

ENRICHING NEW FRONTIERS IN GAMING

Report: New Frontiers in Gaming

New Frontiers in Gaming

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**Matteo Bisanti – IMT School for Advanced
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Francesca Antonacci, Sebastiano Accardi,
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IMT School for Advanced Studies Lucca



The IMT School for Advanced Studies Lucca is a state higher education university and research centre that focuses on the analysis of economic, social, technological and cultural systems. The IMT School is one of the nine Special Organisation Schools in the Italian university system. Since its establishment under the Ministerial Decree of 18 November 2005, the IMT School has excelled for the quality and innovative nature of its research and PhD programs and its interdisciplinary style, featuring complementarity and conversation between methodologies drawn from economics, engineering, computer science, applied mathematics, physics, archaeology, history of art, management science, cultural heritage and, more recently, neuroscience and psychology.

The fusion of tradition and innovation is also reflected in the IMT Campus, located in the recently renovated Convent of San Francesco. The Campus, originally started in 1228 and the home of theological and philosophical studies, now includes spaces for research, laboratories, courses and the life and recreation of teachers and PhD students. With its own life, the Campus is completed by a Library, which offers a plethora of resources and additional workspaces for the IMT School community and, more generally, for the City of Lucca.

The IMT School offers three PhD programs, each of which is divided into one or more curricula: Economics, Analytics and Decision Science, Cultural and Cognitive Systems, Systems Science. It also participates in the new PhD programs of national interest and industrial PhDs. In parallel with its third level education, the IMT School also offers executive courses and degree courses activated in cooperation with other universities and research institutions.

Based on the fundamental principle of scientific rigour, multidisciplinary and excellence, which applies to all sectors and levels of the research community, the IMT School is a leader thanks to its interdisciplinary model, aimed at developing innovative research and acquiring a greater international perspective.

Intesa Sanpaolo Innovation Center



Intesa Sanpaolo Innovation Center is the Intesa Sanpaolo Group company dedicated to frontier innovation. It explores future trends and scenarios, develops multidisciplinary applied research projects, supports startups, accelerates business transformation for companies according to the criteria of Open Innovation and the Circular Economy, facilitates the development of innovative ecosystems and disseminates innovation culture, in order to make Intesa Sanpaolo the driving force behind a better informed, inclusive and sustainable economy.

The Innovation Center, with its headquarters on the 31st floor of the Intesa Sanpaolo skyscraper and its national and international network of hubs and laboratories, is a relationship facilitator for the other stakeholders of the innovation ecosystem – such as businesses, startups, incubators, research centers, universities, national and international institutions – and a promoter of new forms of entrepreneurship and their access to risk capital, with the support of venture capital funds, thanks also to the Neva SGR subsidiary.

Within the scope of applied research, Intesa Sanpaolo Innovation Center created the Neuroscience Lab to respond to the complex needs of the Intesa Sanpaolo Group and its customers that lack the assistance of big players and startups and determined by the evolution of new market trends and technologies with “exponential growth”. The laboratory develops solutions through the activation of research projects, in cooperation with scientific partners such as the IMT School for Advanced Studies Lucca, according to a multidisciplinary approach and through teams of highly qualified researchers. One of the main objectives of the laboratory is to enhance the innovative component of research projects through the publication of scientific articles in prestigious national and international journals, that are important to the reference scientific community and, wherever possible, to pursue the intellectual protection of what has been created.

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foreword

The world of gaming as a growing trend and economic sector; as a scientific tool to broaden the knowledge of our brain; as a universal language; as a key element for learning in schools, for adults and for companies. These are some of the reasons that encouraged us to face the world of gaming in this volume, full of contents and stimuli necessary to innovate. Innovation culture means studying, exploring, discovering and spreading what you have learned with languages and tools capable of reaching out and encourage a wide and heterogeneous audience, to help also shape new ideas on how to use this knowledge in business.

In order to realize this volume Intesa Sanpaolo Innovation Center – with its Neuroscience Lab and its scientific partner - IMT School for Advanced Studies Lucca – involved a variety of experts' voices, on a national level, to give life to a polyphonic and multidisciplinary narrative on gaming. Contemporary philosopher Bernard Suits wrote that “Playing a game is the voluntary attempt to overcome unnecessary obstacles”, but when we find ourselves playing the overcoming of those obstacles become vital, this is the force that leads Intesa Sanpaolo Innovation Center towards the frontier of innovation.

I hope this book makes enjoyable reading.

Maurizio Montagnese

Chairman Intesa Sanpaolo Innovation Center

preface

It is a real pleasure for me to introduce this new volume with its in-depth analysis of the world of gaming - from a neuroscientific perspective - written by the Neuroscience Lab of Intesa Sanpaolo Innovation Center - a company of the Intesa Sanpaolo Group dedicated to innovation and frontier issues - together with its reference scientific partner, the IMT School for Advanced Studies Lucca and with several prestigious contributions from experts from the national and international gaming and educational landscape. The Neuroscience Lab's mission is to carry out applied research and development projects for the Bank and for its external customers/companies, but it also has a deep interest in the dissemination of culture in the neuroscientific field, both inside and outside the banking group it is part of. In addition to holding innovation seminars on a monthly basis, it also produces annually an informative report on various topics, arising from the same research projects or from the most recent trends analysed in the neuroscientific field.

This year's topic on the new frontiers in gaming is aimed at a journey into the vast panorama of games. Starting out with its history and definitions, we then take a look at games applied in the workplace or in museums to target new realities such as the Metaverse and new means of engagement and learning for the young and old alike. I am also particularly honoured to present two initiatives on gaming relating to applied research projects conducted in synergy with and on behalf of the Museum of Saving in Turin and with the IMI Corporate & Investment Banking Division of Intesa Sanpaolo. The first is aimed at studying the concepts of retention regarding financial issues in lower secondary school children, while the second is aimed at helping colleagues in the IMI Division to perfect their negotiating skills.

Having said that, I wish the reader a long and exciting journey into gaming through this report that is published in Italian and English and prepared with a logic of accessibility for people with digital dyslexia and visual impairment.

Luigi Ruggerone

Senior Director - Trend Analysis and Applied Research
Intesa Sanpaolo Innovation Center

game science and neuroscience

Game Science is gaining increasing importance both in the academic and industrial world. Video games and non-digital games are now a fundamental part of collective entertainment, as well as being fundamental tools that are widely used for learning and cognitive training. Some new academic disciplines have developed around this emerging phenomenon, that study games and game-playing, which use games as a model of human behaviour, and which make use of games as a research tool, starting from the codified field of Game Studies and, before that, from “Homo ludens” by Johan Huizinga in 1938.

The dialogue with Cognitive and Social Neuroscience together with the study of the neurobiological bases of behaviour can give significant impetus to Game Science. Neuroscience provides a series of experimental methodologies that allow us to measure body and brain responses of individuals engaged in play activities. Similarly, understanding, for example, how games can influence our behaviour and our mental abilities is an aspect of great methodological and practical importance, also on a clinical level. Just a few years ago,

EndeavorRx™ was the first video game approved by the American Food and Drug Administration for the treatment of children with attention deficit hyperactivity disorder; but others are already being assessed to correct certain developmental disorders in children or to combat cognitive decline in the elderly.

Games can, in fact, assume many important roles in people’s lives, such as for entertainment, the exercise of global intellectual and motivational functions, for facilitating the learning and acquisition of new skills. Games train executive functions, i.e. those more complex skills that in real life are used in the assessment and implementation of our decision-making processes. Video games also allow us to develop motor and visuospatial skills, simulating virtual competitions or situations that, nevertheless, train us for real activities. This awareness of the close relationship between play and mind is so evident to the game designer that some games and video games have been developed specifically to test the cognitive load of players (see for example Cortex™ or Space Fortress™) through increasingly difficult objectives.

The IMT School has for several years understood the importance of nurturing this interdisciplinary dialogue

between Game Science and Neuroscience, facilitating the constant contamination of these two research areas on projects of scientific interest and with a broad socio-economic impact, and as far as supporting the creation of a research centre dedicated to gaming, the GAME Science Research Center, in close cooperation with the local area and institutions. It was therefore natural, if not inevitable, to also include games and Game Science in the research activities of the Neuroscience Lab, the laboratory of research and development applied to Neuroscience of Intesa Sanpaolo Innovation Center in cooperation with the IMT School. Game-playing as a tool for learning correct financial behaviours, game-playing as an element for assessing individual skills, game-playing as a means for training and learning new skills, game-playing as a way to promote occupational well-being: these are the research topics that are studied and developed innovatively by the researchers of the IMT School together with the Neuroscience Lab of the Intesa Sanpaolo Innovation Center.

Science is a relentless forward thrusting of collective objectives and today we can say, and in this report it emerges, that the close relationship between Neuroscience and Game Science is an important driver in this thrust in the 21st century.

Emiliano Ricciardi

Professor of Psychobiology and Physiological Psychology
IMT School for Advanced Studies Lucca

Ennio Bilancini

Professor of Behavioural Economics and Game Theory
IMT School for Advanced Studies Lucca

introduction

We have already been living for some time in a “ludic century”, as suggested by game designer Eric Zimmerman, in which the difference between play and reality will be increasingly blurred. It will be a century in which a large part of our life will be spent in virtual worlds or within the ‘magic circle’, an abstract place where different rules apply from those in reality; we will be told stories through games and these will change our habits, behaviours and perceptions.

It should be noted that when we use the word “game/play” we do not strictly mean just the act of game-playing (gaming), but all the tools that arise from game-playing, such as gamification. Already today, many of the apps we use on our smartphone have play elements, with daily goals, ‘achievements’ to be reached and global rankings to climb. And in the meantime they make us run, clean the house, learn languages and study, with a high motivational level that would otherwise escape us. In this sense, it is essential to refer to all the work of game designer Jane McGonigal and her book “The Reality is broken” (Penguin Books, 2011) in which the author describes our present and future in relation to game-playing.

Gaming will increasingly become a tool of global and borderless communication. Many research centres, also in Italy, such as INAF (National Institute of Astrophysics) and OGS (National Institute of Oceanography and Experimental Geophysics), have turned to ‘game design’ to convey significant and complex messages, such as the global climate change emergency or space exploration. In addition, games for social change have been created over the years, to counter the ‘gender gap’ or pseudoscience, just to list some of the topics covered. Similarly, nowadays particular attention is paid to the fact that board games, for example, should comply with all environmental sustainability standards.

Games have transformed from being pure entertainment to an art form, on account of the authorial element behind the games, which is increasingly important, and because the aesthetics and care in their creation have increased considerably thanks to technology and the commitment of the authors: ever increasing attention is and will be paid to the graphics, mechanics and materials.

Fabio Viola, an Italian gaming expert, goes even further, defining the video game and - we add - the analogue game as the Tenth Art. This is because, from the artistic point of view, games have been enormously influenced by the other “Nine Arts” and in turn have had an influence on them. The game, therefore, becomes an interactive art that constantly dialogues with the person who uses it and so it changes as a consequence.

What has been said, is also confirmed by the experience of the exhibition at the Reggia di Venaria (near Turin) which in July 2022 launched “Play. Un anno tutto da giocare” (“Play. A year with everything to be played for”), with Fabio Viola himself as curator, where video games will be inside the museum halls in order to represent a bona fide contemporary art exhibition.

Gaming will continue to grow as entertainment, social communication, art and design and even sport, or rather, esports. Esports are a new frontier where thousands of “athletes” compete in video game competitions. Unfortunately, there are still a number of difficulties from the legislative point of view on who is the real owner of the rights of an esports - whether it is the software house or the playing public - and on how to have truly fair competitions, without any doubt.

These are some of the topics addressed in the report on new frontiers in gaming. It will be a journey that touches on play themes, starting with the definitions and the past and then to take a look at the future.

In the first chapter, the basic concepts relating to games and game-playing will be addressed and an overview will be provided on the various types of games, the difference between digital and analogue games and the importance of the relationship between gaming and Neuroscience. We will also take a look at the past starting from the Royal Game of Ur (dated about 5000 years ago) right up to the advent of video games.


On the other hand, in the second chapter, there will be an introduction to all the disciplines that study game-playing, from Game Studies up to the new Game Science. A definition will be provided for each discipline and a general overview; in addition, some key words will be analysed in greater depth, such as learning, gamification and strategy.

In the third chapter, a few game applications will be shown in different areas. In addition to the well-known therapeutic possibilities of game-playing, we will see that even companies can reap significant benefits through gaming and gamification, in the HR field or more generally in the social and training dynamics within the company.

Finally, in the last chapter, we will address future technologies and concepts, taking the present as our point of departure. We will talk about the Metaverse, virtual and augmented reality, the global gaming market, gaming for social change and esports, without neglecting to give a critical look at the possible negative implications of gaming in the commercial sphere.

Matteo Bisanti

Researcher at the University of Florence
and the IMT School for Advanced Studies Lucca



1

**Game-playing.
What, how, when
and why**

Before every trip, explorers put everything they need in their backpacks so as to be ready for the adventure. This first chapter has exactly the same spirit: in order to fully understand the contributions in the following chapters and to grasp the range of opportunities that gaming provides and will provide in the future, it is sound advice to get started and be prepared on solid foundations, ‘taking with you’ the essential concepts and definitions in order to truly understand the phenomenon of **gaming** i.e. the act of playing a ‘game’.

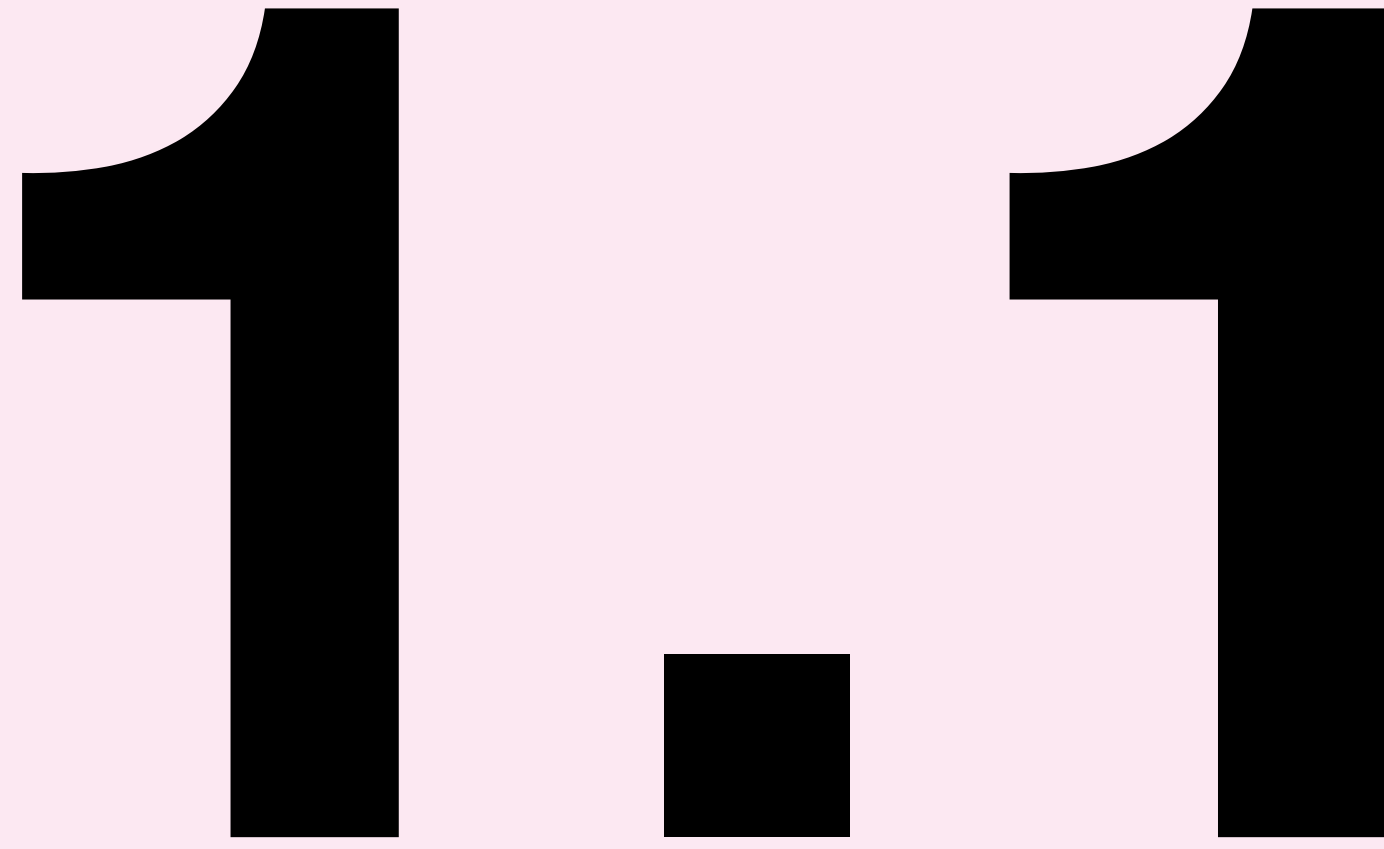
The chapter will begin with the definitions of game and game-playing, considered as languages and tools that are useful in our life, and with the distinction between what is a game and what is not, according to the opinion of the experts.

After the definitions, there will be an in-depth analysis of the time-honoured history of structured games, from the first finds that date back thousands of years and then coming up to the present day, emphasising the way that games

have accompanied history of humankind. The vast range of possible game types in our daily life, as commercial products that are increasingly sought after and in demand, will also then be analysed and defined.

In addition, the report will discuss both digital and analogue games: it will therefore become important to discover the differences between these two alternative and complementary categories, especially from a cognitive and behavioural point of view.

The last part will ultimately address the theme of game-playing from the **point of view of Neuroscience**. If games and game-playing have always been a part of us, we need to understand which cognitive aspects are enhanced and trained, but also illustrate how game-playing can help us to better understand our brains and ultimately ourselves as we all belong to that same species of “Homo ludens”, the expression coined by the “father” of the game studies, Johan Huizinga.



Games and game-playing

contribution by **Francesca Antonacci**
and **Maresa Bertolo***



Francesca Antonacci
Professor and senior lecturer in Play
and Education and Theories and Methods
of Lifelong Learning at the University
of Milano-Bicocca.



Maresa Bertolo
Researcher at ImagisLab,
Department of Design, Politecnico
di Milano and professor in Game Design
and Computer Graphics.

The experience of game-playing

Game-playing is something that is part of everyone's experience, yet when we need to find a definition it is no easy task to indicate its various categories. This is actually an extremely difficult undertaking which the most important theorists of Game Studies have ventured to achieve; **game-playing is an original dimension, which, just like love and work, is fundamental to human experience.** A simple, self-evident and at the same time complex dimension.

According to the teachings of Johan Huizinga - a sociologist, historian and anthropologist, considered the father of Game Studies on account of his essay "Homo Ludens" ([1949] 1967) - game-playing is at the basis of the very concept of culture because it adorns life and adds the finishing touches, and as such it is indispensable.

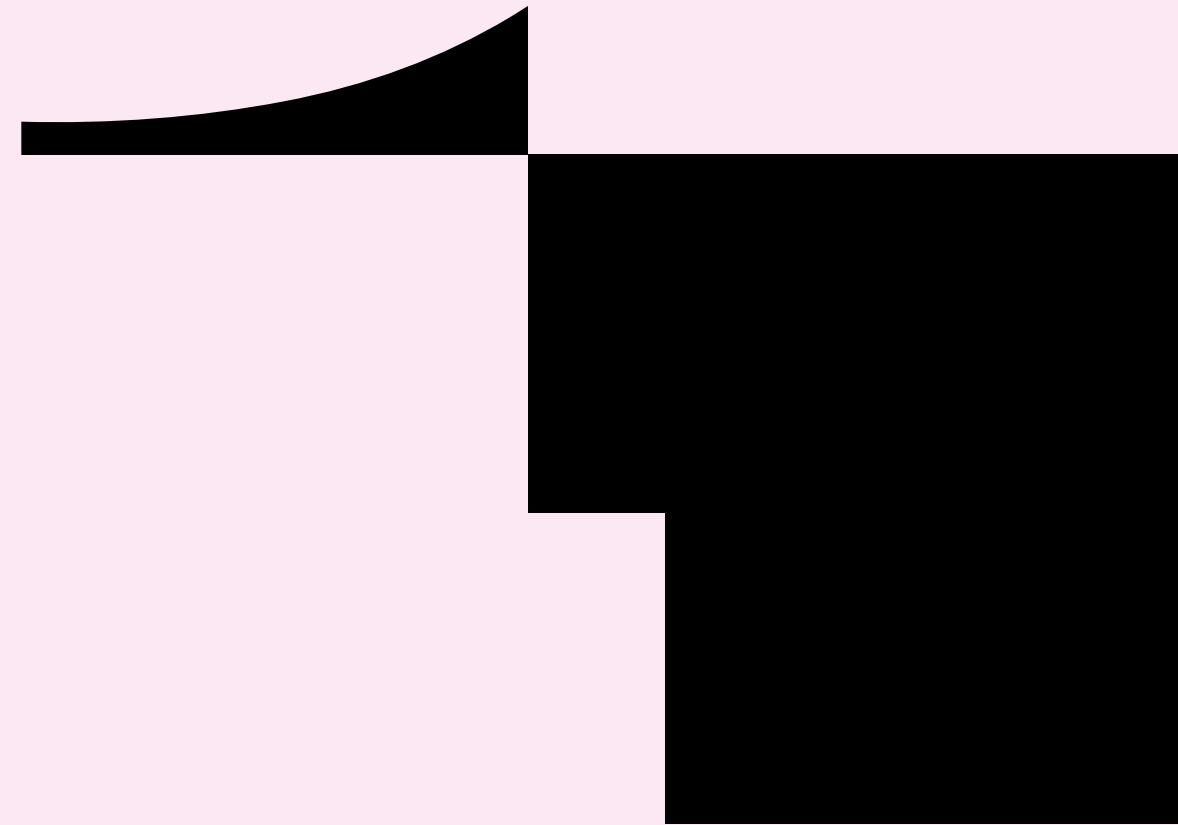
It is indispensable to the individual, being a biological function, and is indispensable as well to the community for its meaning, the expressive value, the spiritual and social bonds it creates, in short as a cultural function. Huizinga emphasizes that **one of the founding characteristics of game-playing is the existence of the kingdom of freedom that derives from its gratuitousness.**

In game-playing everything is possible and yet one can explore, experience and exercise one's freedom only within a 'magic circle' (→ page 103), consisting of a defined space and time, and following a set of explicit or implicit rules, that are always shared and never to be transgressed, under penalty of the end of the game itself or its radical transformation.

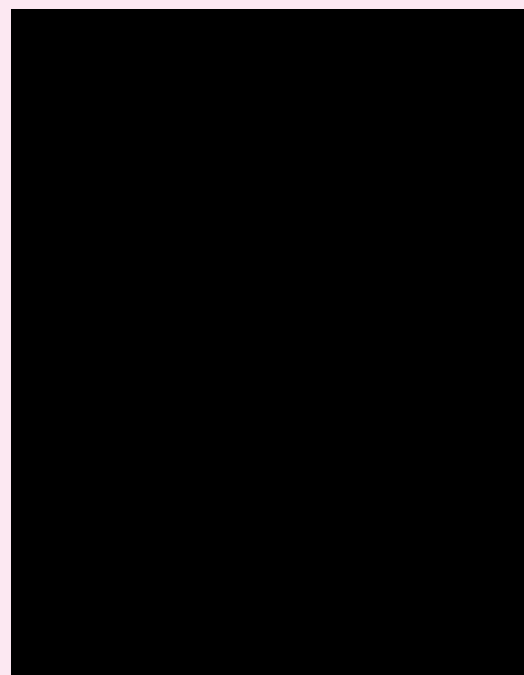
*

This chapter is the result of the authors' joint collaboration. Merely for academic purposes, it should be noted that Francesca Antonacci wrote the paragraph "The experience of game-playing" and Maresa Bertolo the paragraph "The essence of game-playing".

#games #gameplaying #playexperience #lusoryattitude #gamestudies
#gamedesign #gameartefact #freedom #magiccircle



Playing a game is the voluntary attempt to overcome unnecessary obstacles.



The condition of separateness and isolation in game-playing is guaranteed by a state of non-ordinariness, by not being bound by habits or everyday routines.

The place where the game takes place is separated from ordinary space because it is formally delimited or because it is steeped in special magical features by the players.

Even ordinary time is suspended and acquires special characteristics. Not only because **when you play you lose consciousness of the passing time**, but above all because the game establishes a quality of presence that **sharpens one's awareness of being in the world** and it can be defined as an all-round experience capable of engaging the mind, body and emotions all at the same time: playing turns the present into a gift, as argued by philosopher Eugene Fink in his short and intense essay "Oasis of Happiness" (1968).

In order to read and understand 'game-playing', it is essential to know the classification identified by sociologist and anthropologist Roger Caillois, who in his text "Man, Play and Games" (1961) interprets playing as an experience innervated by four fundamental energies: 'agon', 'alea', 'mimicry' and 'ilynx'.

'**Agon**' is game-playing when it is moved by **competition and challenge**, involving opposing people or teams based on the personal skills of the participants. '**Alea**' is **game-playing where luck is involved** where randomness taking the form of good fortune, and not skill, becomes the decisive factor. '**Mimicry**' is game-playing with disguises: **interpretation, mimicry, dressing-up**. '**Ilynx**' is playing

in search of dizziness, a sort of voluptuous panic, like a swing, childish spinning, circus acrobatics, and it responds to the need to abandon ordinary emotions to feel a kind of intoxication.

These energies are always combined with a tension that goes to the extremes in antagonistic poles and which the author calls 'ludus' and 'paidia'.

'**Paidia**' is the most infant part of playing and comes from the Greek word 'pais', meaning infant. It is freedom, relaxation, creativity, imagination, being carefree. '**Ludus**' is the pleasure one feels in overcoming a difficulty, the stimulus that creates a rule, what defines patience, order, control, which is used to try out, **to test one's skills based on arbitrary, constructed difficulties**. It is the pleasure that comes from setting oneself obstacles to find greater satisfaction from solving the games. Game-playing is found precisely in the tension generated by their intertwining. In fact, it is the experience that occurs when a person combines vitality, a desire to have fun and be carefree with a search for moderation, order, discipline, control.

Following a final fundamental definition, that of the philosopher Bernard Suits - presented in "The Grasshopper. Games, Life and Utopia" ([1978] 2005) - "**Playing a game is the voluntary attempt to overcome unnecessary obstacles**" (p.43).



The term ‘play/game’ in itself conveys different meanings in most languages.



In this sense Bernard Suits defines the dimension of fun, lightness and freedom of game-playing as “lusory attitude”, which constitutes the intrinsic motivation (→ page 103) to overcome, voluntarily, obstacles and difficulties that are not necessary, but become such only to stay in the game: like putting balls in holes in the ground that are at a considerable distance from the players, using iron clubs as tools: this is an example of a lusory explanation of the game of Golf! The very rules of Golf impose limitations that prevent the balls from being put into the holes in an ‘efficient way’ (for example, by going to the hole and putting the ball in by hand) by defining the fact that in order to play, it is necessary to use a ‘less efficient’ method with ‘less effective’ means (sending the balls a long way by using golf clubs). Anyone who does not wish to submit to this limitation of means, would not follow the rules and, therefore, would not play golf.

The importance of the definition of ‘game playing’ proposed by Suits - today widely accepted by the scientific community - lies not only in its being short and simple, but also in its ability to adapt to any type of game: if, as an exercise, we try to apply it as a key to understanding what happens when we play, its characteristics are easily found.

The essence of game-playing

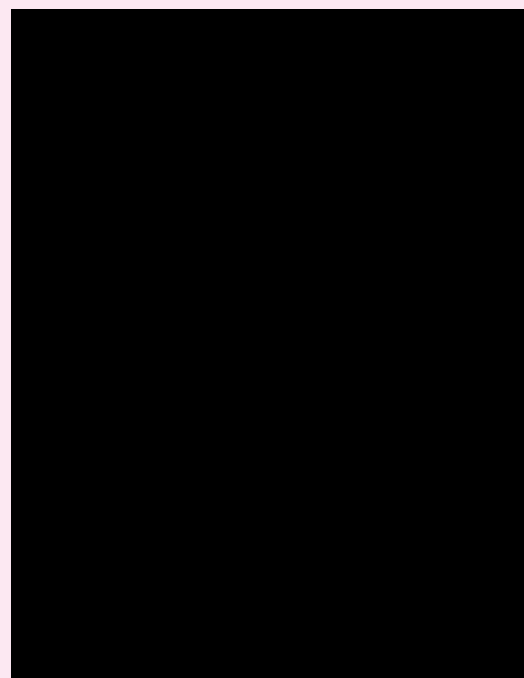
In studying game-playing, certain semantic ambiguities are easily encountered due both to the nature of the game, which tends to escape definition, and to the complexity of the language itself. **The term ‘play/game’ in itself conveys different meanings in most languages**, including English.

The need often arises to distinguish **between the ‘game as an artefact’, which allows ‘the game-playing’, and the activity itself**. In the previous paragraph we analysed ‘game-playing’ as an experience, as an activity, describing its qualities and proposing a definition; it is therefore time to focus attention on game as an artifact, as an entity capable of generating such experience.

This aspect of the term ‘game’ also presents an immediately evident analysis difficulty: let’s think about how many types of games we know; traditional games such as Hide and Seek, card games, board games, video games, ‘mobile-phone’ games, urban games and various other types. Bernard Suits succeeded in the arduous task of briefly and effectively defining the experience of playing any of these games - indeed, all of them. To complete the definition system that allows us to understand the ‘game’ as a whole, we now need a definition able to specify what is meant by game as an artefact, regardless of the specific nature of the individual game, and therefore that can be adapted to any one of the thousands of games in existence.



A game is a system within which the players engage in an artificial conflict, well defined by rules, which leads to a quantifiable result.



In the second half of the 1900s, the search for this definition fully engaged the attention of those involved in studying games, resulting in various proposals. The researchers and game designers Katie Salen and Eric Zimmerman were the ones to formulate the definition that best suits the many and different specific aspects of the myriad of possible games: **“A game is a system within which the players engage in an artificial conflict, well defined by rules, which leads to a quantifiable result”** (“Rules of Play. Game Design Fundamentals”, 2004, p. 81).

The concept of ‘system’ comes from computer science and identifies an entity composed of ‘objects’ (of a physical or abstract nature, for example, chess pieces or the maps of a video game), which are characterised by ‘attributes’ (the colour of chess pieces) and endowed with the ability to ‘interact with each other’ (for example, the chess pieces are supported by the chessboard that determines their movements) and, finally, able to ‘interact with the environment’ (chess pieces can be gripped, lifted and moved).

In the case of a game, it is not just any system, like a window or a boat: in fact, we specify that **the game system (→ page 103) defines an ‘artificial conflict’ established by a set of ‘rules’**. The conflict can be against the system itself, such as in the famous Tetris, or in any solitaire game, but also against other people, such as in Chess. It is an artificial conflict, precisely because it is inside the game, belonging to the sphere of the magic circle described above. Finally, the activity of playing a game defined in this way leads to a **quantifiable result**: victory in a match, or reaching a stage along a course or in a narrative.

As in the case of the activity, let us think of the games we already know and try to describe them on the basis of this definition, to understand them better and to gain familiarity with their nature and with the definition itself.

The definitions of ‘game’ lead us to focus attention on the ‘choices’ made by those who play the game in order to find a way to overcome the conflict and reach the objective despite the restrictions of means imposed by the rules: both the ‘voluntary overcoming of obstacles’, and ‘engaging in artificial conflict’ suggest that game-playing is not passive but active.

Players perform actions based on the choices made in relation to the game situation: sometimes they are immediate, with relatively short-term effects (tactics), sometimes well-considered, with long-term effects (strategies). Any absence of choice shifts the activity with respect to the game environment as defined here; there are numerous cases of activities indicated as ‘games’ that hardly fall within the definitions proposed here – let us think for example of gambling, tombola and its more modern descendants, or Snakes and Ladders: activities in which the only choice that players make is to participate, and then they passively face what the system provides.



1.2

Game-playing: a short (long) history

contribution by **Arturo Mariano Iannace**



Arturo Mariano Iannace
Researcher at the IMT School for Advanced Studies Lucca in Political, Military and Cultural History. Interested in the relationship between games, History and Historiography and member of the GAME Science Research Center.

**#historyofgames #royalgameofur #senet #ancientegypt #go
#chess #chaturanga #mediaevalgames #courtlylove #kriegsspiel
#wargames #homoludens #ludus #huizinga #monopoly**

It is almost impossible to establish a precise point, in time and space, to indicate the origin of structured games as conceived today (a set of two or more players who interact following pre-established rules with the aim of achieving one or more objectives). Whether it is “Senet”, a game dating back to the III Dynasty of the Ancient Egyptian Kingdom (about 2686-2613 BC), or the so-called “Royal Game of Ur” (**Figure 1.2.1**), also dating back to the third millennium BC and the first example of which was found in the Mesopotamian city of the same name (but which, in any case, was widespread throughout the Ancient Near East), or the slightly more recent (and still widely played) “Go”, of Chinese origin, **game-playing is confirmed as an ancestral component of human civilization**. In ancient Rome (as well as more generally in the Greek world first, and then the Hellenistic world) the presence of games is confirmed by numerous written and figurative sources, and in many forms.

Just as game-playing can be considered a permanent element of civilization, the same can be said of the scepticism and hostility directed against game-playing itself.

Bans against game-playing in public or gambling (but the boundary between gambling and non-gambling was always highly fluid) have been reiterated ever since ancient times, but even more so during the Middle Ages, when their moral component (or, if viewed from the point of view of religious authorities, their immoral component) was kept under even stricter control.

During his expedition against Tunis, the King of France Louis IX (later canonized as a saint) took steps to throw all the game items on board his ships into the sea, so that the members of the expedition could spiritually purify themselves before the impending battles.

In the Middle Ages, however, game-playing does not disappear, indeed it is precisely in this period that one of the most famous games of all time, **Chess**, managed to spread from one side of the Eurasian continent to the other. An outstanding example of how game-playing is a fundamental cultural element, and therefore subject to

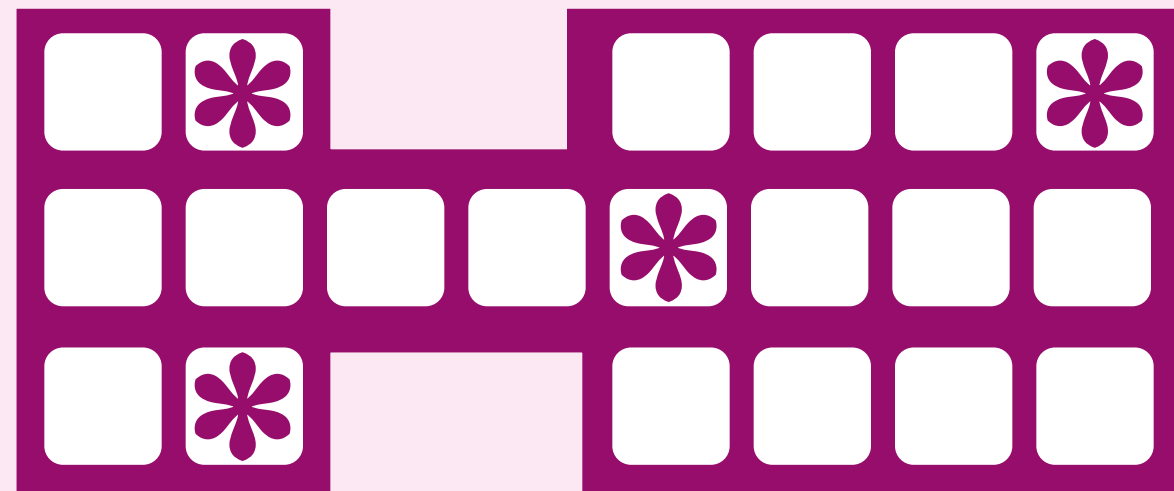


Figure 1.2.1
Layout of the Royal Game of Ur, 3rd millennium BC



The potential to make a conflict more or less abstract, especially that of a military nature, made games a highly valued and appreciated tool in the military circles of European states.



the same exchanges and the same ‘migrations’, as other cultural elements. **Chess was presumably invented in India, where evidence of a similar game, “Chaturanga”, has been found dating back to at least the 6th century AD.** We will not dwell here on the theories regarding the evolution of this game or the reasons for its birth. What we are interested in pointing out is that “Chaturanga” spread over the centuries throughout Eurasia and was enthusiastically received in worlds as diverse as China, Persia and Europe. During each ‘migration’, games are inevitably modified to better match the characteristics of the culture that receives it on each occasion.

