MI
79
MONOGRAPHIES
INSTRUMENTUM



GAMES IN THE ANCIENT WORLD: PLACES, SPACES, ACCESSORIES

■ edited by Alessandro Pace, Tim Penn, Ulrich Schädler

éditions Mergoil

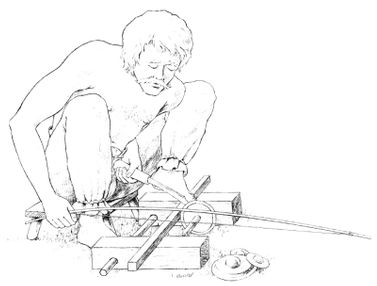
Games in the Ancient World: Places, Spaces, Accessories

edited by:

Alessandro Pace,
Tim Penn,
Ulrich Schädler

Monographies Instrumentum

79



Collection dirigée
par Michel Feugère

Games in the Ancient World: Places, Spaces, Accessories

edited by:

Alessandro Pace,
Tim Penn,
Ulrich Schädler

Published with the support of the European Research Council (ERC)
as part of the ERC Advanced Grant « Locus Ludi.
The Cultural Fabric of Play and Games in Classical Antiquity »
under the European Union's Horizon 2020 research
and innovation programme
(grant agreement # 741520)







éditions Mergoil

Drémil-Lafage - 2024

Direction d'ouvrage
Véronique Dasen & Ulrich Schädler

Tous droits réservés
© 2024

éditions Mergoil

Diffusion, vente par correspondance
Editions Mergoil - 13 Rue des Peupliers - 31280 Drémil-Lafage
Tél : 0345440444 - e-mail : contact@editions-mergoil.com

ISBN : 978-2-35518-145-0
ISSN : 1278 - 3846

Aucune partie de cet ouvrage ne peut être reproduite sous quelque forme que ce soit (photocopie, scanner ou autre) sans l'autorisation expresse des Editions Mergoil.

Mise en page : Thomas Sauvage - www.thomasauvage.com
THOMAS AUVAGE
Graphiste - Directeur Artistique

Couverture : Editions Mergoil
Détail de la mosaïque de Megalopsychia de Yakto (Turquie)
Ve siècle siècle après J.-C. Antioche, Musée archéologique.
Image retravaillée par Wikimedia Commons

Impression : Aquiprint

Dépôt légal juillet 2024

CONTENTS

Introduction
Where the study of games comes from…
Véronique Dasen & Ulrich Schädler ..... *Page 7*

More than just fun and games: the past, present, and future of the materiality of play
Tim Penn, Alessandro Pace & Ulrich Schädler ..... *Page 13*

A community of players. Board games at Deir el-Medina (Egypt)
Marie-Lys Arnette ..... *Page 31*

Games boards from Hellenistic Period Maresha: Predicting the future or simply passing the time?
Ian Stern ..... *Page 53*

Computational approaches for recognising and reconstructing ancient games: The case of ludus latrunculorum
Walter Crist, Éric Piette, Dennis J. N. J. Soemers, Matthew Stephenson & Cameron Browne ..... *Page 63*

Su alcune tavole lusorie dai Fori Imperiali
Luca Dal Monte ..... *Page 81*

Games and gaming in southwestern Asia Minor
Peter Talloen ..... *Page 89*

Gaming in the Place of Palms at Aphrodisias
Ben Russell, Angelos Chaniotis & Andrew Wilson ..... *Page 107*

Roman, Byzantine, and Medieval Games in Ephesus: preliminary survey results
Ulrich Schädler ..... *Page 127*

Europe's playful frontiers: Roman board games in the Barbaricum, from Britain and across the Rhine and Danube lands
Ulrich Schädler & Mark A. Hall ..... *Page 141*

The Iberians played too
Raimon Graells i Fabregat & Miguel F. Pérez Blasco ..... *Page 181*

The gaming material from Empúries, Catalunya
Ilaria Truzzi ..... *Page 191*

Le mobilier de jeu antique dans l'habitat de la cité de Nîmes
Yves Manniez ..... *Page 211*

Wrote for luck? Unofficial literacies and gaming counters from Roman Britain
Natasha Harlow ..... *Page 231*

Casino at *Coria*? Evidence for gaming at Roman Corbridge
Frances McIntosh ..... *Page 243*

On pegged gaming pieces (with particular reference to a Late Celtic set from Lough Sewdy, Ireland)
Mark A. Hall & Katherine Forsyth ..... *Page 255*

Spielen in *Vindonissa.* Spielsteine und Würfel im militärischen Kontext
Regine Fellmann Brogli ..... *Page 279*

Oggetti per il gioco di epoca romana: rinvenimenti in contesti archeologici in Lombardia
Chiara Bianchi ..... *Page 295*

Les jeux de Pompéi. Réflexions sur la culture matérielle ludique de la ville romaine
Alessandro Pace ..... *Page 307*

Did people play games in the countryside of Roman Italy?
Tim Penn ..... *Page 323*

Ritual offerings or divination tools? Objects for play from the Roman Republican sanctuary of Diana in Nemi
Francesca Diosono, Federica Grossi & Loredana Lancini ..... *Page 337*

Appendix I. Games in the Ancient World
Ulrich Schädler ..... *Page 353*

Appendix II. A guide to recognising carved pavement signs in the Greek and Roman World
Alessandro Pace, Tim Penn & Summer Courts ..... *Page 359*

AUTEUR.E.S / AUTHORS ..... *Page 371*

RÉSUMÉS / ABSTRACTS ..... *Page 373*

AUTHORS

Marie-Lys Arnette
Johns Hopkins University
marnett3@jhu.edu

Chiara Bianchi
Université de Fribourg
chiara.bianchi@unifr.ch

Cameron Browne
Department of Advanced Computing Sciences, Maastricht University, Maastricht, the Netherlands
cambolbro@googlemail.com

Angelos Chaniotis
Professor, Institute for Advanced Study, Princeton University
achaniotis@ias.edu

Summer Courts
University of Reading
s.l.courts@pgr.reading.ac.uk

Walter Crist
Centre for the Arts in Society, Leiden University, Leiden, the Netherlands
wcrist@asu.edu

Luca Dal Monte
Università degli Studi di Milano
luca.dalmonte@unimi.it

Véronique Dasen
Université de Fribourg, ERC Locus Ludi
veronique.dasen@unifr.ch

Francesca Diosono
Ludwig-Maximilians-Universität München
francescadiosono@virgilio.it

Regine Fellmann Brogli
Kantonsarchäologie Aargau
Industriestrasse 3
5200 Brugg
regine.fellmann@ag.ch

Katherine Forsyth
University of Glasgow
Katherine.Forsyth@glasgow.ac.uk

Raimon Graells i Fabregat
Profesor – Investigador (RyC)
Universitat d'Alacant
Dept. Prehistoria, Arqueología, Hª. Antigua, Fª. Griega y Fª. Latina
Ed. Filosofia i Lletres III
Carretera de San Vicente del Raspeig s/n
E-03690 San Vicente del Raspeig
orcid.org/0000-0002-9057-7510
raimon.graells@ua.es

Federica Grossi
Università degli Studi di Milano
federica.grossi84@gmail.com

Mark A. Hall
Perth Museum & Stirling University, Scotland
marcvsjantonivs@gmail.com

Natasha Harlow
Honorary Research Fellow,
University of Nottingham, UK
natasha.harlow@nottingham.ac.uk

Loredana Lancini
UCLouvain (INCAL-CEMA) and CReAAH (UMR 6566-Le Mans Université)
lencini loredana.lancini@univ-lemans.fr

Yves Manniez
Montpellier, UMR 5140
yves.manniez2@gmail.com

Frances McIntosh
Newcastle University
Frances.McIntosh@newcastle.ac.uk

Alessandro Pace
Université de Fribourg, ERC Locus Ludi
Università degli Studi di Milano
alessandro.pace@unimi.it

Tim Penn
University of Reading
timothy.penn@classics.ox.ac.uk

Miguel F. Pérez Blasco
Director
Museo Arqueológico y de Historia de Elche
"Alejandro Ramos Folqués" (MAHE)
mperezblasco@elche.es

Éric Piette
ICTEAM, UCLouvain, Louvain-la-Neuve, Belgium
eric.piette@uclouvain.be

Ben Russell
Professor of the Archaeology of the Roman Empire,
University of Edinburgh
ben.russell@ed.ac.uk

Ulrich Schädler
Université de Fribourg, ERC Locus Ludi
schaedler.u@bluewin.ch

Dennis J. N. J. Soemers
Department of Advanced Computing Sciences,
Maastricht University, Maastricht, the Netherlands
dennis.soemers@maastrichtuniversity.nl

Matthew Stephenson
College of Science and Engineering, Flinders University, Adelaide, Australia
matthew.stephenson@flinders.ed.au

Ian Stern
Zinman Institute of Archaeology
University of Haifa
iann.stern@gmail.com

Peter Talloen
Bilkent University – Ankara
peter.talloen@bilkent.edu.tr

Ilaria Truzzi
Università degli Studi di Milano
ilaria.tru@gmail.com

Andrew Wilson
Professor of the Archaeology of the Roman Empire,
University of Oxford,
andrew.wilson@arch.ox.ac.uk

RÉSUMÉS / ABSTRACTS

Marie-Lys Arnette

A Community of players. Board games at Deir el-Medina (Egypt)

Le village de Deir el-Médina, dans la région de Louqsor, abritait les travailleurs et les artistes qui œuvrèrent à l'élaboration des tombes des toutes proches Vallée des Rois et Vallée des Reines, sous le Nouvel Empire égyptien. Le village comme les tombes qui le bordent, fouillés de longue date, ont livré un important matériel archéologique ainsi que des textes et des images, qui éclairent les pratiques ludiques des habitants et des habitantes de Deir el-Médina. L'article propose non seulement une synthèse de la documentation déjà connue, mais présente aussi un vaste corpus archéologique resté inédit – prélude à la publication d'un ouvrage entièrement dédié aux jeux de plateau à Deir el-Medina (Ifao).

Mots clés: astragales, Deir el-Médina, jeu de vingt cases, pions, plateau de jeu, scène de jeu, *senet*

The village of Deir el-Medina, in the Luxor region, was home to the craftsmen and artists who worked on the tombs of the nearby Valley of the Kings and Valley of the Queens during the Egyptian New Kingdom. The village and its surrounding tombs have long been excavated, yielding a wealth of archaeological material, texts and images that shed light on the playful practices of Deir el-Medina's inhabitants. The article offers a synthesis of previously known documentation, and also presents a vast corpus of unpublished archaeological objects – as a prelude to the publication of a book entirely dedicated to board games at Deir el-Medina (Ifao).

Keywords: astragals, Deir el-Médina, game board, game of twenty squares, game scene; pawns; *senet*

Ian Stern

Game boards from Hellenistic Period Maresha: predicting the future or simply passing the time?

Recent excavations at Maresha have uncovered 16 stone fragments identifiable as portable game boards. The ancient city of Maresha, located in the Judean foothills 22 miles (c. 35 km) east of Ashkelon and 25 miles (c. 40 km) southwest of Jerusalem was a thriving city in the Hellenistic period. The city was abandoned following the conquest by the Hasmonean king, John Hyrcanus I in ca. 112/111 BCE providing a terminus ante quem for all the game boards. The fragmentary nature and poor state of preservation of most of these portable boards limits us to only tentative identification of the specific games. However, many of the game boards were discovered in contexts that contained astragals, pessoi, shell counters, as well as divination material. Games in antiquity are understood to have been both a means of entertainment as well as a tangible medium through which to communicate with the gods. This paper will discuss the numerous game boards and other "gaming" items discovered at Maresha and suggest their possible functions within the different contexts they were unearthed.

Keywords: counters, divination, knucklebones, *latrunculi*, Maresha, *pente grammai*, *petteia*

Les fouilles récentes de Maresha ont mis au jour 16 fragments de pierre identifiables comme des plateaux de jeu mobiles. L'ancienne ville de Maresha, située dans les contreforts de Judée c. 35 km à l'est d'Ashkelon et c. 40 km au sud-ouest de Jérusalem était une ville prospère à la période hellénistique. La ville a été abandonnée après sa conquête par le roi hasmonéen, Jean Hyrcan I^{er} vers 112/111 avant J.-C. fournissant le *terminus ante quem* de tous les plateaux de jeu. La nature fragmentaire et le mauvais état de conservation de la plupart de ces plateaux limitent l'identification provisoire de jeux spécifiques. Cependant, beaucoup de plateaux de jeu ont été découverts dans des contextes contenant des osselets, des jetons, des coquillages ainsi que du matériel de divination. Dans l'Antiquité, les jeux étaient à la fois un moyen de divertissement et de communiquer avec les dieux. Cet article abordera les nombreux plateaux de jeu et autres objets « ludiques » découverts à Maresha et suggérera leurs fonctions possibles selon leurs différents contextes de découverte.

Mots-clés : divination, *latrunculi*, Maresha, *pente grammai,* pions, osselets, *petteia*

Walter Crist, Éric Piette, Dennis J. N. J. Soemers, Matthew Stephenson & Cameron Browne

Computational approaches for recognising and reconstructing ancient games: the case of ludus latrunculorum

The study of games in the ancient world has long been hindered by the loss of rules because they were rarely written down. The Digital Ludeme Project aims to apply computational methods to the available evidence for games throughout history to expand the scope of how games can be studied. This involves a two-pronged approach based on documenting evidence of known game rules in specific times and places, and simulation of candidate rule sets borrowed from similar games to calculate gameplay metrics. As an example, this methodology is applied to the Roman game Ludus Latrunculorum, which involves the relatively uncommon custodial capture rule. Adapting documented rule sets featuring this rule and applying them to known Roman era boards, various game metrics are examined to engage with how computational methods can shed light on potential rule differences or preference in game experience. Finally, future applications and improvements of our methodology are discussed.

Keywords: artificial intelligence, board games, computational methods, *ludus latrunculorum*, Roman empire,

L'étude des jeux du monde antique a été longtemps entravée par la perte de leurs règles car elles étaient rarement écrites. Le Digital Ludeme Project vise à appliquer des techniques algorithmiques sur les témoignages historiques disponibles afin d'élargir le champ d'études des jeux. Notre approche est en deux volets, basée d'un côté sur les témoignages concernant les règles connues dans différents lieux et moments historiques, et de l'autre sur la simulation d'ensembles de règles potentielles empruntées à des jeux similaires pour calculer des métriques de jouabilité. À titre d'exemple, cette méthodologie est appliquée au jeu romain Ludus Latrunculorum (le jeu des Latroncules) en appliquant la règle relativement peu fréquente de capture. En adaptant l'ensemble des règles attestées avec ce principe et en les appliquant à des plateaux connus de l'époque romaine, diverses métriques de jouabilité sont examinées pour déterminer comment des méthodes algorithmiques aider à saisir les différences potentielles de règles ou les préférences dans l'expérience de jeu. Enfin, des applications futures et des améliorations de notre méthodologie sont discutées.

Mots-clés: algorithmique, empire Romain, intelligence artificielle, jeu de plateaux, *ludus latrunculorum*

Luca Dal Monte

Su alcune tavole lusorie dai Fori Imperiali

This paper focuses on some gaming boards preserved in the area of the Imperial Forums of Rome, in particular from the Forum of Augustus, the Forum of Caesar, the Forum of Trajan and the complex of the Markets of Trajan. These examples of *tabulae lusoriae* (so often called) are carved on the pavement remains of porticoes and squares, on the paving stones of streets and on some marble blocks reused as thresholds or steps. The gaming bords are decontextualised and probably represent only a part of the original *corpus*, but are nonetheless very significant as they offer a very heterogeneous typological and topographical picture, which allows us to acquire interesting data on the type of use of the most monumental area of Rome in Late Antiquity.

Keywords: gaming boards, ancient types of games, Imperial Forums, Late Antiquity.

Cet article se concentre sur une série de plateaux de jeux conservés dans la zone des Forums impériaux de Rome, en particulier sur le Forum d'Auguste, le Forum de César, le Forum de Trajan et le complexe des Marchés de Trajan. Ces exemples de *tabulae lusoriae* sont gravés sur le pavement de portiques et de places, sur les pavés des rues et sur certains blocs de marbre réutilisés comme seuils ou marches. Les jeux sont décontextualisés et ne représentent probablement qu'une partie du corpus original, mais sont néanmoins très significatifs car ils offrent une image typologique et topographique très hétérogène qui nous permet d'acquérir des données intéressantes sur le type d'utilisation de la zone la plus monumentale de Rome dans l'Antiquité tardive.

Mots-clés : antiquité tardive, forums impériaux, *ludus latrunculorum* marchés de Trajan, marelle, plateaux de jeu

Peter Talloen

Games and gaming in southwestern Asia Minor

Gaming is a well-attested social activity in the region of Southwestern Asia Minor, as could be established on the basis of game boards that were carved into the stone surfaces of four well-documented urban centres. These testimonies of sociability are found at all major public venues of these cities, identifying gaming as an important part of urban daily life. Different types of board games could be identified in this region, generally representing games that are known throughout the Mediterranean world during the Roman Imperial period. They add to the characterization of Southwestern Asia Minor as part of the vast cultural zone created under Rome. Having said that, some regional specifics could be pointed out as well. While the rules of the game and configurations of the boards remain largely

unchanged, certain aspects of board games can be sensitive to their socio-cultural environment. Especially the materiality of the *Alea* game boards, in the sense of their monumental form, stands out. It illustrates the different reception the concept of a game could undergo, in response to cultural traditions.

Keywords: *alea,* Asia Minor, *duodecim scripta*, *ludus latrunculorum*, game boards, materiality, Roman Imperial period, *pente grammai*, public space,

Le jeu est une activité sociale bien attestée dans la région du sud-ouest de l'Asie Mineure, comme cela a pu être établi sur la base de plateaux de jeu gravés sur les surfaces de sol en pierre de quatre centres urbains bien documentés. Ces témoignages de sociabilité se retrouvent dans tous les grands lieux publics de ces villes, identifiant le jeu comme une part importante de la vie quotidienne urbaine. Différents types de jeux de société ont pu être identifiés dans cette région, des jeux généralement connus dans tout le monde méditerranéen à l'époque impériale romaine. Ils ajoutent à la caractérisation du sud-ouest de l'Asie Mineure comme partie de la vaste zone culturelle créée sous l'empire romain. Certaines spécificités régionales pourraient également être soulignées. Si les règles du jeu et les configurations des plateaux restent largement inchangées, certains aspects des jeux de société peuvent être sensibles à leur environnement socioculturel. La matérialité des plateaux de jeu d'*Alea* se démarque par leur forme monumentale. Cette diversité illustre la réception différente du concept de jeu selon les traditions culturelles.

Mots-clés: *alea,* Asie Mineure, espace public, *duodecim scripta*, *ludus latrunculorum*, plateaux de jeu, matérialité, *pente grammai*, période impériale romaine

Ben Russell, Angelos Chaniotis & Andrew Wilson

Gaming in the Place of Palms at Aphrodisias

The Place of Palms at Aphrodisias contains the highest concentration of gameboards identified to date at any Roman site. Following years of careful study, the extensive corpus of informal inscriptions from this complex, roughly half of which are gameboards, has been documented, mapped, and analysed. In this contribution we introduce the Place of Palms and explain its remarkable archaeology and architecture, and what we now know of its development over more than six centuries. We then turn to the mass of gameboards inscribed on the marble surfaces within this complex, and what their distribution, the range of game types represented, and the texts and decoration that accompany them reveal about the use of this space and the chronology of gaming within it.

Keywords: *alea*, Aphrodisias, Asia Minor, boardgames, graffiti, *duodecim scripta*, mancala, *pente grammai*

La place des Palmiers à Aphrodisias contient la plus forte concentration de plateaux de jeu identifiés à ce jour sur un site romain. Après des années d'études approfondies, le vaste corpus d'inscriptions informelles de ce complexe, dont environ la moitié sont des plateaux de jeu, a été documenté, cartographié et analysé. Dans cette contribution, nous présentons la Place des Palmiers et expliquons son archéologie et son architecture remarquables, et ce que nous savons maintenant de son développement sur plus de six siècles. Nous nous tournons ensuite vers la masse de plateaux de jeu inscrits sur les surfaces de marbre de ce complexe, et sur ce que leur répartition, leur variété, ainsi que les textes et le décor associés aux jeux gravés révèlent sur l'utilisation de cet espace et la chronologie du jeu.

Mots-clés: *alea*, Aphrodisias, Asie Mineure, graffiti, *duodecim scripta* mancala, *pente grammai*

Ulrich Schädler

Roman, Byzantine, and Medieval Games in Ephesus: preliminary survey results

In this chapter the author presents preliminary results of a survey on Roman, Byzantine, Arabic or Turkish games found at Ephesus in Western Asia Minor. The survey was conducted during two campaigns in 2007 and 2008 to document pavement signs and gaming tables. During this fieldwork, more than 300 game boards and other floor markings were documented. The survey encompassed two archaeological sites: the area of the Graeco-Roman town on the one hand and the Ayasoluk hill on the other. The main questions considered in this chapter are: which of the pavement signs and markings were used for playing games? Which were the games played in these public spaces? Is there a difference between the games played in the Graeco-Roman town and in the Byzantine and later settlement on the Ayasoluk? The author presented some of the aspects discussed here in numerous papers given on various occasions during the last 15 years, but these ideas and data are presented here in print for the first time.

