are reported.

2. EXPERIMENTAL SECTION
2.1 Synthesis & Crystal Growth

L-Threonine Manganese acetate (LTMA) single crystal was successfully grown from aqueous solution in the equimolar ratio by slow evaporation method. L-Threonine and Manganese acetate tetra hydrate (Nice - AR grade) chemicals used to prepare 100 ml saturated solution at room temperature. After proper recrystallization process, solution was filtered into a beaker and it was covered with perforated plastic sheet and then housed in a dust free atmosphere so as to ensure solvent evaporation. After a period of 25 days, harvested single crystal of $11 \times 3 \times 2$ mm^3 size LTMA was grown is shown in Fig. 1.
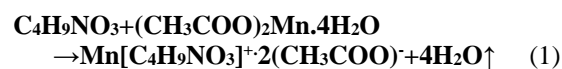
Chemical Formula

$$C_4H_9NO_3 + (CH_3COO)_2Mn.4H_2O$$
$$\rightarrow Mn[C_4H_9NO_3]^+ \cdot 2(CH_3COO)^- + 4H_2O \uparrow \quad (1)$$

Fig. 1 Photograph of as grown LTMA single crystal

3. RESULTS AND DISCUSSION

3.1 Single Crystal X – Ray Diffraction Analysis

The grown single crystal of LTMA was subjected to single crystal X-ray diffraction analysis to find the lattice parameters. Single crystal XRD analysis carried out using Nonius CAD4/MACH3 Single Crystal X-ray diffractometer with MoKα (α= 0.71073 Å) radiation revealed that like pure L-Threonine crystal, LTMA has Orthorhombic system with unit cell parameters were determined as shown in Table 1. Previous reports similar base material L-Threonine and Cadmium acetate doped L-Threonine single crystal results are compared in this table 1. This result proved that LTMA also satify the previous reports in this regard.

Table 1 Single Crystal XRD data of LTMA

Parameter	LTMA [present]	Pure L-Threonine [reported 14]	LTCA [reported 24]
a	5.106(19) Å	5:147 Å	5.131(1)Å
b	7.721(19) Å	7:733 Å	7.711(3)Å,
b	13.45(4) Å	13:610 Å	13.513(5)Å
α=β=γ	90°	90°	90°
Volume	530(4) Å^3	537:98 Å^3	534.6(3)Å
System	Orthorhombic	Orthorhombic	Orthorhombic

3.2 Powder X – ray diffraction analysis

The Powder X-ray diffraction pattern recorded for grown crystal by an X-ray diffractometer (Model JDX 8030) with CuKα (α = 1.5408 Å) radiation are shown in Fig.2. Miller indices estimated by powder V1.0 software along with 2 Theta values of LTMA crystal is given in table 2. The different peaks confirm the Powder XRD pattern L-Threonine Manganese Acetate single crystal. All the peaks differ from the peaks of pure L-Threonine single crystal [14].
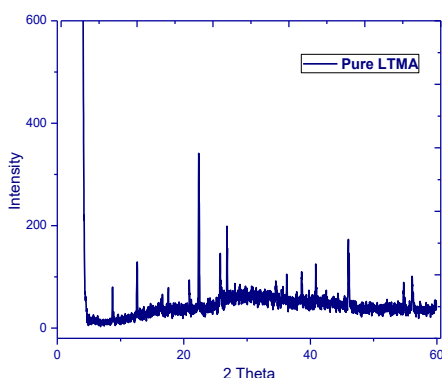

Fig. 2 Powder XRD pattern of LTMA single crystal

The first peak start at 3.93 degree and its plane calculated [111] and second maximum reaches as 345 a.u intensity in angle 22.2 degree, its plane calculated as [411]. The continual peaks reveals at the angles 25.6,26.6,36,38.4 and 44.9 in the repective peaks of plane 422,431, 444, 552 and 661. Fig.2 proved that the pure LTMA consist, number of different planes with different lattice points. It concluded that no one single element result as different peaks, therefore this material contain greater single element.