“Chaturanga” and all its derivations, including Chess, are strictly associated with representing, albeit abstractly, an armed confrontation. It is no coincidence that some scholars have thought of tracing the origins of the “Chaturanga” back to the Hindu caste of the Kshatriyas, the warriors; as if to underline the plausibility of an origin of this kind, in Europe Chess was the game of noble warriors and knights.

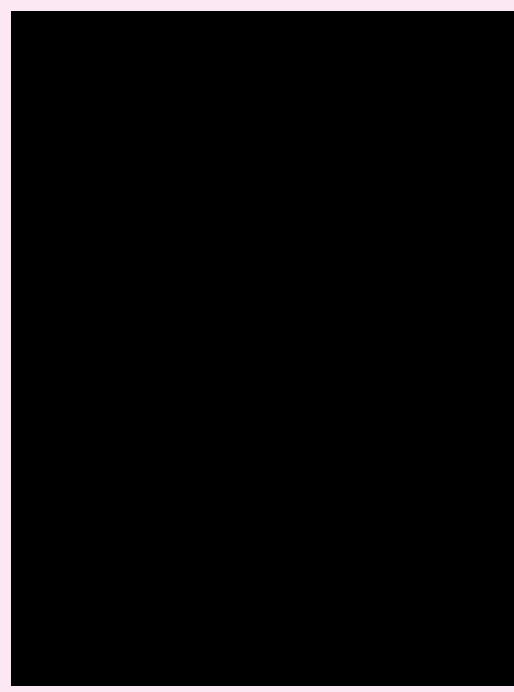
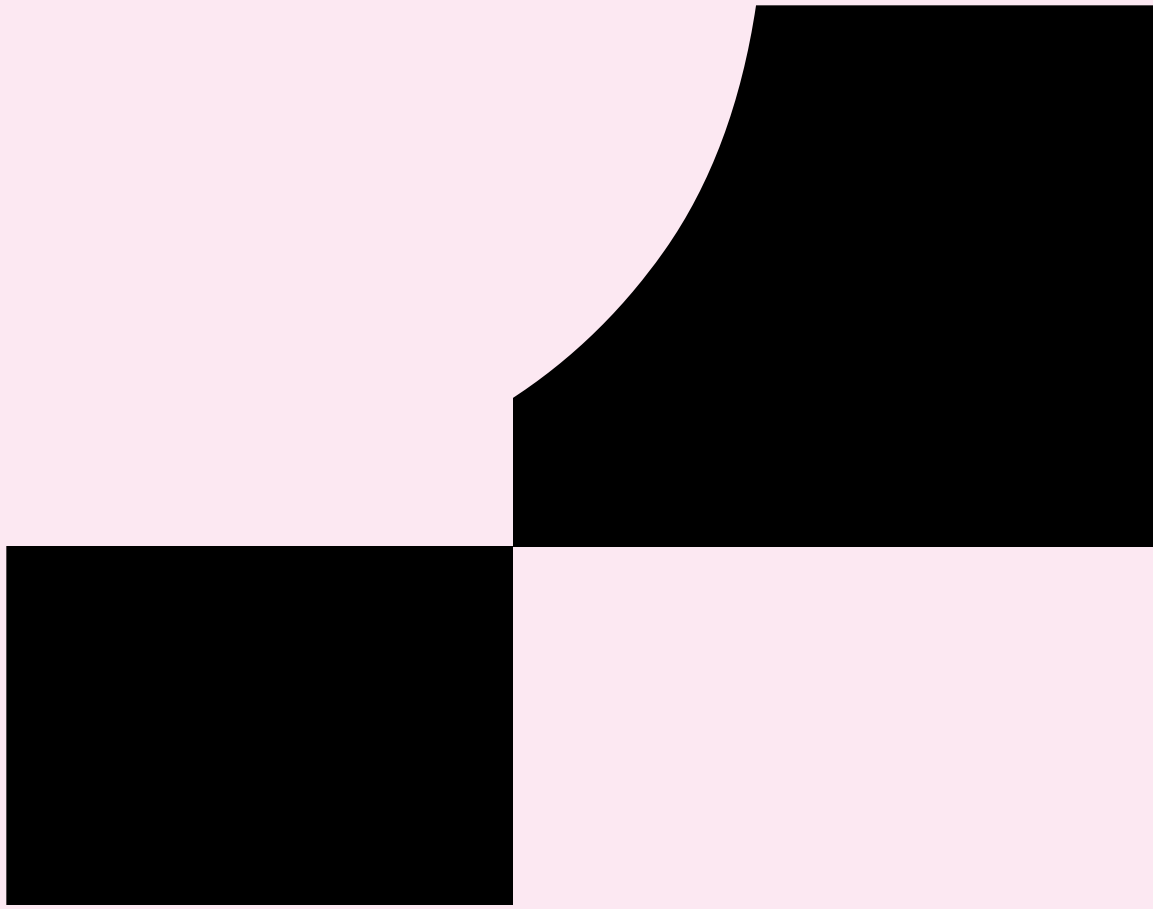
In the Late Middle Ages, Chess assumed a truly extraordinary level of importance within the culture of European nobility. This makes Chess once again highly useful in showing how much game-playing can be so interconnected with the elements of a culture that it practically becomes indistinguishable from it. **Late medieval men and women saw Chess not only as an abstraction of a military confrontation, but rather as an allegory of any form of confrontation, even the amorous, courtly one,** in an era that some scholars (first of which, Johann Huizinga) wanted to see imbued with game-playing in every component, from jousting tournaments (which

are nothing but ‘simulated’ battles and fights) to the rigid procedures of courtly love.

The potential to make a conflict more or less abstract, especially that of a military nature, made games a highly valued and appreciated tool in the military circles of European states, in particular after the spread of the theories of Jomini and Von Clausewitz, in the nineteenth century, had made it clear that war also follows its own very specific rules, creating situations in which certain strategies can prove to be decidedly successful and others, on the contrary, absolutely disastrous; in other words, they seemed to reveal that even war is nothing more than a game.

The Prussian General Staff were the first to adopt game-playing as an exploratory tool for military strategies: thus the “Kriegsspiel” was invented, which literally means ‘war games’.

We are half way through the 19th century. More or less in the same period, a wide range of different games continued to gain popularity among the population (one could almost say, as always), including the middle classes of the new industrialised nations. It is perhaps symptomatic that one of the earliest examples of wargames where miniatures were used, though not intended for officer training, came down to us from the hand of the famous British writer H. G. Wells, who wrote a sort of games manual to be used with his friends.



**Board Game Geek,
a world catalogue
of board games**



**Goblins' den website,
an Italian catalogue
of board games**



**Top 10 historical
board games**



Board Games Land

One can say that since the end of the Second World War games have enjoyed their real “Golden Age”.

Beyond the fact of their widespread diffusion, what is really striking is the fact that more and more new games are being created and the list of ways they are used is continually expanding. Games are no longer considered merely a form of entertainment, but also a learning tool, a teaching aid, a device for combating certain forms of psychological disorders and even acquiring scientific knowledge, or social criticism. A fine example of the above is “Monopoly”, a game created at the beginning of the twentieth century as a critique of the free capitalist market, that has probably become (over and above its original intentions) one of the most popular board games in the world.

Taking an even deeper look into contemporary games, the list could stretch indefinitely. If we wanted to take the field of wargames as an example, we could mention the colossal “World in Flames”, a game that aims to give the player the opportunity to recreate the Second World War in its chronological and geographical entirety, or the development of a genre that derives from wargames, but which is not quite the same, such as 4X (from the four terms: EXplore, eXpand, eXploit, eXterminate), which puts the player in the shoes of a leader (usually, in a science fiction setting) and whose most distinguished example is undoubtedly “Twilight Imperium”.

Wargames and 4X games were among the first board games to be transferred to the medium that has made gaming today a truly ‘mass’ product: the computer. RTS (Real-Time Strategy) games or turn-based strategy games (thus highlighting their origins even more clearly) are among the most popular genres, although certainly not the only ones in the landscape of video games that is relentlessly and sometimes unpredictably in transformation.



1.3

Types of games

contribution by **Alessandro Demichelis**



Alessandro Demichelis
PhD researcher at the IMT School for Advanced Studies Lucca. Educational Philosopher; his interest is in how people take decisions in conditions of uncertainty. He possesses lots of dice.

Considering the way in which different games can have profoundly different procedures, materials, durations and purposes, it is not surprising that there is a considerable variety of different types. This multiplicity can be confusing for a person outside a specific gaming community. Therefore, some examples of these types are listed below, without any pretence of being a comprehensive list.

Board games are one of the most varied categories. They usually have two or more players and a common factor is that they all have some form of game board (hence the name).

One of the oldest and best-known types of board games are 'abstract strategy board games'. They are given this name because they include a strategy (→ page 104), i.e. a list of moves and counter-moves by the players and because the narrative issue is not a fundamental element in the development of the game. As mentioned before in 1.2, the most famous example is Chess, which is played by moving the pieces which have specific rules

on a clearly outlined game board. **The strategic component is highlighted in the act of taking alternating moves**, a factor that requires not only the construction of a plan by each player, but also the ability to adapt to and attempt to forecast the opponent's plan. Apart from the opponent's strategy, the rules governing the interaction of the pieces, their position and any other information relating to the game are always accessible to the players. Other examples of similar games include the aforementioned game of Go (**Figure 1.3.1**), Draughts and the more recent "Abalone".

In other board games, however, **the narrative issue plays a more important role in the development of the action**. Many of these games have a random component in determining the resolution of events, such as rolling the dice. The simplest and most famous examples of this category are probably "Risiko" and "Monopoly". The extreme importance of the randomness and the scarce strategic component of these games may mean that they are not very engaging for the players. Recently, therefore, two approaches have been developed that attempt to

**#boardgames #tabletopgames #cardgames #tabletop
#germangames #americangames #wh40k #rpg #dnd #larp #pc
#playstation #videogames #vr #ar #gaming**



Figure 1.3.1
Game of Go



The game of “Go”

In a game of “Go” two players take turns placing black and white pieces on a board which has lines and nodes. The object of the game is to completely surround groups of opposing pieces with one’s own pieces. A completely surrounded group of opposing pieces is captured and removed from the board, giving points at the end of the game.

improve this system: the so-called ‘American’ games and ‘German (or European)’ games, a division that has less to do with the place of origin and more with the setting. In the ‘American’ ones, the random component is maintained, but it is often mitigated by having a high number of dice to roll. In addition, they often feature well-crafted game materials, detailed miniatures, complex environments, and direct interaction between the players. On the contrary, the setting of the ‘German’ games is characterised by minimizing the presence and impact of chance. In its place, alternative methods are used to determine the resolution of events, such as auctions or by optimising resource management, with mostly indirect interaction between players.

Direct competition is often a preponderant characteristic in card games whose origins are almost as ancient as board games.

In classic card games, such as Poker or Bridge, concealing what cards you have in your hand while trying to identify those of your opponents is a highly important element: bluffing and the calculation of odds play a significant part here. These characteristics are preserved in more recent card games, such as “Magic: the Gathering” or “Pokemon TCG”, which in addition add typical collecting and strategic deck building elements.

A very different approach is a feature of **role-playing games**. In these games, each player takes on the identity of a character and, through exchanges with other players, creates a narrative space where fictitious events occur.

The special feature of role-playing games is that they have characteristics of a board game, such as the presence of fixed rules governing the interaction between players, and also of play acting, such as the identification and the assumption of a momentary and fictitious identity.

Often they are played in small groups, where one player takes care of being the group coordinator, a figure halfway between a director, a scriptwriter and a game referee. **The closest relatives of board games are ‘paper role-playing games’, the most famous example of which is the fantasy game “Dungeons & Dragons”.** In these games the specific abilities of the characters and their various possible interactions are described by detailed rules, and often also by random components such as dice rolls, while the construction of the characters’ identity and their interpretation are left to discussions between the players and the narrative description. In contrast, in ‘live-action role-playing’ (often abbreviated to LARP) much more freedom is allowed in interactions, which often act like the characters portrayed, rather than just describing their behaviours. In this perspective, there is greater attention paid to the acting side, also through the use of costumes and “props”, such as foam swords and period clothing.



VR promises to revolutionise the way we approach virtual games.



Finally, we should remember the important role played by video games, whose market annually exceeds that of the combined music and cinema industries (see 4.1).

Rather than representing a specific type of game, the salient feature of video games is the means through which they are played, i.e. the electronic support of a computer, a console or a smartphone.

This particular aspect offers considerable advantages: computing power means that one can disengage from the need for a physical support, making it possible to simulate both the game material and the behaviour of virtual opponents. Access to internet makes it extremely easy to find other players for those who prefer to share experiences with other people, without being tied to particular geographical needs. Furthermore, the continuous development of new technologies allows game producers to expand their experimentation as regards the types of media and their expressive potential: **in this sense, the possibilities offered by forms of ‘extended reality’, such as VR (virtual reality) and AR (augmented reality), are generating considerable interest.** Most of the types of games discussed above also have examples in video games, so much so that until a few years ago some predicted a definitive decline of physical games with respect to virtual ones. This is not the case at the moment and now the division between the former and the latter reflects characteristics of complementarity, rather than direct competition.

1.4

Digital games and analogue games

contribution by Alan D.A. Mattiassi



Alan D.A. Mattiassi
PhD, psychologist and researcher working on games. He currently holds a research grant at the University of Florence and is Game Science Lead at FEM.

#analoguegame #digitalgame #videogame #gameplay #metagaming
#experience #perception #manipulation #mediation #screen
#boardgame #viewing #sensation #interaction #medium

In recent years, when we talk about games we tend to identify a specific type: that of the digital game, or video game. It is true that this form of entertainment has had the most significant growth of all: it only entered the public domain in the 1980s and managed to surpass the revenue of the Hollywood and music industries in just thirty years. However, **it is equally true that analogue games are also experiencing their Golden Age**, with a continuous increase in board games produced per year, card games with a thriving market and role-playing games in continuous development and growing popularity (including gamebooks, a genre that saw a brief success only in the 90s).

If, as seen in previous chapters, the search for a definition of 'game/gaming' has not yet reached a consensus, even the definition of what a video game is creates further problems. For the purposes of this report, a simplification will be applied, defining a video game as a game (therefore a subset of games) that is played through the use of a screen that depicts its elements that exist solely in a virtual world.

Although this is a non-exhaustive criterion due to the existence of non-visual forms of digital gaming, it remains a central factor in many definitions and describes almost all video games on the market today.

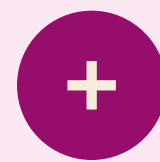
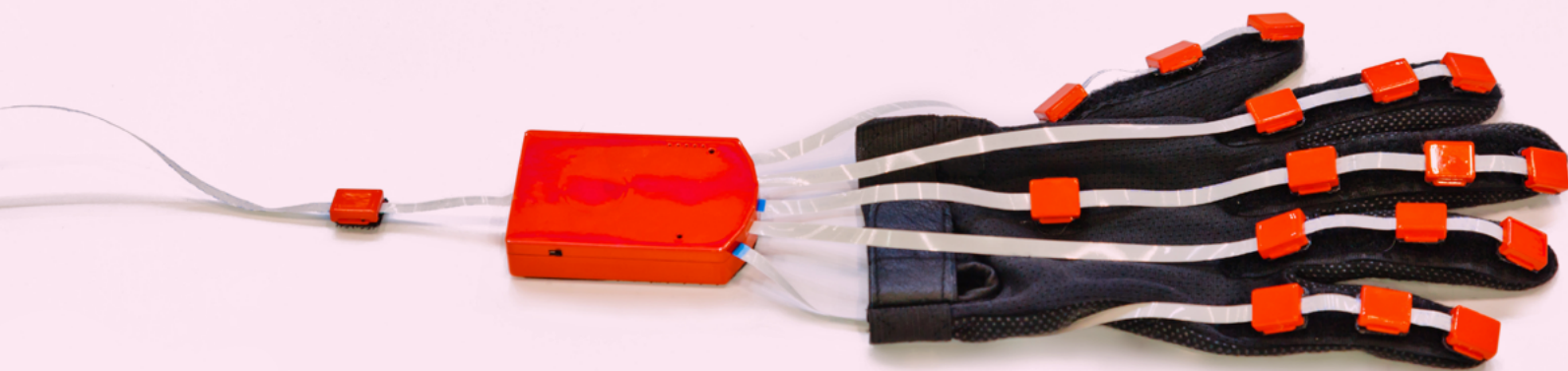
In its existence as a game, the video game inherits some features of the latter: they are both activities that require the player to interact within defined rules towards a playful objective, investing a share of mental and possibly physical commitment, whose outcome has a significant impact on the actual achievement of that objective.

The general structure that determines inclusion within the "games" category is therefore also present in video games. But are there any macroscopic differences? At this point, we would like to investigate some of them, in terms of interaction, gameplay (→ page 103) and metagaming (→ page 103).

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With the development of haptic peripherals for virtual reality, it will also be possible to obtain a tactile/pressure sensory feedback of virtual elements.

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Gamebook

A gamebook is an interactive book which allows the players to choose the development of the story by deciding between some possible alternatives. The reader follows some playful mechanics to build the main character of the book. The most famous gamebook in the world is Lone Wolf by Joe Dever, illustrated by Gary Chalk.

Interaction

The first and perhaps most obvious difference between analogue and digital games is the way interaction takes place. In analogue games, the elements of the game can be manipulated manually, whereas in digital games this manipulation can only happen indirectly, through peripherals such as a mouse, keyboard, joystick, pad and so on. With the development of touchscreen technology, however, we can observe “perceptually direct” manual manipulation of the virtual elements, since the spatial correspondence between the input device and the position of the graphic element in the game is perfect for the player. Furthermore, with the development of virtual reality, augmented reality, and mixed reality technologies, we are witnessing manipulation of the virtual elements in which the spatial correspondence is located in an immersive three-dimensional environment, which perceptually surrounds the player and replaces or overlaps the space around him/her. With the development of haptic peripherals for virtual reality, it will also be possible to obtain a tactile/pressure sensory feedback of virtual elements, further simulating the manual manipulation found in analogue game.

Technological sophistication has a very specific objective: to simulate natural interaction. The current difference in the interaction with the game elements between a digital and an analogue game, therefore, is a difference linked to the approximation with which we can create an illusion of natural interaction.

Gameplay

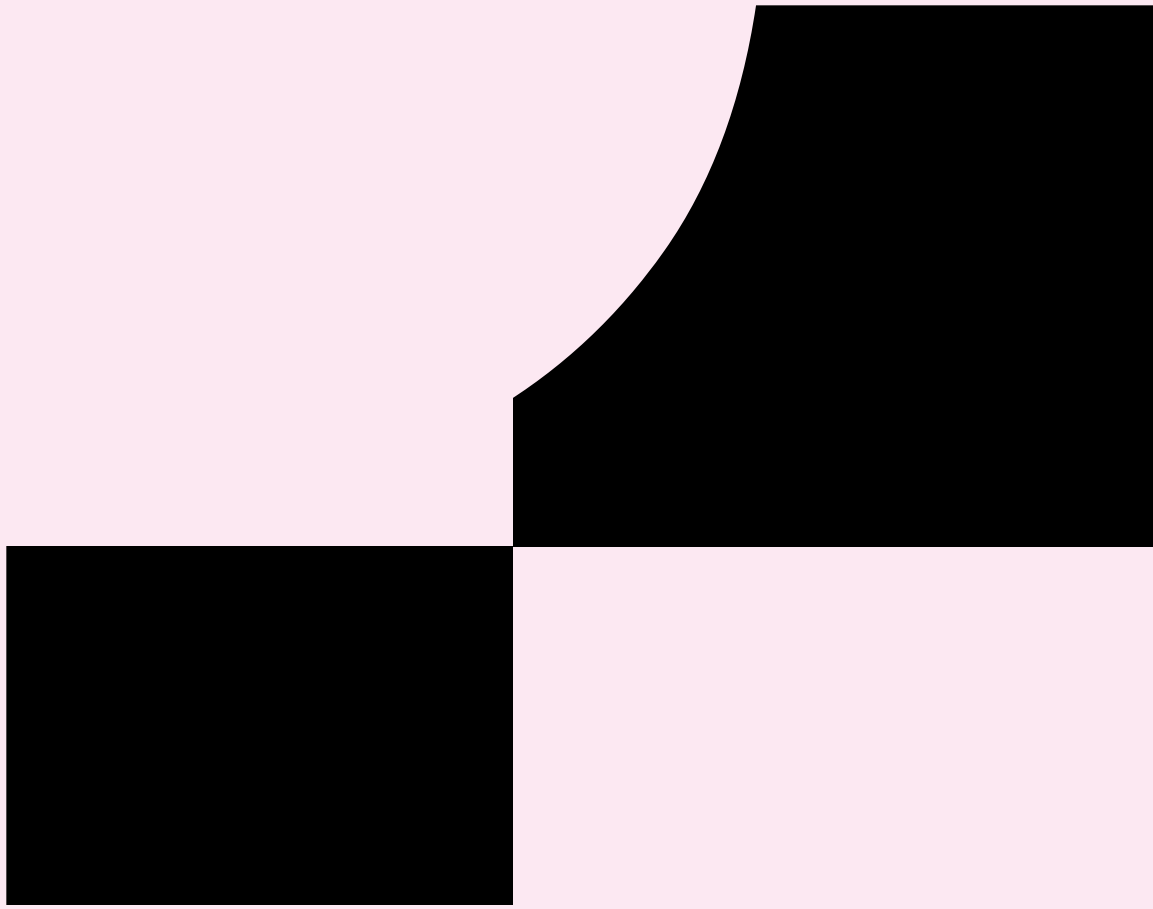
‘Gameplay’, which consists of the player’s interaction experience with the game, is affected by a series of intrinsic characteristics of the two mediums - analogue and digital - which set limits and create possibilities.

A first interesting aspect is the relationship with rules. Digital gaming places real limits on what the player can do: you cannot push beyond a certain boundary, you cannot climb a mountain, you cannot run faster than is permitted, the available time ends, etc. These are not limits on which the players agree: they are, on the contrary, limits imposed by the designer (or by the hardware). While they cannot be changed by an agreement between players in a digital game, the rules of an analogue game can.

The rules in digital games and analogue games are equally stringent, but in analogue game you can create new rules with a simple agreement, while in digital games you cannot create new ones, and the final word remains with the game designer.

The second relevant aspect is that many analogue games, like almost all board games, card games, and tabletop versions of RPGs, are “mind” games. What do we mean by this? That the cognitive processes of planning, strategy and tactical calculation, game theory and Theory of Mind (→ page 104), and so on, are central elements, compared to those processes which involve keen motor skills or eye-hand coordination. Conversely, the latter are often fundamental when playing digital games.

Traditionally, in fact, video games require the player to have



Theory of Mind

The Theory of Mind is the ability to understand other people by attributing to them emotions, mental states or intentions.

The name derives from a possible explanation of this ability: human beings perhaps are able to form a theory about the functioning and contents of other people's minds.

keen motor skills, usually manual skills, and a very high precision in terms of coordination.

Both digital and analogue games require a great deal of mental processing, but in digital games this processing is mostly linked to an adequate motor response in terms of timing, while in analogue games the mental load is more linked to processes of planning and strategy.

Metagaming

A third point of difference between analogue and digital games relates to all that happens around the gaming session. This is probably one of the least considered factors, but in areas such as Game-Based Learning or the sociological analysis of game-playing it becomes an extremely important subject of research and study.

How is a game organised with friends? What access do people have to the game at all times? With what other people is the game played? All of these questions are unconnected to a design analysis of a game, but they have a profound impact.

Today there are games on the market characterised by the presence of “persistent worlds”, i.e. virtual worlds that exist whether or not the player is actually playing. They are worlds that have their own operation and advancement regardless of the presence of users: when someone wants to play, they connect to that world and interact with it and with the other people connected to it. All you need is an internet connection.

On the other hand, we have games in which devices are essential elements in the game and in order to play it, physical interaction with other people who want to play is required. Accessibility to the game supplies and the energies required outside the game in order to take part in it are closely, and inversely, linked.

The differences between digital games and analogue games therefore involve a different kind of access to these two modes.

In conclusion, analogue games and digital games are two differently organised forms of the same phenomenon, each with its peculiarities that determine a typical use. The evolution of gaming and of its various forms is associated with technological and cultural progress.



1.5

Games surveyed through a neuroscientific approach

contribution by **Dario Menicagli**



Dario Menicagli
PhD, researcher in Psychology and Neuroscience at the IMT School for Advanced Studies Lucca. Psychologist, researcher in the field of social interaction and architecture of choice.

Developments in Neuroscience have revolutionised the study of individual cognitive abilities, especially since the 1990s, during the so-called “Decade of the Brain”, in which neuroimaging techniques were developed, such as high-density electroencephalography (EEG), positron emission tomography (PET) or brain magnetic resonance imaging (fMRI), which allow users to visualise and measure what happens in the brains of individuals engaged in experimental tasks, created specifically to ‘activate’ their mental functions.

Thanks to these methods, we have not only been able to ‘map’ perception and cognitive functions, such as memory or language, but also **expand the research into the neurobiological bases to the more complex and subjective aspects of our emotions and social life.**

With regard to our topic of interest - the investigation of more complex cognitive functions, such as problem solving or decision making - it has represented a methodological challenge ever since the birth of neuroimaging (→ [page 103](#)): if, on the one hand, it was necessary to maintain a

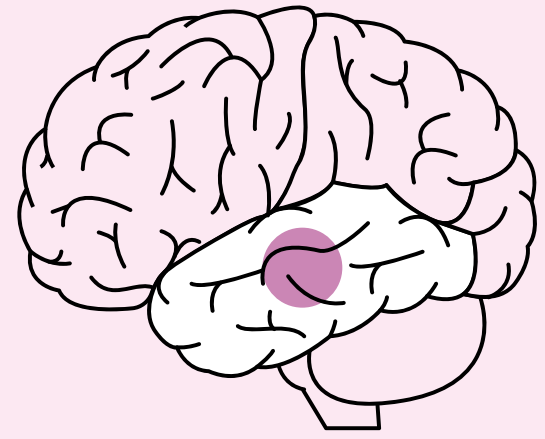
simplified approach, in order to be able to propose tasks during an experiment, it was equally necessary to build fairly well structured experimental designs, capable of making the results obtained in the laboratory comparable with the various forms of reasoning in real life. The use of games, in particular Chess, immediately proved to be a useful study tool for assessing the different difficulty in the cognitive tests used (e.g. ability to visualise strategy and planning) or to compare experienced and novice players so as to evaluate how much experience and training actually affect individual performance.

Since they are similar to small logical or mathematical problems, Chess and other traditional abstract games represent an example of how it is possible to use play activities as a tool for understanding human cognitive mechanisms.

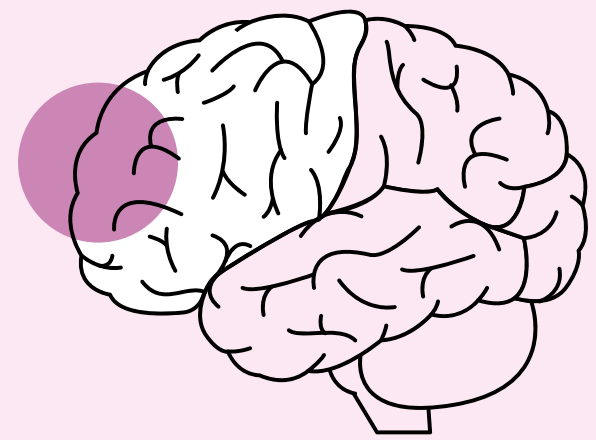
**#neuroscience #videogames #chess #experimenting
#lobofrontal #brain #psychology #cognitive #checkmate
#actiongame #tetris #callofduty #biological**



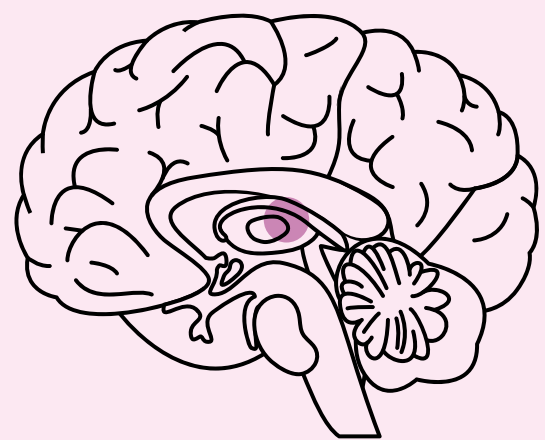
Occipital and parietal cortex
visual processing of the patterns
of the pieces



Temporal cortex
memory recall of the various game
strategies and learning them



Prefrontal cortex
choice between the strategies
to be undertaken



Caudate nucleus
activation of the previously learnt
patterns of play



**Posterior cingulate cortex,
prefrontal areas, angular gyrus**
Default Mode Network

Figure 1.5.1
Brain areas and functions
engaged when playing
Chess

**The exploration of the neuro-cognitive bases
of game-playing through the variants of Chess**

In a pioneering 1994 study conducted by Paolo Nichelli and colleagues, a sample of expert Chess players challenged themselves to recognizing the best moves with respect to certain configurations of the pieces on the board, while their brain activity was being visualized with a PET scan. The complexity of the experiment required the participants to be involved in the various game sessions via a monitor placed inside the PET scanner, while the machine globally mapped their brain activation in relation to their decisions. The results showed a **generalised activation of the various brain regions**, confirming the simultaneous use of multiple processes, **from visual perception, to spatial processing, procedural memory and also the processing of simultaneous strategic solutions.**

The occipital and parietal regions of the cerebral cortex (→ page 102) are in fact engaged in spatial visual processing, the medial temporal cortex and the hippocampus in recovering the rules, but they are the prefrontal regions, the most advanced parts in our brain, that elaborate the strategy and then plan the moves.

The subsequent development of more advanced and non-invasive neuroimaging methods, such as the fMRI, made it possible to monitor in more detail the activity of the individual regions of our brain, identifying with greater temporal and spatial precision the involvement of specific cognitive functions during game phases and to evaluate how these differentiate the skills of the various players. According to these studies, professional chess players mainly recruit areas of the frontal and parietal lobe, usually

involved in visual research and in the subdivision of the information available to them in simplified formats (a process known as ‘chunking’). Less experienced players, on the other hand, also demonstrate an involvement of the temporal lobe areas, dedicated to learning and recalling stored information, in an attempt to identify a pattern to be followed during the game experimental testing. This difference demonstrates how the **level of experience influences the recognition of previously learned ‘patterns’ and the more effective manipulation of available data**, a process that occurs in different types of games and that also applies to real situations, when we need to choose between different solution paths for a problem that has already been addressed.

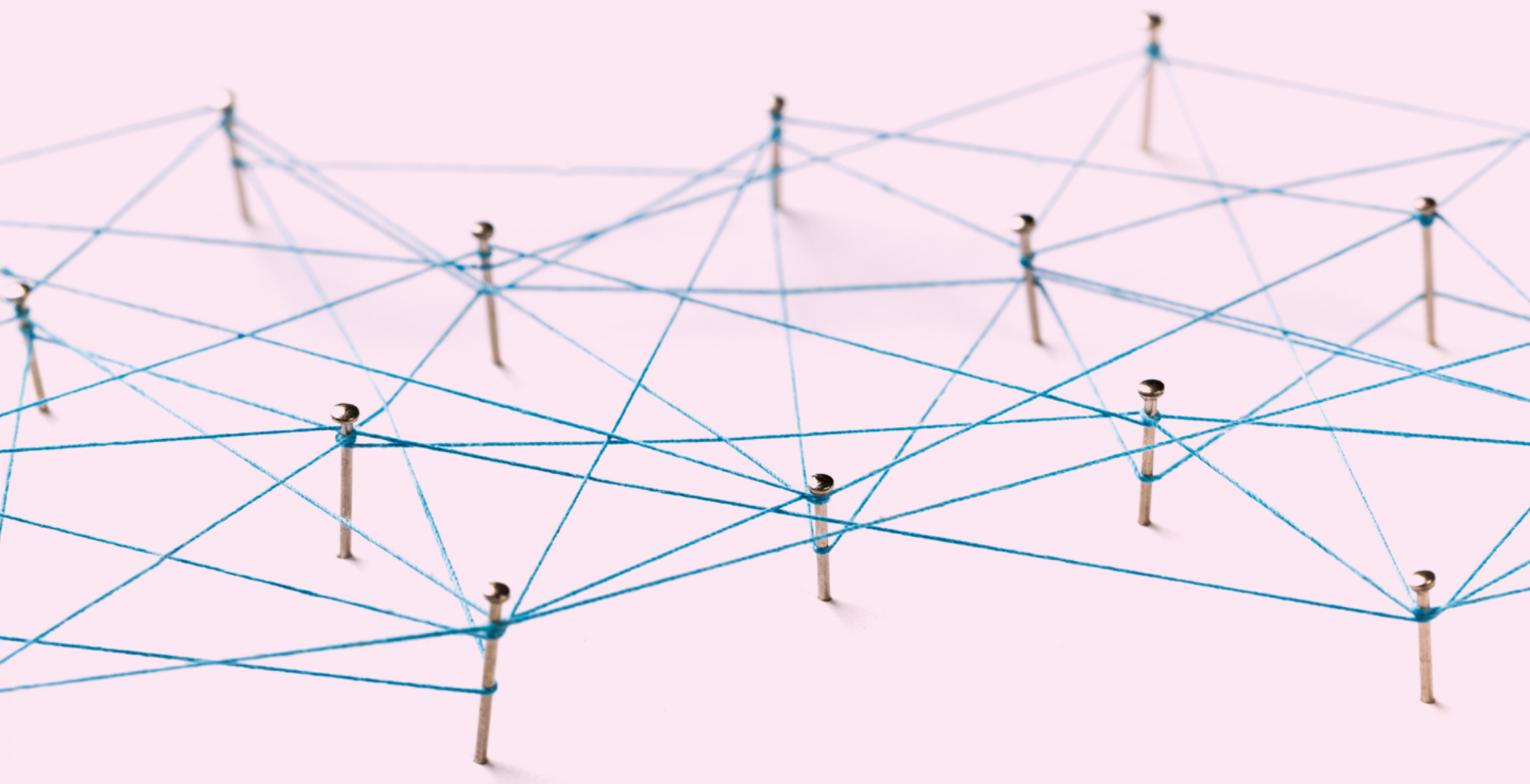
A deeper understanding of the complexity of a player’s brain can also be seen by examining the interaction between his/her brain regions during and after a challenging move, in particular by investigating the behaviour of a network of areas, defined as “Default mode Network” (DMN → page 102). The characteristic of the DMN is to activate itself during the rest time following a cognitive test, when we are not engaged in any exercise, and rather remain inactive when the other areas of the brain are collaborating for a specific task.

During a series of decisions regarding the strategy to be adopted in Chinese chess, expert players show a brain activation similar to that of novices, with the involvement of the same regions relating to attention and control of information.

“

An ‘expert’ brain makes the best use of its resources and manages to strengthen, also structurally, the communication between the areas involved in playing the game.

”



Everything changes, however, if we observe the network of areas of the DMN, which demonstrate a more marked de-activation in master players during experimental testing. This greater ability for silencing specific areas during the solving of a game problem demonstrates **a more efficient allocation of cognitive resources and less effort in finding the solution by chess masters that is detected via the reduced involvement and reduced interference of the DMN**. An expert player, therefore, knows how not to waste their ‘brain resources’.

However, it should not be assumed that decision-making processes are fully conscious in experienced players. In a study based on a time trial with the Japanese version of chess, “Shogi”, one can also note in professional players an activation of even deeper brain structures linked to the association between visual stimuli and automatic response patterns.

We can therefore assume that expert players do not base their game plan on the representation of a successive linear sequence of moves but, especially in so-called quick ‘checkmate’ problems, they sense a general pattern of resolution in which they then select the path to take.

