

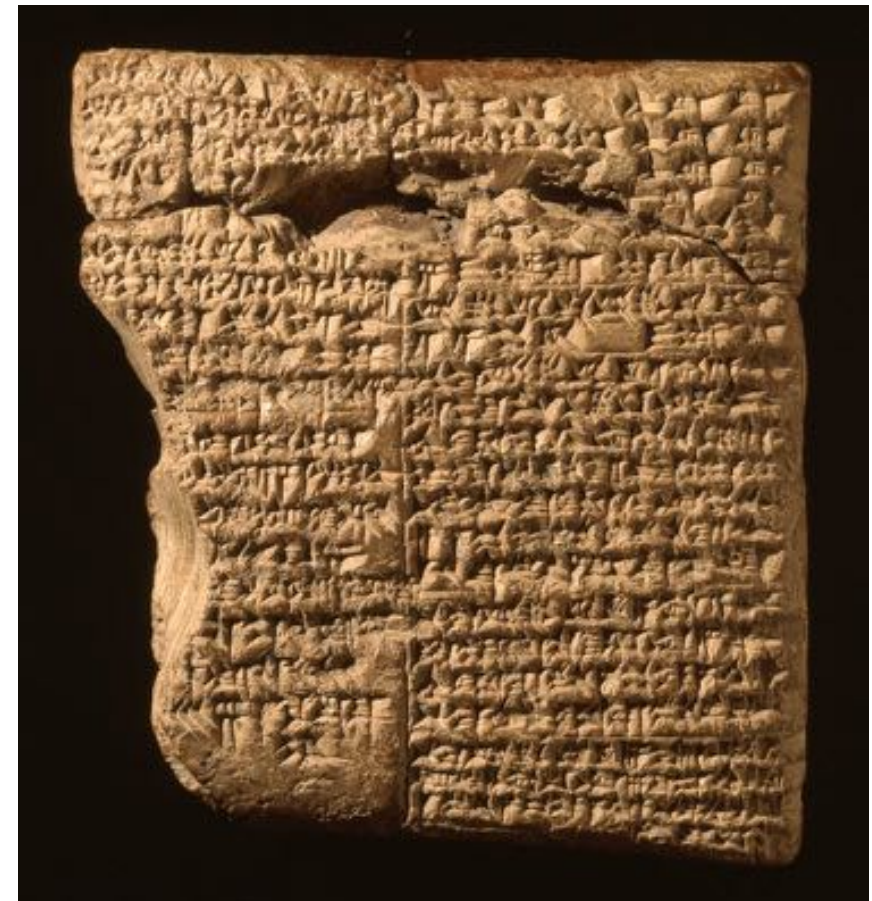
Playing in the Past: Using Archaeological Data for Ancient Game Reconstruction

Walter Crist
Maastricht University
October 9, 2019



Games In Human History

- ~5000 years of documented history of games (maybe ~9000 years)
- Games are found worldwide, among all types of societies
- Most people did not write down rule sets!
- Archaeological evidence provides clues
- Reconstruction of ancient games has been a subjective endeavor



Seleucid Game Rules text, British Museum. 177 BCE. BM 33333

Games in Anthropology and Archaeology

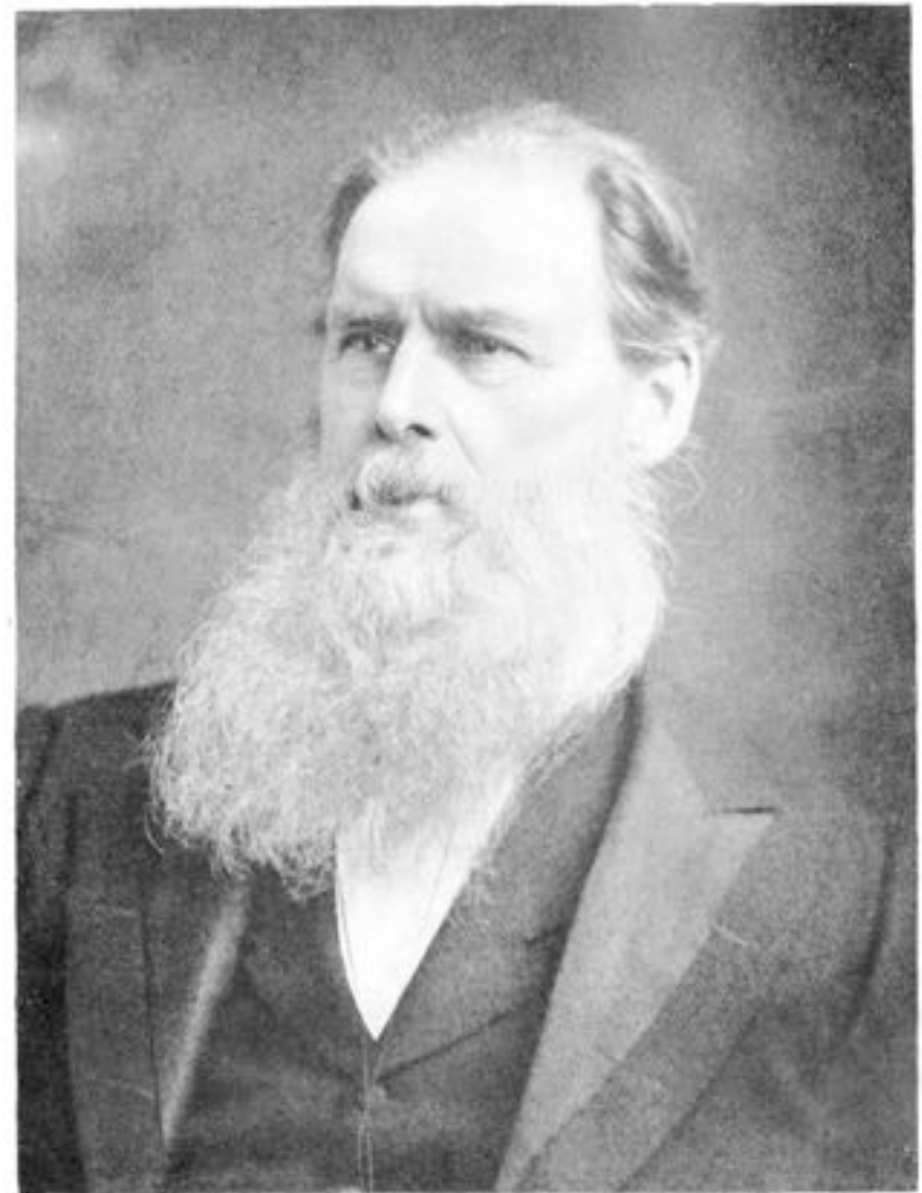
- Documentation of rules
- Attempts to trace origins
- Cultural diffusion



Patolli, Mexico



Pacheesi, India



E.B. Tylor, 1832–1917

Archaeology and Games

- New approaches in archaeology favor scientific techniques and emphasis on social processes
- Lack of evidence
- Lack of anthropological theory
- De-emphasis of cultural diffusion
- Little work done, except for culturally-specific research



**Tomb of Tut'ankhamun,
Photograph: Harry Burton,
1922**

Games in Bronze Age Cyprus (2500–1050 BCE)



Mehen

Senet

Site	Number	Kissonerga Skalia	6	Paramali Pharkonia	3	Lemba Lakkous	1
Sotira Kaminoudhia	63	Kition Kathari	5	Anoyira Ayios Ioannis	2	Magounda Kokkinokampos	1
Marki Alonia	44	Kouklia Marcello	5	Erimi Pitharka	2	Marion	1
Episkopi Phaneromeni	42	Maa Palaeokastro	5	Kalavassos Malouteri	2	Marki Kappara	1
Politiko Troullia	40	Maroni Tsaroukkas	5	Morphou Toumba tou Skourou	2	Maroni Kapsaloudhia	1
Evdhimou Beyouk Tarla	26	Amathus	4	Politiko Tamassos	2	Paramali Mandra tou Poppou	1
Episkopi Bamboula	21	Anoyira Livadhia	4	Pyla Kokkinokremos	2	Phlamoudhi Vounari	1
Anoyira Peralijithias	19	Erimi Kafkalla	4	Bellapais Vounous	1	Politiko Lambertis	1
Erimi Laonin tou Porakou	15	Evdhimou Alatoni	4	Dheneia Kafkalla	1	Psematismenos Trelloukas	1
Evdhimou Stympouli	9	Hala Sultan Tekke	4	Dromolaxia Trypes	1	Sarama Aishetou	1
Alambra Mouttes	8	Paramali Lochos	4	Evdhimou Ambelovounos	1	Sterakovou	1
Aredhiou Vouppes	8	Enkomi Agios Iakovos	3	Kalavassos Arkangelos	1	Tokhni Oriti North	1
Kouklia Skales	8	Evdhimou Shilles	3	Kalavassos Laroumena	1	Marki Pappara	1
Maroni Vournes	8	Kalavasos Ayios Dhimitrios	3	Kition Terra Umbra	1	TOTAL	405

Bronze Age Cyprus

Periods	Phase/Culture	Dates
Chalcolithic	Late Chalcolithic	2700–2500/2400 BCE
Prehistoric Bronze Age 1	Philia Phase	2400/2350–2250 BCE
	Early Bronze Age I–II	2250–2000 BCE
Prehistoric Bronze Age 2	Early Bronze Age III–Middle Bronze Age II	2000–1750/1700 BCE
Protohistoric Bronze Age 1	Middle Bronze Age III–Late Bronze Age I	1700–1450 BCE
Protohistoric Bronze Age 2	Late Bronze Age IIA– IIC (early)	1450–1300 BCE
Protohistoric Bronze Age 3	Late Bronze Age IIC (late)–IIIA	1300–1125/1100 BCE
Early Iron Age	Late Bronze Age IIIB	1125/1100–1050 BCE

