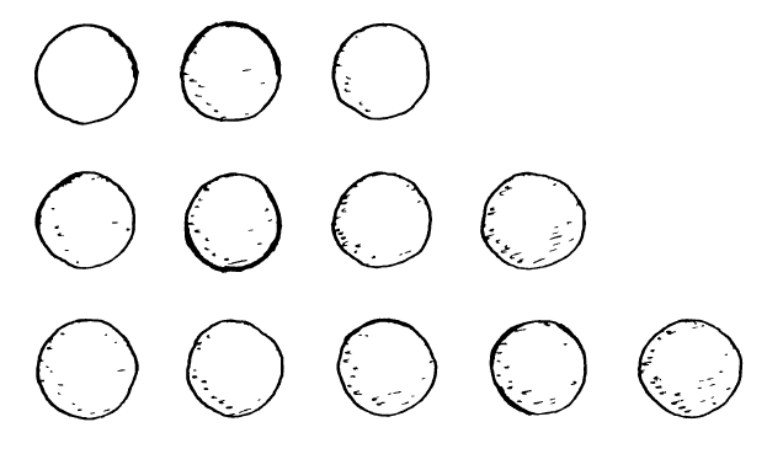
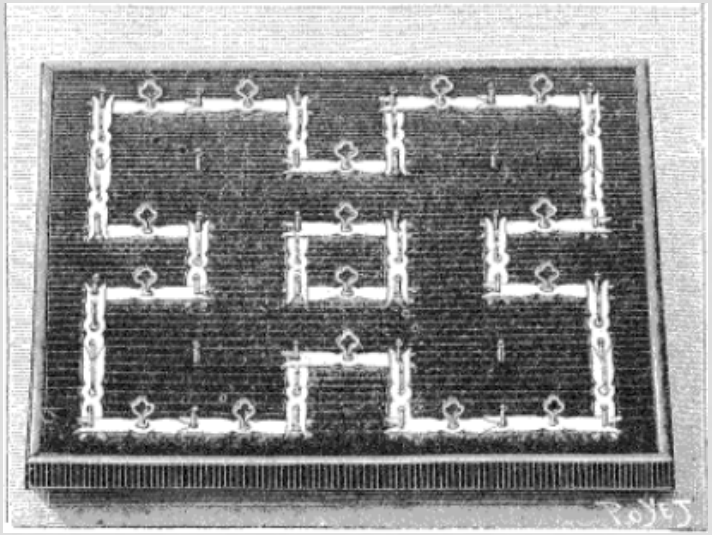




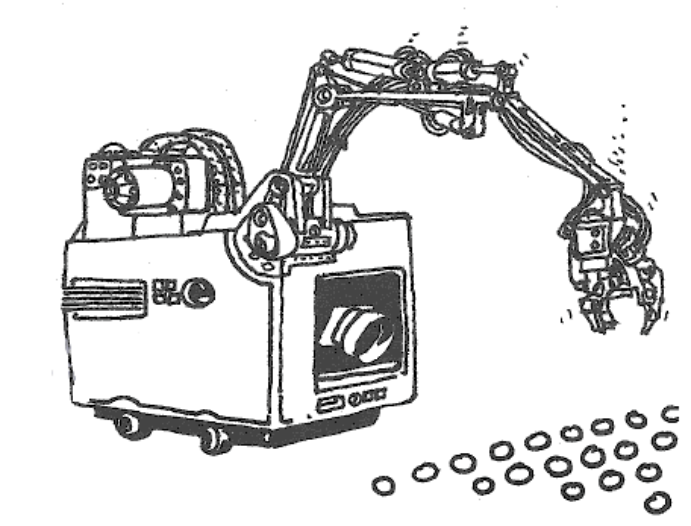
Back to the historical roots of a few combinatorial games

Maastricht University, Digital Ludeme Project
Wednesday, November 6th 2019

Lisa Rougetet
Centre François Viète
Université de Bretagne Occidentale, France

Before we start…

- A definition of a combinatorial game :
  - two players
  - playing alternatively
  - no chance
  - perfect information
  - finite
  - the winner is determined by the last move



Nim game and its prehistoric variants

Ludii Portal

Home of the Ludii General Game System

Home Games Downloads Services History Publications Contact Us

Nim

Ludii Portal

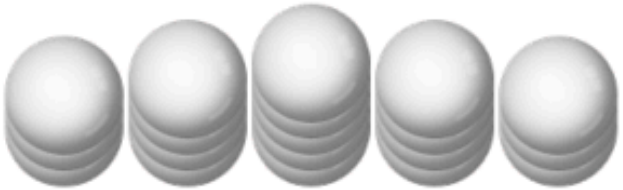
Home of the Ludii General Game System

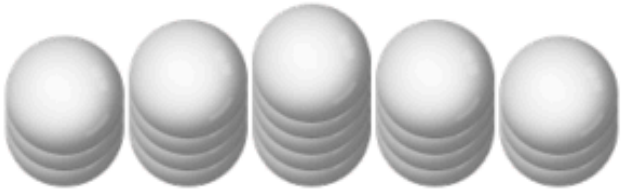
Home | Games | Downloads | Services | History | Publications | Contact Us

Nim

Description

Nim is a game of uncertain origins, it's earliest mentions in Europe are from the 16th century. It is similar to other games worldwide, but the simple nature of the game indicates that multiple independent inventions may be possible, not necessarily the dispersion of a single game worldwide. Essentially, the game consists of a number of objects in "heaps," and players alternate turns taking any number of objects from one of the heaps. This continues until no objects are left, and the last player to remove an object loses.





Nim game

- Dates back to 1901 (under that name).

Nim game

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NIM, A GAME WITH A COMPLETE MATHEMATICAL THEORY.

By Charles L. Bouton.

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BY CHARLES L. BOUTON.

- Published in the *Annals of Mathematics*.

Nim game

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NIM, A GAME WITH A COMPLETE MATHEMATICAL THEORY.

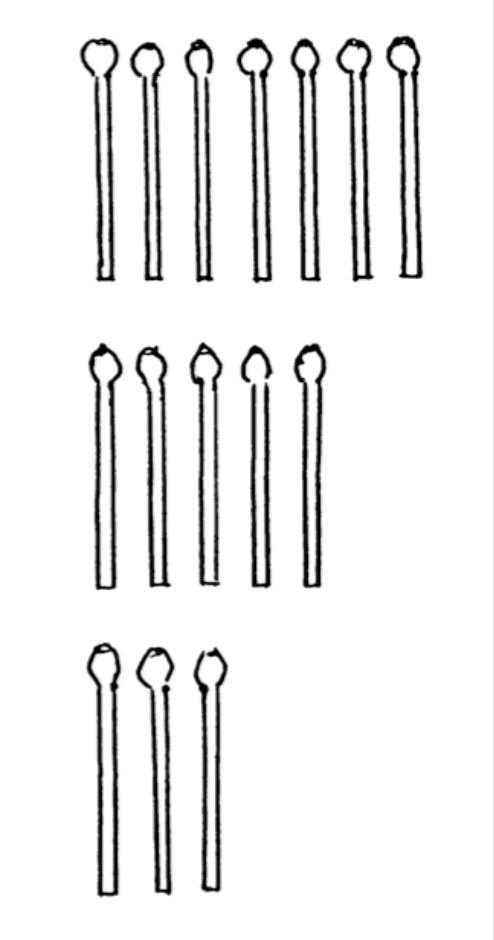
BY CHARLES L. BOUTON.

