“Play” in Biological Life and Artificial Intelligence: A Critical Evaluation of the Phenomenon of “Play” in Human beings and Animals and in AI Machine systems

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Chapter 1

Introduction

(Mechanical Turk to Drosophila of AI)

1.1 The Main Problem of the Dissertation:

The main question or research problem of this dissertation is Can Artificial Intelligent systems “play”? or Is it possible for AI systems to fit in the structure of “play”? So the main aim of this dissertation is to evaluate the existence and role of play in AI systems. The phenomenon of play is extraordinarily pervasive and essential to both animal and human lives. However, nowadays we are aware that many AI systems also engage in gaming. So the main question of this dissertation has a crucial value in the current circumstances.

1.2 The Main Thesis of the Dissertation:

The main thesis of this dissertation is “currently it seems impossible for AI systems to “just play” or it is difficult for AI systems to fit in the complex structure of play because of two reasons. Firstly, just playing and playing games are two very different things. Lastly due to the complex structure of play that is deeply rooted in the phenomenon of life. The main theme of the dissertation revolves around the orbit of these two reasons and intriguingly both reasons and parts reflect each other.

1.3 Background:

In the late 18th century a Hungarian civil servant named Wolfgang von Kempelen who had sufficient knowledge of physics and mathematics constructed and introduced a machine or “automaton” which can play chess by itself. Kempelmen’s automaton defeated many noteworthy

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chess players in different games. Once François-André a famous chess master managed to defeat the automaton but he also expressed that was a tough competition. Kempelmen's Mechanical Turk was a wooden man sitting behind the cabinet with a chess board. When the opponent come in front of the automaton, the automation was spring to life and started different chess moves. After the death of Kempelmen, the automaton was adopted by Johann who was also a mechanical engineer and also continued to visit different places and show with the automaton. When Kempelmen's automaton got more fame then different people started the debate over its authenticity of automaton. For example, is this all an illusion for a show or this automation is in a real sense play by itself? But when people investigated the machine thoroughly they realized that it was a hoax and an illusion for the eyes because that "wooden man" was managed by another man who sits behind the curtains and plays different chess moves with the use of "unseeable wires".

However, the illusion of Kempelmen's automaton changed into reality when in 1997 an IBM Deep Blue system defeated world champion, Garry Kasparov, in chess after a six-game match. One game was won by Garry and two games were won by IBM computer and the other three matches were drawn. The match continued for several days and got massive media coverage all over the world. The main headline on the electronic and print media was "Man vs Machine" and like before people again started a debate about the playing capacity of IBM computers. However, now the case was very different because the IBM system was not like the Mechanical Turk which was moved by the hands of men but a real programmed automaton that has the capacity to make different clever moves. The transition from tangible to intangible wires took place over a period of about 200 years. In other words, now the wires weren’t physical but based on some abstract numbers and algorithms. Notwithstanding the match aims to keep forward the complex calculations that are useful in different medical and financial dimensions of human life. Nathan

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Ensmenger a computer scientist from Indiana University argues that many engineers from the AI industry believe that the mastery of AI in chess is intellectually par excellence. For example, according to Alexander Kronrod a famous soviet mathematician, chess is a “Drosophila of AI”. That means chess for AI is just like the “fruit fly” (which has the biological name of Drosophila) for the research of genetics. For biologists, the fruit fly has a unique significance because it has more than 60% disease-causing genes in humans, etc. Many computer scientists argue that chess has also a crucial and pervasive role in the understanding of the diversity of AI intelligence and overall they think that games in AI systems are the premier source of developing and enhancing them that can help us in other fields of life. In 1997 John McCarthy published a paper on AI as Sport in which he argues that “…computer chess has developed much as genetics might have if the geneticists had concentrated their efforts starting in 1910 on breeding racing Drosophila. We would have some science, but mainly we would have very fast fruit flies”.1 Nowadays AI systems are also playing different games like GO, Jeopardy, etc. and ironically they won in many games against humans. The fundamental query, however, is whether playing games is the exclusive manifestation of intellect or whether human intelligence is solely founded on the principles of precision and accuracy, abstraction, etc.

1.4 Conclusion:

Play is a phenomenon that is extremely widespread and vital to both animal and human existence. Despite the fact that humans appear to be more distinct and evolved than other species in the phylogenetic tree because they possess more sophisticated and intricate linguistic tools that allow them to influence and control many aspects of nature. However, for many communication

1John McCarthy, AI as Sport: Kasparov versus Deep Blue. Computer Chess Comes of Age, (Springer-Verlag, New York, 1996) xiv, 322 pp.

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researchers “play” is the first and primary form of meta-communication. So this topic has significance in the current scenario and it is necessary to evaluate and describe the phenomenon of play, especially where the machine can also play and see how "just play" is different from playing games. In the next chapters firstly I will describe the difference between play and games and argue about play as the essence of games. Then the second part of the dissertation will be based on the discussion of play in biological life and the functioning of play in the framework of the brain system. In the third part, I will go deeper and discuss the ontological and cultural structure of the play. Lastly, we will see how AI programmers and computer scientists respond to the phenomenon of play in AI systems. Due to the development of AI, it is now a widely held belief among both the general public and academics that AI systems are capable of matching human capabilities, particularly intelligence, and could eventually take the place of humans. But the issue is that they either limit human nature to a limited set of functions or reduce all life to a special model of hyper intellect. while letting loose those aspects of biological beings that are ingrained with contradictions and irrationality. The relationship between biological beings and life and nature, as well as vice versa, is much more complicated than we realize. This dissertation's major goal is to illustrate and assess the nature of play in human life and determine how Artificial Intelligent lack and accomplishes its nature. So the main theme of this dissertation is to discuss and evaluate the structure of the play in all sufficient ways and see the diversity of play in human and animal life and how the AI system fits in this plot.

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Chapter 2

“Play” and “Games”

2.1 The Task of the Definition of Play:

The arduous task in this chapter will be to define and elaborate on the structural foundation of the word "Play" from all possible ways and how "just play" and playing games are two different sets of activities. First, we must review the definition of play in the dictionary. The definition of Play as it has been described in the Oxford Dictionary is as follows,

“to do things for pleasure, as children do; to enjoy yourself, rather than work…. or to pretend to be or do something for fun”2.

Peter Gray, the play theorist, also considers imagination as one of the four main characteristics of play. He contends all kinds of play activities have some kind of imagination, mimicry, or “pretending”. The definition of a Game as it has been described in the Oxford Dictionary is as follows,

"an activity or a sport with rules in which people or teams compete against each other… an occasion of playing the game."3

2Hornby, A. S., & Cowie, A. P. (1977). Oxford Advanced Learner's Dictionary of Current English (7th edition, 2005), 1153

3 Hornby, A. S., & Cowie, A. P. (1977). Oxford Advanced Learner's Dictionary of Current English (7th edition, 2005), 637

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2.2 Diversity of the word “Play”:

The first issue of the thesis is to define the term "play" in the sense of "what do you mean by play" because the term has many distinct meanings and depends much on context. For instance, "He is playing the bad guy in the play," "Arsenal played well today," "I know all your tactics, so don't play with me," and "Robert excels at playing the piano". etc. In light of how imprecise this concept is, it appears paradoxical and pointless to compare the role of play in biological beings and AI systems. Contrasted with this, the role of play is extremely an essential thing in human and animal life and one of the main instincts which we can observe and experience roughly in all mammalian life. Taking the urge to play for granted would therefore be unfair because it is one of the primary ways that animals interact with one another and humans can use it to improve their abilities and understanding. Play is a word with a wide range of applications and is difficult to define in a single sentence, but it has some fundamental characteristics that can help us understand its structure. This is where philosophers differ from lexicographers in that their main objective is not to define a word but to identify its fundamental characteristics that can help us comprehend its constitution and determine how other things fit within it. The goal is the same. This differentiation also tries to assist us in the relationship of this issue, which is intriguing if we consider the pattern of play and games in the morphological parallelism of word and meaning. I'll discuss this subsequently.