But the specific characteristics of great Chess masters can also appear contradictory: the areas of intersection of the occipital-temporal junction, assessed through structural magnetic resonance, are smaller in size than those of non-experts, and they also have a specific architecture of the white matter, i.e. the fibres that connect neuronal cells to each other. These morphological peculiarities are a

feature of the brain portions involved in the management of perception and attention. A possible explanation could lie in the specialisation that these areas acquire in chess champions: in fact the brain form and connection are in proportion to the number of years of play and are even influenced by the ELO score, i.e. a classification of chess players that is used in tournaments and official competitions. As we said before, **an ‘expert’ brain makes the best use of its resources and manages to strengthen, also structurally, the communication between the areas involved in playing the game.**

Video games as an evolution of the relationship between playful practices and Neuroscience

The advent of video games made it possible to offer individuals involved in experiments a broader and more detailed interaction with the game context, making their experience even more engaging and profound than in the abstract games used in previous research. The combination of neuroscientific methods and the study of expert video gamers has allowed us to understand that the greater complexity of these forms of play enables the development of multiple cognitive systems, but also of affective and social functions, depending on the type of video game used in the study. If cognitive aspects are taken into consideration, the ability to shift one’s focus of attention and control of the resources involved during a game are examples of highly developed skills in all gamers, but **action video games (“Call of Duty@”)**, for example, are the ones that contribute most to developing the flexibility in modifying one’s strategy in real time, because they train us to make decisions in a matter of seconds.



The possibility of creating a more sensorially vivid and reactive virtual environment facilitates the development of an emotional bond with the contents in video games.



How does Space Fortress work?

Visuospatial skills (i.e the recognition and representation of figures or spatial paths) are highly developed, on the other hand, in players who prefer **puzzle video games (“Tetris”) and exploratory video games (“Assassins’ Creed®)**, showing an involvement of the processes of visual coding and place memorisation, within the hippocampus, similar to those occurring in expert taxi drivers or those who memorise detailed maps in their professional work. Then there are video games like **“Space Fortress”** specifically programmed to test the cognitive load of players through the achievement of objectives of increasing difficulty and the management of visual stimuli.

Although games of this type are based on the reaction times and speed of the participants, training and experience seem to trigger the same brain responses as those described in professional chess players, with a restricted, and therefore more efficient activation in the areas of the dorsolateral frontal cortex.

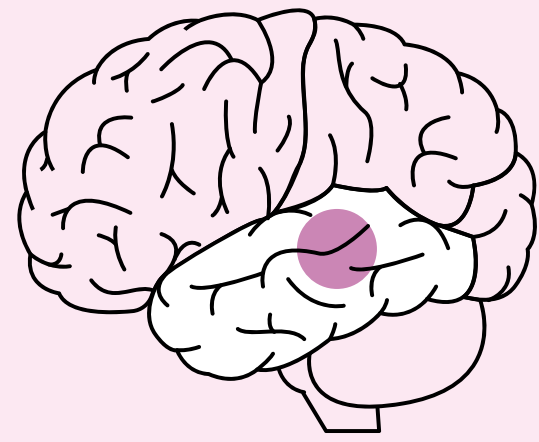
The extreme versatility of these new forms of play means that apps and software for educational purposes can be created, thanks to the ease with which many participants can be reached and the ability to accurately evaluate their results. Precisely **from the synergy between educational aims and video games, a number of projects based on the contribution of Neuroscience have been developed, such as those created by Neuroscape**, in particular the game called ACE which aims to train the control functions of players, those skills that are so important in chess and in planning decisions.



ACE a game created by Neuroscape

Due to the interactive nature and the identification guaranteed by video games, it is also possible to study an important component of the gaming experience, which had previously been excluded from our analysis: the emotional reactions and affective involvement of the player. **The possibility of creating a more sensorially vivid and reactive virtual environment facilitates the development of an emotional bond with the contents in video games.** The impact of the context on the subject’s performance is such that only a few elements need to be added to the setting to transform an aseptic cognitive exercise into a form of learning based on game-playing, which **stimulates the participant’s amygdala (→ page 102) and tegmental areas** which are assigned to affective processes, thus improving their results especially in children.

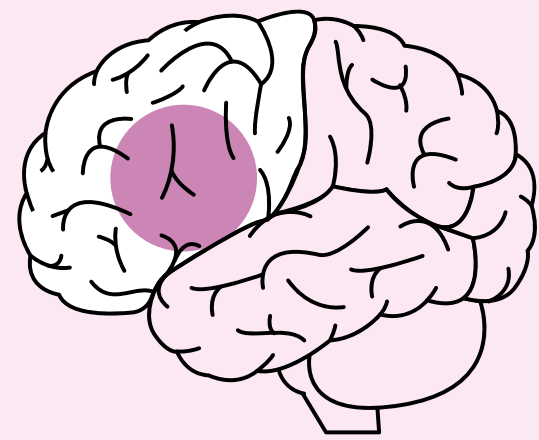
The real-time feedback of video games and the complexity of the scenarios are therefore the fundamental elements that engage the gamers in front of a screen, thanks to the **stimulation of the limbic, striatal and dopaminergic systems that are highly sensitive to the emotional rewards and incentives we receive during games.** This same network of areas is also involved in the neural responses in forms of pathological gambling and behavioural addiction, so much so that it prompted the American Psychiatry Association to coin the term ‘Internet Gaming Disorder’ (IGD) to designate **compulsive forms of attachment to video games.** However, this definition and classification is considered controversial by researchers, especially since neuroscientific analyses show very different characteristics in professional gamers compared to those who show symptoms of IGD. The difference would seem to concern the morphology of the areas of the gyrus of the cingulate and of the thalamus, which in subjects with IGD



Hippocampus
activated in exploration games
and to store and recall previously
learned spatial information



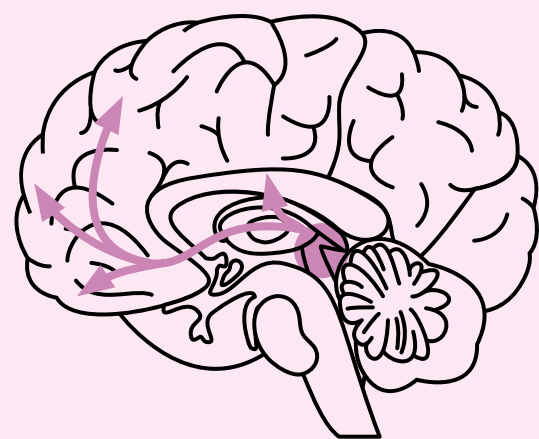
Dorsolateral pre-frontal areas
action planning and control and cognitive load
in action and strategy games



Medial pre-frontal areas
management of the sensory stimuli
in the virtual environment of action games



Amygdala and limbic system
reaction and evaluation of emotional
stimuli related to the environment
and the themes of the game



Dopaminergic system and locus coeruleus
management of the gratification systems found in
the game and involved in the state of “flow”

Figure 1.5.2
Brain areas and functions
engaged by video games

could relate to a greater impulsiveness and a persistence in errors related to the calculation of the probability of victory and reward.

The effects of ‘gaming disorder’ seem to be linked above all to the pervasiveness that video games can exert in the lives of children and adolescents, occupying the time and taking the place of players’ other daily activities.

These risks derive from the potential of video games to represent a context of experiences and emotional stimuli that goes beyond the simple play interlude for those who use them. Among the most popular video games currently, those that involve entire communities on the web, for example, allow gamers to experience social interactions, forms of gratification and challenges that can compete with those that gamers experience in real life. Video games, especially when conceived as commercial products, are also designed to offer a system of rewards and entertainment strategies that aim to create a game routine to which the younger population groups are especially susceptible. However, these risks can be prevented, precisely by sharing the interest that children and adolescents have for these forms of playing and managing with them the time dedicated to such activities.

If on the one hand, therefore, video games are able to trigger an intense emotional response in those who use them, due to their peculiarities, they are also a perfect means to train control over the stability of emotions and mental state during demanding tasks. It would appear, in fact, that video games can facilitate the experience of ‘flow’ (→ page 102), a particular condition of commitment during a task that perfectly balances the difficulty of the test with the skills of the individual, making the execution of the activity pleasant and causing the player to lose all track of time. The oscillation between this state of concentration, boredom, or the excessive difficulty of the task, can be modulated precisely thanks to the programming of the typical progressive level of challenges in video games, making it possible to assess and to train the brain areas involved through ‘neuroimaging’ techniques.



It would appear that video games can facilitate the experience of ‘flow’, a particular condition of commitment during a task that perfectly balances the difficulty of the test with the skills of the individual.





Research based on behavioural evidence confirms that training with board games and video games has a real impact on people's abilities and even improves their performance during intelligence tests based on deductive skills and cognitive flexibility.



"Video games are damn good for your brain, says science"

Games as a bridge between cognitive abilities and individual learning

Neuroscientific surveys and analyses demonstrate the importance of games as an activity not only for entertainment or recreation, but also as tasks that engage our global intellectual and motivational abilities, promoting learning and the acquisition of new skills. The brain data we have described shows how mastery in a playful context is largely based on the **involvement and development of what are defined as 'executive functions'**, that is, those systems that deal with control and coordination and lower-order cognitive processes, and which in real life are **employed in assessing and implementing our choices**. Research based on behavioural evidence also confirms that training with board games and marketed video games has a real impact on people's abilities and even improves their performance during intelligence tests based on deductive skills and cognitive flexibility, such as Raven's Progressive Matrices, thus giving further support to the observations in Neuroscience. Similarly, the potential for involvement and the emotional impact of some forms of gaming can be exploited to strengthen the learning processes conveyed through them, making training activities but also the performance more effective.

Neuroscientific research has so far used and adapted various forms of play to test our superior abilities, taking for granted **the value that game-playing has as a complex activity for human beings** and trying to decode its biological component.

In addition to the challenge of making these results that link individual abilities to specific games and specific brain areas more accurate, it would now appear necessary and fascinating to do more in-depth research into what the essence of the playful experience itself is equivalent to, thus giving dignity to this universal activity as a main object of research and not as a mere investigation tool.

Game-playing, in fact, represents a unique human practice, which intertwines cognitive and affective elements albeit in a space defined by rules and the player's behaviour. Being able to investigate the peculiarity of this dimension through Neuroscience means grasping the biological basis of an exclusively human cultural product.



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2.

**Learning,
gamification, strategy**

In the first chapter the linguistic and terminological bases were laid, while in the second chapter our real “journey” in the world of gaming begins, developing the theme in the various study categories that it is made up of.

To guide our journey through the chapter we will rely on three keywords, linked together through gaming:

- learning;
- gamification;
- strategy.

When **game-playing and learning** are combined, the direct reference goes to Game-Based Learning, which means the “discipline that studies and applies game-playing in the educational field and the resources that playful activity can offer as a tool for learning” (Nesti, 2017; see 2.1).

Learning with reference to the field of playful activity, is the use of games not only in the didactic and educational field, but also in the field of training, thanks to the ability to increase motivation so as to learn and improve cognitive skills (see 2.1 and the interview with ludologist Andrea Ligabue).

One of the tools that Game-Based Learning can use, in addition to the actual design of games, is **Gamification**.

Gamification means the use of game design elements in contexts other than gaming to achieve a certain goal. A typical use is that of shopping points in a supermarket or scores in fitness apps, for example: gaining awards (badges) or bonuses and climbing public rankings helps to maximise one’s commitment in an activity and allows you to achieve higher and higher goals, with greater involvement (see 2.2).

The last keyword in this chapter is ‘strategy’, i.e. the study focus of Game Theory which is the discipline that studies human behaviour in abstract situations, called ‘games’. The study of the strategic aspects of games is fundamental to understand how people behave and what psychological mechanisms they make use of, when they have to make choices and make decisions (see 2.3).

Finally, the chapter will deal with the theme of **Game Science**, an umbrella containing all the other disciplines and whose aim is to analyse games from a purely quantitative point of view, that is by collecting data and analysing it statistically so as to reach considerations that may be generalised to all games (see 2.4).

2.1

Game-Based Learning. Learning, assessment and games

contribution by **Liliana Silva** and **Andrea Maffia**



Liliana Silva

Researcher at the COSPECS of the University of Messina. She focuses on assessment within the educational sphere, mainly through the use of board games and role-playing games.



Andrea Maffia

Researcher at the Department of Mathematics of the University of Pavia, he focuses on studying the process of teaching/learning Mathematics.

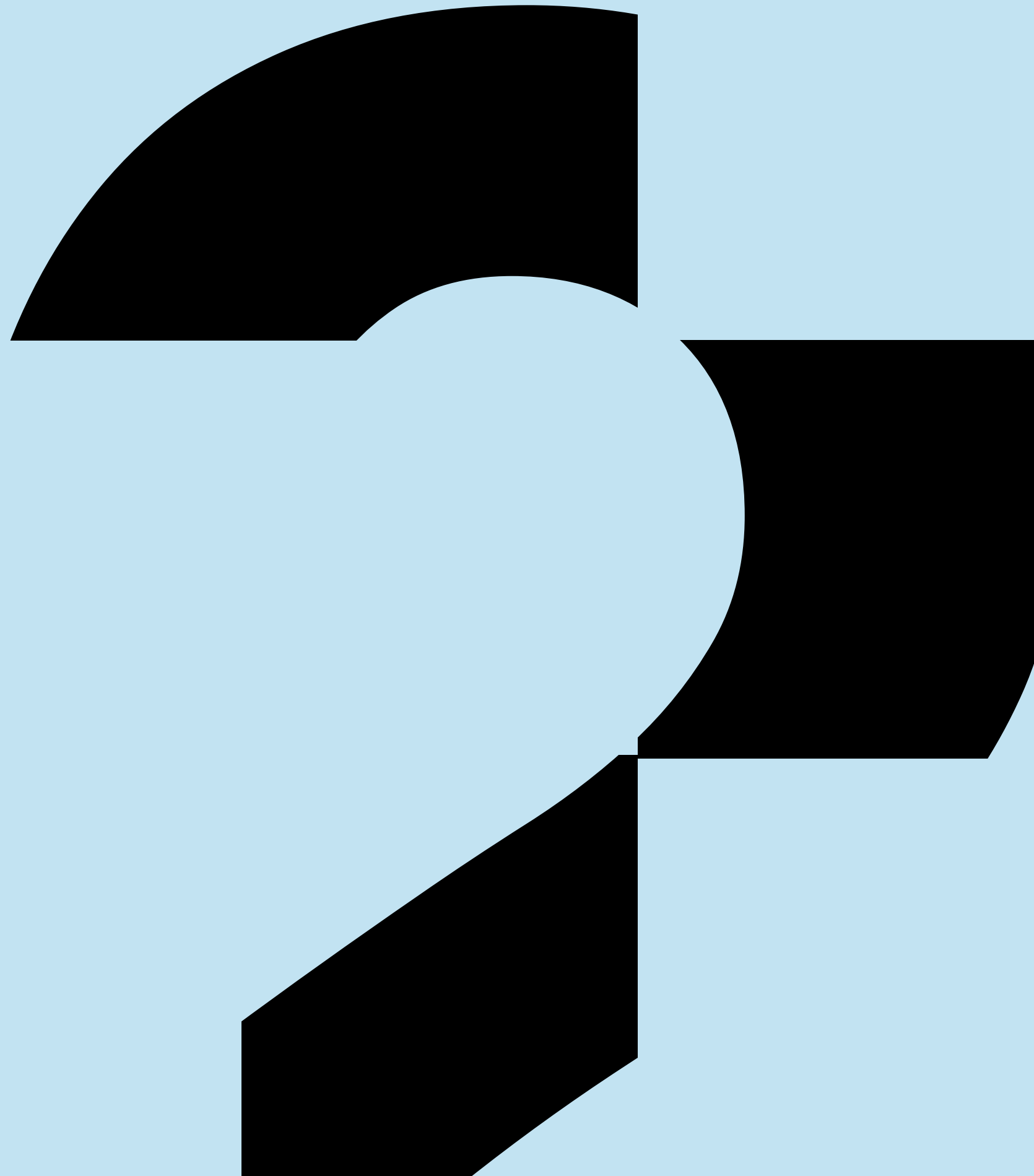
Game-playing - as the Dutch historian and linguist Johann Huizinga also stated in his famous book “Homo ludens”, published in the 1930s - is at the centre of every pre-cultural phenomenon and the social organisation of different cultures. Precisely for this reason, education, as a form of construction and development of individuals and society, cannot avoid, even in our daily life, having some reference to **game-playing as a tool for learning and relating**.

The concept of game-playing combined with that of learning is not a new idea; however, it has only been in the last few decades that it has acquired dignity and seriousness in terms of education when relating to children, and even more recently it has also become a useful tool for the acquisition of skills in the world of work.

Maria Montessori, for example, was among the first to recognize and highlight the importance of play, so much so that she associated it with actual work, to enhance its proper importance: playing is a child's job.

Within the playful and educational context, the concept of **Game-Based Learning (GBL)** takes on particular relevance, as it represents the use of the game-playing as a real methodology and model within the teaching/learning process. Some forms, such as ‘gamification’ (see 2.2 in this regard), i.e. the use of ‘game-design’ techniques in non-playful contexts (such as in business and marketing), have assumed particular importance in the processes of learning, with the aim of encouraging - especially via the most up-to-date technologies - success and competition through a playful approach.

**#gamebasedlearning #playful #gamebased #educate #learn #space
#metaphors #assessment #curriculum #didactics #mathematics
#wellbeing #skills #improvement #learning #school**



In his book “Esperienza e valutazione” (“Experience and assessment”) of 1958, the pedagogist Aldo Visalberghi developed a fundamental distinction to understand the educational role of play: **‘playful activity’, i.e. an activity whose aim is fun, and ‘play-shaped activity’, where the purpose and aim are learning, education and the acquisition of skills.** If we start from the experience of game-playing, it is therefore possible to structure training activities that do not exclusively entail the involvement of a school or childhood context.

Game-playing thus becomes a “serious thing”, as for example the scholars Winnicott and Bateson define it, as it involves the individual in their entirety within the so-called ‘flow’, a state of equilibrium between the required commitment from the test and the skills of the individual, a moment of great attention and concentration, in which challenges and learning are experienced at the same time.

The elements that emerge from consolidated literature as characterising game-based processes are the following:

- support and motivation for learning;
- the acquisition of notions or skills through experiences that produce pleasure (‘playful’ activity);
- the authenticity and awareness of one’s own learning processes (with the transversal skill of learning to learn that is also encouraged at an intentional level);
- the improvement of confidence in one’s abilities / skills and self-esteem;
- experimentation, i.e. the possibility of having direct experience of the game itself.

An important role, within these processes, is played by certain elements that are combined with effective learning, i.e. motivation, the encouragement of self-assessment as a tool for self-regulation and the use of feedback, which derive from the game itself. or from those sharing the game. These aspects allow us to introduce another side of teaching/learning, the theme of assessment.

In the field of playful activity, **assessment means ‘assessment as learning’, that is, not a form of feedback as an end in itself, but a comment that, at the same time, enables learning.** This approach allows game assessment processes to be activated that respond to its improvement-based function, supported precisely by motivation and the ‘flow’, the context within which this balance also responds to the need of not being judged.



If we start from the experience of game-playing, it is possible to structure training activities that do not exclusively entail the involvement of a school or childhood context.





“

Making boys and girls play with linear board games can improve their counting ability, the comparison of different numbers and the ability to estimate quantities.

”

GBL can be applied to various teaching and training contexts: it can in fact become a **useful tool for learning disciplinary skills**.

For example, game-playing can be the main tool for discovering applications of abstract concepts. The “Indicazioni Nazionali per il curricolo” (“National Instructions for the Curriculum” - a document of the Italian Ministry of Education that gives general, but also specific, instructions to all schools in Italy, from infant school to lower secondary school, regarding the construction of the school curriculum), updated in 2012, maintain that game-playing should be used in primary school maths teaching. Various authors have been involved in designing **board games and video games to support the learning of mathematics**, but we know that even simple traditional games can provide an excellent context for developing numerical skills.

Some US researchers (Ramani & Siegler, 2008), for example, have shown that making boys and girls play with **linear board games** (such as “Snakes and Ladders”) **can improve their counting ability, the comparison of different numbers and the ability to estimate quantities**.

However, the same authors noted that games with a circular (rather than linear) path are not so effective. This suggests that one needs to pay attention to the choice of games based on the abilities/skills on which we aim to work. For example, a traditional game such as “Shut the Box” lends itself to assessing a child’s ability to represent the same number through various sums, while other dice games are not so effective.

Several games are created with explicitly didactic or educational purposes; the challenge for teachers and trainers is to be able to identify games that are also widespread on the market as useful for the playful context and which can actually also be used as game-based tools.

These games enable pupils to internalise more effectively both the disciplinary skills and the so-called transversal skills, which need to be assessed by the school at certain moments throughout the pupils’ school career. These skills exemplify the importance of lifelong learning, which allows students to acquire skills that they can exploit not only in formal contexts (firstly at school and then in their profession), but also in informal and non-formal contexts (‘lifewide learning’). This perspective enables **games to be used as a tool aimed** not only at learning content, but also **at social well-being based on relationships** and on the possibility of living cooperative experiences (or competitive challenges) that put one’s skills to the test at any age.

Games as an educational tool

interview with **Andrea Ligabue**



Andrea Ligabue
Game expert with ten years' experience in playful teaching. Artistic Director of Play - Festival of Play and member of the scientific committee of the GAME Science Research Center.

Andrea Ligabue is a ludologist and author of the book “Didattica Ludica” (“Playful Teaching”) for Erickson. He is one of the leading Italian experts in the use of games as an educational tool, mainly for the development of cognitive skills. For many years he has taken structured game-playing into schools for skills education and teaching.

What cognitive skills can be trained through game-playing?

Undoubtedly all those that rely on **executive functions, that is problem-solving, critical sense, analysis**. Games stimulate and train **attention capacity, work memory** (→ [page 103](#)), the ability to take effective decisions, entrepreneurial spirit and independence. By designing the right teaching setting with games, one can work on **metacognition** (→ [page 103](#)) and on analysis.

Can you recommend some games that are useful for starting to train cognitive skills?

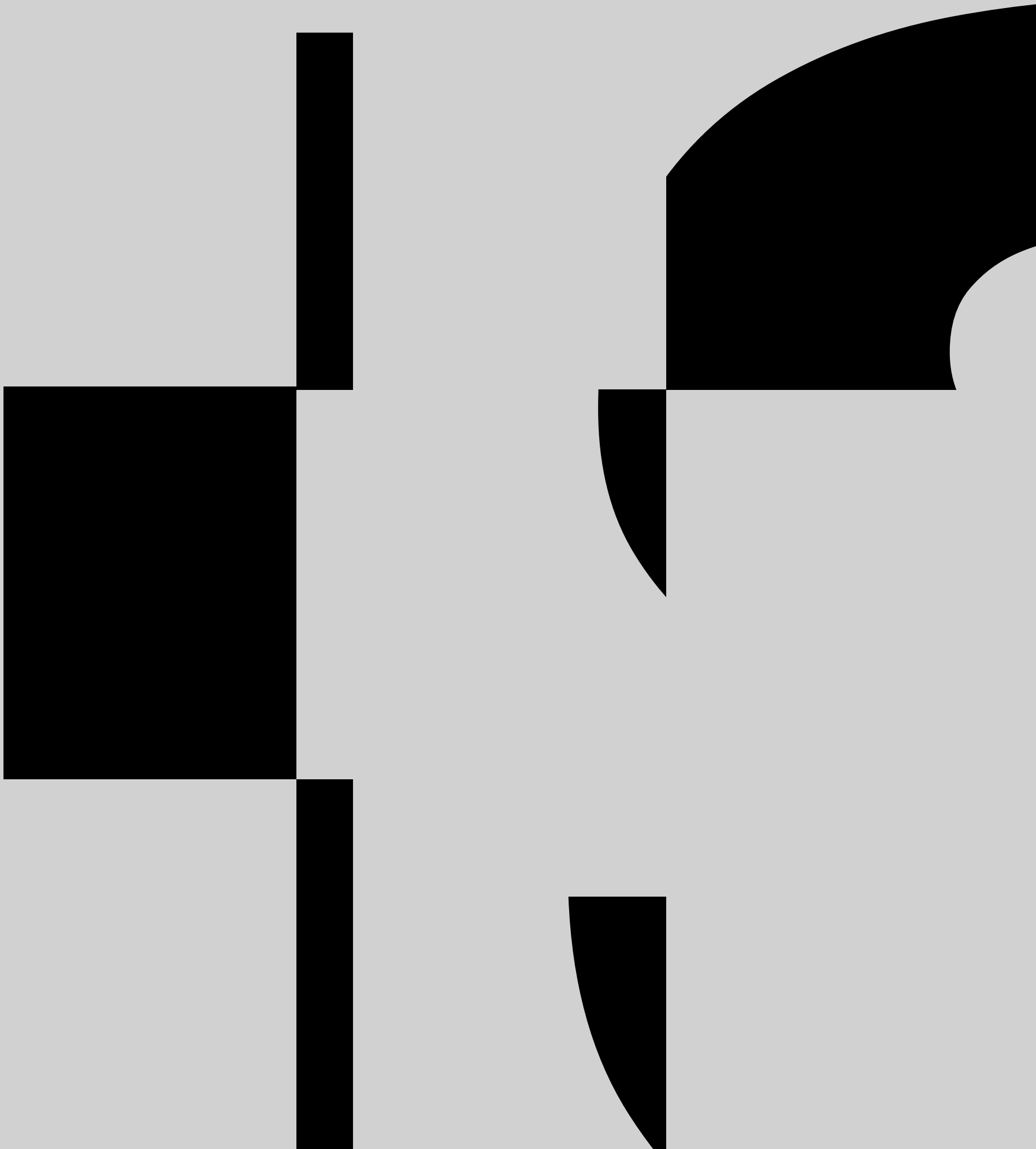
Some games that I have often used to good effect are “Jamaica”, “Ticket to Ride” and “Stone Age”. Each

of these games places students in front of decisive choices and they require and stimulate the students' problem-solving and analytical skills. Going into secondary schools I have also used “Alta Tensione” (“High Voltage”) and “Coloni di Catan” (“Settlers of Catan”) which generate more complex dynamics.



Games stimulate and train attention capacity, work memory, the ability to take effective decisions, entrepreneurial spirit and independence.





Those you listed are all board games. Why are board games so important in teaching at school?

Board games are an effective instrument from various points of view. They have an environment that young people know and recognize; they use a language (play language) that students understand and appreciate and which reaches them effectively. It is also a flexible and adaptable educational tool: once the teaching staff and students are accustomed to the use of the game, the different types of mechanics and regulations can be exploited to **build very different educational and didactic settings**.



Every game is a complex system that, in order to be used to best effect, requires a structured and also creative approach to the resolution of problems.



What are the characteristics of a game that allow you to increase learning?

Every game is a complex system that, in order to be used to best effect, requires a **structured and also creative approach to the resolution of problems**. Managing rules, mechanics and interaction with other players and with random elements educates students towards dynamic and effective problem-solving skills that can then be easily transferred to real life contexts.

To use a term dear to the school world, “every match of a game is a task of ‘reality’”.

Game-playing also stimulates **non-cognitive skills**, such as relationships, empathy and the management of stress and emotions.

Lastly, a curiosity: what does it mean to be a “ludologist”? What did you have to do to become one?

I embarked on this journey over ten years ago as a parent, playing with my children and observing the effect of play on their learning. As regards schools, I started by organising afternoon play workshops in infant schools and primary schools. I was lucky enough to meet some enlightened public administrations with whom we prepared some training courses for teachers so as to take game-playing into schools, of all levels, in a structured way. My journey then continued within the university environment, where I teach playful teaching to students on Primary Education degree courses and at the Game Science Research Center. In addition, I started up a collaborative programme with Erickson, with whom I have designed and conducted several training courses, and also published a book on the subject.

“Escape from the Castle”, a neuroscientific game aimed at financial education



Matteo Bisanti
Researcher at the University of Florence and member of the GAME Science Research Center; he focuses mainly on Game Science applied to environmental sustainability.

contribution by **Matteo Bisanti**

The applied research project called “Neuroscientific study of savings behaviour in school-age boys and girls” aimed, from a neuroscientific point of view, to create and validate a game for the financial education of lower secondary school girls and boys, by studying the role of game-playing and collaboration in learning and retention. The research was conducted by the Neuroscience Lab of Intesa Sanpaolo Innovation Center - with the support of its scientific partner, IMT School for Advanced Studies Lucca - for, and in collaboration with, the Museum of Saving in the period from December 2019 to July 2021.

Starting from the relevant scientific literature, the concepts of **cooperative approach**, which facilitates emotional and cognitive involvement, and of **self-efficacy** were studied in depth (→ [page 103](#)), measuring associated behaviours to investigate the role of gaming in learning mechanisms. In fact, this involvement can be a tool for strengthening learning and can promote the development of social skills in interactions between peers. In addition, for girls and boys of school age, these skills can facilitate the enhancement of problem solving skills. A cooperative approach also

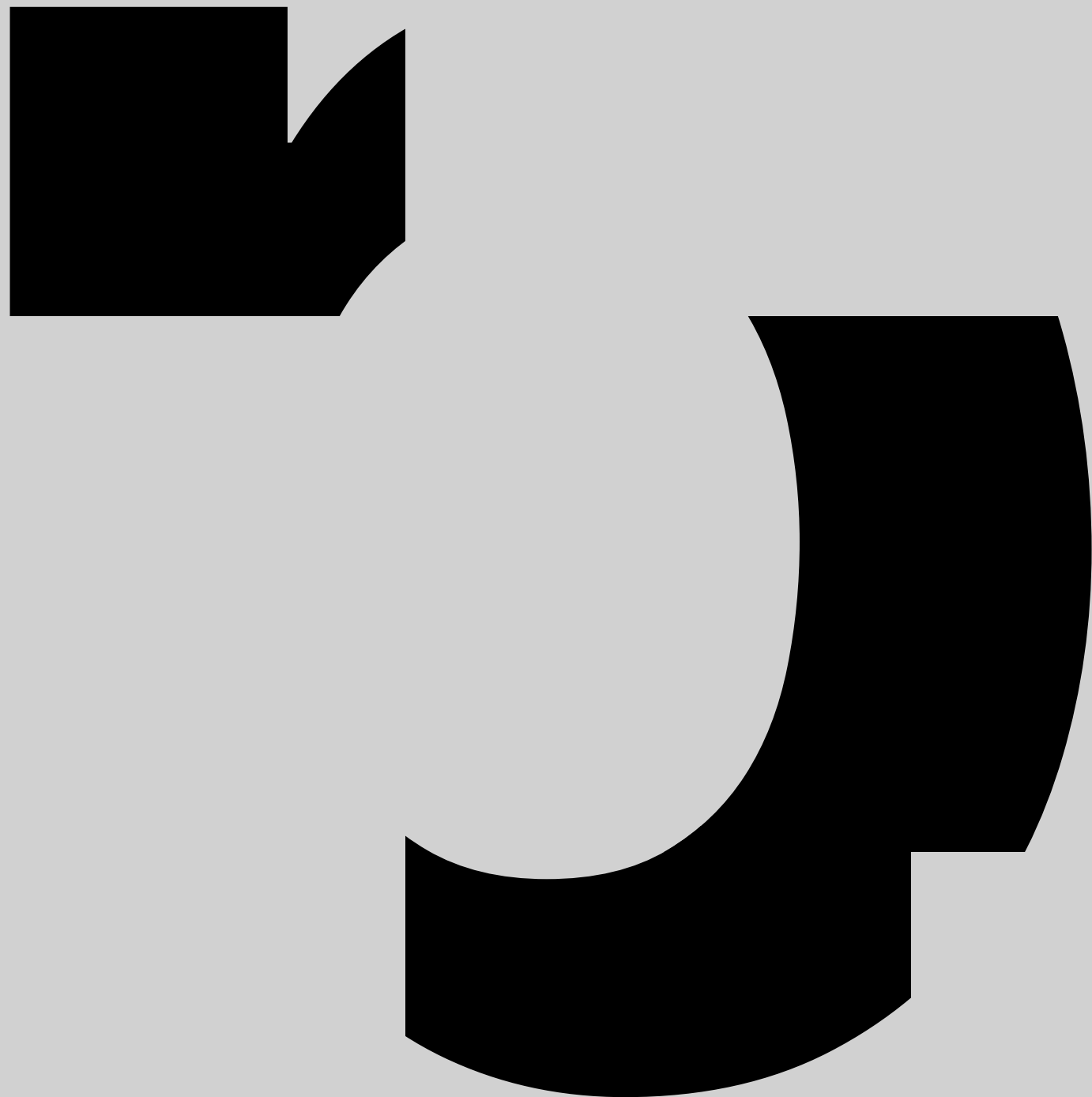
increases awareness of one’s own abilities/skills (‘self-efficacy’) and, when applied to money management, it increases the self-perception of being able to make consumer and savings choices effectively so as to be able to achieve one’s goals. **A high level of financial self-efficacy facilitates intertemporal choices (between today and tomorrow) that are better weighed up and, usually, more favourable in terms of economic output.**

“Escape from the Castle” was precisely the video game produced within the neuroscientific project mentioned at the beginning, an ‘escape game’ [1](#) (→ [page 102](#)) whose puzzles addressed the theme of savings: the management of scarce resources, making decisions with budget constraints and financial planning. In “Escape from the Castle”, the aim was to help the ant Mica, one of the two mascots of the Museum of Saving, to escape from the castle of the Baroness’s ghost. To do this, each player had to solve four puzzles in as many rooms of the castle with the help of clues from For, the Museum’s other mascot.



Download the “Escape from the Castle” app

1
‘Escape games’ are games in which the players progress within a story through the resolution of puzzles. This type of game is increasingly used for teaching because it is successful in capturing attention and allows disciplinary topics to be managed in an engaging way.



Museum of Saving

The Museum of Saving in Turin is a museum aimed at financial education opened by Intesa Sanpaolo in 2012. It is an innovative and fun place that aims to bring people closer to the concepts of savings and investment and to improve the level of financial literacy. Since its creation, its activity has been based on Game-Based Learning and Edutainment. The mascots of the Museum, the ants called For & Mica, accompany adults and children through the Museum with smart cartoons, revealing some amusing curiosities about the Museum to visitors. In addition to the educational activity, the Museum has many playful projects that it is engaged in and a number of downloadable apps.

The video game was used for experimentation which involved - on a voluntary and anonymous basis - more than 100 girls and boys from two lower secondary schools in Turin. In a first phase in May 2021, held at the Museum of Saving, the volunteers played “Escape from the Castle”: some collaborated in small groups to solve the puzzles, while others played individually. During the testing phases, in addition to the game data, some neurophysiological data was collected through ‘eye-trackers’, or glasses that capture pupil dilation, a useful element for indirectly measuring the involvement of boys and girls in the game.

Subsequently, a gamification initiative was organised through the creation of a ranking involving the adding together of the points purchased by playing “Escape from the Castle” online, following the visit to the Museum.

The results showed that collaboration between the boys and girls favoured significantly higher scores than those of boys and girls who played individually, and their puzzle resolution times were also faster. **It can therefore be assumed that those who played collaboratively understood the game better** and learned the contents better. The analysis of the eye-trackers’ data on pupillary dilation, showed a clear link between collaboration and high dilation, which indicates that the students who worked together were more highly involved and focused better on the game. This data would therefore also highlight a higher level of concentration on the contents of the game and on the puzzles as a result of collaboration.

Furthermore, the data collected during gamification confirmed that on average scores improve after each game, while the time for solving the puzzles decreases, with increasingly successful rates, although the puzzles were different with each new game.

Since the resolution of the puzzles, i.e. the actual mechanics of the game itself, is closely linked to understanding the financial contents in the game, the recorded improvements can therefore be extended to the learning of the topics covered in the various phases of the game. In the analysis of the data, both during the phase held at the Museum and in the gamification phase, no significant differences emerged with respect to gender. At the end of the project, given the excellent scientific results achieved, the game was placed inside the Museum of Saving in the “experiment room” and the app was published in the Apple and Android stores.

in-depth analysis

Physical space as an important element in learning

contribution by **Andrea Maffia** and **Liliana Silva**



Andrea Maffia

Researcher at the Department of Mathematics of the University of Pavia, he focuses on studying the process of teaching/learning Mathematics.