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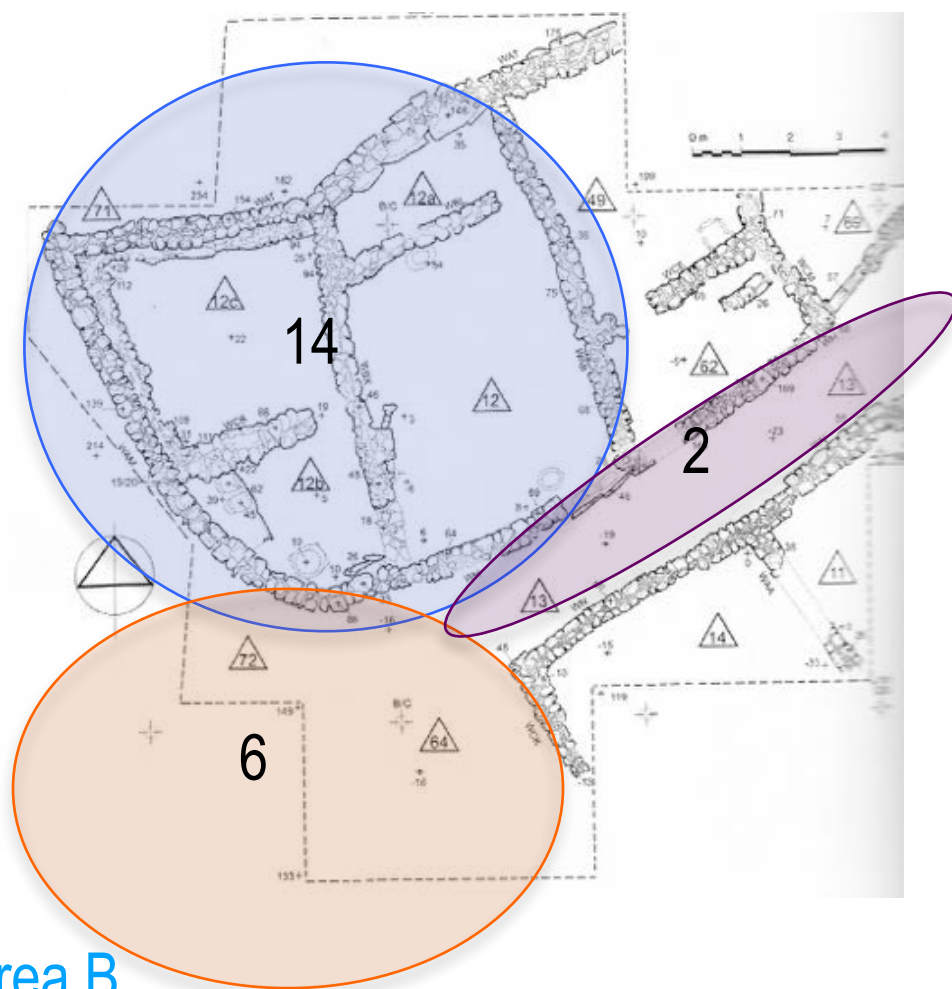
Major Sites on Cyprus that have Produced Games



Methodology

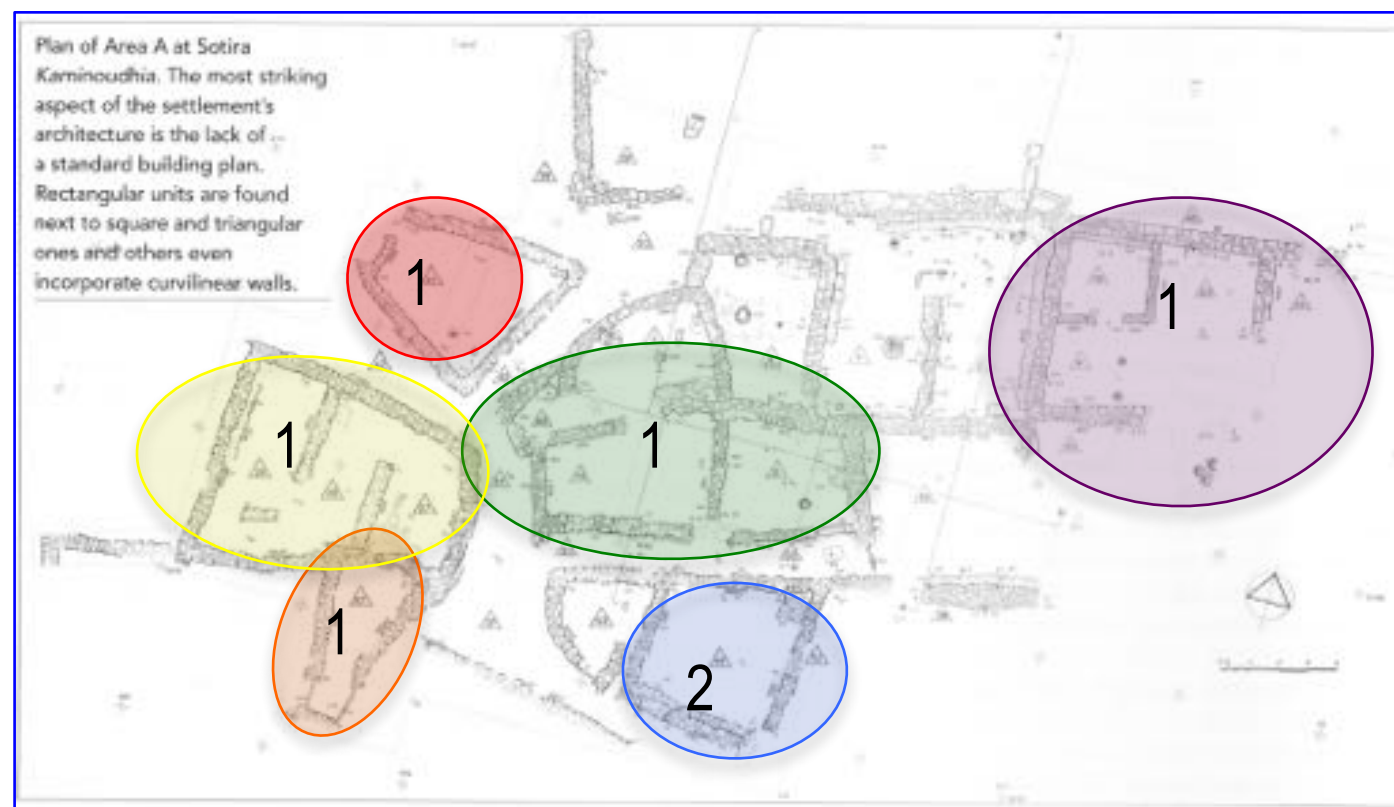
- Compile catalog of Cypriot games
 - Identification, measurement, and description
- Determine spaces in which games were played
 - Measuring weight
- Determine what other activities occurred alongside games
 - Compilation of contextual data
- Determine regional and chronological differences in gaming practices
 - Correspondence Analysis