2.3 Wittgenstein and Games

As a result of our need for fundamental knowledge that would allow us to utilize language as a tool for communication with ease, we define things to restrict their scope and meaning. Our communication will be more accurate the more exact you are. This is the rationale behind early 20th-century analytic philosophy's interest in linguistic issues. They adopted an extreme stance

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and attempted to transform all language into abstract symbols of symbolic and formal logic because they wanted to be precise in their language. Early Wittgenstein also focused on and supported this linguistic issue. Philosophy is the byproduct of misunderstanding language, is one of his most well-known quotes. He thus suggested that if we can resolve linguistic issues, particularly the link between word and meaning, we will be able to simply resolve all philosophical issues. However, Wittgenstein later distanced himself from his initial theories and concluded that language games could help us understand the intricacy of language. It's interesting, even inside the parameters of the subject research, that he uses the definition of "game" as an example to highlight how challenging it is to explain words in a horizontal strand of a sentence due to linguistic usage4. He basically says that we typically infer the meaning of words and sentences by playing different language games. When we try to define the word "game," for instance, we find that its essence encompasses a wide range of activities. Wittgenstein does not, however, claim that a word cannot be defined, but rather that there are similarities between words, particularly those that are firmly ingrained in our instincts, culture, and understandings, such as the word “Play” or “Game”.

2.4 The Nature of Play:

Johan Huizinga, a Dutch historian also portrays the phenomenon of play in the framework of irrationality. He wrote a whole book Homo Ludens in which he defines play as the main cause behind the human culture and civilizations. Usually, when we see the word "play", we think of things like joy, happiness, excitement, or adventure. However, playing games is not the same as playing. The best illustration of pure play can be seen in children's play. Huizinga states, "Child-Play possesses the play-form in its veriest essence, and most purely".5 Typically, we play sports like rugby, soccer, or cricket. However, child play is a unique

4Ludwig Wittgenstein, Philosophical investigations. (John Wiley & Sons. 2010)

5Johan Huizinga, Homo Ludens: A study of the play-element in culture. (Angelico Press. 2016) ,17.

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situation. For example, the phrase "Hey let's play" is frequently heard in children's play, and if a child is seen leaping or running around, he will typically respond, "I'm just playing," when asked what he is doing. Play, therefore, consists primarily of irrational and random behavior that is sustained by feelings of pleasure, joy, and curiosity. From here it is possible to see the main difference between play and games and that is the difference in rules of regulations. Game is basically the activity but with some defined rules and regulations which restricted the chaotic nature of play.

2.5 Freedom and Play

Another problem with the fundamental quality of play is that, in contrast to Huizinga, many theorists do not believe that play is merely a random or irrational activity. For instance, when children play together and jump and run around, they are actually chasing or jumping up and down, which is a result of laws and regulations. Play, according to play theorist and psychologist Peter Gray, is not just a collection of random activities6. He contends that when kids play, they are engaging in a specific activity. The sole distinction is if there are explicit or implicit rules. For instance, when children play, the rules are implied yet are created by the children's freedom. Lev Vygotsky, a Russian psychologist, claims that “all play has rules and that players must exert conscious control over their own actions to follow the rules”.7in one of Peter's articles. He continues by citing the example of rough and tumble play when both partners instinctively know how to keep each other safe. Therefore, it is forbidden to hurt other players. First of all, play is a self-selected and constant manifestation of the nature of freedom, according to Peter Gray and other play theorists. Without freedom, play cannot exist. Freedom is also divided into two different categories. primarily through spatial, material words, and secondarily by feelings. The drama, however, is fundamentally devoid of rules and regulations; but, as soon as it entered the world or entered space, it automatically changed into something else with rules and regulations. So space and time enchain play in different forms and human

6 Play-based Learning with Dr. Peter Gray, https://www.youtube.com/watch?v=wJaAegok8L4&t=178s. 7 Peter Gray, The decline of play and the rise of psychopathology in children and adolescents. ( American Journal of Play, 3(4), 443-463.2011) , 445

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reason switches these forms into a game. However, children's play demonstrates the purest form of play, and from her, merely playing and playing games diverge into distinct activities. Huizinga asserts “Play only becomes possible, thinkable and understandable when an influx of mind breaks down the absolute determinism of the cosmos” (Huizinga, 2016, p. 3) When we enjoin play with a formal set of rules, it turns into a game like a basketball, soccer, or cricket, among others.

2.6 The Role of Play in Culture and Philosophy:

Historical authors and various cultures and civilizations have long discussed the distinction between games and pure play. For example, distinguishes ἀγών “Agon” or contest from παιδιά “Paidia” or child play (Huizinga, 2016, p. 48). But because play exists everywhere there is a game, these two words can occasionally be used interchangeably. Play also has a dual nature, which is another defining feature. For instance, it is primarily a serious but insignificant activity. Due to the fact that play is always associated with children, it is very popular to view it as a lighthearted pastime. For instance, play begins when people or children are relaxed, which implies they are not in a rush, anxious, depressed, etc. The other factor is the enthusiasm and joy that make you want to play and make playing more enjoyable. However, as soon as children and young adults enter the world of play, they become more and more focused and their level of concentration rises. From this point, their level of curiosity rises, and at the height of their excitement, they experience "process anxiety," which encourages them to play and explore more. Process anxiety in this context refers to a peak in the excitement in action, such as not being caught or being caught during a play. In other words, it refers to an overwhelming sensation or a state of being overwhelmed. Because the mind and body have reached their peak levels of excitement and are now weary, this is also the moment at which play comes to an end. The rest of the play can now be saved for another day, but it is still important to maintain a relaxed attitude and sense of delight. As a result, the phenomena of play veer away from joy and irreverence. Nietzsche once stated, “A man's maturity consists in having found again the seriousness ones

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had as a child, at play ”.8 Play, according to Brain Sutton-Smith, is a paradoxical phenomenon. He describes the variety of play with various instances. There is subjective play, for example, in which children and adults play in their imaginations or with various metaphors. Then there is solitary play, which occurs when people discover the joy of play in their passions and hobbies. He also plays with precision in a variety of behaviors. Then there is social play, which is found in various dimensions of culture and society such as sports, contests, music, and so on. He claims that the ambiguity of play is due to the variety of forms of play. He classified play into seven rhetorics in his book "The Ambiguity of Play." The rhetoric of play is progress, as fate, as power, as identity, as the imaginary, the self, and as frivolous. The concept of "play" is important in both western and eastern philosophy. Mihai Spariosu argues that the very continental philosophy is free to play and the main motive of analytic philosophy is to constrain the freedom of play. In other words, the working of continental philosophy is very near to the phenomenon of "free play" and the analytic philosophy preferably wants a strict game with a lot of rules and regulations. In his book "*Dionysus Reborn: Play and the Aesthetic Dimension in Modern Philosophical and Scientific Discourse*", Mihai Spariosu provides a detailed philosophical account of the play. He also divided Western philosophy into two camps: those who believe play is rational and those who believe it is irrational or pre-rational. According to Spariosu, the second group wins the debate over the pre-rationality of play. According to Spariosu, play as Agon is the most primitive form of play in ancient Greece. In Greece, people see gods in playful behavior or in as violent forces. Further, he describes the essence of the Greek era in playfulness or irrationality and the Roman period as the era of games, systems, or rationality. Again in the modern era, we see this division in modern philosophy. For example, Schiller and Kant again want to rationalize the play, and on the contrary, Nietzsche and Rousseau advocate the phenomenon of play in its pure or real form.

8Fredrick Nietzsche, Beyond good and evil. Www. Publishing. com, 2000.

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2.7 Conclusion:

If we extract the main characteristics of play and game from this chapter then we can see play as irrationality, disorder, freedom, chaos, etc., and game as rationality, system, determination, and order, etc. This distinction between play and game will help us to analyze the main question thesis and the objective of the thesis. So when we will analyze the phenomenon of play in AI systems we have to see all these qualities which are irrationality and freedom etc. and have to see how AI systems deal with the ambiguity of play. John Rogers Searle, a philosopher of mind and language, draws a line of demarcation between strong artificial intelligence or AGI and weak artificial intelligence. Strong Artificial Intelligence is a theoretical model according to which if AI will achieve this kind of intelligence then AI can easily become equal to human beings like they can achieve self-aware consciousness through which they can enhance themselves in problem-solving, planning, etc. Here the main problem is not about AI and consciousness but to evaluate the phenomena of strong artificial intelligence from the perspective of life. Human beings are not only conscious beings but they are also living beings and life is much more complex and diverse including the trinity of body, mind, and environment. Play is also the phenomenon of life that is connected with all these three things. Those who believe that AI can achieve all human being’s faculties they mostly use the arguments of materialism, behaviorism, and functionalism in their favor and the main purpose of this dissertation is to prove that play is not a phenomenon that can be reducible or coverable in the input/output processes or not a thing which can be defined on some functional processes.