Keywords: Alquerque, Ayasoluk, board games, Ephesus, *duodecim scripta*, marbles, Seega, St. John, Tâb, topos marker, wheel pattern

Dans ce chapitre, l'auteur présente les résultats préliminaires d'une enquête sur les jeux romains, byzantins, arabes ou turcs trouvés à Éphèse en Asie Mineure occidentale. L'enquête a été menée pendant deux campagnes en 2007 et 2008 pour documenter les panneaux de trottoir et les tables de jeu. Au cours

de ce travail sur le terrain, plus de 300 plateaux de jeu et autres marquages au sol ont été documentés. L'étude a porté sur deux sites archéologiques : la zone de la ville gréco-romaine d'une part et la colline d'Ayasoluk d'autre part. Les principales questions abordées dans ce chapitre sont les suivantes : quels panneaux et marquages ont été utilisés pour jouer à des jeux ? Quels étaient les jeux joués dans ces espaces publics ? Y a-t-il une différence entre les jeux joués dans la ville gréco-romaine et dans la colonie byzantine et plus tard sur l'Ayasoluk? L'auteur a présenté certains des aspects discutés ici dans de nombreux articles donnés à diverses occasions au cours des 15 dernières années, mais ces idées et données sont présentées ici en version imprimée pour la première fois.

Mots-clés : Alquerque, Ayasoluk, billes, Ephesus, *duodecim scripta*, motif de roue, plateaux de jeu, Seega, St. John, Tâb, topos marker

Ulrich Schädler & Mark A. Hall

Europe's playful frontiers: Roman board games in the Barbaricum, from Britain and across the Rhine and Danube lands

Through this contribution, the authors seek to explore the presence, meanings and values of board games along the edges of the Roman Empire in central and NW Europe, spanning Britain to the Danubian Provinces and also in the successor states as the Western Empire collapsed and Rome's centre of gravity moved fully to Constantinople. The paper draws together evidence from sites across the various frontier zones, including Clickimin in the Orkneys, Stanway in England, Vimose and Brøndsager in Denmark and Poprad in Slovakia as well as the well-known sites in Germany (Leuna, Gommern, Neudorf-Bornstein, Heiligenhafen etc.) and Poland (Pielgrzymono, Zgliczyn Pobodzy, Zakrzów etc.). The purpose is to explore the ways board games moved across the frontier, the cultural interactions they were part of (military, diplomatic, trade and exchange) and ideas around the innovations indigenous communities are imagined having made to these games. Thus, the coverage will include how some of these games may consequently have changed, and in several cases 'returned' to their Roman roots with population movements through the second half of the first millennium AD, including the Langobards, the Alemanni, the Vikings and the Normans.

Keywords: Barbaricum, Britannia, Danube, dice, magic, Rhine, Roman board games, supernatural,

Par cette contribution, les auteurs cherchent à explorer la présence, les significations et les valeurs des jeux de société le long des frontières de l'Empire romain en Europe centrale et nord-ouest, Il s'étend de la Grande-Bretagne aux provinces danubiennes et aussi dans les États successeurs lorsque l'Empire occidental s'effondre et que le centre de gravité de Rome se déplace entièrement vers Constantinople. L'article rassemble des preuves provenant de sites situés dans les différentes zones frontalières, notamment Clickimin dans les Orcades, Stanway en Angleterre, Vimose et Brøndsager au Danemark et Poprad en Slovaquie, ainsi que des sites bien connus en Allemagne (Leuna, Gommern, Neudorf-Bornstein, Heiligenhafen, etc.) et la Pologne (Pielgrzymono, Zgliczyn Pobodzy, Zakrzów, etc.). L'objectif est d'explorer les façons dont les jeux de société se sont déplacés à travers la frontière, les interactions culturelles auxquelles ils ont participé (militaires, diplomatiques, commerce et échanges) et les idées autour des innovations que les communautés autochtones imaginent avoir apportées à ces jeux. Ainsi, la couverture inclura la façon dont certains de ces jeux peuvent avoir changé par conséquent, et dans plusieurs cas «sont retournés» à leurs racines romaines avec des mouvements de population au cours de la seconde moitié du premier millénaire après J.-C., y compris les Langobards, les Alemans, les Vikings et les Normands.

Mots-clés: Barbaricum, Britannia, Danube, dés, magie, plateaux de jeu Romains, Rhin, surnaturel

Raimon Graells i Fabregat & Miguel F. Pérez Blasco

The Iberians played too

This contribution aims to highlight a neglected aspect of the daily life of the Iberians. Our contribution has considered only a part of these games, those of hazard and strategy played with tokens, dice and astragali. A brief contribution that shows how the Iberians played both the games that were practised throughout the Mediterranean and different local variants.

Keywords: élite, bone astragals, glass counters, ivory dice, mercenaries.

Cette contribution entend mettre en évidence un aspect négligé de la vie quotidienne des Ibères. Notre contribution s'intéresse à une sélection de jeux, ceux de hasard et de stratégie joués avec des pions, des dés et osselets. L'objectif est de montrer comment les Ibères ont pratiqué à la fois les jeux répandus dans toute la Méditerranée et différentes variantes locales.

Mots-clés: billes, dés en ivoire, élite, mercenaires, osselets en os, péninsule ibérique, pions en verre

Ilaria Truzzi

The gaming material from Empúries, Catalunya

Empuriés was founded as a commercial entrepôt in the 6th century BCE by Phocaeans of Massalia. It became a permanent and rich city thanks to

its strategic location for Mediterranean trade, continuing its existence during the Roman conquest of Iberia down until the early Roman Empire, and reaching its zenith during the 1st century CE when acquired the title of *Municipium Emporiae*. Now the site is called Empuriés which refers in Catalan to the two cities — the Greek one and the Roman one. Excavations have found gaming material in both cities. The research presented in this article focuses on the astragals from the Greek cemeteries and on the counters and the dice from the Roman city, where there also seems to be a complete set of gaming counters. Most of the finds can be interpreted as material for *Latrunculi* or *XII Scripta*. There is also a series of *tesserae lusoriae*. The large quantity and rich variety of game materials found here so far provide us with important information about the history of games and entertainment among the inhabitants of this site.

Keywords: Empúries, Greek astragals, *duodecim scripta, ludus latrunculorum* Roman counters, Roman dice, *tesserae lusoriae*

Empurias a été fondée comme entrepôt commercial au VI^e^ siècle avant J.-C. par les Phocéens de Marseille. Elle est devenue une cité prospère grâce à son emplacement stratégique pour le commerce méditerranéen, continuant son existence pendant la conquête romaine de l'Ibérie jusqu'au début de l'Empire romain, et atteint son apogée au cours du I^er^ siècle de notre ère lorsqu'elle obtient le statut de *Municipium Emporiae*. Le nom actuel du site, Empuriés, fait référence en catalan aux deux villes, grecque et romaine. Des fouilles ont livré du matériel de jeu dans les deux villes. La recherche présentée dans cet article se concentre sur les osselets des nécropoles grecques et sur les dés, pions ou jetons de la ville romaine ; nous analyserons aussi ce qui semble constituer un ensemble complet de pions de jeux. La plupart des découvertes peuvent être interprétées comme du matériel pour le *Ludus latrunculorum* ou *XII Scripta*. Il y a aussi une série de *tesserae lusoriae*. La grande quantité et la riche variété de matériel de jeu trouvé ici jusqu'à présent nous fournissent des informations importantes sur l'histoire des jeux et du divertissement parmi les habitants de ce site.

Mots-clés: dés romains, Empúries, *duodecim scripta, ludus latrunculorum*, osselets grecs, pions romains, *tesserae lusoriae*

Yves Manniez

Le mobilier de jeu antique dans l'habitat de la cité de Nîmes

Cette étude, basée sur un corpus de 880 objets issus des fouilles menées sur le territoire de l'ancienne cité de Nîmes, ces 50 dernières années, donne une vision réaliste, car basée essentiellement sur des données de fouilles, de ce qui composait le mobilier ludique dans l'Antiquité dans cette région de l'Empire romain. Si elle révèle le caractère répétitif des grandes catégories et la rareté des jouets, la prise en compte d'un grand nombre d'éléments trouvés en contexte nous permet de préciser la date d'apparition de certains artefacts, de mettre en lumière des différences notables entre les pratiques ludiques rurales et urbaines et de percevoir une évolution dans l'apparition des différents types de jeu.

Mots-clés : Antiquité, astragales, dés, habitat, jetons, Nîmes, pions

This study, based on a corpus of 880 objects from excavations carried out in the territory of the ancient city of Nîmes over the last 50 years, gives a realistic view, based essentially on excavation data, of what made up the play furniture in Antiquity in this region of the Roman Empire. Although it reveals the repetitive nature of the main categories and the rarity of toys, the consideration of a large number of elements found in context allows us to specify the date of appearance of certain artefacts, to highlight notable differences between rural and urban play practices and to perceive an evolution in the appearance of different types of play.

Keywords : Anitquity, astragals, dice, counters, habitat, Nîmes, token

Natasha Harlow

Wrote for luck? Unofficial literacies and gaming counters from Roman Britain

Lathe-turned bone gaming counters are ubiquitous finds on Roman sites across the northwest provinces. Many examples have Latin numerals, letters and other symbols scratched onto their surfaces, suggesting that local variants of well-known board games were being played, or that counters were used for other practices, such as accountancy or divination. This paper examines the range of different markings on game pieces, with examples from Romano-British sites including *civitas* capitals and forts, and how they relate to the spread of literacy and numeracy in the provinces and the democratisation of these practices in everyday life. The use of magical or apotropaic scripts is also well-attested in the Roman provinces and the influence of the gods may have been invoked in games of chance. Gaming can be a subversive practice, enabling varied groups to mingle and providing opportunities to invert the social order. Were people in Roman Britain appropriating key skills such as writing and numeracy, more usually applied in official circumstances of tax collecting and administration, for these purposes? Such unofficial literacies may have allowed subject populations to integrate with, and perhaps influence, the occupying forces.

Keywords: gaming counters, Roman Britain, inscriptions, graffiti

Les jetons en os tournés au tour sont des trouvailles omniprésentes sur les sites romains des provinces du nord-ouest. De nombreux exemples ont des chiffres latins, des lettres et d'autres symboles gravés sur leurs surfaces, suggérant que des variantes locales de jeux de société bien connus étaient jouées, ou que des jetons étaient utilisés pour d'autres pratiques, telles que la comptabilité ou la divination. Cet article examine la variété des différentes marques sur ce type de pièces de jeu en se basant sur des exemples de sites romano-britanniques, y compris les cités et les forts militaires. Quel lien peut-il être établi avec la diffusion de l'alphabétisation et de la numératie dans les provinces et leur démocratisation dans la vie quotidienne ? L'utilisation d'écritures magiques ou apotropaïques est également bien attestée dans les provinces romaines et des puissances divines sont parfois invoquées dans les jeux de hasard. Le jeu peut être aussi une pratique subversive, permettant à des groupes variés de se mêler en offrant l'opportunité d'inverser l'ordre social. Les habitants de la Grande-Bretagne romaine se sont-ils appropriés grâce au jeu des compétences clés telles que l'écriture et le calcul, utilisées généralement pour la collecte et l'administration des impôts ? Ces alphabétisations non officielles ont peut-être permis aux populations soumises de s'intégrer, et peut-être aussi dd'agir sur les forces d'occupation romaines.

Mots-clés: alphabétisation, *Britannia*, graffiti, inscriptions, pions

Frances McIntosh

Casino at Coria? Evidence for gaming at Roman Corbridge

Coria was a fort and a town for over 350 years on the north-western edge of the Roman Empire. There are over 380 circular discs cut down from Samian vessels at the site, along with over 100 of other ceramic fabrics. This paper looks at the context (if known) of these items alongside other gaming paraphernalia from the site to consider what this can tell us about gaming, and the production of the material required for playing games at this site.

Keywords; Corbridge, *Coria,* counters, Hadrian's Wall, Samian,

Coria a été un fort et une ville pendant plus de 350 ans à la limite nord-ouest de l'Empire romain. Plus de 380 disques circulaires découpés dans des récipients samiens ont été retrouvés sur le site, ainsi que plus de 100 autres productions céramiques. Cet article analyse le contexte de trouvaille de ces artefacts ainsi que d'autres accessoires de jeu du site en examinant l'apport de leur témoignage sur les pratiques ludiques et le mode de production du matériel nécessaire pour jouer à des jeux sur ce site.

Mots-clés: Corbridge, *Coria*, mur d'Hadrien, pions, Samian, jetons

Mark A. Hall & Katherine Forsyth

On pegged gaming pieces (with particular reference to a Late Celtic set from Lough Sewdy, Ireland)

The use of pegged gaming pieces and reciprocally holed gaming boards is attested from at least as early as the Middle Kingdom of Ancient Egypt. They re-surface in Egypt in Early Medieval/Coptic times. They seem not to have been common in the Roman period either in Italy or much of the Empire (including Egypt) but are possibly linked with the Celtic-speaking provinces in France and Britain and also in Ireland. This use continues in post-Roman times, when textual and archaeological evidence combines to suggest renewed interest in pegged gaming sets among Celtic-speaking and Scandinavian elites. Having laid out this historical context, we combine archaeological and literary evidence to explore the nature and significance of pegged gaming pieces, with a particular focus on the previously unpublished set of Late Celtic, gilt-copper-alloy and bone pegged pieces, recovered through metal-detecting at Lough Sewdy, Ireland. The paper will put this set in the particular context of the facility of such sharply pointed pieces to become weapons, both during play and away from the board.

Key words: Ancient board games, *fidchell*, *hnefatafl, hounds and jackals***,** *fifty-eight holes*, *the Coptic board game/the game of thirty points*, pegged pieces, peg-boards

L'utilisation de pièces de jeu chevillées et de plateaux de jeu à trous est attestée au moins dès le Moyen Empire de l'Égypte ancienne. Ils réapparaissent en Égypte au début du Moyen Âge/époque copte. Ils ne semblent pas avoir été répandus à la période romaine, ni en Italie ni dans une grande partie de l'Empire (y compris l'Égypte), mais sont probablement liés aux provinces de langue celtique en France et en Grande-Bretagne ainsi qu'en Irlande. Cette utilisation se poursuit à l'époque post-romaine, lorsque les preuves textuelles et archéologiques se combinent pour suggérer un intérêt renouvelé pour les jeux des élites celtiques et scandinaves. Après avoir exposé ce contexte historique, nous combinons des témoignages archéologiques et littéraires pour explorer la nature et la signification des pièces de jeu, avec un accent particulier sur l'ensemble inédit de pièces celtiques tardives en alliage de cuivre doré et en os récupéré par la détection de métal à Lough Sewdy (Irlande). Le document mettra cet ensemble dans le contexte particulier de la facilité de ces pièces pointues à devenir des armes, à la fois pendant le jeu et loin de la carte.

Mots-clés: Egypte copte, fidchell, hnefatafl, Irlande, le jeu de plateau copte/jeu de trente points, jeu des cinquante-huit trous, jeu des chiens et chacals, pions en cheville, plateaux de jeu

Regine Fellmann Brogli

Spielen in Vindonissa. Spielsteine und Würfel im militärischen Kontext

Les jetons de jeu et les dés sont bien attestés parmi les découvertes de *Vindonissa* (Windisch, canton d'Argovie, CH), un camp légionnaire entouré d'une agglomération civile datant du 1er siècle. ap. J.-C. Plus de 800 jetons de jeu et plus de 80 dés sont actuellement enregistrés dans la base de données archéologique du service archéologique cantonal d'Argovie. La longue histoire des recherches et l'histoire complexe de la structure bâtie de *Vindonissa* ne facilitent pas l'interprétation de la répartition des jetons et des dés. Sur la base de quatre dépôts et d'une sélection de jetons et de dés publiées, la question est discutée dans quelle mesure la répartition des objets permet de tirer des conclusions sur les lieux de jeu possibles à l'intérieur et à l'extérieur du camp et si on peut dire quelque chose sur l'identité des joueurs.

Mots-clés: agglomération civile, camp légionnaire, dépôt de jetons de jeu, dés, jetons, *Vindonissa*

Gaming pieces and dices are well documented within the finds from *Vindonissa* (Windisch, Canton Aargau, CH), a legionary fortress with a surrounding civil settlement of the 1st century A.D. Over 800 tokens and more than 80 dice are currently recorded in the archaeological database of the Kantonsarchäologie Aargau. The long history of research and the complex structural development of *Vindonissa* make it rather difficult to interpret the distribution of the gaming pieces and dice. Based on four deposits and a selection of published gaming pieces and dice, the question is discussed, what conclusion on possible playing zones may be drawn based on the distribution of finds inside and outside the legionary fortress and if we can say something about who was playing.

Keywords: civil settlement, deposit of gaming pieces, dice, gaming piece, legionary fortress, tokens, *Vindonissa*

Chiara Bianchi

Oggetti per il gioco di epoca romana: rinvenimenti in contesti archeologici in Lombardia

This contribution aims to carry out a critical review of the existing documentation on some objects related to board games (dice, counters, tokens) found in the territory of the current region Lombardy.

The contexts of discovery are presented by geographical areas corresponding to the cities that have returned evidence, such as *Mediolanum*, *Brixia*, *Cremona*, *Ticinum*, as well as some sites in extra-urban territories, such as in the case of the provinces of Brescia and Pavia.

In a chapter devoted to the critical analysis of the documentation, data on contexts are discussed in more detail, distinguishing between finds from necropolis (cremation and burial tombs) and those from urban areas designated for residence or worship (domus, rustic buildings, sanctuaries).

Keywords: dice, counters, tokens, Roman period, Lombardy, bone, ivory, glass

Cette contribution examine la documentation relative aux objets liés aux jeux de société (dés, pions, jetons) trouvés sur le territoire de la Lombardie actuelle.

Les contextes de découverte sont présentés par zones géographiques correspondant aux villes qui ont livré du matériel, telles que *Mediolanum*, *Brixia*, *Cremona*, *Ticinum*, ainsi que certains sites dans des territoires extra-urbains, comme dans le cas des provinces de Brescia et Pavie.

Dans un chapitre consacré à l'analyse critique de la documentation, les données sur les contextes sont discutées plus en détail, en distinguant les découvertes de nécropoles (crémation et sépultures) et celles des zones urbaines désignées pour résidence ou culte (*domus*, bâtiments rustiques, sanctuaires).

Mots-clés: dés, époque romaine, jetons, ivoire, Lombardie, os, pions, verre

Alessandro Pace

Les jeux de Pompéi. Réflexions sur la culture matérielle ludique de la ville romaine

We know that many different typologies of gaming tools were used in the Roman time, but for the modern scholars it is quite impossible to understand how the most part of them were really employed in the ludic activities.

Normally, counters, marbles and various typologies of so-called '*tesserae*' are founded in the tombs, but the data from Pompeii allow us to have new perspectives on the ludic habits of the daily-life in a Roman city of the first imperial age.

This new insight into the Pompeian game culture show how the modern categories aren't efficient enough to understand the complexity and the fluidty of the ludic habits of the ancient inhabitants.

Keywords : dice, glass counters, knucklebones, Pompeii, tokens

Nous savons que de nombreuses typologies différentes de jeux ont été utilisées à l'époque romaine, mais pour les chercheurs modernes, il est tout à fait impossible de comprendre comment la

plupart d'entre eux étaient réellement utilisés dans les activités ludiques.

Normalement, des pions, des billes et diverses typologies de '*tesserae*' sont fondés dans les tombes, mais les données de Pompéi nous permettent d'avoir de nouvelles perspectives sur les habitudes ludiques de la vie quotidienne dans une ville romaine du premier âge impérial.

Ce nouvel aperçu de la culture des jeux de Pompée montre comment les catégories modernes ne sont pas assez efficaces pour comprendre la complexité et la fluidité des habitudes ludiques des anciens habitants.

Mots-clés : astragales, dés, pions en verre, Pompéi, tokens

Tim Penn

Did people play games in the countryside of Roman Italy?

Existing scholarship on gaming often assumes that board games were primarily played in towns under the Roman empire and textual sources leave us in no doubt that game-playing was an important part of the urban experience. But it is also important to consider the extent to which games were played in the countryside. This contribution seeks to set the agenda for future research into playing and games in Roman rural settings by interrogating the urban-centric biases of literary sources. It juxtaposes the town-centric view provided by the textual tradition with the archaeological evidence from selected rural sites of different types across Roman Italy. This approach provides new insights into play and leisure in non-urban contexts.