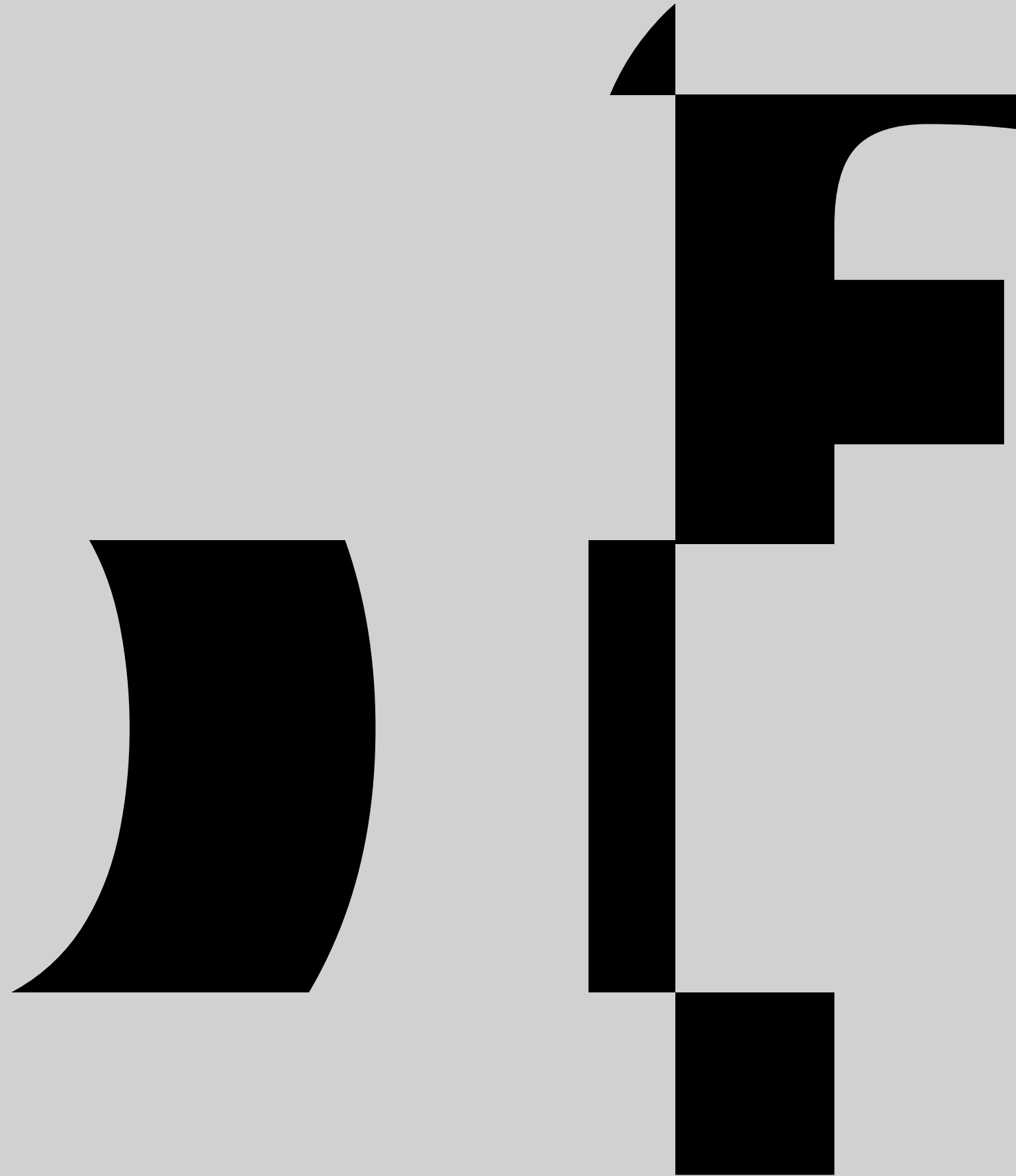


Liliana Silva

Researcher at the COSPECS of the University of Messina. She focuses on assessment within the educational sphere, mainly through the use of board games and role-playing games.

From the day we are born, our mind continuously acquires information about the physical space in which we move: we see shapes and colours, we perceive emptiness and fullness, heat and cold. Our way of understanding the world is based on our physical experience: this is true when we speak strictly about physical space, but it is also true in a metaphorical sense. For example, we can describe the subjective experience of understanding a fact or a statement in terms of 'grasping it', i.e. in a sensory-motor experience. We therefore speak about making a notion an acquired fact, of assimilating it or understanding it. The cognitive mechanism underlying this conceptualisation is defined as a 'conceptual metaphor' by the American linguist George Lakoff. The latter states that we are able to describe our conceptual experience thanks to complex metaphors which are in turn based on **primitive metaphors**, constructed from early childhood onwards. For example, we are accustomed to talking about relationships in terms of closeness or distance, warmth or coldness.

Working from this assumption, it is clear that **any scholastic (or non-scholastic) learning is based on the primitive metaphors we have had (and still have) experience of**. Some of these metaphors are pervasive in learning; a classic example is the metaphor that the passage of time corresponds to a movement. In our sensory-motor experience, when we move, this physical movement corresponds in some way to elapsed time, so much so that on some occasions we measure space in the number of minutes or hours needed to travel that distance. In a metaphorical sense, we describe time as if it were a space to be crossed, so we all understand that when we say that "time flies" we are referring to the speed with which it passes. This metaphor is highly prevalent in school learning contexts: for example, we use time lines in history lessons, Cartesian charts in which the horizontal axis represents time in classic physics problems. Elapsed time is represented by the distance between two events, which are also referred to as points on lines.



How do boys and girls internalise this metaphor? How do they manage to do it so well so as to assist themselves in learning history or science with visual aids (based on this metaphor)? The answer to these questions could be both experiential and linguistic. On the one hand, children have experience of the relationship between space and time and, on the other, they hear the people around them talking about it and learn to re-use the same linguistic expressions to refer to what they have experienced. It is therefore essential to provide children with the opportunity to have certain experiences and talk about them with their peers and with adults: game-playing provides an excellent opportunity for doing so. For example, let's consider a linear board game, such as "Snakes and Ladders": the greater the number in a square, the greater the distance travelled to reach it, the greater the number of steps that had to be counted and the greater the time needed to cover the distance. In some board games of this type (for example "The game of life") the path taken by the pieces represents exactly the passage of time, thus making the metaphor more real.



It is essential to provide children with the opportunity to have certain experiences and talk about them with their peers and with adults: game-playing provides an excellent opportunity for doing so.



2.2

Gamification: what it is and how it works

contribution by **Niccolò Toccafondi**,
Veronica Pizziol and **Roberto Di Paolo**



Niccolò Toccafondi
PhD student at the IMT School for Advanced Studies Lucca. His research focuses on the influence of game-playing and playful elements on human behaviour.



Veronica Pizziol
Doctoral student in Economics, Networks and Business Analytics at the IMT School for Advanced Studies Lucca; she works in the field of Behavioural and Experimental Economics on research topics concerning prosocial behaviour.



Roberto Di Paolo
Researcher at the IMT School for Advanced Studies Lucca. His main research interest is in Behavioural and Experimental Economics. Ordinary member of the GAME Science Research Center.

In literature, **gamification** – as already mentioned at the start of the chapter - is defined as the use of game elements in non-playful contexts. In recent years, it has received a lot of attention from scholars, thanks to the tremendous impact it can have on businesses and consumers. A clear example is given by Duolingo, an application for smartphones and tablets used by millions of users for learning one or more foreign languages. The reasons for its success relate to its user-friendly interface, the ability to learn in a gradual and customised manner and the level of motivation that it manages to convey to the user, in other words its ‘user engagement’ (→ page 102). This last aspect is achieved precisely through gamification. Duolingo, like many other gamified applications, uses a system of points, levels, awards and rankings (in jargon PBL (→ page 103), ‘points, badges and leaderboards’; for more in-depth analysis, see **For the Win**).

These game-playing elements engage users in two ways. Mainly, they allow users to keep track of their progress and stimulate their constant learning. Furthermore, through the use of leaderboards, **they trigger competitive dynamics between users**.

There are also elements that induce cooperation between participants, or that reward the achievement of objectives by providing the possibility to customise one’s character or page. The introduction of these elements makes it possible to maintain a high level of engagement in contexts such as education, sport, marketing or raising awareness about climate change.

Users are driven towards behaviours aimed at improving themselves and the context in which they live, such as learning a new language, a better lifestyle or greater cooperation between citizens.

**#gamification #customisation #learning #userengagement
#badge #points #leaderboards #achievements #climatechange
#crowdsourcing #socialchange #education #amusement
#marketing #efficiency #pbl**



By dividing up the problem into small tasks, the experience can become fun for the users and useful for the platform.



For example, in order to encourage drivers to reduce fuel consumption and reduce the impact on the environment, some car manufacturers have decided to gamify the driving experience. In particular, using on-board computers, some smartphone applications can analyse the driver's driving style and assign higher scores for the most eco-sustainable behaviour behind the wheel. With this simple device, drivers are encouraged to drive correctly, save fuel and reduce their environmental impact.

Gamification, however, must not be confused with 'serious games' (→ page 104) i.e. that category of games with an additional "non-playful" purpose. The main difference between the two categories lies in the fact that 'serious games', in addition to being useful in non-playful contexts, also have the purpose of entertaining. Examples of 'serious games' are games for social change, board or digital games, useful for teaching prosocial behaviours to players (→ page 103). Conversely, gamified applications contain only a few game elements and are only meant to be engaging.

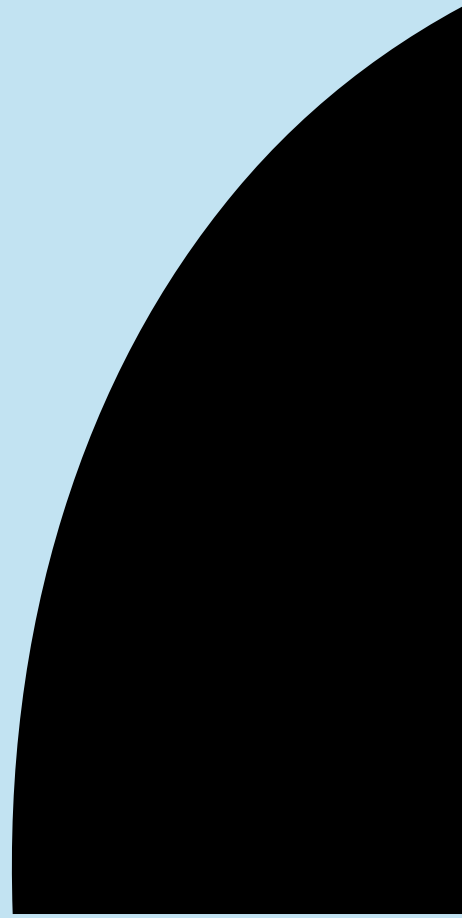
Once the distinction between 'serious games' and gamification is clear to us, we can analyse **the differences between internal and external gamification, for social change and for 'crowdsourcing'** (→ page 102).

Internal gamification aims to improve the efficiency and productivity of users and is applied inside companies or in the field of education. On the contrary, external gamification aims to engage new customers by offering a social interaction service such as multiplayer systems (→ page 103) or 'peer rating'.

In the case of gamification for social change, as already seen in the example of car manufacturers, **the aim is to develop and consolidate prosocial practices and habits in the population.**

Lastly, **gamification aimed at 'crowdsourcing'** on the other hand, refers to those cases in which **businesses, companies or platforms** that have a large number of difficult problems to solve, **turn to their customers or platform users and ask them for help.** By dividing up the problem into small tasks, the experience can become fun for the users and useful for the platform. By getting its users to translate fragments of text, Duolingo also manages to make them work together to translate books and newspaper articles which it can then sell on to online newspapers. On the one hand, this allows the platform to obtain some revenue, and on the other, it allows the users to test their knowledge on current texts.

Over the last few years, **internal gamification in school education systems has been the main study focus among researchers**, as it is relatively easy to establish its impact on school performance. The results, however, are not uniform.



Some studies (Hamari, Koivisto and Sarsa, 2014; Koivisto and Hamari, 2019; Halifax et al, 2019) show results in favour of the thesis that **gamification improves users' performance**, while other research projects have come to contrary conclusions. The common element was the use of point systems and leaderboards. These, however, can trigger **negative competition mechanisms**, causing stress and anxiety in the users involved. Further research therefore seems necessary to fully understand the actual effectiveness of these techniques.

The main objective of gamification is to obtain desired forms of behaviour, by creating a 'mindset' in the user (→ page 103) similar to that created when playing traditional games. The user must find an intrinsic motivation that drives him/her towards their objective.

Inserting simple mechanisms in the workplace aimed at competition between employees or time limits is a wrong way of doing gamification because this contributes to making the workplace toxic and non-engaging.

Cooperative and immersive systems are for example little studied alternative systems. These can be particularly effective since some players derive **greater motivation during play sessions from social and role-playing components rather than from competitive ones**. These types of players, therefore, will appreciate the addition of **avatars** with the possibility of customisation and acting. New methodologies of this type are therefore desirable for use in public situations such as those of social services and state services.

However, there remains a question of what are the best ways of implementing them, critically and each time by customising the tools to the context and to the "players" that may be involved.

In brief, gamification can be a **valid tool applicable in any sector**, but its future will mainly depend on the connection that can be created with more traditional fields of study, such as Psychology, Economics, Art and many others.



Museums, video games and gamification



Fabio Viola

Founder of TuoMuseo and Curator of the Reggia of Venaria. He worked for international video game companies before founding the TuoMuseo (YourMuseum) collective, a cross between art and video games.

interview with **Fabio Viola**



www.tuomuseo.it

Fabio Viola is one of the leading Italian gamification experts and for years, through **TuoMuseo**, he has been designing and building video games for museums. In this short interview we want to take an even closer look at the cross between these three elements: Museums, video games and gamification.

How can gamification processes become a part of museum processes?

For some years, gamification has become an integral part of museum strategies, even turning into a disciplinary subject in many masters' degree courses in Cultural Heritage. It is an approach that is strongly connected with policies on 'audience development', 'audience engagement' and customer loyalty with a time span linked to the phases before, during and after the visit. In general, the new forms of digital interaction become significant tools in order to reach visitors when they are not physically present within the cultural space, for example, a tool for preparing the visit or maintaining a relationship in the post-visit stage in order to favour the creation of an 'ambassador'. Furthermore, one should not forget the potential in the Museums' internal processes.



www.playablecity.com




www.playalghero.it

One can imagine gamification applied to the training of cultural operators or to team-building phases.

On the topic of digital interaction, which museums are moving towards gaming, in addition to the Museum of Saving (see the in-depth study on "Escape from the Castle", a game aimed at financial education)?

In Italy, the National Archaeological Museum of Naples was the forerunner in 2017 with "Father and Son", **the first video game in the world published by a museum for an international audience**, collecting about 5 million downloads. Madrid's Thyssen-Bornemisza with its "Educa" division has launched numerous game-based projects, including "Nubla The Island", also available on Sony Playstation that has been a success with critics and in sales. A more recent case is that of the Centre Pompidou with the title "Prisma7". In 2018, The Victoria & Albert Museum promoted a beautiful curatorial exhibition entitled "Play, Design, Disrupt" and in 2022 the Reggia of Venaria in Italy is the protagonist of an exhibition linked to the theme of video games as the eighth form of art. On an urban scale, it is worth following the "Playable City"



projects created in Bristol and “Play Alghero” created in Alghero, linked to the playful infrastructure of entire cities to engage citizens and facilitate tourism and cultural promotion.

Why can video games be so useful to a Museum?

I see at least three interpretations and interpenetrations. First of all, video games represent one of the main **artistic and cultural expressions in the contemporary world**. Conventional art forms such as painting, architecture, music, writing and sculpture expressed on a digital rather than physical canvas come together within the games. Since they are artist-created, interactive works, providing visions of the world, with full entitlement to enter Museum collections, the M.O.M.A. has included them since 2013. Furthermore, video games represent an extraordinary visual tool through which Museums can look at the social, economic, technological and identity-based changes in progress. As a language used annually by over 2.5 billion people in the world, largely those under 40, video games help us to understand the dreams, expectations and desires of those audiences that largely avoid involvement with culture in its “traditional” forms. Last but not least, video games represent a **tool at the service of cultural practices**, a tool to attract the Z and Y generations, to engage and retain them through increasingly participatory, customised and interactive forms of experiences.

What are the characteristics of a video game created for a Museum?

The greatest challenge in this kind of meeting lies in the ability to balance the cultural component with the engagement component. A constant tension between what the Museum management would like to deliver in scientific terms and what the public itself would like to receive. In these years of pioneering experiences with the TuoMuseo collective, I have developed a few key points underlying each of our experimental projects:

- The Projects must speak to an international audience; the play video ‘stores’ (App Store, Google Play, Steam etc.) oblige us to ensure this, and this means languages and narratives for people who live geographically and culturally far away from the context of the game itself. It is an enormous challenge but, at the same time, it offers opportunities to move the Museum out of the Museum and place it in the same time and space as the players.
- It is essential to engage the player and, subsequently, to initiate phases of cultural transfer through immersion, contextualisation and protagonism. Numerous studies and fieldwork initiatives have demonstrated the power of engagement: **when a person is in a social, emotional, participatory environment, they memorise information more easily, become pro-active and are able to recall that content even after some time.**
- The video game must be able to live and to make sense **regardless of the cultural container** commissioning it and paradoxically be able to survive it. This means creating experiences that have a value in themselves and can therefore be enjoyed by those who are not familiar with the content they intend to transfer.

2.3

Game Theory and the role of strategy

contribution by **Ennio Bilancini** and **Leonardo Boncinelli**



Ennio Bilancini
Professor at the IMT School for Advanced Studies Lucca and Director of the GAME Science Research Center. He focuses on Game Theory, Game Science and Behavioural Economics.



Leonardo Boncinelli
Professor of Economic Policy at the University of Florence, with research interests in Game Theory, Behavioural and Experimental Economics.

In common parlance, the term game refers to a playful activity organised and defined by rules and is typically interactive, i.e. it engages more than one player. **Choices must always be made in a game** and the outcome depends on the choices made by all players. In Game Theory the term “game” has an **abstract and not necessarily playful meaning**, with the aim of grasping the dynamics of a huge range of real situations ranging **from political to military decisions, from competition between companies to courtship practices, from board games to sports**.

Game Theory is the discipline that studies the decisions made by ‘intelligent’ individuals with ‘rational preferences’ where the results of such decisions depend on the decisions of the ‘decision makers’ involved.

In such a context, it may not be easy to make the right choice, because this generally depends on **what the other participants in the game choose to do**. What is valid for one is valid for everyone: therefore a recursion

is generated that **makes it problematic to predict what will happen in a game**. There are, therefore, some fundamental concepts in Game Theory that are useful for trying to clarify the various situations.

The term **‘strategy’ refers to the set of choices that a person decides to make in a game**. In games where there is only one selectable choice, which must be made in a single possible condition, the strategy adopted is the actually made choice. In games where a player is required to select from more than one choice and/or there are multiple conditions in which the choice can be made, the adopted strategy is the set of all the choices made and those potentially made, that is, a choice for each situation or condition in which the player is required to choose.

There is **‘strategic dominance’** when a strategy guarantees a **systematically better result** than another strategy, regardless of the strategies used by the other players. Strategic dominance can be applied to provide that certain strategies will not reasonably be adopted by players, because they are dominated by others strategies. For a

**#nash #equilibrium #strategy #payoff #rationality
#dominance #information #action #pareto #utility #probability
#beliefs #prisoner’sdilemma #normalform #extendedform**

		Bruno	
		L	C
Anna	L	2, 2	2, 0
	C	0, 2	3, 3

Fig. 2.3.1
 “Deer Hunt”.
 There are two ‘Nash equilibriums: (L,L) and (C,C), but only the latter is ‘Pareto efficient’.

		Bruno	
		D	C
Anna	D	0, 0	b, -c
	C	b, -c	b-c, b-c

Fig. 2.3.2
 “Prisoner’s Dilemma”.
 D is the dominant strategy for both players.

player, the ‘optimal response’ to a given set of strategies of other players is a strategy that guarantees the best possible outcome from those achievable.

A ‘**Nash equilibrium**’ (concept devised by John Nash, economist and mathematician, Nobel laureate in 1994) **is a set of strategies**, one for each player, in which each strategy is an optimal response to the others. In other words, a Nash equilibrium is a situation in which each player chooses a strategy that guarantees the most preferred outcome taking into account the strategies chosen by the others.

‘**Pareto efficiency**’, on the other hand, is a criterion for determining, in negative terms, **the outcomes with respect to which it is certainly possible to make improvements without displeasing anyone**, while it does not typically allow all the outcomes to be ordered according to a collective preferability scale or always to have an outcome unanimously considered the best. One example of these concepts is in [Figure 2.3.1](#).

A typical representation of Game Theory is called ‘normal form or ‘strategic form’; it consists of the ‘payoff matrix’, where the rows represent the strategies available to one player while the columns represent the strategies available to the other player, and the payoffs for the two players are shown inside each cell of the matrix (cfr. [Fig. 2.3.1](#) and [Fig. 2.3.2](#)).

To become familiar with some of the concepts introduced, let’s consider the most famous game of all: **the “Prisoner’s Dilemma”, a paradigmatic representation of a social dilemma**, where a certain behaviour is expensive for the single individual, but beneficial for the group as a whole. This behaviour is referred to as ‘cooperation’, indicating it with the letter “C”. We can indicate with “c” the cost incurred by the individual who chooses C, and with “b” the benefit that C brings to the partner. The letter “D” indicates the alternative behaviour to C, often called “defection”. [Figure 2.3.2](#) provides a graphical representation of the “Prisoner’s Dilemma”.

The presence of a cost without any benefit for the decision maker leads us to conclude that cooperative behaviour is not convenient for the individual. In other words, D is the optimal response against any strategy chosen by the opponent. Assuming b is greater than c, cooperative behaviour is, however, socially desirable, in the sense that **the benefit brought to the partner is greater than the cost incurred by the decision maker**. If both individuals chose C, each of them would get a net benefit where the difference between b and c is greater than 0, and therefore would be better off than if they both chose D, when they would get 0. We can say that (D,D) is the solution obtained by eliminating the dominated strategies, as well as being the only ‘Nash equilibrium’ in this game. At the same time we observe that (D,D) leads to a ‘Pareto inefficient’ outcome, as both players would prefer (C,C). The “Prisoner’s Dilemma”, in its simplicity, shows us how **individual rationality**, with the meaning of the mere pursuit of the interest of the individual, **does not necessarily lead to social well-being**.

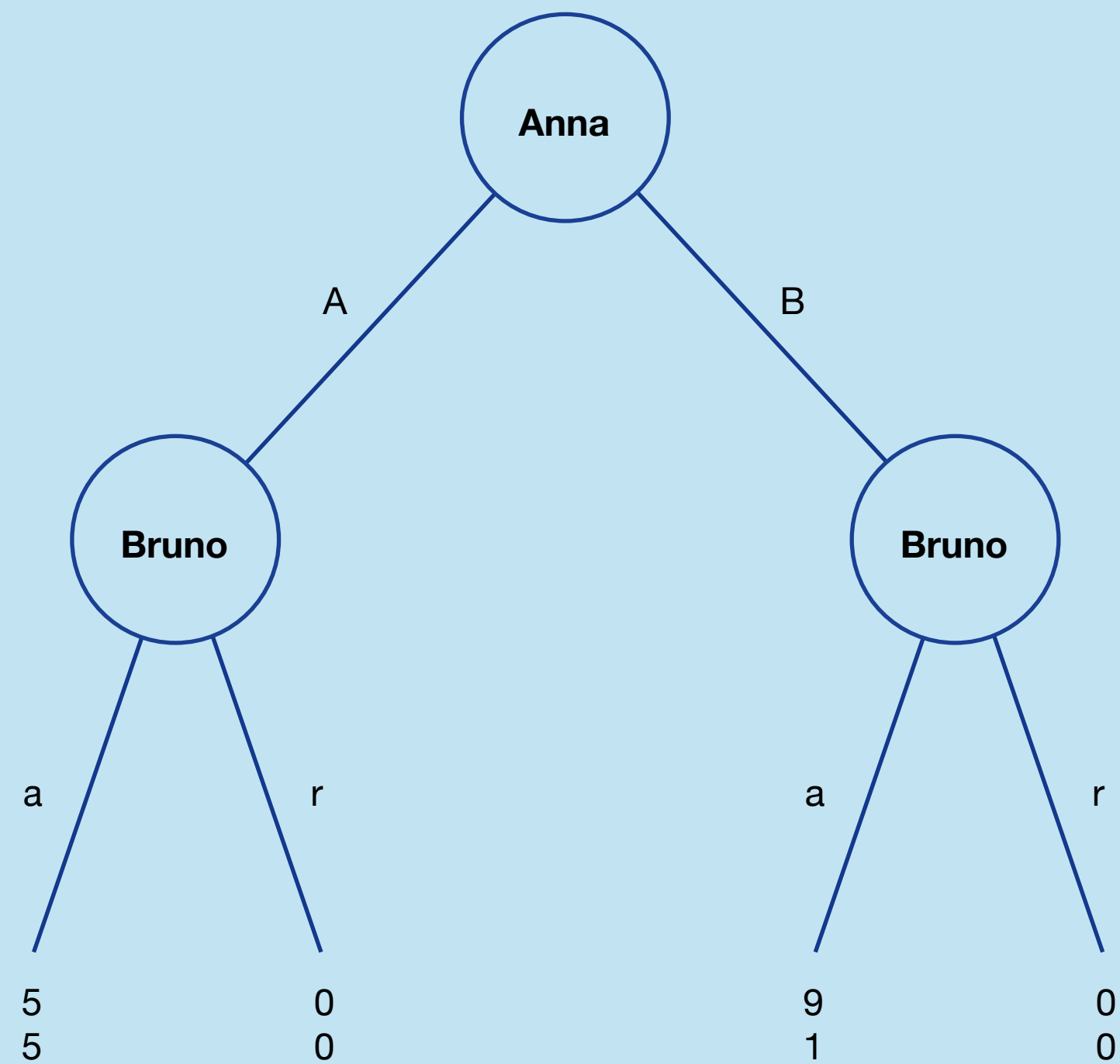


Fig. 2.3.3
 “Ultimatum Game”, extended form representation.
 Through backward induction, Anna chooses “B” because it is advantageous for Bruno in any case to choose “a”.

Another method of representation is the ‘extended form’, where a “tree graph” is used to describe the sequence of possible choices in the game (cfr. **Fig. 2.3.3**), i.e. a scheme in which the players are represented as nodes and from which the different possibilities unfold in the form of branches, which the players can choose from, with their respective payoffs. A game in extended form lends itself well to applying a typical Game Theory method of reasoning, ‘backward induction’. By ‘backward induction’ we mean a game resolution procedure in which we start from the final decisions, those at the bottom of the tree, where there is no strategic uncertainty as there are no following choices from other players. Once the best choices among the final ones have been identified, **you go back up the tree** assuming that the decision taken at that moment is a good one, **until you reach the beginning of the tree (called “the root of the game”)**.

“

A game in extended form lends itself well to applying a typical Game Theory method of reasoning, ‘backward induction’.

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A neuroscientific game app which enhances financial negotiating capacity

contribution by **Luca Polonio**

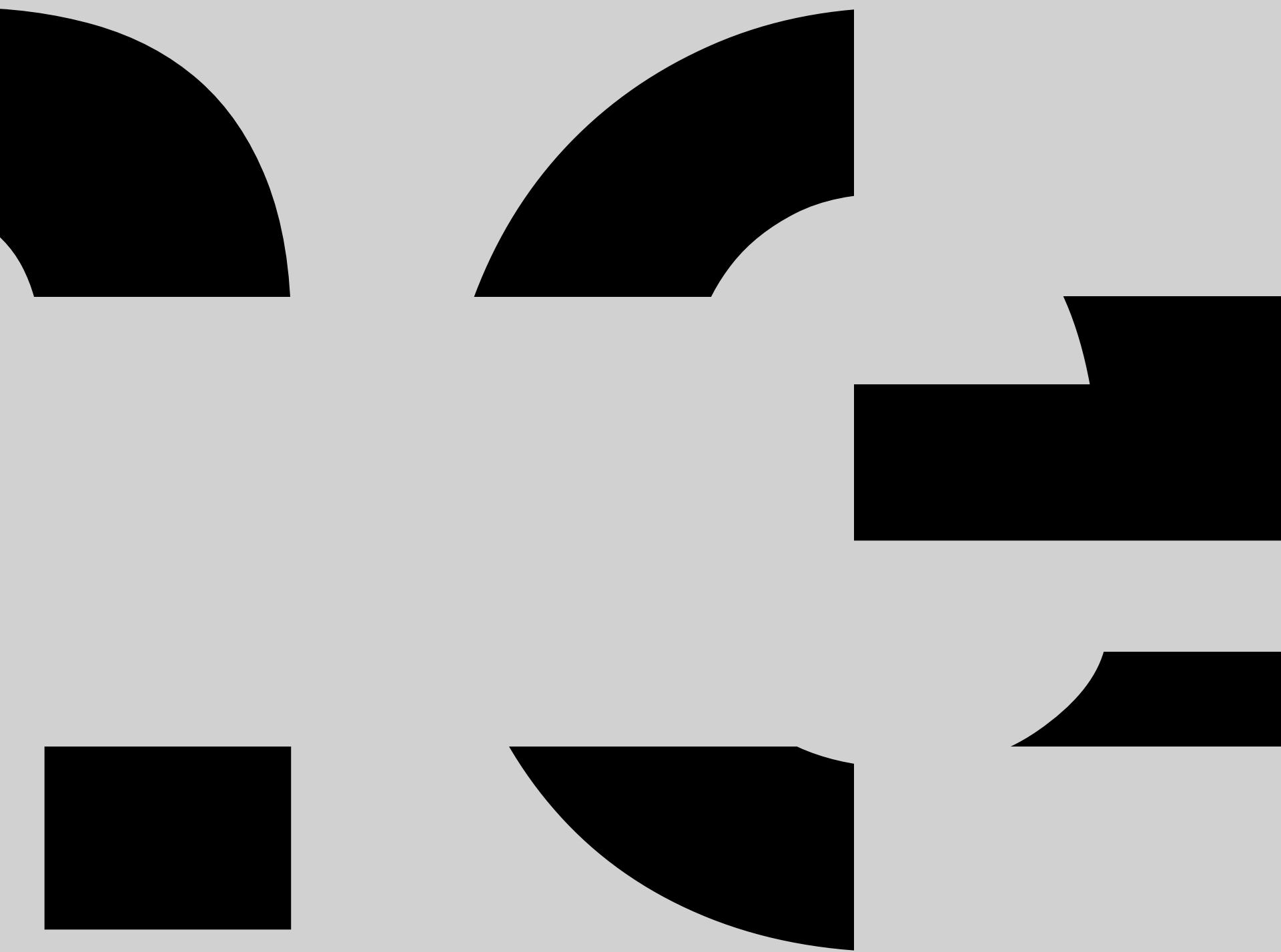


Luca Polonio
Assistant Professor in Political Economics at the University of Milano-Bicocca. His research interests include Game Theory and Behavioural Economics.

The neuroscientific research project called “Decision-making styles and cognitive flexibility to support the negotiation process” was conducted between 2021 and 2022 by the Neuroscience Lab of Intesa Sanpaolo Innovation Center - in collaboration with its scientific partner, the IMT School for Advanced Studies Lucca - for the IMI Corporate & Investment Banking Division of the Intesa Sanpaolo Group. This research was inspired by the desire and propensity of the Global Markets Solutions & Financing (GMSF) Department, within the IMI CIB Division, to apply these research topics to the decision-making style of its own (sales and structurer) negotiators and to implement **intervention strategies - through a training game** - to increase the cognitive flexibility and logical-strategic reasoning of the participants.

The research started from the analysis of the reference scientific landscape which demonstrated that a person’s decisions are the result of different cognitive processes: some of an intuitive, experiential and emotional nature, others of a logical and rational nature. However, only the latter styles are able to determine optimal decisions, especially in complex contexts such as that of negotiation.

The neuroscientific project involved a panel of about one hundred and thirty people from the Global Markets Solutions & Financing Business Unit of the IMI CIB Division, of which about seventy voluntarily completed the activity and a sample of one hundred and forty participants from outside Intesa Sanpaolo. This last sample, called the control group, typically aims to ensure that the data from the experimental group are actually due to the variables being tested and not to unknown external influences. The project was run according to longitudinal timing, where an anonymous online assessment was initially conducted on the decision-making and cognitive flexibility skills of junior and senior negotiators of the Intesa Sanpaolo Business Unit; in a second experimental phase a **mobile game training app** was developed and distributed to both internal and external panels and the last phase again proposed a final assessment test to verify the actual effectiveness of the cognitive training.



The game training app - created ad hoc by the IMT School for Advanced Studies Lucca for the project - fulfilled the fundamental purpose of the research: **teaching negotiators more effective decision-making strategies**, leveraging the following dimensions:

- improving logical reasoning and the ability to make optimal choices in various strategic contexts;
- **increasing the ability to learn from previous experience** and to transfer the knowledge acquired to various environments of strategic choice;
- recognize, manage and effectively adapt context information (cognitive flexibility).

The game included several exercises aimed at training decision-making, cognitive flexibility and stress management skills, essential attributes for making optimal and less impulsive decisions.

A reflective approach is generally more effective in the negotiation phase, especially when it is required to adapt to the changeable context of interaction. The ability to adapt to the strategic context requires adequate and logical consideration of the information arriving from the counterparty. **This is why cognitive and social skills and cognitive flexibility are essential in order to understand the signals received from the counterparty** and to structure one's own communication in a logical and rational way.

The results obtained showed that **the initial strategic reasoning skills of the negotiators of the GMSF department were higher than those of external participants with a comparable educational level.**

This showed that the banking panel already possessed quite well developed basic strategic skills. The aim was therefore to further enhance these skills to high standard levels. The results obtained following the training phase showed the effectiveness of the intervention procedure: there was, in fact, a significant increase (of around 25%) in the ability of the Department's negotiators to make optimal decisions and to accurately predict the counterparty's choices. The external parties also achieved an increase in their strategic skills following the training phase, but the improvements observed were modest compared to those of the Business Unit. The external participants increased their proportion of optimal decisions by 15% and in terms of overall skills they remained well below the skills developed by the Business Unit. The 'Transfer effect', i.e. the ability of game training to be effective, also proved to be so with respect to the cognitive flexibility component, although less significantly than the strategic decision component.

The research activity demonstrated the effectiveness of the game training app with respect to the objectives and enabled the IMI Corporate & Investment Banking Division and the Intesa Sanpaolo Group for a possible **industrialisation and use in terms of training and enhancing the skills of colleagues in the Intesa Sanpaolo Group**, primarily in positions that require negotiating skills.



2.4

From Game Studies to Game Science? Possible evolutions in research on games and game-playing

contribution by **Veronica Pizziol**,
Roberto Di Paolo, **Ennio Bilancini**,
Leonardo Boncinelli

Games and game-playing have a central role in the life of everyone. Although play is often thought to be fundamental only in the development of children, a closer look at the scientific evidence on training, development and maintenance of skills suggests that **game-playing can be beneficial for people of all ages, and perhaps even more so for adults.**

Game-playing can be defined in different ways and there is no generalized consensus around its standard definition (see 1.1 for the definitions of game and game-playing). For example, game-playing can be interpreted as a model of strategic behaviour: it offers a general and flexible way to describe and explain the phenomena of interactive decision-making, facilitating the understanding of their dynamics and possibly predicting the results. This is what Game Theory typically does (see 2.3). In another way, game-playing can be taken to mean any playful activity organised around well-defined rules: game-playing embodies an important part of socially organised activities and can represent a valid tool for increasing motivation, enhancing prevention and healthcare support, cultural and



Veronica Pizziol

Doctoral student in Economics, Networks and Business Analytics at the IMT School for Advanced Studies Lucca; she works in the field of Behavioural and Experimental Economics on research topics concerning prosocial behaviour.



Roberto Di Paolo

Researcher at the IMT School for Advanced Studies Lucca. His main research interest is in Behavioural and Experimental Economics. Ordinary member of the GAME Science Research Center.