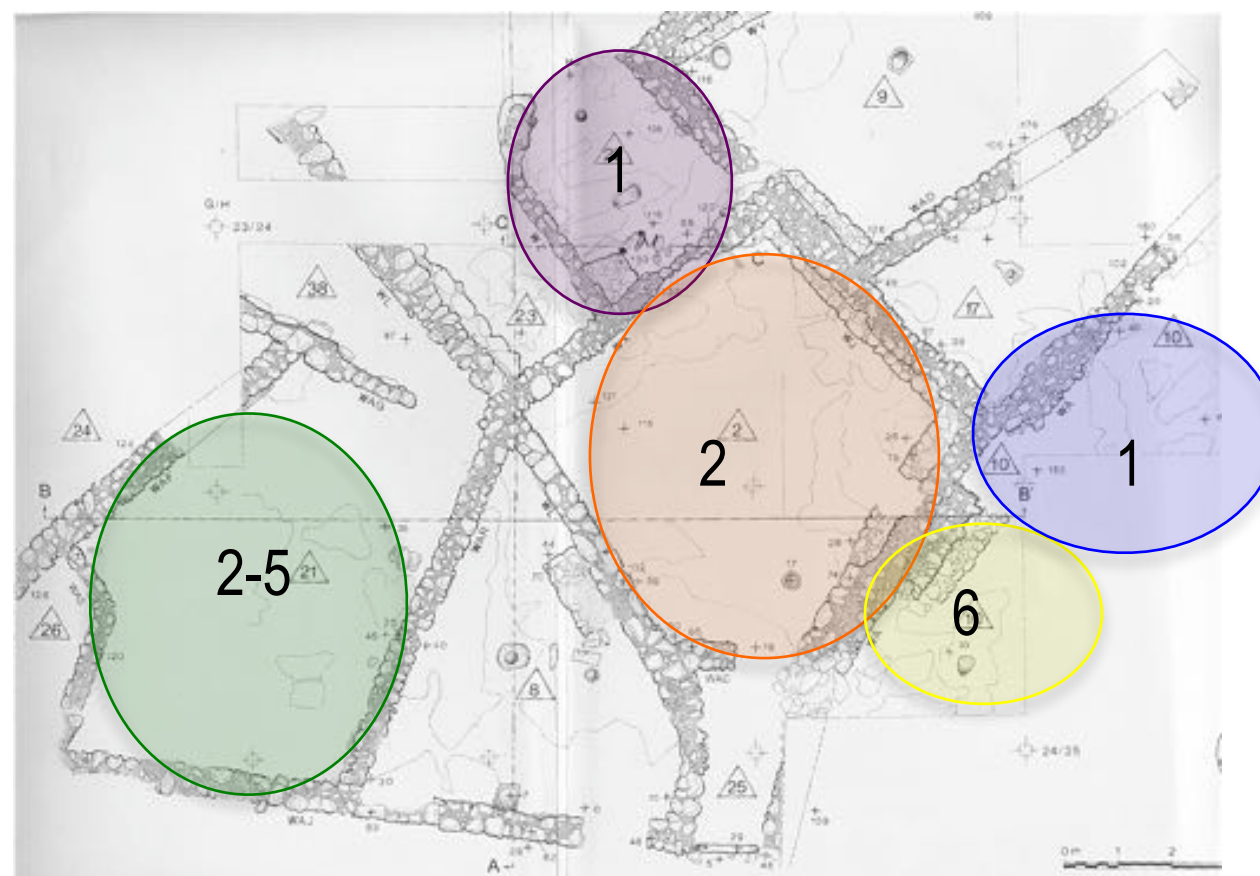


Area B

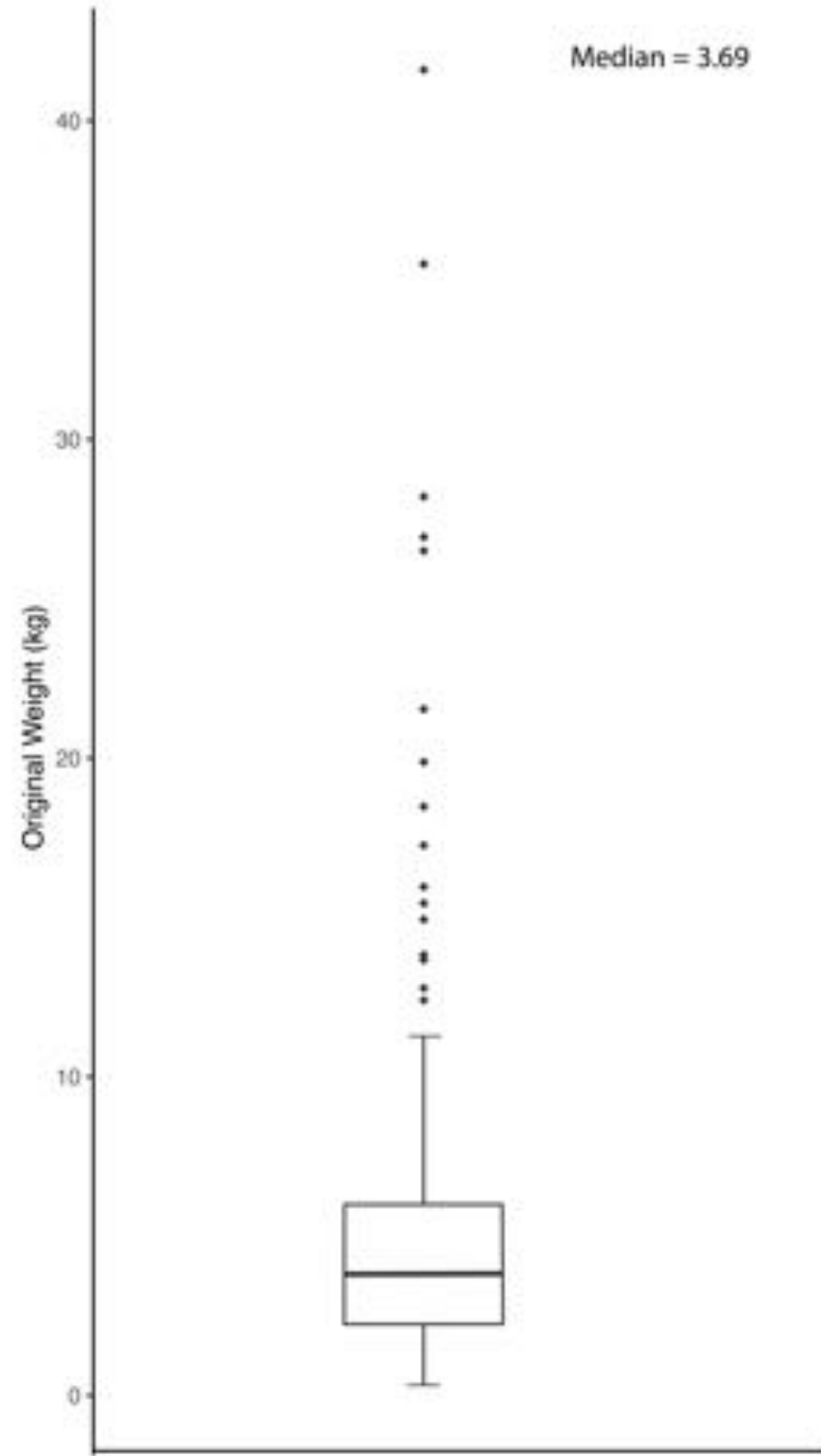
Sotira *Kaminoudhia*: Clusters of games in unroofed areas, areas interpreted as communal spaces



Area A



Area C



Gaming Spaces

Space	Game(s)	Heavy/fixed/cluster	Open air/roofed
Sotira <i>Kaminoudhia</i> Unit 12 Complex		heavy (S1086), cluster	open-air
-Unit 12	<i>Senet</i> : S325, S424, S467, S991, S1085, S1086 Double-sided <i>mehen/senet</i> : S425, S1084		
-Unit 12a	Double-sided <i>senet/mehen</i> : S7		
-Unit 12c	<i>Senet</i> : S851, S859, S887, S888, S958		
Sotira <i>Kaminoudhia</i> Unit 10	<i>Senet</i> : S77, S78, S80, S102, S109, S114, S234, S727,	cluster	roofed
Episkopi <i>Phaneromeni</i> Unit 13	<i>Senet</i> : S21, S137, S138	heavy (S138), cluster	partially roofed?
Sotira <i>Kaminoudhia</i> Unit 21	<i>Senet</i> : S546, S613	cluster	open-air
Sotira <i>Kaminoudhia</i> Unit 2	<i>Senet</i> : S71, S72	cluster	open-air
Marki <i>Alonia</i> Unit LXV, G-1	<i>Mehen</i> : S150	heavy	open-air
Sotira <i>Kaminoudhia</i> Unit 4	<i>Senet</i> : S163	heavy	open-air
Alambra <i>Mouttes</i> Rooms 3/7	<i>Senet</i> : B310	fixed	roofed
Marki <i>Alonia</i> Unit CIII, H-1	<i>Senet</i> : S521	fixed	roofed
Maa <i>Palaeokastro</i> Areas 76/96	<i>Senet</i> : I	fixed	transitional
Maa <i>Palaeokastro</i> Areas 77/88	<i>Senet</i> : II	fixed	transitional

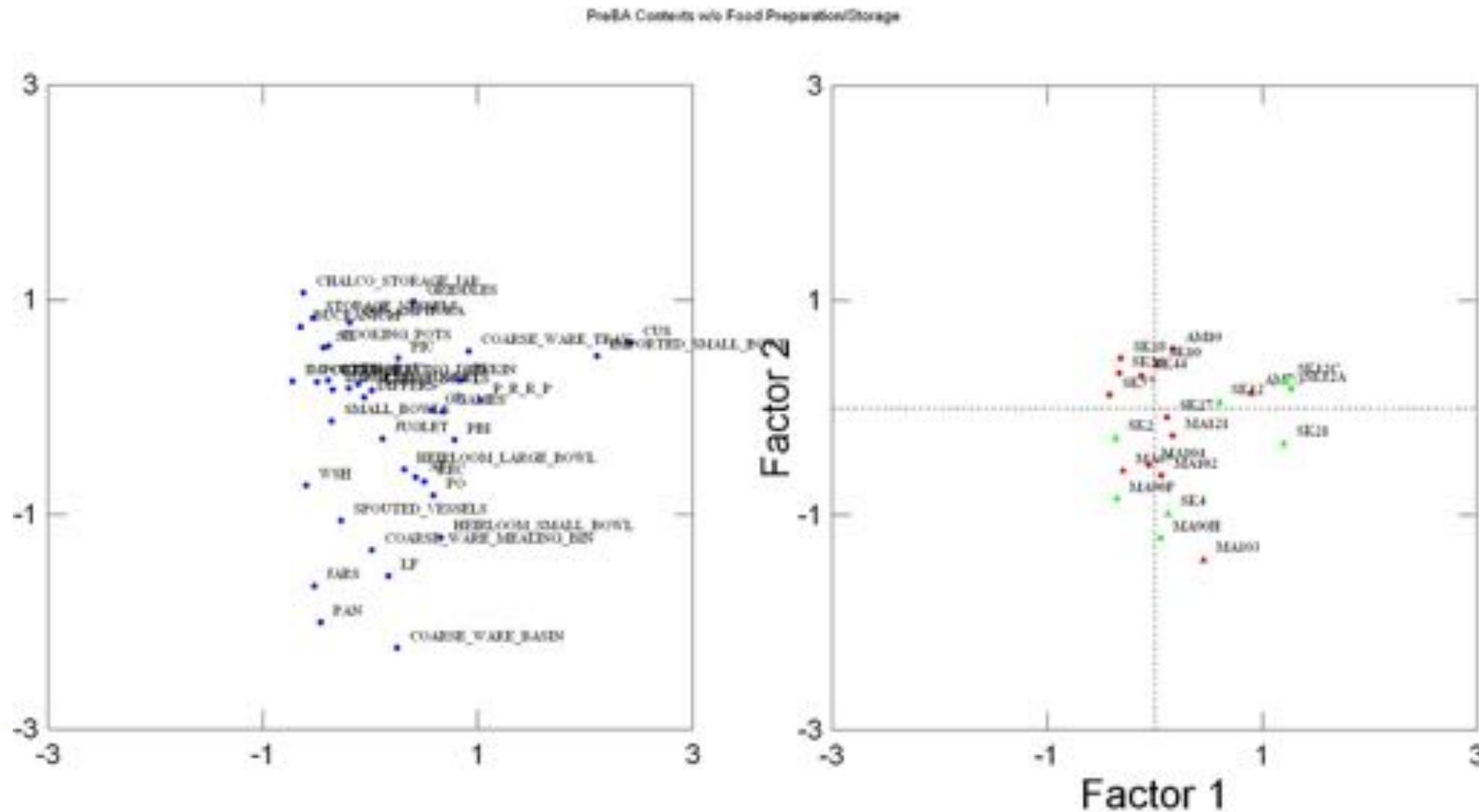
Contextual Data

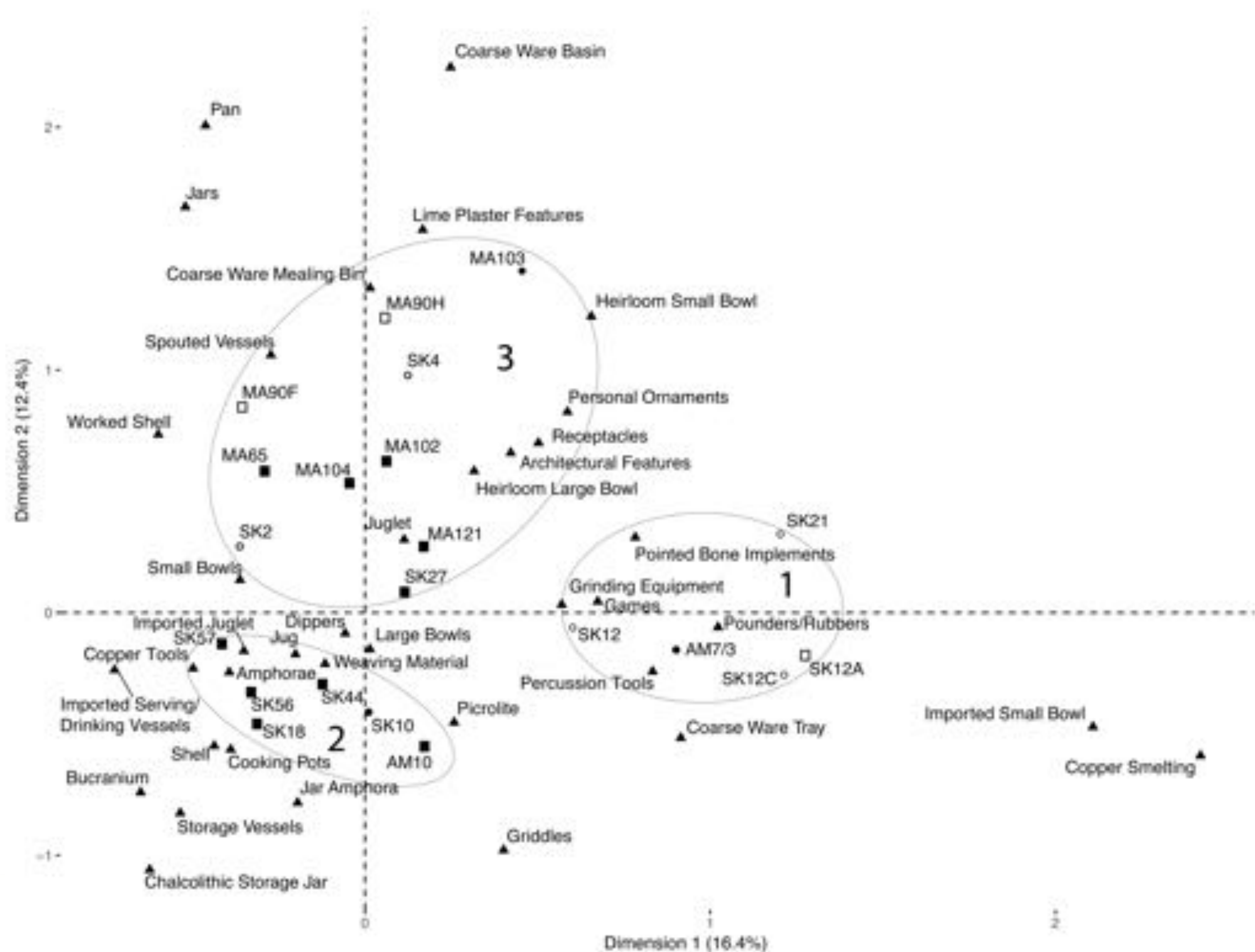
- PreBA Sites: *Alambra Mouttes*, *Marki Alonia*, *Sotira Kaminoudhia*
- ProBA Sites: *Episkopi Phaneromeni*, *Maa Palaeokastro*, *Maroni Tsaroukkas*, *Morphou Toumba tou Skourou*