Key words: *alea*, boardgames, countryside,Roman Italy, *duodecim scripta*, *ludus latrunculorum* merels, necropolis, Rome

Les études sur le jeu partent souvent du principe que les jeux de société étaient principalement joués dans les villes de l'Empire romain. Cette hypothèse est soutenue par les sources textuelles qui ne laissent aucun doute sur l'importance du jeu en contexte urbain. Il est également important de chercher dans quelle mesure les jeux ont été pratiqués à la campagne. Cette contribution vise à ouvrir les pistes de recherches futures sur les jeux en milieux ruraux romains en s'écartant des sources littéraires. Il compare la vue centrée sur la ville fournie par la tradition textuelle avec les preuves archéologiques de sites ruraux de différents types en Italie romaine. Cette approche fournit de nouvelles perspectives sur le jeu et les loisirs dans des contextes non urbains.

Mots-clés: *alea*, campagne, Italie romaine, *duodecim scripta*, *ludus latrunculorum* marelle, necropolis, plateaux de jeu

Francesca Diosono, Federica Grossi and Loredana Lancini

Ritual offerings or divination tools? Objects for play from the Roman Republican sanctuary of Diana in Nemi

Recent research conducted at the sanctuary of Diana at Nemi entailed both fieldwork and a re-examination of finds from earlier excavations in the area. Diana protects women (especially in childbirth), slaves, children, and young people in times of status transition. Offerings of objects of play or human representations bearing toys in the sanctuary space should be viewed as relating to the latter, as is usual in other sanctuaries in ancient *Latium*. Among the thousands of objects found in Nemi, the objects of this type are relatively few, while real toys for small children are altogether absent. Figurines of dedicatees carrying games and children with animals are rare: it is also not clear whether they are simply replicas of widespread moulds or have a particular meaning. Depictions of children are also uncommon, though there is one statuette of a nursing mother. The games we have at the sanctuary of Nemi are above all counters and astragals, and their analysis within the context of the sanctuary provides new insights for the study of these items. Our working hypothesis is that there was a possible relationship between astragals (and maybe other gaming-related objects) and activities related to predicting the future in the sanctuary at Nemi (i.e. cleromancy). This contribution therefore explores the complexity of the data, aiming to analyse the materials found in the sanctuary of Diana *Nemorensis*.

Keywords: astragals, cleromancy, counters, Latium, Nemi, oracle, Roman Republican period

Les recherches récentes dans le sanctuaire de Diane à Nemi se sont concentrées à la fois sur le travail de terrain et sur un réexamen des matériaux des fouilles archéologiques plus anciennes. Une des sphères de compétences de la déesse Diane était la protection des femmes (en particulier dans l'adolescence), des esclaves, des enfants et des jeunes pendant la phase de transition d'un statut à un autre. Demander cette protection pouvait être la raison d'offrir des jouets dont témoignent les représentations de dédicants dans plusieurs sanctuaires du Latium. Toutefois, malgré le rôle de transition et de passage de Diane, peu d'objets de ce type ont été retrouvés dans son sanctuaire à Nemi ni aucun jouet de petit enfant. Presque absentes sont aussi les représentations de dédicants avec un jouet ou d'enfant avec des animaux et il nous échappe également s'il s'agissait des répliques de célèbres moules ou s'ils avaient une signification particulière. Seule une statuette représente une mère qui allaite. Le matériel ludique retrouvé dans le sanctuaire est composé en majorité de pions et osselets dont la présence en contexte religieux ouvre de nouvelles perspectives d'étude. Nous proposons l'hypothèse d'une relation possible

des osselets (et peut-être des autres objets ludiques) avec des activités oraculaires de cléromantique dans le sanctuaire de Nemi. Au travers d'une approche envisageant la complexité des données, nous allons dans cette recherche présenter une interprétation inédite des objets ludiques retrouvés dans le sanctuaire de Diana *Nemorensis*.

Mots-clés: cléromancie, époque romaine républicaine, Latium, Nemi, oracle, osselets, pions

Walter Crist

Centre for the Arts in Society, Leiden University, Leiden, the Netherlands
wcrist@asu.edu

Éric Piette

ICTEAM, UCLouvain, Louvain-la-Neuve, Belgium
eric.piette@uclouvain.be

Dennis J. N. J. Soemers

Department of Advanced Computing Sciences, Maastricht University, Maastricht, the Netherlands
dennis.soemers@maastrichtuniversity.nl

Matthew Stephenson

College of Science and Engineering, Flinders University, Adelaide, Australia matthew.stephenson@flinders.ed.au

Cameron Browne

Department of Advanced Computing Sciences, Maastricht University, Maastricht, the Netherlands

cambolbro@googlemail.com

Computational approaches for recognising and reconstructing ancient games: the case of ludus latrunculorum

1. INTRODUCTION THE DIGITAL LUDEME PROJECT

1.1 Approaches to Game Reconstruction

The existence of board games in the ancient world has been documented from the early days of archaeology, and along with the discovery of boards and their identification with games known from written texts, archaeologists and others interested in games have sought to produce playable rulesets to bring these ancient practices back to life. Some authors who have attempted to reconstruct the rules for ancient games have paid very close attention to the ancient sources,[1] while others have been more creative in their interpretations.[2] Usually, there is a degree of playtesting involved, to produce a game that seems to play well. Nevertheless, these reconstructions are subjective to varying degrees, and it is not always clear whether the rules that have been included in a particular reconstructed game are inspired from games that may be reasonably connected to their ancient counterparts or chosen for other reasons. This paper uses the example of the ancient Roman game Ludus Latrunculorum to demonstrate the ways that a computational approach can contribute to the processes of identifying games in the archaeological record and reconstructing playable rulesets.[3]

1.2 The Digital Ludeme Project

The Digital Ludeme Project was a five-year research project that sought to improve our understanding of the development of (primarily) board games throughout recorded human history, through computational analyses of the available evidence. This task is made challenging by the paucity and incomplete nature of evidence for ancient games and the unreliable nature of much of the information that is available about them, which is often based on interpretations of the source material filtered through a modern (Western) lens. Another factor is that the rules for games are typically carefully crafted and fragile to change, and there is no guarantee that even well researched reconstructions of ancient rules that are entirely plausible within their historical and

1 e.g., Schädler (2001); Schädler (1994).

2 e.g, Becq de Fouquières (1869): 454–456; Bell (1979): 86–87.

3 Browne *et al.* (2019).

cultural contexts will actually play well *as games*.

The Digital Ludeme Project promotes a new field of research called *Digital Archaeoludology*[4] in which games are digitally modelled as accurately as possible from the available evidence, then missing information about them is interpolated probabilistically based on how well the candidate rulesets function as games in addition to their authenticity within the given historical and cultural contexts.

This chapter demonstrates these principles in action. Using the historical and cultural context to identify plausible rule combinations for the reconstruction of Ludus Latrunculorum, we then apply computational self-play analyses of the resulting candidate rulesets to identify those that work more successfully as games. While this approach may not necessarily reveal how the game was actually played, it can indicate with some confidence how it was *not* played, which can be just as useful to know.

1.3 Ludii

Ludii is a computer program that was developed as part of the Digital Ludeme Project that constitutes a complete general game system for modelling, playing, evaluating and reconstructing the full range of games required for the project. Games are modelled digitally as structured sets of *ludemes*[5] to provide a playable database of both complete games and partial descriptions requiring reconstruction, suitable for computer self-play by *artificial intelligence* (AI) agents which can playtest candidate rulesets much more quickly than human players.

The Digital Ludeme Project games database[6] compiles what is known about traditional games from the past five thousand years, including geographic, chronological, social, and rules data for 1,006 games at the time of writing.[7] Compiling all of this data facilitates comparison between games, particularly in connecting games which are close to each other geographically, chronologically, and with respect to game concepts. In the future, the process of connecting games according to these measurements will be automated, but for this study with a limited scope an *ad hoc* approach must be taken and is sufficient to make the necessary connections.

1.4 Game Concepts

Game concepts[8] are features designating high-level aspects of games which can be shared between different games. Each concept is expressed in game-terms commonly used by players and designers. They can be related to the equipment (board or pieces), or rules (game setup, ending condition(s), or movement of the pieces), but also to more general aspects such as properties (e.g., time model, information type, symmetries). The current list of all identified concepts used through Ludii is available on our website.[9]

Thanks to the ludeme representation of games in Ludii, during the compilation process, the existence of specific ludemes or combinations of ludemes trigger each of these concepts. Binary concepts are activated by the existence of ludemes while numerical concepts instead have their values set when the game is compiled. Consequently, all concepts are computed in a few milliseconds. For this reason, they are a powerful tool to identify similar games.

2. LUDUS LATRUNCULORUM: THE EVIDENCE

2.1 Documentary Evidence for Rules

Ludus Latrunculorum, or the "Game of Little Soldiers", is one of the games played by the Romans about which we have the most documentary evidence, since several authors seem to have been familiar enough with the game to mention portions of the rules. A complete recounting of the textual references to the game is beyond the scope of this paper, and has been covered extensively elsewhere.[10] Nevertheless, there are four aspects of the game that can be gleaned from the sources.

Placement phase: Two ancient sources confirm that the board is empty at the beginning of the game. In *Laus Pisonis*, by an anonymous author, there is a passage which praises Piso in the context of a game that holds the same military symbolism as other descriptions of the game.[11] It is explicitly stated that the pieces are cunningly placed on an open board.[12] Isidore, writing in the late 6th or early 7th century CE, indicates three kinds of pieces or, more precisely, the states of movement of three kinds of pieces: *ordine*, which move regularly, *vagi*, which move anywhere, and *inciti*, which cannot move.[13]

Orthogonal movement: Ovid, in his *Tristia*, indicated that the pieces on the board are moved in a straight line.[14]

Custodial capture: The next phrase in Ovid's *Tristia* states that a piece between two enemies is lost.[15] Ovid also makes this clear in *Ars Amatoria*, where he says

4 Browne *et al.* (2019).

5 A *ludeme* is a game-related concept that can be expressed as a functional unit. See Parlett (2016).

6 Accessible at https://ludii.games/library.

7 Stephenson, Crist, Browne (2020).

8 Piette *et al.* (2021).

9 Accessible at https://ludii.games/searchConcepts.php.

10 Schädler (1994).

11 Anonymous, *Panegyric on Piso*, 192–193.

12 Austin (1934), 30; Schädler (1994), 55–54.

13 Isidore, *Origins,* 18.67; Schädler (1995), 82.

14 Ovid, *Sorrows*, 2.477; Schädler (1994): 52.

15 Ovid, *Sorrows*, 2.477; Schädler (1994): 52.

that one counter perishes between twin foes.[16] This form of capture is commonly known as custodial capture in games literature.[17]

Quadrangular board: Varro, writing about the Latin language in the 1st century BCE, describes a declination table for the word *albus*, with horizontal and vertical lines, as similar to the game board used to play Ludus Latrunculorum.[18] This indicates that the game was played on a rectangular or square board (i.e., Types 29 and 30—see Appendix to this volume), but does not specify its size. Schädler points out that a declination table would have six lines for the six cases of Latin nouns, and six columns for the singular and plural for masculine, feminine, and neuter genders.[19]

2.2 Archaeological Evidence for Boards

Despite Varro's implication, only one six-by-six board has been found at a Roman site. Therefore, we must assume that Varro's description refers generally to a square or rectangular board, rather than one of a specific size. Archaeological evidence, then, must be consulted to provide information about the size of the quadrangular grid that likely formed the board of Ludus Latrunculorum.

Quadrangular boards within the *limes* of the empire have been found in many different kinds of archaeological contexts (Figure 1). A considerably large number have been found at fortresses and military installations, particularly in the provinces of Britannia,[20] Hispania Terraconensis,[21] and Aegyptus,[22] as well as in urban contexts, such as within Rome itself, Athens,[23] and the cities of Asia Minor,[24] in spaces devoted to leisure such as the Antonine Baths at Carthage,[25] as well as rural sites such as Gebel el-Silsila in Egypt[26] and Thornham, England.[27]

The boards that have been preserved are made of stone or ceramic. Ludus Latrunculorum tends to appear as secondary use on stone surfaces, whether as graffiti or as a reappropriated object on which the board is carved. Only one example, formerly held



Fig. 1. Four Roman Ludus Latrunculorum boards held at Dover Castle. Clockwise from top left: Intact 8 x 8 chalk board (14.5 x 26 x 10 cm), from Dover, 2nd c. CE?, Dover Castle DV2000; fragmentary marble board with 8 or 9 x 7+ squares (26 x 28 x 4.5 cm), from Richborough Fort, Roman in date, Dover Castle 78305715; fragmentary marble board with 10+ x 5+ squares (19.2 x 23 x 4.2 cm), from Richborough Fort, Roman in date, Dover Castle 78305708/478; fragmentary sandstone board with 6+ x 5+ squares (14.5 x 10.3 x 2.6–3.3 cm), from Richborough Fort, after 280 CE, Dover Castle 78303093. Photos by Summer Courts.

in Zurich,[28] appears to have been manufactured as a board for Ludus Latrunculorum. It is questionable whether all of the grids on ceramic tiles were meant to have functioned as game boards; it has also been noted that ceramic tiles may have been scored in the same manner to aid in fixing them to vertical surfaces.[29] Wooden boards may also have been used to play Ludus Latrunculorum, but they have not survived in the archaeological record.

In addition to artifacts used for playing, there are two terracotta models of quadrangular boards which appear to represent Ludus Latrunculorum. One comes from Athens, with a group of players sitting around a six-by-seven board.[30] Another, found in Egypt's Fayyum Oasis, shows a six-by-seven board with pieces arrayed on it.[31]

Judging from the boards with an intact gaming pattern, it is apparent that there is a wide range of sizes for quadrangular boards from Roman sites. The twenty-five known intact boards (see Figure 2) show that they range in size from six-by-six to eleven-by-

16 Ovid, *The Art of Love,* 358.

17 Bell (1979), 78; Parlett (1999), 199; also called interception capture, Murray (1951), 10.

18 Varro, *On the Latin Language*, 10.22.

19 Schädler (2007), 361.

20 Austin (1934), 26–27; Schädler (1994), 50; Pace 2015; Pace 2020; Pace 2022; Courts, Penn (2019).

21 Carretero Vaquero (1998); Fernández Pintos (2017), 234–240.

22 Mulvin, Sidebotham (2004), 611–612.

23 Schädler (1994), 49–50.

24 Bell (2007), 98; Ersoy, Erdin (2015), 151.

25 De Voogt (2019), 91.

26 De Voogt, Nilsson, Ward (2020), 127–128.

27 Gregory, Gurney (1986), 13.

28 May (1991), 174–175.

29 Courts, Penn (2019): 6–7.

30 Michaelis (1863); Schädler (1994), 53.

31 Petrie (1927), 55.

Location	Size	Reference
Aventicum	6x6	Roman Museum of Avenches 13/15890-01
Athens (model)	6x7	SCHÄDLER (1994): 53
Monte de Santa Tegra	6x7	FERNÁNDEZ PINTOS (2017): 235-236
Aventicum,	6x8	Roman Museum of Avenches X/02924
Qasr Ibrim	7x8	ROSE (1996): 160
Chesters Fort	7x8	AUSTIN (1934): 27
Villa Adriana	7x8	MANDERSCHEID et al. (2011): 514-518
Corbridge	7x8	MURRAY (1913): 30
Gebel el-Silsila	7x8	DE VOOGT et al. (2020): 127
Parthenon, Athens	8x8	KARAKITSOU (2009): 24
Chedworth	8x8	BADDESLEY (1925)
Exeter	8x8	HOLBROOK and BIDWELL (1991): 278
Miletus	8x8	BELL (2007): 98
Smyrna	8x8	ERSOY and ERDIN (2015)
Smyrna	8x8	ERSOY and ERDIN (2015)
Brescia	8x8	MOSCA and PUPPO (2012): 274–275, 278
Basilica Iulia, Rome	8x8	SCHÄDLER (1994): 49-50
Xanthus	8x8	BELL (2007): 98
Kom Ombo	8x9	CRIST et al. (2016): 140-141
Gebel el-Silsila	8x9	DE VOOGT et al. (2020): 127
Carthage	9x10	DE VOOGT (2019): 91
Dover	10x10	PHILIP (1981): 167
Samos	11x12	SCHÄDLER (2007): 361
Puig Castellar de Bosca	11x16	RODRIGO REQUENA and ROMANÍ SALA (2021)

Fig. 2. Intact quadrangular boards found within the borders of the Roman Empire.

Location	Preserved Grid	Reference
Singidunum	2x2	JANKOVIC (2009): Fig. 11
Cemenelum	2x5	MOSCA and PUPPO (2012): 274–275
Saldum	3x3	JEREMIC (2009): 50–51
Didymoi	3x3	BRUN (2011): 126, 153
Cumidava	3x4	GUDEA and POP (1971): Pl. LII.3
Singidunum	3x4	JANKOVIC (2009): Fig. 12
Didymoi	3x4	BRUN (2011): 121, 143
Petavonium	4x1	CARRETERO VAQUERO (1998): Fig. 2.6
Petavonium	4x2	CARRETERO VAQUERO (1998): Fig. 2.4
Conimbriga	4x4	DA PONTE (1986): 138-139
Halpići	4x4	BUSULADŽIĆ (2017): Pl. 3
Petavonium	4x4	CARRETERO VAQUERO (1998): Fig. 2.3
Abu Sha'ar	4x5	MULVIN and SIDEBOTHAM (2004): Fig. 9.3
Abu Sha'ar	4x7	MULVIN and SIDEBOTHAM (2004): Fig 9.2
Didymoi	4x7	BRUN (2011): 126, 153
Petavonium	5x3	CARRETERO VAQUERO (1998): Fig. 2.5
Vindolanda	5x5	PENN and COURTS (n.d.)
Krokodilo	5x7	MATELLY (2003): 594, 605
Abu Sha'ar	5x9	MULVIN and SIDEBOTHAM (2004): Fig. 9.1
Exeter	6-7x8-9	HOLBROOK and BIDWELL (1991): Fig. 135
Abu Sha'ar	6-8x8-9	MULVIN and SIDEBOTHAM (2004): Fig. 9.5
Bearsden	6x4	BREEZE (2016): 93–94
Aventicum	6x6	DANIAUX (2019): Fig 3
Richborough	6x7	BUSHE-FOX (1928): Fig. 1.3
Aquis Querquennis	6x7	AVELAIRA (2015): 66
Noville	6x7	PÉREZ LOSADA (1993): 1058, Fig. 3
Buciumi	7x3	GUDEA (1971): Pl. LVI.4
Vindolanda	7x9	PENN and COURTS (n.d.)
Carthage	8x10-11	DE VOOGT 2019: 91
Richborough	8x5	BUSHE-FOX (1928): Fig. 1.2
San Chuis	8x5	VILLA VALDÉS (2010–2012): 109–110
Abu Sha'ar	8x6	MULVIN and SIDEBOTHAM (2004): Fig. 9.4
Petavonium	8x7	CARRETERO VAQUERO (1998): Fig. 2.1
Abu Sha'ar	9–10x10–11	MULVIN and SIDEBOTHAM (2004): Fig . 9.1
Birrens, England	9x15	ROBERTSON (1975): 33, 58, 100
Castiellu de Llagú	9x5	BERROCAL et al (2002): 128–129
Richborough	9x7	BUSHE-FOX (1928): Fig. 1.1
Petavonium	9x7	CARRETERO VAQUERO (1998): Fig. 2.2
Abu Sha'ar	9x9/9x10	MULVIN and SIDEBOTHAM (2004): Fig. 9.1
Viladonga	11x12	FERNÁNDEZ PINTOS (2017): 236–237
Chao de Samartín	12x17	VILLA VALDÉS (2000): Fig. 8.1
Inverarvon	13x16	DUNWELL and RALSTON (1995): 562, 564

Fig. 3. Fragmentary quadrangular boards found within the borders of the Roman Empire.