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Chapter 3

A Scientific Study of Play in Animal and Human life

*“… Animal play, so they must be more than merely mechanical things. We play and know that we play, so we must be more than merely rational beings, for play is irrational”. (Huizinga, Homo Ludens)*

Play is an essential activity both in animal and human life. Humans appear to be more distinct and evolved beings in the phylogenetic tree because they have more advanced and complex tools of language through which they can change and control many things in nature, but play is a very unique kind of thing that we can find from animal life to human life equally. Many linguists, however, argue that play is the initial form of metacommunication like when animals give each other play signals. In this chapter, I will evaluate the scientific structure of the play and see what are the scientific causes of play in animal and human life, and argue that "Play" can be defined by external environmental factors and internal biological factors but not necessarily.

3.1 Do Animals Play?

But the main issue here is how we can say that animals can also play. When we talk about play in animal life, we mean evaluating the phenomena of play in those species that play coherently. To begin, it is difficult to discuss the phenomenon of play in all animals. Second, play can be defined in animal life because there are hundreds of behavioral, brain, and bodily patterns in animal play that are completely equivalent to human play, and there is also some concrete evidence that shows how play exists both in animals and humans as a mental state. Later passages show, through various examples, how play exists in animal life and how it is very similar to human play.

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The existence of play in non-mammalian life is the other major issue. For a long time, biologists and other scientists believed that non-mammals could not play, even though they observed different non-mammals playing with each other, such as birds dancing or flocking fish. However, it is now clear from various reports that non-mammals can also play. The best example is the octopus, which is an alien isolated short-span animal in the phylogenetic tree but can play not only with its own specie but also with humans, that's why they can interact with other beings.

3.2 The Genesis of Play:

The most detailed account of the scientific study of play especially of animals is written by Gordon Burghardt, a psychologist, and an evolutionary biologist. Burghardt argues that play not only occurs in mammalian life According to Burghardt play is more important than mating or eating because it occurs more frequently than those instincts however the scholars show their lack of seriousness because of the non-seriousness of this activity. However, he argues that there is debate on the origin and history of play because many scientists don't think that those historical texts or fossils are well enough to trace the origin of play in the early world. But Gordon quotes Edward Thompson (Gordon, 2005: 25), the author of the book *The Passions of Animals* and shows the example of crabs who play with stones, etc. He presents further examples from Thompsons' passages that show diverse activities of play in the animal play. For example, whales are extremely frolicsome when they leap out of the water, etc. According to Darwin even insects and ants play with each other (Gordon, 2005: 26).

In the first chapter of his well-known book *The Genesis of Animal Play: Testing the Boundaries,* he presents a list of definitions by different authors. He states, "Play is the process most conducive to improved motor skills, learning ability, imagination, and educational attainments in infancy and

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childhood…Play is just fooling around; the start of the slippery slope leading to delinquency, gambling, and even crime…”9

Interestingly, the above definitions and properties of play are divided into two sections. The first is a systematic section that shows how the process of play is effective and beneficial in animal human learning. The second part depicts the nature of play, which is absolute freedom or chaos, implying that if we allow play to occur naturally, it begins to destruct the boundaries of society. A controlled play, in other words, is a system or order. Later chapters will go over the nature of "play as chaos" and "games as order."

3.3 Scientific Structure of Play:

Gordon develops five scientific criteria for the definition of play (Gordon,2005: 70-82) which are limited immediate function, endogenous component, structural or temporal difference, repeated performance, and relaxed field. Limited immediate function means that in this process reward is not immediate. The endogenous component signifies that the behavior is spontaneous, voluntary, pleasurable, and rewarding. In other words, that means the behavior is done for its own sake. Temporal play can be defined as when a specie pretends something other without the limit of time and structure. For example, when a child pretends itself to be an old man. Repeated performance means when there is the repetition of different actions in a joyful or funny but not rigid way. The last one is a relaxed field which means play occurs in a relaxed mood.

9 Gordon Burghardt, The genesis of animal play: Testing the limits. (MIT Press. 2005), 7

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3.4 Forms of Play:

In his other article, *The Mystery and Origins of Play* Gordon divided the play into three forms which are Object Play, Locomotor or Rotational Play, and Social Play. These shapes are also found in human or child play. Object play is a type of play in which animals, for example, engage in play with their prey. As an example, when a cat is fully stratified with food, she frequently plays with her prey, similar to how children play with dolls or toys. This type of play also includes biting, manipulating, and so on. Locomotor or rotational play is the other type of play. This scenario contains jumping or hitting. For instance, a few days old cub or buck jumps around to see how good she is at walking or running. Social play is the third type of play. This type of play takes place between two or more animals. As in two cubs playfully biting each other or rough and tumble play in rats. However, all types of play are interconnected, particularly in the case of social play. For instance, when two dogs are hiding behind a wood log. As a result, all of the above forms are included in this activity. When two dogs play together, this is referred to as social play. When both dogs are positioned behind an object, this is referred to as object play. When dogs run or jump, this is referred to as locomotor play. As a result, it is impossible to categorize play in a single category because each one intersects with another. There are hundreds of different types of play in humans, and this intersection is becoming increasingly complex and this thing increases the ambiguity of human play. The most distinct form of play in humans is imaginative play, which exists in every human play because it is the gateway to extend and alter the possibilities of human play and the threshold where humans can play a game without the rules and regulations of games and test new possibilities to play the game without disrupting the objective form of a game.

There are some mental states which reduce or cease the activity of play. For example, play cannot exist in depression, anxiety, and boredom but the activity of play can be used to get out of those

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states, etc. The first feeling which is attached to the phenomenon of play is the feeling of joy. Gordon argues that there are three main causes to play which are boredom, immature behavior, and excessive metabolism. Boredom is the point at which the game begins and ends. For example, if you want to get rid of boredom, you start playing, and when you enter the domain of boredom mood, you stop playing. Immature behavior is also associated with play because most people believe it is a non-serious activity. Adult animals and humans typically have weak play activities due to other serious activities, particularly in animals the activity of catching prey for survival, and in humans due to societal etiquette. However, in animals, play is not suppressed manually but rather naturally changes mode. In contrast to animals, human beings' play or playful behavior is suppressed by a variety of individual and social factors.

These three theories regarding the main cause of play are surplus energy, instinct practice, and recapitulation. Baldwin categorizes the first two in the biological group and the last one in the psychological group (Gordon, 2005: 27). According to surplus energy theory animals and humans play because of the excessive amount of energy. For Instance, when animals are fully satisfied with food, they have a lot of energy to use. Instinct practice theory, which is also supported by Herbert Spencer, defines play as a motivation or useful skill for survival. So the activity of play helps in the development of mind and body with the harmony of nature. The last one indicates play as an activity which is the mimicry or pretending of early stages of species in the evolutionary process.

3.5 Komodo Dragon and Curiosity:

There are various factors and theories regarding play that's why the activity of play is not observable in cold-blooded reptiles because their metabolism is works slow. Gordon states that

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there are different motives in animals to play like to acquire good hunting skills or to be social. Mostly those animals play which have good metabolisms so after a good meal they feel relaxed and want enjoyment. That's why there are very few examples in reptiles because their metabolism is not so strong. But besides all of this Gordon argues that we cannot reduce play to some physical, natural, or social conditions. He observed different animals in his whereat many spots he found no specific reason to play. He also gives the example of a komodo dragon where he shows his curiosity for different plastic things. He gives the example of the play Komodo Dragon. He states "The most frequently used objects were a sturdy plastic ring and shoes (clean or used sneakers). The animal would perform a wide variety of actions, including nudging, grabbing, shaking, putting her head inside the shoe, and so on (figure 12.2). Her behavior, particularly with the shoe, was similar to a dog’s and became even more similar when the tape was run at twice the normal speed” (Burghardt, 2005: 285).

Even there are some observations of pretend play in snakes. The American eastern hognose snake plays the role of the dead.10 Normally when you try to catch most species of snake they attack or run. But to show themselves dead is a very rare thing in snake specie.

So the main argument of Gordon is that there are many scientific factors of play in animals but we cannot reduce the activity only to these factors. Gordon argues that there is an iota of doubt that play is deeply rooted in the evolutionary process but this phenomenon didn't evolve in one sequence because we can find the activity of play in different animals with different diversity and in some animals this activity is rare. Normally when we try to define or elaborate things scientifically we try to determine their specific causes and try to reduce them to those causes. But

10 Eastern Hognose Snake Playing Dead, Jul 11, 2011. https://www.youtube.com/watch?v=tuZtKVM6koo

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the phenomenon of play is so diverse, ambiguous, and complex that it is very difficult to reduce to some internal or external environmental factors. However, those factors help us a lot to find the structure of the play.

Secondly, Gordon proves that the activity of play approximately exists in all animals whether they are mammals or non-mammals even if they are invertebrates but their cases are very rare. However, we can find the activity of play somehow in all animals.