- Published in the *Annals of Mathematics*.
- The word "Nim" comes from the imperative form of the German verb "nehmen": "nimm".

NIM, A GAME WITH A COMPLETE MATHEMATICAL THEORY.

By Charles L. Bouton.

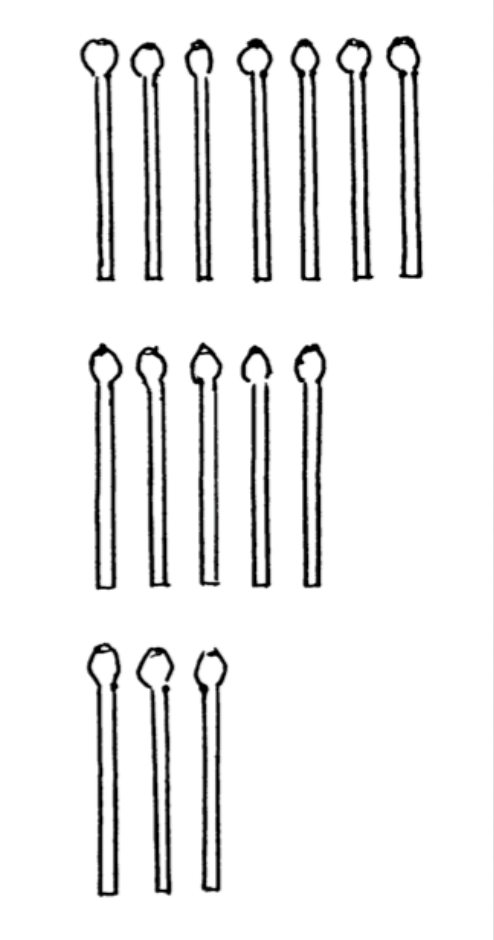
- Played with several piles of matches, each pile contains an arbitrary number of matches.



NIM, A GAME WITH A COMPLETE MATHEMATICAL THEORY.

By Charles L. Bouton.

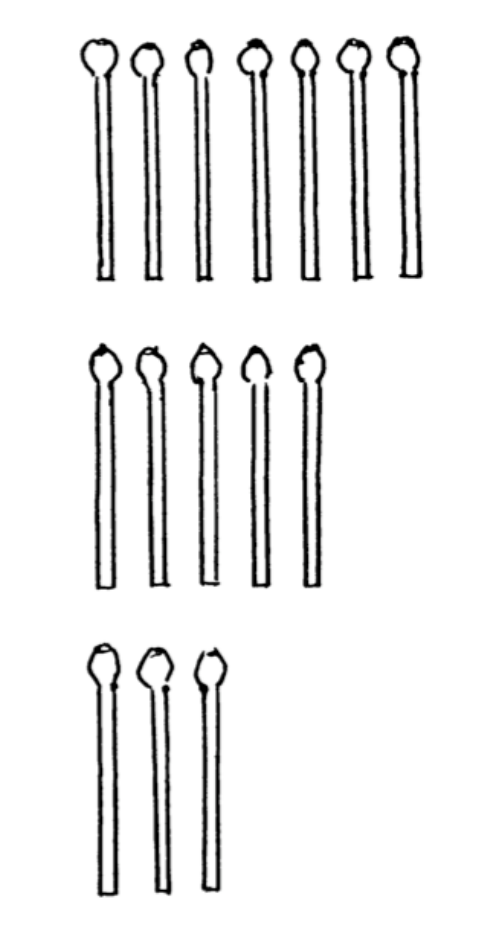
- Played with several piles of matches, each pile contains an arbitrary number of matches.
- At each turn, a player chooses one pile and remove a certain number of matches: one, two, three… or the whole pile.



NIM, A GAME WITH A COMPLETE MATHEMATICAL THEORY.

By Charles L. Bouton.

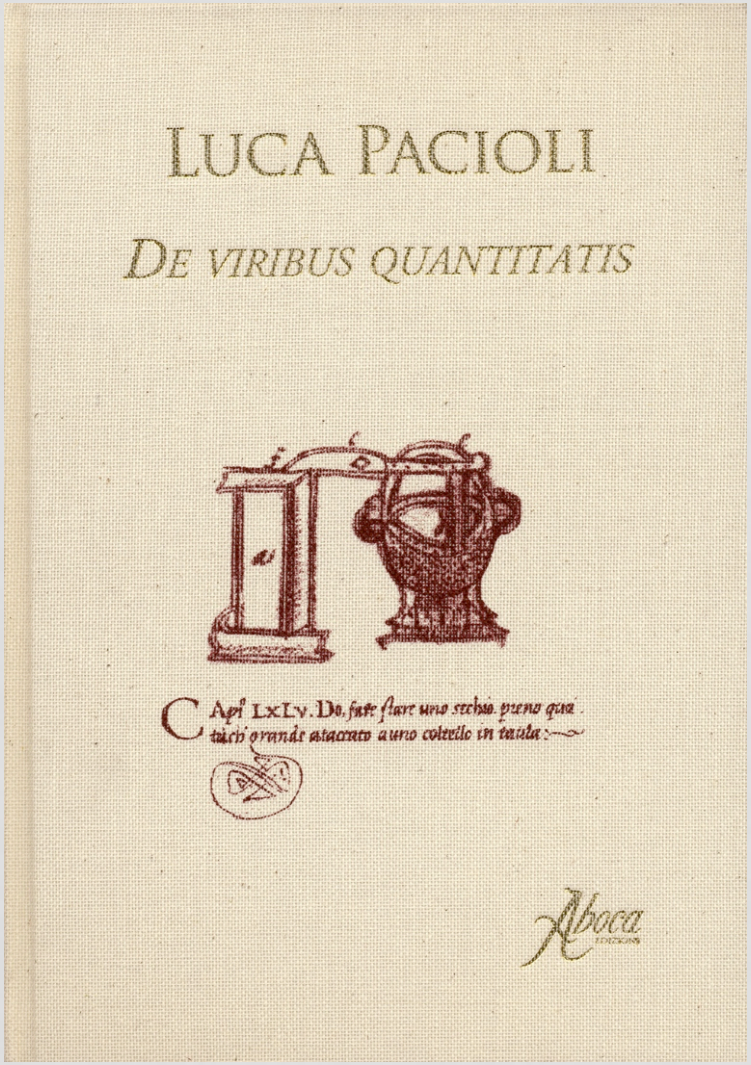
- Played with several piles of matches, each pile contains an arbitrary number of matches.
- At each turn, a player chooses one pile and remove a certain number of matches: one, two, three… or the whole pile.
- Aim: take the last match(es).