Table 2. 2θ Vs Intensity values LTMA crystal

2θ	Intensity	hkl
3.93	1178	111
12.5	134	211
17.6	100	222
22.2	345	411
25.6	154	422
26.6	203	431
36.0	108	444
38.4	113	552
44.9	176	661

3.3 Energy Dispersive analysis (EDAX)

Energy dispersive X-ray analysis (EDAX) used in conjunction mode and an important tool for confirming the element present in the crystal. Fig. 3 illustrates the EDAX spectrum of LTMA crystal under accelerated voltage 15.0 kV, magnification ×1000, working distance 15.1 mm using JEOL company (JSM-6701 F, SEM). The presence of Carbon, Nitrogen, Oxygen and Manganese in LTMA single crystal was determined. The spectrum of LTMA single

crystal was obtained as shown in Fig. 3. Due to the inclusion of acetic acid, Carbon & Oxygen has the maximum peaks. Manganese places are clearly displayed in EDAX Spectrum.

The percentage of elements was traced and showed that the compounds contained the elements as: Carbon, Nitrogen, Oxygen and Manganese. In Table 3, displays the weight, percentage of compound placed in crystal as experimental values. It proves the purity and exacts of the crystal.
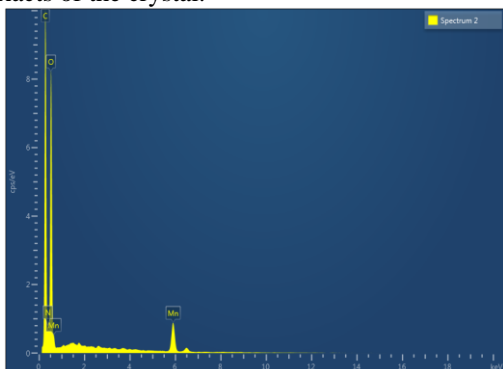

Fig. 3 EDAX spectrum of pure LTMA

Table 3 Experimented EDAX data of LTMA

Element	Line Type	Wt%	Atomic %
C	K series	41.51	49.7
N	K series	6.76	6.94
O	K series	46.79	42.06
Mn	K series	4.94	1.29
Total:		100	100

3.4 Fourier Transform Infra-Red analysis

The identification of functional groups was performed by Fourier Transform Infra-Red analysis (FTIR) spectroscopy. The FTIR spectrum of a compound provides more information than normally available electronic spectra. The presence or absence of absorption bands helps in predicting the presence of certain functional groups in the compound. To analyze the FTIR spectrum, accurate information about structure of L-Threonine and Manganese acetate is much essential. The FTIR spectra of pure LTMA crystal recorded by Perkin Elmer spectrometer in the frequency region of 400-4000 cm-1 using KBr pellet technique as shown in Fig.4. In order to do assignment, The FTIR frequencies of pure L-Threonine manganese acetate are tabulated below in Table 4. In order to do assignment, FTIR frequencies are tabulated in Table 4. The peak observed at 489 cm^{-1} is attributed to NH$_3^+$

bending. 560 cm^{-1}, 701 cm^{-1} and 769 cm^{-1} are COO$^-$ rocking deformation, COO$^-$ wagging vibration and COO$^-$ bending respectively. 871 cm^{-1} and 932 cm^{-1} are C-C-N rocking and C-C rocking. 1040 cm^{-1}, 1113 cm^{-1} are C-N and NH$_3^+$ rocking and 1346 cm^{-1} was CH symmetric deformation. 1417 cm^{-1}, 1629 cm^{-1} are NH$_3^+$ symmetric and NH$_3^+$ asymmetric deformation respectively. The broad vibrational band observed at 3029 cm^{-1}, 3169 cm^{-1} is assigned to the NH$_3^+$ symmetric and NH$_3^+$ asymmetric stretching.
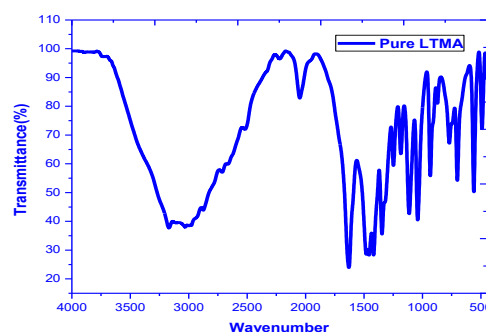