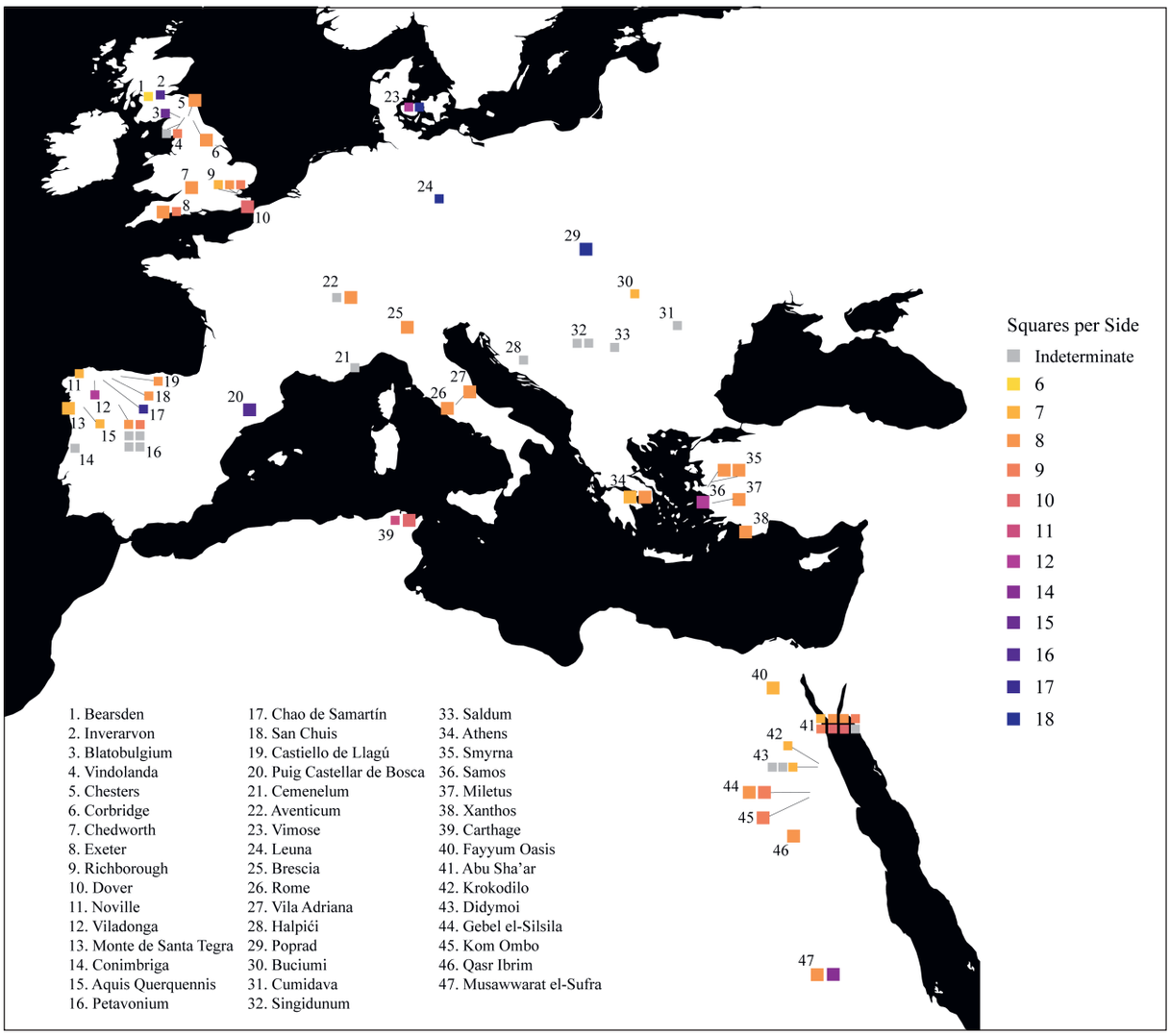


Fig. 4. Map of quadrangular boards contemporary with the Roman Empire. Large squares are complete boards; small squares are fragmentary boards.

sixteen. Nine of these boards were eight-by-eight, the most frequent size in the sample, with multiple examples of six-by-seven, seven-by-eight, and eight-by-nine boards. The boards with grids larger than this are unique examples of their respective patterns.

Information about the size of boards may also be inferred from the remains of fragmentary boards, in which the grid of squares is incompletely preserved and the exact pattern cannot be known (Figure 3). Many of these are too small to make any conclusions about their original size, but others clearly demonstrate that large boards existed in some places, with up to seventeen squares in a row.

Looking at the geographic distribution of the boards, it becomes apparent that the common board sizes are found throughout the empire, while the larger, uncommon board sizes are further away from the core of the Empire, defined as Italy and major urban centers (Figure 4).

2.3 Contemporaneous Quadrangular Boards

The archaeological record also presents examples of boards which are contemporary with, but found outside of, the Roman Empire. These boards have been found at sites in Central and Northern Europe, well beyond the *limes* of the Empire, but certainly from areas which were in contact with the Romans. These boards all appear to have been quadrangular, like those seen in the Roman Empire. Indeed, the remains of one of these boards, found at Vimose in Denmark, bears the distinct pattern of the Roman game Duodecim Scripta on the opposite side of the grid,[32] demonstrating that Roman games existed outside the Empire (see discussion on globalisation in Chapter 1). The preferred material for these boards seems to have been wood, and few of them are preserved though there are indications that, at least sometimes, these boards were placed in graves with counters on them, which may provide hints as to the original configuration, such as the one found at Leuna in Germany.[33] These boards are contemporary

32 Krüger (1982), 162, 222.

33 Schulz (1953), 29, 63–66, Pl. XXVII–XXVIII.

with the Roman Empire.[34] Only one example is intact: a wooden board with a seventeen-by-seventeen or seventeen-by-eighteen grid found in a 4th century CE elite tomb in Poprad, Slovakia.[35] A seven-by-fourteen board found at Musawwarat el-Sufra, a Meriotic site in Sudan,[36] also points to quadrangular boards of larger size outside the Empire.

The influence of Rome on the board games of temperate Europe is clear, especially with respect to game pieces, which were often imported from places within the Empire.[37] Indeed, the evidence for these games and the Roman influence that can be traced has been used as evidence for a connection between Ludus Latrunculorum and the medieval game Hnefatafl and other games which are probably related to it, such as Brandubh and Tawlbwrdd.[38] Aside from the material evidence for Roman games and Roman-style gaming materials in Northern Europe, the connection between Ludus Latrunculorum and Hnefatafl is made because it is thought that Hnefatafl also employed the custodial capture mechanism. This is inferred from the documentation of the game of Tablut among the Sámi people in what is now Finland during the 18th century CE by Linnaeus, which features custodial captures.[39] Tablut is thought to be a game derived from, or somehow related to, Hnefatafl, based on the board and the presence of a "King" piece for one player and not the other.[40] However, none of the sources which discuss Hnefatafl or its contemporary medieval games confirm that custodial capture was part of these games.

The archaeological evidence of quadrangular game boards found within the Roman Empire and in adjacent regions clearly demonstrate that boards ranging from six-by-seven to seventeen-by-seventeen or -eighteen were used to play games. This very wide range of board sizes presents the question of whether the same game can be played on such disparate boards, or if the different board sizes could indicate the presence of games other than Ludus Latrunculorum that were also played on quadrangular boards.

3. METHODOLOGY

3.1 Identifying Candidate Rulesets

In order to determine whether a game can be played on the wide range of quadrangular boards found in and around the Roman Empire, a reasonable set of rules must be applied to these boards to be able to implement them in the Ludii software to calculate metrics that can indicate how the difference in board sizes changes the experience of the game. Candidate rulesets should contain all of the rules that are known to have been a part of Ludus Latrunculorum as described by the ancient sources, and have been documented geographically close to the region where the game was played. Ideally, contemporary rules would be chosen over rules which are further distant with regard to time, but since there are no completely documented game rules contemporary with the Roman Empire in the Ludii database, this is impossible.

To identify which games in the Ludii database contain the rules known for Ludus Latrunculorum, a search was made for the following game concepts: 3.3.2.6 Custodial Capture; 3.3.4.1.3 Orthogonal Direction (movement); 2.1.1.1.1 Square Shape (board); 2.1.1.2.1 Square Tiling (square spaces on the board); and 3.2.2 Pieces Placed Outside Board (indicates pieces begin off the board and must be placed on it, i.e. there is a placement phase in the game).[41] This search produced five games that contain all of those rules: two types of Gala,[42] Kharebga,[43] Seega,[44] and Shantarad.[45] Of these games, the only ones which were played in places that at one time were part of the Roman Empire are Kharebga, documented in El Oued, Algeria, and Seega, played in Egypt and Sudan. Gala is played on the island of Sulawesi in Indonesia, and Shantarad is played in Somalia, and thus far beyond the borders of the Roman Empire. Nevertheless, Seega was documented in the 19th century, and Kharebga in the 20th century, so the chronological distance between these games and that of Ludus Latrunculorum is greater than a millennium. Despite this, Kharebga and Seega are the most likely candidates for games that could be similar to Ludus Latrunculorum.

In addition, Tablut is the only game from Europe for which the complete set of rules have been documented that also contains the custodial capture mechanism, and there is reason to examine it on these boards as well. If Tablut is indeed related to Hnefatafl, as the evidence seems to suggest, this connects the evidence to a period in time much closer to the end of the Roman Empire, as evidence for Hnefatafl appears in the late 8th or 9th century CE. Nevertheless, Tablut does not have the placement phase known to exist in Ludus Latrunculorum, but has custodial capture, orthogonal movement, and a quadrangular board. However, it also has differentiated pieces, with one player playing with a "King" piece. There are also different numbers of pieces per player, a central

34 De Voogt (2019), 92–93.

35 Staneková (2020), 56–57.

36 Crist *et al.* (2016a): 140.

37 Hall, Forsyth (2011), 1326–1330

38 Hall (2019), 204–207, Hall, Forsyth (2011), 1333.

39 Linnaeus (1732), 147–148.

40 Murray (1913), 445.

41 Piette *et al.* (2021).

42 Matthes (1859), 899; Matthes (1874), 71–72.

43 Bellin (1964), 53–54.

44 Davies (1925), 138–139; Lane (1836), 356–357.

45 Marin (1931), 595–596.

square which affects capturing mechanisms, and different winning conditions for the two players—one attempts to move the King piece to the edge of the board, while the opponent attempts to capture the King piece. Despite these differences, and in light of the suggestions that Hnefatafl—and, therefore, Tablut—is derived from, inspired by, or in some way connected to Ludus Latrunculorum, it is worthwhile evaluating the Tablut rules on quadrangular boards as well.

3.2 Applying Rulesets to Boards

To measure behaviour metrics on the different board sizes of quadrangular board, and thus evaluate whether they all might have been used for the same set of rules, the rulesets for Kharebga, Seega, and Tablut were applied to boards with the dimensions of the intact quadrangular boards from within the Roman Empire, as well as the board from Poprad. These rulesets were implemented in the Ludii software so they could be played.

Kharebga is played on either a five-by-five board or a seven-by-seven board. Players alternate turns placing two pieces on the board, leaving the central space empty. When all the pieces have been placed, the players alternate turns moving their pieces over any distance in an orthogonal direction—also known as the slide move. Captures are made when an opponent's piece is between two of the player's own pieces (i.e., custodial capture). Captures are not made during the placement phase. The first player to capture all of their opponent's pieces wins.

Seega is very similar to Kharebga; it is played on a five-by-five, seven-by-seven, or nine-by-nine board. The other main difference is that pieces move one space at a time, rather than at a distance—known as the step move.

Tablut is very different from the other two. There is no placement phase; the pieces start in a fixed position, with the "King" piece beginning on the center spot, with its eight allied pieces surrounding it, and the opponent's sixteen pieces are arrayed toward the edge of the board. Players alternate turns moving a piece orthogonally any distance. Captures are custodial, but if the "King" is still in the central space, it can only be captured by surrounding it with four pieces, and if it is next to the central space, it must be surrounded on three sides. The central space cannot be entered by any piece including the "King" once it has left it. The player with the "King" wins by moving the "King" to the edge of the board; the opponent wins by capturing the King. It was played on a nine-by-nine board.

Adapting the rules to the known quadrangular boards contemporary with the Roman Empire immediately presents some issues. Only one of the known board sizes—seventeen-by-seventeen—provides a central space. Since the central space features in the rules for all three games, the rules must be adapted for a board with an even number of spaces. For Kharebga and Seega, the rule that the central space must be left empty is discarded, and play begins when only two spaces are left empty on the board; with each player placing one piece on the final turn of the placement phase. It should also be noted that increasing the board size for these games implicitly introduces more pieces to the board: (n/2)-1 for each player, with n being the total number of spaces on the board.

For Tablut, the central space is more crucial, as it is required for the "King" piece's starting position which, in turn, imposes symmetry on the starting position of the pieces. The central space also imposes capturing and movement restrictions. Because of the many changes that would be required to adapt Tablut rules to a board with an even number of spaces, it was not applied to these boards, as it would effectively be a different game. Tablut rules were therefore only applied to the seventeen-by-seventeen board, and it was tested with two different versions: one with the original number of pieces—eight plus the "King" for one player; sixteen for the opponent— and one with the number of pieces increased in proportion and configuration to the larger board size—sixteen plus the "King" for one player, forty for the other.

3.3 Artificial Intelligence Agents

Once these rules were implemented on the different boards in Ludii, it was necessary to choose the parameters for the AI to conduct experiments to generate behavioural game-play metrics. Two basic tree search approaches were considered to provide the AI engines for automated game-playing; UCT[46] and Alpha-Beta[47] search. Both of these tree search approaches perform lookahead searches, in which they "look ahead" into various different future game states that may be reached through different

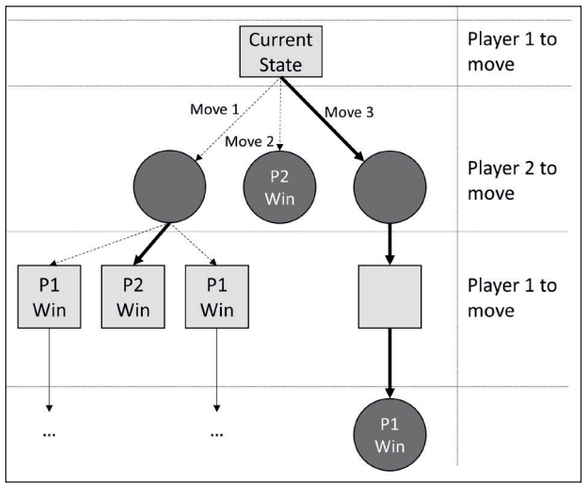


Fig. 5. Example game tree for lookahead tree search algorithms. Thick arrows correspond to moves that tree search algorithms would end up playing after sufficient analysis.

46 Kocsis, Szepesvári (2006).

47 Knuth, Moore (1975).

sequences of moves from the current game state (Figure 5), but they use different strategies for deciding which parts of their search spaces to explore or prioritise. UCT was found to barely play better than a random player, if at all, in all but the smallest of boards. This is a common issue for UCT in games where long sequences of random play—of which the algorithm uses many to estimate how valuable different game states are—are unlikely to lead to a variety of outcomes. This is the case in particular for the Seega and Kharebga rulesets, where random play on large boards is highly unlikely to ever lead to a victory for either player.

Alpha-Beta search was evaluated with a variety of different heuristic state evaluation functions, which it can use to compare states to each other without relying on such rollouts of random play. A straightforward "Material" heuristic, which incentivises the program to attempt capturing more opposing pieces than it loses, was found to produce an effective player. The program also used iterative deepening[48] to automatically tune its search depth for any given time constraint, and a transposition table[49] to improve the efficiency of the algorithm. The Alpha-Beta program can perform deeper tree searches if it is given more "thinking time" per move, and deeper searches usually lead to a stronger level of play. Hence, the amount of thinking time per move may be tuned to run different experiments between different players with different levels of playing strength.

One risk with AI-based players is that they will never get "bored"; if they fail to find a line of play that improves their position or leads to a win, but do find a line of play that simply stalls the game, they are likely to prefer indefinitely stalling the game over a more risky, aggressive move. This is arguably not representative of how humans would have played a game. In an attempt to address this, experiments were also run with variants of the Alpha-Beta program that were either restricted to solely even search depths, or solely odd search depths. When a program with a material heuristic searches only to odd search depths, it may typically be expected to play more aggressively, because it will focus on evaluating states in which it was allowed to make the final move—without considering a final reply by the opponent. Conversely, a program that searches only to even search depths may be expected to have a more defensive playstyle. This allows for experiments to be run in which it is expected that there will be at least some variety in playstyles between the two players, where the presence of at least one player with a more aggressive playstyle can help to reduce the likelihood of games that are stalled indefinitely.

48 Korf (1985).

49 Greenblatt, Eastlake, Crocker (1967).

3.4 Behaviour Metrics

By allowing these AI programs to play multiple games against each other, it is possible to measure certain gameplay properties that may give an indication about how the game is experienced by humans. These are called behaviour metrics, and can reveal interesting properties about a game which may not be apparent from just a casual observance of the rules—for example, measuring how long a game typically takes to play, the percentage of games which end in a draw, how many moves a player has to decide between each turn, etc. While there are over one hundred behaviour metrics currently implemented in Ludii, this paper is only concerned with three of them which produce interesting results:

- Duration: The average number of turns needed to complete a game. This metric can be used to tell if a game finishes in a reasonable number of turns, or will likely take thousands of turns to complete.
- Completion: The percentage of games which did not finish before reaching the 2,500 turn limit. Similar to duration, this metric can be used to tell if a game finishes in a reasonable number of turns.
- Branching Factor: The average number of different possible moves that a player can make during their turn. Games with a higher branching factor mean that each player has more options to consider on their turn, often indicating a more complex game.

3.5 Experiments

To compute all the metrics of each proposed ruleset, one hundred playouts are run between two Alpha-Beta agents, one using even search depths and the other using odd search depth alternately playing player one and player two after each game. Ten seconds are allocated to each agent to make a decision at each move. Each playout is limited by 1,250 moves per player; if that limit is exceeded the game is considered to be incomplete.

Every process was run on a single CPU core @2.2 GHz. 20,480MB of memory was allocated per process, of which 16,384 MB was made available to the Java Virtual Machine (JVM). Each process was also limited to four days of computation.

Concerning the largest board sizes (seventeen-by-seventeen, seventeen-by-eighteen for Seega and Kharebga rulesets), most of the playouts are extremely lengthy to run due to the high number of pieces and playable sites (~ 7.4 hours per playout). For this reason and due to the limit of four days, the decision was taken to run only ten playouts for these rulesets.

As a separate process to track the evolution of the number of pieces owned by each player after each move, one single playout for each ruleset was run and the total number of pieces placed on the board and

the number of pieces owned by each player placed on the board at each state were stored.

4. RESULTS

4.1 Completion

The Kharebga, Seega, and both Tablut rulesets demonstrate different trends with respect to board size. As board size increases, the percentage of playouts which played to completion before reaching the turn limit decreased for both Kharebga and Seega rulesets (Figure 6). Completion for Seega rulesets plummeted with increasing board size, with only the six-by-six, six-by-seven, and six-by-eight boards completing over 75% of the time. Boards larger than eleven-by-twelve completed less than 13% of the time. The seventeen-by-seventeen and seventeen-by-eighteen Seega rulesets never played to completion. In comparison, for the Kharebga rulesets, only the seventeen-by-eighteen board completed less than 75% of the time, with a gradual decrease with increasing board size. Both Tablut rulesets—only implemented on the seventeen-by-seventeen board— completed 100% of the time.

4.2 Duration

The number of turns for Kharebga, Seega, and Tablut rulesets showed results that mirror those for the completion metric (Figure 7). The length of the game increased steeply for Seega rulesets, with boards greater than eleven-by-twelve in size at nearly 2,500 turns—the timeout limit. Kharebga rulesets also increased in duration with respect to board size, but the increase was more gradual. It should be noted that the rate of increase appears to be more drastic up to the eleven-by-sixteen board size, with the seventeen-by-seventeen and seventeen-by-eighteen boards having lower duration than expected in comparison to the trend on boards smaller than this. This could be attributed to sampling error with a sample of only ten playouts. The Tablut rulesets were shorter than any of the others, even though they were played on the second-largest board, lasting 26.04 turns for the unmodified Tablut rules and 73.17 turns for the ruleset with added pieces.

These results show that increasing board size has a greater effect on the duration of games played with Seega rules than for Kharebga rulesets. Nevertheless, though the increase in duration of Kharebga may be more gradual, increased board size does increase the duration of games to over one thousand turns. Meanwhile, Tablut rulesets, even though they are played on a large board, are played in a fraction of the amount of time as the Seega or Kharebga rulesets.