Ennio Bilancini

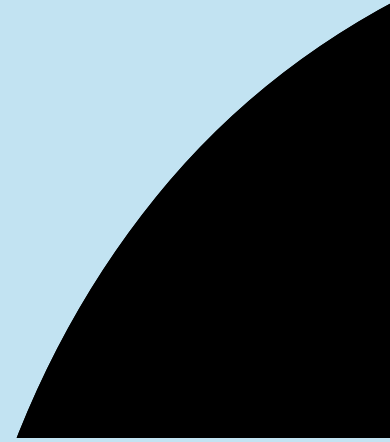
Professor at the IMT School for Advanced Studies Lucca and Director of the GAME Science Research Center. He focuses on Game Theory, Game Science and Behavioural Economics.



Leonardo Boncinelli

Professor of Economic Policy at the University of Florence, with research interests in Game Theory, Behavioural and Experimental Economics.

[#gamescience](#) [#gamestudies](#) [#ludology](#) [#gameplaying](#) [#behaviour](#)
[#training](#) [#discipline](#) [#socialsciences](#) [#human sciences](#) [#gamification](#)
[#socialchange](#) [#gbl](#) [#homoludens](#) [#university](#) [#research](#)



Game Science aims to study not only the phenomena related to the notion of game-playing in the sense of a system of rules and mechanics for playful activities, but also as a model of strategic behaviour.



social change, dissemination of scientific information and artistic exploration.

Over the last twenty years or so, an area of study has developed around the second meaning of game-playing called Game Studies, whose outlines are still being defined.

Game Studies, sometimes also known as Ludology, focuses its attention on games, the act of playing and the players.

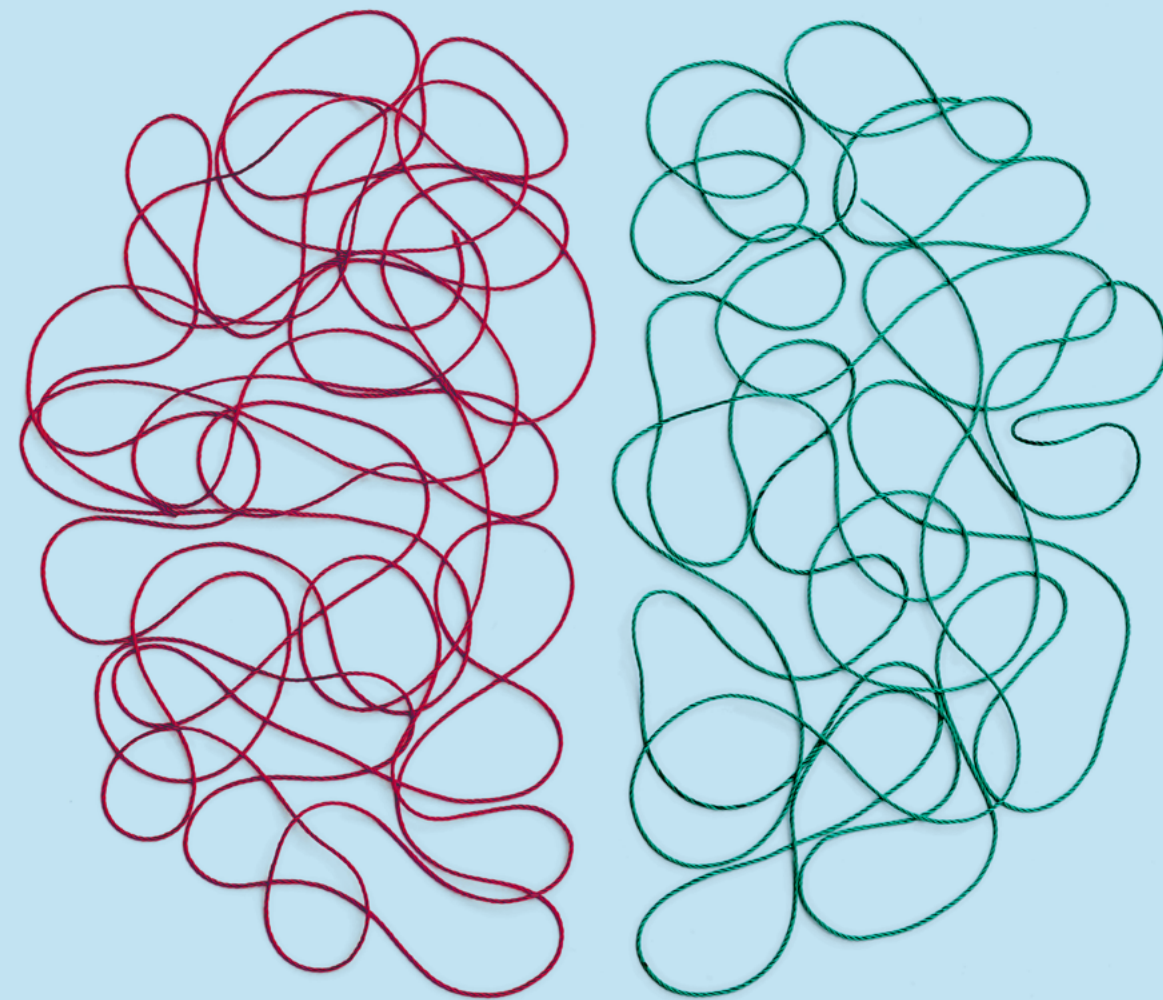
Game Studies arose from and developed mainly within the Human and Social Sciences, focusing above all on historical, cultural and social issues concerning game-playing. Although there is still no clear definition as an academic discipline, there is no lack of explicit contributions within the many disciplines that contribute to the subject, with pride of place going to the famous “Homo Ludens” in 1938 by the historian J. Huizinga.

The interest in the connections between “games” and “real life” seems to have played a significant role in establishing Game Studies as a field of research. The perception of “games” as important items in everyday life has continued to gain strength together with the idea of the study of games as a legitimate and relevant direction of research: if games count for anything in our contemporary society, then game studies deserves to be developed.

However, in more recent years, academics and researchers from all over the world have begun to approach the study of game-playing with increasingly elaborate methods, including techniques and notions traditionally belonging above all to the disciplines of Natural and

Social Sciences: the collection of data for quantitative analysis, statistical inference on the collected data, the design and implementation of controlled experiments for measuring the impact and the falsification of theories, the development of new dedicated technologies, the measurement of the effectiveness of the technologies and, of utmost importance, the application of these techniques for **estimating the impact of the use of games and game-playing, also within structured programs** of which game-playing constitutes only a part (for example, training projects that pivot around Game-Based Learning, see 2.1, or on Games for social change, see 4.3).

This movement has actually taken the name of Game Science and is not in opposition to Game Studies, but rather it encompasses the latter and broadens its horizons by bringing the contribution of Natural and Social Sciences, especially in their quantitative components. Game Science is therefore an emerging area of scientific research and, perhaps, with even less well defined outlines than Game Studies. Like the latter, Game Science is characterised by a strong multidisciplinary nature, but embracing a wider range of disciplines, from Human to Social Sciences, from Life Sciences to Natural Sciences. It aims to study the phenomena related to the notion of game-playing in the sense not only of a system of rules and mechanics for playful activities, but also of a model of strategic behaviour, that is, according to the first of the two definitions presented in this chapter. Furthermore, in Game Science, method plays a crucial role, alongside the object of study. According to the most rigorous principles of the scientific approach, Game Science aims to provide conclusive and robust evidence on all phenomena relevant to games and game-playing.



So, not only theoretical importance regarding games and game-playing, therefore, but also particular emphasis on the ability to prove the theories developed and convince the international scientific community about the effect of games and game-playing.

An approach that is typically used in Game Science to facilitate engagement and motivation in learning is Game-Based Learning. For example, in an Economics course, students could be organised to compete in a virtual stock exchange or, in a Political Science course, students could perform role-plays while engaging in simulated negotiations between diplomats from various countries. A similar, but not identical approach can be seen, as described above, in gamification (see 2.2). For example, a badge system is used by blood donor organisations where donors are awarded a medal upon reaching a certain number of donations, either in private or during a public event.

As mentioned, Game Studies and Game Science are not in opposition to each other. However, we are still a long way from being able to present them as components of a single institutionalised discipline that studies games and game-playing. Game Studies has the merit of having developed within other humanistic disciplines as early as the first half of the last century, and then of obtaining a certain academic recognition, whereas Game Science has a great potential for diffusion thanks to the use of tried and tested tools in the Natural and Social Sciences, essential for being able to demonstrate or deny the effectiveness of a game or a playful project with respect to particular objectives, such as the promotion of virtuous behaviour by players in the society that surrounds them.



Game Science has a great potential for being able to demonstrate or deny the effectiveness of a game or a playful project with respect to particular objectives, such as the promotion of virtuous behaviour by players in the society that surrounds them.



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3

Examples of game applications and game-playing

Even in everyday language, play is often downgraded as an activity that is superfluous (“first work, then play”), flippant (“I’m not playing a game, you know!”) or infantile (“it’s a kids’ game”). On the contrary, a vast range of scientific works in the fields of ethology, anthropology, psychology and sociology has largely confuted the peripheral role of game-playing, demonstrating conversely that it represents an unmistakable **opportunity for learning and training**. In this perspective, playful activity has two basic characteristics:

- **in adults** it has mainly a social role, therefore it has an effect on hierarchy and ‘friendship’, facilitating the understanding of one’s own social roles and those of others;
- **in children** it can have many meanings: building relationships with other individual puppies/children, improving physical characteristics and the understanding of social limits and rules, training certain skills or becoming familiar with the surrounding environment.

Precisely for these reasons, game-playing appears, as also seen in the previous chapters, a fundamental tool for human activities, **both in terms of relational skills and training**.

Through game-playing, training activities are mainly cognitive; this represents the **strong link between Neuroscience and Gaming**, precisely because game-playing is a very important tool for the refinement of **hard skills** (→ page 103) and **soft skills** (→ page 104).

Without presuming to provide a wholly comprehensive picture of the reality of playfulness, this chapter aims to present a series of examples of sectors or activities in which game-playing can be used positively.

Medical and therapeutic applications are some of the fundamental ones: game-playing as a tool capable of giving psychological support, while recalling problematic events within the safety of the playful magic circle, and capable of preventing burnout (→ page 102) or similar disorders, such as delaying the effects of Alzheimer’s disease.

Game-playing can then be a stimulus to encourage positive social behaviours for all, becoming **an engine of prosociality**, i.e. a positive attitude towards human activities while respecting the community.

Games can also be used **in the business environment**, as tools for simulation and training, especially with regard to Organisational Neuroscience. Finally, game-playing has become useful in the life of companies for **creating engagement** between employees and for the selection of personnel: game-playing not only allows the best candidates to be selected for a position in the company, but also to attract more candidates.

3.1

Games with therapeutic purposes

contribution by **Maria Donata Orfei**



Maria Donata Orfei
Psychologist, psychotherapist and doctor of Neuropsychology; she focuses on occupational psychological distress at the IMT School for Advanced Studies Lucca.

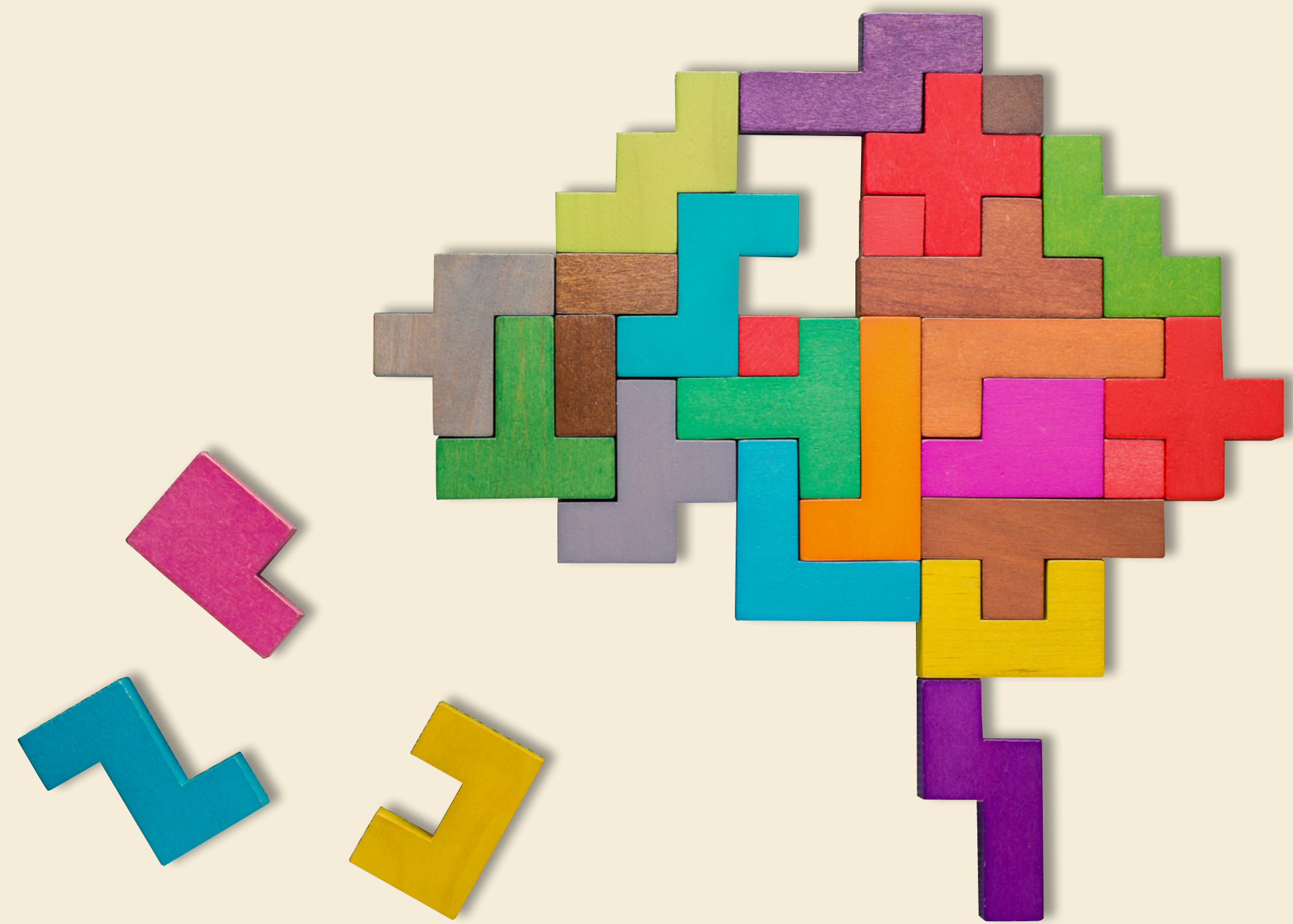
Game-playing represents one of the first forms of communication used by human beings. It mimics reality and is based on an analogue code, i.e. a mode that refers to the thing being represented through an association between the subject of the game and what is used to express it; in this way, for example, a stick can represent a sword, a teddy bear can become a little brother or a little sister. Given its high potential, game-playing has long been recognized as having a **therapeutic value**, which the clinician needs to be aware of and know how to use according to the cases that arise and the objectives to need to be achieved.

Play in infant therapy

The first theories on the use of game-playing as a therapeutic tool were formed in the psychoanalytic field and date back to Freudian observations on little Hans, subsequently passing through Melanie Klein and Anna Freud, for whom children's play was essentially equivalent to the free associations used with adults (and therefore, as such, it could provide access to a child's subconsciousness and facilitate positive attachment to the therapist).

They were further enriched by the contributions from Donald Winnicott, regarding for example the symbolic function of the transitional object. For their part, the cognitivist psychologists theorised about the crucial role of play in cognitive development: Jean Piaget affirmed that play is the primary tool for the study of a child's cognitive process and is the "most spontaneous habit of infant thinking". Lev Vigotsky firmly maintained that symbolic play represents a fundamental activity during early childhood through which a child has the opportunity to **develop and structure his/her cognitive, social and affective aspect** In the 1930s, to help boys and girls who had lived through stressful experiences, David Levy developed a technique he called 'release therapy', while Virginia Axline summarised the concept of 'play therapy' in the following statement: "A play experience is therapeutic because it provides a safe relationship between the child and adult, so that the child has the freedom and space to express himself/herself through his/her own means, exactly as he/she is at that precise moment, in his/her own way and in his/her own time".

#playtherapy #cognitivedevelopment #psychology
#symbolicplay #subconsciousness #psychodrama
#neuropsychologicalfunctions #emotions #workingmemory
#learningtolearn #rehabilitation #antistress #oxytocin
#clowntherapy #psychoneuroendocrinoimmunology
#dopamine #multisensorystimulation #empathy
#emotionalintelligence #cooperation



Game-playing facilitates the production of oxytocin, a hormone that not only increases sociability and empathy, but also raises the threshold of the nociceptive networks.



Game-playing as a therapeutic instrument for adults

So, if play has achieved a prime and essential position in child psychology, recently numerous articles have documented the effectiveness of game-playing therapy as a model of intervention with adults as well. In addition to recreation and entertainment, its function is also **the development of physical and intellectual qualities**, and can therefore be exploited by anyone, whatever their age. Through games and simulations, as can happen for example in a **psychodrama**, the patient is offered the opportunity to experiment with new ways of behaving and relating by modifying some “scripts” that would otherwise always be repeated in the same way.

It also allows adults **to symbolically express what cannot be expressed verbally**, for example people can feel empowered to represent their emotions in a “free” space or to express conflicts that otherwise they would have difficulty in communicating.

In addition to helping on the affective and emotional level, play can also become an important therapeutic tool on the **cognitive level**. Through specific exercises proposed in the form of game-playing, it is possible **to train and develop numerous neuropsychological functions**, such as for example visual-spatial skills, problem-solving, sustained attention, visual-motor coordination, the so-called working memory (→ page 104) and mnemonic functions. Recent studies by Zhang have suggested that subjects who had trained in ‘action video games’ showed shorter learning times in perceptual and working memory tasks, compared to people who had not participated in the same type of games. In other words, **game-playing facilitates the so-called “learning to learn”**, through a process of generalisation,

whereby a function that is trained in one context also shows improvements in similar domains. Therefore, games with building bricks, exercises similar to puzzles or the famous “Memory”, or even puzzle games are commonly used both with children and adults for neuropsychological rehabilitation. Examples of where the activities we are talking about may be applied are learning disabilities, mild cognitive retardation and cognitive decline in the elderly.

The anti-stress function of game-playing

Game-playing has important therapeutic purposes also in many other conditions: in the adult person with disabilities or dementia, in stressful situations, in end-of-life care, in supporting **caregivers**, in the prevention of burnout and for chronic pain. **In fact, game-playing facilitates the production of oxytocin**, a hormone that not only increases sociability and empathy, but also raises the threshold of the nociceptive networks (the neural networks of the central and peripheral nervous system responsible for pain sensitivity), so much so that today it is considered for use in relieving stress and pain.

These principles are also the basis for ‘**clown therapy**’ practiced more and more widely in hospital wards for children, but also in nursing homes and other reception settings. ‘Clown therapy’ is linked to the principles of Gelotology (from the Greek ‘gelos’ = laughter and ‘logos’ = science), according to which playing and therefore having fun and laughing stimulate the heart and breathing, favouring blood oxygenation, a decrease in blood pressure and muscle relaxation. In addition, fun associated with the play area facilitates the release of beta-endorphins by the adrenal glands and cortisol, a hormone that regulates the

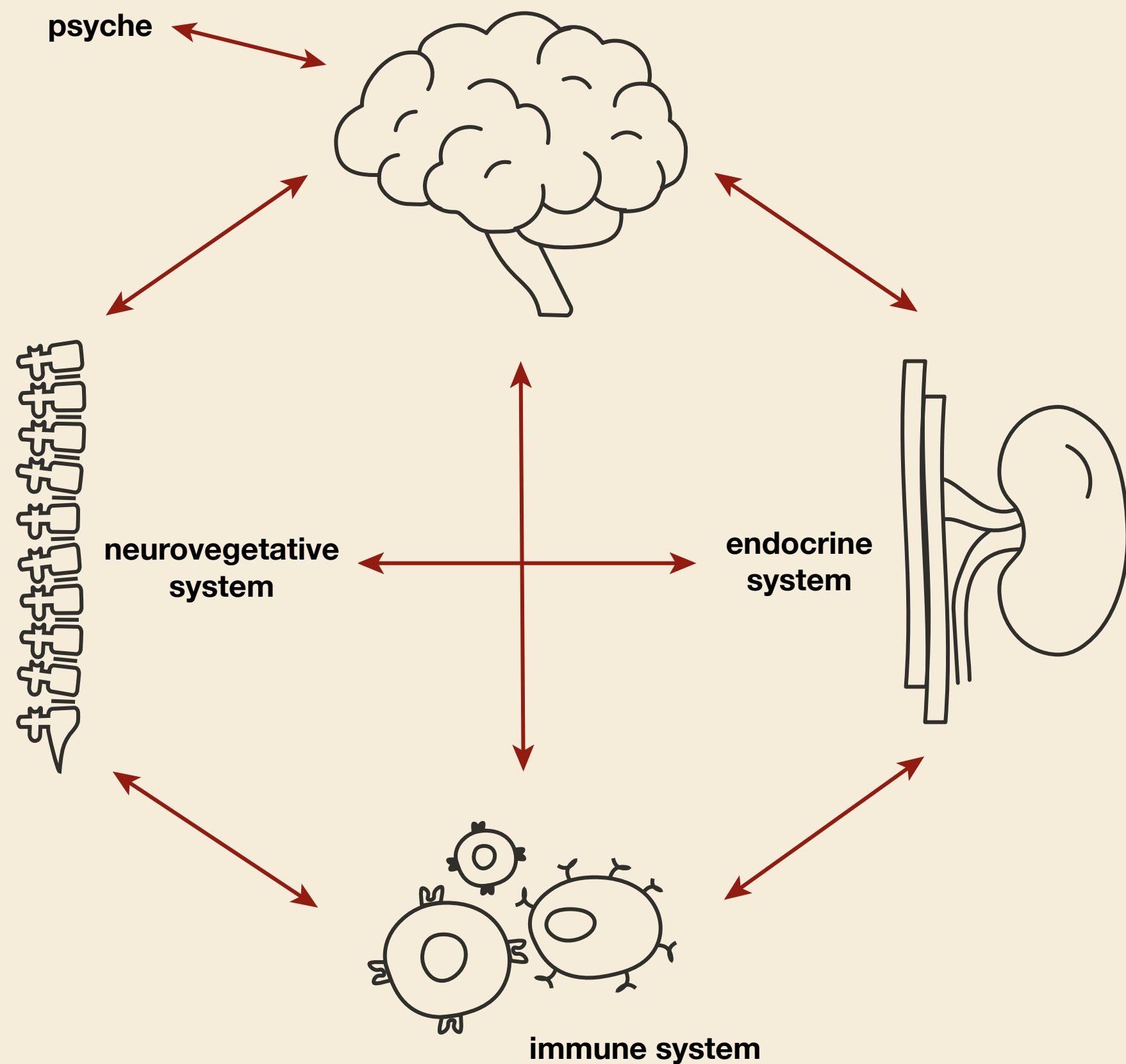


Figure 3.1.1
The complex relationships between the central nervous system, endocrine system, neurovegetative system and immune system according to the principles of Psychoneuroendocrinoimmunology (PNEI).



What is PNEI?

response to stress. Lastly, according to the principles of Psychoneuroendocrinoimmunology (PNEI → page 103), the discipline that studies the complex relationships between affective states, nervous system, endocrine system and the immune system, playing and laughing help to enhance the immune system defences (Fig. 3.1.1).

In addition, **when we play, our organism produces dopamine** (→ page 102), a neurotransmitter that stimulates the sensation of pleasure in the brain, thus giving a feeling of well-being and gratification. Unfortunately, dopamine is also responsible for the processes underlying “pathological gambling”, ranging from actual gambling, to the more subtle but no less dangerous gambling disorders and addictions related to slot machines or ‘scratch cards’.

Game-playing as a therapeutic instrument in adults with dementia

The game-playing dimension has proved to be an effective emotional-affective passe-partout even in the treatment of individuals suffering from severe neurological diseases. One of the best known examples is the Snoezelen method, a therapeutic approach that was conceived in the 1970s with the aim of promoting the well-being of the person through **modulated multisensory stimulation**.

‘Doll Therapy’ and ‘Emotional Toy Therapy’ are approaches that are becoming increasingly popular for use in the treatment of people with severe brain and neurological disabilities and also of the elderly with dementia, in particular with Alzheimer’s disease. The primary purpose of doll therapy is to reduce some of the more frequent behavioural disturbances that affect individuals suffering

from dementia, such as ‘wandering’, business and aggression, agitation, anxiety, depression, apathy and sleep disorders.

In fact, the use of dolls with realistic features or soft toy animals can produce unexpected benefits in these people, inducing **pleasant emotional states**, relaxation and reduced aggressiveness. Holding a doll or a soft toy in their arms can not only help patients suffering from apathy, social withdrawal, psychomotor agitation and anxiety, but **can also facilitate an urge to communicate and to express themselves**. Furthermore, taking care of a doll or a toy animal encourages these patients to find a purpose, a routine and actions aimed at focusing on positive emotions.

Game-playing as a medium for empathising and socialising

Finally, another dimension where game-playing has a purpose although not strictly therapeutic, but nevertheless linked to individual well-being is **team building** in the business environment: this type of experience, in fact, allows colleagues belonging to the same work group to play together **developing team spirit, empathy and emotional intelligence**. Being part of a team can be decisive in developing one’s personal skills, but it’s not always easy.

Team building, through participation in specially prepared games, allows members of the working group to get to know each other and cooperate to achieve new goals, which although different from corporate ones, are common and dictated by the experience that the participants are sharing. Team building fosters a sense of mutual trust, the



Doll Therapy



ability to measure one's roles and exploit one's potential by putting them at the service of the team.

This type of approach not only stimulates productivity, but also helps to promote individual well-being in the workplace. Moreover, numerous studies have shown that cooperative play favours intercerebral synchronisation, that is a sort of tuning on the same cerebral wavelength.

In various experiments conducted through EEG for the detection of cerebral electrical activity it has been shown that the neural network of the frontal brain areas is more densely and intensely interconnected between two players when they cooperate, compared to when they play individually (Babiloni et al.; 2007; Li et al., 2021). This phenomenon would result in a “tuning” to the same brain-wave rhythms in the two cooperating individuals, a phenomenon that would seem to affect above all the theta and alpha rhythms produced by the electrical activity in the brain.



3.2

Gaming as a prosocial driver

contribution by **Roberto Di Paolo** and **Veronica Pizziol**



Roberto Di Paolo
Researcher at the IMT School for Advanced Studies Lucca. His main research interest is in Behavioural and Experimental Economics. Ordinary member of the GAME Science Research Center.



Veronica Pizziol
Doctoral student in Economics, Networks and Business Analytics at the IMT School for Advanced Studies Lucca; she works in the field of Behavioural and Experimental Economics on research topics concerning prosocial behaviour.

Prosocial behaviours are defined as voluntary behaviours aimed at benefiting others without the immediate pursuit of a personal reward. The role played by prosocial behaviour in promoting “psychosocial” adaptation (→ page 103), which concerns the influence of mental processes on social interaction, is of particular importance especially from childhood onwards. Adolescents, in fact, who have developed prosocial behaviours since childhood adapt better over time and are **less likely to develop emotional and behavioural disorders** typical of the developmental age.

The consolidation of prosocial behaviours by boys and girls is therefore important for their health, their well-being and, consequently, for making good progress at school. Furthermore, **the power of prosociality affects social and academic achievement in the long run, too**. In fact, in recent years, it has been observed that learning prosocial skills during early childhood increases prosocial behaviours for the rest of one’s life.

Using games to support these prosocial behaviours has proved to be a highly motivating and effective tool. There are many playful elements that can be identified to promote prosociality: the play area, multipurpose toys, dedicated reading, group games and organised games.

In particular, given the level of time that play occupies in the daily life of boys and girls, educational programmes based on organised and group play are the ideal tools for encouraging the desired behaviours.

The IMT School for Advanced Studies Lucca, in collaboration with the Municipality of Lucca, GEAL (Gestione Esercizio Acquedotti Lucchesi - a water company) and Lucca Crea, studied the behaviour of children participating in a play-educational programme called “BluTube - Chi porta l’acqua a casa” (BluTube - Who brings the water home). The programme saw the participation of about a thousand children from primary schools in the Municipality of Lucca; it involved the use of the BluTube board game in school and

#prosociality #behaviour #prosocial #childhood #organisedplay #playeducational #sharing #awareness #behaviouraleconomics #neuroscience #behaviouralmodels #reducinginequality #reciprocity #decisions #socialimage

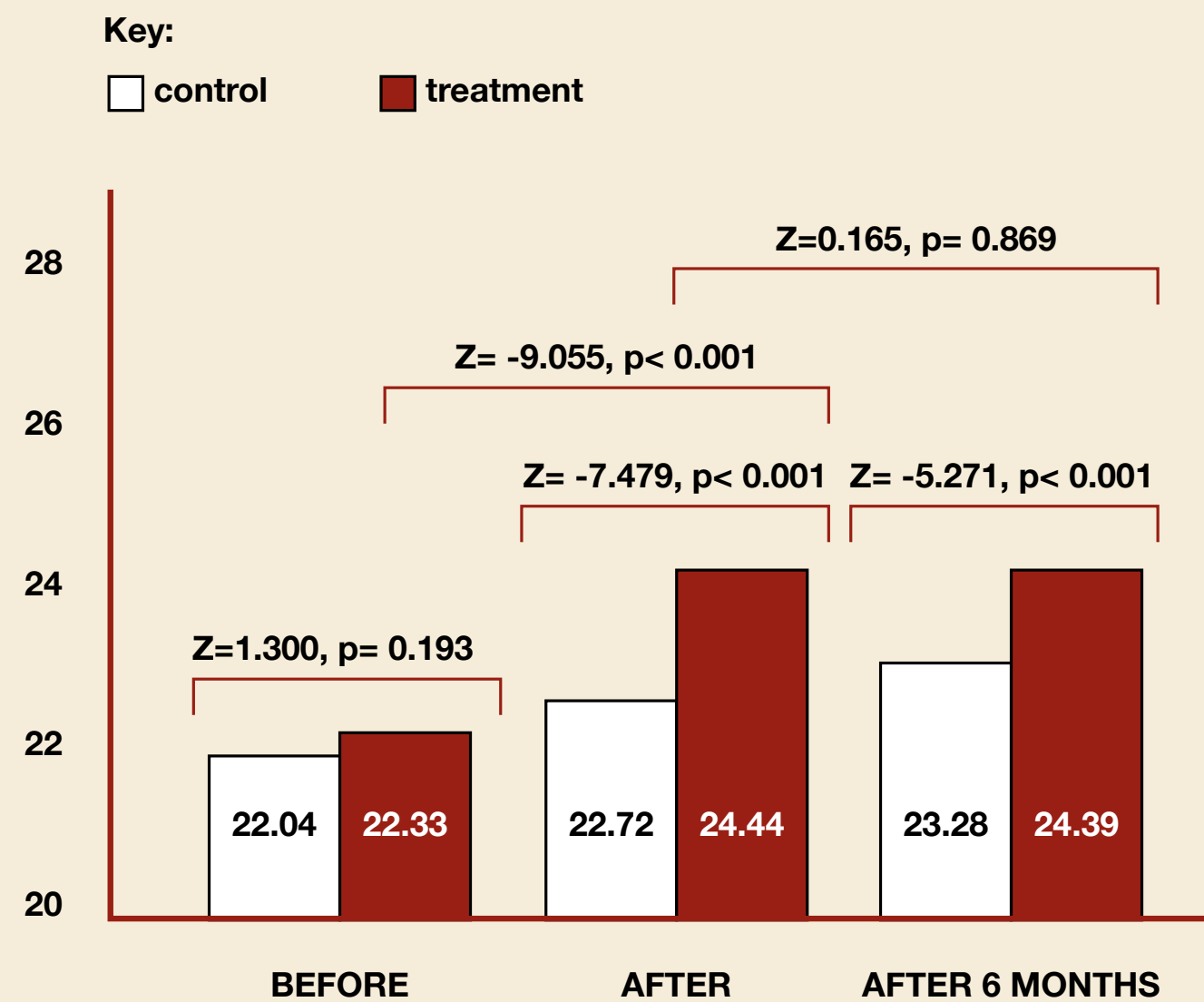


Figure 3.2.1
Average reported prosocial behaviour for treatment and control.
Bilancini et al. 2021



Blu Tube - Chi porta l'acqua a casa

It is a competitive board game in which the goal is to build a more efficient city from a water point of view: by constructing the waterworks, improving buildings, repairing faults, expanding the water network and connecting the various areas of the city, the players can earn Efficiency Points (PE). The player who gets the most PE is the winner.

at home or with friends, and also outdoor activities like discovering the so-called water places, such as fountains and waterworks, in the city. The results of the study show, as highlighted in **Figure 3.2.1**, that the children who participated in the programme **behaved more virtuously as regards water consumption practices** than a group of children who did not take part. Furthermore, the type of behaviour displayed by the participants remained constant even six months after the end of the project.

The programme did not only study the effectiveness of the physical and active game-playing but also **the role of digital games in similar contexts**. Recent studies have shown the benefits of learning through digital games compared to traditional teaching, without the use of playful practices. As shown by research from the University of Denver Business School, the use of digital games **increases students' effective knowledge on average**, their skills based on learned concepts are assimilated more fruitfully and information is retained for longer.

Promoting prosociality in adults

In adulthood, the issue becomes more complex: prosociality goes beyond simply helping, caring and sharing and implies a particular propensity towards participating in the emotional experiences of others with an awareness of the effects of one's actions. In order to study how prosocial behaviours develop in adults, a branch of economics is used: the so-called Behavioural Economics. Since it is based on evidence deriving from Psychology and other Social Sciences, **Behavioural Economics** becomes a fundamental alternative to classic economic theories. More precisely, instead of relying solely on the purely economic dimension of

individuals, Behavioural Economics starts from experimental analysis and uses concepts drawn from Psychology to suggest cognitive models that are closer to human reality. So, it is this alternative from Behavioral Economics that adds certain limits to the individual's calculation ability, willpower and selfishness. **The knowledge of these limits comes from Psychology and, more recently, from Neuroscience.**

Behavioural Economics is particularly useful when the decisions are complex and efficiency is difficult to achieve: such decisions include some of the most important choices people make, such as those regarding education, career, purchasing a car or house and even the choice of partner. The methods offered by this discipline are versatile and can also be used to measure simpler behaviours, such as those underlying the choices made by children.



Behavioural Economics starts from experimental analysis and uses concepts drawn from Psychology to suggest cognitive models that are closer to human reality.





1
Described by da C. Hauert.
[www.univie.ac.at/virtuallabs/
PublicGoods/index.html#pgg](http://www.univie.ac.at/virtuallabs/PublicGoods/index.html#pgg)

2
Described by D. Kahenman.
www.jstor.org/stable/2352761

Behavioural Economics, along with Neuroscience, has explored many other reasons that can motivate human behaviour. The main prosocial behaviours include: **reducing inequality between people; reciprocity**, i.e. deciding how to behave according to the treatment received from others, for example by returning a benevolent act with equal generosity and a hostile act with another act of hostility; **the social image that one has of oneself**, for example the desire to be perceived by others as generous.

Many Behavioural Economics experiments have shown empirical evidence that these aspects influence the choices of individuals. More specifically, in the application of this discipline, use is often made of particular games, economic ones.

In this case, games are defined as **interactive decision situations** consisting of:

- players who make decisions;
- rules, which specify the order of the players' decisions and the information available;
- results determined by the choices of all the players;
- the players' preferences on the results.

For example, in strategic games where people can decide how to help others using their own money (such as the “public assets’ game” **1** or “the dictator’s game” **2**), people show generosity, as they tend to reduce differences, they contribute more if they think that others will do the same (due to positive reciprocity) and they give more when their actions are public. These human reasons can also be influenced by belonging to a group. In fact, there seem to be **two types of prosociality: a “parochial” type**, which denotes attention to one’s own group and a sense of territorial belonging, and a **“universal” type** which denotes attention to “others” in a general way without conditions of belonging to a specific group.



