BOARD GAME RESEARCH MEETING

Atti del convegno

Università degli Studi di Milano

A cura di D. Aurelio, C. A. Iocco

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Editor: D. Aurelio, C. A. Iocco

Cos'è il Board Game Research Meeting?

Il Board Game Research Meeting (BGRM) è il primo convegno sui giochi da tavolo organizzato dal Dipartimento di Informatica "Giovanni degli Antoni" dell'Università degli Studi di Milano.

Il convegno trova spazio negli ambienti del Dipartimento di Informatica, in via Celoria 18 a Milano.

Le attività del BGRM rientrano nell'alveo del progetto PRIN PNRR Game4Ced, CUP G53D23007210001.

Il progetto Game4CED

Il progetto Game4CED unisce giochi da tavolo e ricerca sul daltonismo con gli obiettivi di sviluppare un gioco da tavolo come strumento educativo per la rilevazione precoce del daltonismo, aumentare la consapevolezza delle persone sul daltonismo e migliorare l'accessibilità dei soggetti ai giochi.

Il progetto Game4CED, che si articola su quattro "pacchetti di lavoro", vuole fornire nuovi strumenti per insegnanti ed educatori al fine di creare una pratica scolastica di maggiore accessibilità per tutti i bambini.

Da un lato, Game4CED lavora sul piano della **ricerca** per sviluppare uno strumento in grado di valutare l'accessibilità dei giochi da tavolo con un focus specifico sulle disabilità visive. Tra gli obiettivi di Game4CED c'è infatti quello di redigere un protocollo di azioni per supportare insegnanti, genitori ed educatori nell'uso di vari giochi come strumenti per la rilevazione del daltonismo; questo va di pari passo con l'**educazione** nella comprensione della condizione e nell'affrontare i problemi legati alla visione del colore. A questo punto deve necessariamente seguire la **disseminazione** dei risultati ottenuti tramite pubblicazione di articoli scientifici, atti di conferenze e vari festival del gioco o del mondo dell'educazione, come *Play: Festival del gioco* di Modena (IT), *Essen Spiel Messe* (DE) o *Didacta* (IT).

Per qualunque informazione, gli organizzatori sono raggiungibili all'indirizzo game4ced@gmail.com.

Presentazione del volume

Il presente volume raccoglie gli atti del *Board Game Research Meeting 2024*, convegno dedicato allo studio multidisciplinare dei giochi da tavolo e delle loro applicazioni nei contesti educativi, culturali e sociali. L'evento, tenutosi all'Università degli Studi di Milano il 18 e 19 luglio 2024, ha riunito studiosi, educatori, designer e professionisti del settore ludico per esplorare le molteplici sfaccettature del gioco come strumento di apprendimento, innovazione e interazione sociale.

Negli ultimi decenni, la ricerca sui giochi ha acquisito una crescente rilevanza nel panorama accademico, grazie al contributo di discipline quali la pedagogia, la psicologia cognitiva, la sociologia e il game design (Gee, 2003; Salen & Zimmerman, 2004). Il concetto di *game-based learning* (GBL) ha dimostrato come il gioco possa rappresentare una metodologia efficace per il potenziamento delle competenze cognitive, sociali ed emotive (Abdul Jabbar & Felicia, 2015; Allsop & Jessel, 2015). In particolare, il *board game-based learning* (BGBL) si è rivelato un approccio valido per migliorare l'engagement degli studenti e facilitare il trasferimento delle conoscenze in modo esperienziale (Zsoldos-Marchis & Juhàsz, 2020; O'Neill & Holmes, 2022).
L'utilizzo dei giochi da tavolo come strumenti educativi si basa su principi costruttivisti, che enfatizzano l'apprendimento attivo attraverso la sperimentazione e la collaborazione (Polin, 2021). Le meccaniche ludiche, infatti, stimolano il pensiero critico, invitano alla risoluzione dei problemi e potenziano la capacità di lavorare in gruppo. Inoltre, il gioco è stato utilizzato con successo in contesti di formazione professionale e di sensibilizzazione sociale, come dimostrato da esperienze di *serious gaming* applicate a tematiche quali l'inclusione sociale e la cittadinanza globale (Young & al., 2012).

I contributi raccolti in questo volume sono stati scritti su base volontaria dagli autori e dalle autrici degli interventi del convegno. Pur nell'alveo dei giochi da tavolo, gli approcci seguiti sono stati diversi, e multi-sfaccettati.