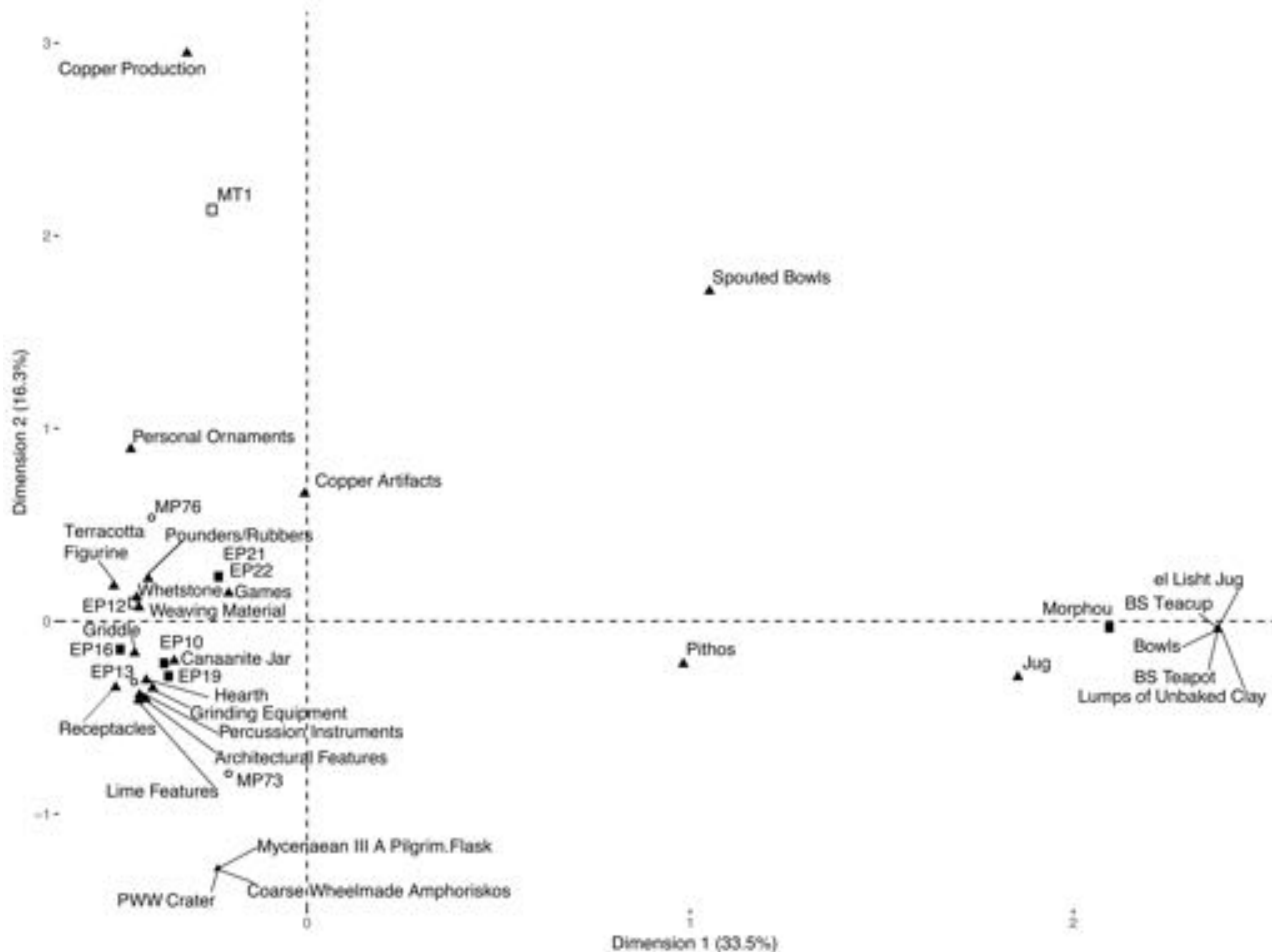


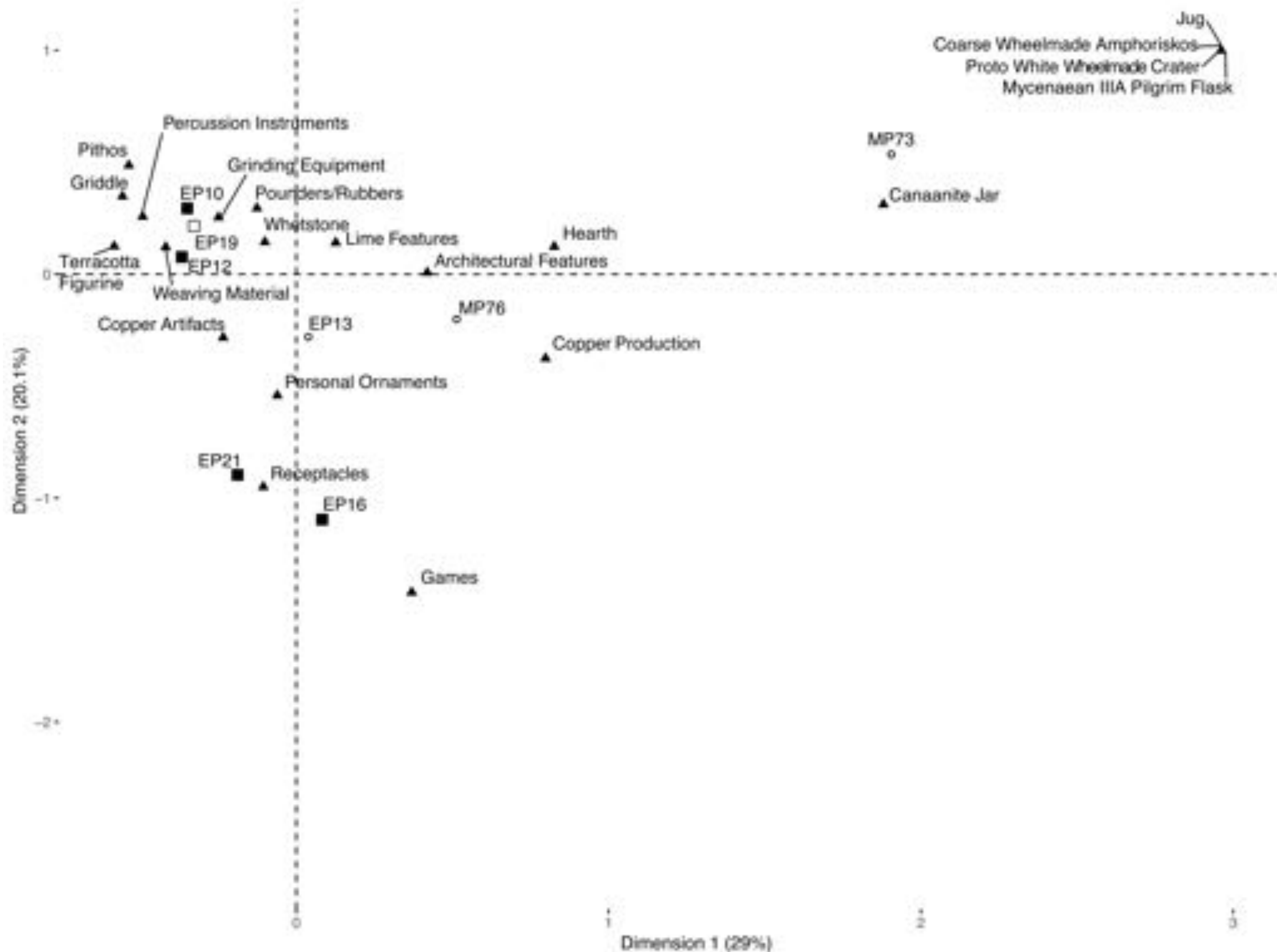
Correspondence Analysis (CA)

- Multivariate statistical technique for categorical data
- PreBA and ProBA analyzed separately









Changing Context of Game Playing

- Small-Scale Society: Play in more intimate settings; emphasis on building relationships
- Complex Society: Play in public; emphasis on performance of play



20 Squares game, Enkomi, 13th century BCE



10-Ring Game, Episkopi *Bamboula*, 13–12 century BCE

Rebooting Old Goals: The Digital Ludeme Project

- 5 year ERC funded research project
- Using the available historical evidence, use Artificial Intelligence to:
 - **Model** and preserve the knowledge of games from the past
 - **Reconstruct** missing knowledge
 - **Map** transmission of games



How is this different?

- Evidence-based
- Reconstructions provide new lines of evidence, previously inaccessible
- Scientific and quantitative in approach
- Critically evaluates games reconstructions for historical accuracy



**Royal Game of Ur, British Museum,
c. 2600 BCE**

1000 “Most Important” Games

- What does “important” mean?
- Criteria include:
 - Documented in some form
 - Can be given a geographic location and time range
 - Were not commercially invented for sale
 - Involve more than just chance
 - Exceptions for historically significant games: Snakes and Ladders, Game of the Goose
- Includes board, card, and domino games



XII scripta board from Laodicea, Turkey



Liubo set from China, 1st century BCE–
1st century CE

Ludemic Game Description

- “Ludeme”: game “meme”
- Much simpler than the industry standard game programming language (Game Description Language)
- Human readable: more closely reflects the ways humans conceptualize games

```
(tiling square)
```

```
(size 3 3)
```

```
(board  
  (tiling square)  
  (shape square)  
  (size 3 3)  
)
```