The prehistory of Nim game

The prehistory of Nim game

Luca Pacioli (1445-1517)



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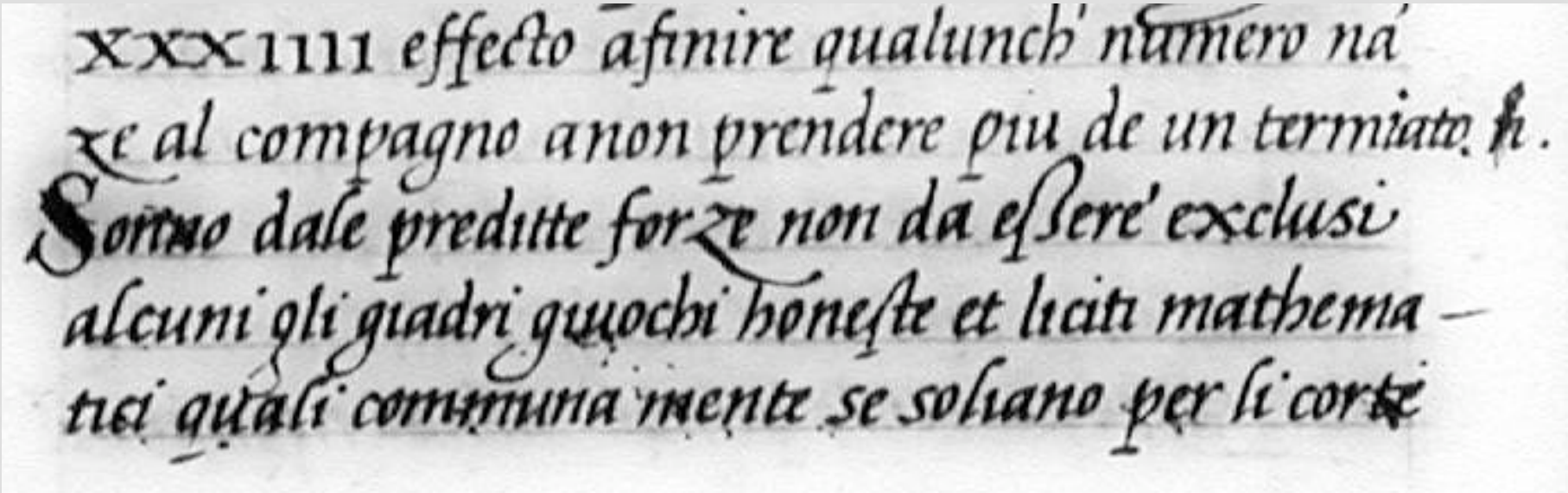
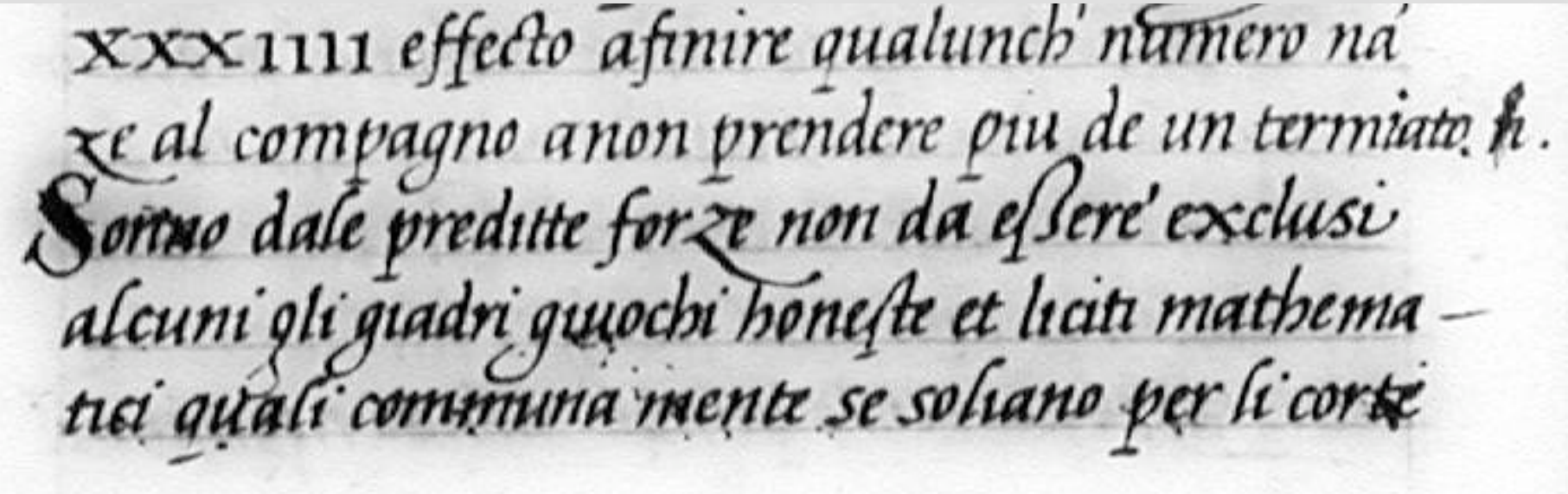

xxxiiii effecto afinire qualunch' numero na
ze al compagno anon prendere piu de un termiato fi.
Sonno dale preditte forze non da essere exclusi
alcuni gli giadri giuochi honeste et liciti mathema-
tici quali communamente se soliano per li corte

Luca Pacioli (1445-1517)


XXXIIII effecto afinire qualunch' numero ná
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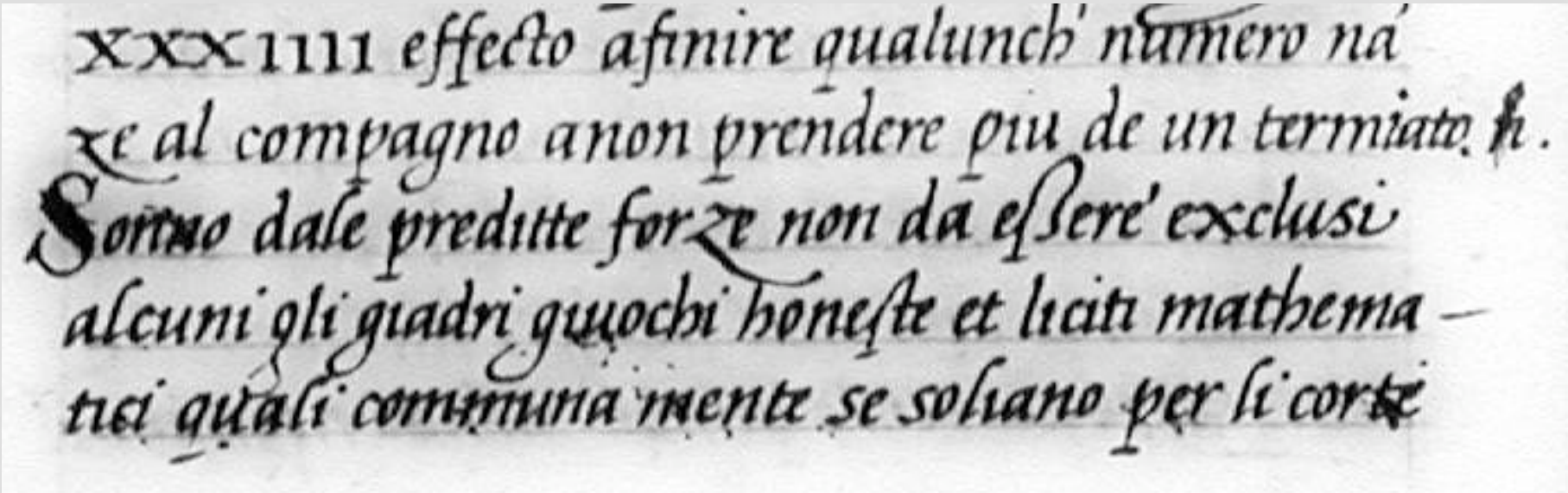
Sonno dale preditte forze non da essere exclusi
alcuni gli giadri giuochi honeste et liciti mathema-
tici quali communamente se soliano per li corte

Effecto XXXIIII : How to arrive at any number before your companion and not take more than a determined number.