Si è ad esempio parlato di game design per lo sviluppo di strumenti educativi, con approfondimenti sulle meccaniche e sulle dinamiche di gioco più efficaci per l'apprendimento e la presentazione di nuovi giochi progettati per la didattica e per la formazione professionale. Si è parlato delle principali metodologie didattiche che integrano i giochi nei processi di apprendimento, con particolare attenzione su alcuni casi specifici. Come gruppo Game4CED abbiamo fortemente voluto porre l'accento sul tema dell'accessibilità e dell'inclusione nel gioco, favorendo la discussione su strategie che rendano i giochi accessibili a persone con disabilità cognitive e sensoriali e sulle *good practice* cui attenersi nel design di giochi da tavolo educativi. Si è anche parlato dell'impatto culturale, storico e sociale dei giochi, e del ruolo che questi hanno avuto, possono avere e hanno nella costruzione di comunità e nello sviluppo delle competenze sociali, sia come opera di sensibilizzazione che come invito al cambiamento sociale.

Il nostro augurio è che questa raccolta di studi possa rappresentare un punto di riferimento per ricercatori, educatori e professionisti interessati all'applicazione dei giochi da tavolo in ambiti formativi e di ricerca. Il *Board Game Research Meeting*, che verrà riproposto nel 2025 nella sede dell'Università di Modena e Reggio Emilia, si conferma così come un'importante piattaforma di scambio interdisciplinare, che contribuisce alla crescita della comunità scientifica dedicata allo studio del gioco e delle sue potenzialità educative e sociali.

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Il comitato organizzatore

Alessandro Rizzi: Professore Ordinario presso il Dipartimento di Informatica dell'Università degli Studi di Milano dove insegna "*Progetto Multimediale*", "*Colorimetria e gestione del colore per i beni culturali*" e "*Metodologie e tecniche per il restauro cinematografico e fotografico*". Si occupa dal 1990 di immagini digitali, colore e percezione visiva. E' Fellow dell'IS&T, ed è stato segretario internazionale della divisione 8 della CIE, è tra i fondatori del Gruppo del Colore, chair della conferenza Color Imaging: Displaying, Hardcopy, Processing, and Applications, parte dell'Electronic Imaging e membro di diversi comitati di programma di conferenze del settore. E' topical editor per Applied Color Science per il Journal of Optical Society of America A e associate editor per il Journal of Electronic Imaging. Nel 2015, ha ricevuto la Davies medal della Royal Photographic Society.

Liliana Silva: Professore Associato di Pedagogia sperimentale presso il Dipartimento di Educazione e Scienze Umane dell'Università degli studi di Modena e Reggio Emilia, si occupa principalmente delle tematiche della valutazione applicata a contesti lifelong e lifewide learning e degli approcci di valutazione ludica.

Matteo Sassi: Fisico, si occupa dell'utilizzo di Giochi da Tavola come strumenti formativi/educativi. L'ambito principale di ricerca riguarda lo studio dell'accessibilità del gioco in tutte le sue forme. Game Trainer Erickson. È autore di giochi da tavola e coordinatore della rete di Incontri degli Autori di Giochi da Tavola (IDEAG). Membro del Game Science Research Center.

Carlo Iocco: Ricercatore del laboratorio MIPS dell'università "La Statale" di Milano. Si occupa di design di giochi da tavolo e videogiochi con un focus sulle componenti di accessibilità relative al daltonismo, alla rappresentazione delle immagini e dell'interfaccia grafica.

Daniele Aurelio: Fisico, ricercatore del laboratorio MIPS dell'università degli studi di Milano e appassionato di giochi astratti. Tra i membri fondatori del gruppo di divulgazione scientifica Physics4Teenagers, ha l'hobby della comunicazione della scienza, ed è il coordinatore del Mathsjam di Pavia, evento internazionale di matematica ricreativa.

Sommario

Contributi al convegno

Computational Techniques for Tabletop Games Heritage (GameTable)

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Abstract:

The multifaceted study of games spans diverse disciplines which have often operated in isolation. In this era of rapid developments in computer science, games stand as testbeds for pioneering methodologies, shaping and influencing techniques in economics, engineering, and AI. At the same time, archaeologists, historians, and anthropologists explore the motivations underlying human play, dissecting its social implications on both individual and societal levels. Furthermore, games have played a central role in pedagogical development and are progressively acknowledged as integral components of humanity's cultural heritage.

The GameTable COST Action is an ongoing scientific network which started in October 2023, funded by the European Cooperation in Science and Technology research scheme, aiming to gather scholars, researchers and stakeholders from a variety of fields and career stages across academia, industry and heritage institutions. GameTable aims to forge long-lasting international collaborations by establishing an interdisciplinary network to develop new methodologies and applications for using game AI to study, reconstruct, and preserve the intangible cultural heritage of games.