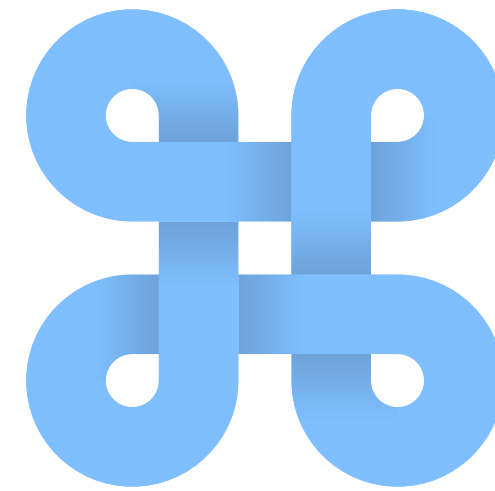
Game Description Language

```
(role white) (role black)
(init (cell 1 1 b)) (init (cell 1 2 b)) (init (cell 1 3 b))
(init (cell 2 1 b)) (init (cell 2 2 b)) (init (cell 2 3 b))
(init (cell 3 1 b)) (init (cell 3 2 b)) (init (cell 3 3 b))
(init (control white))
(<= (legal ?w (mark ?x ?y)) (true (cell ?x ?y b))
    (true (control ?w)))
(<= (legal white noop) (true (control black)))
(<= (legal black noop) (true (control white)))
(<= (next (cell ?m ?n x)) (does white (mark ?m ?n))
    (true (cell ?m ?n b)))
(<= (next (cell ?m ?n o)) (does black (mark ?m ?n))
    (true (cell ?m ?n b)))
(<= (next (cell ?m ?n ?w)) (true (cell ?m ?n ?w))
    (distinct ?w b))
(<= (next (cell ?m ?n b)) (does ?w (mark ?j ?k))
    (true (cell ?m ?n b)) (or (distinct ?m ?j)
    (distinct ?n ?k)))
(<= (next (control white)) (true (control black)))
(<= (next (control black)) (true (control white)))
(<= (row ?m ?x) (true (cell ?m 1 ?x))
    (true (cell ?m 2 ?x)) (true (cell ?m 3 ?x)))
(<= (column ?n ?x) (true (cell 1 ?n ?x))
    (true (cell 2 ?n ?x)) (true (cell 3 ?n ?x)))
(<= (diagonal ?x) (true (cell 1 1 ?x))
    (true (cell 2 2 ?x)) (true (cell 3 3 ?x)))
(<= (diagonal ?x) (true (cell 1 3 ?x))
    (true (cell 2 2 ?x)) (true (cell 3 1 ?x)))
(<= (line ?x) (row ?m ?x))
(<= (line ?x) (column ?m ?x))
(<= (line ?x) (diagonal ?x))
(<= open (true (cell ?m ?n b))) (<= (goal white 100) (line x))
(<= (goal white 50) (not open) (not (line x)) (not (line o)))
(<= (goal white 0) open (not (line x)))
(<= (goal black 100) (line o))
(<= (goal black 50) (not open) (not (line x)) (not (line o)))
(<= (goal black 0) open (not (line o)))
(<= terminal (line x))
(<= terminal (line o))
(<= terminal (not open))
```

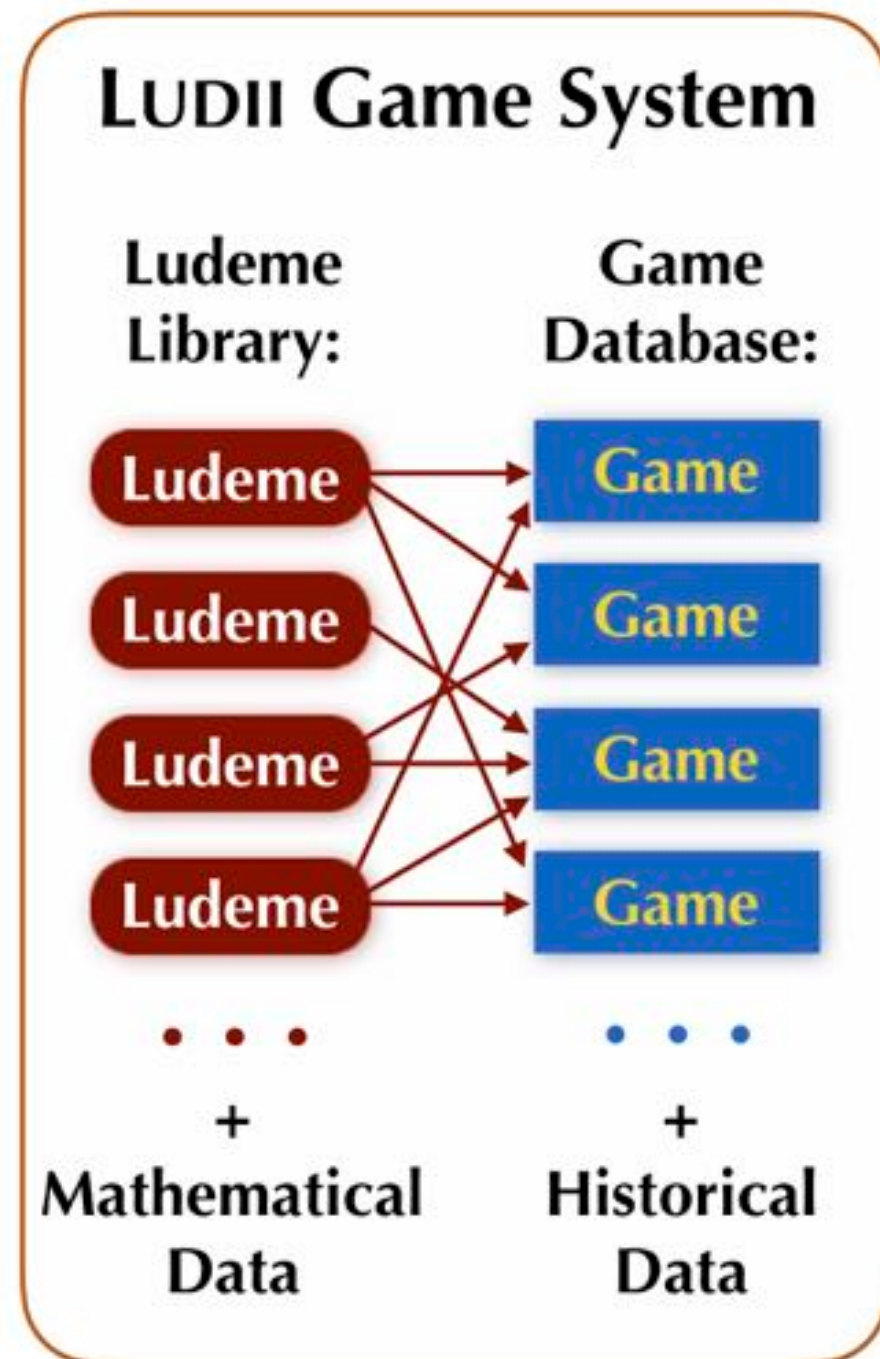

Ludemic Language

```
(game Tic-Tac-Toe
  (players White Black)
  (board
    (tiling square)
    (shape square)
    (size 3 3)
  )
  (end (All win (in-a-row 3)))
)
```


Ludii

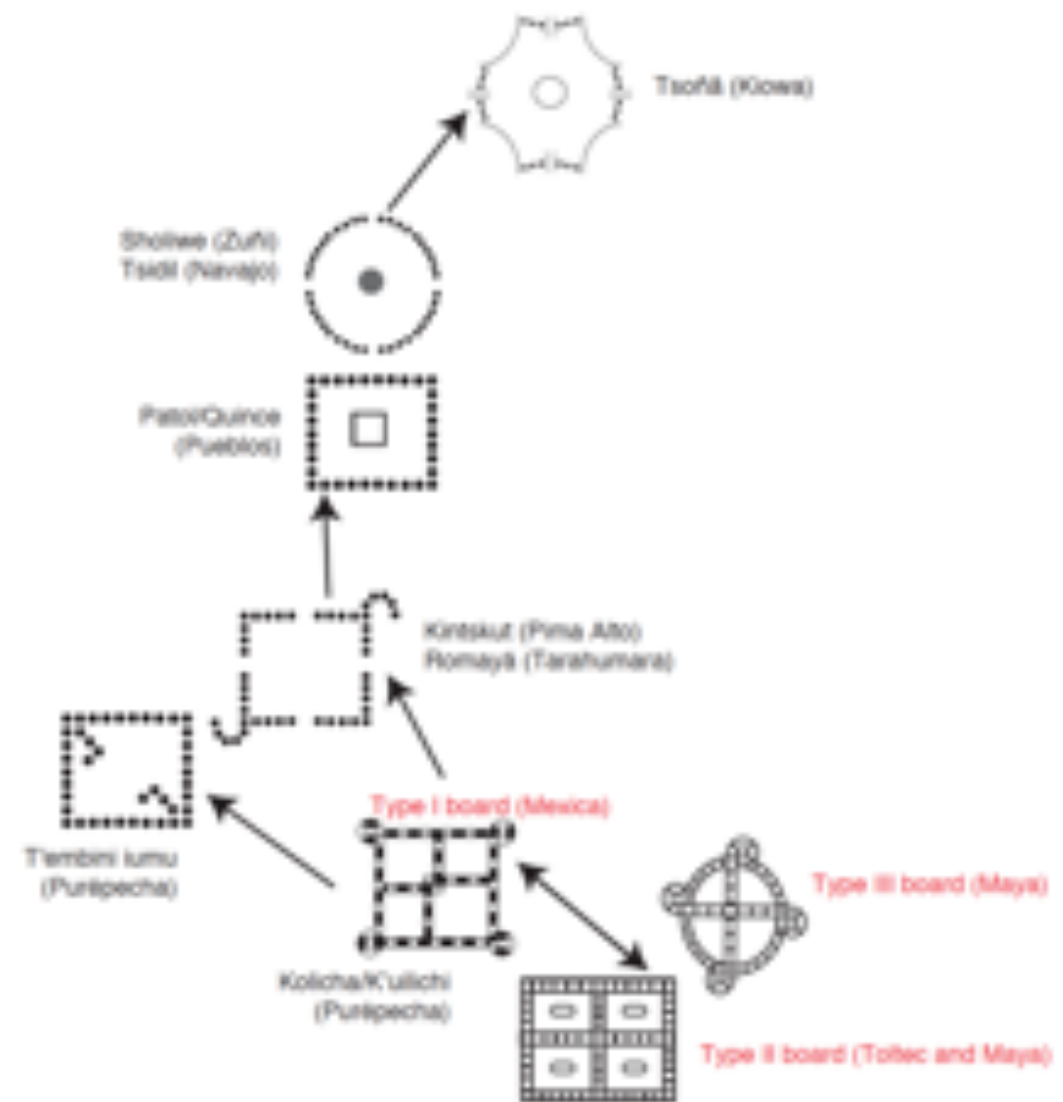


- General Game System based on:
 - Ludeme Library
 - Game Database
 - Game Descriptions
 - Historical Data
- Games are playable!
ludii.games