Luca Pacioli (1445-1517)

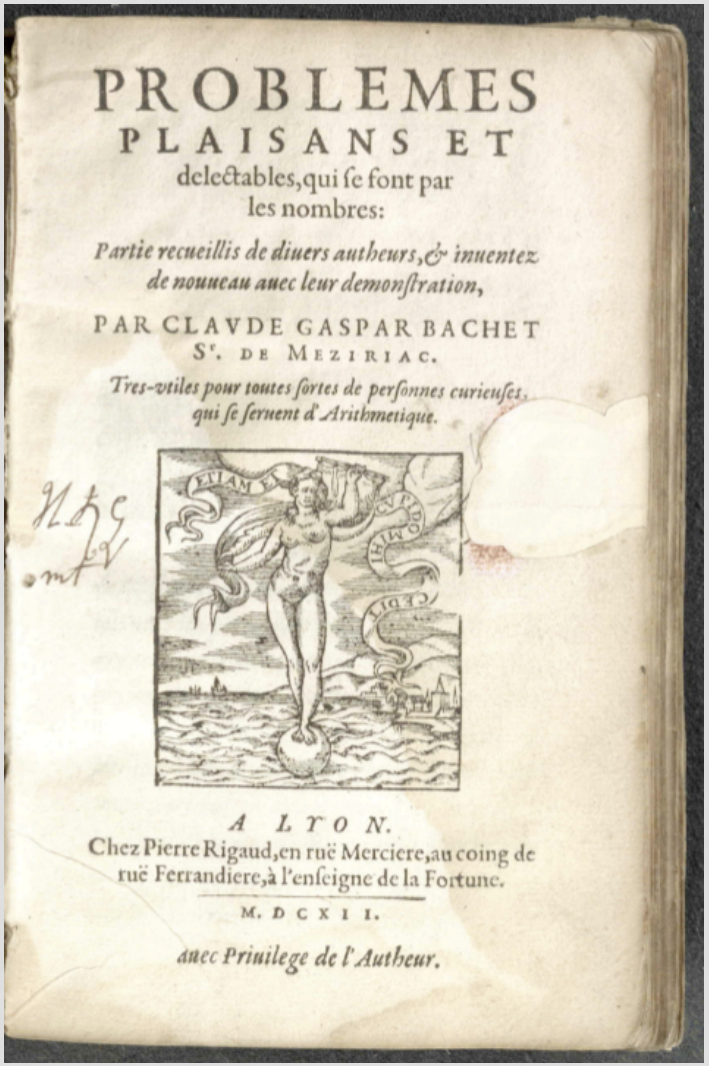

XXXIIII effecto afinire qualunch' numero na
ze al compagno anon prendere piu de un termiato h.
Sonno dale preditte forze non da essere exclusi
alcuni gli giadri giuochi honeste et liciti mathema-
tici quali communamente se soliano per li corte

Effecto XXXIIII : How to arrive at any number before your companion and not take more than a determined number.

Example: reach the number 30 by summing up, alternately, numbers between 1 and 6.

Claude-Gaspard Bachet (1581-1638)

Claude-Gaspard Bachet (1581-1638)



PROBLEMES
PLAISANS ET
delectables, qui se font par
les nombres:

Partie recueillis de diuers autheurs, & inuentez de nouueau auec leur demonstration,

PAR CLAVDE GASPAR BACHET
S^r. DE MEZIRIAC.

Tres-vtiles pour toutes sortes de personnes curieuses, qui se seruent d'Arithmetique.

A LYON.
Chez Pierre Rigaud, en ruë Merciere, au coing de ruë Ferrandiere, à l'enseigne de la Fortune.

M. DCXII.

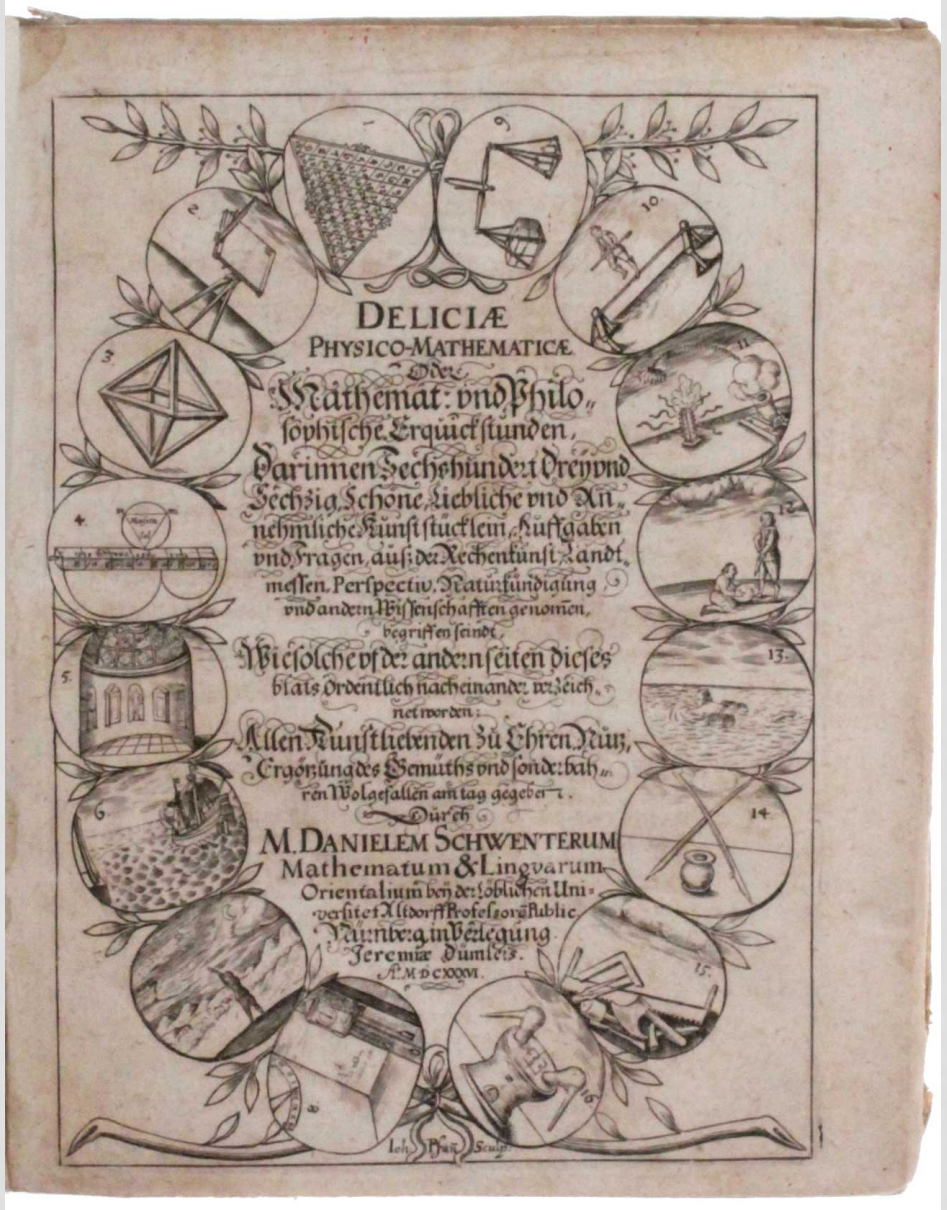
auec Priuilege de l'Autheur.