The network proposes to approach AI techniques, archaeology, and gaming research into a cohesive framework. In doing so, the group aspires to demonstrate how games are both form of entertainment and repositories of cultural richness and historical narratives. Key challenges include innovative approaches for studying and preserving heritage games, reconstructing missing rules in incomplete games, simulating human-like play, applying AI to study historical games, developing novel methods to identify unrecognized games measuring their evolution across space and time, developing pedagogical tools, and leveraging AI in a culturally diverse way.

Keywords: AI Approaches, Tabletop Games, Cultural Heritage of Games, General Game Playing, Game Design, Mathematics in games

1. Introduction

Tabletop games are one of the most popular pastimes for millions of people worldwide. The first forms of games date back at least 5,500 years, granting them an essential role of the intangible cultural heritage of humanity (Browne, 2018). Ancient games settings and rules are partially known from the discovery of gaming equipment, the depiction of gaming activity in artistic representations, and ancient literature that discusses or refers to them. Thousands of different games have been played by people since prehistory, though the rules for many are now lost, and new games are constantly being developed (Murray, 1951). Beyond being a form of entertainment, play holds intellectual and social significance, allowing us to analyse leisure and sociability in past and modern societies. Therefore,

both board and card games are arising as a subject of intense study in many different research fields in academia, industry, and cultural institutions. Relevant recent examples in the field of game studies, with a focus on board games played in Antiquity, are the ERC Locus Ludi and the ERC Digital Ludeme Project (Dasen, 2021; Crist, Soemers, 2023; Browne et al., 2019).

The main objective of the GameTable Action is to explore new methods to study games across diverse fields such as history, archaeology, mathematics, and education, in collaboration with AI researchers. The group aims to design algorithms, methods, and techniques capable of emulating human-like gameplay across a wide range of tabletop games to unlock new insights for research within these disciplines (MoU, 2023).