Historical Game Reconstruction

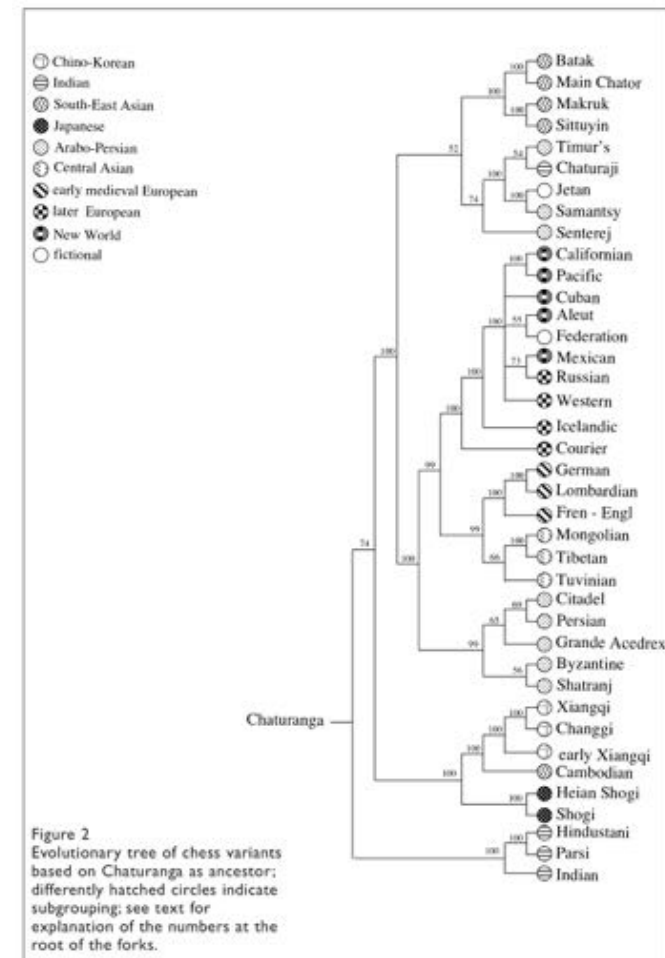
- Cultural Transmission Theory explains how games are transferred from person to person
- Ludemes are the packages which are transmitted (DNA of games)
- Need to calculate ludemic distance: number of steps required to change one game into another



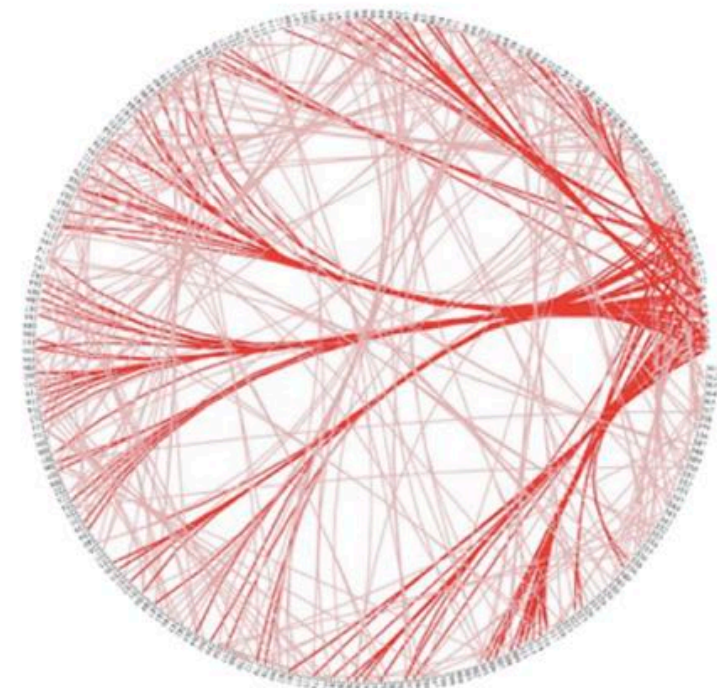
Evolution of North American and Mesoamerican board games (after Depaulis 2018)

Cultural Transmission of Games

- Phylogenetic and horizontal transmission approaches
- Can help to determine which games likely developed from others
- Games are transferred through horizontal transmission
- Allows a better reconstruction of ludic transfer



Phylogeny of Chess
Kraaijeveld 2000



HIM of programming languages
Valverde & Sole (2015) JRSI

Challenges for Historical Reconstruction

- Data are sparse and missing information
- Multiple lines of evidence
- Some pieces are less reliable for providing certain kinds of information
 - Historical sources writing about games in their past
 - Uncertainty whether certain artifacts belong to certain games
- Much information that exists is speculation



“Round merels” pattern from Leptis Magna, Libya

Evidence-based Historical Data

- Each game is associated with a suite of pieces of “evidence”: an artifact, text, depiction, etc. which provides some clue about the rules of the game
- Some games will have many; some will have only one
- Evidence supports the connection of ludemes with particular games.
- Confidence percentages assigned to each piece of evidence based on its quality



Documenting 58 Holes board at Capmalı,
Azerbaijan, April 2018

Data to be gathered

- Name
- Location
- Game rules
- Social status
- Gender of players
- Age of players
- Spaces in which people played



Game boards from Sotira *Kaminoudhia*, Cyprus

Artifacts

- Actual materials used to play: boards, pieces, forms of dice
- Tell us about:
 - Date
 - Location
 - Form of the board
 - Markings on the board
 - Gaming equipment
 - Sometimes: Social status; gender; space



Senet board from Tomb of Tut'ankhamun



Senet fragment in Arizona State Museum; c. 980–838 BCE

Rules Texts

- Texts describing the rules of a game
- Tells us about:
 - Rules
 - Gaming equipment
 - Location
 - Date
 - Sometimes: Social status; gender; spaces



Page from Alfonso X of Castille's *Libro de los Juegos*, 1283

Ugallu-bird, a pill token;

Raven, a pill token;

Eagle, a pill token;

Swallow, a pill token;

Rooster, a pill token; Five flying game pieces.

An ox astragal, a sheep astragal,

Two that move the game pieces.

If the astragals score 2, the Swallow sits at the head rosette.

Should it then land on a rosette, a woman will love those who linger in a tavern,
well-being is established for their pack.

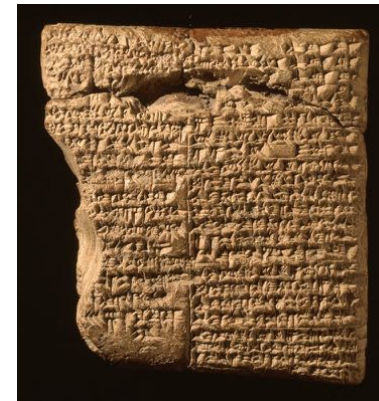
If it does not land on a rosette, a woman will reject those who linger in a tavern,
well-being is not established for the entire pack....

Written, checked, and examined. Tablet of Iddin-Bel, son of Maranu.

By the hand of Itti-Marduk-balatu II.

He who fears Bel and Beltiya, and Nanaya of Ezida, must not efface the writing!

Babylon; Month of Arahsamna, Day 3, Year 135 of Seleucus the King.



Seleucid Game Rules text,
British Museum. 177 BCE.
BM 33333



20 Squares board from Enkomi,
Cyprus, 13th century BCE. BM
1897,0401.96

how a multi-coloured piece attacks in a straight line,
when a piece between two enemy pieces is lost,
how to pursue with force, and then recall
the piece in front, and retreat again safely, in company

Ovid, *Tristia* 2.477–480

at one time a white counter traps blacks, another a black traps whites; Yet what counter
has not fled from you; another, which stood at a vantage point, comes from a position far
retired; each of your hands rattles with its band of captives

Anonymous, *Laus Pisonis* 192–208

two sets of lines are drawn up, the ones crosswise and the others vertical, as is the regular
arrangement on a board on which they play *latrunculi*.

Varro, *De lingua latina* 22

She should play the *latrunculus* game warily not rashly, where one piece can be lost to
twin enemies, and a warrior battles without his companion who's been taken, and a rival
often has to retrace the journey he began

Ovid, *Ars Amatoria* 3.356–60

So you win, with a *mandra*, and the glass *latrones* are closed off

Martial, *Epigrams* 7.72.7–8

He was playing at *latrunculi* when the centurion in charge of a number of those who were
going to be executed bade him, join them: on the summons he counted his men and said
to his companion, "Mind you do not tell a lie after my death, and say that you won;" then,
turning to the centurion, he said "You will bear me witness that I am one man ahead of
him." Do you think that Kanus played upon that game board? nay, he played with it.

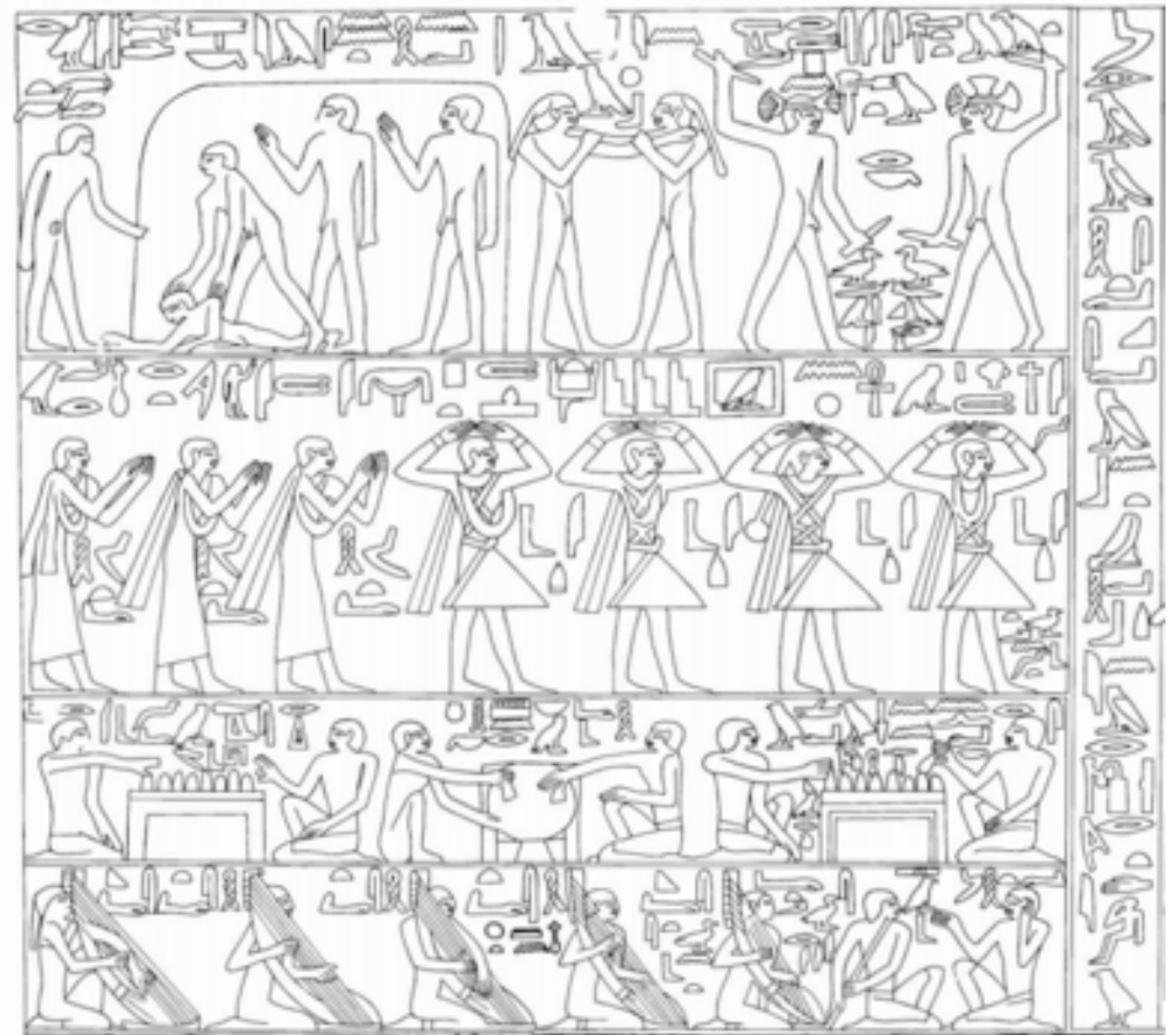
Seneca, *De Tranquillitate Animi* 14.7



***Ludus Latrunculorum* Board, Sabratha,
Libya**

Artistic Depiction

- Scenes of people playing games
- Tells us about:
 - Social context
 - Social status
 - Gender
 - Gaming equipment
 - Sometimes: form of the board; snippets of game action; space