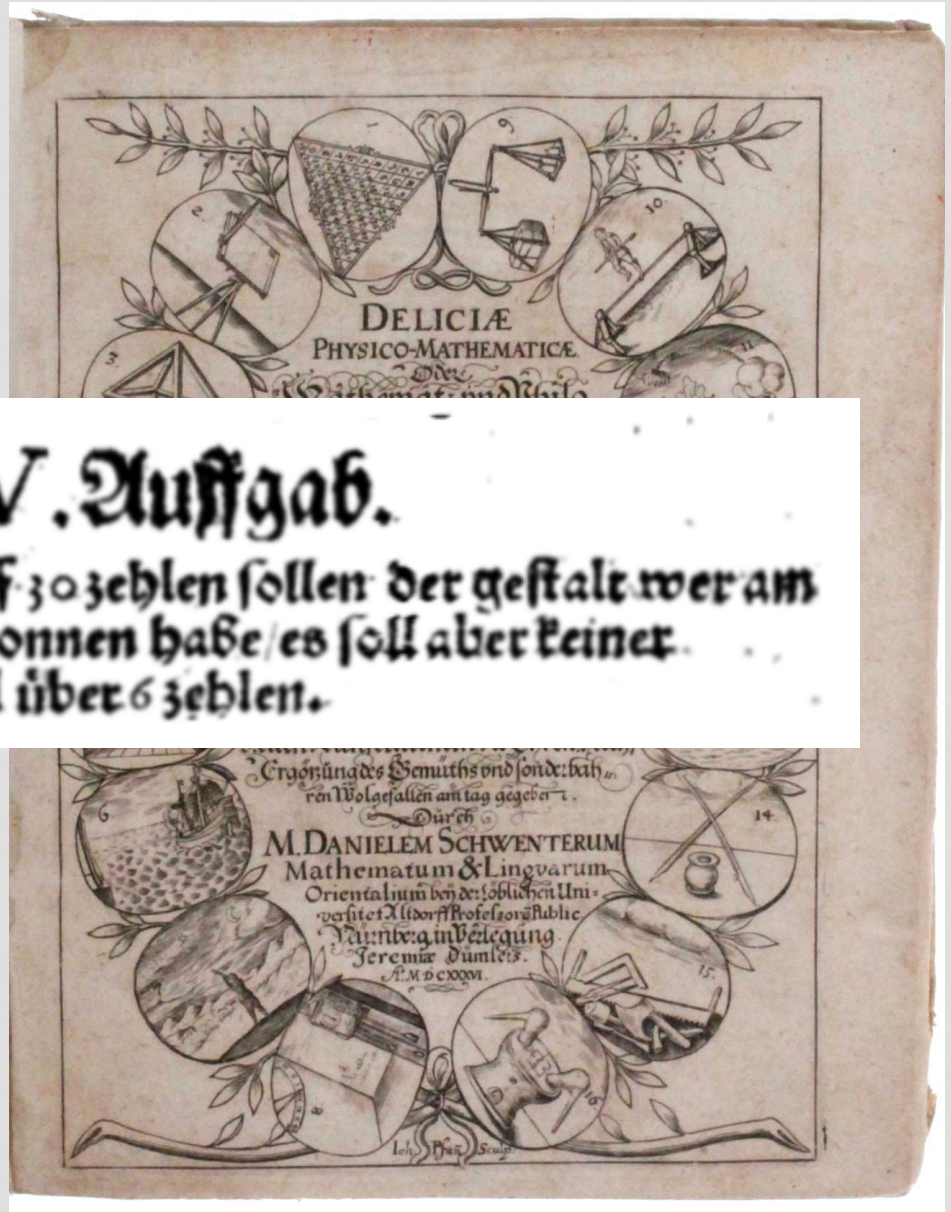
Claude-Gaspard Bachet (1581-1638)

PROBLEME XIX.

Si deux ont proposé entre eux, de dire chascun l'vn apres l'autre alternatiuement vn nombre à plaisir, qui toutesfois ne surpasse point vn certain nombre prefix, pour voir adioustant ensemble les nombres qu'ils diront qui arriuera plustost à quelque nombre prescrit ; faire si bien qu'on arriue tousiours le premier au nombre desiné.

Daniel Schwenter (1585-1636)





Die XLV. Auffgab.

So jhr zween mit einander biß auff 30 zehlen sollen der gestalt wer am ersten könne 30 nennen/gewonnen habe/es soll aber keiner auff einmahl über 6 zehlen.

Daniel Schwenter (1585-1636)

Jacques Ozanam (1640-1718)

- French mathematician, teacher, first popularizer of mathematics (so to speak).
- Author of mathematical recreations.

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Bernard de Fontenelle (1657-1757)

Jacques Ozana

- French mathematician, te
  mathematics (so to speak
- Author of mathematical r

Bernard de Fontenelle (1657-1757)

ELOGE

DE M. OZANAM.

JACQUES OZANAM nâquit en 1640 dans la Souveraineté de Dombes d'un Pere riche, & qui avoit plusieurs Terres. La famille étoit d'origine Juive, ce que marque assés le nom, qui a tout-à-fait l'air Hebreu, mais il y avoit long-temps que cette tache, peut-être moins réelle qu'on ne pense, étoit effacée par la profession du Christianisme, & de la Religion Catholique. Cette famille étoit illustrée par plusieurs Charges qu'elle avoit possedées dans des Parlements de Provinces.

M. Ozanam étoit cadet, & par la Loi de son Pays tous les biens devoient apartenir à l'aîné. Son Pere, qui étoit un homme vertueux, voulut réparer ce desavantage par une excellente éducation. Il le destinoit à l'Eglise pour lui faire tomber quelques petits Benefices qui dépendoient de la famille. Les mœurs du jeune Homme étoient bien éloignées de s'opposer à cette destination, elles se portoient naturellement à tout ce qui seroit à desirer dans un Ecclesiastique, & une Mere trés pieuse les fortifioit encore & par son exemple & par ses soins, d'autant plus puissants qu'elle étoit tendrement aimée de ce fils. Cependant il ne se tournoit pas volontiers du côté de l'Eglise, il avoit fort bien réüssi dans ses Humanités, mais il avoit pris beaucoup de dégoût pour la Philosophie Scolastique, la Theologie ressembloit trop à cette Philosophie, & enfin il avoit vû par malheur des Livres de Mathematiques, qui lui avoient appris à quoi il étoit destiné.

Il n'eut point de Maître, & on n'avoit garde de lui en donner, mais la Nature seule fait de bons Ecoliers. A 10


Cardiff
Brighton
Southampton
Plymouth
Manche (mer)
Anvers
Bruxelles
Cologne
Lille
Belgique
Luxembourg
Guernesey
Jersey
Paris
Brest
Rennes
Strasbourg
Tours
Nantes
Zurich
Suisse
France
La Rochelle
Limoges
Clermont-Ferrand
Lyon
Grenoble
Turin
Golfe de Gascogne
Bordeaux
Toulouse
Montpellier
Monaco
Marseille
Cannes
Gijón
Santander
Saint-Sébastien
Bilbao
Vitoria-Gasteiz
Andorre

LA TRIGONOMETRIE
RECTILIGNE ET SPHÉRIQUE;
AVEC
LES TABLES
DES SINUS,
TANGENTES ET SÉCANTES,

Pour un Rayon de 10000000 parties.

ET LES

TABLES DES LOGARITHMES
DES SINUS
ET DES TANGENTES,

Pour un Rayon de 10000000000 parties.