3.6 Octopus at Play:

*OTHER MINDS: The Octopus and the Evolution of Intelligent Life* is a book written by Godfrey Smith about the private sea life of Octopuses. This book tells us a lot about the lives of aliens and mostly socially inept deep sea creatures. Smith contends that, while octopuses are the most antisocial and alien invertebrates in the phylogenetic tree, their behavior demonstrates some impressive aspects of their intelligent life. He explains how they exhibit complex behaviors on numerous occasions, which we normally see in vertebrate animals that live in social environments. Octopus Playtime | Octopus in My House | BBC Earth is a BBC Earth documentary about octopuses' playful behavior. The documentary demonstrates octopuses' impressive level of curiosity about non-edible things, as well as their skin color change in response to being observed. My Octopus Teacher is another documentary that Netflix has recorded. Craig Foster, a filmmaker, naturalist, and scuba diver narrates his journey in the deep sea with the octopus in this documentary. He observes the octopuses' playful behavior. He gives the example of an octopus hiding and seeking her prey when she tries to kill it. This entire discussion spontaneously generates the question, "How does it feel to be in play?". This documentary also shows how the octopus starts trusting Craig and how their relationship depicts the view of friendship. There is a lot of

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other examples of octopuses in which octopus play with their fellow specie beings, human beings, and with other different objects. The other strange thing about octopuses is that approximately 500 neurons are not in their brain but their hands. For example, they can do different things at the same time with their different hands. However, the biological structure of octopuses is very near to AI systems.

3.7 Conclusion:

In this chapter, we see different scientific factors of animal and human play. For instance, the animals usually play when they are in a relaxed mood or have enough food or have good metabolic systems, etc. and there are other social and psychological factors that can determine or explain the phenomenon of play. But the phenomenon of play is so diverse in the phylogenetic tree that it is not even possible to reduce or pack the activity of play in some scientific or natural factors. The above discussion shows that in the end play is an activity that is done for its own sake. Animal play is different from human play because in human beings the act of pretending or mimicry finds its way into Art but in art, the activity of play is always dominant because it is the first step of human beings toward a system so it is still close to its essence that is playing. For example, when chimpanzees are fighting with each other in a playful behavior they end it by doing some other activity but humans have the ability to formalize the playful behavior which becomes a game. Intelligence and adaptive behavior are also closely linked with the activity of play and vice versa. But we cannot reduce the activity of play to just intelligence however we can say intelligence is an offshoot of the activity of play. The fighting between animals in a playful behavior indicates a lot of things regarding the nature of play. For example, when two lions are playing with each other they bite each other. But they know this is a bite which not harmful and at the same time, they know when this bite means an attack. So they have an understanding of things without the tool of

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language. Play is not a thing in the animal world that they learn from their environments or not even they learn to play from their parents. It is a thing that is deeply rooted in their brains and evolutionary process. But without joy, the emotion of play is nothing in other words the emotion of play is completed with the feeling of joy or fun. So play even in animals is a self-directed or self-chosen phenomenon and it signifies the nature of freedom in the phylogenetic tree and evolutionary process. Most functionalists argue that all mental phenomena are the by-product of functional processes. For example, Adam's perception of rain causes him to believe that it is raining outside. As a result, perception, like belief, is responsible for mental states. The belief that it will rain and the desire to stay dry drive the behavior of carrying a raincoat and an umbrella. In simple words, this is all input and output processing. But the matter of the play is much more complicated. The phenomenon of play has an immersive network of beliefs and desires. It's not simply evaluated in the process of input and output because it’s also paradoxical in nature. For instance, Brian Sutton-Smith states in his book The ambiguity of play that "Geoffrey Bateson (1955), a biologist, suggests that play is a paradox because it both is and is not what it appears to be. Animals at play bite each other playfully, knowing that the playful nip connotes a bite, but not what a bite connotes".11 So play is not the activity that is totally based on the process of action and reaction but the activity of this complex life that is sometimes irrational and random. The main aim of this chapter was to show that play can be defined by external environmental factors and internal biological factors but not necessarily. This scientific study of play in animals rejects the notion of reductionism and determinism in animals because those philosophers think that biological beings are nothing but a machine and use the arguments of materialism for their doctrines. For example, play is just another determine phenomenon of mechanistic life and they are some specific roles

11 Brian Sutton Smith, The ambiguity of play. (Harvard University Press. 2009) ,1

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and causes to play. The main of this chapter was to do the scientific study of play in animals and human beings and to show that it is true that there are many internal or external causes of play in animals and human beings but the diversity of play in all phylogenetic trees can be reduced to some causes.

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Chapter 4

Play as Emotion

What is an emotion? The simple answer is “emotions are the way we feel”. It is very common to mix emotions with sensory feelings like the pleasure of eating an apple or getting the pain because of a fall on the road etc. Bodily feelings are also not considered pain. For example, getting hungry or thirsty, etc. All of the above have emotional feelings. Emotional feelings are the very large bodily and brain responses to the world (Panksepp).12 According to Panksepp, an affective neuroscientist, emotions are intrinsically guardians of survival because they inform us which things are essential for survival. He states, “Our brains contain at least seven primary-process emotional systems, shared by all mammals, that help us anticipate and respond to situations that promote or threaten our survival”.13 So emotions are neither outside sensory feelings nor inside feelings but have a holistic structure in biological life.

4.1 Emotions in Brain:

It is critical to evaluate the evolutionary perspective of the brain for understanding emotions because the most complex thing we acquired during the evolutionary process other than the heart is our brain. Our brain structure is very different from that of animals, and it is now obvious to see the difference in intelligence between animals and humans based on brain structure. Our brain is an evolved organ with many layers of development, and each layer of the brain has a unique function in humans, such as the portion of the hippocampus in the human brain that stores data

12 Brain cast 247 -- Systems of Emotions ½. Feb 11, 2013. https://www.youtube.com/watch?v=M\_YqvtJIRtY 13 Panksepp & Biven The archaeology of mind: neuroevolutionary origins of human emotions (Norton series on interpersonal neurobiology 2012). WW Norton & Company.

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and is considered a critical part of our memory or the Broca area that is related to speech production. However, emotive mental states are always neglected by neuroscientists and cognitive scientists because of the hegemony of behaviorism over other schools of thought. So their major focus is on the cognitive functions of the brain and they also put the debate of emotion under the umbrella of cognition and behavior. But Jaak Panksepp is the one who seriously investigates the domain of emotion in the brain because according to Panksepp it is essential to study the domain of emotion separately if we want to solve and elaborate on the relationship between mind, brain, and life. Basically, B.F Skinner and other behaviorist psychologists and philosophers put the wall against all mental states, and because of this most cognitive scientists see the mind as a cognition and informative machine. But Panksepp separately discusses the phenomenon of emotion. Panksepp argues that the main aim of neuroscience is to understand the mind that is always volitional that is desire or will (Panksepp, 2012. 51). Panksepp argues that emotions are basically the need of our brain. For instance, if someone breaks a contract with you then you will get angry. This example also shows the ethical foundations of human beings from the perspective of emotion and brain or in the stream of the evolutionary process.

4.2 Hierarchy in Brain:

Another discovery that Panksepp made is about the structure brain in the hierarchy of evolution. He argues that the structure of the brain best depicts the layers of evolution. The more ancient part of the brain is the lowest part of the brain and the less ancient part consists of the middle part of the brain and the more recent part of the brain is more outside part of the brain. So fear and anger are the earliest emotions of the human brain in the hierarchy of evolution. Panksepp extracts seven primal emotional systems in child development which are seeking, rage, lust, fear, care, sadness, and "play" system. Every system is related to some feelings. For instance, the seeking system is

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related to the exploration or euphoria and if this system is powerful then it changes into the state of mania. The system of rage is related to anger, fear to anxiety, lust with libido, care with empathy, sadness with grief, and at last play with joy or fun. Seeking, care, rage, and fear systems are the main systems in vertebrates and mammals. However, the care system is also directly linked with the lust system, and both these systems play a crucial role in the development of sociality. The system of play also interacts with these other systems. So according to Panksepp, our brain systems mediate social connections. For example, because of the touch the opioids released and their consistent releasing boost, the addiction to sociality and oxytocin increase the confidence in the mother which they need for their motherhood.