Relief from the Tomb of Idu, Gaza, Egypt, 2345-2181 BCE



***Filles turques qui jouent au Mangala,
Jean-Baptiste Vanmour, 1714***



**Sailors playing game, Tomb of Nefwa, Beni
Hasan, Egypt, 2125–1940 BCE**

Ethnography

- Observation and documentation of people actually playing games
- Tells us about:
 - Gender
 - Gaming Equipment
 - Social Status
 - Age
 - Spaces
 - Location
 - Date
 - Sometimes: Rules, history



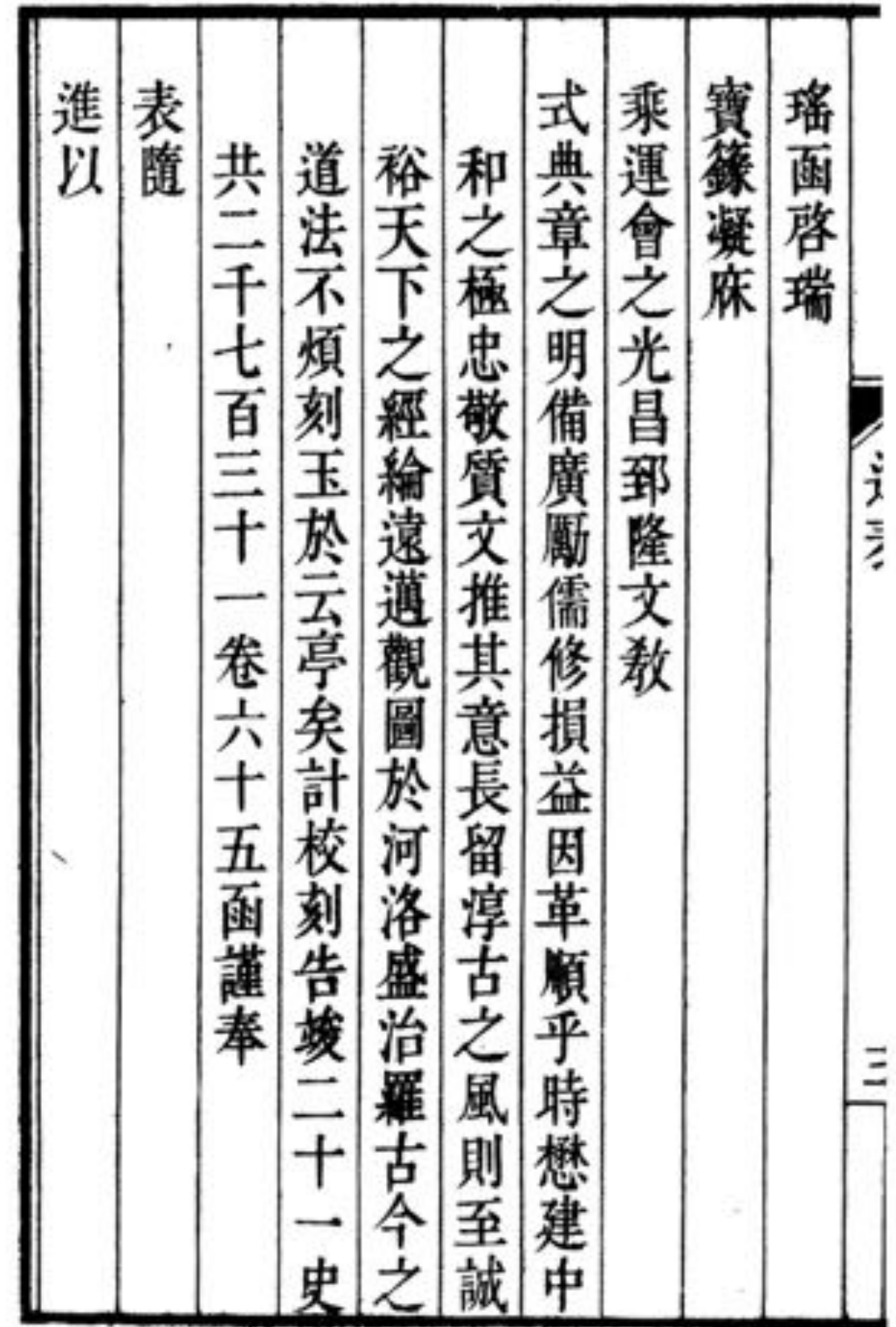
Two men playing bao in Malawi

"The Penihings have a game called ot-tjin which I also observed in other Bornean tribes, and which to some extent is practiced by the Malays...With the Penihings the complete name is aw-li on-nam ot-tjin, meaning: play on-nam fish. An essential of the game is an oblong block of heavy wood which on its upper surface is provided with two rows of shallow holes, ten in each row, also a larger one on each end. The implement is called tu-tung ot-jin, as is also both of the single holes at the ends. There are two players who sit opposite each other, each controlling ten holes. The stake may be ten or twenty wristlets, or perhaps a fowl, or the black rings that are tied about the upper part of the calf of the leg, but not money, because usually there is none about. The game is played in the evenings. Two, three, four, or five stones of a small fruit may be put in each hole; I noticed they generally had three; pebbles may be used instead. Let us suppose two have been placed in each hole; the first player takes up two from any hole on his side. He then deposits one in the hole next following. Thus we have three in each of these two holes. He takes all three from the last hole and deposits one in each of the next three holes; from the last hole he again takes all three, depositing one in each of the next three holes. His endeavour is to get two stones in a hole and thus make a "fish." He proceeds until he reaches an empty hole, when a situation has arisen which is called a gok—that is to say, he must stop, leaving his stone there. His adversary now begins on his side wherever he likes, proceeding in the same way, from right to left, until he reaches an empty hole, which makes him gok, and he has to stop. To bring together two stones in one hole makes a "fish," but if three stones were originally placed in each hole, then they make a "fish"; if four were originally placed, then four make a "fish," etc., up to five. The player deposits the "fish" he gains to the right in the single hole at the end. The two men proceed alternately in this manner, trying to make a "fish" (ára ot-tjin). The player is stopped in his quest by an empty hole; there he deposits his last stone and his adversary begins. During the process of taking up and laying down the stones no hole is omitted, in some of them the stones will accumulate. On the occasion of the game I described I saw two with eight in them. When one of the players has no stones left in his holes he has lost. If stones are left on either side, then there is an impasse, and the game must be played over again."

Lumholtz, C. 1920. *Through Central Borneo: An Account of Two Years' Travel in the Land of the Head-Hunters between the years 1913 and 1917*. Stockholm.

Historical Accounts

- Authors writing about games in the past
- Can be modern authors or historical authors
- Tells us about:
 - Potential rules
 - Location
 - Dates
 - Social status
 - Gender
 - Spaces



Text from *Shiji* (Records of the Grand Historian),
Sima Qian, second century BCE

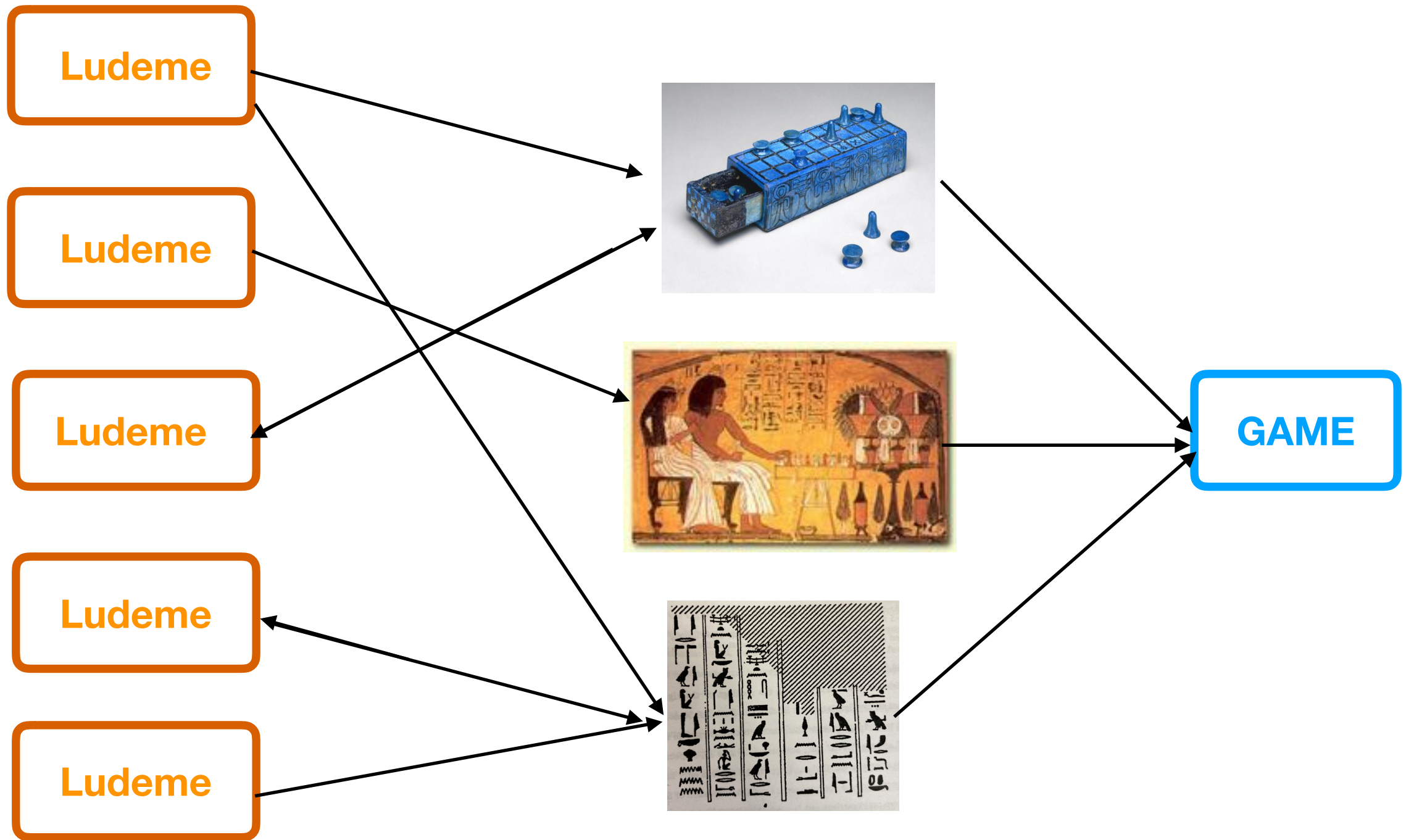
Confidence in sources

- Some types of sources are more reliable for certain data points
- Some authors or researchers have been shown to be more reliable than others
- Older methodologies may make uncertain interpretations

The screenshot shows a web-based database form with a menu bar at the top containing: Browse, Structure, SQL, Search, Insert, Export, Import, Privileges, and Operations. The form is organized into several sections, each with a header row containing 'Column', 'Type', 'Function', 'Null', and 'Value'.