4.3 Branching Factor

Branching factor also increases for the Kharebga and Seega rulesets (Figure 8). The Kharebga rulesets all have greater branching factor than Seega rulesets

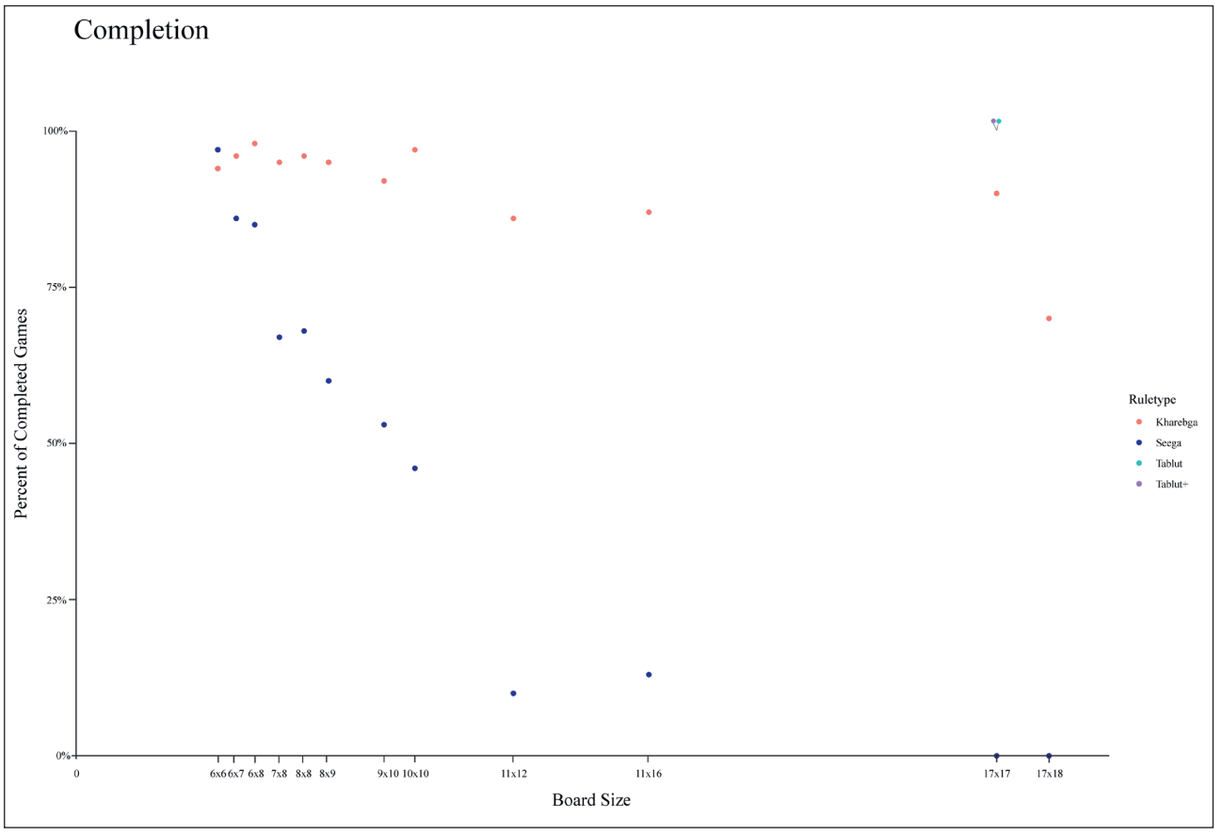


Fig. 6. Percent completion of playouts for different board sizes.

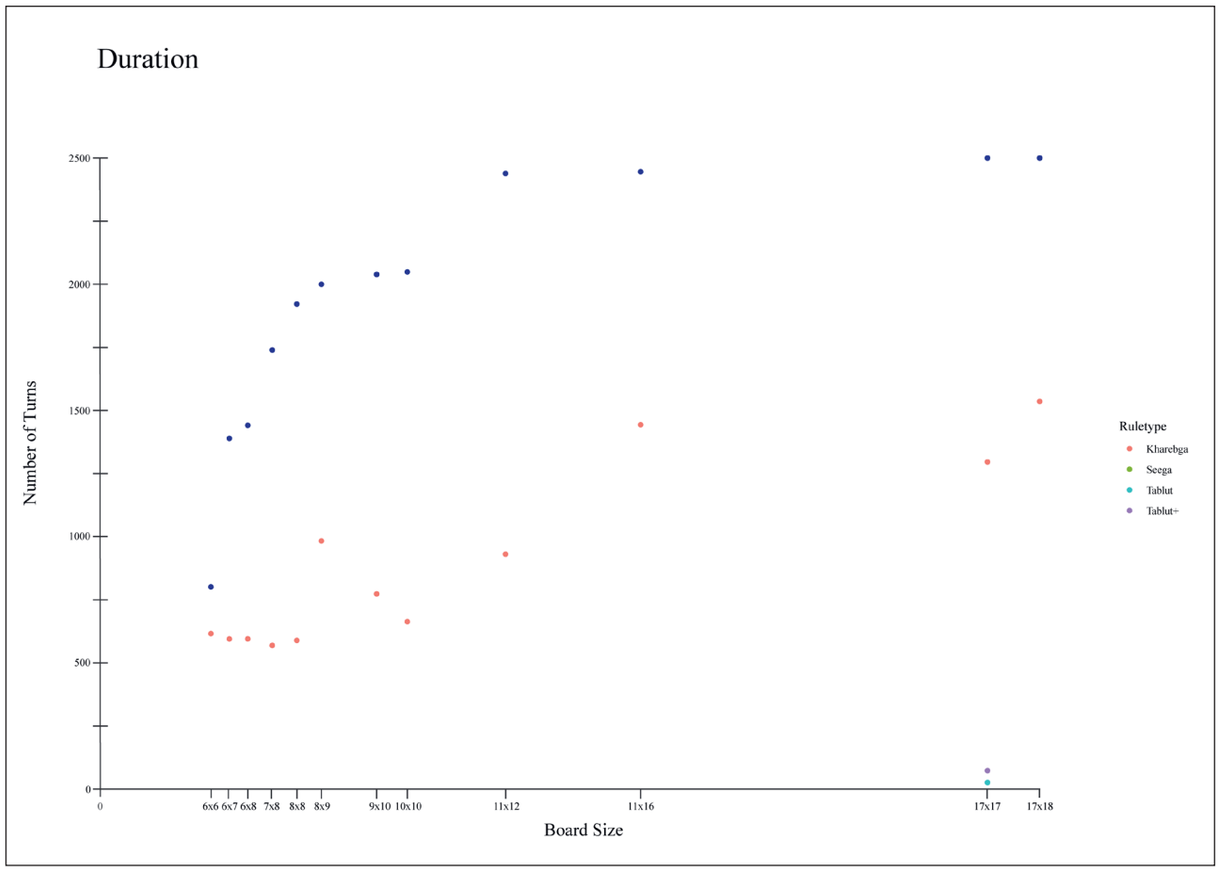


Fig. 7. Duration of playouts for different board sizes.

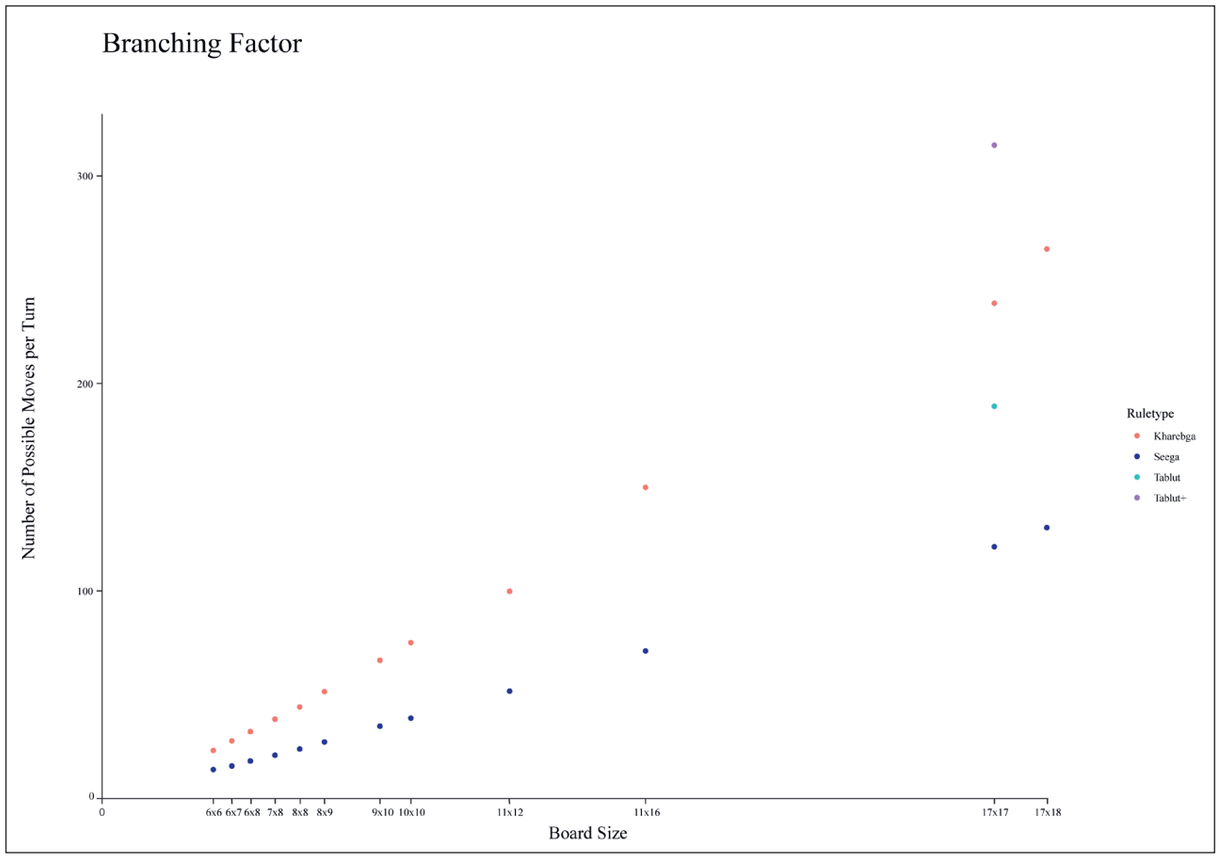


Fig. 8. Branching factor for different board sizes.

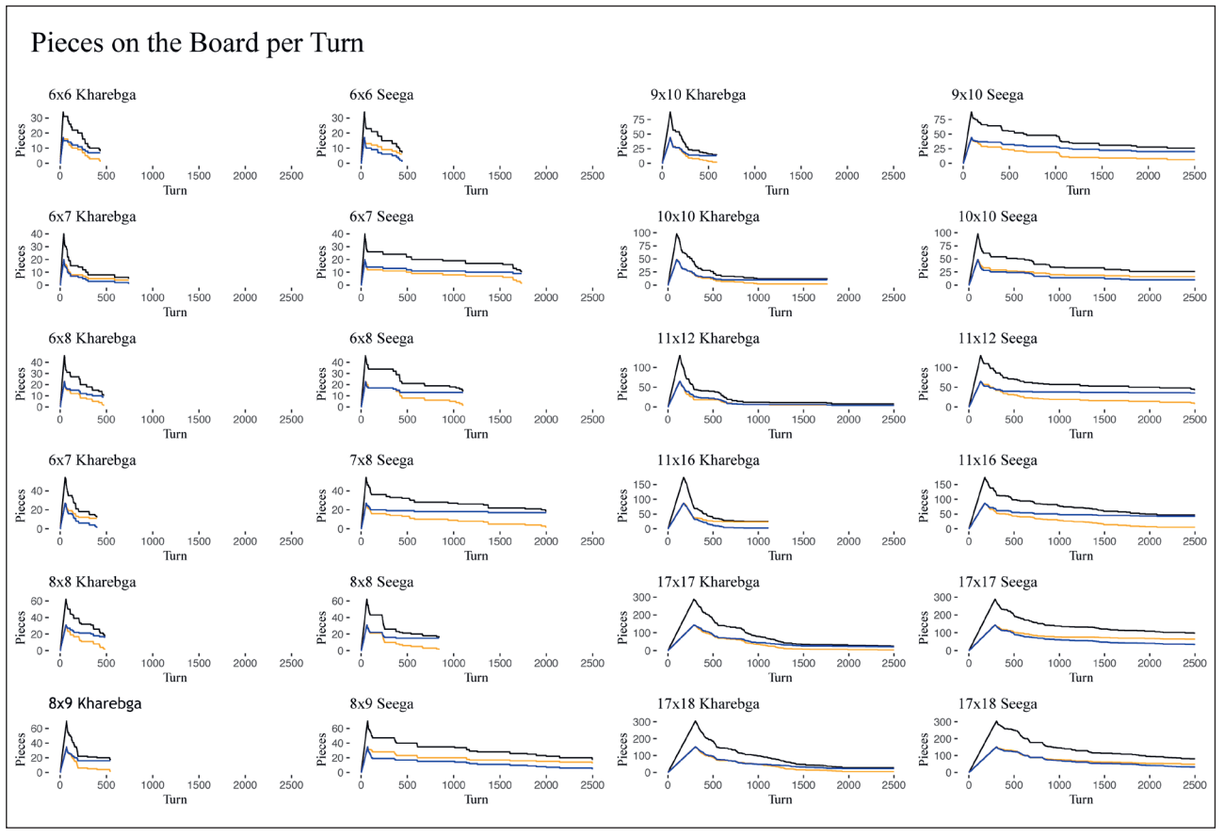


Fig. 9. Number of pieces per player at each turn for different board sizes.

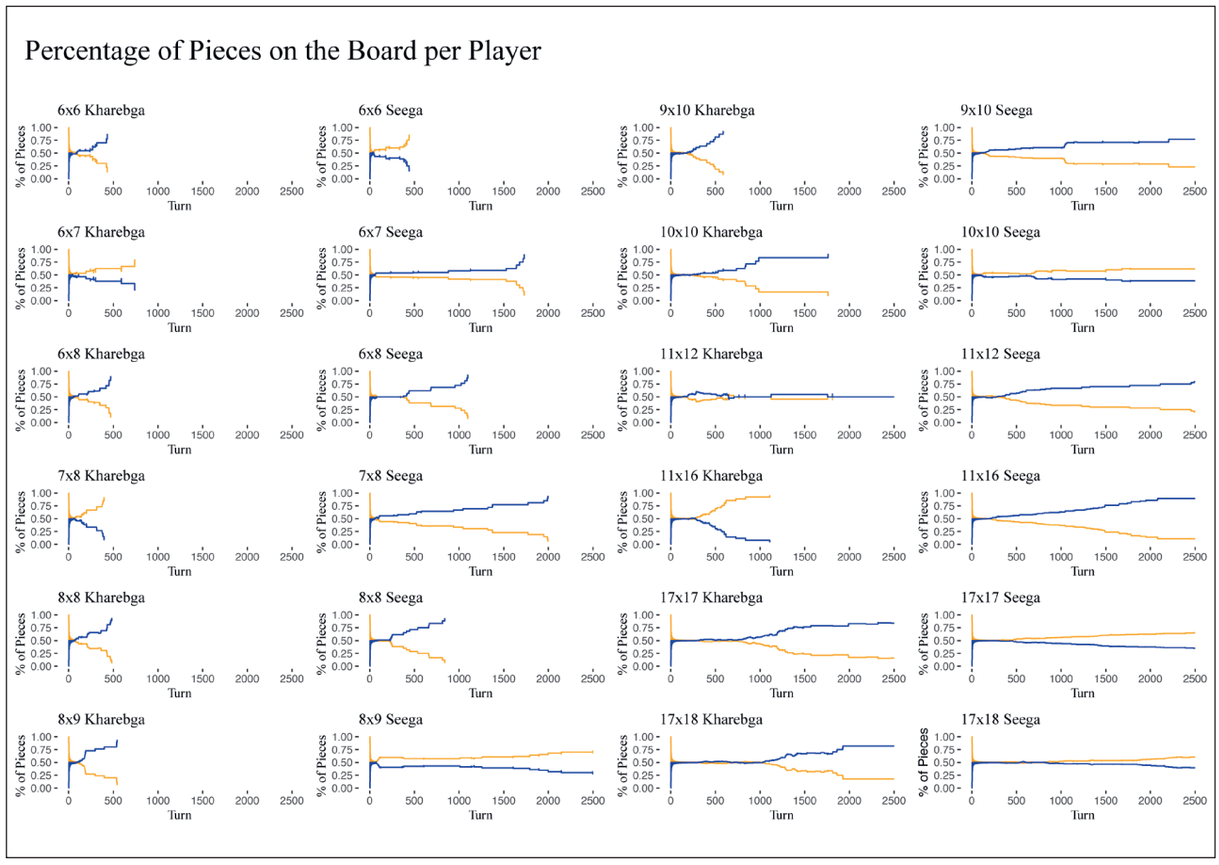


Fig. 10. Percent of pieces on the board for each player at each turn for different board sizes.

on the same board, and the difference increases with increasing board size. This is logical, since the sliding move of Kharebga gives more movement options for the players than the step move of Seega. Furthermore, the values for the Tablut rulesets show that these rules also have large branching factors, though they have fewer pieces than the Kharebga or Seega rulesets, but increasing the number of pieces (i.e., the difference between the Tablut and Tablut+ rulesests) also increases the branching factor.

4.4 Pieces per Turn

Examining the number of pieces on the board at every turn gives a sense of the gameplay for the Kharebga and Seega rulesets, and how that changes with increasing board size (Figure 9). The plots corroborate the duration metric results—that Kharebga rulesets play more quickly than the Seega rulesets. For all of the board sizes, and for both rulesets, the game tends to follow a similar pattern. After the initial placement phase, when the number of pieces on the board increases linearly, there is a period where captures can be made in fairly rapid succession. After this phase, there is a long tail where one player has more pieces than the other, but captures happen with decreased frequency, sometimes with hundreds of turns between captures. This tail lengthens more quickly with increasing board size in Seega rulesets, mirroring the more rapid increase in duration seen in this ruleset.

Examining the percentage of pieces owned by each player at each turn throughout the game provides more detail about gameplay (Figure 10). These results show more clearly that after the initial phase of rapid capturing, one player gains an insurmountable lead over their opponent. In the larger boards, hundreds of turns can be played where one player has twice or thrice the number of pieces of their opponent. In the one case where one player does not gain an advantage over the other (eleven-by-sixteen Kharebga), the game still continues for hundreds of turns without captures.

5. DISCUSSION

5.1 Playing on Large Boards

The playout data indicate some of the gameplay consequences of increasing board size for particular sets of rules. Based on what we know about Ludus Latrunculorum, the rulesets for Kharebga and Seega contain all of the rules that are known about the Roman game, and also are played in places where the Roman Empire once existed. Evaluating the playout results of these rulesets on the different board sizes found within the Roman Empire, as well as the board found at Poprad, can help us to recognize which rulesets may be closer to the original rules of Ludus Latrunculorum, and, when coupled with the archaeological evidence, may indicate whether all of these boards were likely to have been used for Ludus Latrunculorum, a similar game, or a completely different one.

The clear results of the playouts were that both games increased in duration as board size was increased. This is not surprising, because increasing the size of the board also increases the number of pieces on the board, all of which need to be captured to win. However, the pieces per turn data show that increasing the board size also makes it more difficult for the AI agents to make captures, particularly in Seega rulesets. This likely happens for a couple of reasons. For Seega rulesets, which employ the step move, the AI may have difficulty detecting a move that brings it closer to an opposing piece in order to make a capture if they are distant from one another on the board because of the time limit imposed on the tree search. For Kharebga rulesets, the slide move allows the player more movement options, and therefore it is easier for an AI agent to avoid capture for a long time.

For these reasons, it is difficult to exactly translate the number of turns played by the AI agents into real-life turns of a game played by humans. Nevertheless, the trend of increased number of turns and board size is consistent across both rulesets, and constraints which compel the agents to to play in a more human-like fashion do not eliminate the problem. Despite this, the problem is not only with the way AI agents play, but is a problem with having a large amount of empty space with few pieces remaining on the board, requiring the coordinated movement of two pieces to make a capture. This is alluded to in previous work refuting the hypothesis that the so-called "Doctor's Game" from Stanway, England was a Ludus Latrunculorum board because there were too few pieces included with the board.[50] Furthermore, the difficulty in making the final captures has been observed in classroom settings,[51] indicating that this is a real-world problem with the game and not merely a limitation of the AI agents.

The fact that the Tablut rulesets play much more quickly on a large board than the Kharebga and Seega rulesets shows that a large board itself is not the problem, nor is it the number of choices that the player has to make, since the branching factor for the Tablut and Tablut+ rulesets also have high values for this metric. It may be, though, that having a large number of decisions to make, over hundreds of turns without captures, would be exhausting and indicates a game that would likely not be played. For these reasons, Seega is a less convincing candidate ruleset for the larger boards. Since we know that

50 Schädler (2007), 368–369.

51 Marco Tibaldini, personal communication.

Seega was played on nine-by-nine boards, it cannot be ruled out as a possibility for the smaller boards—but the fact that it was played on boards ranging from five-by-five to nine-by-nine but not larger may be indicative of the fact that larger boards make the game interminable with these rules.

Furthermore, the slide move employed in Kharebga is more in line with Ovid's description of the pieces moving in a straight line than a step move. It is also important to note a passage in the *Historia Augusta*, which provides a second-hand account of Proculus being declared *imperator* after winning ten games of Ludus Latrunculorum in a row,[52] indicating the game must have been of sufficient brevity to play so many in succession. For all of these reasons, it appears to be more likely that Kharebga was a more suitable ruleset because the slide move allows for a game that can more frequently be played to a conclusion, and which can be played faster on the greatest number of boards. Neither Seega nor Kharebga appear to play in a reasonable fashion on larger boards. The Tablut and Tablut+ playout data indicate that other rules can be more amenable to large boards.