Par M. OZANAM, de l'Académie Royale des Sciences, tirés de son Cours de Mathématique.

Nouvelle Edition, revûe & corrigée exactement.

A PARIS, RUE DAUPHINE,

Chez CH. ANT. JOMBERT, Libraire du Roi pour l'Artillerie & le Génie, à l'Image Notre-Dame.

M. DCC. LXV.

Avec Approbation & Privilége du Roi.

2 Dégrés.

Minut.	Sinus.	Tangent.	Sécantes.		Log. Sin.
0	3489.95	3492.08	100060.95		8.542[illegible]
1	3519.02	3521.20	100061.97		8.545[illegible]
2	3548.09	3550.31	100063.00		8.549[illegible]
3	3577.16	3579.45	100064.04		8.553[illegible]
4	3606.23	3608.58	100065.09		8.557[illegible]
5	3635.30	3637.71	100066.15		8.560[illegible]
6	3664.37	3666.83	100067.21		8.563[illegible]
7	3693.44	3695.96	100068.28		8.567[illegible]
8	3722.51	3725.09	100069.36		8.570[illegible]
9	3751.58	3754.22	100070.45		8.574[illegible]
10	3780.64	3783.35	100071.55		8.577[illegible]
11	3809.71	3812.48	100072.66		8.580[illegible]
12	3838.78	3841.61	100073.77		8.584[illegible]
13	3867.85	3870.74	100074.89		8.587[illegible]
14	3896.91	3899.88	100076.02		8.590[illegible]
15	3925.98	3929.01	100077.16		8.593[illegible]
16	3955.05	3958.14	100078.31		8.597[illegible]
17	3984.11	3987.28	100079.47		8.600[illegible]
18	4013.18	4016.41	100080.63		8.603[illegible]
19	4042.24	4045.55	100081.80		8.606[illegible]
20	4071.31	4074.69	100082.98		8.609[illegible]
21	4100.37	4103.83	100084.17		8.612[illegible]
22	4129.44	4132.96	100085.37		8.615[illegible]
23	4158.50	4162.10	100086.58		8.618[illegible]
24	4187.57	4191.24	100087.80		8.621[illegible]
25	4216.63	4220.38	100089.02		8.624[illegible]
26	4245.69	4249.52	100090.25		8.627[illegible]
27	4274.75	4278.66	100091.49		8.630[illegible]
28	4303.82	4307.81	100092.74		8.633[illegible]
29	4332.88	4336.95	100094.00		8.636[illegible]
30	4361.94	4366.09	100095.27		8.639[illegible]

87 Dégrés.

Minut.	Sinus.	Tangent.	Sécantes.	Log. Sin.	Log. Tang.
60	99939.08	2863625.3	2865370.8	9.9997354	11.4569162
59	99938.06	2839939.7	2841699.7	9.9997309	11.4533091
58	99937.03	2816642.2	2818416.8	9.9997265	11.4497317
57	99935.99	2793723.3	2795512.5	9.9997220	11.4461834
56	99934.95	2771174.0	2772977.7	9.9997174	11.4426638
55	99933.90	2748985.3	2750803.5	9.9997128	11.4391724
54	99932.84	2727148.6	2728981.4	9.9997082	11.4357088
53	99931.77	2705655.7	2707503.0	9.9997036	11.4322725
52	99930.69	2684498.4	2686360.3	9.9996989	11.4288632
51	99929.60	2663669.0	2665545.5	9.9996942	11.4254803
50	99928.51	2643160.0	2645051.0	9.9996894	11.4221234
49	99927.40	2622963.8	2624869.4	9.9996846	11.4187923
48	99926.29	2603073.6	2604993.7	9.9996798	11.4154864
47	99925.17	2583482.3	2585416.9	9.9996745	11.4122055
46	99924.04	2564183.2	2566132.4	9.9996706	11.4089491
45	99922.90	2545170.0	2547133.7	9.9996650	11.4057168
44	99921.75	2526436.1	2528414.4	9.9996601	11.4025083
43	99920.60	2507975.7	2509968.5	9.9996550	11.3993233
42	99919.44	2489782.6	2491790.0	9.9996500	11.3961614
41	99918.27	2471851.2	2473873.1	9.9996449	11.3930223
40	99917.05	2454175.8	2456212.3	9.9996398	11.3899057
39	99915.90	2436750.9	2438802.0	9.9996346	11.3868111
38	99914.70	2419571.4	2421637.0	9.9996294	11.3837384
37	99913.49	2402632.0	2404712.1	9.9996242	11.3806873
36	99912.28	2385927.7	2388022.4	9.9996189	11.3776573
35	99911.06	2369453.7	2371563.0	9.9996136	11.3746482
34	99909.83	2353205.2	2355329.0	9.9996082	11.3716598
33	99908.59	2337177.7	2339316.1	9.9996028	11.3686917
32	99907.34	2321366.6	2323519.6	9.9995974	11.3657437
31	99906.08	2305767.7	2307935.1	9.9995919	11.3628155
30	99904.82	2290376.5	2292558.6	9.9995865	11.3599059

B ij

DICTIONAIRE MATHEMATIQUE, OU IDÉE GENERALE DES MATHEMATIQUES.

DANS LEQUEL SONT CONTENUS LES TERMES de cette ſcience, outre pluſieurs termes des Arts & des autres ſciences, avec des raiſonnemens qui conduiſent peu à peu l'eſprit à une connoiſſance univerſelle des Mathematiques.

Par M. OZANAM, Profeſſeur des Mathematiques du Roy Tres-Chrétien à Paris.

20
3

Sur l'Imprimé à Paris.

A AMSTERDAM,
Aux dépens des HUGUETAN.

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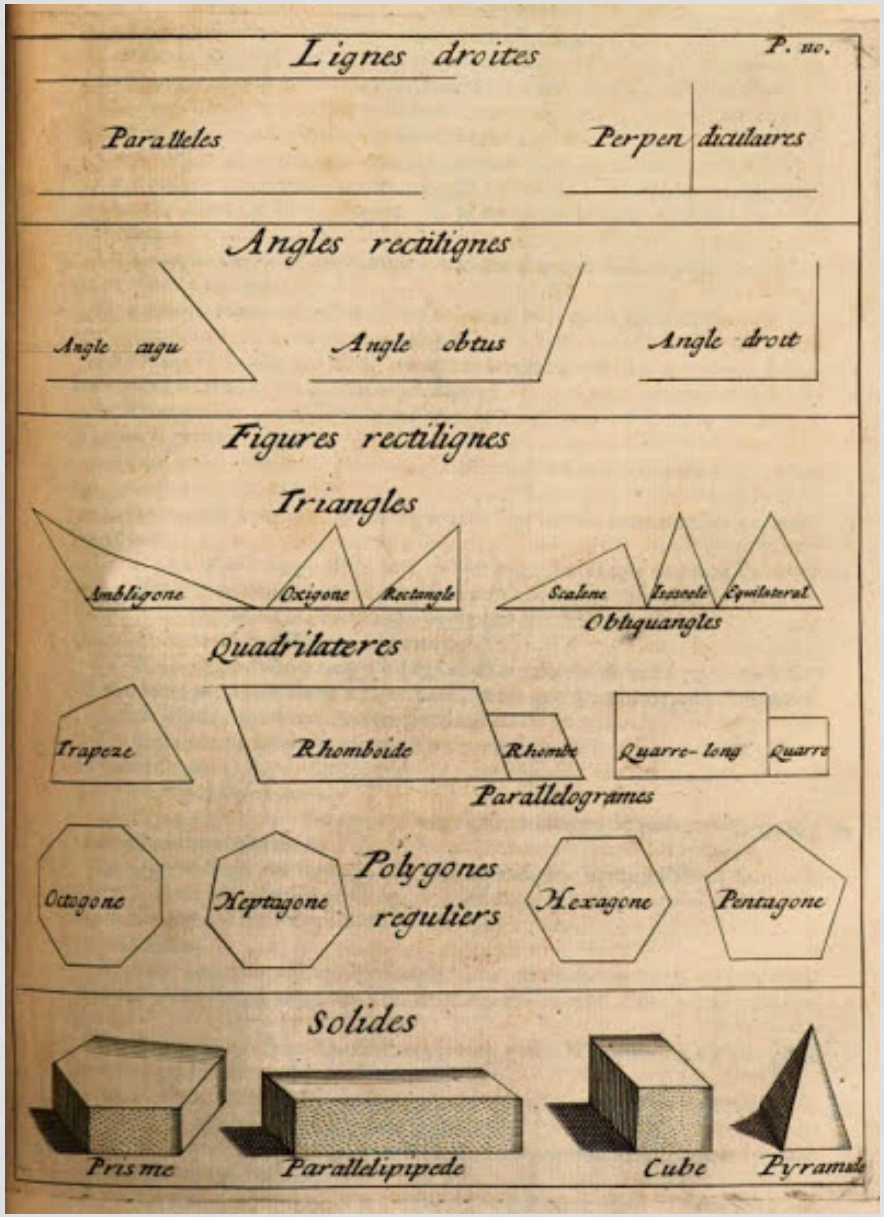