4.3 Emotion and Cognition:

Panksepp argues that most psychologists generally discuss emotions with the tertiary process level which is the third upper outside part of the brain or what we called it cortical area. However, the cortex is based on the things which are learned. Behaviorists called the primary process of emotions as unconditioned responses. But in animals, it is very difficult to study the tertiary processes but we can have access to the primary processes of emotions in animals. Panksepp argues that the secondary process of the brain system is memory and learning. There is nothing exceptional in human beings regarding animals in the evolutionary process but a unique and enormous neocortex. However, according to Panksepp, the neocortex is blank and empty at birth. So everything is constructed afterward with time. For example, vision is also learned in the neocortex (Panksepp, 2012. 28). So through the help of affective neuroscience, we can study the mind scientifically both in humans and animals equally because animal research cannot unconcealed how the upper mind works. This discussion reveals a lot about the evolutionary process that which comes first always rules. So these affective systems are the foundations of

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learning and memory. Feelings are the guardian of emotion and from feeling humans and animals can know that are they on the path of survival or destruction. So this all-over discussion signifies how emotions are deeply rooted in an evolutionary process. Secondly, Panksepp rejects the notion of behaviorists and cognitive scientists who always try to pack the domain of emotions in cognition and behavior.

Functionalists also try to evaluate emotions in relational or causal terms. According to functionalists emotions are discrete states which show the relationship of a person with their environment. Functionalists also considered emotions as part of cognitive processing however Panksepp eradicates the view of this theory from its roots by proposing emotions as separate and independently evolving mental states. Emotions are not the by-product of input and output processing but exist on their own and they got their existence through a long journey of evolutionary processes in the brain.

4.4 Rough and Tumble Play:

Jaak Panksepp conducted some experiments on rats and the results revolutionized the whole scenario of emotions and play in the brain. This is now a very well-established belief that young animals play more than adult or mature animals. According to Panksepp rather than the fact, the activity of play is weak in adults but play is the root cause of all human activities and sociality. Play is started in newborn rats on the 18th day and fully developed after 25 days.14 The main purpose of Panksepp was to know that play is a learned activity and the results of the most evolved part of the brain or play are the phenomenon that is deeply rooted in our evolutionary brain that is our ancient part of the brain which consisted of eating, sleeping, and sex, etc. Panksepp surgically

14 Jaak Panksepp, The ontogeny of play in rats. Developmental Psychobiology: (The Journal of the International Society for Developmental Psychobiology, 1981) 14(4), 327-332.

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removed the rat's upper part of the brain and started to observe the activity of play in the rat. Astonishingly, he observed that rats were playing normally. He also asked his research to make a distinction between normal and operated rats. The researchers also failed to make a distinction between them although some of them considered operated rats more normal. So play come from the deep primitive part of the brain and has no direct connection with the upper part of the brain which is related to the functioning of logical reasoning and planning.

Rough and tumble play is the most general kind of play in rats. Panksepp also considered rough and tumble as a kind of free play. Rough and tumble play is very close to the play of professional wrestling where two or more wrestlers pretend they are fighting with each other. However, animal wrestling is freer than human wrestling because in rats the only purpose of wrestling is to have fun and joy but in human beings, this fun wrestling changed into professional fighting where wrestlers always want the fun and joy of the audience.

4.5 Play and Sociality:

The play has a key role in the development of sociality because the activity of play teaches the phenomena of giving and taking without the usage of language. For example, fighting is a thing that is very opposite to the phenomena of friendship and empathy but through rough and tumble play rats know how to be social and enjoy the time. Another thing Panksepp concluded about rat play is that they can also laugh. For example, when Panksepp playfully tickled the rats he discovered the frequency of their laughter. Panksepp argues that play is not a thing in animals that animals learn and he states, "Thus, the impulse for rough and tumbles play is created not from the past experiences but from the spontaneous neural urges within the brain". 15 Panksepp also argues

15 Jaak Panksepp, Affective neuroscience: The foundations of human and animal emotions. (Oxford university press. 2004), 281

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that the play system in the brain also helps other systems like lust or care etc. to enhance the sociality in animals and human beings.

“Why do we play” was the cover story of the New York Times on February 17, 2008. The main point of all of the cover stories was that play is more than just a gender issue, but it's also harmless fun. "As well as a sandbox for new evolutionary ideas." Many philosophers and sociologists have various theories about the origins of society. But they overlooked one crucial aspect of this entire social contract scenario: play. As previously discussed, many linguists regard play as a symbol of metacommunication, which means a source of communication before any language. In "play," understanding trumps language because no one asks why I'm doing this thing again and again because they know they're in the state of play. This aspect of play, in particular, is the essence of comedy. I've talked a lot about animals playing with their own family members, but if two very different predators start playing with each other, that's a big red flag. Dr. Stuart Brown, a medical doctor, and psychiatrist illustrated a very unusual incident on play in one of his TED Talks16. He said that there was no ice on Hudson Bay north of Churchill, Manitoba, in October and November. And at that place, one 1200-pound male polar bear appeared, and that polar bear was also wild and hungry. Norbert Rosing, a German photographer, was also on the scene, taking photos of the tethered huskies. That wild, male polar bear with a predatory gaze appeared in front of them. It is common in Africa if wild dogs are coming toward you with a predatory gaze then it is evident that you are in danger. But on the other side of that predatory gaze was a female husky wagging her tail in a play bow. And then something strange happened. That behavior which both animals showed to each other is specifically famous that one animal is going to be the meal of the other. But they started playing with each other and not even simply playing but they bit each other in a

16 Stuart Brown: Play is more than fun. Mar 12, 2009. https://www.youtube.com/watch?v=HHwXlcHcTHc&t=176s.

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playful way. To begin with, polar bears are not very social animals, spending most of their time with their female partners and children. On the other side, some huskies are also a predator. So playful behavior between two predators in a frozen desert, where hunger prevails, is astonishing. Second, this incident reveals a great deal about the essence of social behavior and sociality, as well as opening new doors to the question of the formation of human society in evolutionary chapters. On the other hand, this event was very useful in uncovering the structure of the play and how this natural feature can create a bond between two carnivorous animals. The other role of play in sociality is the understanding of “bullying”. Panksepp states, “When animals play, they may learn whom they can bully and who can bully them. In short, the brain’s PLAY networks may help stitch individuals into the stratified social fabric that will be the staging ground for their lives, and these networks may also prepare them to handle various unexpected events that life will surely throw their way”. (Panksepp, 2012. 215). He further argues that if a dog only wants to win then the things lead to the activity of bullying. This statement also tells a lot about the activity of play that in play there isn't the main goal or wish to win but only to have fun. But this also shows another positive aspect of the game which is to control the bullying in play.

4.6 Conclusion:

The main argument of Panksepp revolves around the primacy of emotions, from different scientific facts, over the cognition of biological beings. One of his main facts about the primacy of emotions is about the most ancient part of our brain is based on our emotions or the first evolved part of the brain made up of different emotive systems. That's why a kid always prefers to play rather than

initially put herself in the domain of the game. Panksepp also considered play as an emotion with the association of a feeling of joy or fun. This whole picture depicts three things. Firstly, play is a separate and independent phenomenon from playing games. Secondly, play rules the games, and

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lastly, games are dependent upon the phenomenon of play. The other main thing that this scene depicts is that the functioning and working of play in evolutionary biological beings are different from AI systems. AI gaming systems are programmed systems and wired logically. The intelligence of those systems revolves around the notion of reasoning, precision, and accuracy. On the other hand, human and animal playing gaming systems are based on primitive and ancient brains which strongly wired with other emotive systems. Secondly, according to Panksepp these ancient and primitive parts of the brain also rule the upper part of the brain that's based on logical reasoning and planning, etc. Even the upper outside part of the brain in animals is not well developed or not even possible for a scientist to study that part of the brain in animals. This doctrine explains two things about the play that both animals and human beings are equal in the matter of play and another thing about the reason for the lack of games in animals. Maybe that's the reason that animals can only play but humans also have the ability to play games and sports which are structured by some rules and regulations. The other important thing is the hierarchy of play and games in evolutionary that is different from AI systems because in biological beings' play comes first and then they start playing games but AI systems are programmed with ready-made tools of logic and reasoning. To digress briefly the working and functioning of play are quite different between biological beings and AI systems. In the end, I quote Panksepp and he states “Thus we can conclude that the urge to play is not learned. It is innate. The evidence indicates that PLAY is one of the primary processes, genetically determined social urges”17

17 Jaak Panksepp & Biven The archaeology of mind: neuroevolutionary origins of human emotions (Norton series on interpersonal neurobiology, 2012). WW Norton & Company, 356

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Chapter 5

The Ontological Structure of Play

In the previous chapter, I discussed and evaluated the phenomenon of play using various linguistic, scientific, and particularly neurobiological approaches, demonstrating the complexity, diversity, and primacy of play. Now I'll delve deeper into the existence of play and talk about play as the essence of a game. I will also elaborate on the distinction between “play and games” in the framework of morphological parallelism. Eugene Fink and Hans-Georg Gadamer are two major philosophers who have written extensively on the structure and ontology of play. Firstly, I will highlight the main features of the phenomenon of play through the spectacles of Eugene Fink.