3.3

Business game and Organisational Neuroscience

contribution by **Antonio Mastrogiorgio**



Antonio Mastrogiorgio
Researcher at the IMT School for Advanced Studies Lucca; he focuses on biological foundations in decision-making and organisational behaviour.

Playful learning is not a recent innovation, but on the contrary it has its roots in the past. Business games, for example, have a well-established domain of applications in the business and economic spheres with a tradition dating back to the late 1950s. They are used for educational purposes and can be declined in different subdomains such as strategy, finance, production, logistics, human resources, etc.

A definition in negative terms can be drawn through the intersection between:

- **role-playing games**, based on technologies and methodologies capable of simulating real world situations and problems;
- **management games**, used to reproduce management contexts (not necessarily in business);
- **serious games**, created for purposes other than mere entertainment and with learning objectives.

Therefore **business games are games that through simulation reproduce management contexts in the business field**. The characteristic elements, useful for structuring them, are set out in **Figure 3.3.1**.

Environment of Application	→	the spatial and temporal dimensions of the business game environment
Design Elements of User Interface	→	the user interface elements of the business game
Target Groups, Goal Objectives and Feedback	→	the target and reinforcement mechanisms that are a specific feature of the business game
User Relation / Community	→	the relational characteristics that set the business game apart
Model	→	the simulation model underlying the business game

Figure 3.3.1
Elements of a business game

#neuroscience #business #simulation #strategy #management
#seriousgame #companypractice #cognitiveprocesses #engagement
#organisations #relationaldynamics #experimentalcontext
#makingadecision #formulatingassessments #problemsolving

Creating

Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing.

Evaluating

Making judgments based on criteria and standards through checking and critiquing.

Analyzing

Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing.

Applying

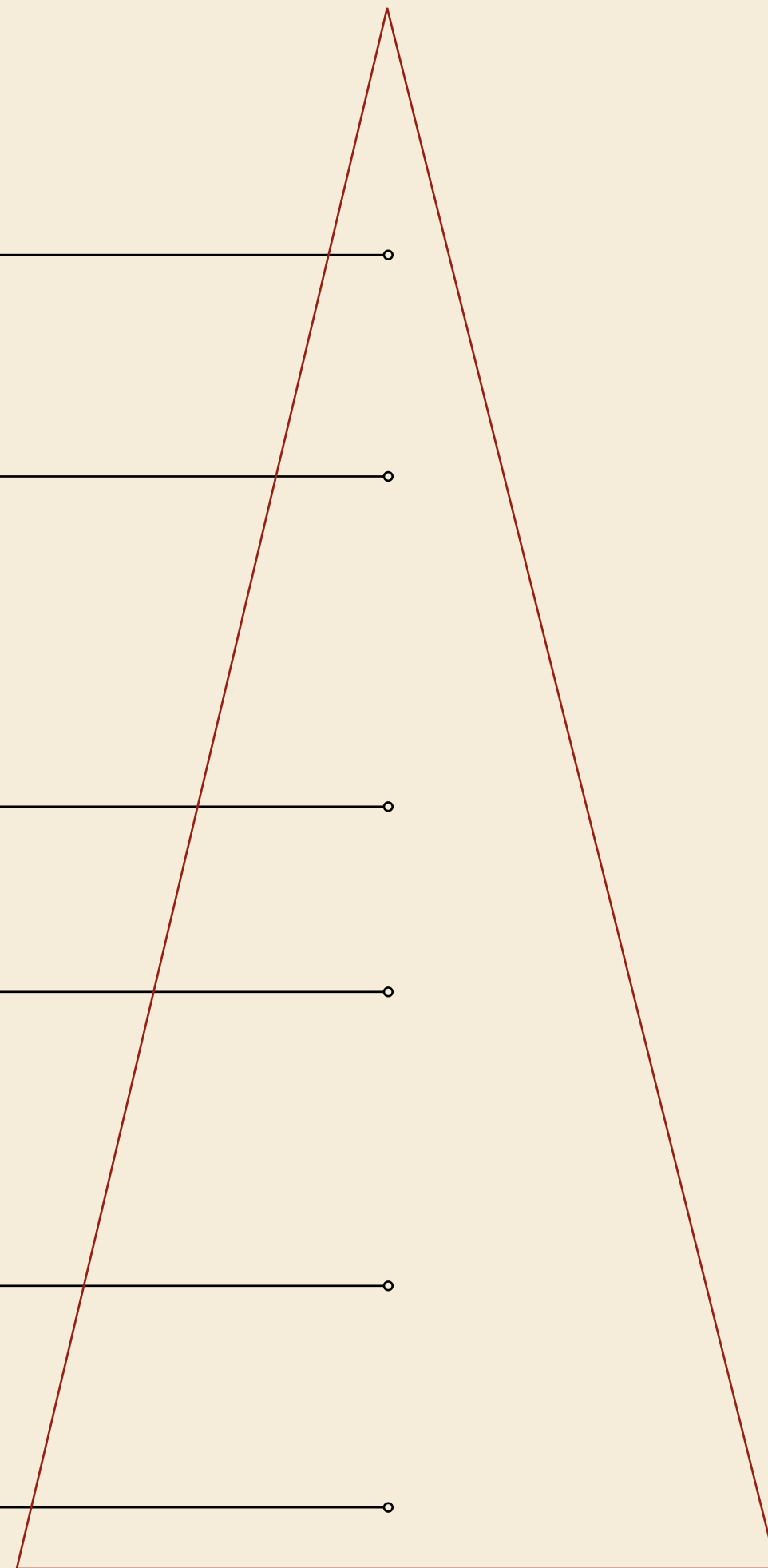
Carrying out or using a procedure through executing or implementing.

Understanding

Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.

Remembering

Retrieving, recognizing, and recalling relevant knowledge from long-term memory.



Organisational Neuroscience

Organisational Neuroscience combines studies on the human brain with studies on behaviour in organisations. Using methods, techniques and tools borrowed from Neuroscience, it analyses various typical phenomena, pertaining to different organisational levels: micro (motivation, decisions, emotions, personality traits, ethics, etc.), meso (shared mental models, emotional contagion, empathy, interpersonal traits, cooperation, etc.), macro (climate, organisational change, strategy, power coalitions, etc.).

If you consider that each element can be exploded into further sub-elements, you can understand the usefulness of the scheme: it allows you to compare existing business games and provides guidelines for their design and development.

“Cognitive” aspects

The need to define what a business game is (and what it isn't) serves to sort out a complex domain of applications that, for more than half a century, has brought together scientific research, technological development and business practices.

In the mid-1950s, a taxonomy (also known as “**Bloom's taxonomy**”) was proposed by a few writers that could be used to hierarchically classify the learning elements according to different levels of complexity and specificity. An updated version of it, which takes account of cognitive processes is in **Figure 3.3.2**.

The hierarchy defined above makes it possible to identify, in an orderly manner, the cognitive dimensions that characterise learning processes and therefore, by extension, the processes mediated by game-playing. Albeit with some criticalities, the hierarchy has a high heuristic value as it allows the construction of learning programmes to be arranged in relation to the identified cognitive processes.

The role of Organisational Neuroscience

Studies on games, from a neuro-behavioural perspective, represent a consolidated domain that over the decades **has evolved paradigmatically**, as the same rate as the development of games, in particular digital ones. In the 1980s, the approach to game analysis was of the so-called quasi-experimental type: levels of cognitive performance were compared between a group of habitual users of games (especially video games) and a group of individuals who did not use games. From the 1990s onwards, with the development of digital technologies, **there has been a clearer classification of games** and their subdivision into specific categories. This arrangement went hand in hand with the formulation of dedicated hypotheses linked to specific mechanisms such as perceptual decisions, selective attention, visual-spatial memory, reaction times, etc.

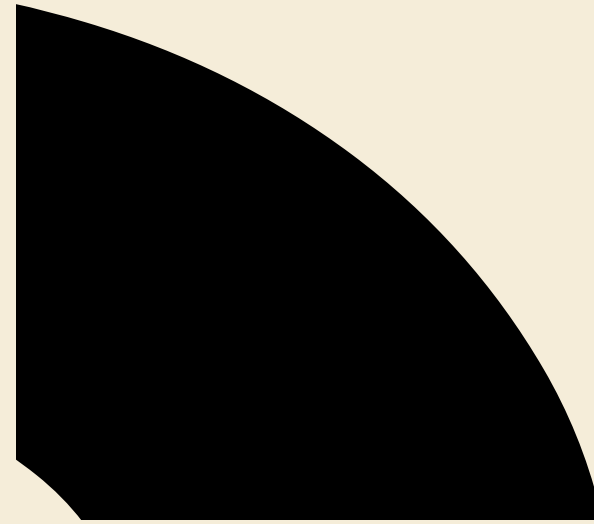
To date, research has been strongly conditioned by two aspects:

- the distinction between **action games** and **nonaction games** — once useful, as it allowed to demarcate different types of neuro-cognitive mechanisms — is now increasingly weaker;
- while in the past **playful activity** was associated with specific hobbies and personal propensities (which required investments of time, effort, as well as money), nowadays it has become pervasive in human systems. It is increasingly difficult to identify a typical player as there are no individuals who have never played, so the very identification of the individuals to be studied requires specific consideration.

Figure 3.3.2
Learning according to “Bloom's taxonomy”



“Business games” are effective only if their implementation takes individual differences into account and also the differences in role and relational dynamics that exist in an organisation.



A list of the main business simulation video games

Although the literature on gaming is well consolidated, the same cannot be said for business games which are a **poorly studied domain from a neurocognitive and behavioural perspective**. The lack of consolidated scientific literature must be seen not so much as an element of omission in the progress of knowledge, but as a symptom of the difficulty in embracing a domain, that of business games, whose expansion has gone hand in hand with the evolution of digital technologies and company practices.

Operational suggestions

A scientifically based development of business games is not easily practicable today if we consider the lack of consolidated literature on the subject. It is possible, however, to provide some prescriptive elements that reflect the state of the art.

- In the past, the use or development of business games was associated with **high costs and therefore was only the prerogative of large organisations**. The evolution of digital technologies is gradually but radically redefining these trends and reducing cost barriers. The design of a game is easier to pursue also given the possibility of customising the offer.
- Business games show their potential **when used together with other learning tools**. Therefore they should not be considered as mere substitutes for more traditional methods. Rather than transforming an entire context into a game, it might be more effective to accompany the game with material and tools external to it.

- If we say that business games can be **integrated with external elements**, we cannot, however, neglect the systemic-organisational aspect. Business games are effective only if their implementation takes individual differences into account and also the **differences in role and relational dynamics that exist in an organisation**. A business game intended for specific individuals — for example a team or an entire organisation — must take into account the relational dynamics that define the group.
- **Specific corporate cultures** represent a crucial factor that can facilitate or inhibit the effectiveness of a game-based activity in the business environment. The presence of a “traditionalist” management, and therefore one that is sceptical of business games, could easily turn into widespread scepticism, defeating the use of the game. **The use of a business game cannot therefore be separated from careful consideration of the various stakeholders**.
- It is a good idea to consider that often a game-based activity can serve more as a **useful tool for enhancing relational dynamics** found in the organisation, rather than to convey content. In this perspective, games should be considered more as relational tools instead of tools for the development of knowledge.



“

While a simulation moves firmly in the direction of reality, a game-based activity has its raison d'être precisely in the extent that it “neutralises” those elements of reality that do not appear playful and are unable to “entertain” player.

”

Between reality and simulation

Business games are a paradox. Being reproductions of real decision-making contexts, they risk replicating the actual problems inside organisations and therefore **could lead to poor engagement**. In other words, fidelity to actual reality and a playful dimension could be elements of a ‘trade-off’ (→ [page 104](#)). While a simulation moves firmly in the direction of reality, **a game-based activity has its raison d'être precisely in the extent that it “neutralises” those elements of reality** that do not appear playful and are unable to “entertain” player.

The tension, therefore, between the need for reality and game-playing opportunities represents one of the greatest challenges in the future development of business games.

This challenge is even more stimulating if we consider that today individuals are normally bombarded with playful experiences.

Organisational Neuroscience represents a domain that is not yet sufficiently consolidated, which could find business games as a promising field of research in the coming years. At the same time, business games can provide some experimental contexts that could be useful for analysing the areas of the brain involved in making decisions, in formulating judgements and solving problems in relation to the business world.



3.4

Game-playing and personnel management

contribution by **Giada Reali**



Giada Reali

PhD student in Occupational Psychology at the University of Florence with interest in the application of playful elements in company contexts.

**#humanresources #strategicmanagement #stimulatingenvironment
#selection #training #skills #abilities #candidates #personalitytraits
#cognitiveprofile #engagement #memorisation #inclusion #motivation
#rewards #socialinteraction #insularcortex**

The role of people managers in companies has evolved over the last twenty years: today it is more correct to speak of **strategic personnel management**, a concept that emphasizes the connection of all activities and decisions relating to employees with the strategies and objectives of the company. Knowing how to recruit new professionals, create a stimulating and safe work environment, and knowing how to support staff in the acquisition of new skills, knowledge and abilities are the key to success for a company in order to achieve its objectives, high level performance and to obtain a productive and competitive advantage. Games and gamification mechanisms can represent strategic support for a company, offering valuable help in all these personnel management tasks, from selection to training.

At the same time they can help employees to increase productivity and commitment, making work more engaging and interesting, to learn skills and abilities used in the game and that can be transferred to the workplace and to increase cooperation between colleagues through group games (see 3.1), that work on team building. Below, some

real examples of 'game-based' approaches suited to recruitment and selection practices, and also training and reward systems will be presented.

Games used in recruitment and selection

Games are a valid tool for **attracting the most suitable candidates** to a position and are useful in then **choosing the best candidate**. PwC, a multinational company that provides strategic, legal and tax advisory services to businesses, makes extensive use of games. Until 2016, its search and selection of personnel involved the use of a virtual 'serious game', "Multipoly", which led candidates to experience all stages of the selection. As noted by Noemi Biró, regional recruiter manager of PwC Hungary:

“those who had played were on average more prepared for the real interview because they were already educated on the company vision, on the skills needed to work at PwC and in general on what the job would be like”.

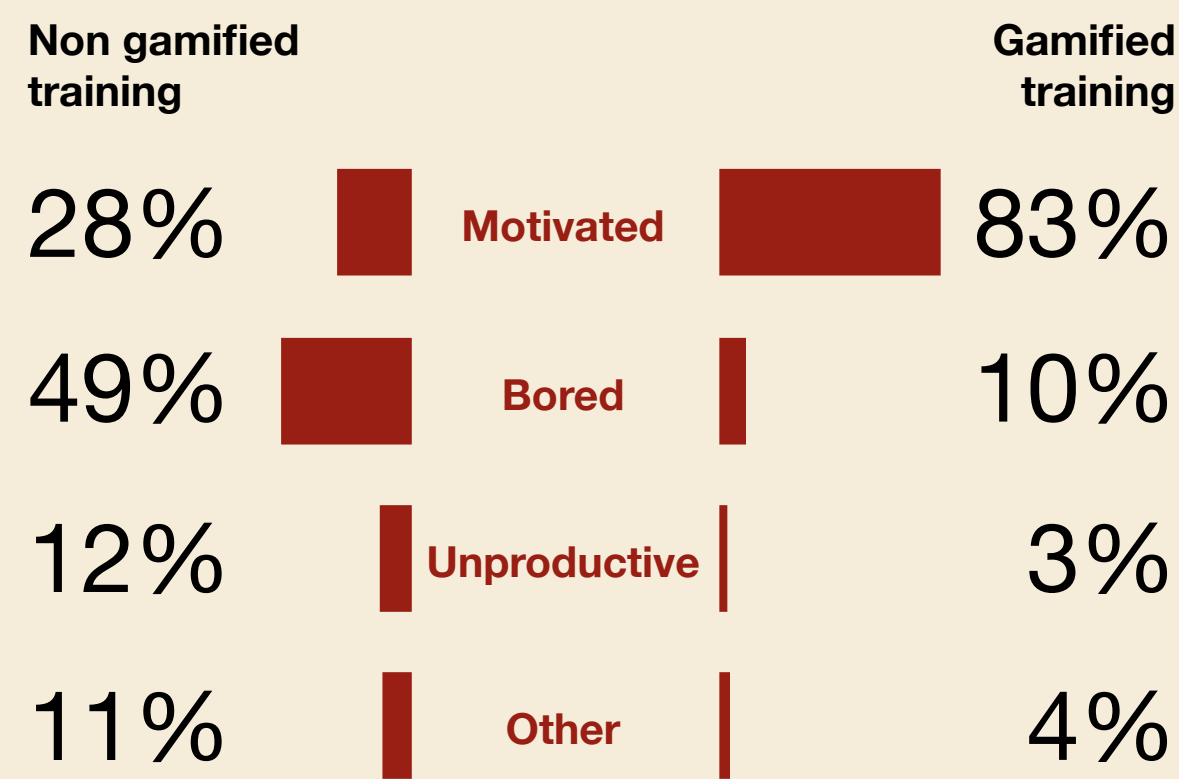


Figure 3.4.1
Differences between formal lessons and gamified lessons

(source: TalentLMS Gamification Survey)



To learn more about
“Multipoly”

By simulating the phases of the selection process, in fact, the candidates had actually trained themselves, **the learning process had created the cognitive schemes that would then be reactivated in the similar context, i.e. during the actual selection process.** Furthermore, “Multipoly” turned out to be a valid tool for attracting new people as it recorded an increase in candidatures of 190%.

Thanks to the application of Neuroscience in candidate profiling, some games have been created that can assess personality traits so as to create behavioural models and cognitive profiles and so choose the candidate on these bases.



To learn more about
the TalentLMS study

Pymetrics, a company specialised in the development of game-based assessments, for example, in order to create the best working environment, allows candidates to be classified as follows: ‘cooperators’, being the first to take the initiative and to give support to the group; ‘free riders’, those who do not usually make a contribution or who take advantage of the contribution of others, and ‘reciprocators’, those who help the group to have a personal advantage.

Mckinsey & Company, a strategic consulting multinational, uses the ‘problem-solving game’ called “Imbellus” to create a **cognitive profile**, for each participant, based on five cognitive constructs: critical thinking, ‘decision making’, metacognition, situational awareness and systems of thought.

Game-playing in training and development

The use of games in training proves to be advantageous in many respects: **it helps to acquire knowledge and skills** more effectively than other more traditional methods, **it increases engagement and enables better memorisation of information** and for longer. A study conducted by the University of Colorado on the impact of games on students shows that those who had received this type of training scored 14% better on skill-based knowledge assessments, 11% more in terms of knowledge of facts and a 9% higher knowledge retention rate than those who had attended traditional classes. With regard to the aspects of motivation and engagement, a study by TalentLMS, a company that deals in training in the business environment, investigated these aspects between participants in traditional lessons and participants in game-based lessons for learning hard skills (→ page 103). As can be seen in **Figure 3.4.1**, and in accordance with the literature on gamified learning, **the main capacity of this educational model is to increase the level of motivation, in this case by more than 50% compared to a traditional, lecture-based model** for learning.

Game-playing in the system of company rewards

Zappos is an American clothing and footwear e-commerce company, noteworthy for the gamification processes that it applies as part of company rewards. By undertaking a training course and helping colleagues, employees earn “Zollars”, a currency that can only be used in the company and can be donated to other colleagues to recognize their commitment and kindness.

In addition, every week, each employee can nominate a



The playful element of the award has a social recognition function, promotes inclusiveness and aligns people towards a common goal.



deserving colleague, explaining the reason for their choice, who should be given a parking space near the entrance, usually reserved for management figures. Finally, the employees who have been able to distinguish themselves can be elected “company hero/heroine”, win a cash prize and a ‘standing ovation’ from colleagues with the obligation, however, to wear a cloak when in the company. **The playful element of the award has a social recognition function, promotes inclusiveness and aligns people towards a common goal.** Furthermore, this system of rewards proves to be motivating because material rewards such as money, called extrinsic, are accompanied by **the intrinsic ones that satisfy the primary needs**, such as, precisely, that of recognition. They stimulate social interaction, the approval of other employees’ commitment and kindness, increase motivation and, at a neural level, activate the insular cortex, linked to emotional processing.

The gaming applications in the context of the organisation of human resources, in all its levers, are extremely numerous.

These are just some of the examples of how these tools can be used to improve the working environment and increase employee engagement and motivation. Finally, thanks to Game Studies and Game Science and the continuous exchange between neuroscientific practice and research, it will be easier and easier to find the right person for the right place.



Laborplay - the game for advisory work and training



Gaetano Andrea Mancini
Occupational psychologist and PhD; he has been teaching Marketing and Advertising Psychology at the University of Florence since 2008. Co-founder of Laborplay and author of numerous publications.

Interview with **Gaetano Andrea Mancini, Laborplay**

What is Laborplay and how did the idea come about?

Laborplay is a spin-off of the University of Florence which provides advisory and training services to Companies. We mainly deal with soft skills and we do it with games and gamification. Being a spin-off means offering solid, innovative and scientifically validated products and services to the market. The business idea came up with a desire to stand out from the crowd by combining the experience gained in the management of human resources with the belief that the HR world needed a few changes.



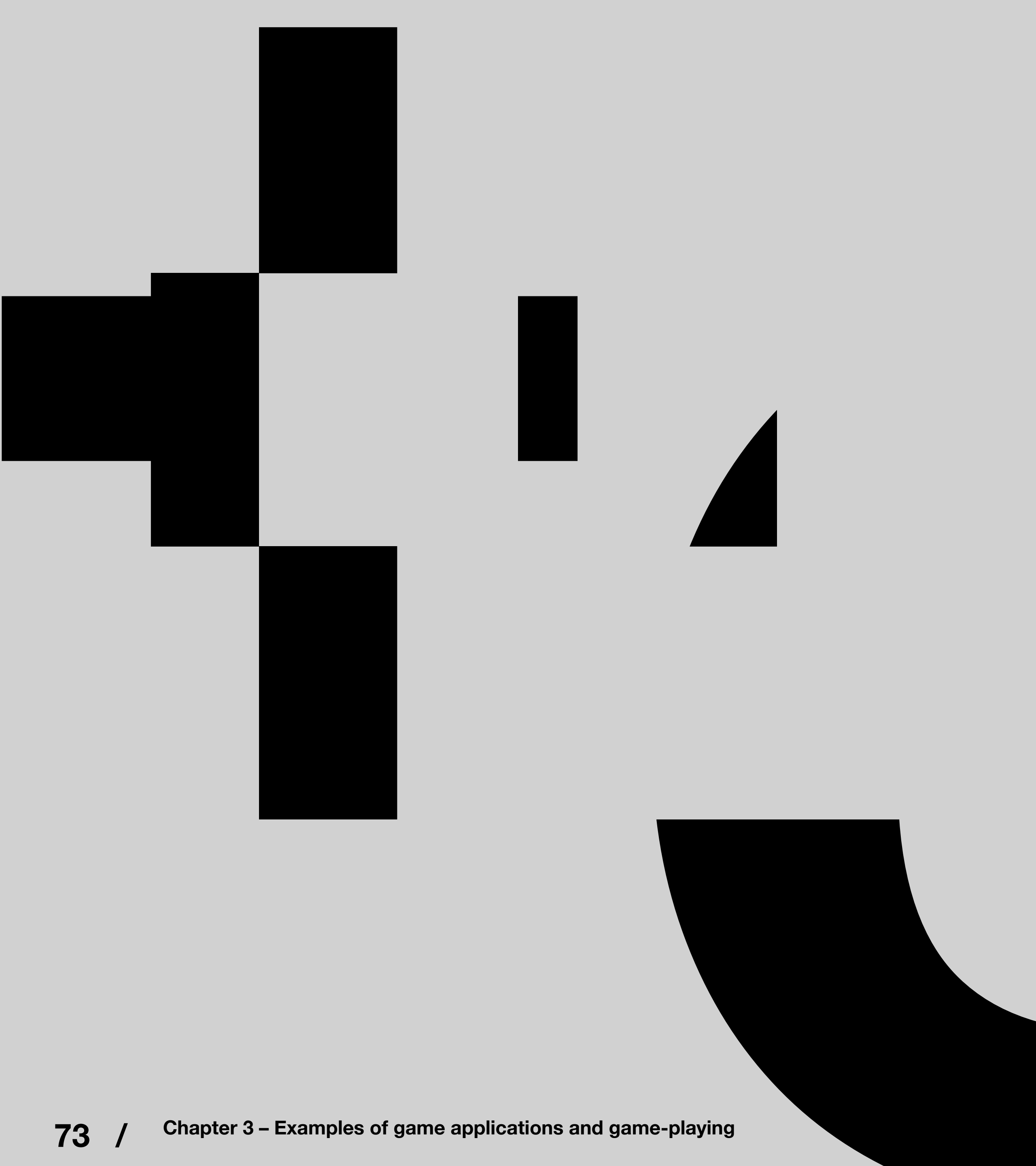
Being a spin-off means offering solid, innovative and scientifically validated products and services to the market.



The group of founding members, all occupational psychologists since their University days, succeeded in finding in gaming the lowest common denominator and a powerful functional tool for facilitating learning. In fact since their research work and cooperation in the (research) laboratory Labor, they uncovered gaming as also a disruptive element actually in those circles that had always thought it appropriate to separate work from fun. So, in 2015 we created something that not yet known on the market and that would allow us to keep on doing what we did before, but in an increasingly fun and engaging way.

Can you give me some examples of games or gamification processes among your proposals?

On the one hand, we work by trying to gamify some organisational processes, such as the training of technicians who manage car maintenance. Everyone knows how important training is but, in the end, no one wants to participate, because it is boring and designed for what is often passive use. So, by including playful elements, such as game rankings, 'badges' or levels,



people can be motivated to acquire more and more knowledge, where intrinsic motivation (→ page 103) for learning combines with extrinsic motivation (→ page 102) to climb a ranking list to gain some recognition. On the other hand, we use real ‘game-based’ tools, i.e. games or video games, including ones that already exist and to which we apply a new protocol, like Lego bricks or wooden dominoes, and the participants are called upon to use these to challenge each other to reproduce the same stimulus altogether. In the end, the important thing is almost never what they are doing but how they do it. And above all, the essential aspect is the downstream reflection on the experience. Conversely, at other times, a more traditional solution is needed and perhaps we use playfulness as a supplementary tool, such as something to break the ice, for example. For us, game-playing is never the goal: it is always just a tool at the service of corporate objectives.

Do you also use assessment methods?

Assessment and training are much closer than they actually appear to be. You cannot use one without the other, and vice versa.

At least in the approach we use. We use a number of games in our assessment centres, which always end with more or less structured debriefing phases to facilitate the construction of a shared meaning framework. “Assessing” the participants at one of our training events is unavoidable because it is the games themselves that provide real-time feedback (Did you win or lose? Did you reach the next level or was it game over?) and their forms of behaviour are easy to observe and to relate to a specific set of skills.

“

Part of our consulting activity is not only to find the most suitable form of game-playing for the company’s objectives but also to explain its potential and to manage people in an increasingly fun, engaging and motivating way.

”

What kind of companies seek the services of Laborplay?

We work with multinational giants and smaller local entities, listed companies and cooperatives, public bodies and private enterprises: the difference is not in the size of the company, the industrial sector or its geographical location. The real difference is the mindset of those who manage it. The important thing is to be able to reach them, to be able to clear away any doubts and prejudices that may also be linked to “this item here is a luxury item that I cannot afford, I need to be doing something else, I need to produce turnover”, as if these things were mutually exclusive. Part of our consulting activity is not only to find the most suitable form of game-playing for the company’s objectives but also to explain its potential and to manage people in an increasingly fun, engaging and motivating way. Also for us, the providers of the service.

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Interview

Brown S., Gray D., Macanufo J. (2010). **Gamestorming: A Playbook for Innovators, Rulebreakers, and Changemakers.** O'Reilly Media.

A complex, abstract pattern of teal-colored geometric shapes, including rectangles, squares, and triangles, arranged in a grid-like fashion. The shapes are of varying sizes and are positioned to create a sense of depth and movement, with some shapes appearing to overlap others. The overall effect is a modern, architectural design.

4

New Frontiers

1
For a full discussion, one should refer to:
kotaku.com/manifesto-the-21st-century-will-be-defined-by-games-1275355204

Eric Zimmerman, game designer and philosopher of games, in his 2013 “Manifesto for a Ludic Century”, wrote that “Increasingly, the ways that people spend their leisure time and consume art, design, and entertainment will be games - or experiences very much like games”. In addition to this, in the “Manifesto” he expresses thirteen ideas (outlined in the volume “The Gameful World” and that arise out of the debate on game-playing as an improvement of everyday life), listed under **1**, which define the present and future of game-playing:

1. Games are ancient.
2. Digital technology has given games a new relevance.
3. The 20th Century was the century of information.
4. In our Ludic Century, information has been put at play.
5. In the 20th Century, the moving image was the dominant cultural form.
6. The Ludic Century is an era of games.
7. We live in a world of systems.
8. There is a need to be playful.
9. We should think like designers.
10. Games are a literacy.
11. Gaming literacy can address our problems.
12. In the Ludic Century, everyone will be a game designer.
13. Games are beautiful. They do not need to be justified.

Even just by scrolling through them you can understand that game-playing was in the past, is today, and will be in the future, a fundamental element of our life, as a form of art, a common language and a channel of communication. The past and the present have already been discussed in the previous chapters; in this last stage of our journey into the world of gaming, however, we will look ahead and open some “windows” on the future, extrapolating some macro-themes that will become central to our daily lives.

We will then discuss the potential of the Metaverse (augmented and virtual reality), games as promoters of social change, esports and the economy of playful entertainment, and also the new perspectives that video games can offer to players with disabilities. However, it will not be just a positive vision. Gaming is taking on a progressive transformation into a cultural consumer product, which shows a persuasive side to be read critically.

4.1

Economic growth and the global spread of the gaming market

contribution by **Costanza Usai**



Costanza Usai
PhD student in Economics at the Universities of Siena, Florence and Pisa; her field of research is Behavioural and Experimental Economics.

Gaming stands out today as the **driving force behind much of the investment** and job creation across the entertainment industry.

The gaming sector may have benefited from the changes that have occurred in the entertainment and media fields, also due to the Covid-19 pandemic (Ortiz et al., 2020).

In fact, the restrictions due to the health crisis have only accelerated a positive trend that the gaming industry had been experiencing for many years, as more and more people around the world have turned to this form of entertainment as a tool for socialisation and connection in a period of social isolation (Marston & Kowert, 2020).

Video games and the digital industry

The gaming industry, including all businesses that deal with the design, production and marketing of playful articles, **is often underestimated in terms of its size and influence within the global economy.** By observing the aggregate figures of the entire entertainment industry, which also includes the recording and cinema sector, it is possible to compare on a global scale the profits generated by the video game sector with those of the other sectors of the market.

Figure 4.1.1 shows the global profits of the digital media market, a market that includes the music and digital publishing sector (i.e. ePublishing), videos-on-demand and video games. The latter, as shown in the graph, **represents the largest source of revenues (52.9%) in the entire digital media market.** In addition, another important observation concerns the expansion of the online entertainment industry following the Covid-19 pandemic, which went from a global revenue of 177 billion dollars in 2019 to 294 billion dollars in 2021. The segment of the video game market witnessed the most significant growth rate (of 12%) within the reference framework.

#games #videogame #boardgame #players #gameindustry #gamemarket #gamehabits #entertainment #gamesintheworld #playersintheworld #revenuesinthegameindustry #gamemarketgrowth #covid19 #lockdown #gamesandcovid19 #gamesandlockdown

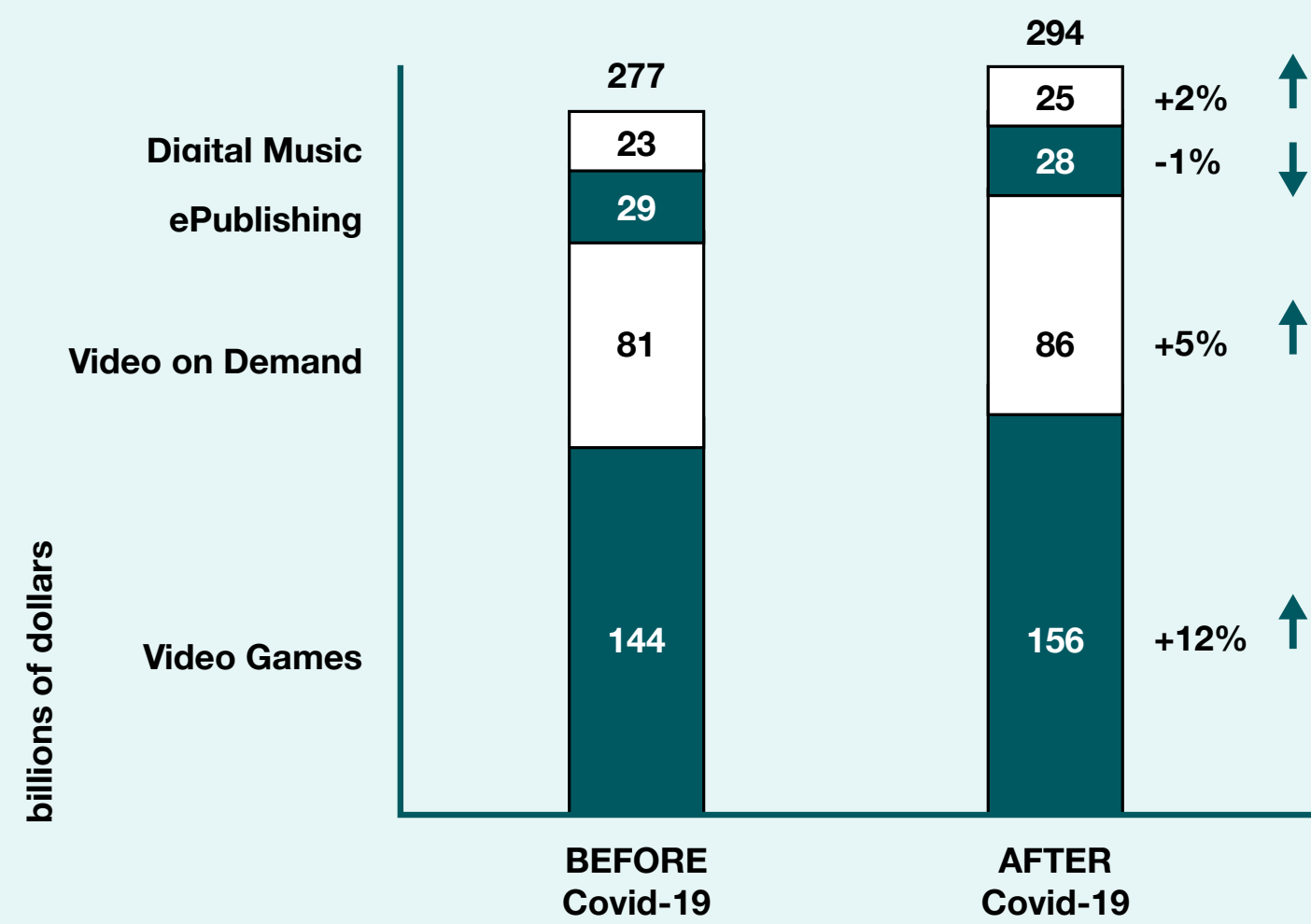


Figure 4.1.1
Revenues by sector in the entertainment industry before and after Covid 19

Source: Statista

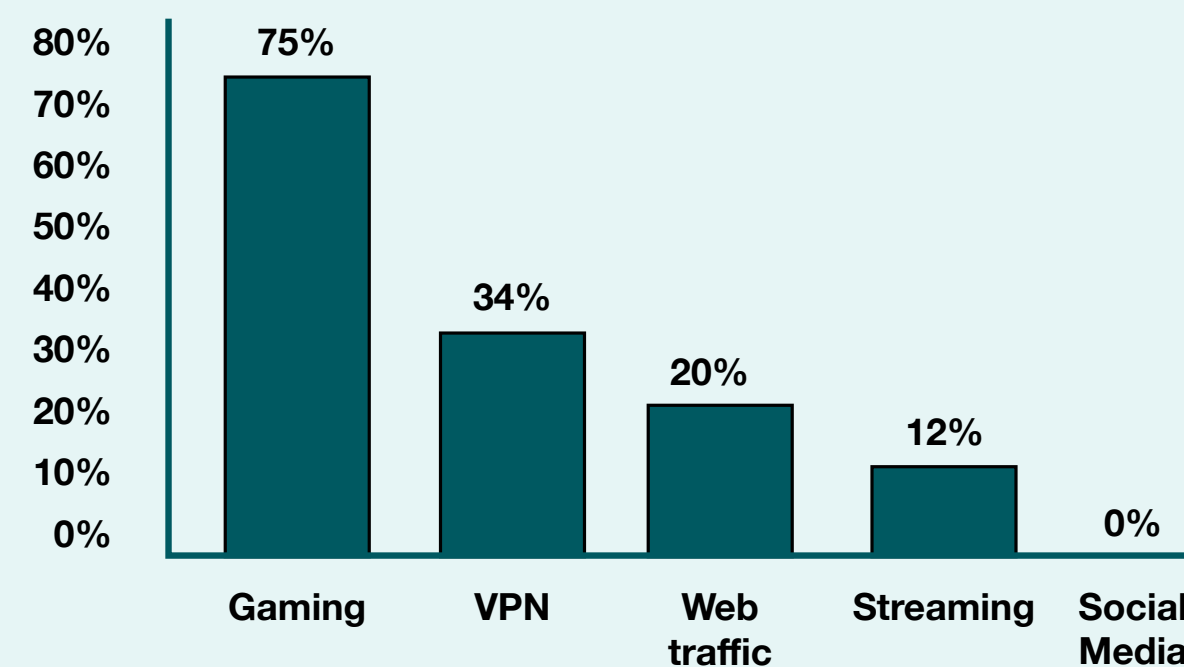


Figure 4.1.2
Average weekly increase, in March 2020, by category, in the use of data in the United States due to the spread of Covid-19

Source: Statista

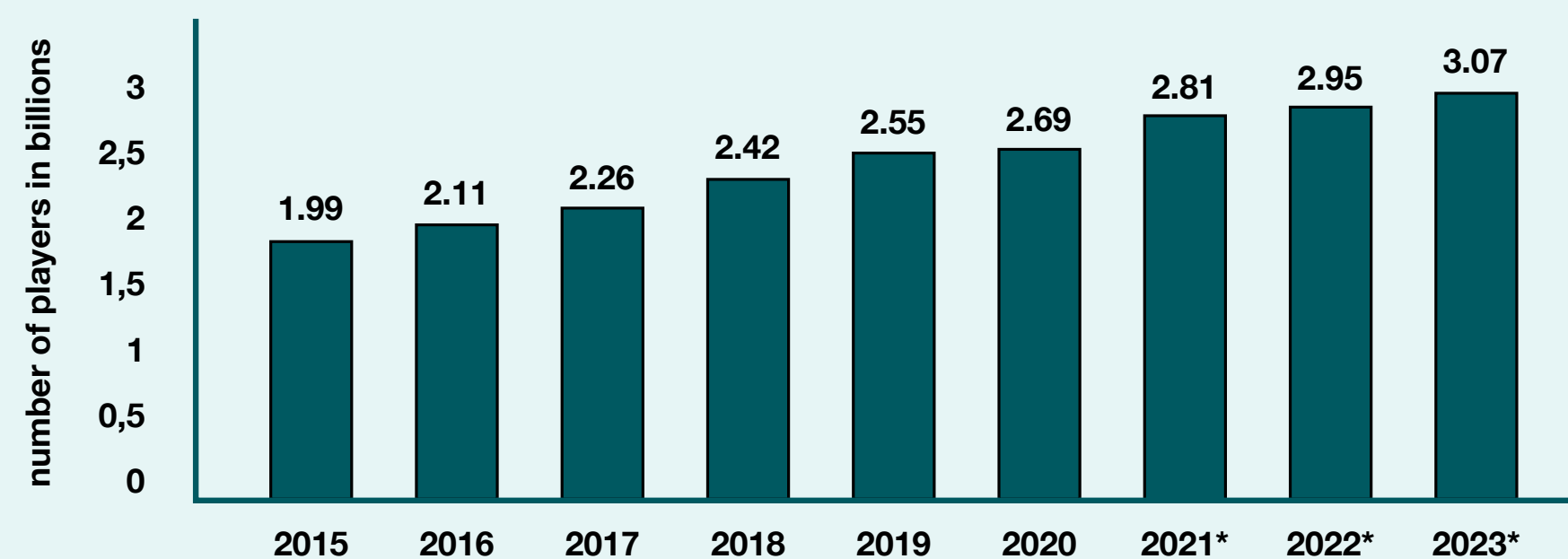


Figure 4.1.3
Number of players in the world (2015 – 2023)

Source: Statista, Newzoo

Conversely, **Figure 4.1.2** shows a detailed overview of the increase in data flows during the pandemic period in the United States: due to restrictions imposed across the country to combat the spread of the virus, online browsing increased significantly. In particular, as the graph shows, **data traffic dedicated to online gaming increased on average by 75% on a weekly basis merely in March 2020** due to the restrictive measures implemented by the government to combat the spread of Covid-19.