RECREATIONS MATHEMATIQUES ET PHYSIQUES,

QUI CONTIENNENT

Plusieurs Problêmes d'Arithmetique, de Geometrie, d'Optique, de Gnomonique, de Cosmographie, de Mecanique, de Pyrotechnie, & de Physique. Avec un Traité nouveau des Horloges Elementaires.

Par Mr OZANAM, Professeur des Mathematiques.

TOME PREMIER.

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RECREATIONS MATHEMATIQUES

RECREATIONS MATHEMATIQUES

PROBLEME XXI.

Deux personnes étant convenus de prendre à plaisir des nombres moindres qu'un nombre proposé, en continuant alternativement jusqu'à ce que tous leurs nombres fassent ensemble un nombre déterminé plus grand que le proposé, faire qu'on arrive à ce nombre déterminé plus grand.

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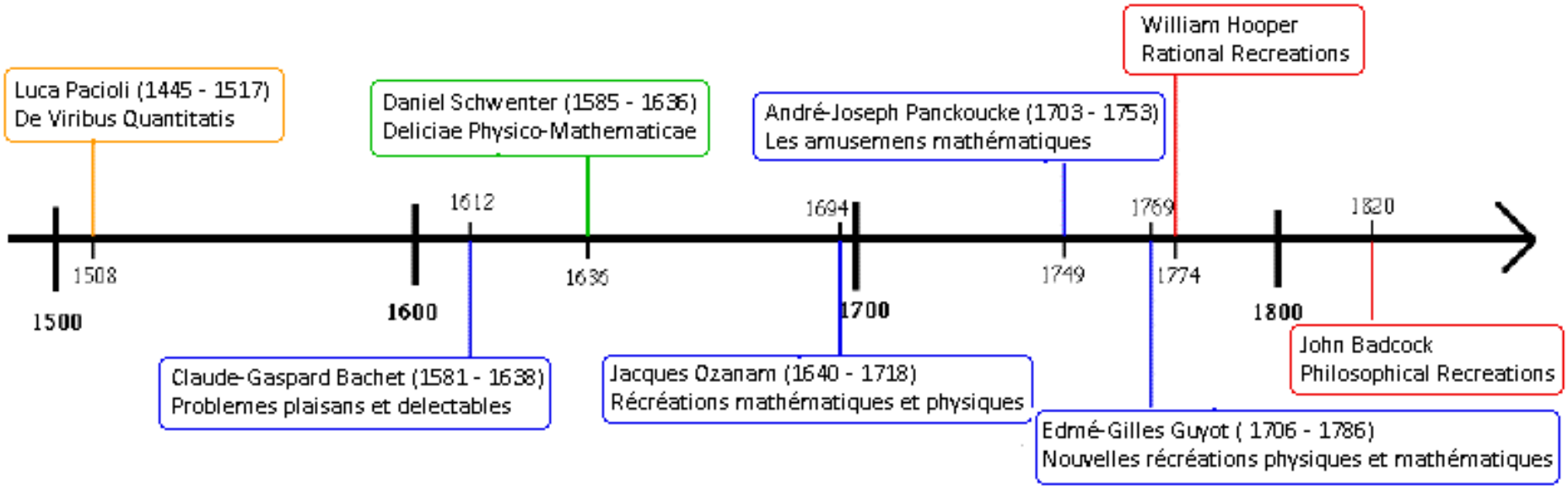
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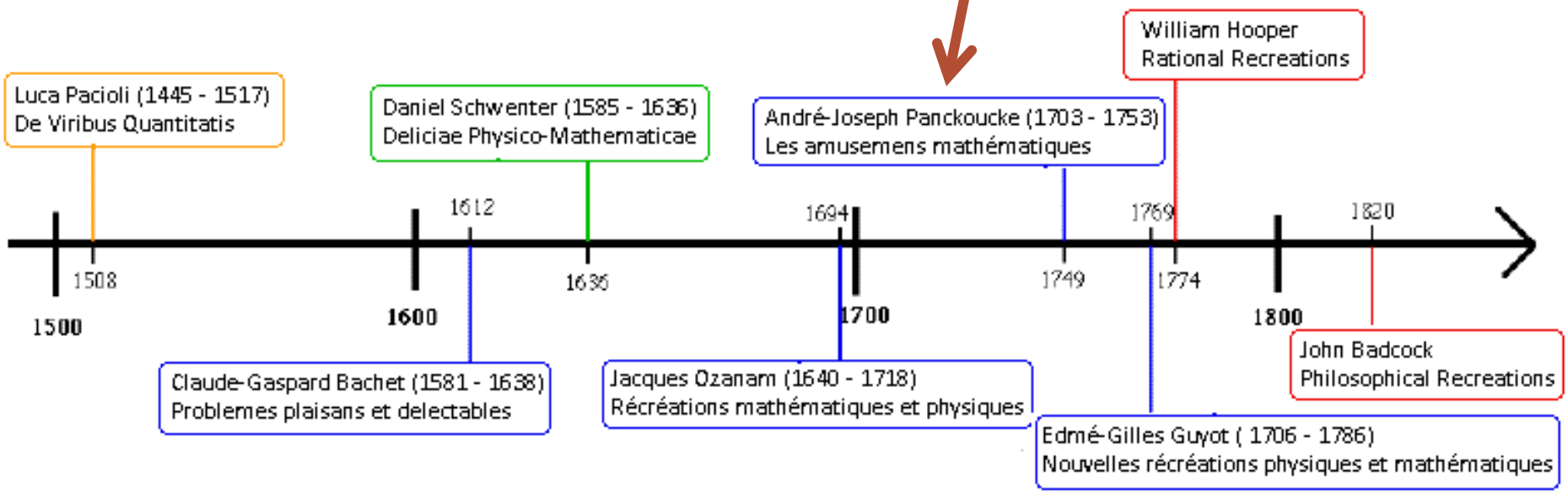
Daniel Schwenter (1585 - 1636)
Deliciae Physico-Mathematicae
André-Joseph Panckoucke (1703 - 1753)
Les amusemens mathématiques
William Hooper
Rational Recreations
1508
1612
1636
1694
1749
1769
1774
1820
1500
1600
1700
1800
Claude-Gaspard Bachet (1581 - 1638)
Problemes plaisans et delectables
Jacques Ozanam (1640 - 1718)
Récréations mathématiques et physiques
Edmé-Gilles Guyot (1706 - 1786)
Nouvelles récréations physiques et mathématiques
John Badcock
Philosophical Recreations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Jacques Ozanam (1640 - 1718)
Récréations mathématiques et physiques
Edmé-Gilles Guyot (1706 - 1786)
Nouvelles récréations physiques et mathématiques
John Badcock
Philosophical Recreations

PROBLEME 10.