5.2 Games with Large Boards

It is useful to look at games that were played on large boards to examine whether people played games similar to Kharebga and Seega on large boards. The sample of games documented as part of the Digital Ludeme Project allows for such comparison. In the sample of 1,007 games at the time of writing, 17 war games[53] have boards with more than 100 playing sites. These can largely be divided into four separate categories: Draughts games, multiplayer games, enlarged versions of existing games with added pieces with new movement properties, and Konane. Each of these categories features something about their rules that either requires a large board or speeds up the game. Draughts games only use half of the sites. Multiplayer games have three or more players, requiring more space than a game with two players. Enlarged games, which are largely versions of Chess and Shogi, add pieces which both necessitate a larger board for the starting position and introduce more powerful movement for these pieces. Finally, the number of moves in Konane is capped by the number of spaces on the board because each move must involve a capture.

In addition, there is archaeological and historical evidence for other large games, for which the rules have been lost. Hnefatafl, and games which may be related to it such as Alea Evangelii, fall into this group. Hnefatafl could apparently be played on a thirteen-by-thirteen board, while Alea Evangelii was depicted on an eighteen-by-eighteen board.[54] The playout results for the Tablut rules are relevant here, since it is likely that Hnefatafl and Alea Evangelii had similar rules. When applied to larger boards, Tablut rules play much faster than the Seega or Kharebga rules, which may be attributable to the fact that winning the game is focused on the capture or escape of the "King" piece. It is expected that Hnefatafl and Alea Evangelii would play similarly.

The game at Stanway may have been a nine-by-thirteen board. Though Roman in date, it is thought to have been a Celtic board game.[55] The aforementioned boards from Vimose include one which has eighteen squares per row and another with fourteen or more per row.

Other boards, for which the names of the games are unknown, have been found at pre-Roman sites in the Mediterranean basin. At Tell Zakariya in the Levant, a complete twelve-by-twelve board was found in the upper layers of the site, post-Iron Age but pre-Roman in date, as well as a fragment of a stone gaming table that had at least ten rows of squares.[56] Another, at nearby Maresha, has at least ten spaces per row, and is Hellenistic in date.[57] Other large pre-Roman boards have been found in Greece at Rhamnous, where a nine-by-nine and an eight-by-ten board were found inscribed on a block dating to the 3rd century BCE,[58] as well as an eleven-by-eleven Hellenistic board from Pella.[59]

These boards show that other games were played on larger boards before and after the Roman Empire. The Hellenistic boards above could be for the game Polis, which is mentioned in Greek sources but not described in great detail. It is thought to be similar in some ways to Ludus Latrunculorum, but the candidate boards are larger than the commonly-found Ludus Latrunculorum boards and, perhaps indicatively, tend to have an odd number of spaces while Ludus Latrunculorum strictly has an even number. Less is known about the rules for Polis, so there is likely something missing from these rules to make a playable game on a larger board.

5.3 Archaeological Context of Boards

The archaeological context of the boards provides further evidence for the interpretation of quadrangular grids. Looking at the geographical distribution of board size, it is clear that the most common board sizes, six-by-seven, seven-by-eight,

52 Flavius Vopiscus Syracusanus, *Four Tyrants*, 12.1–3.

53 Defined as games in which capturing the opponent's pieces is the primary criterion for determining a win.

54 Duggan (2021); Schulte (2017) for recent surveys of the evidence for these games.

55 Schädler (2007), 368–369.

56 Bliss, Macallister (1902), 144.

57 Stern (2019), 127–128; Stern this volume.

58 Fachard (2021).

59 Ignatiadou (2019), 142, 152.

and eight-by-eight, are widely spread throughout the empire. These are also found in major cities of the empire, such as Athens, Rome itself, and the cities of western Asia Minor. These games exist as graffiti in urban contexts, such as at the Basilica Iulia and the Parthenon, but others were also found in military contexts, particularly in Britain, Spain, and Egypt (e.g., Chesters, Monte de Santa Tegra, Abu Sha'ar). The widespread use of these particular grid patterns, and the fact that the seven-by-eight and eight-by-eight boards are the only ones found intact in Italy, follows the pattern that would be expected in the Roman Empire—that the game would appear both in the central core of the Empire as well as in the places the Romans occupied.

The fact that the larger boards are not found in Italy, but typically in forts on the fringes of the empire, could be explained in two ways. The simplest argument is that troops stationed at forts have a lot of idle time, and therefore the presence of larger boards at these places might explain an attempt to take up this time. The playout data indicates, though, that the rules known for Ludus Latrunculorum played on these boards are probably not amenable even for people who are trying to waste a considerable amount of time.

Perhaps a more compelling explanation is that these larger game boards are not for Ludus Latrunculorum, but other games about which we know nothing concerning the rules. Pre-Roman quadrangular boards indicate that Ludus Latrunculorum was not the first such game to exist in the Mediterranean basin. Indeed, Polis, which was played in the Greek world, seems to have been played on larger boards, and it is possible that the board from Samos is this game, rather than Ludus Latrunculorum. But other boards, such as one from the Late Period Sacred Animal Necropolis at Saqqara in Egypt,[60] as well as several in northwest Spain[61] cannot be tied to any known games. Coupled with the conclusion that the Stanway game was a Celtic board game of unknown type, and that other larger boards found at Vimose, Leuna, and Poprad were also probably indigenous rather than Roman games,[62] it is plausible that these larger boards were not Ludus Latrunculorum, but other games which existed in a suite of games played on quadrangular boards stretching from Britain and Scandinavia to the Meroitic Kingdom in Sudan. Auxiliary troops were drawn from the indigenous populations of the Empire and beyond,[63] so the presence of indigenous games at Roman military sites is not surprising, particularly since games function as social lubricants which can be used to acquaint people with one another and to form the basis for other social interactions.[64]

6. CONCLUSIONS AND FUTURE WORK

Computational methods can add another line of evidence to traditional archaeological and philological methods to help identify board games and test plausible rulesets. For Ludus Latrunculorum, playout analysis shows that a game in which pieces move with a slide movement such as Kharebga fits the description of the Roman authors and is reasonably playable on the boards known from the archaeological record. Furthermore, larger boards seem to be less amenable to these rules, and traditional games with similar rules on large boards have not been recorded in human history. This leads to one of two conclusions: that there are key rules missing from the written record of Ludus Latrunculorum that would allow these rules to work on large boards, or that there are other games with unknown rules that were played on large boards. The archaeological record supports the presence of pre- and non-Roman games on large boards, so the latter argument is favoured.

Future work can improve the utility of computational methods in the study of games. Developing improved AI agents by introducing heuristics and features to the agents can help them to play more effectively. The development of game distance metrics can help to quantitatively analyze the ludemic similarity of games to one another, allowing for better identification of candidate rulesets. In addition, a social network approach can add the cultural dimension to measurement of game distance. At press, this is being developed by the Digital Ludeme Project to potentially automate the identification of candidate games for analyzing and reconstructing traditional games of the past. These innovations can be used not only to bring new insight into antiquity, but also to make the past interactive and to preserve this intangible cultural heritage by providing playable games that more closely replicate the way ancient peoples played board games.

ACKNOWLEDGEMENTS

We wish to thank Véronique Dasen for the invitation to contribute to the volume, as well as the ERC Locus Ludi Project and Marco Tibaldini for pointing us to more evidence for Ludus Latrunculorum and Polis. This research was funded by the European Research Council (ERC Consolidator Grant #771292).

60 Martin (1981), 30, Pl. 39.

61 Berrocal-Ranger *et al.* (2003), 103–104; Llanos Ortiz de Landaluze (2002), 191–193.

62 Schädler (2007), 369–373.

63 Haynes (2013), 95–142.

64 Malaby (2003), 59–74; Crist *et al.* (2016b).

BIBLIOGRAPHY

Austin, Roland, "Roman Board Games I", *Greece and Rome*, 4 (1934), 24–34.

Avelaira, Tomás, "Aquae Querquennae (Porto Quintela, Ourense, España): Un campamento Romano en el NW de Hispania", *Ephemeris Napocensis,* 25 (2015), 43–80.

Baddesley, St. Clair, "A Roman Draught-Board", *Transactions of the Bristol and Gloucestershire Archaeological Society,* 45 (1923), 285.

Becq de Fouquières, Louis. *Les jeux des anciens,* Paris (1869).

Bell, Robert, *Board and Table Games from Many Civilizations*, New York (1979).

Bell, Robert, "Notes on Pavement Games of Greece and Rome", in Irving Finkel (ed.), *Ancient Board Games in Perspective*, London (2007), 98–99.

Bellin, Paul, "L'enfant saharien à travers ses jeux", *Journal des Africanistes*, 33 (1964), 47–104.

Berrocal-Ranger, Luis, Martínez Seco, Paz, Ruiz Treviño, Carmen. *Castiellu de Llagú (Latores, Oviedo): Un castro Astur en los orígenes de Oviedo*, Bibliotheca Archaeologica Hispana 13, Madrid (2002).

Bliss, Frederick, Macallister, Robert. *Excavations in Palestine in the Years 1898–1900*, London (1902).

Brezee, David, *Bearsden: A Roman Fort on the Antonine Wall*, Edinburgh (2016).

Browne, Cameron, *et al*., "Foundations of Digital Archaeoludology. Report on Dagstuhl Research Meeting 19153", *ArXhiv* 1905.13516v1 (2019).

Brun, Jean-Pierre, "Le dépotoir", in Hélène Cuvigny (ed), *Didymoi: Une garnison romaine dans le désert Orientale d'Égypte*, Institut Français d'Archéologie Orientale 64/1, Cairo (2011), 115–155.

Bushe-Fox, Joscelyn, *Second Report on the Excavation of the Roman Fort at Richborough, Kent,* Reports of the Research Committee of the Society of Antiquaries of London 7, Oxford (1928).

Busuladžić, Adnan, "Roman Gaming Boards and Pieces: Unpublished Astragals, Talus and Calculi from the Antiquities Collection of the National Museum of Bosnia and Herzegovina", *Glasnik Zemaljskog Muzeja Bosne i Hercegovine u Sarajevu: Arheologija*, 54 (2017), 185–208.

Carretero Vaquero, Santiago, "El Ludus Latrunculorum, un juego de estrategia practicado por los equites del Ala II Flavia", *Boletín del Seminario de Estudios de Arte y Arqueología*, 64 (1998), 117–140.

Courts, Summer, Penn, Timothy, "A Corpus of Gaming Boards from Roman Britain", *Lucerna,* 57 (2019), 4–12.

Crist, Walter, De Voogt, Alex, Dunn-Vaturi, Anne-Elizabeth, *Ancient Egyptians at Play: Board Games across Borders*, London (2016a).

Crist, Walter, Dunn-Vaturi, Anne-Elizabeth, De Voogt, Alex, "Facilitating Interaction: Board Games as Social Lubricants in the Ancient Near East", *Oxford Journal of Archaeology,* 35 (2016), 179–196.

Culin, Stewart, *Games of the North American Indians.* Lincoln (1907).

Da Ponte, Sálete, "Jogos romanos de Conimbriga", *Conimbriga: Revista de Arqueologia*, 25 (1986), 131–141.

Daniaux, Thomas, "Plateaux et jetons de jeu d'Aventicum (Suisse)", in Véronique Dasen (ed.), *Ludique. Jouer dans l'antiquité*, catalogue de l'exposition, Lugdunum, musée et théâtres romains, 20 juin-1er décembre 2019, Gent (2019), 88–89.

Davies, Robert, "Some Arab Games and Puzzles", *Sudan Notes and Records*, 8 (1925), 137–152.

De Voogt, Alex, "Traces of Appropriation: Roman Board Games in Egypt and Sudan", in Véronique Dasen, Ulrich Schädler (eds), *Dossier Jouer dans l'Antiquité. Identité et multiculturalité, Archimède*, 6 (2019), 89–99.

De Voogt, Alex, Nilsson, Maria, Ward, John, "The Role of Graffiti Game Boards in the Understanding of an Archaeological Site: The Gebel el-Silsila Quarries", *Journal of Egyptian Archaeology*, 106 (2020), 123–132.

Duggan, Eddie, "A Game on the Edge: An Attempt to Unravel the Gordian Knot of Tafl Games", *Board Game Studies,* 15, 99–132.

Dunwell, Andrew, Ralston, Ian, "Excavations at Inverarvon on the Antonine Wall, 1991", *Proceedings of the Society of Antiquaries of Scotland,* 125 (1995), 521–576.

Ersoy, Akın, Erdin, Özer, "Antik Dönem Smyrna Agorası'nda Bulunan Roma Dönemi Ludus Latrunculorum ve Mankala Oyun Tablaları Üzerine İnceleme", in Emre Okan, Cenker Atila (eds), *Prof. Dr. Ömer* Özyiğit'e *Armağan*, İstanbul (2015), 141–156.

Fachard, Sylvain, "Games in the Garrison Forts of Attica", paper given at The Archaeology of Play and Games Workshop, ERC Locus Ludi (2021).

Fernández Pintos, Julio, "Tableros de juego rupestres en el SO. de Galicia", Unpublished manuscript (2017).

Greenblatt, Richard D., Eastlake III, Donald E., Crocker, Stephen D., "The Greenblatt chess program", in *Proceedings of the November 14-16, 1967, Fall Joint Computer Conference*, London (1967), 801–810.

Gregory, Tony, Gurney, David, *Excavations at Thornham, Warham, Wighton and Calstor, Norfolk,* Early Anglian Archaeology 175, Norwich (1986).

Gudea, Nicolae, "Ceramica", in Eugen Chirilă (ed.), *Castrul roman de la Buciumi*, Cluj (1972).

Gudea, Nicolae, Pop, Ioan, *Castrul roman de la Risnoc Cumidava*, Brasov (1971).

Hall, Mark, "Whose Game Is It Anyway? Board and Dice Games as an Example of Cultural Transfer and Hybridity",

in Véronique Dasen, Ulrich Schädler (eds), *Dossier Jouer dans l'Antiquité. Identité et multiculturalité, Archimède*, 6 (2019), 199–212.

Hall, Mark, Forsyth, Katherine. "Roman Rules? The Introduction of Board Games to Britain and Ireland", *Antiquity* 85 (2011), 1325–1338.

Haynes, Ian, *Blood of the Provinces: The Roman Auxilia and the Making of Provincial Society from Augustus to the Severans*, Oxford (2013).

Holbrook, Neil, Bidwell, Paul, *Roman Finds from Exeter*, Exeter Archaeological Reports 4, Exeter (1991).

Ignatiadou, Despina, "Luxury Board Games for the Northern Greek Elite", in Véronique Dasen, Ulrich Schädler (eds), *Dossier Jouer dans l'Antiquité. Identité et multiculturalité, Archimède*, 6 (2019), 144–159.

Jankovic, Marko, "Rimske igre na table u Singidunumu i okolini", *Godišnjak grada Beograda*, 50-51 (2009), 55–68.

Jeremic, Gordana, *Saldum: Roman and Early Byzantine Fortification,* Cahiers des Portes de Fer Monographies 6, Belgrade (2009).

Karakitsou, Elena, "Games in the Parthenon", *The Acropolis Restoration News,* 9 (2009), 23–25.

Knuth, Donald E., Moore, Ronald W., "An Analysis of Alpha-Beta Pruning", *Artificial Intelligence*, 6 (1975), 293–326.

Kocsis, Levente, Szepesvári, Csaba, "Bandit Based Monte-Carlo Planning", in Johannes Fürnkranz, Tobias Scheffer, Myra Spiliopoulou (eds), *Machine Learning: ECML 2006*, Vol. 4212 of Lecture Notes in Computer Science, Berlin (2006), 282–293.

Korf, Richard E., "Depth-first iterative-deepening: An optimal admissible tree search", *Artificial Intelligence*, 27 (1985), 97–109.

Krüger, Thomas, *Das Brett- und Würfelspiel der Spätlatènezeit und römischen Kaiserzeit im freien Germanien,* Hildesheim (1982).

Lane, Edward, *An Account of the Manners and Customs of the Modern Egyptians*, London (1836).

Linnaeus, Carolus, *Iter Lapponicum*, Stockholm (1732).

Llanos Ortiz de Landaluze, Armando, "Tableros de juego en el patrimonio arqueológico de Álava", *Estudios de Arqueología Alavesa*, 19 (2002), 191–196.

Malaby, Thomas, *Gambling Life: Dealing in Contingency in a Greek City*, Urbana (2003).

Manderscheid, Hubertus, Carboni, Francesca, Bruno, Matthias, "Tabulae lusoriae nel mondo romano: Il tavoliere dei muratori di Villa Adriana, tabulae dalle Terme di Traiano a Roma e da Leptis Magna", *Archeologia Classica*, 62 (2011), 513–535.

Marin, G., "Somali Games", *Journal of the Royal Anthropological Institute of Great Britain and Ireland*, 61 (1931): 499–511.

Martin, Geoffrey, *The Sacred Animal Necropolis at North Saqqara: The Southern Dependencies of the Main Temple Complex*, London (1981).

Matelly, Marie-Angès, "Les petits objets", in Hélène Cuvigny (ed), *La route de Myos Hormos: L'armée romaine dans le désert Oriental d'Égypte*, Institut Français d'Archéologie Orientale 48/II, Cairo (2003), 589–617.

Matthes, Benjamin, *Makassaarsch-Hollandsch Woordenboek*, Amsterdam (1859).

Matthes, Benjamin, *Boegineesch-Hollandsch Woordenboek*, Amsterdam (1874).

May, Roland. *Jouer dans l'Antiquité*, Marseille (1991).

Michaelis, Adolf, "Terrakottagruppe aus Athen", *Archäologischer Anzeiger*, 13 (1863), 37–43.

Mosca, Fabio, Puppo, Paola, "Riflessioni su dadi e giochi da tavolo nel mondo Romano", *Histria Antiqua,* 21 (2012), 271–280.

Mulvin, Lynda, Sidebotham, Steven, "Roman Game Boards from Abu Sha'ar (Red Sea Coast, Egypt)", *Antiquity,* 78 (2004), 602–617.

Murray, Harold, *A History of Chess,* London (1913).

Murray, Harold, *A History of Board-Games other than Chess*, Oxford (1951).

Pace, Alesssandro, "*Miles ludens*: il gioco e i soldati nella Britannia romana", in Claudia Lambrugo, Fabrizio Slavazzi, Anna Maria Fedeli (eds), *I materiali della Collezione Archeologica "Giulio Sambon" di Milano*, 1. *Tra* alea *e* agòn: *giochi di abilità e azzardo*, Materia e Arte 1, Firenze (2015), 43-49

Pace, Alesssandro, "Playing with Batavians. Game as educational tool for a *romano more vivere*", *Archimède,* 7 (2020), 317-326.

Pace, Alesssandro, "Play at being Romans. *Ludus* e omologazione culturale nei contesti militari del mondo romano", in Raimon Graells i Fabregat, Alessandro Pace, Miguel F. Pérez Blasco (eds), *Warrios@Play*, Proceedings of the International Congress held at the Museum of History and Archaeology of Elche, 28th May 2021, Alacant (2022), 155-167.

Parlett, David, *The Oxford History of Board Games,* Oxford (1999).

Parlett, David, "What's a Ludeme?" *Game Puzzle Design* 2 (2016), 83–86.

Penn, Tim, Courts, Summer. "Playing Games at Vindolanda", https://www.vindolanda.com/blog/playing-games-at-vindolanda (n.d.).

Pérez Losada, Fermin, "Una pieza epigrafica excepcional procedente de Noville (Mugardos, A Coruña, Galicia", *II Congreso Peninsular de História Antiga, Actas*, Coimbra (1993), 1049–1066.

Petrie, Flinders, *Objects of Daily Use*, London (1927).

Philip, Brian, *Excavation of the Roman Forts of the Classis Britannica Dover 1970–1977.* Kent Monograph Series 3, Dover (1981).

Piette, Éric, Stephenson, Matthew, Soemers, Dennis J. N. J., Browne, Cameron. "General Board Game Concepts", *2021 IEEE Conference on Games (CoG 2021)*, (2021), 1-8.

doi: 10.1109/CoG52621.2021.9618990.

Robertson, Anne. *Birrens (Blatobulgium)*. Edinburgh (1975).

Rodrigo Requena, Esther, Romaní Sala, Núria. "Una tabula lusoria hallada en el castellum republicano de Puig Castellar de Biosca en Lleida, Catalunya (180–120 a. C.)", *Archivo Español de Arqueología*, 94 (2021), 1–12.

Rose, Pamela, *Qasr Ibrim: The Hinterland Survey*. Excavation Memoirs 62, London, (1996).

Schädler, Ulrich, "Latrunculi—ein verlorenes strategisches Brettspiel der Römer", *Homo Ludens: Der spielende Mensch*, 4 (1994), 47–67.

Schädler, Ulrich, "XII Scripta, Alea, Tabula—New Evidence for the Roman History of 'Backgammon'", in Alex de Voogt (ed), *New Approaches to Board Games Research: Asian Origins and Future Perspectives*, Leiden (1995), 73–98.

Schädler, Ulrich, "Latrunculi: A Forgotten Roman Game of Strategy Reconstructed", *Abstract Games* 7 (2001), 10–11.