Fig.4: The FTIR spectra of LTMA

Table 4 The FTIR assignments of LTMA

Wavenumber (cm^{-1})		Assignments
Pure L-T [reported 24]	LTMA (Present work)	
3157	3169	NH$_3^+$ asymmetric
-	3029	NH$_3^+$ symmetric
1633	1629	NH$_3^+$ asymmetric deformation
1457	1417	NH$_3^+$ symmetric deformation
1342	1346	CH symmetric deformation
1112	1113	NH$_3^+$ Rocking
1037	1040	C-N Rocking
931	932	C-C Rocking
871	871	C-C-N Rocking
767	769	COO$^-$ Bending
700	701	COO$^-$ wagging vibration
559	560	COO$^-$ Rocking Deformation
489	489	NH$_3^+$ Bending

3.5 Optical Studies

3.5.1 Transmittance Studies

The transmittance spectra of LTMA recorded in the range 190-1200 nm using Lambda 35 spectrometer. The Optical transmittance spectra of LTMA are shown in Fig.5. It reveals that there is no absorption peak in the range of 267 nm to 1100 nm. It can be seen from the transmission curve that below 300nm the transmittance of the

grown crystal LTMA slightly decreases. Variation in the transmittance may be due to the presence of manganese acetate. Very low absorbance in the entire visible region would be attributed to the delocalization of electronic cloud through charge transfer.

3.5.2 Absorption Studies

The absorption spectrum of grown crystal analyzed in the range 190-1200 nm. Fig.6 shown, there is no change from the transmittance spectra. The absence of absorption in the visible region clearly indicates that the grown crystal can be used for photonic applications. The absence of absorption spectrum concluded the good energy band gap value. By knowing optical constants of a material, examine the potential of the material for photonics applications. The optical absorption coefficient (α) calculated by the relation

$$\alpha = (1/t). \log (1/T) \qquad (2)$$

Where, t is Thickness of the material and T is Transmittance.

The band gap of the crystal was estimated by Tauc's relation:

$$\alpha h\nu = A(h\nu - E_g)^n \qquad (3)$$

Where, E_g is the optical bandgap of the crystal and A is a constant. So, the energy band gap of grown crystal was determined from the Fig. 7, as 4.3eV.
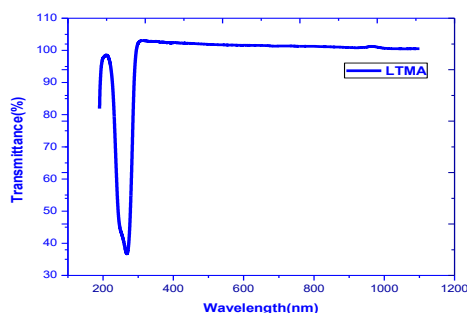

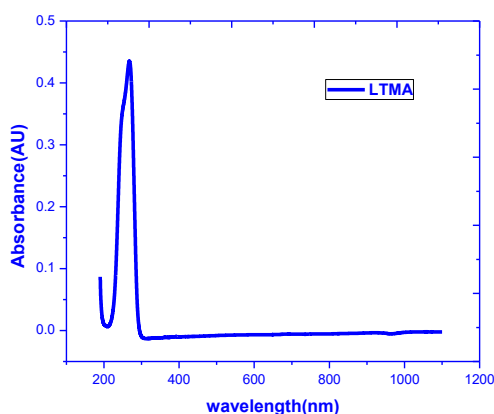**Fig. 5** UV transmittance spectrum of LTMA
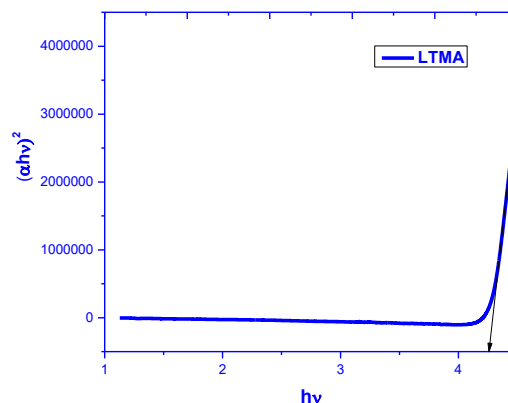