5.1 Child Play to Cosmic Play:

Fink sees play as a pathway that directs towards the cores of ontology. Fink demonstrates play in the picture of child play to cosmic play. According to Fink play is the finest example of a real unreal world in the activity of play the players don't play with actual existing things like kids playing with dolls etc. and even players are not the real like playing the role of others. On the other hand, the activity of play exists in real space and time. From this perspective play is something that is at some point or time “real and unreal”. However, this unreal picture of play is not subjective but objective in its direction or the form of intersubjectivity. Fink states that “the actuality of playful action is ceaselessly and permanently creative regarding the 'non-actuality' of the play

world”.18 Secondly, Fink argues that play is an activity that is purposeless or isn't goal-oriented but an activity directed to itself. He states, The ontic appearance (mirroring and the like) is more

18 Eugene Fink, Spiel Als Weltsymbol [Play as Symbol of the World]. Stuttgart: Kohlhammer, 1960. 81-82

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than just an analog of the play world; it occurs within the play world for the most part as a structural aspect in its own right”.19 However, from the above argument of real and unreal Fink refuses the metaphysical interpretation of play and mimicry of Plato. In *The Oasis of Happiness*, he argues about the relation of play with the imaginary world “We play in the so-called real world, but while playing there emerges an enigmatic realm that is not nothing…. but in the play world there are also imaginary beings such as the "child," which in play is very much alive, to be sure - but "in reality" is nothing more than a doll, or even a piece of wood” (Fink, 1968:2)

Fink considers playing as the spring of human happiness. In his book Play as the Symbol of the World, he states, “When we play, we are released for a while from the hustle and bustle of life as though transported to another planet where life seems lighter, more buoyant, easier (Fink, 1968. 20). Lastly Fink consider play as the phenomenon of possibilities especially the possibility of social existence (Fink, 1968. 23).

5.2 Play over Subjectivity:

Gadamer sees play as a dynamic thing in which objects cannot be detached from subjectivity. Gadamer also sees play as the starting point of the game. Gadamer argues about the primacy of play contrary to Schiller who argues about the subjectivity of play.20 Gadamer also argues in his book Truth and Method that only man can transcend to the world of game from play because animals don't possess reason. He further states that play displays itself through the presentation of the player. At one point players don't play but in the hand of play that is, he considers play to be a force, similar to how someone moves a tennis ball attached to a piece of string. With the moving ball at one point, that person is between the centripetal and centrifugal forces. As a result, the

19 Eugene Fink Play as the symbol of the world: And other writings. (Indiana University Press, 2016), 29 20 Hans Georg Gadamer, Truth and method. (New York: Continuum. 1981), 100

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drama of this play is revealed between the "tension." Gadamer also argues that the real essence of play is itself which is the feeling of joy and expression of freedom. But when we start playing a game the essence of play can be in danger because sometimes during playing games we are doing things for the happiness and joy of the audience. Nowadays for some people playing games is just an activity of earning money which destroys the real essence of play because they have always the fear of failure rather than the feeling of joy. Currently, there is a heated debate about how machines compete with humans in all aspects of life. Machines, for example, are far more intelligent, faster, and accurate than humans, and this trend is continuing. On the contrary, the new world order's economic, political, and social chains assist humans in reaching the level of machines. In short, maybe machines are not surpassing the level of being human, but human beings are approaching the level of machines due to their mechanistic lifestyle.

5.3 Play as the Spring of Possibilities:

From the above discussion, it is now quite clear that the working of play is paradoxical or dual which means at the same time play is real and unreal or serious and non-serious, etc. However, this dual phenomenon of play signifies play as a “spring of possibilities” or we can also say that play is in itself a possibility that can bring us the activity of the game. But the first possibilities which come towards us from the Pandora of Play are the possibilities that we can take in the form of irrationality, chaos, randomness, disorder, etc. and these possibilities generate different systems for example disorder or chaos can generate different orders or systems, etc. One of the main characteristics of possibilities is that possibility starts from the procedure of destruction. Play is the essence of a game because the play doesn't need to be a game but the game is empty from the content without the activity of play. However, the phenomenon of play also needs a game through which it can show its most refined form but it also depends upon the rules and regulations of the

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game that how beautifully it structures the play, and how much space and flexibility the game gives to play in which a play can express itself fully. So if the rules and regulations of a game are not well-formed then it also destructs the real essence of the play. So generally the real purpose of rules and regulations is to maintain the essence of an idea.

5.4 Play as the essence of Games:

On the other hand, the phenomenon of play always tries to break out of the chains of games. So if the rules and regulations are strict then more chances of play come out of the cover of the game. Also, the finest player always invents different possibilities within the game which also change the direction of the game. For example, at the very first stage, a player only starts with simple play. Then a player formed himself in playful behavior and then the player starts how to play games. When a player starts playing games fully then a passionate player wants to do something different a unique. Then the player again starts playing and makes a new dimension of the game and becomes an artist. For example, Panenka’s penalty21 in football or Doosra style22 balling in cricket. We can also apply this theoretical model of play and games to different problems of duality from the perspective of morphological parallelism. For example, the problem of words and meaning. Meaning always tries to come out of word and that's why some philosophers of language argue about the inaccessibility of meaning and some only focus on the functioning of words and want to precise them. Men are born empty in the possibilities of a world where these possibilities fill their existence but men have the ability (medium) to pick different possible certainties from these possibilities which also always have the potential of different possibilities

21 https://en.wikipedia.org/wiki/Panenka\_(penalty\_kick)

22 https://economictimes.indiatimes.com/definition/doosra

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5.5 Conclusion:

In the above discussion, the main purpose was to explore deeply the ontological structure of the play and see the limits of play. The main thing about the essence of play is that it is the spring of possibilities. Nowadays AI machines are also playing different computer and outdoor games like GO, Jeopardy and online video games, etc. But the main question here is that are AI systems "playing" in the true sense that means Can the playing activity of AI Systems generate different possibilities within the game? Because especially human play is always revolving around the possibilities which open new gates of human perspectives. Another thing is about the destructive nature of play which means the activity of human play also involves the creation or construction of new things but this construction starts from destruction or deconstruction. We always see the AI system from the perspective of creativity and intelligence but human creativity is not always about the creation or intelligence it starts from destruction and irrationality. For example, if the kid is playing with mud and for the sake of curiosity she pours water into the mud then the kid becomes able to make a muddy house and again she breaks the house because the kid again sees the new perspective of the house and it goes on. So the above example also shows the relationship between curiosity and irrationality because many AI scientists are trying to make curious systems that can make things their own and can learn different things from the environment. But here we also have to see the working of irrationality and destruction in this framework.

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Chapter 6

Play, Games, and Artificial Intelligence

6.1 Background:

AI scientists and researchers are much interested in the field of gaming because this field gives them a lot of understanding of the working possibilities and capabilities of AI. For example, many AI researchers develop different games to test different AI programs which they can use for different calculations. That's why AI gaming systems are considered Drosophila. But the increasing amount of AI gaming systems which are also superseding human beings diverts the direction of the debate because now AI systems are challenging human competencies. For example, different AI systems are now defeating humans in the games like GO, Jeopardy, Solitaire, etc. AI researchers recently created an AI system that participated in a debating contest. However, in that contest AI system didn't do well according to judges but AI systems equally presented different kinds of arguments on the issue23. Although it’s another debate that AI can only manipulate the language and syntax and semantics are two different things. However, the crux is that AI systems are outdating and competing with human beings in every field of life. This "imitation game" began with Alan Turing's creation of a computer that acted similarly to humans. Alan Turing also conducted tests that were used to prove that the mind is nothing but a behavior or outcome of some logical functions. Nowadays this doctrine has different advanced forms like computer functionalism or eliminative materialism etc. But here the main debate is not about the existence of the mind or consciousness as a separate entity in humans but a common objective

23 What happens when AI stops playing games? Jun 22, 2020. https://www.youtube.com/watch?v=NSxVEaWEUjk

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activity of animals and human beings. There are many debates on the existence of mental phenomena in animals even nowadays in humans but there is the fact that animals and humans play equally.