The number of players worldwide all grew. In 2020, in fact, there were 2.69 billion players around the world and according to a forecast by Newzoo - a leading company in gaming data analysis - the number is destined to grow further over the coming years, possibly reaching 3.07 billion in 2023 (source **Newzoo**), as shown in **Figure 4.1.3**. In comparison, in 2020, music streaming services and subscription radios had 400 million users worldwide (source **Statista**), while pay-TV and online streaming services together reached around 860 million subscribers (**Point Topic**).

For the gaming industry, the rise of internet and mobile phones is one of the decisive drivers of revenue growth from tens of billions to hundreds of billions of dollars.

A first step was taken with the possibility of making use of subscription and ‘freemium’ services (→ **page 102**), a type of subscription that allows the user to use a basic version free-of-charge, while any additional features must be paid for. In 2001, Microsoft launched the Xbox Live online gaming platform for a monthly fee, providing gamers with access to ‘multiplayer matchmaking’ and voice chat services. Meanwhile, on the PC front, Blizzard - a US video game manufacturer - with the release in 2004 of “World of Warcraft”, drew on the **massive multiplayer online** market (MMO → **page 103**), generating a peak of more than 14 million monthly subscriptions.

While companies like Nintendo have continued to focus on the console market, introducing increasingly innovative products such as Nintendo Switch, it was the giant Apple with the iPhone that consolidated the transition of gaming to the mobile platform.

The release by the Cupertino company of its smartphones onto the global market (immediately followed by Google with the Android devices) paved the way for application developers to create free, paid and ‘pay-per-feature’ games (→ **page 103**) for a mass market, which currently accounts for a large chunk of its total revenues.

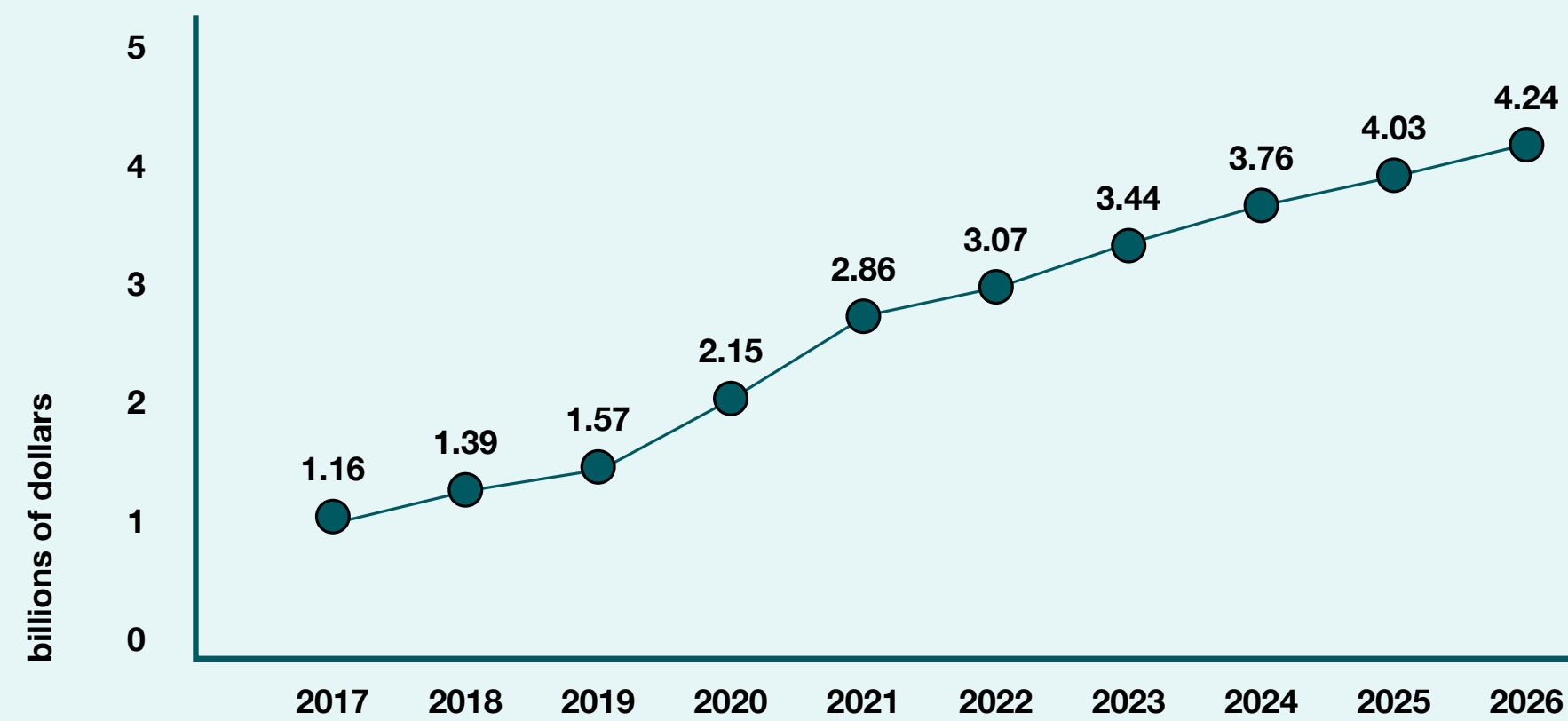


Figure 4.1.4
Value of the global board game market (2017 - 2026)

Source: Statista

The market of analogue games

Even traditional analogue games have conquered a substantial slice of the entertainment market, avoiding being engulfed by the digital revolution.

Showing growth for over a decade, the board games market has recently experienced a new surge following lockdown during the first wave of Covid-19. In a research carried out by Hasbro - the third largest game manufacturer and owner of the Parker Bros companies (publisher of “Monopoly”, “Cluedo”, “Risiko”) and Wizards of the Coast (publisher of “Magic: The Gathering” and “Dungeon & Dragons”) - 37% of the interviewees, answering a questionnaire on the change in playful habits following the spread of the virus, declared that they had resorted to board games to distract themselves from the difficult situation in socialising due to social distancing.

Hasbro has in fact confirmed a **boom in the sales of many classics, including “Monopoly”, “Trivial Pursuit”, “Risiko”, but also in role-playing games such as “Dungeons & Dragons”**. Hasbro’s success mirrors an overall increase in table and role-playing game sales throughout 2020 and 2021. The chart in **Figure 4.1.4**, in fact, shows a jump in the revenues of the global board game market, going from 1.57 billion dollars in 2019 to 2.15 and 2.86 billion dollars in 2020 and 2021 respectively. Furthermore, according to Statista’s forecast, this positive trend is destined to continue, albeit at a lower growth rate than that observed during the lockdown period. Revenue is expected to rise, reaching 4.24 billion dollars by 2026.

Figure 4.1.5 shows in detail how the revenues of the gaming industry are divided between China, the United States and Europe. In 2021, China was the country that recorded the highest revenue with 45.6 billion dollars, while the US took second place with 30.4 billion, followed by Europe with 24.4 billion. With regard to revenue estimates for 2026, the video games sector in China is estimated to reach around 76 billion dollars, with a growth rate of 9.3% between 2021 and 2026. The United States and Europe are close behind with a growth trend, respectively, of 8.3% and 8.7%.

With regard to the percentage of players in the various regions of the world, Statista estimates that 73% of the Asian population and 63% of the North American population use gaming as a form of entertainment. While for the European continent, Europe’s Video Game Industry estimates that 50% of the European population play games in their free time. Finally, with respect to the distribution of players in the world - 2.69 billion at the end of 2020 - more than half of these reside in Asia, while North America and Europe make up respectively only 7% and 14% of global players (source: Newzoo). The last figure reflects the distribution of the world population, 59.8% of which is made up of Asian people (source: Worldometer).

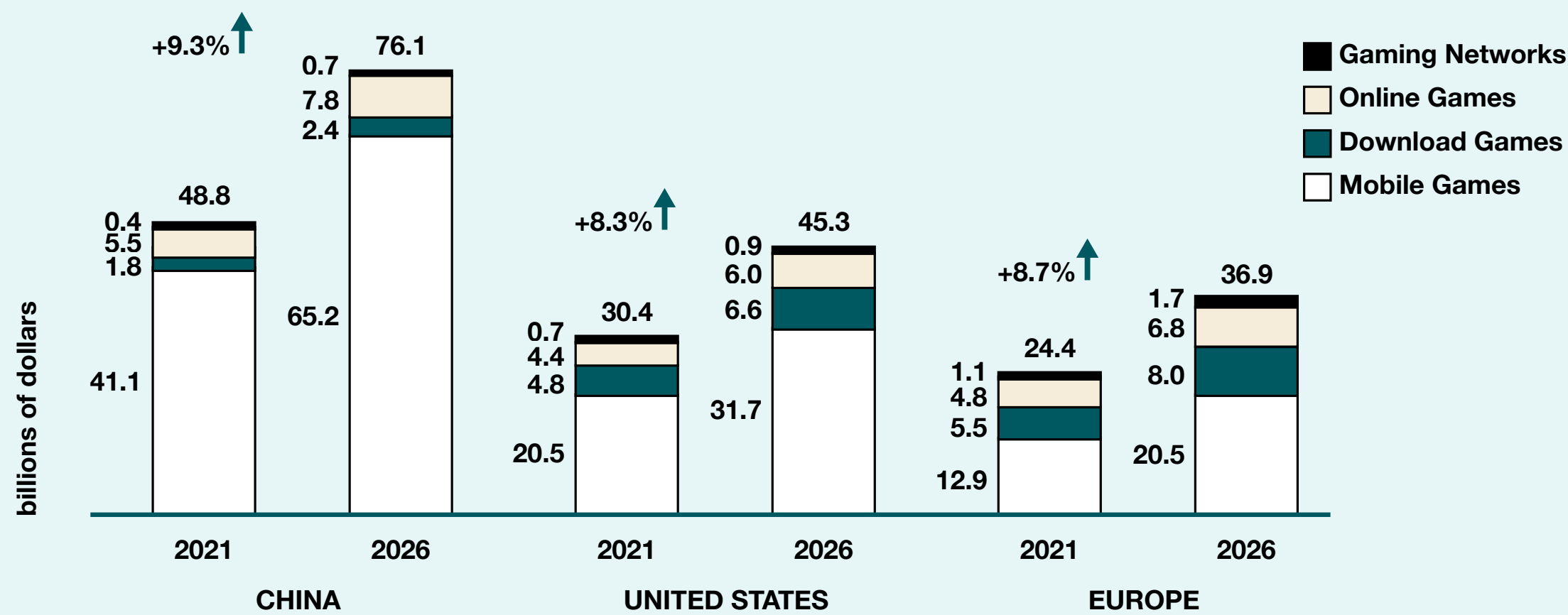


Figure 4.1.5
Global gaming market (2021-2026)

Source: Statista

4.2

The frontiers of digital reality and the advent of the Metaverse

contribution by **Sebastiano Accardi**



Sebastiano Accardi
Research assistant at the IMT School for Advanced Studies Lucca providing support to the Neuroscience Lab of the Intesa Sanpaolo Innovation Center. UX Expert, he works with Brescia Esports as a esport psychologist.

Today we can consider gaming as a tool that can introduce a perspective that has no borders and no operational limits in the perception of the world. **In the near future, and already partly now, gaming will be able to provide ever wider communities with new tools in all areas of human sociality such as training, work, communication, marketing and entertainment.**

The technological tools that are pushing humans to experiment with new social archetypes and reality perception are: Virtual Reality and Augmented Reality.

In less recent times a VR headset seemed to be a utopia and something unattainable by the average consumer but now, thanks to access technology, everyone can make use of one at competitive costs. This accessibility has allowed developers from all over the world to expand the VR scenario in a potentially infinite way, creating applications and software for all categories and types of use.

For this reason, today software and apps for VR satisfy a whole range of needs, by crossing the narrow boundaries of gaming and giving new impetus to gamification, which can thus extend its effects from the private dimension, for example to work, school and inclusion of people with specific integration difficulties in the professional and training world.

**#metaverse #VR #virtual #AR #augmented #gamification
#NFT #blockchain #crypto #horizon #meta #science #gamescience
#psychology #videogamepsychology #neuroscience**



Figure 4.2.1
The logo of the game “Keep Talking and Nobody Explodes”
Keite Soares, Logo Keep Talking and Nobody Explodes, CC BY-SA 4.0

From the point of view of scientific research, one of the most important advantages of VR is the creation of simulations of real environments consisting not only of simple objects that can be grasped, but also of socio-environmental and contextual situations under the complete control of the researcher.

Wearing a headset and pads, controllers that allow the user to move within the latest generation virtual space, the brain is stimulated on a visual, auditory and even motor level to interact with the virtual environment in which the user is immersed. activating a ‘user-virtual environment’ experience with the possibility of modifying it. This experience, comparable to that of the real world, has allowed **various effects on the brain to be studied, such as the ‘Sense of Presence’ (SoP → page 104)**. The sense of presence in a virtual world accompanies users in the simulation, giving them the impression that they are physically present in the virtual environment and inducing them to respond in a realistic way to the stimuli that surround them, with observable physiological and cerebral reactions. For example, if we were to cross a beam suspended over a void we would take more careful steps (**Richie’s Plank Experience**) or if we were to lift objects that seem heavier to us, our body would react accordingly, simulating a feeling of fatigue (**Boneworks**).

However, this is not the only illusion that VR can induce: in some games or applications it is possible to “embody” an avatar, i.e. experience the sensation of taking possession of a body, in this case a digital body, and being able to look at the digital body feeling that it is your own. This phenomenon, defined by Slater as ‘**Sense of Embodiment’ (SoE → page 103)**, is also the most advanced aspect of VR; in fact, thanks to it we can create experiences that are impossible to replicate in real life, opening new frontiers for researchers to study the mind-brain relationship. **It is possible to recreate situations in which a person sees his/her body in a totally different way from reality, by changing his/her height or ethnicity and to assess his/her behavioural and physiological responses.**

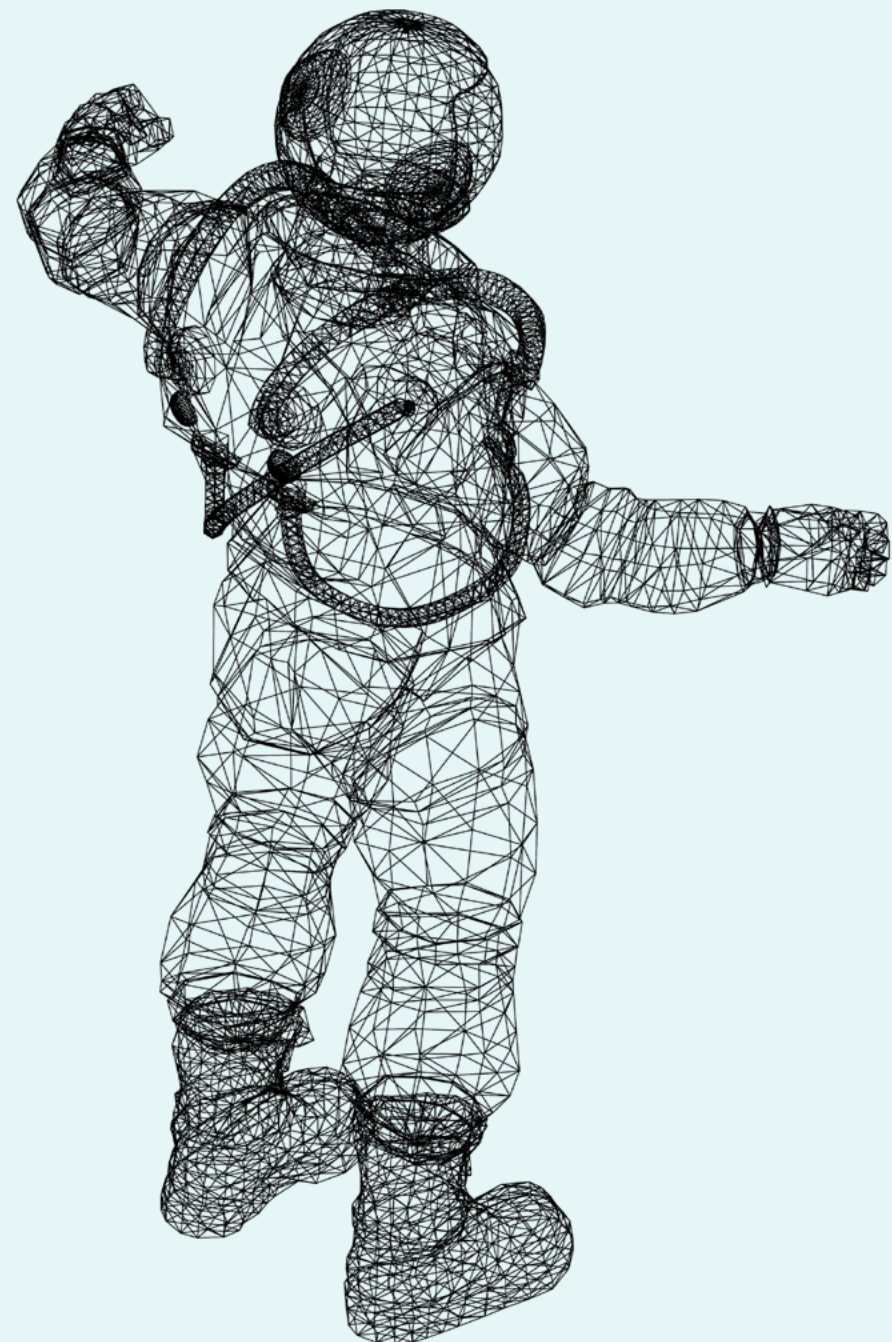
In a business environment, especially in relation to the issue of managing people, building a functional, collaborative and communicative team is absolutely essential. It is already known that the use of gamification within a company allows the consolidation of commitment and involvement within a group of colleagues (see 3.4). For this reason, using VR as a support tool for team building activities allows you to create a cohesive and efficient team and there are many apps and games that, supported by VR, can allow this.

A note of merit goes to the game “**Keep Talking and Nobody Explodes**” (**Figure 4.2.1**) which allows you to work on functional communication by creating an asynchronous play-work space.

“

The sense of immersion that a virtual space transmits to users stimulates their sense of belonging to the world with which they are interacting.

”



Virtual Reality

Virtual Reality (VR) is an exclusively digital environment, created by one or more computers that simulate actual reality and recreate it in an intangible way. This reality is conveyed to our senses through headsets that enable full immersion in the three-dimensional and dynamic simulation.

Even schools have begun to make bolder use of VR. **A 2020 study by Bogusevschi and colleagues demonstrated that teaching physics notions within a virtual space is profitable not only from the point of view of learning, but also from the emotional point of view, transforming a teaching activity into a enjoyable and fun experience.** All this occurs thanks to the sense of immersion that a virtual space manages to transmit to users, stimulating their sense of belonging to the world with which they are interacting. In this case, the students are not simply learning, but are personally experiencing the modification of the environment, a virtual environment, and feeling their physical actions as the cause of the effects they are witnessing.

From a perspective of inclusiveness in the school system, it is interesting to note that VR can be used as a rehabilitation tool, for example for dyslexia. In a study by Corvace and colleagues, it is predicted, with the use of predictive models, that the use of this application may **increase the engagement of boys and girls and their sustained attention**, leading to better results during rehabilitation.

All these VR applications must be supported by a good level of immersion and detail: high-level graphics and engaging content allow the users, therefore, to explore complex topics in ways that would be impossible to apply in traditional teaching.

Conversely, on the subject of ‘Augmented Reality’ (AR) this is also a technology that can revolutionise the way that society interacts. In the popular world of imagination, AR can be associated with the cinematographic transpositions of the books by Philip K. Dick or the interaction of Iron Man with Jarvis (his virtual assistant). Here it is easy to understand how an engineer could find great help in the visualisation of projects with the use of AR so as to take them to completion. Unfortunately, however, AR is still too long way off from a technological point of view from the use that Tony Stark makes of it to develop technologies that are needed to save the world.

In today’s real context, AR took its first steps in the world of gaming with the highly famous “Pokemon Go” which, enjoying enormous success with millions of users, aroused the interest of researchers and computer scientists to develop similar applications and software.

In school teaching, self-renewal and maintaining a high engagement rate are essential in order to improve learning. In an interesting meta-analysis by Garzon and colleagues, it was found that **the use of Augmented Reality improves the results of pupils who use it, especially when the actions have a collaborative pedagogical approach.**



Figure 4.2.2
Use of VR inside a museum

“

The use of ‘game applications’ combined with AR technology can be very useful for increasing the experience inside a museum.

”



Augmented Reality

Augmented Reality (AR) is a technology that provides the user with tools to enhance the experience of interaction with reality. The term “Augmented Reality” was coined by Caudell and Mizell (1992) to describe the technology that allows users not only to increase their field of view but also to obtain more information in real time using common technologies in smartphones or wearable electronic devices similar to glasses.

Looking more closely at how this technology could facilitate learning, Barma’s research has shown that AR significantly helps students to visualise a physical phenomenon in three dimensions (3D). Through the use of an Augmented Reality game (“Parallel”) it is possible to have a visual representation of an abstract situation that otherwise would not be easily accessible. Students can “see instead of imagining” and match the theory they have studied with its physical manifestation. In this way students can immediately consolidate their understanding.

Even in the world of sport, the use of augmented reality can help sportspeople to train. Indeed, several AR-based approaches could be used to learn and provide feedback. In football, for example, using the AR (→ page 102) would allow players to calculate the trajectory of the ball and its position, providing players with immediate feedback on the movement to be made and on how to improve reaction times.

In conclusion, even in the tourism sector this technology would help with renewal and to create greater customer engagement.

The use of ‘game applications’ combined with AR technology can be very useful for increasing the experience inside a museum not only from the point of view of user satisfaction but also for learning information about the works on display.

“

There is a new world, which is not a simple digitalisation of the real world but a second reality known as the Metaverse.

”

The tools described are some pieces of a larger puzzle, necessary to enter a new world, which is not a simple digitalisation of the real world but a second reality, the Metaverse.

It is peculiar how our references to the Metaverse refer to plots in Sci-Fi films, often of a dystopian nature, such as “Ready Player One” by Spielberg, “Nirvana” by Salvatores or the extremely famous “Matrix” by the Wachowski sisters. But if we pause to reflect more deeply, the question arises: what is the real common element in these films that is totally absent in the real world? The presence of a single Metaverse that guides the lives of the protagonists.



NFTs can be linked to the acquisition of assets of various kinds, from the purchase of a work of art, a virtual property, a digital dress for one's own avatar.



Dark Glasses NFT



Horizon

To date, the evolution of the internet is moving towards the well-known Web 3.0 where it is possible to find numerous digital universes that also try to carve out a space in economic contexts related to the concept of cryptocurrencies. Mentioning just the most famous Metaverses, such as “Decentraland”, “The Sandbox”, “Earth 2.0”, including the Italian one called “The Nemesis”, we find that **each of them has its own world, a different mode of interaction and, above all, an economy of its own, dominated by the specific ‘non-fungible token’ (NFT → page 103), cryptocurrency and reference blockchain platform.**

Within these worlds, users can engage in various types of activities such as playing video games, taking part in exclusive events, purchasing a tangible asset, typically through the purchase of an NFT.

An NFT is a digital token that represents the purchase and consequently the deed of ownership of a specified exclusive (digital or physical) asset; in fact the person who buys the token does not buy the work in itself, but the possibility of demonstrating and exercising a right over the work itself. The right does not guarantee that the work, for example, if digital, cannot be copied and duplicated and in general the right is linked to the specific platform of the Metaverse. In fact, NFTs can be linked to the acquisition of assets of various kinds, from the purchase of a work of art, a virtual property, a digital dress for one's own avatar, or even the exclusive contents of a film, as Dario Argento did for his film “Dark Glasses” (2022).

Even corporate environments are moving towards such realities, sometimes overlapping the concept of Metaverse with that of digitalisation. In fact, participating in a meeting via VR does not automatically mean distorting the experience of a virtual meeting which can be accessed remotely using the most traditional communication and collaboration tools, but simply digitising the interaction by introducing sensations that are different from classic calls. The Metaverse enables other operational dimensions and probably, only with the spread of web 3.0 and the consolidation of a platform universally recognized as such by millions of people, such as Zuckerberg's “Horizon”, will people be able to give a clear identity to what it is meant by the Metaverse and its infinite possibilities.

From digital reality to virtual reality

interview with **Gianpaolo Greco, Uqido**



Gianpaolo Greco
Uqido Creative Director and university lecturer in the Professional Master's programme in Computer Game Development; he worked for over 10 years in the Game Industry as a Game Designer and Producer.

Uqido is a Software House located in Padua, with well-established experience in the field of Immersive Technologies, Computer Vision, Machine Learning, Artificial Intelligence, Internet of Things and Software Development.

In your corporate mission you often talk about transition between today and tomorrow. What are the necessary steps for society to reach the future and what are the technological and social characteristics that will define it?

We imagine a future where technology has made everything simpler, not the other way around. The trend that began with the advent of the Internet in the 90s will reach its peak when everything is “connected” - when everything can be monitored and controlled remotely. Objects will continue to break, but they will also be able to request their repair on their own, perhaps even in advance of the actual time of failure. Human beings will be required to do less and less and they will witness a gradual change in their habits. When machines, objects and algorithms reach an adequate level of autonomy and complexity, people will shift their added value onto other activities. We imagine a world where technology

will increasingly eliminate information asymmetries and market frictions, making us faster, freer and more aware.

It is now also scientifically approved that VR and AR can be an excellent tool for training purposes. What issues need to be resolved before these methods can be used by everyone and not just by an elitist few?

In the field of education and training, the added value of interactivity has already been demonstrated, because it raises the quality of the training experience. Furthermore, being able to offer remote training thanks to the virtualisation of tools and environments, allows, on the one hand, to save enormous quantities of CO2 - by reducing travel, shipping of materials, creation of test areas and ad-hoc samples - and, on the other hand, it allows learning to be made universal. At the same time, the use of immersive experiences in training is currently the prerogative of large organisations that can support the costs of their development and distribute it easily over a large number of end users. On balance, this provides a valid



The Metaverse

economic advantage in return for superior training effectiveness. It is easy to assume that only when the devices used to enjoy immersive experiences are more widely available - thanks to the achievement of adequate technological and market maturity - will training experiences become democratised.

The achievement of a digital reality that is not subordinate but as valid as the real one is gradually getting closer thanks to the concept of Metaverse. Is today's digital person ready to change and to transfer a large part of his/her life to the Metaverse?

Fifteen years ago, when the spread of smartphones began, a fair number of people would probably have declared that they were unwilling to transfer their entire lives onto an object without buttons, constantly connected and bombarded with notifications from social networks, messages and applications of all kinds. Yet, today this is our daily life and for most people it would be unthinkable to give it up. Like any revolutionary technology, we think that its adoption will take place gradually and without us realizing it: in this context, the leading players today are the 'Tech Enthusiasts' - individuals interested solely and exclusively in the latest news. Little by little, they see "Visionaries" appearing at their side: the first actors who really perceive the advantages of a new technology and establish the direction it should go in. Everyone will, at their own speed and according to the added value they perceive, have more to do with the Metaverse, exactly as happened with the advent of the Internet and then smartphones.

The world of virtual reality has made enormous strides thanks to gaming and user-friendliness. Will the Metaverse



Like any revolutionary technology, we think that its adoption will take place gradually and without us realizing it: in this context, the leading players today are the 'Tech Enthusiasts'.




remain in the collective imagination as a continuation of the simple video game, a real second life or both?

Zuckerberg has announced his entry into an entire ecosystem born in the 90s, the Metaverse, of which Facebook represents only a part with its wagered stake of 10 billion dollars. A galaxy of integrated services, apps and hardware solutions that will change the way we work, entertain and connect. Various brands and companies have followed him close behind, taking their first steps towards what we will learn to know as the Metaverse over the coming decades.

It will take years before we see it in action as accurately told by Facebook, yet we can already hazard a guess as to what Meta's future will contain: Immersive Experiences applied to daily needs, Avatars, Artificial Intelligence and lots more.

Facebook has already provided a first example of innovation applied to the business world with Horizon Workrooms, the tool that allows you to create workspaces in VR. We will have to wait until next year, however, before we can use Messenger's Virtual Reality calls.



Meta is keeping tracks on certain tendencies that are destined to become trends, which we as Software House are also working on: meetings in VR are already gradually becoming a reality with requests for them by companies.

So what can we expect in the next few years? Innovative launches, new products and features for users, creators and anyone who is ready to grasp their potential. There is no doubt that our future will be shaped by what companies and giants like Facebook will be able to offer in terms of development and technological innovation.

“

We can already hazard a guess as to what Meta's future will contain: Immersive Experiences applied to daily needs, Avatars, Artificial Intelligence and lots more.

”

In the current state of the art, what can effectively be embodied in the Metaverse as a replacement to that in real life and, conversely, what is irreplaceable?

In recent years we have seen a number of companies immerse themselves in new digital universes, offering experiences, events and exclusive products. For example, in Roblox, a digital metaverse that has 40M+ of daily users, Gucci has sold bags at a higher price than real ones and there is no mention of products in NFTs but only digital twins (→ [page 102](#)). Vans has opened branded virtual spaces on the same platform, where you can interact with the community and sell exclusively digital products. The purchase of these products, whether they are obtained through NFTs or not, originates in the real world but remains within the digital world for which they were created and where they acquire value. Therefore, these are shopping and use experiences that have generated a completely new emotion that cannot be reproduced in the real world, as they could not exist there. These products “live” in the digital world and by definition are linked to the Metaverse. Other experiences, on the other hand, will remain in the physical world for a long time to come: everything that has to do with the senses - meeting other people, simple gestures such as shaking hands, looking into a person's eyes, smelling the aroma of coffee - according to current technological progress, cannot as yet be reproduced in the digital world. The Metaverse aims to expand human experience by offering new emotions that are currently short and intense and involve sight and hearing, while desperately waiting for a turning point: the digitalisation of all human senses, if it will ever come about.

4.3

Games for social change

contribution by **Maresa Bertolo**



Maresa Bertolo
Researcher at ImagisLab,
Department of Design, Politecnico
di Milano and professor in Game Design
and Computer Graphics.

We have seen in the previous chapters (see 1.1) that game-playing constitutes a fundamental part of the life of people of all ages and that it has a **role in contributing to the creation and maintenance of a sense of community**, it is a bearer of meanings and strengthens social bonds.

The capability of games to become a “vehicle of meaning” leads us to talk about ‘meaningful experience’, a concept with different levels of interpretation, two of which can here be looked at with interest. The first, more evident point is linked to the **immediate perception of meaningful acting**: making reasoned choices while playing, endowed with sense, able to lead us on the best possible path during the experience. A second reading lies in noting that game-playing can **convey specific meanings** and be a ‘bearer of sense’. A game-player experiences a reality that is different from the normal, everyday’s one: entering the aforementioned ‘magic circle’ they plays roles that are different from their usual ones, following rules that are different from those of real life.

While playing a game, we explore fantastic, more or less abstract worlds, we find ourselves at the head of armies (as in Chess), we sail the seas on pirate vessels, we leap from star to star or carefully build a financial empire.

At the end of the game, we return to reality, bringing with us the memory of the experience, often shared with the people we played with, who are now in some way closer to us, by virtue of this experience.