Column	Type	Function	Null	Value
Id	int(11)		<input type="checkbox"/>	157
TypeId	int(11)		<input type="checkbox"/>	6
GameId	int(11)		<input type="checkbox"/>	4 Browse foreign values
VariationId	int(11)		<input checked="" type="checkbox"/>	
SourceId	int(11)		<input checked="" type="checkbox"/>	Browse foreign values
DateStart	date		<input type="checkbox"/>	0560-01-01
DateStartBC	tinyint(1)		<input type="checkbox"/>	0
DateEnd	date		<input type="checkbox"/>	0636-12-31
DateEndBC	tinyint(1)		<input type="checkbox"/>	0
Location	text		<input checked="" type="checkbox"/>	<div></div>
KML	varchar(45)		<input checked="" type="checkbox"/>	
Rules	text		<input type="checkbox"/>	<div>pieces trapped between two opposing pieces cannot move, pieces are placed on any space on the board in the beginning of play, pieces move forwards or sideways</div>
Misc	text		<input type="checkbox"/>	<div>Soldiers Origines XVIII.47 "DE CALCULORUM MODO. Calculi partim ordinis venientur, partim vagi: idem alius ordinarius, alius vagus appellatur: et vici qui moveri omnino non possunt, vacilli dicuntur. Unde et agens homines vacilli vocantur, quibus agere ultra procedendi nulla restat." Translation Schöffer 1995: "Some of the pieces move regularly, others here and there: therefore the first are called ordinarii, the others vagi, and those that cannot move at all are called"</div>
ConfidenceMultiplier	int(11)		<input type="checkbox"/>	50

At the bottom right of the form is a 'Go' button.



Important Data to be Gathered and Historical Contributions

- Persistent “factoids” in general and scholarly literature on games
- Will help to resolve some of the commonly cited but incorrect statements about the history of games



Temple of Seti I (c. 1290–1279 BCE) at Qurna, Egypt

Potential Research

Egypt: Graffiti on Temple of Dendera roof

Graffiti on Temple of Qurna roof

Graffiti at Temple of Medinet Habu

Graffiti at Karnak (Taharqa boat ramp)

Ostrakon with senet found by Hawass at Valley of the Kings: Get a photograph or see the object; too blurry in publication photo (which museum is it in?)

26th Dynasty spiral game from Bahariya Oasis (Temple of Bes): what is this?

Ship model of Tomb of Meketre (Theban tomb 280); Dynasty 11

Ethiopia: Graffiti at Axum (base of Stela 3)

Graffiti at Yeha (Location unknown)

Eritrea: Graffiti games at Matara: earliest documented mancala?

Mexico: Graffiti games at Teotihuacan; other sites (Michoacan, Jalisco, other regions to W and N; including SE USA)

Mesopotamia: Reconcile find spots of game of 20 squares records from Ur (excavation records @ British Museum)

Greece: Graffiti on Parthenon (?)

Hellenistic sherd from Mycenae with merels game on it: Find the findspot and context information

Rome: Graffiti in Basilica Julia and other monuments in Forum Romanum (Francisco Trifilo; what has happened to his data?)

South Africa: Games graffiti at Mapungubwe nat'l park: modern or from the excavations?

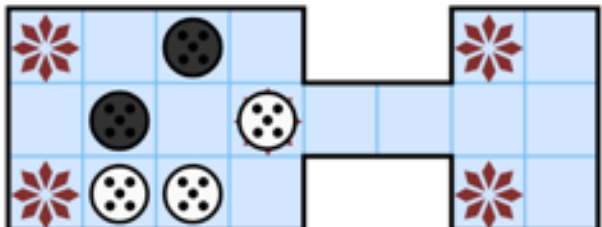
Azerbaijan: Archaeological context of 58 holes games and more precise dating; talk to Idris Aliyev about provenience dating and context; current traditional games (mancala games?)


Cyprus: Document remaining games from Episkopi survey: potentially Aredhiou, Erimi, other sites to be included

UK: Durham University—Consult Bell's archives and track down the original information on Surakarta


Probabilistic Reconstructions

- Define constraints: Based on evidence, what can be determined for certain about game rules
- Possible ludemes that fill in the gaps of knowledge will be used to run simulations of games using Artificial Intelligence
- Games will be scored based on their playability, based on measures of:
 - Drawishness
 - Elimination of endless loops
 - Playing time
- Maximize possible reconstructions for historical accuracy and game quality

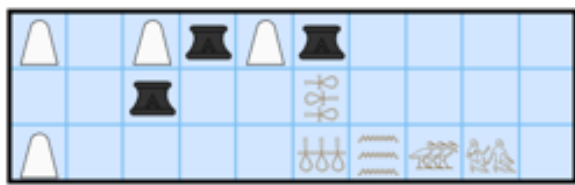




Status	Moves	Analysis	Ludeme	Info
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				



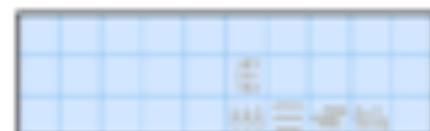
Status	Moves	Analysis	Ludeme	Info
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				
Player 2 to move.				
Player 1 to move.				



Reconstructions of Royal Game of Ur and *senet* in Ludii



Senet



Period

Ancient

Region

Egypt

Description

Senet is played on a 3x10 board. Two players have 7 pieces each, the goal is to be the first player to reach the end of the game track and remove one's pieces from the board. Also played at certain times in Cyprus, the Levant, and Nubia.

Ludeme Description

[Senet.Lud](#)

Evidence Map



Twenty Squares



Period

Ancient

Region

Southeast Asia

Description

Twenty Squares is a game derived from the Royal Game of Ur. Boards consist of a grid of 2x4 squares and a continuation of the central row in the grid that extends for 8 further squares. Each player starts play on one of the top corners of the 2x4 grid, proceeding down that row to the opposite corner, and then up the central track, which both players use, with the goal of moving off the end of the track. If a player lands on an opponent's spot, they are removed from the board and may reenter on a subsequent turn. A rosette in the center of the central track marks the spot where a player is safe from capture. Rosettes in the four corners allow a player to roll again. A player wins when they remove all seven of their pieces from the board by rolling the exact number of spaces left in the track, plus one.

Evidence Map



GeaChron

- Geographic database of cultures and trade routes through time
- Can be used to track possible lines of transmission (through trade or conquest) between regions
- Only covers historical data; archaeological and anthropological data are absent



Missing Data: Non-state groups

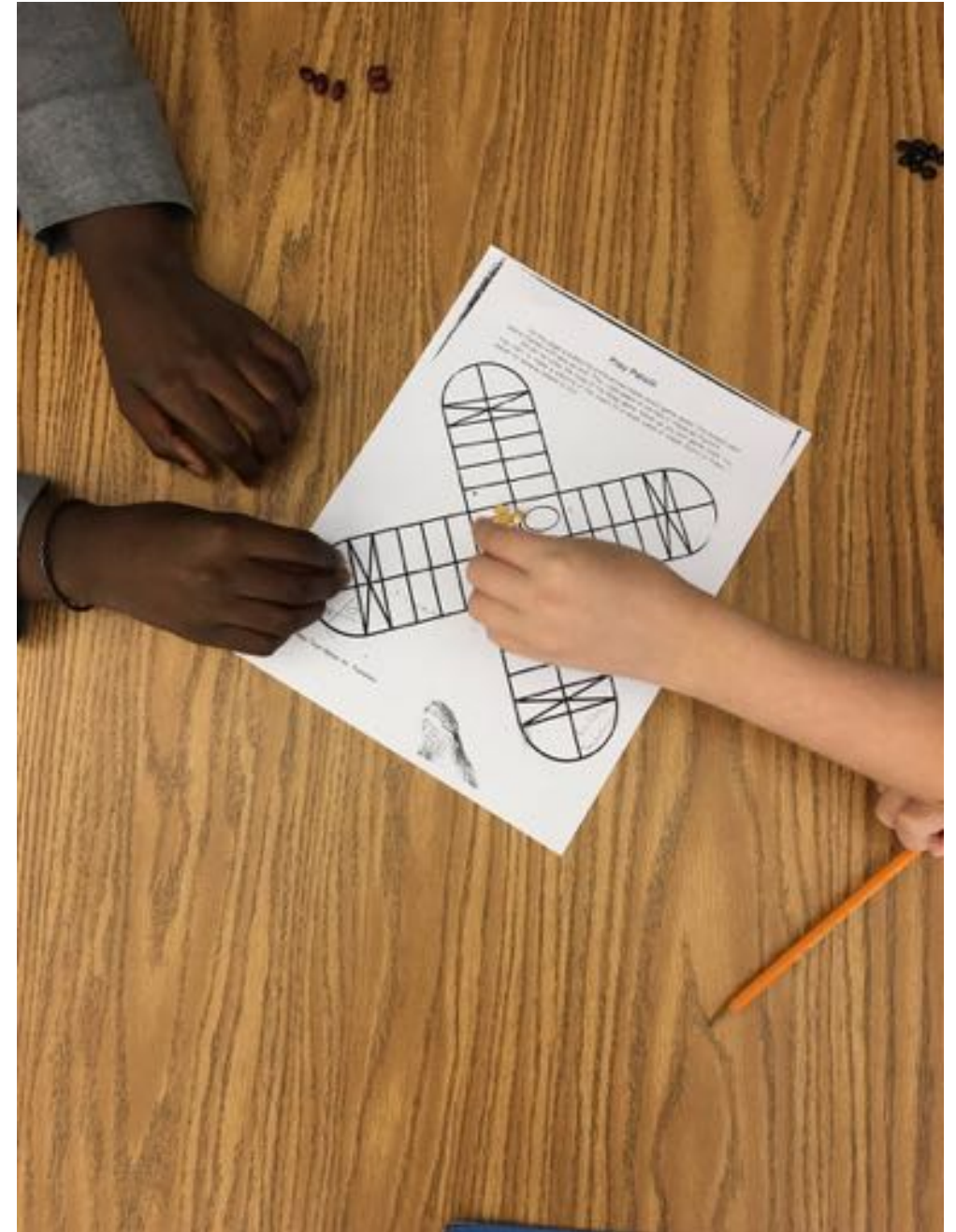


Missing Data: Obscured Diversity



Preserving Cultural Heritage

- Many of these games are being played less, in favor of commercially sold games
- Some are likely already gone
- Resurrection of ancient and historical games can help people to engage with the past in new ways



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- Twitter: @archaeoludology; @LudiiGames
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Download Ludii and start playing at ludii.games

More info: www.ludeme.eu

Contact us: walter.crist@maastrichtuniversity.nl; cameron.browne@maastrichtuniversity.nl