Fig. 6 UV Absorption spectrum of LTMA

Fig. 7 Energy band gap of Pure LTMA crystal

3.6 Vicker's Micro Hardness Study (MHD)

The micro hardness study was carried out to determine the mechanical strength of the grown crystals using HMT 2T, SHIMADZU Vickers micro hardness tester. The indentation marks were made on the surface of the crystals at room temperature by applying load of 25gm, 50gm and 100gm. The H_v was found to increase with the increase in the load from 25 to 100g and crack occurred at higher loads as shown in Table 5. A graph (Fig. 8) has been plotted between H_v and applied load P. The Vickers micro hardness number H_v of the crystal was calculated using the relation

$$H_v = 1.8544 \ P/d_2 \ (kg/mm^2) \qquad (4)$$

where, H_v is the Vickers hardness number in kg/mm^2, P is the applied load in kg and d is the average diagonal length of the indentation in mm. From the graph it can be observed that the hardness value increased up to 100g and the maximum hardness value was 80.5 kg/mm^2 at 100gm.

Table.5 Vickers Hardness Test data

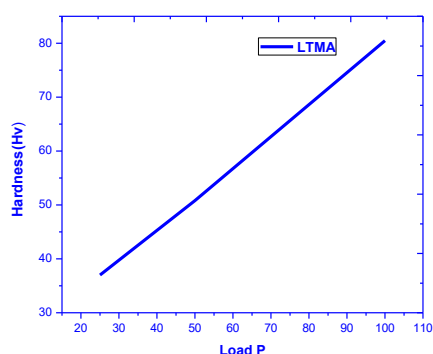| Load P [gm]	Hardness [H_v]
25	37
50	50.8
100	80.5

Fig. load P Vs hardness (H$_V$) of LTMA

4. CONCLUSIONS

Good quality single crystal of L-Threonine Manganese Acetate (LTMA) was grown in room Temperature by slow evaporation method. Structural characterization of the grown crystal was concluded as orthorhombic crystal system by single crystal and periodics of hkl planes analysed by powder X-ray diffraction studies, and the lattice parameters have been evaluated. Presence of Chemical compositions C, N, O and Mn in the grown mater was qualitatively confirmed by EDAX analysis. The functional groups in the crystal lattice, was analyzed by FTIR spectrum. The UV Transmittance & Absorption spectrum were plotted and energy band gap was determined as 4.3eV. The increasing Hardness nature of the LTMA crystal was obtained by Vicker's Micro hardness study. Thus the pure L-Threonine Manganese Acetate (LTMA) simple crystal is a Multi character raw material.

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ENHANCED LION OPTIMIZATION ALGORITHM BASED ON FUZZY C MEAN FOR TEXTUAL DATA CLUSTERING ALGORITHMS

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Abstract: *Data is a vital component of the world activity. The dynamic representation of data is wanted to organizes and retrieve most effectively. Information is needed to format some meaningful format then only retrieving of information is knowable. Text mining is concept also called as text analysis process which extracts the related, non related information and knowledge from the unstructured text data. Applications of clustering environment are retrieval, data analysis, statistics, machine learning and linguistics. Similar group of related data item joined together is called clustering. Clustering is evergreen research area in text mining under the data mining domain. The partition cluster analysis Fuzzy C Mean algorithm Combined with Lion Optimization Algorithm found that Enhanced Lion Optimization Algorithm based on Fuzzy C Mean for Textual Data Clustering Algorithms (ELFCM). FCM is better clustering algorithm, some time it will take more time for pick the initial cluster centre point. It may be take more iteration for selecting centre point of cluster. For clustering operation FCM is very best. So overcome this issues pick the initial point from LOA and cluster operation performed by FMC. The proposal shows that very clearly for ELFCM is better clustering algorithm from others. Implement this algorithm in Java and compare with some existing algorithm utilize three different Dataset.*

Keywords: *Information retrieval, Text mining, clustering, Optimization algorithm, Dataset*

1. INTRODUCTION

Text mining encompasses many text processing and classification techniques, such as text categorization, clustering and retrieval and extraction of information. Traditional information management methods are woefully inadequate for the enormous amount of text data. In general, only a very small percentage of easily available document will be applicable to a specific individual of user. And without understanding of what has been in the documents it is difficult to formulate effective requests to analysis and extract useful information from the data. The users need to apply techniques to distinguish between different documents and categorize the importance and significance of documents or find patterns.