Schädler, Ulrich, "The Doctor's Game—New Light on the History of Ancient Board Games," in Philip Crummy *et al.* (eds), *Stanway: An Elite Burial Site at Camulodunum,* Britannia Monograph Series 24, London (2007), 359–375.

Schulte, Michael, ""Board Games of the Vikings—From Hnefatafl to Chess", *Maal og Minne,* 2 (2017), 1–42.

Schulz, Walther, *Leuna: Ein germanischer Bestattungsplatz der spätrömischen Kaiserzeit*, Berlin (1953).

Staneková, Zuzana, "Stolové hry v staroveku. Archeologické doklady zo severozápadného slovenska", *Zborník Slovenského Národného Múzea v Martine*, 15 (2020), 48–67.

Stephenson, Matthew, Crist, Walter, Browne, Cameron, "Digital Ludeme Project Database Guide," unpublished manuscript (2020).

Stern, Ian, "Game Boards," in Ian Stern *et al.* (eds), *Excavations at Maresha Subterranean Complex 169: Final Report Seasons 2000–2016*, Annual of the Hebrew Union College 11, Jerusalem (2019), 127–131.

Villa Valdés, Angel, "Descripción de estructuras defensivas e trazado urbano no castro do Chao de San Martín (Grandas de Salime, Asturias)", *Boletin do Museo Provincial de Lugo*, 9 (2000), 367–419.

Villa Valdés, Angel, "Grabados zoomorfos sobre pizarra y otros epígrafes inéditos en castros asturianos", *Sautuola*, 16–17 (2010–2012), 97–112.

AUTHORS

Marie-Lys Arnette
Johns Hopkins University
marnett3@jhu.edu

Chiara Bianchi
Université de Fribourg
chiara.bianchi@unifr.ch

Cameron Browne
Department of Advanced Computing Sciences, Maastricht University, Maastricht, the Netherlands
cambolbro@googlemail.com

Angelos Chaniotis
Professor, Institute for Advanced Study, Princeton University
achaniotis@ias.edu

Summer Courts
University of Reading
s.l.courts@pgr.reading.ac.uk

Walter Crist
Centre for the Arts in Society, Leiden University, Leiden, the Netherlands
wcrist@asu.edu

Luca Dal Monte
Università degli Studi di Milano
luca.dalmonte@unimi.it

Véronique Dasen
Université de Fribourg, ERC Locus Ludi
veronique.dasen@unifr.ch

Francesca Diosono
Ludwig-Maximilians-Universität München
francescadiosono@virgilio.it

Regine Fellmann Brogli
Kantonsarchäologie Aargau
Industriestrasse 3
5200 Brugg
regine.fellmann@ag.ch

Katherine Forsyth
University of Glasgow
Katherine.Forsyth@glasgow.ac.uk

Raimon Graells i Fabregat
Profesor – Investigador (RyC)
Universitat d'Alacant
Dept. Prehistoria, Arqueología, Hª. Antigua, Fª. Griega y Fª. Latina
Ed. Filosofia i Lletres III
Carretera de San Vicente del Raspeig s/n
E-03690 San Vicente del Raspeig
orcid.org/0000-0002-9057-7510
raimon.graells@ua.es

Federica Grossi
Università degli Studi di Milano
federica.grossi84@gmail.com

Mark A. Hall
Perth Museum & Stirling University, Scotland
marcvsjantonivs@gmail.com

Natasha Harlow
Honorary Research Fellow,
University of Nottingham, UK
natasha.harlow@nottingham.ac.uk

Loredana Lancini
UCLouvain (INCAL-CEMA) and CReAAH (UMR 6566-Le Mans Université)
lencini loredana.lancini@univ-lemans.fr

Yves Manniez
Montpellier, UMR 5140
yves.manniez2@gmail.com

Frances McIntosh
Newcastle University
Frances.McIntosh@newcastle.ac.uk

Alessandro Pace
Université de Fribourg, ERC Locus Ludi
Università degli Studi di Milano
alessandro.pace@unimi.it

Tim Penn
University of Reading
timothy.penn@classics.ox.ac.uk

Miguel F. Pérez Blasco
Director
Museo Arqueológico y de Historia de Elche
"Alejandro Ramos Folqués" (MAHE)
mperezblasco@elche.es

Éric Piette
ICTEAM, UCLouvain, Louvain-la-Neuve, Belgium
eric.piette@uclouvain.be

Ben Russell
Professor of the Archaeology of the Roman Empire,
University of Edinburgh
ben.russell@ed.ac.uk

Ulrich Schädler
Université de Fribourg, ERC Locus Ludi
schaedler.u@bluewin.ch

Dennis J. N. J. Soemers
Department of Advanced Computing Sciences,
Maastricht University, Maastricht, the Netherlands
dennis.soemers@maastrichtuniversity.nl

Matthew Stephenson
College of Science and Engineering, Flinders University, Adelaide, Australia
matthew.stephenson@flinders.ed.au

Ian Stern
Zinman Institute of Archaeology
University of Haifa
iann.stern@gmail.com

Peter Talloen
Bilkent University – Ankara
peter.talloen@bilkent.edu.tr

Ilaria Truzzi
Università degli Studi di Milano
ilaria.tru@gmail.com

Andrew Wilson
Professor of the Archaeology of the Roman Empire,
University of Oxford,
andrew.wilson@arch.ox.ac.uk

RÉSUMÉS / ABSTRACTS

Marie-Lys Arnette

A Community of players. Board games at Deir el-Medina (Egypt)

Le village de Deir el-Médina, dans la région de Louqsor, abritait les travailleurs et les artistes qui œuvrèrent à l'élaboration des tombes des toutes proches Vallée des Rois et Vallée des Reines, sous le Nouvel Empire égyptien. Le village comme les tombes qui le bordent, fouillés de longue date, ont livré un important matériel archéologique ainsi que des textes et des images, qui éclairent les pratiques ludiques des habitants et des habitantes de Deir el-Médina. L'article propose non seulement une synthèse de la documentation déjà connue, mais présente aussi un vaste corpus archéologique resté inédit – prélude à la publication d'un ouvrage entièrement dédié aux jeux de plateau à Deir el-Medina (Ifao).

Mots clés: astragales, Deir el-Médina, jeu de vingt cases, pions, plateau de jeu, scène de jeu, *senet*

The village of Deir el-Medina, in the Luxor region, was home to the craftsmen and artists who worked on the tombs of the nearby Valley of the Kings and Valley of the Queens during the Egyptian New Kingdom. The village and its surrounding tombs have long been excavated, yielding a wealth of archaeological material, texts and images that shed light on the playful practices of Deir el-Medina's inhabitants. The article offers a synthesis of previously known documentation, and also presents a vast corpus of unpublished archaeological objects – as a prelude to the publication of a book entirely dedicated to board games at Deir el-Medina (Ifao).

Keywords: astragals, Deir el-Médina, game board, game of twenty squares, game scene; pawns; *senet*

Ian Stern

Game boards from Hellenistic Period Maresha: predicting the future or simply passing the time?

Recent excavations at Maresha have uncovered 16 stone fragments identifiable as portable game boards. The ancient city of Maresha, located in the Judean foothills 22 miles (c. 35 km) east of Ashkelon and 25 miles (c. 40 km) southwest of Jerusalem was a thriving city in the Hellenistic period. The city was abandoned following the conquest by the Hasmonean king, John Hyrcanus I in ca. 112/111 BCE providing a terminus ante quem for all the game boards. The fragmentary nature and poor state of preservation of most of these portable boards limits us to only tentative identification of the specific games. However, many of the game boards were discovered in contexts that contained astragals, pessoi, shell counters, as well as divination material. Games in antiquity are understood to have been both a means of entertainment as well as a tangible medium through which to communicate with the gods. This paper will discuss the numerous game boards and other "gaming" items discovered at Maresha and suggest their possible functions within the different contexts they were unearthed.

Keywords: counters, divination, knucklebones, *latrunculi*, Maresha, *pente grammai*, *petteia*

Les fouilles récentes de Maresha ont mis au jour 16 fragments de pierre identifiables comme des plateaux de jeu mobiles. L'ancienne ville de Maresha, située dans les contreforts de Judée c. 35 km à l'est d'Ashkelon et c. 40 km au sud-ouest de Jérusalem était une ville prospère à la période hellénistique. La ville a été abandonnée après sa conquête par le roi hasmonéen, Jean Hyrcan I^{er} vers 112/111 avant J.-C. fournissant le *terminus ante quem* de tous les plateaux de jeu. La nature fragmentaire et le mauvais état de conservation de la plupart de ces plateaux limitent l'identification provisoire de jeux spécifiques. Cependant, beaucoup de plateaux de jeu ont été découverts dans des contextes contenant des osselets, des jetons, des coquillages ainsi que du matériel de divination. Dans l'Antiquité, les jeux étaient à la fois un moyen de divertissement et de communiquer avec les dieux. Cet article abordera les nombreux plateaux de jeu et autres objets « ludiques » découverts à Maresha et suggérera leurs fonctions possibles selon leurs différents contextes de découverte.

Mots-clés : divination, *latrunculi*, Maresha, *pente grammai,* pions, osselets, *petteia*

Walter Crist, Éric Piette, Dennis J. N. J. Soemers, Matthew Stephenson & Cameron Browne

Computational approaches for recognising and reconstructing ancient games: the case of ludus latrunculorum

The study of games in the ancient world has long been hindered by the loss of rules because they were rarely written down. The Digital Ludeme Project aims to apply computational methods to the available evidence for games throughout history to expand the scope of how games can be studied. This involves a two-pronged approach based on documenting evidence of known game rules in specific times and places, and simulation of candidate rule sets borrowed from similar games to calculate gameplay metrics. As an example, this methodology is applied to the Roman game Ludus Latrunculorum, which involves the relatively uncommon custodial capture rule. Adapting documented rule sets featuring this rule and applying them to known Roman era boards, various game metrics are examined to engage with how computational methods can shed light on potential rule differences or preference in game experience. Finally, future applications and improvements of our methodology are discussed.

Keywords: artificial intelligence, board games, computational methods, *ludus latrunculorum*, Roman empire,

L'étude des jeux du monde antique a été longtemps entravée par la perte de leurs règles car elles étaient rarement écrites. Le Digital Ludeme Project vise à appliquer des techniques algorithmiques sur les témoignages historiques disponibles afin d'élargir le champ d'études des jeux. Notre approche est en deux volets, basée d'un côté sur les témoignages concernant les règles connues dans différents lieux et moments historiques, et de l'autre sur la simulation d'ensembles de règles potentielles empruntées à des jeux similaires pour calculer des métriques de jouabilité. À titre d'exemple, cette méthodologie est appliquée au jeu romain Ludus Latrunculorum (le jeu des Latroncules) en appliquant la règle relativement peu fréquente de capture. En adaptant l'ensemble des règles attestées avec ce principe et en les appliquant à des plateaux connus de l'époque romaine, diverses métriques de jouabilité sont examinées pour déterminer comment des méthodes algorithmiques aider à saisir les différences potentielles de règles ou les préférences dans l'expérience de jeu. Enfin, des applications futures et des améliorations de notre méthodologie sont discutées.

Mots-clés: algorithmique, empire Romain, intelligence artificielle, jeu de plateaux, *ludus latrunculorum*

Luca Dal Monte

Su alcune tavole lusorie dai Fori Imperiali

This paper focuses on some gaming boards preserved in the area of the Imperial Forums of Rome, in particular from the Forum of Augustus, the Forum of Caesar, the Forum of Trajan and the complex of the Markets of Trajan. These examples of *tabulae lusoriae* (so often called) are carved on the pavement remains of porticoes and squares, on the paving stones of streets and on some marble blocks reused as thresholds or steps. The gaming bords are decontextualised and probably represent only a part of the original *corpus*, but are nonetheless very significant as they offer a very heterogeneous typological and topographical picture, which allows us to acquire interesting data on the type of use of the most monumental area of Rome in Late Antiquity.

Keywords: gaming boards, ancient types of games, Imperial Forums, Late Antiquity.

Cet article se concentre sur une série de plateaux de jeux conservés dans la zone des Forums impériaux de Rome, en particulier sur le Forum d'Auguste, le Forum de César, le Forum de Trajan et le complexe des Marchés de Trajan. Ces exemples de *tabulae lusoriae* sont gravés sur le pavement de portiques et de places, sur les pavés des rues et sur certains blocs de marbre réutilisés comme seuils ou marches. Les jeux sont décontextualisés et ne représentent probablement qu'une partie du corpus original, mais sont néanmoins très significatifs car ils offrent une image typologique et topographique très hétérogène qui nous permet d'acquérir des données intéressantes sur le type d'utilisation de la zone la plus monumentale de Rome dans l'Antiquité tardive.

Mots-clés : antiquité tardive, forums impériaux, *ludus latrunculorum* marchés de Trajan, marelle, plateaux de jeu

Peter Talloen

Games and gaming in southwestern Asia Minor

Gaming is a well-attested social activity in the region of Southwestern Asia Minor, as could be established on the basis of game boards that were carved into the stone surfaces of four well-documented urban centres. These testimonies of sociability are found at all major public venues of these cities, identifying gaming as an important part of urban daily life. Different types of board games could be identified in this region, generally representing games that are known throughout the Mediterranean world during the Roman Imperial period. They add to the characterization of Southwestern Asia Minor as part of the vast cultural zone created under Rome. Having said that, some regional specifics could be pointed out as well. While the rules of the game and configurations of the boards remain largely

unchanged, certain aspects of board games can be sensitive to their socio-cultural environment. Especially the materiality of the *Alea* game boards, in the sense of their monumental form, stands out. It illustrates the different reception the concept of a game could undergo, in response to cultural traditions.

Keywords: *alea,* Asia Minor, *duodecim scripta*, *ludus latrunculorum*, game boards, materiality, Roman Imperial period, *pente grammai*, public space,

Le jeu est une activité sociale bien attestée dans la région du sud-ouest de l'Asie Mineure, comme cela a pu être établi sur la base de plateaux de jeu gravés sur les surfaces de sol en pierre de quatre centres urbains bien documentés. Ces témoignages de sociabilité se retrouvent dans tous les grands lieux publics de ces villes, identifiant le jeu comme une part importante de la vie quotidienne urbaine. Différents types de jeux de société ont pu être identifiés dans cette région, des jeux généralement connus dans tout le monde méditerranéen à l'époque impériale romaine. Ils ajoutent à la caractérisation du sud-ouest de l'Asie Mineure comme partie de la vaste zone culturelle créée sous l'empire romain. Certaines spécificités régionales pourraient également être soulignées. Si les règles du jeu et les configurations des plateaux restent largement inchangées, certains aspects des jeux de société peuvent être sensibles à leur environnement socioculturel. La matérialité des plateaux de jeu d'*Alea* se démarque par leur forme monumentale. Cette diversité illustre la réception différente du concept de jeu selon les traditions culturelles.

Mots-clés: *alea,* Asie Mineure, espace public, *duodecim scripta*, *ludus latrunculorum*, plateaux de jeu, matérialité, *pente grammai*, période impériale romaine

Ben Russell, Angelos Chaniotis & Andrew Wilson

Gaming in the Place of Palms at Aphrodisias

The Place of Palms at Aphrodisias contains the highest concentration of gameboards identified to date at any Roman site. Following years of careful study, the extensive corpus of informal inscriptions from this complex, roughly half of which are gameboards, has been documented, mapped, and analysed. In this contribution we introduce the Place of Palms and explain its remarkable archaeology and architecture, and what we now know of its development over more than six centuries. We then turn to the mass of gameboards inscribed on the marble surfaces within this complex, and what their distribution, the range of game types represented, and the texts and decoration that accompany them reveal about the use of this space and the chronology of gaming within it.

Keywords: *alea*, Aphrodisias, Asia Minor, boardgames, graffiti, *duodecim scripta*, mancala, *pente grammai*

La place des Palmiers à Aphrodisias contient la plus forte concentration de plateaux de jeu identifiés à ce jour sur un site romain. Après des années d'études approfondies, le vaste corpus d'inscriptions informelles de ce complexe, dont environ la moitié sont des plateaux de jeu, a été documenté, cartographié et analysé. Dans cette contribution, nous présentons la Place des Palmiers et expliquons son archéologie et son architecture remarquables, et ce que nous savons maintenant de son développement sur plus de six siècles. Nous nous tournons ensuite vers la masse de plateaux de jeu inscrits sur les surfaces de marbre de ce complexe, et sur ce que leur répartition, leur variété, ainsi que les textes et le décor associés aux jeux gravés révèlent sur l'utilisation de cet espace et la chronologie du jeu.

Mots-clés: *alea*, Aphrodisias, Asie Mineure, graffiti, *duodecim scripta* mancala, *pente grammai*

Ulrich Schädler

Roman, Byzantine, and Medieval Games in Ephesus: preliminary survey results

In this chapter the author presents preliminary results of a survey on Roman, Byzantine, Arabic or Turkish games found at Ephesus in Western Asia Minor. The survey was conducted during two campaigns in 2007 and 2008 to document pavement signs and gaming tables. During this fieldwork, more than 300 game boards and other floor markings were documented. The survey encompassed two archaeological sites: the area of the Graeco-Roman town on the one hand and the Ayasoluk hill on the other. The main questions considered in this chapter are: which of the pavement signs and markings were used for playing games? Which were the games played in these public spaces? Is there a difference between the games played in the Graeco-Roman town and in the Byzantine and later settlement on the Ayasoluk? The author presented some of the aspects discussed here in numerous papers given on various occasions during the last 15 years, but these ideas and data are presented here in print for the first time.

Keywords: Alquerque, Ayasoluk, board games, Ephesus, *duodecim scripta*, marbles, Seega, St. John, Tâb, topos marker, wheel pattern

Dans ce chapitre, l'auteur présente les résultats préliminaires d'une enquête sur les jeux romains, byzantins, arabes ou turcs trouvés à Éphèse en Asie Mineure occidentale. L'enquête a été menée pendant deux campagnes en 2007 et 2008 pour documenter les panneaux de trottoir et les tables de jeu. Au cours

de ce travail sur le terrain, plus de 300 plateaux de jeu et autres marquages au sol ont été documentés. L'étude a porté sur deux sites archéologiques : la zone de la ville gréco-romaine d'une part et la colline d'Ayasoluk d'autre part. Les principales questions abordées dans ce chapitre sont les suivantes : quels panneaux et marquages ont été utilisés pour jouer à des jeux ? Quels étaient les jeux joués dans ces espaces publics ? Y a-t-il une différence entre les jeux joués dans la ville gréco-romaine et dans la colonie byzantine et plus tard sur l'Ayasoluk? L'auteur a présenté certains des aspects discutés ici dans de nombreux articles donnés à diverses occasions au cours des 15 dernières années, mais ces idées et données sont présentées ici en version imprimée pour la première fois.

Mots-clés : Alquerque, Ayasoluk, billes, Ephesus, *duodecim scripta*, motif de roue, plateaux de jeu, Seega, St. John, Tâb, topos marker

Ulrich Schädler & Mark A. Hall

Europe's playful frontiers: Roman board games in the Barbaricum, from Britain and across the Rhine and Danube lands

Through this contribution, the authors seek to explore the presence, meanings and values of board games along the edges of the Roman Empire in central and NW Europe, spanning Britain to the Danubian Provinces and also in the successor states as the Western Empire collapsed and Rome's centre of gravity moved fully to Constantinople. The paper draws together evidence from sites across the various frontier zones, including Clickimin in the Orkneys, Stanway in England, Vimose and Brøndsager in Denmark and Poprad in Slovakia as well as the well-known sites in Germany (Leuna, Gommern, Neudorf-Bornstein, Heiligenhafen etc.) and Poland (Pielgrzymono, Zgliczyn Pobodzy, Zakrzów etc.). The purpose is to explore the ways board games moved across the frontier, the cultural interactions they were part of (military, diplomatic, trade and exchange) and ideas around the innovations indigenous communities are imagined having made to these games. Thus, the coverage will include how some of these games may consequently have changed, and in several cases 'returned' to their Roman roots with population movements through the second half of the first millennium AD, including the Langobards, the Alemanni, the Vikings and the Normans.

Keywords: Barbaricum, Britannia, Danube, dice, magic, Rhine, Roman board games, supernatural,

Par cette contribution, les auteurs cherchent à explorer la présence, les significations et les valeurs des jeux de société le long des frontières de l'Empire romain en Europe centrale et nord-ouest, Il s'étend de la Grande-Bretagne aux provinces danubiennes et aussi dans les États successeurs lorsque l'Empire occidental s'effondre et que le centre de gravité de Rome se déplace entièrement vers Constantinople. L'article rassemble des preuves provenant de sites situés dans les différentes zones frontalières, notamment Clickimin dans les Orcades, Stanway en Angleterre, Vimose et Brøndsager au Danemark et Poprad en Slovaquie, ainsi que des sites bien connus en Allemagne (Leuna, Gommern, Neudorf-Bornstein, Heiligenhafen, etc.) et la Pologne (Pielgrzymono, Zgliczyn Pobodzy, Zakrzów, etc.). L'objectif est d'explorer les façons dont les jeux de société se sont déplacés à travers la frontière, les interactions culturelles auxquelles ils ont participé (militaires, diplomatiques, commerce et échanges) et les idées autour des innovations que les communautés autochtones imaginent avoir apportées à ces jeux. Ainsi, la couverture inclura la façon dont certains de ces jeux peuvent avoir changé par conséquent, et dans plusieurs cas «sont retournés» à leurs racines romaines avec des mouvements de population au cours de la seconde moitié du premier millénaire après J.-C., y compris les Langobards, les Alemans, les Vikings et les Normands.