6.2 Over smartness in Playing Games:

I'll start this section with an editorial by Kylie Foy, which was published on the MIT News page, titled “*Artificial intelligence is smart, but does it play well with others*?” In her blog, she discusses how difficult it is for humans to play with AI systems since too much smartness in AI systems promotes human irritation. She presents an example of a game in which AI systems were human teammates, and she writes, "The results astonished the researchers, but individuals frequently disliked playing with their AI teammate." They found it uncertain, inconsistent, and unreliable, and they were unhappy even when the team performed well." She also presents certain cases of AI systems beating humans, however, some human participants indicated it was a terrible experience. "If researchers wouldn't emphasis the matter of subjective human preference," she continues, "then we won't construct AI that humans truly want to use," Allen argues. These three things are to be noticed. Firstly, the importance and role of over-smartness in the activity of playing games. Secondly the interaction of human beings and machines in games and lastly the frustration of human players with AI teammates. The main purpose of playing with biological beings is to have fun which leads towards the path of curiosity or vice versa. For instance, a mathematician proves a mathematical equation on a whiteboard with different explanations, and the same calculations are done by a calculator in 1 second. Both cases are quite different in context but the results are the same. In human beings, procedure and context much matter more than speed and fastness. However, human beings always prefer speed and fastness only to ease and soothe themselves. Furthermore, the interaction between players takes the lead in both human and animal play. The

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comprehension of games is not only a vital part of human and animal play, but the context, environment, and understanding of interaction are very important, such as what other players' body language and attitudes are conveying or in what sort of social and cultural surroundings the game is playing. Finally, due to the AI teammate's over-smartness, team members lost interest in the game and began to detest or feel frustrated with them, indicating that the main attribute of play is joy and play is the essence game. So, if the feeling of joy is removed from the game, it becomes only a forceful worthless activity. Nick Statt contends in his blog *"How Artificial Intelligence Will Revolutionize the Way Video Games Are Developed and Play"* that AI has completely changed the situations of video games, rendering them more developed and realistic. He quotes Mike Cook and says, "The best AI [in games] is the AI you don't notice. It's the AI that seems spookily accurate at certain times or strangely omniscient. But not too omniscient, because then you'll notice it's an AI". Cook also claims that the AI we see in games is only half of the story, with the other half representing psychology. The blog of Nick Statt also shows the contextual and environmental importance of the activity of play. The main problem is the narrow point of view regarding games that it is all about smartness. For example, there are a hundred kinds of playing activities and every game has kind unique qualities but we take the game of chess as the standard. However, Hubert Dreyfus also mentions the role of skilled action in the game of chess rather than only logical reasoning and planning. Dreyfus also argues that our background knowledge to do different things consist largely of our skills which we use in our daily lives the dealing with this world.24 The other important factor is comprehending the other player, which implies that both players have social and human bonds with one other. Though even playing games with your groupmates is about comprehension, fun, and adventure rather than superintelligence and smartness. Elizabeth Lopatto

24 Hubert Dreyfus, What computer still can’t do ( The MIT Press , London), 237

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in The Verge" wrote a blog titled "Google's AI can learn to play video games" and discussed how Google is working on it by acquiring Deep Mind technologies.

6.3 Curiosity and Play:

Curiosity is another important characteristic, particularly in children's play. However, play and curiosity are two different phenomena but sometimes play ends in curiosity or curiosity ends in play and sometimes they overlap each other. But fundamentally they are two separate entities. Although many AI researchers are trying to develop the activity of play by programming curiosity in AI systems. James Vincent in his blog "How educating AI to be interested helps machines learn for themselves," attempts to expand on this phenomenon. He claims that by using Reinforcement Learning, which is based on trial and error, it is feasible to build curiosity in AI computers. Adaptability to the game and surroundings is another important factor to consider, and many AI experts are researching it. Reinforcement learning is a kind of machine learning in which a system can learn different things from its environment by the methodology of trial and error. That means if a system gets the erroneous result then it again starts the trial for better results and it goes on till the system gets the accurate result. The result here means adaptability and bonding with internal and external surroundings. In his other interview-based article "Why video games and board games aren’t a good measure of AI intelligence” James argues “Beating humans at chess and Go is impressive, yes, but what does it matter if the smartest computer can be out-strategized in general problem-solving by a toddler or a rat?” Dreyfus also mentioned the matter of problem-solving and pattern recognition in a computer that how computers fail when they try to solve simple problems. So the matter of smartness is very different in human beings. It's not always about abstract logical reasoning or planning a logical plot. On the other hand, human beings have also the ability to instantiate their logical reasoning not only with the logical picture but with simple daily life

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problems. Nowadays AI researchers are trying to make adaptive robots that don't only work by some external rewards but also can discover different things without any supervision. Jürgen Schmidhuber, a computer scientist, is especially working in this field. In his paper "Developmental Robotics, Optimal Artificial Curiosity, Creativity, Music, and the Fine Arts”, He claims that if we create an "adaptive predictive world model," the system will be able to pose questions based on if and then statements. He also used reinforcement learning to enhance the predictive model. He also argues in this work that a system can grasp the fine arts through the consequences of principle. So Schmidhuber's major goal is to create a model based on curiosity because the system of curiosity is always drawn to novelty, which opens up new doors of possibilities. He states, “Intuitively, to achieve its goal the robot may profit from exploring its environment and learning about the consequences of its actions to build a predictive world model. Such activity is commonly referred to as curiosity”25. Normally the activity of play is considered a curiosity. For example, a toddler can play with curiosity or vice versa like examining new things with a sense of novelty. So curiosity especially synchronizes with object play. But these two activities are different in their nature and identity. Gordon states, "Such exploration and curiosity are major topics in psychology and are often linked with play (Weisler & McCall, 1976), as is stimulation seeking in general (Hoyenga & Hoyenga, 1984). Yet, the play seems different from ‘‘mere’’ exploration and curiosity, although it often involves activity and new or varied stimulation” (Gordon, 2005. 57). Jaak Panksepp also argues in our brain play and seeking systems are two separate systems however they interact with each other. He argues there is strong evidence that both play and seeking systems are distinct, albeit these systems have some interactions. He states, “Neurochemical evidence may also be taken to support the distinction between PLAY and SEEKING. We have seen that

25Jürgen Schmidhuber, Developmental robotics, optimal artificial curiosity, creativity, music, and the fine arts. (Connection Science, 18(2), 173-187, 2006), 2.

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dopamine fuels the SEEKING system, and psychostimulants such as amphetamines strongly increase brain dopamine activity. An increase in dopamine activity produces vigorous exploratory behavior while markedly reducing play (Beatty et al., 1982). Blocking dopamine receptors, however, also reduces play (Siviy, 2010)” (Panksepp, 2012. 360). So a system that is only based on seeking or curiosity system doesn't equal the system of play. Another notable thing is that the activity of play and curiosity are also linked with creativity and intelligence. However, this is not the case. Because play and curiosity can sometimes lead to damage to life. Many birds and other mammals, for example, die of curiosity or become prey while playing.

6.4 Destruction and Play:

There is no iota of doubt that these both interact with each other but both curiosity and playing also generate the process of destruction. For example, in humans, curiosity starts from destruction which means opening novel things because curiosity is always directed toward hidden things and ends or boosts after the openness of things. So in the activity of uncovering things the process of destruction is also hidden. However, curiosity also revolves around the method of trial and error but it starts from destruction. That's why every construction starts from destruction. So if we need a real artificial curious system then it must also be able to destruct but this thing leads towards destruction because in this life destruction and creativity overlap each other because this is the result of a long evolutionary process that life sometimes stable itself from the process of destruction but it is impossible to generate a controlled destructive system.

6.5 The Measurement of Intelligence:

The other main characteristic of playing games is intelligence which means playing games is a sign of intelligence. But in biological beings especially human beings there are a lot of shades of

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intelligence. For instance, there is logical-mathematical intelligence, spatial intelligence, linguistic intelligence, emotional intelligence, bodily-kinesthetic intelligence, etc. But now it's also a trend to measure intelligence based on logical-mathematical intelligence or to summarize all kinds of bits of intelligence on the parameters of logical intelligence because many AI researchers and cognitive scientists argue that the working of all other intelligence is based on the functioning of logical intelligence. But human intelligence is not based only on abstract logical models but interconnected with other faculties of mental phenomena. The brain is considered as an organ that is the center of intelligence but in the brain, only neuron functioning doesn't matter the architecture, connectivity activation potential, precision, etc. also play an immersive role in intelligence. The phenomena of precision are very different in the brain than neural net running on a computer because the human brain is much noisier and less precise than neural networks and between these, all noisiness of human intelligence emerges. Andy Clark states, "Intelligence and understanding are rooted not in the presence and manipulation of explicit, language-like data structure, but something more earthy: the tuning of the basic responses to a real world that enables an embodied organism to sense, act and survive".26 James Vincent, an IT blogger, interviewed François Chollet, a soft engineer who wrote a paper *“On the measure of intelligence”* in which he claims that not only playing but playing games is more than just a question of intelligence. Chollet contends that it is now required to redefine the term intelligence and that in humans, intellect plus skill is what makes things intelligent in a genuine sense. In response to one inquiry, he states that humans are implicitly truly intelligent since they learn from the ground up. After all, unlike AI systems, humans are neither programmed nor designed to play chess. He further argues that the capability of every new AI system measured by the previous one and the new one is abstract from the

26 Andy Clark, Being There (p. 222). (Cambridge, MA: MIT Press. 1997), 4.

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previous problems and defects. On the contrary human progress take also the previous burdens and get evolve with all those past things. In his paper, Chollet argues that in humans both task specific skill and generality and adaptability go hand in hand. There is no break. He argues that the main problem lies in the confusion of skill with intelligence or vice versa because acquiring skills is also the process of intelligence. But this phenomenon is only true for humans but not for machines. He states, "If intelligence lies in the process of acquiring skills, then there is no task X such that skill at X demonstrates intelligence unless X is actually a meta-task involving skill acquisition across a broad range of tasks”27.