2. COST Action outcomes at the first Board Game Research Meeting

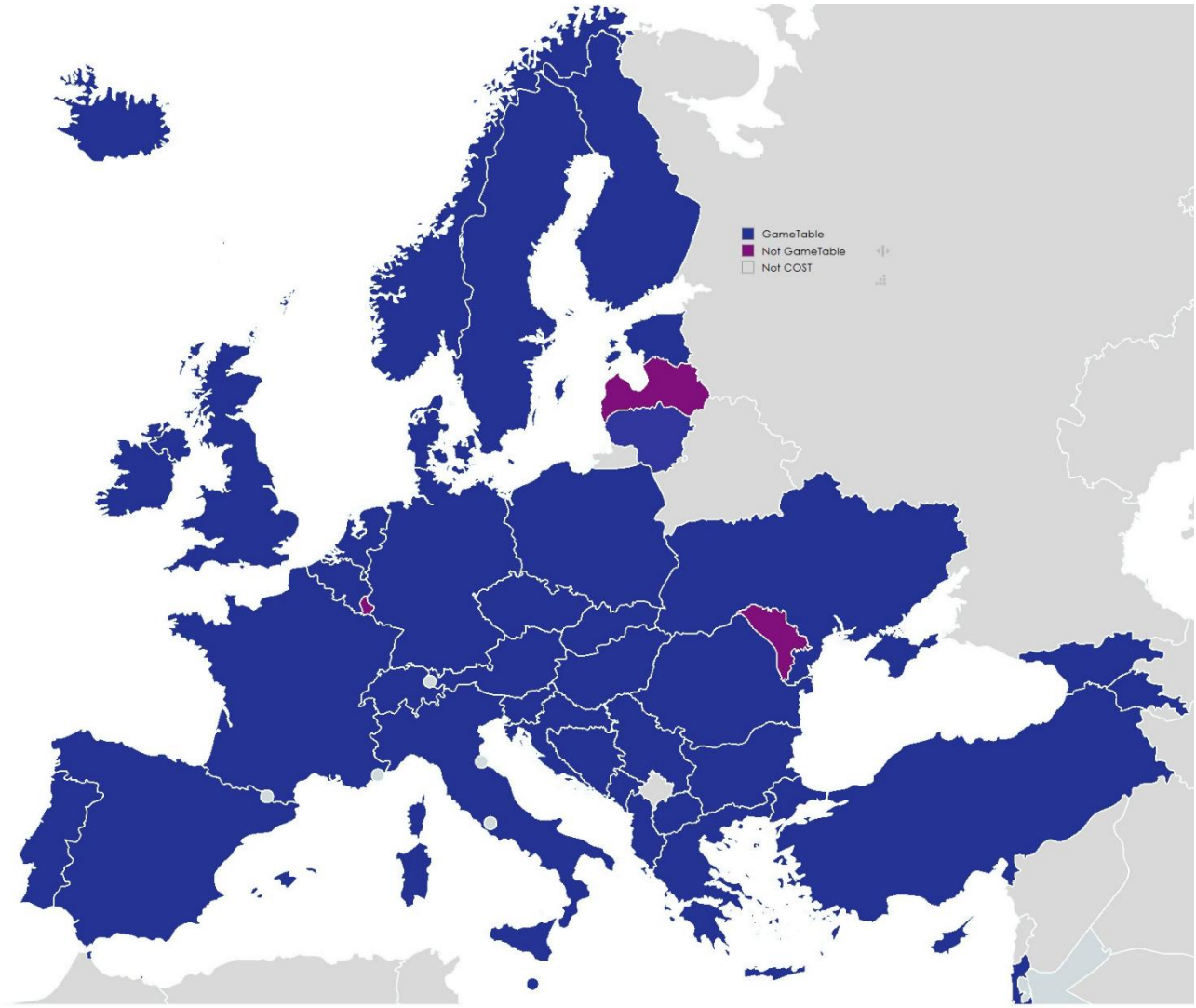
The GameTable COST Action was presented through a Dissemination Conference Grant (See below) at the first Board Game Research Meeting organised by the Game4CED project in Milano (Perego *at al.,* 2023). This research focuses on investigating tabletop games and boardgames that works for visual impaired and blind colours players, with the aim to develop games and tools to establish the premature progress of the colour-blind disease in young people. The lecture was delivered together with GameTable Action members and experts in cognitive ergonomics in board games Michele Masini and Tommaso Piccinno (Passarelli *et al*., 2024). Our presentation introduced the Action structure and goals by focusing on this first year of the network, during which many research projects have been initiated by its members. In addition, the organization of the five operating working groups within the Action, and their upcoming research, was underlined with an effort to show how the Gametable network has fostered—and will continue to foster—collaboration throughout the members of the community, by emphasizing interdisciplinary methods and studies. We also presented the project grant awarding scheme, explaining the Action's venues of funding opportunities through the e-COST system, the scope of which is to allow collaboration on innovative scientific missions in the near future.

Our participation was beneficial to the Action dissemination goals because many topics which align with the GameTable Action objectives were presented during the conference. This is especially important given the conference's focus on mathematics and computer science, game design, but also education and teaching through game-related activities. Research topics presented included both case studies of specific games, the games industry in Italy, game making, and multiple reflections on games and accessibility, as much as games as educational tools for young people with visual impairment or learning disabilities and games applied in therapeutic environments. The diverse backgrounds of the participants—game designers, teachers, researchers, and educators allowed to engage with different situations and challenges, and therefore to enhance significant collaborations, share resources, and exchange ideas to carry the field forward. The network main focus and its challenges have been introduced by emphasising on the intersections between different fields involved in the Action.

3. Action Structure

The GameTable COST Action CA22145, initiated on October 24th, 2023, currently – February 2025 – includes 274 members from 39 COST countries and 15 international Partners countries, engaged in

its working groups, overseen by a Management Committee (MC) of 64 members (https://www.cost.eu/actions/CA22145/). In addition, the Action is led by a core group of 16 members consisting of the Action grant holders and chairs representatives Eric Piette, affiliated with the Université Catholique de Louvain (UCLouvain), and Walter Crist, affiliated with Leiden University, the leaders of each working group, the Science Communication Coordinator, the Grant Awarding Coordinators, the General Inclusivity Coordinator, and the Industrial Relationship Coordinator.



(Fig. 1: List of the COST countries involved in the CA22145 at the beginning of the 2nd Grant Period, 1-11-2024. Portugal, Spain, Italy, Malta, Greece, Cyprus, Turkey, Israel, Albania, North Macedonia, Bulgaria, Serbia, Bosnia and Herzegovina, Croatia, France, Switzerland, Slovenia, Austria, Slovakia, Czechia, Poland, Germany, Belgium, Netherlands, United Kingdom, Ireland, Denmark, Finland, Sweden, Norway, Iceland, Hungary, Estonia, Ukraine, Lithuania, Romania, Montenegros, Armenia, Georgia)

The main aims of the core group are:

• Responsibility for overseeing the Action on behalf of the MC.