Thus, the text mining approach has become important in recent days. Clustering is an unsupervised learning without any prior identified cluster operation work on the go. As the related data items are joined together, the data can be analysed without any disturb. Understanding the advantages

of data clustering and prevalent usage of textual data, this work sets its goal to present a textual data clustering algorithm by clubbing FCM and LOA.The enormous amount of unstructured data is being transferred into the information network. The greatest challenge is to organize and extract new information or knowledge from this large, unstructured text, leading towards the concept of text data mining or document grouping.

The aim of this work is to improve the performance of current clustering documents. The aim is to offer an efficient, accurate and scalable, better quality clustering solution. Textual data mining is focus two main techniques. First one supervised learning and second one unsupervised learning. Under the surveillance of teacher student learning in the class room. It is the example for supervised learning. Without a teacher, instead refers to unsupervised learning. Some in which training dataset is not labelled and the typical goal of which of which is to find natural cluster of the patterns specified that is cluster.

2. RELATED WORKS

Clustering algorithm are arrange into group on the similarity of a collection of patterns. Patterns within a valid cluster are intuitively more similar to each other than to a pattern that belongs to another cluster. But there are few previous information on the dataset available in many of such problems and as few assumptions about the data as possible must be made by the decision maker [3].In [4] Text document clustering was most essential research in recent years. It helps to organize textual information in particular order for retrieving information easy.

Text clustering is most useful for many resent task that is either offline or online work based on textual information. It is an extensively spread sub-set of data clustering that uses concepts from all domain. Based on Lion nature clustering operations are made. In [5] this proposal an approach based on ensemble methods for a non-parametric document classification. Non – parametric document clustering can be defined as the process of grouping similar document with requiring either the number of categories of the document or an accurate start of the process.

In [6] multiple label text document categorization technique based on fuzzy relevance clustering. This work clusters the content by considering must link

and cannot_link constraints. The must link constraint works on document with greater semantic information and the cannot_link constrains is meant for information with minimal similarity. In [7] work employs a fuzzy relevance measure for transforming the high dimensional document to the low dimensional fuzzy relevance vector.

The information clustering technique with manifold based optimization of Bag-og-Features (BoF) is proposed [8]. This proposed utilizes the data manifold and clustering results are formed. In [9] attempted to present another text clustering technique by employing genetic algorithm. The claimed that performance of harmony search algorithm is better than the performance of genetic algorithm on combine with k-means algorithm. The performance of Fuzzy C mean is enhanced by several optimization algorithm, so as to support the FCM from Convergence at local minima [10].

3. PROPOSED ELFCM ALGORITHM

The proposed text clustering algorithm is form a group with similar together that could organize text data item. This algorithm is clubbing Lion optimization algorithm with Fuzzy mean algorithm. The optimization algorithm for choose initial point and FCM for cluster operation. LOA imitates the character of Lion. The merits with this algorithm restricted control parameters. There are three important steps involve ELFCM.

- Pre-processing
- Text Similarity Computation
- Cluster Operation
-

The pre-processes are removing unwanted meaningless data through source dataset. To eliminate mask that is unwanted product. ELFCM us used vector space method for making pre-process. The product of pre-process is called Bag of word. It represented as follows

$$t = (td_{i1}, td_2, \ldots \ldots, td_n) \tag{1}$$
$$d_x = (W_{x_1}, W_{x_2}, \ldots \ldots, W_{x_k}) \tag{2}$$

Based on weight of the documents are assigned, Before cluster operation on dataset. Pre-process refine some stops and removing stem words.
Similarity computing utilized to measure distance from document to document. It predict whether text are similar or dissimilar based their distance. The clustering is to grouping of data item into particular group. To calculates similarity between data items internal or externally. Euclidean distance is extract suitable for calculate distance between textual data item. Here implement MVS with Euclidean distance. MVS is used for calculate distance in multiple distance vector space.

$$sim(d_i, d_j) = \frac{1}{n-n_r} \sum d_n \in S \ sim(d_i - d_\square, d_\square - d_j)$$
(3)

Lion optimization algorithm is better to pick the initial point of cluster. Based on living nature it divided into two type as single and group such as nomad and pride. It is decide to hunting behaviour and success rate of capture prey. Some principle apply for dataset and get the initial point. To calculate it quality and fixed as a initial point of cluster.

$$Lion[fitness] = \frac{f_i}{\sum_{i=1}^{n} f_n} \tag{4}$$

Fuzzy C-Mean algorithm described by Fuzzy Matrix μ with n rows and C columns. The n is number of data objects and c is the number of cluster. μ_{ij} the element in the $i^{t\square}$ row and $j^{t\square}$ column in μ.