Mots-clés: Barbaricum, Britannia, Danube, dés, magie, plateaux de jeu Romains, Rhin, surnaturel

Raimon Graells i Fabregat & Miguel F. Pérez Blasco

The Iberians played too

This contribution aims to highlight a neglected aspect of the daily life of the Iberians. Our contribution has considered only a part of these games, those of hazard and strategy played with tokens, dice and astragali. A brief contribution that shows how the Iberians played both the games that were practised throughout the Mediterranean and different local variants.

Keywords: élite, bone astragals, glass counters, ivory dice, mercenaries.

Cette contribution entend mettre en évidence un aspect négligé de la vie quotidienne des Ibères. Notre contribution s'intéresse à une sélection de jeux, ceux de hasard et de stratégie joués avec des pions, des dés et osselets. L'objectif est de montrer comment les Ibères ont pratiqué à la fois les jeux répandus dans toute la Méditerranée et différentes variantes locales.

Mots-clés: billes, dés en ivoire, élite, mercenaires, osselets en os, péninsule ibérique, pions en verre

Ilaria Truzzi

The gaming material from Empúries, Catalunya

Empuriés was founded as a commercial entrepôt in the 6th century BCE by Phocaeans of Massalia. It became a permanent and rich city thanks to

its strategic location for Mediterranean trade, continuing its existence during the Roman conquest of Iberia down until the early Roman Empire, and reaching its zenith during the 1st century CE when acquired the title of *Municipium Emporiae*. Now the site is called Empuriés which refers in Catalan to the two cities — the Greek one and the Roman one. Excavations have found gaming material in both cities. The research presented in this article focuses on the astragals from the Greek cemeteries and on the counters and the dice from the Roman city, where there also seems to be a complete set of gaming counters. Most of the finds can be interpreted as material for *Latrunculi* or *XII Scripta*. There is also a series of *tesserae lusoriae*. The large quantity and rich variety of game materials found here so far provide us with important information about the history of games and entertainment among the inhabitants of this site.

Keywords: Empúries, Greek astragals, *duodecim scripta, ludus latrunculorum* Roman counters, Roman dice, *tesserae lusoriae*

Empurias a été fondée comme entrepôt commercial au VI^e^ siècle avant J.-C. par les Phocéens de Marseille. Elle est devenue une cité prospère grâce à son emplacement stratégique pour le commerce méditerranéen, continuant son existence pendant la conquête romaine de l'Ibérie jusqu'au début de l'Empire romain, et atteint son apogée au cours du I^er^ siècle de notre ère lorsqu'elle obtient le statut de *Municipium Emporiae*. Le nom actuel du site, Empuriés, fait référence en catalan aux deux villes, grecque et romaine. Des fouilles ont livré du matériel de jeu dans les deux villes. La recherche présentée dans cet article se concentre sur les osselets des nécropoles grecques et sur les dés, pions ou jetons de la ville romaine ; nous analyserons aussi ce qui semble constituer un ensemble complet de pions de jeux. La plupart des découvertes peuvent être interprétées comme du matériel pour le *Ludus latrunculorum* ou *XII Scripta*. Il y a aussi une série de *tesserae lusoriae*. La grande quantité et la riche variété de matériel de jeu trouvé ici jusqu'à présent nous fournissent des informations importantes sur l'histoire des jeux et du divertissement parmi les habitants de ce site.

Mots-clés: dés romains, Empúries, *duodecim scripta, ludus latrunculorum*, osselets grecs, pions romains, *tesserae lusoriae*

Yves Manniez

Le mobilier de jeu antique dans l'habitat de la cité de Nîmes

Cette étude, basée sur un corpus de 880 objets issus des fouilles menées sur le territoire de l'ancienne cité de Nîmes, ces 50 dernières années, donne une vision réaliste, car basée essentiellement sur des données de fouilles, de ce qui composait le mobilier ludique dans l'Antiquité dans cette région de l'Empire romain. Si elle révèle le caractère répétitif des grandes catégories et la rareté des jouets, la prise en compte d'un grand nombre d'éléments trouvés en contexte nous permet de préciser la date d'apparition de certains artefacts, de mettre en lumière des différences notables entre les pratiques ludiques rurales et urbaines et de percevoir une évolution dans l'apparition des différents types de jeu.

Mots-clés : Antiquité, astragales, dés, habitat, jetons, Nîmes, pions

This study, based on a corpus of 880 objects from excavations carried out in the territory of the ancient city of Nîmes over the last 50 years, gives a realistic view, based essentially on excavation data, of what made up the play furniture in Antiquity in this region of the Roman Empire. Although it reveals the repetitive nature of the main categories and the rarity of toys, the consideration of a large number of elements found in context allows us to specify the date of appearance of certain artefacts, to highlight notable differences between rural and urban play practices and to perceive an evolution in the appearance of different types of play.

Keywords : Anitquity, astragals, dice, counters, habitat, Nîmes, token

Natasha Harlow

Wrote for luck? Unofficial literacies and gaming counters from Roman Britain

Lathe-turned bone gaming counters are ubiquitous finds on Roman sites across the northwest provinces. Many examples have Latin numerals, letters and other symbols scratched onto their surfaces, suggesting that local variants of well-known board games were being played, or that counters were used for other practices, such as accountancy or divination. This paper examines the range of different markings on game pieces, with examples from Romano-British sites including *civitas* capitals and forts, and how they relate to the spread of literacy and numeracy in the provinces and the democratisation of these practices in everyday life. The use of magical or apotropaic scripts is also well-attested in the Roman provinces and the influence of the gods may have been invoked in games of chance. Gaming can be a subversive practice, enabling varied groups to mingle and providing opportunities to invert the social order. Were people in Roman Britain appropriating key skills such as writing and numeracy, more usually applied in official circumstances of tax collecting and administration, for these purposes? Such unofficial literacies may have allowed subject populations to integrate with, and perhaps influence, the occupying forces.

Keywords: gaming counters, Roman Britain, inscriptions, graffiti

Les jetons en os tournés au tour sont des trouvailles omniprésentes sur les sites romains des provinces du nord-ouest. De nombreux exemples ont des chiffres latins, des lettres et d'autres symboles gravés sur leurs surfaces, suggérant que des variantes locales de jeux de société bien connus étaient jouées, ou que des jetons étaient utilisés pour d'autres pratiques, telles que la comptabilité ou la divination. Cet article examine la variété des différentes marques sur ce type de pièces de jeu en se basant sur des exemples de sites romano-britanniques, y compris les cités et les forts militaires. Quel lien peut-il être établi avec la diffusion de l'alphabétisation et de la numératie dans les provinces et leur démocratisation dans la vie quotidienne ? L'utilisation d'écritures magiques ou apotropaïques est également bien attestée dans les provinces romaines et des puissances divines sont parfois invoquées dans les jeux de hasard. Le jeu peut être aussi une pratique subversive, permettant à des groupes variés de se mêler en offrant l'opportunité d'inverser l'ordre social. Les habitants de la Grande-Bretagne romaine se sont-ils appropriés grâce au jeu des compétences clés telles que l'écriture et le calcul, utilisées généralement pour la collecte et l'administration des impôts ? Ces alphabétisations non officielles ont peut-être permis aux populations soumises de s'intégrer, et peut-être aussi dd'agir sur les forces d'occupation romaines.

Mots-clés: alphabétisation, *Britannia*, graffiti, inscriptions, pions

Frances McIntosh

Casino at Coria? Evidence for gaming at Roman Corbridge

Coria was a fort and a town for over 350 years on the north-western edge of the Roman Empire. There are over 380 circular discs cut down from Samian vessels at the site, along with over 100 of other ceramic fabrics. This paper looks at the context (if known) of these items alongside other gaming paraphernalia from the site to consider what this can tell us about gaming, and the production of the material required for playing games at this site.

Keywords; Corbridge, *Coria,* counters, Hadrian's Wall, Samian,

Coria a été un fort et une ville pendant plus de 350 ans à la limite nord-ouest de l'Empire romain. Plus de 380 disques circulaires découpés dans des récipients samiens ont été retrouvés sur le site, ainsi que plus de 100 autres productions céramiques. Cet article analyse le contexte de trouvaille de ces artefacts ainsi que d'autres accessoires de jeu du site en examinant l'apport de leur témoignage sur les pratiques ludiques et le mode de production du matériel nécessaire pour jouer à des jeux sur ce site.

Mots-clés: Corbridge, *Coria*, mur d'Hadrien, pions, Samian, jetons

Mark A. Hall & Katherine Forsyth

On pegged gaming pieces (with particular reference to a Late Celtic set from Lough Sewdy, Ireland)

The use of pegged gaming pieces and reciprocally holed gaming boards is attested from at least as early as the Middle Kingdom of Ancient Egypt. They re-surface in Egypt in Early Medieval/Coptic times. They seem not to have been common in the Roman period either in Italy or much of the Empire (including Egypt) but are possibly linked with the Celtic-speaking provinces in France and Britain and also in Ireland. This use continues in post-Roman times, when textual and archaeological evidence combines to suggest renewed interest in pegged gaming sets among Celtic-speaking and Scandinavian elites. Having laid out this historical context, we combine archaeological and literary evidence to explore the nature and significance of pegged gaming pieces, with a particular focus on the previously unpublished set of Late Celtic, gilt-copper-alloy and bone pegged pieces, recovered through metal-detecting at Lough Sewdy, Ireland. The paper will put this set in the particular context of the facility of such sharply pointed pieces to become weapons, both during play and away from the board.

Key words: Ancient board games, *fidchell*, *hnefatafl, hounds and jackals***,** *fifty-eight holes*, *the Coptic board game/the game of thirty points*, pegged pieces, peg-boards

L'utilisation de pièces de jeu chevillées et de plateaux de jeu à trous est attestée au moins dès le Moyen Empire de l'Égypte ancienne. Ils réapparaissent en Égypte au début du Moyen Âge/époque copte. Ils ne semblent pas avoir été répandus à la période romaine, ni en Italie ni dans une grande partie de l'Empire (y compris l'Égypte), mais sont probablement liés aux provinces de langue celtique en France et en Grande-Bretagne ainsi qu'en Irlande. Cette utilisation se poursuit à l'époque post-romaine, lorsque les preuves textuelles et archéologiques se combinent pour suggérer un intérêt renouvelé pour les jeux des élites celtiques et scandinaves. Après avoir exposé ce contexte historique, nous combinons des témoignages archéologiques et littéraires pour explorer la nature et la signification des pièces de jeu, avec un accent particulier sur l'ensemble inédit de pièces celtiques tardives en alliage de cuivre doré et en os récupéré par la détection de métal à Lough Sewdy (Irlande). Le document mettra cet ensemble dans le contexte particulier de la facilité de ces pièces pointues à devenir des armes, à la fois pendant le jeu et loin de la carte.

Mots-clés: Egypte copte, fidchell, hnefatafl, Irlande, le jeu de plateau copte/jeu de trente points, jeu des cinquante-huit trous, jeu des chiens et chacals, pions en cheville, plateaux de jeu

Regine Fellmann Brogli

Spielen in Vindonissa. Spielsteine und Würfel im militärischen Kontext

Les jetons de jeu et les dés sont bien attestés parmi les découvertes de *Vindonissa* (Windisch, canton d'Argovie, CH), un camp légionnaire entouré d'une agglomération civile datant du 1er siècle. ap. J.-C. Plus de 800 jetons de jeu et plus de 80 dés sont actuellement enregistrés dans la base de données archéologique du service archéologique cantonal d'Argovie. La longue histoire des recherches et l'histoire complexe de la structure bâtie de *Vindonissa* ne facilitent pas l'interprétation de la répartition des jetons et des dés. Sur la base de quatre dépôts et d'une sélection de jetons et de dés publiées, la question est discutée dans quelle mesure la répartition des objets permet de tirer des conclusions sur les lieux de jeu possibles à l'intérieur et à l'extérieur du camp et si on peut dire quelque chose sur l'identité des joueurs.

Mots-clés: agglomération civile, camp légionnaire, dépôt de jetons de jeu, dés, jetons, *Vindonissa*

Gaming pieces and dices are well documented within the finds from *Vindonissa* (Windisch, Canton Aargau, CH), a legionary fortress with a surrounding civil settlement of the 1st century A.D. Over 800 tokens and more than 80 dice are currently recorded in the archaeological database of the Kantonsarchäologie Aargau. The long history of research and the complex structural development of *Vindonissa* make it rather difficult to interpret the distribution of the gaming pieces and dice. Based on four deposits and a selection of published gaming pieces and dice, the question is discussed, what conclusion on possible playing zones may be drawn based on the distribution of finds inside and outside the legionary fortress and if we can say something about who was playing.

Keywords: civil settlement, deposit of gaming pieces, dice, gaming piece, legionary fortress, tokens, *Vindonissa*

Chiara Bianchi

Oggetti per il gioco di epoca romana: rinvenimenti in contesti archeologici in Lombardia

This contribution aims to carry out a critical review of the existing documentation on some objects related to board games (dice, counters, tokens) found in the territory of the current region Lombardy.

The contexts of discovery are presented by geographical areas corresponding to the cities that have returned evidence, such as *Mediolanum*, *Brixia*, *Cremona*, *Ticinum*, as well as some sites in extra-urban territories, such as in the case of the provinces of Brescia and Pavia.

In a chapter devoted to the critical analysis of the documentation, data on contexts are discussed in more detail, distinguishing between finds from necropolis (cremation and burial tombs) and those from urban areas designated for residence or worship (domus, rustic buildings, sanctuaries).

Keywords: dice, counters, tokens, Roman period, Lombardy, bone, ivory, glass

Cette contribution examine la documentation relative aux objets liés aux jeux de société (dés, pions, jetons) trouvés sur le territoire de la Lombardie actuelle.

Les contextes de découverte sont présentés par zones géographiques correspondant aux villes qui ont livré du matériel, telles que *Mediolanum*, *Brixia*, *Cremona*, *Ticinum*, ainsi que certains sites dans des territoires extra-urbains, comme dans le cas des provinces de Brescia et Pavie.

Dans un chapitre consacré à l'analyse critique de la documentation, les données sur les contextes sont discutées plus en détail, en distinguant les découvertes de nécropoles (crémation et sépultures) et celles des zones urbaines désignées pour résidence ou culte (*domus*, bâtiments rustiques, sanctuaires).

Mots-clés: dés, époque romaine, jetons, ivoire, Lombardie, os, pions, verre

Alessandro Pace

Les jeux de Pompéi. Réflexions sur la culture matérielle ludique de la ville romaine

We know that many different typologies of gaming tools were used in the Roman time, but for the modern scholars it is quite impossible to understand how the most part of them were really employed in the ludic activities.

Normally, counters, marbles and various typologies of so-called '*tesserae*' are founded in the tombs, but the data from Pompeii allow us to have new perspectives on the ludic habits of the daily-life in a Roman city of the first imperial age.

This new insight into the Pompeian game culture show how the modern categories aren't efficient enough to understand the complexity and the fluidty of the ludic habits of the ancient inhabitants.

Keywords : dice, glass counters, knucklebones, Pompeii, tokens

Nous savons que de nombreuses typologies différentes de jeux ont été utilisées à l'époque romaine, mais pour les chercheurs modernes, il est tout à fait impossible de comprendre comment la

plupart d'entre eux étaient réellement utilisés dans les activités ludiques.

Normalement, des pions, des billes et diverses typologies de '*tesserae*' sont fondés dans les tombes, mais les données de Pompéi nous permettent d'avoir de nouvelles perspectives sur les habitudes ludiques de la vie quotidienne dans une ville romaine du premier âge impérial.

Ce nouvel aperçu de la culture des jeux de Pompée montre comment les catégories modernes ne sont pas assez efficaces pour comprendre la complexité et la fluidité des habitudes ludiques des anciens habitants.

Mots-clés : astragales, dés, pions en verre, Pompéi, tokens

Tim Penn

Did people play games in the countryside of Roman Italy?

Existing scholarship on gaming often assumes that board games were primarily played in towns under the Roman empire and textual sources leave us in no doubt that game-playing was an important part of the urban experience. But it is also important to consider the extent to which games were played in the countryside. This contribution seeks to set the agenda for future research into playing and games in Roman rural settings by interrogating the urban-centric biases of literary sources. It juxtaposes the town-centric view provided by the textual tradition with the archaeological evidence from selected rural sites of different types across Roman Italy. This approach provides new insights into play and leisure in non-urban contexts.

Key words: *alea*, boardgames, countryside,Roman Italy, *duodecim scripta*, *ludus latrunculorum* merels, necropolis, Rome

Les études sur le jeu partent souvent du principe que les jeux de société étaient principalement joués dans les villes de l'Empire romain. Cette hypothèse est soutenue par les sources textuelles qui ne laissent aucun doute sur l'importance du jeu en contexte urbain. Il est également important de chercher dans quelle mesure les jeux ont été pratiqués à la campagne. Cette contribution vise à ouvrir les pistes de recherches futures sur les jeux en milieux ruraux romains en s'écartant des sources littéraires. Il compare la vue centrée sur la ville fournie par la tradition textuelle avec les preuves archéologiques de sites ruraux de différents types en Italie romaine. Cette approche fournit de nouvelles perspectives sur le jeu et les loisirs dans des contextes non urbains.

Mots-clés: *alea*, campagne, Italie romaine, *duodecim scripta*, *ludus latrunculorum* marelle, necropolis, plateaux de jeu

Francesca Diosono, Federica Grossi and Loredana Lancini

Ritual offerings or divination tools? Objects for play from the Roman Republican sanctuary of Diana in Nemi

Recent research conducted at the sanctuary of Diana at Nemi entailed both fieldwork and a re-examination of finds from earlier excavations in the area. Diana protects women (especially in childbirth), slaves, children, and young people in times of status transition. Offerings of objects of play or human representations bearing toys in the sanctuary space should be viewed as relating to the latter, as is usual in other sanctuaries in ancient *Latium*. Among the thousands of objects found in Nemi, the objects of this type are relatively few, while real toys for small children are altogether absent. Figurines of dedicatees carrying games and children with animals are rare: it is also not clear whether they are simply replicas of widespread moulds or have a particular meaning. Depictions of children are also uncommon, though there is one statuette of a nursing mother. The games we have at the sanctuary of Nemi are above all counters and astragals, and their analysis within the context of the sanctuary provides new insights for the study of these items. Our working hypothesis is that there was a possible relationship between astragals (and maybe other gaming-related objects) and activities related to predicting the future in the sanctuary at Nemi (i.e. cleromancy). This contribution therefore explores the complexity of the data, aiming to analyse the materials found in the sanctuary of Diana *Nemorensis*.

Keywords: astragals, cleromancy, counters, Latium, Nemi, oracle, Roman Republican period

Les recherches récentes dans le sanctuaire de Diane à Nemi se sont concentrées à la fois sur le travail de terrain et sur un réexamen des matériaux des fouilles archéologiques plus anciennes. Une des sphères de compétences de la déesse Diane était la protection des femmes (en particulier dans l'adolescence), des esclaves, des enfants et des jeunes pendant la phase de transition d'un statut à un autre. Demander cette protection pouvait être la raison d'offrir des jouets dont témoignent les représentations de dédicants dans plusieurs sanctuaires du Latium. Toutefois, malgré le rôle de transition et de passage de Diane, peu d'objets de ce type ont été retrouvés dans son sanctuaire à Nemi ni aucun jouet de petit enfant. Presque absentes sont aussi les représentations de dédicants avec un jouet ou d'enfant avec des animaux et il nous échappe également s'il s'agissait des répliques de célèbres moules ou s'ils avaient une signification particulière. Seule une statuette représente une mère qui allaite. Le matériel ludique retrouvé dans le sanctuaire est composé en majorité de pions et osselets dont la présence en contexte religieux ouvre de nouvelles perspectives d'étude. Nous proposons l'hypothèse d'une relation possible

des osselets (et peut-être des autres objets ludiques) avec des activités oraculaires de cléromantique dans le sanctuaire de Nemi. Au travers d'une approche envisageant la complexité des données, nous allons dans cette recherche présenter une interprétation inédite des objets ludiques retrouvés dans le sanctuaire de Diana *Nemorensis*.

Mots-clés: cléromancie, époque romaine républicaine, Latium, Nemi, oracle, osselets, pions