• Implementation of the Action website to coordinate communication internally between the members and WGs, as well as to the different stakeholders and the public.

• Enlarge the network and involvement of ITCs (Inclusiveness Target Countries) in fostering the public Action events in ITC.

• Develop an Action plan to increase inclusivity with respect to gender and ethnicity.

• Manage the Grant Awarding process within the Action and explore new funding opportunities and research projects.

• Address internal and external communications by coordinating the dissemination efforts of the Action.

• Establish connections with industrial partners.

The Action is organized into five working group (WGs), each represented by two leaders:

WG1 - "Search, Planning, Learning, and Explainability" relies to the expertise of European Game-playing AI researchers. The main objectives of the group are to improve the AI search, planning, and learning techniques to play any tabletop games, by developing explainable approaches to produce strategies to enhance the human understanding of games, and to study learning algorithms that improve their gameplay through experience (Soemers *et al.,* 2024). These techniques will rely on a general game-playing system similar to the Ludii General Game System (Genesereth, 2005; Piette, 2020). Additional focus topics of the WG1 are human-like AI, imperfect-information games and reinforcement learning (Georgios, 2018; Morenville, Piette, 2024a; Morenville, Piette, 2024b).

WG2 - "Cultural Heritage of Games" brings together scholars from many fields—particularly anthropologists, historians, and archaeologists specialising in regions around the globe from prehistory to the present day. Its main goal is to explore and preserve the intangible heritage of games, by developing new applications to the study of games in different historical periods (Pace *et al.* 2024; Crist, 2019). One of the group's main goals is to identify the intersection between recent developed AI techniques for the study of games, and the cultural heritage of games (Crist *et al.,* 2024). An additional focus will be reinforcing data management strategies to expand data collection for regions in underrepresented gaming studies (Browne *et al.,* 2023; Crist et al., in preparation).

WG3 - "Automated Game and Puzzle Design" aims to develop design methods for reconstructing the missing rules of incomplete traditional games, and to generate new high-quality games and new expansions for existing games for commercial application purposes. The group aims to create new algorithms for automatically generating original tabletop games and puzzles, and for identifying mathematical principles in games. This work will enhance educational material by developing software programs that assist in generating and evaluating games used for educational purposes (Stephenson *et al.,* 2022; Todd *et al.,* 2024).

WG4 - "Mathematics in Games" focuses on understanding and uncovering the connections between games and mathematics. Game analysis involves diverse branches of mathematics, each focusing on different aspects of gameplay such as rulesets, game spaces, pieces, tactics, and players. The field comprises set theory, number theory, graph theory, combinatorial game theory, and probabilities, among others (Albert *et al*., 2007; Piette *et al*., 2021). Special attention will be given to the interplay between the histories of games and mathematics, exploring how researchers in the field approach the study of games and what are the essential mathematical tools and concepts for developing strategies.

Moreover, understanding these processes of knowledge production is crucial for modern teaching methods, since games can be valuable pedagogical tools for promoting mathematical learning (Bragg, 2012; Hall *et al.,* 2024).

WG5 - "Implementation, Dissemination, and Education", is the largest working group as most members of the other groups are also interested in dissemination and education. This working group plans to serve as the central hub connecting all the other WGs, maximising the impact of GameTable and implementing new tools based on the solutions developed through the Action (Piette et al., 2025). The group aims to create methods and teaching strategies which are relevant to both researchers, educators, and the general public. This work will be handled by ensuring the collaboration between end users and researchers/developers, together with cultural heritage institutions, museums, and industrial partners, increasing the chance that the tools developed are adopted by all the relevant stakeholders. This WG also has oversight of dissemination to ensure visibility, and manage events, outcomes and deliverables of all WGs. Additional key activities for WG5 include:

• Coordinating the development of the general game system, ensuring its accessibility by the wider public.

• Producing interdisciplinary scientific papers in cooperation with all WGs.

• Creating tutorials and videos to be released on social media channels to promote GameTable's results and to make more effective use of the AI-based tools produced.

• Connecting heritage education and game-based learning activities within Europe and sharing related experience, methodologies and best practices.

• Producing relevant material for teacher training, both in primary and in secondary schools.

• Creating and promoting a digital exhibition on the application of Game AI to traditional games.

3.1 Action goals

The GameTable COST Action's main objectives rely on the collaborative efforts of all the WGs to tackle their respective challenges by applying interdisciplinary approaches to the study of games. The collective goals to be undertaken throughout the course of the Action are simplified in Table 1. This table sets out how our objectives need to be carried out by employing an interdisciplinary approach that involves the different WGs' skills and expertise.