6.6 The Layers of Understanding:

Understanding also plays a key role in the evidence of intelligence. In an abstract way, understanding shows itself through outcome or behavior and AI systems are way better than humans and animals in this thing. But the working of understanding is also very different in humans. For example, there are four conditions in which human understanding works. Firstly, (X) understands the (Y) understandings (Facts). Secondly (X) understands the (Y) and thirdly (X) misunderstands the (Y) misunderstanding. Lastly, the (X) misunderstands the (Y) misunderstanding. The last condition is a crucial one in human understanding because sometimes you misunderstand the misunderstandings but the results come correct. Because the last condition also potentially has a probability of understanding or the possibility of the correct result.

6.7 Moravec Paradox:

Hans Moravec, a futurist and robotics specialist, makes various forecasts regarding the future of AI and how, in the near future, AI devices and systems would outperform human intelligence from

27 François Chollet, On the measure of intelligence. (arXiv preprint arXiv:1911.01547. 2019), 8.

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all angles. On the other hand, he and his colleagues introduced the “Moravec paradox” in 1980. According to this paradox, AI computers solve complex mathematical problems significantly more efficiently than humans. On the contrary, AI systems encounter more difficulties while attempting to resolve simple children's problems. Hans states, “It is comparatively easy to make computers exhibit adult level performance […] and difficult or impossible to give them the skills of a one

year-old”. This is just one example of a machine paradox, but what about the paradoxes that commonly exist in human playful behaviour? But there is no doubt that AI systems are getting increasingly sophisticated and adaptive through various learning methods, with reinforcement learning playing a vital part in this scenario. However, many AI researchers are that kinds of AI systems through the help of reinforcement learning (Q learning and neural networks) that can play on a freeway and have the capability to learn their environment on their own. The main purpose of these AI systems is to play as a learner but not to outsmart other teammates.

6.8 Snake from Scratch:

There are two examples of AI systems that can play and learn how to play on their own. The first example of an AI agent who learns how to play the game of "snake from scratch". In this game, the agent learns different things from its environment (the structure of the Game) that is based on a reward and punishment system. The system gets punishment or reward for its performed action. For example, if the action is accurate then the system gets the reward and jumps to the next level and the system learns from the punishment that the performed action was not right. So the main of this AI system is to maximize its rewards. Interestingly AI systems are also not programmed by the rules of games. So by reward and punishment, the system learns by itself the rules of the game. In the start, the snake doesn’t know what to do or how to deal with the environment but with time and experience of rewarding the system learns how to play. Although it’s an incredible change in

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AI systems but still things are quiet from human play and learning abilities. Firstly, in this, all Q learning some point tables show the reward and punishment points. Also this all learning process occurs in an abstract way or as a separate process without any distraction. The agent only follows the rules of the table which means the agent doesn't have any motivation to move to the next level but only to maximize the rewards. Also, reward and punishment are related to games not to free play. Free play is self-directed and for its own sake. But there is also the reward in free play which is the feeling of joy. However, this reward doesn’t work in a logical way.

6.9 Open AI and Curiosity:

Researchers from Open AI made a game that is only based on curiosity. So they trained a system without any external reward. According to researchers, the AI system is based on the psychological interpretation of curiosity. So this AI system can learn about its environment through the process of curiosity. According to researchers AI system passed 11 levels of the game Mario with the sheer tool of curiosity. But still, that curiosity is programmed with a lot of background data. On the other hand, the structure of the game is already made by researchers which means it is not the case that in a random environment with different unstructured things AI system develops a whole new play and game. However, we humans are born into a structured environment or a world of possibilities. We may also deduce from this article what the medium between play and games is, and this appears to be curiosity.

6.10 Play in Distraction:

However, distraction plays an important part here as well, because distraction can occasionally open new gates and directions to a new system. However, distraction is also affected by the number of options available. So the key issue for AI is to identify entertaining behavior in the midst of all

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distractions in the game. However, we know that distractions in computer games differ greatly from those in real-life human games because conscious experience plays a role in human beings. So the real curiosity with skills and learning with intelligence starts in the midst of distraction which sharps our curiosity if we manage to focus ourselves on distraction, learning, and intelligence. Also, distraction is a sign of the existence of new possibilities around and sometimes help us to find the creativity and facts on the other side.

6.11 Conclusion:

In this chapter the main aim was to see what are the new advancements of play and games in AI systems and how AI systems are fitting in the structure of play and games. When we unbox the realm of play it opens with different tools like intelligence, creativity, curiosity and skills etc. Interestingly AI researchers who are working on the play and games in AI system also want to update these tools which can help them to make an autonomous agent. However, it is very difficult to put all these tool in one box because all these tools became part of human beings after a long evolutionary process that also include the human history and civilization. On the other hand, new developments in AI like machine learning or reinforcement learning are enhancing the systems which are opening the new gates of possibilities.

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Chapter 7

Epilogue

*“Reason is, and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them”28. David Hume.*

Giving the central idea of my thesis, I proceed to the conclusion that "Just Play" is a very unique phenomenon that differs from playing games and that it is currently impossible for an AI to fit fully in the structure of play because of those aspects of play that always revolve around in the orbit of play that are irrationality, randomness, ambiguity, curiosity, joy, paradoxical, destruction, and distraction. Even games require the roots of play. Free play is not an activity based on abstract logical principles, but rather an activity that is interconnected with various parts of life; in other words, play is a live phenomenon that manifests itself through the triad of mind, body, and environment. Significantly, the topic that clarifies the entire picture of play is the role of the play system and its relationship with other systems in the brain. I believe that the finding of the play system as a separate entity in the brain is a watershed moment in the actual understanding of play in human and animal life, and it will also aid in the development of AI systems that can play in a real sense. Another intriguing aspect of the play system is its interconnection with other systems, which supports other systems in developing sociality. As I previously stated, many communicationists believe that play is a sort of metacommunication; this remark also represents how understanding trumps language. The most challenging aspect was determining the concept of play because any thesis must begin with a clear definition of the issue. However, due of the various usages and variations in language, it is difficult to define some universal activity in a single line;

28 David Hume, A treatise of human nature, (Floating Press. 2009) ,636.

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however, we can determine definition through its essential properties, which are also interconnected. The scientific study of play portrays the diversity of play in both animal and human life. Human play, on the other hand, may change its form into a game, which is why even animal play or fighting is a game for humans. We humans not only live in a world of possibilities, but we also exist as a part of those possibilities. Science and technological breakthroughs are also shades of human possibilities, and as a result, we see ourselves reflected in these advancements. Artificial intelligence is one of the most momentous steps in human history, upheaving our thoughts and allowing us to resurrect them. Although AI is not yet capable of becoming a human being, their presence is a form of extension of biological beings. So the key point isn't the battle between humans and AI, but how AI represents human existence. Human beings' irrationality and rationality coexist. Play, for example, is regarded an illogical action, but through the core of this play, we develop games, which are then deemed rational acts because games contain rules and regulations, as well as the fear of failure with the desire of success. As a result, an AI system can only play in the genuine sense if it also has the ability to be illogical. However, it is possible that the AI system's only rational behaviour is also a sort of irrationality. So how do we distinguish between human and AI irrationality? The essential point is that AI systems are part of the realm of possibilities, and their presence is an extension of human beings. As a result, the existence of irrationality in AI is a reflection of human beings. Animals and AI systems are quite similar in their approach to humans because animals can only play and AI systems only have games, and humans play the games.

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