Research on games shows that the “reality - game - reality” mechanism described above can provide something more: **towards the end of the last century Games for Change was conceived, often also referred to as for Social Change.**

**#gamestudies #gamedesign #gamesforchange #experience
#meaningfulexperience #sense #magiccircle #interaction
#saferepresentation #proceduralrhetoric #assessingeffectiveness**



“

Games are a place of safe representation, where conflicts and risks are only simulated, allowing players to explore them and experience their representation, with no chance of consequences leaving the magic circle, except in one's memory as a lived experience.

”

1
An interesting overview, available at www.gamesforchange.org demonstrates that the international community is extremely active - evidence of the Italian research and activities in this field is the Play4Change Award www.play4change.it

It uses already-existing or purpose-built games in order to put players in the shoes of other social categories, to explore meanings of reality that normally go unnoticed, to stimulate awareness and personal growth with respect to topics and issues of collective relevance, such as multiculturalism, generation gap, 'digital divide' (i.e. the gap between those who have access to information technologies and those who do not), migration phenomena, climate change, rights of the weakest and of animals, cultural awareness, critical capacity, civil and civic conscience and personal responsibility.

Games can play an **'active' role in this sense, thanks to their being an intrinsically interactive medium.** With a book or film we play a passive role of fruition, whereas in games it is necessary and essential **to make choices and perform actions**, whose consequences determine the progress of the gameplay for all the people who are taking part in it. Witnessing the occurrence of events, with the awareness of having actively taken part in shaping them and causing them to happen, is decidedly more engaging than the passive fruition of a report on the outcome of such events: we are active participants, we take actions, we take a stand and we face consequences. In this sense it is important to underline that games are **a place of safe representation, where conflicts and risks are only simulated**, allowing players to explore them and experience their representation, with no chance of consequences leaving the magic circle, except in one's memory as a lived experience.

We are well aware of the effectiveness that a well-designed rhetorical system can have in conveying content and we are familiar with written and oral rhetoric, as well as with its more recent forms, such as movies. When we look at games, we find a specific type of rhetoric of interactive systems, which has been named 'procedural rhetoric' by the researcher and game designer Ian Bogost. In his words, it is "the art of persuasion through rule-based representations and interactions rather than the spoken word, writing, images or moving pictures" (Persuasive Games, 2007, p. ix).

However, it is not "persuasion" meant in the commonly understood coercive sense of the term, but **a suggestion to reflect, an appeal to consider other points of view**, other interpretations for situations and concepts, an invitation to consequently consider changing certain aspects of our life.

It should be kept in mind and underlined that, while playing, we maintain awareness of our ethical and moral values, as well as our critical capacity, which allow us to examine and assess messages and stimuli transmitted by the game.

In this process, **the game reveals, suggests, informs and stimulates, sometimes delicately and sometimes abruptly.** Thousands of titles have been developed over the last twenty years or so **1**. Given their nature, games for change often involve dealing with problematic issues and therefore it is necessary to manage the difficulty of their "invitation to the game": it is obvious that it is no easy matter inviting someone to play a game that openly wants to talk with us about delicate topics or invite us to change our point of view on an issue. Research carried out in the



The ‘embedded design’ allows us to design games that are capable to act as vehicles for change and at the same time be fun and generate enjoyable, meaningful experiences.



tiltfactor.org/game/profit-seed/



www.demoela.com/prodotto/my-brother/

context of games for change has identified the effectiveness of an approach - called ‘embedded design’ (→ page 102) - which allows the game to be presented without necessarily declaring its nature as a game for change, thanks to a design approach mixing the elements related to the issue with other more neutral ones, or masking them with metaphors. This allows us to design games that are capable to act as **vehicles for change and at the same time be fun and generate enjoyable, meaningful experiences.**

Games for change cover a wide range of themes and come in every type of playful format, both digital and analogue or hybrid; by way of example, we would mention “Profit Seed” and “My brother”.

“Profit Seed” is a digital game designed by Mary Flanagan and Nicholas Pappas for Tiltfactor; it deals with the topic of genetically modified organisms (GMOs). It describes the difficulties of a farmer in whose fields modified seeds blown by the wind are settling: if a sufficient quantity of these take root and germinate, the owners of the seed patent report the matter and expropriate the farmer’s land.

“My brother” is a collaborative board game created by Irene Nappi. It was conceived as a project to communicate correct behavioural practices in case of schizophrenia sufferers incurring an acute attack. It was part of the author’s master’s degree thesis in Communication Design at the School of Design of the Politecnico di Milano. The version of the game published by Demoelà and Ghenos Games focuses on the good collective management of stress and the protection of family fragility in stressful situations, with the possibility of downloading material dealing with the original issue.

The experience that everyone has with a game for change is influenced not only by the game itself, but also by the way their own ethical and moral values guide the interpretation of the information and situations that the game proposes, as well as by their own knowledge, skills and previous experiences.

Although the process of designing a game - especially if aimed at stimulating change - provides for an initial phase of accurate target analysis, the strong, individual and subjective nature of experience precludes any prior certainty of the result in terms of effectiveness in stimulating desired change.

The design of a game for change must include a phase of analysing the actual experience lived by its players, in order to better assess its effectiveness in achieving the desired goal. Available tools on that sense are such as observation, participatory observation, interviews, questionnaires, focus groups, semantic analysis and behavioural analysis that should be carried out before, during and after the play experience. Based on the characteristics of the specific project, the circumstances in which it is played and the people who play it, an effectiveness analysis system needs to be developed that allows us to assess whether and in what way the game is successful not only as a game, but also as a communicative artefact capable of stimulating change.

4.4

Game perversion

contribution by **Francesca Antonacci**
and **Sara Tubaro**



Francesca Antonacci
Professor and senior lecturer
in Play and Education and Theories
and Methods of Lifelong Learning
at the University of Milano-Bicocca.



Sara Tubaro
Assistant to the Head of Education
in the start up called Becoming Education
and she is a developer of the subject
Play and Education at the University of
Milano-Bicocca.

The narrative about game-playing has changed profoundly over the past few decades. In the past games were considered to relate solely to the realms of childhood and to lose status in adulthood, as a pointless and immature activity, whereas today we as scholars are challenged by new readings of the phenomenon. The potential of games in their ability to create immersion and engagement is increasingly being enlisted into the ‘society of work’ (Han, “The Transparency Society” 2015), which is equipping itself with new tools and languages, whose most obvious expression is the phenomenon of **gamification**. And this is happening while the exponentially increasing development in the efficiency of smart machinery is accompanied by a relentless contraction in the need for manpower.

In this paradigm, the gaming industry, from video games to gambling sites, from fun to entertainment, will constitute an increasingly attractive market in the eyes of the post-post-industrial economy.

The impact of this transformation is to be read in the context of a society that, in an increasingly persuasive manner, surrounds individuals with devices that engage instincts and drives, in a passive fruition of the numerous screens that are now an inseparable part of everyday life (Han, 2015). In this context, the areas of education, from schools to traditional institutions, cannot keep pace with these bewitching sirens and the growth of human potential, with its vocational ascendancy, is being systemically undermined.

The fuse is precisely this transformation of game-playing, from a language and posture of joy (Fink, 2008) into a means of escape and entertainment, through digital mediation. So game-playing, instead of being an end in itself – playing for the pure pleasure of playing – becomes a means to obtain results: diversion, passing the time, making otherwise heavy and boring activities lighter and less tedious. In the contemporary world, we can see that game-playing can be distorted and deprived of its deepest liberating essence. From being a phenomenon whose intrinsic aim is the creation of well-being and the

**#gamestudies #gamedesign #digitalgames
#pervasivegames #persuasivegames #addiction #gratification
#gamification #flow #liberatinggames #socialcriticism**

“

As a vehicle of gratification, the ‘flow’ can generate states of addiction (...). It is as if the player becomes tied to the device in a double knot and cannot break loose from it.

”



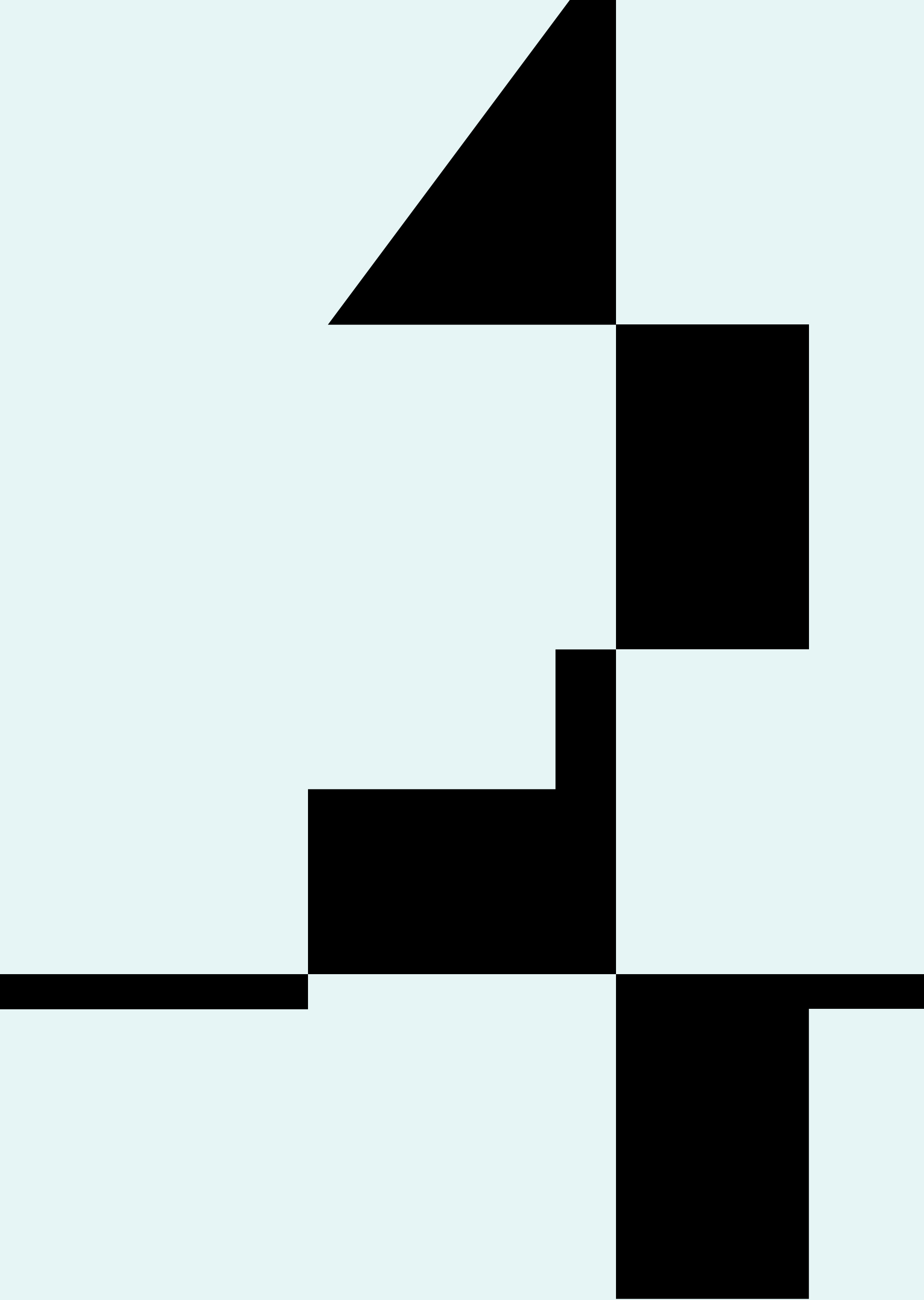
promotion of socialisation, bonds and the development of cognitive, emotional and strategic skills, it can become a **manipulated and manipulative activity**. We know that the condition of flow (Csíkszentmihályi, “Flow: The Psychology of Optimal Experience”, 1990) – that is, the element that keeps a person who is playing concentrated and absorbed in the game, making them forget about the passing of time and their own needs, because they are absorbed in an activity that finds a perfect balance between skills and challenges – **can be used by behavioural scholars and designers who design the mediation of devices so that it is increasingly beguiling and pervasive**.

In this way game-playing can be degraded from a beneficial activity and source of gratifying pleasure into a mechanism aimed solely at increasing the economic profits of technology companies.

As a vehicle of gratification, the ‘flow’ can generate states of addiction and, by studying persuasive behaviour (Dow Schull, “Addiction by Design: Machine Gambling in Las Vegas”, 2014; Soderman, “Against Flow: Video Games and the Flowing Subject”, 2021), one can understand that by controlling gratification one can also control the states of addiction of individuals (see 1.4 and 3.1 in this regard).

In this way, game-playing is no longer seen as “the seed of every beginning, effervescence, a driving and multiplicative force, a lightweight and imaginative attitude” (Antonacci, “Il cerchio magico”, 2019). Conversely, it is seen as a ‘pseudo game’ interwoven with vacuous, alienating and inconclusive experiences that do not engage thought processes in a critical, bodily and affective way of expression, but on the contrary they facilitate the extinction of individuals, encouraging the repetition of compulsive and gratifying acts (increasingly analogous to masturbation) through machines: a passive abandonment, sold as fun, but which does not increase the well-being of players and makes them more and more insecure, aggressive and frustrated.

In this architecture, it is as if the player becomes tied to the device in a double bind (with his/her gaze, digital contact and immersive grip) and cannot break loose from it. The ‘magic circle’ of the game, that framework that protects players from the everyday world and allows them to carve out an oasis of happiness (Fink, “Oasis of Happiness”, 1968), loses its softness and flexibility, that particular imaginative and symbolic significance. The ‘circle’ stiffens relentlessly and the ‘magic’ is suffocated by an elusive fantasy of success or victory. Gamers and users of social media or media content (whether active or passive) are all subjects chained by ‘flow’ designers to remain addicted, scrolling down a screen in the endless search for pseudo pleasure to fill pseudo gaps and pseudo desires, driven by compulsive behaviours.



If awareness is freedom, as the pedagogist Paulo Freire (Freire, “Pedagogy of the Oppressed”, 1970) argued, the most effective design for entrapping the subject in this flow is precisely by **minimising the player’s awareness**, making him/her increasingly alienated and dependent on the machine, which offers an ephemeral and spurious pleasure and an ever more perverse, corrupt, annihilating enjoyment.

This is why a critical analysis of the social emergency is necessary which in the widest landscape of ‘new addictions’ brings to the fore the frailties conveyed by these devices, revealing a profound and increasingly widespread collective unease and not only among children and young people.

However, the aim is not to find a culprit or concoct conspiracy theories, but to **deal with the subject on a scientific level**, proposing a broader focus that frames the impact of the problem and outlines its effects from a social, economic and political point of view. In this sense, critical knowledge can provide a balance against an economic imperative which, naturally guided by profit, does not care about individuals, their well-being and the right of each person “to be more fully human” (Freire, 1970), like the right to be equipped to express a conscious form of citizenship both in the present and in the future.

In the same way, the narratives that nowadays promote gaming as a destructive and lethal phenomenon like “Alice in Borderland” or “Squid Game”, with their roots in “Hunger Games” in its various interpretations, are highly disturbing, because **they do not grasp the liberating and beneficial matrix of game-playing**. After all, game-playing is such

only when an activity is “for fun”, that is, it has no effect on real life and therefore can be performed in a risk-free space. Today, however, this fun and entertainment industry only promotes the exterior form of the game – in some cases competition, elsewhere indulging in risk and chance, or even disguise and representation or, finally, intoxication and vertigo (Caillois, “Man, Play and Games”, 1961) – **to use the power of the flow that directs the players’ energies towards consumption, or dissipates them by indulging them in an ephemeral form of gratification, without any project on their development as people, groups or as a community.**

On this basis we can understand the success of TV series that stage experiences that reach paroxysm, where, in the grip of addiction, the stakes rise even further, to the point that life itself is put on the line and in doing so, the very essence of playing is denied, where one always acts “as if”, in a protected world precisely because it becomes a context of experimentation, pleasure, delight and learning. If we go back to Freire, we can read this increasingly intoxicating and immersive power as a new form of education, but with the sign inverted, which becomes indoctrination and, instead of liberating them, it makes consumers increasingly oppressed, intoxicated by the lights and colours of a satisfying and enveloping gamification, whose effects and dangers only game studies can illuminate and foresee.



4.5

**#esport #e-sport #sport #gaming #e-gaming
#pro-gaming #competitivegaming #gamingindustry
#lootbox #cheating #goodplay #videogames #law
#esportlaw #esportintellectualproperty**

1
Enciclopedia Treccani
[www.treccani.it/
enciclopedia/sport](http://www.treccani.it/enciclopedia/sport).

2
IIDEA, Position on the
development of the esports
sector in Italy, Milan, 2021
[iideassociation.com/
kdocs/2013128/iidea_
position_paper_esports.pdf](http://iideassociation.com/kdocs/2013128/iidea_position_paper_esports.pdf)

Esport: a new frontier

contribution by **Gianluigi Fioriglio**



Gianluigi Fioriglio
Lawyer, adjunct professor of Legal
Informatics - Department of Law,
University of Modena and Reggio Emilia.
Ordinary member of the Game Science
Research Center.

Sport and esport

Esport (or e-sport, eSport, electronic sport) is a phenomenon that is gaining more and more importance, even though what it is precisely and whether or not it can be considered a new form of sport (or whether it should be kept distinct from it) is still under discussion.

It therefore seems appropriate to ask ourselves, on a preliminary basis, what is meant by “sport” and by “esport”.

The definition of sport provided by the Treccani Encyclopaedia is:

“Activity intended to develop physical and mental abilities, and the complex of exercises and events, especially competitive ones, in which it is performed, practiced in compliance with rules codified by specific bodies, both for a spirit of competition and for fun (without the obligation/ necessity of work). [...] Professional bases connect the term sport to its etymological meaning [...] in relation not so much to the activity performed by the athletes but more to the fun that the spectators derive from it, showing

enthusiasm in various ways about the progress and outcome of the competitions” **1** .

As for esports, according to scientists Schubert, Drachen and Mahlmann “Esports are computer games played in a competitive environment”; for IIDEA (Italian Interactive Digital Entertainment Association), “esports are leagues, competitive circuits, tournaments or similar competitions, which typically envisage an audience of spectators, where **individual players or teams play video games, both in person and online, for the purpose of obtaining prizes or merely for entertainment purposes**. They are sometimes also referred to as ‘competitive gaming’, ‘egaming’ or ‘pro-gaming’” **2** .

In principle, there are traits that unite sport and esport: competition, regulation, amateurism and professionalism, entertainment. Nevertheless, if one considers the IT specificities of esport disciplines, this suggests there should be a distinction between sport and esport.



Esport disciplines

Sports disciplines are well known and range from soccer to cycling, from tennis to swimming, and so on; each is governed by its own rules.

In the field of esports, each video game can be classed as a “discipline”, but in general a distinction can be made between games based on their mechanics and rules:

- **traditional games** (football, such as the FIFA series or the Pro Evolution Soccer series; basketball, such as the NBA Live and NBA 2K series; motor racing, such as Assetto Corsa Competizione and the F1 series; etc.);
- **typical video games and sometimes only possible in virtual worlds** (MMORPGs like World of Warcraft, MOBAs like League of Legends, “shooters” like Fortnite, etc.).

However, in video games, the publisher of the video game has enormous power and, not surprisingly, in doctrine, esports have been looked at in the perspective of “pay-to-play”, introducing the concept of “Executive Ownership” for which the owner of the intellectual property rights (the publisher who develops and maintains the video game, the servers and the “playing fields”) has absolute power over when and how the game/sport itself can be played. In this way esports is described as eSport: “economic Sport”, rather than “electronic Sport”.

Even the IOC (International Olympic Committee) has become interested in this phenomenon, however referring to it as “virtual sports”³ and even holding the first “Olympic Virtual Series” in 2021.

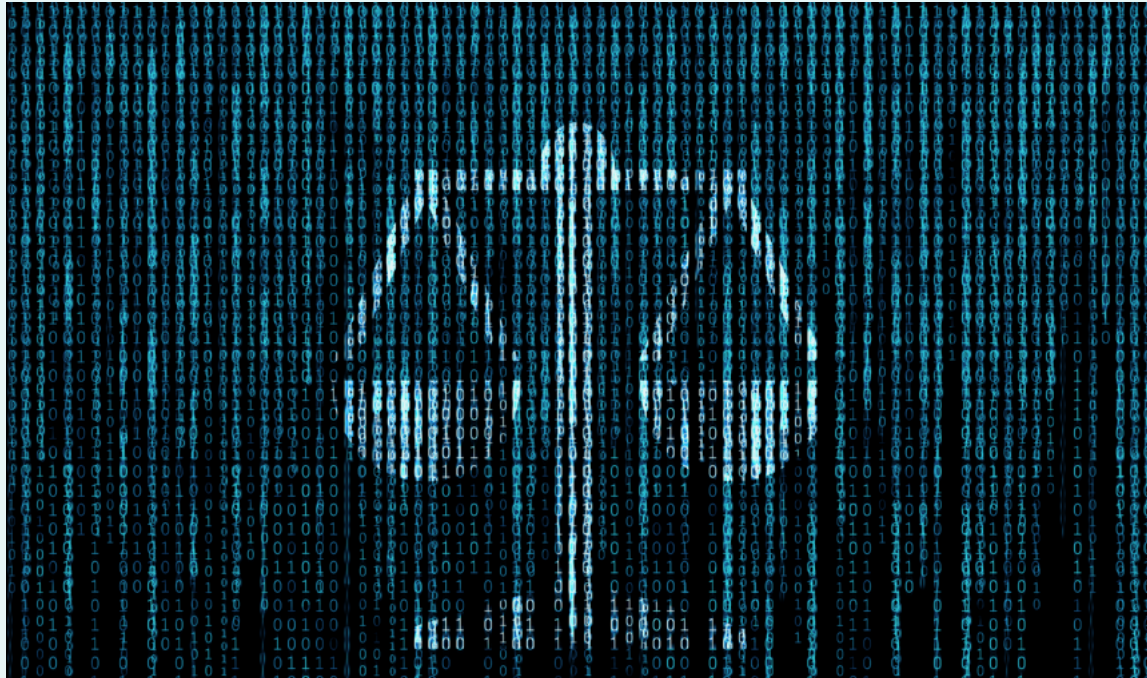
However, one should consider that several video games that constitute real esports disciplines are characterized by violence, in contrast, among other things, with the repudiation of violence referred to in Rule 2 (1) of the Olympic Charter.

“

Esports are leagues, competitive circuits, tournaments or similar competitions, which typically envisage an audience of spectators, where individual players or teams play video games, both in person and online, for the purpose of obtaining prizes or merely for entertainment purposes.

”

³
Cfr. Olympic Agend
2020+5, in particular
Recommendation no. 9.



“Esport” justice is administered primarily through the algorithms executed by the software that the discipline consists of.



Esport: a few figures

Since 1972, when over twenty students at Stanford challenged each other in a game of “Spacewar”, a lot has changed in the world of video game competitions, both in the number of players and in the global turnover (in Italy alone in 2020 it reached two billion, 179 million euros). With regard to the specific esport sector, it was found that in Italy 475,000 people declared that they follow an event every day (as so-called ‘avid fans’) and 1,620,000 one event several times a week (so-called ‘esports fan’)*.

*
IIDEA, Report on esports in Italy 2021, Milan, 2021
iideassociation.com/kdocs/2009209/rapporto_sugli_esports_in_italia_2021.pdf

A possible mapping of legal issues

Although it is not possible here to carry out a complete mapping of all legal issues raised by esports, it is nevertheless useful to highlight the main ones, bearing in mind that, to date, only a few states (including France and Germany) have issued specific provisions on the subject, without however fully regulating it (while South Korea’s legislative apparatus is much more comprehensive).

Given the above, several issues arise in the field of labour law: **qualification of the employment relationship** (and the role of many players who are also influencers), **child labour**, **surveillance using technological devices**, **actual working hours**, **safety in the workplace** (not only with respect to the video terminal, but also in relation to the specific peripherals used and, more generally, the work environment, with reference to lighting, sitting position, etc.).

There are also problems regarding the **constitution and management of teams** (as well as the related contracts, for example with players and sponsors), as well as real competitions that are sometimes performed as part of the activities of Amateur Sports Associations and Amateur Sports Clubs and sometimes as prize competitions.

Furthermore, the primarily virtual sphere of esports makes the centrality of compliance with the legislation on privacy and protection of personal data absolutely clear, as well as issues relating to the **intellectual property of the publisher** (which controls each video game and therefore each discipline), the **“esport” justice** (administered primarily through the algorithms executed by the software that the discipline consists of) and, ultimately, the **“death” of the discipline** itself, which is largely left to the will of the publisher. Finally, there are some highly delicate questions regarding online betting, ‘loot boxes’ (→ page 103), doping, ‘cheating’ (→ page 102) and the unlawful conduct of haters and trolls (→ page 104).

A broad and complex picture, therefore, which highlights the need for intervention by various legislators.

Conclusions and outlook

Esport is a new frontier that, when properly oriented, will allow new markets to be opened, new forms of professionalism to be created and new opportunities to be offered to suppliers of innovative and traditional services and products. It can also have a role in educating about “ethical play” and healthy fun, but it would appear, however, that a systematic intervention by the legislators who regulate this type of activity for the protection of all the parties “at stake”, cannot be delayed any further.

The world of video games and attention towards disability



Sauro Fani

He works in Intesa Sanpaolo. He is an accredited consultant/trainer at IRIFOR - training, research and rehabilitation regarding visual impairment.

Interview with **Sauro Fani**

Sauro Fani is an expert in web accessibility, ICT usability in rehabilitation/habilitation contexts and is part of the Interfunctional Group for Disability Management of Intesa Sanpaolo. He is a video game enthusiast.

Thinking about disabilities in general, what steps has been taken over time to make game-playing as accessible and inclusive as possible?

In recent years, console manufacturers have begun to integrate accessibility features and dedicated hardware into their products, with the aim of involving even those people who, due to their disability, were excluded from the world of gaming until just a few years ago. “Adaptive Controllers”, customisable peripherals that adapt to the specific needs of players with physical/motor problems, have been introduced onto the market, while the operating systems of the most recent consoles have been equipped with accessibility features such as: changing the colour and size of the background and characters, activation of subtitles, transcription of all options and the game chat through the Text To Speech (speech synthesis), immersive

audio feedback, wider choice of game difficulty levels, features for limiting flashing and other events concerning epilepsy and photosensitivity and re-mapping of all game controls.

Are there video games today, or have they existed, that have considered a gameplay related to disabilities?

Yes, they do exist, but there is still a lot of work to do. A study on diversity and representation in video games conducted in 2019 by Currys PC World, a well-known British retailer of electronics and appliances, clearly states, for example, that, although great attention has been paid in recent years to issues related to gender, ethnicity and disability, some stereotypes have not been eradicated. The study shows that games dealing with mental illnesses (anxiety, post traumatic disorder and depression) have increased and those dealing with physical disabilities are even more widespread; the latter talking about disabled characters with superhuman powers or high-tech prostheses. In fact, compassionate messages, or, on the contrary, those exalting supernatural powers assigned to



Guidelines on accessibility produced by Microsoft

“superheroes” who can perform feats bordering on the impossible, move away from the fair representation of how, in the world of entertainment, the diversity in our society should also be portrayed.

Have international guidelines been drawn up that a software house can follow so as to be more inclusive?

Microsoft has published a series of “guidelines” on accessibility created in collaboration with industry experts, aimed at indicating “best practices” for game designers, developers, producers and testers, so that everyone can be provided with the best gaming experience.

The last update dates back to 10/01/2021.

What are the features that a video game should have in order to be truly inclusive towards people with disabilities?

What elements are currently missing but may be there in the near future?

As mentioned, modern consoles are equipped with accessibility features, but to produce a video game that is truly usable for everyone, the developers themselves need to call for these features to be included within their productions.

I think that the market still offers very little in terms of truly usable games for some types of gamers with disabilities, for example those who are totally blind. A good example of best practice is the highly famous and successful “The Last of Us Part II” for Playstation consoles which, having included more than 60 different accessibility features, has now become one of the most usable video games on the market.

Already today, thanks to the newly implemented “Augmented Reality” and in the future, thanks to

“Virtual Reality”, this world will be able to provide everyone with experiences that were unthinkable just a few years ago.

We could mention, for example, the possibility of people with a physical or sensory disability to live experiences that in all probability they would never be able to have in real life, or the contribution that these technologies will also offer in terms of rehabilitation or functional recovery/maintenance.

It is important to underline that the Net, in this case, offers greater inclusivity than the real world; in fact, through the various online platforms, disabled people can play and compete at the same level as the so-called “able-bodied” people and are generally judged only on the basis of their skills as a gamer!

On the “Twitch” live-streaming platform, you can come across disabled “streamers” who have turned their passion into a real professional activity.



The Net offers inclusivity: (...) disabled people can compete at the same level as “able-bodied” people and are generally judged only on the basis of their skills as a gamer!



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Isabella Negri

Psychologist, trainer, game designer and researcher in the field of games. She works as a research fellow at the University of Florence.

Amygdala

Brain area with an ‘almond’ shape (hence the name) that belongs to the limbic system. It fulfils various functions: it has a role in the memorisation of events with a strong emotional value or that have caused pain, in the conditioning and processing of fear, anger, happiness, sadness, aggression, in decision-making processes and in states of excitement.

AR

The acronym ‘AR’ stands for Augmented Reality. Augmented reality consists of inserting virtual details into the real environment through the use of digital media (smartphones or tablets) in which AR apps are installed for viewing and interacting with digital content added to reality.

Burnout

State of emotional, physical and mental exhaustion. The WHO classifies this syndrome as a form of work stress that cannot be successfully managed. It manifests itself through a variety of emotional and cognitive symptoms, such as difficulty concentrating; low self-esteem; feelings of guilt, failure, anger and resentment; agitation, irritability and nervousness; unhappiness; frequent crying; indecision; lack of attention; difficulty in thinking clearly and lack of creativity.

Cerebral cortex

It is the layer of grey matter that surrounds the white matter in the brain. It is made up of various areas that fulfil different functions. It plays an essential role in cognitive processes such as - for example - memory, language, consciousness, attention, thought.

Cheating

Behaviour aimed at bending the rules or mechanics of a game to gain an unfair advantage over other players.

Crowdsourcing

Economic model for the development of projects based on the sharing of skills and knowledge.

Default mode network

This term is translated into Italian as “sistema della condizione di default”. It represents a large-scale brain network, consisting of interacting and interrelated brain regions, distinct from other brain networks that are involved in various mental functions. Typically, in fact, this brain network responds and synchronizes when the individual is in a state of rest or is not focused on the outside world.

Digital twin

Digital representation of a physical system or object, strongly connected to its real twin and designed to make decision-making processes easier. Through digital twins it is possible to explore and improve the behaviours of the real twin: for example, understanding what would happen in certain circumstances, enhancing one’s abilities, understanding how to improve oneself.

Dopamine

Neurotransmitter responsible for the sense of gratification and satisfaction following a reward. It plays an important role in the field of cognition, behaviour, motivation, voluntary movement, and inhibition of prolactin production. In addition to this, it plays an important role in the processes of sleep, mood, attention, working memory and learning. On a physiological level, it is responsible for accelerating the heartbeat and increasing blood pressure.

Embedded design

In the IT field, it is a system designed for a specific function, which cannot be reprogrammed for other purposes by the user.

Engagement

Level of involvement of a person in a specific activity.

Escape game

Type of game whose aim is to “escape” from a given situation. They can be set in different contexts and have various plots underlying them. They are usually played in groups and the aim is to solve all the puzzles before the time runs out.

Extrinsic motivation

Motivation conveyed by external reinforcements, for example the awarding of prizes. This type of motivation acts immediately but tends to be rather short-lived. When there are no further reinforcements, in fact, the behaviour ceases.

Flow

Construct defined by the Hungarian psychologist Mihály Csikszentmihalyi; it represents a state of complete immersion within a specific activity and is achieved when the challenges are equally balanced to a person’s skill level. If there is an imbalance, boredom occurs, if the player’s skills are higher than the challenge level, or anxiety occurs, if the challenge level is higher than the player’s skills.

Freemium

Economic model that consists of offering the user a double version of the product: a free version with limited features and a paid version with all the features.

Gameplay

This term derives from the jargon of video games and represents the experience of interaction between the game and the users.

(Game) system

Set of rules and interactions that are created within the game. Game systems can be of different types: they are defined as ‘competitive’ when there is individual competition in order to win the game, or ‘collaborative’ when players cooperate to win against the game.

Hard skill

Technical skills i.e. all the skills strongly connected to the reference sector.

Intrinsic motivation

Motivation dependent on internal factors, for example wants or needs. This type of motivation is more long-lasting and leads to the adoption of behaviours in a systematic way.

Loot box

Alternative form of monetization. It is a metaphorical money chest that contains some currencies that can be used to purchase game materials.

Magic circle

In its definition given by the historian and linguist J. Huizinga, it is the space dedicated to games and game-playing. It is a metaphorical space built voluntarily and limited in space and time.

Massive multiplayer online (MMO)

Type of online video game in which the players can play in groups to complete different types of missions. The interactions take place synchronously, through chat or voice communication.

Metacognition

Cognition about cognition indicates all the knowledge and processes concerning cognitive activities.

Metagaming

Term that indicates all those activities perceived as peripheral or external to the game.

Mindset

Typical mental state of a person: the way in which he/she conducts his/her daily life in the various spheres.

Multiplayer

Type of video game in which several players can participate at the same time.

Neuroimages

Methods that typically acquire images of a certain brain structure or function. Some methods used are positron emission tomography (PET), magnetic resonance imaging (MRI), electroencephalography (EEG), or magnetoencephalography (MEG), single photon emission computed tomography (SPECT), computed axial tomography (CAT).

NFT (Non fungible tokens)

Digital token that contains specific information that gives the user a certain right. The non-fungibility derives from the fact that it is not possible to exchange the asset with another equal and equivalent one. NFTs, therefore, have unique and exclusive characteristics.

Pay-per-feature

Game mode in which some exclusive features are only available upon payment of a fee.

PBL (Project based learning)

Teaching methods in which students are actively and experientially involved in the realisation of significant projects that require exploration of the real world.

PNEI**(psychoneuroendocrinoimmunology)**

Model that provides for reciprocal interaction between mental activity, the nervous system, behaviour, the immune response and the endocrine system of human beings.

Prosocial behaviours

Behaviours that aim to bring some benefit to other people. The condition for considering a behaviour as prosocial is the fact that the other person accepts and approves the action and, in addition to this, is satisfied with it.

Psychosocial adjustment

Psychological term that identifies an individual’s ability to adapt to his/her social environment.

Self-efficacy

Cognitive process identified by Albert Bandura that concerns the perception of one’s chances of achieving a certain objective.

Sense of embodiment

Term that expresses our existence in the world, surpassing the Cartesian body-mind dualism. This concept has to do with the feeling of possessing, controlling and being inside a body.

Sense of presence

Feeling of being present at a certain time, inside a certain space, as well as awareness of one's own existence.

Serious games

Games that have a purpose other than simple entertainment; they have in fact a balance between the fun and learning elements. They can for example be educational, training or social change games. In general, the term is slowly being abandoned to be replaced with more specific terms related to Game-Based Learning.

Soft skill

Transversal skills, i.e. skills that can be applied in a wide range of different contexts.

Strategy

Long-term tactics, used to coordinate and define actions, with the aim of achieving a specific purpose or objective.

Theory of Mind

Ability to understand the mental states of others. It has to do with the cognitive ability to represent one's own and others' mental states in order to explain and predict the adoption of certain behaviours.

Trade-off

The term trade-off derives from economic terminology and indicates a type of exchange that is inversely proportionate in which the increase of one quantity determines the decrease of another quantity. In this situation, a person has the choice as to which quantity to increase.

Troll

In typical internet jargon, this is a person who teases users, causing reactions of anger and annoyance and taking part in virtual communities through deliberately provocative, meaningless or incorrect messages, with the aim of disturbing communication.

Twich

Interactive live-streaming online platform covering content ranging from games, to sports and culture.

VR

The acronym 'VR' stands for Virtual Reality. Virtual reality consists of the creation of an entire digital environment with which users can interact through the use of specific peripherals, such as some immersive headsets.

Working memory

Executive feature that represents the ability to store certain information in the memory for a limited time, to allow immediate use.