Action Goal	**WG1 task**	**WG2 task**	**WG3 task**	**WG4 task**	**WG5 task**
Identify what is missing from AI approaches that hinders techniques to studying human play.	Develop human-like AI approaches.	Provide insights on the motivations and choices of the players.	/	/	/
Combine traditional archaeological and historical methodologies	Recognise and perform the required experiments to further identify	Explore ways to use traditional methods of material culture and textual	/	/	/

with Game AI techniques to unfold new lines of inquiry.	potential research questions.	analysis to identify observations that could be tested with playout experiments.			
Improve the quality of education in multiple topics.	Develop and extend the teaching of the most modern AI approaches to undergraduate (Bachelors) and postgraduate taught (Masters) students.	Produce booklets on games and history to contribute to teaching.	Develop software programs to help generating and evaluating the games used for educational purposes.	Produce booklets on games and mathematics to contribute to teaching.	Ensure collaboration among the WGs and oversee dissemination.
Reconstruct ancient games from partial historical evidence.	Evaluate possible reconstructions through human-like AI techniques.	Provide information on what is known about specific historical games.	Provide sophisticated techniques for generating possible rulesets.	/	/
Reinforce the current state-of-the-art techniques.	Coordinate the research efforts of the AI researchers, by improving the efficiency of general Game AI techniques.	Provide a synthesis of what is known about a game, to reconstruct rulesets based on expectations of human play.	/	/	/
Develop a general game system.	Provide innovative techniques to study, analyse, evaluate, reconstruct, and play any tabletop game.	Ensure the system is built to be able to address the research questions relevant to the WG.	/	Ensure the system is built to be able to address the research questions relevant to the WG.	/
Imperfect-information games research.	Define a proper general representation of imperfect-information games and establish new approaches based on new learning models capable of discovering and playing efficient strategies.	Identify relevant case studies of imperfect-information games such as cards and dominoes.	/	Identify relevant case studies of imperfect-information games such as cards and dominoes.	/
Examine the history of mathematics through the study of games.	Perform experiments in reconstructing games that may identify	Determine how mathematics is used in games and what the evidence from history and	Perform experiments in reconstructing games that may identify	Determine how mathematics is used in games and what the	/

	mathematical principles.	archaeology can tell us about the use of mathematics in the games of past societies.	mathematical principles.	evidence from history and archaeology can tell us about the use of mathematics in the games of past societies.	
Develop new algorithms to automatically generate high-quality and original tabletop games, particularly for commercial use.	/	Identify relevant case studies of tabletop games of historical importance.	Generation of new games customised to users' preferences and free-form game design to discover new game types.	Identify relevant case studies of mathematical games.	/

Table 1: Action goals. Source: CA22145 MoU 2023.

3.2 Networking venues

Annual WGs meetings and thematic training schools are programmed events of any COST Action. These meetings have the scope of allowing the encounter of WGs members working together to address the Action goals, by transferring and creating knowledge and implementing the venue of collaborative research.

Working Group	**Place**	**Dates**
All (Kick off meeting)	Leiden (Netherlands)	January 29-30, 2024
WG1	Leiden (Netherlands)	January 31, 2024
WG2	Virtual	December 14, 2023
WG2	Mustafapaşa (Turkey)	May 03, 2024,
WG3	Valletta (Malta)	March 25, 2024
WG4	Virtual	January 24, 2024
WG4	Aveiro (Portugal)	March 15, 2024
WG5	Virtual	January 4, 2024
WG5	Santorini (Greece)	October 10-11, 2024.
Core Group (Management Committee Meeting)	Virtual	October 24, 2023
Core Group (Management Committee Meeting)	Virtual	September 4, 2024

Table 2: First Grant Period Meetings (all in person events were held in hybrid form)

The last meeting of this Grant Period, the WG5 meeting held in Santorini, particularly allowed members from across all of the WGs to meet and discuss the various projects which have been carried out throughout the first year of the GameTable project. Particular attention was paid to the organization of the general game system, the Action digital exhibition, and the production of educational materials to be used by teachers in university and school settings. (Minutes available at https://gametable.network/index-wg-meeting.html)

Furthermore, GameTable ensures networking activities organized through a grant awarding process. These contribute to the visibility of COST, by offering valuable development experience for Young Researchers and Innovators, which are researchers or innovators under the age of 40, as well as for

established researchers. Moreover, these opportunities can strengthen the existing networks by allowing researchers and innovators to foster collaboration both in a face-to-face and online setting, to exchange knowledge, learn new techniques, and disseminate Action results (COST 094/21 2024).