$$F_n = \sum_{i=1}^{r} \sum_{j=1}^{c} \mu_{ij}^{ff} \left\| x_i - x_j \right\|^2 \tag{5}$$

ff is the fuzzy factor and μ is the fuzzy membership value.

$$X = (x_1, x_2, \ldots \ldots, x_c) \tag{6}$$
$$Y = (y_1, y_{2,\ldots\ldots\ldots}y_r) \tag{7}$$

Cluster centres of cluster s(r) can have w features.

$$C_i = (C_{i,1}, C_{i,2} \ldots \ldots \ldots C_{i,w}, C_i, r \times (w-1) + 2 \ldots \ldots (i. r \times w) \tag{8}$$

Proposed ELFCM Algorithm
Input : Text dataset(N)
Output: Text cluster(C)
Begin
For all
Step 1: Start Pre-Processing;
Step 2: Initialize the population of Lion;
*   Selecting random Nomad and Pride;*
Step 3: Distribute the prey;
*   For each pride of nomad*
*   Compute fitness of lion;*
*   Compute the success rate ;*
Step 4: if (fitness(nomad lion)>fitness(pride lion)
*   Modify the living location of lion;*
*   Verify the search space of lion;*
*   Alter the search space;*
*   End if*
Step 5: Apply FCM for cluster operation;
*   Calculate Membership factor;*
*   Create μ Matrix;*
*   End if*
Step 6: Store the optimum solution;
*   End for*
*   End*
Step 7: Some step involving in Textual dataset;

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4. EXPERIMENTAL SETPU AND RESULTS

In this section evaluated the proposed text cluster algorithm with existing approach. A new proposal

ELFCM evaluated by standard performance metrics such as Precision, Recall, F-Score, Purity, Entropy. This work utilized some of popular dataset through the respectively their links. The performance associated with the text clustering algorithm is implemented in Core Java with 12 GB RAM. The following table represent about the datasets.

Table No :1

Dataset

Data	Source	Classes	Number Document	Pages
Hitext	TREC	17	2301	13170
Reuter7	Reuters	07	2500	4977
WebKb	WebAce	20	2340	13859
Re0	Reuters	13	1504	2886
20 News Group	WebAce	20	2200	20000

T_P, T_N, F_P, F_N based on these value performance metric are computed
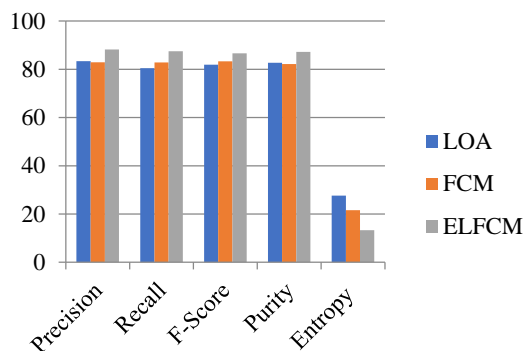
Table No: 2

Performance Metrics

	Precision (%)	Recall (%)	F-Score (%)	Purity (%)	Entropy (%)
LOA	83.36	80.46	81.9	82.7	27.62
FCM	82.9	82.82	83.3	82.2	21.6
ELFCM	88.2	87.5	86.6	87.2	13.3

The above table describe the details about the performance analysis of ELFCM. The graphical representation of ELFCM is follows

Figure no: 1

Performance metric of ELFCM

The proposed algorithm ELFCM compare with existing algorithm it clearly proven works better. Based on the Precision rate of the proposal are greater than existing employed individually. Recall rate can price are greater. F-Score analysis demonstrably enhanced. The entropy of this proposal approach is smaller compare with LOA and FCM. Performance metrics are shows that ELFCM very efficient textual cluster algorithm.

5. CONCLUSION

In this paper, we proposed a new textual clustering algorithm, named as ELFCM. It would utilize the merits of Lion Optimization Algorithm and Fuzzy C Mean. We are proven ELFCM attain highly effective as well as efficiency based on empirical evidence and theoretical analysis. The key concept of this approach is initial point of cluster from LOA and cluster operation performed by FCM. The formed clusters are measured with performance metrics. In future this work can be improve by including semantic based analytics for cluster documents.

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