The GameTable grant awarding scheme includes:

-Short Term Scientific Missions - institutional visits aimed at supporting individual mobility, fostering collaboration between researchers and stakeholders. This grant funds a short-term visit to a host organization located in a different country, for a period that goes from 5 to 90 days of duration. The researcher or innovator will undertake specific research work, relevant to implement the Action objectives.

-Dissemination Conference Grants - fund Action participants to attend and present their work at high-level conferences that are not organised or co-organised by the COST Action. Dissemination Conference Grants help increase the visibility of the Action in the wider research community, and they also contribute to the visibility of the presenter. Moreover, the presentation of GameTable research-related projects may attract additional participants and stakeholders to the Action.

-Inclusiveness Target Countries (ITC) Conference Grants - provide financial support for Young Researchers and Innovators from an Inclusiveness Target Country / Near Neighbour Country (NNC) to participate in high-level conferences. ITC are less research-intensive COST Members countries while NNC are non-COST Countries (for further detail see Annex I – Level A: Country and organisations table in the COST Annotated Rules). These grants ensure applicants receive support to attend and present their own work within the scope of the Action at a conference, with the aim of establishing new venues for future collaborations.

Young researchers and Innovators (YRI) Conference Grants are aimed at supporting Young Researchers and Innovators participation in high-level conferences fully organised by a third party. The grantee receives support for attending and presenting their work (poster/oral presentation) aiming to establish a strong network and increase their visibility in the research community.

3.3 First Grant Period STSMs

As emphasised in the previous section, Short Term Scientific Missions are one of the networking activities organized through a grant awarding process. During the first Grant Period (24/10/2023-31/10/2024), the GameTable Action granted a total of eight STSMs, which have tackled diverse gaming topics relevant to the Action goals. These missions are summarised in Table 3.

Name of Grantee	**Topic**	**Period**	**Country**
Miloš Stojaković	Client-Waiter games on graphs	03/03/2024-09/03/2024	Poznan, Poland
Achille Morenville	Exploring Approaches in Reinforcement Learning for Imperfect-Information Game	08/04/2024-31/05/2024	Maastricht, Netherlands
Manuel Eberhardinger	Explaining the Decision-Making Process of Board	15/07/2024-26/09/2024	Tokyo, Japan

	Game Agents with Program Synthesis		
Alex de Voogt	Analyzing Mourra	27/06/2024-03/07/2024	Brest, France
Alex de Voogt	Materiality and games	04/07/2024-11/07/2024	Leiden, Netherlands
Daniel Finnegan	Augmented Board Games	09/08/2024-12/08/2024	Vilnius, Lithuania
Walter Crist	Games Heritage of Azerbaijan	20/07/2024-11/08/2024	Baku, Azerbaijian
Barbara Caré	Communication, education and dissemination strategies for heritage games and "game table" network	14/10/2024-20/10/2024	Athens, Greece

Table 3: STSMs carried out during the 1st Grant Period

Grantees must provide a research plan and a report of each mission they undertake. By way of example, I include here sample documents from research undertaken by Alex De Voogt which will lead to a publication about analysing the 'Mourra' game, in collaboration with Lisa Rougetet:

Research Plan (June 2024):

"In this project I will collaborate with Prof. Lisa Rougetet on an ethnomathematical analysis of 'Mourra', a game played mostly in Italy. This gesture game is related to n!ài, a game on which I published previously from a statistical point of view (De Voogt 2024)*. The goal of the mission is to expand our understanding of these games and to provide a mathematical basis. The work consists of three stages. First, we will provide a description of the games from an anthropological point of view. Relevant data will be collected from videos and appropriate literature. This description details the written and unwritten rules of the game, the variations of play and the behaviour of players. Second, we will focus on the mathematical underpinnings of the games, determined by analysing the main rules, and the broader rules that include variations. Finally, the mathematical analysis will serve to contrast formal strategies based on math, and human strategies based on descriptions of play. We expect to publish the results of this research discussing the ethnomathematical properties of the game of 'Mourra', possibly including games with similar properties.*"

STSM Report (July 2024):

"At Brest University, I worked with Lisa Rougetet and developed a publication on the game of Mourra by comparing its strategic properties with that of rock-paper-scissors and n!ài. We reached out to a contact at a leading popular science journal in France who encouraged us to use this outlet. The article is mostly finished but still needs illustrations and further editing before submission. During our work we explored several other possibilities for research and publications. We reached out to an editor and were invited to translate a short French sixteenth century text about games. In addition, we explored possible articles on the game of Sorry! of which the hybrid properties are of particular interest. In sum, the collaboration was much more productive that just the initial idea of analyzing Mourra and several possibilities are now available for the future. We submitted and are waiting for the publication of a translation for the journal ROMChip entitled 'Translation of Étienne de

Flacourt's Fifangha rules (1661)'. We intend to follow-up our collaboration not only to finalize the above projects but also to publish a translation from German of Emanuel Lasker's text from 1930 on Nim-games for the journal ROMChip, as well as produce an analysis of the game of Sorry! as a hybrid card and board game (De Voogt, Rougetet, 2024)*."*

4. What's next? Second Grant Period objectives

GameTable will continue developing ongoing projects and address its research goals and objectives. The Action has now developed his official website which is constantly updated (https://gametable.network/index.html).

(Fig 2: Official GameTable Logo)

Furthermore, as the beginning of the 2nd Grant Period has officially started (26-11-2024), the WGs and Core Group members have decided to focus on additional secondary objectives (MoU objectives 2024), including:

• Identifying AI techniques that can answer archaeological and historical research questions and facilitate future research on games of the past through the creation of digital tools.

• Understanding the ways that cultural processes can change gameplay and explore the ways that games have had an impact on cultural change. Providing methodologies to connect artefacts with specific kinds of gameplay and create innovative techniques for studying gaming cultures of the past.

• Improving standard approaches for the analysis of tabletop games in developing interaction between AI search techniques and the mathematical aspects involved in these techniques.

• Providing explainable approaches for the strategies performed by AI agents and elements of comparison between tactics and strategies.

• Designing AIs using a variety of strategies, simulating how humans experience gameplay. Learn from human in-game communication and teach AIs how to interact with AIs and humans.

• Providing reconstructed games for use by cultural institutions in their educational programs and create accessible digital tools to engage the public with heritage games.

• Extending General Game Playing (GGP) research by developing a framework to model imperfect-information games.

• Developing procedural generation techniques of higher quality games and puzzles and providing automatic evaluation, play testing and balancing of tabletop games.

• Generating innovative and original high-quality games for commercialisation.

• Developing effective educational strategies for teaching Game AI and pedagogical programs and activities among students at all levels of education.

• Establishing a robust network of European researchers, through the organisation and coordination of open and multidisciplinary events, fostering enduring collaborations that extend beyond the duration of the project.

• Promoting a collaborative research agenda aimed at facilitating the inception of new projects that leverage combined expertise, skills, and human resources.

• Attracting the next generation of Young Researchers and Innovators in games, and supporting them to learn about the manifold subjects, topics and possibilities in the fields to contribute to the improvement of computer science, mathematics, history, anthropology, and archaeology.

• Promoting Young Researchers and Innovators (YRI) in increasing their visibility through conferences and workshops.

• Developing collaborations between YRIs and experts from various fields in supporting researcher mobility by encouraging researchers to participate in training schools and through the intensive use of Short-Term Scientific Missions (STSMs).

• Disseminating the results of the Action activities to the scientific community and to the public.

• Achieving geographical and demographical diversity, with special attention to gender balance and COST Inclusiveness Target Countries (ITC), throughout the Action.

• Identifying and interacting with stakeholders identified among Action members and beyond.

• Forming an educational programme to offer training in the different multidisciplinary areas embedded in this Action.

5. Conclusions

The first Grant Period of the GameTable Action has seen the start of research to tackle the Action's main objectives and goals, with the aim of finding innovative approaches for studying and preserving the intangible cultural heritage of games. Methodologies include the application of AI to study historical games, the analysis of mathematical aspects of ancient and modern games, the development of a general playing system, the application of procedural generation techniques to create higher quality games and puzzles, and much more.

The five Working Groups have met to share ideas, identify common practices and apply an interdisciplinary approach to the field of tabletop games research. Moreover, the grant scheme has enabled the dissemination of the Action ongoing projects and main goals at several conferences within COST participant countries. Many other tools have been used as an opportunity to meet and discuss about relevant topics, such as the first kick-off meeting in Leiden, online monthly webinars, and management committee meetings. Short Term Scientific Missions on the other hand have allowed researchers to meet and focus on specific scientific topics.

During the next three years of this network all participants will continue working on the implementation of methods to study, analyse, evaluate, and play diverse tabletop games by applying an innovative interdisciplinary approach, aiming to address a host of questions useful to educators, researchers, and the general public.

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