Le Piquet des Cavaliers.

Deux amis voyagent à cheval, l'un propose à l'autre un cent de Piquet sans carte.

Ils conviennent, 1°. Que celui qui arrivera le premier à 100 sera défrayé du soupé, 2°. qu'ils ne pourront prendre alternativement plus de 10 à la fois.

LES

AMUSEMENS

MATHÉMATIQUES

PRECEDÉS

Des Elémens d'Arithmétique, d'Algébre & de Géométrie nécessaires pour l'intelligence des Problêmes.

Sapientem decet interdum Remittere aciem rebus agendis intentam. Aug. de Mus.

A LILLE,

Chez ANDRÉ-JOSEPH PANCKOUCKE.

ET SE VEND A PARIS,

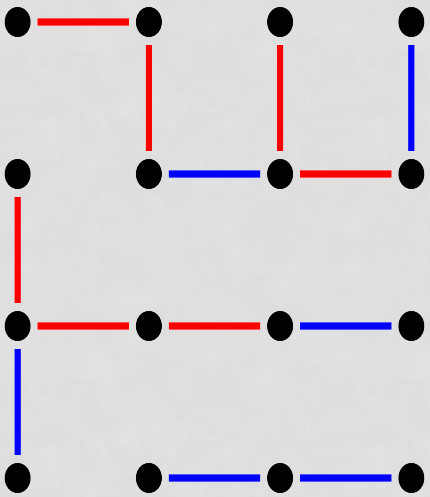
Chez TILLIARD, Libraire, Quai des Augustins, près le Pont Saint-Michel, à S. Paul.

M. DCC. XLIX.

Avec Approbation & Privilége du Roi.

Conclusion

- Nim game ancestors are part of "mathematical recreations", a new literary and editorial genre that emerged in the 17th century.
- Particular solutions are provided (not general) with examples.
- The game spread thanks to many reprints of the books (especially Ozanam's one).



Dots and Boxes and other *jeux de combinaisons* of the 19th c.

DOTS AND BOXES

Dots and Boxes is also known as :

- Dot to Dot

DOTS AND BOXES

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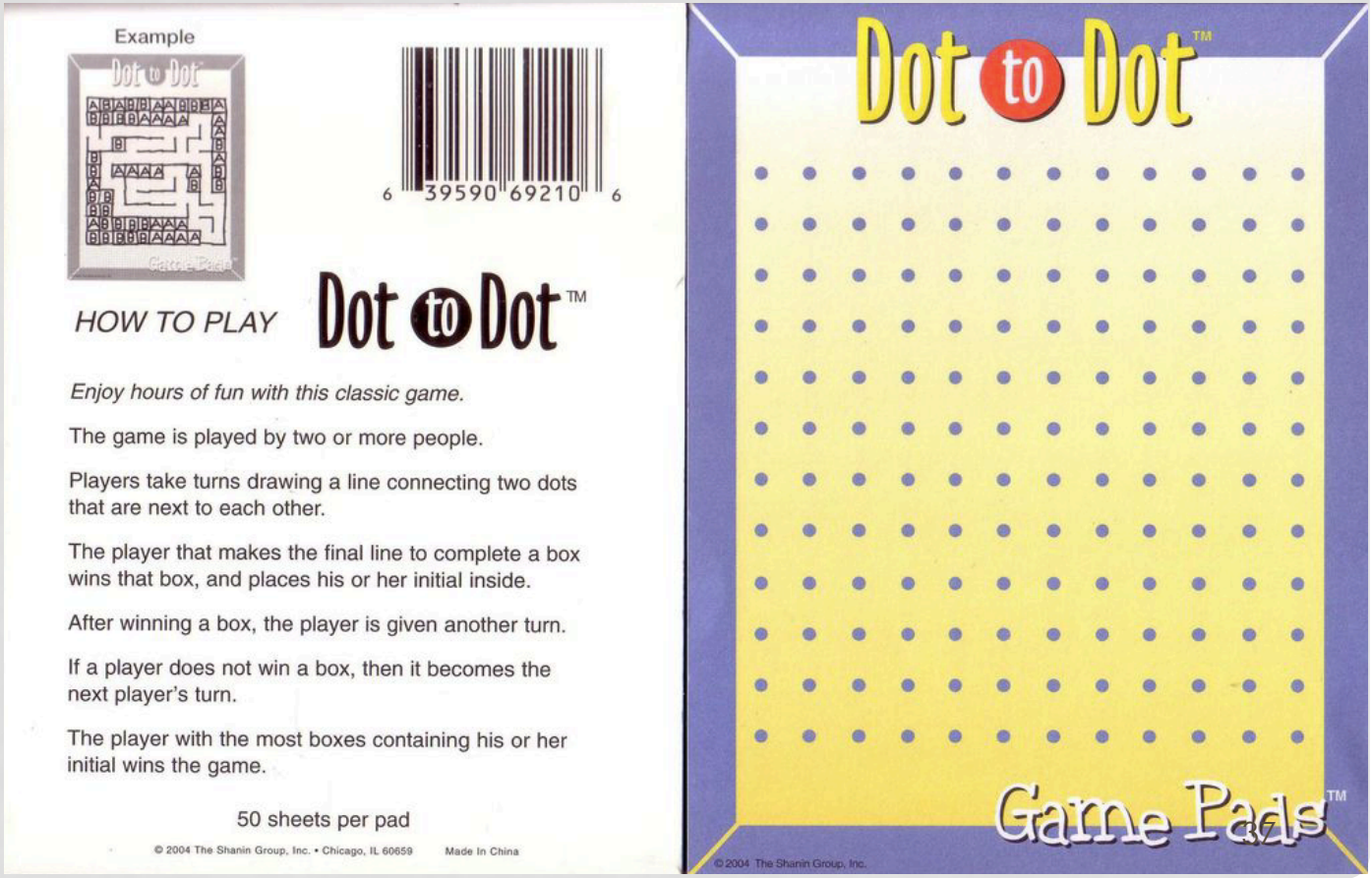
- Dot to Dot



Example

HOW TO PLAY Dot to Dot™

Enjoy hours of fun with this classic game.

The game is played by two or more people.

Players take turns drawing a line connecting two dots that are next to each other.

The player that makes the final line to complete a box wins that box, and places his or her initial inside.

After winning a box, the player is given another turn.

If a player does not win a box, then it becomes the next player's turn.

The player with the most boxes containing his or her initial wins the game.

50 sheets per pad

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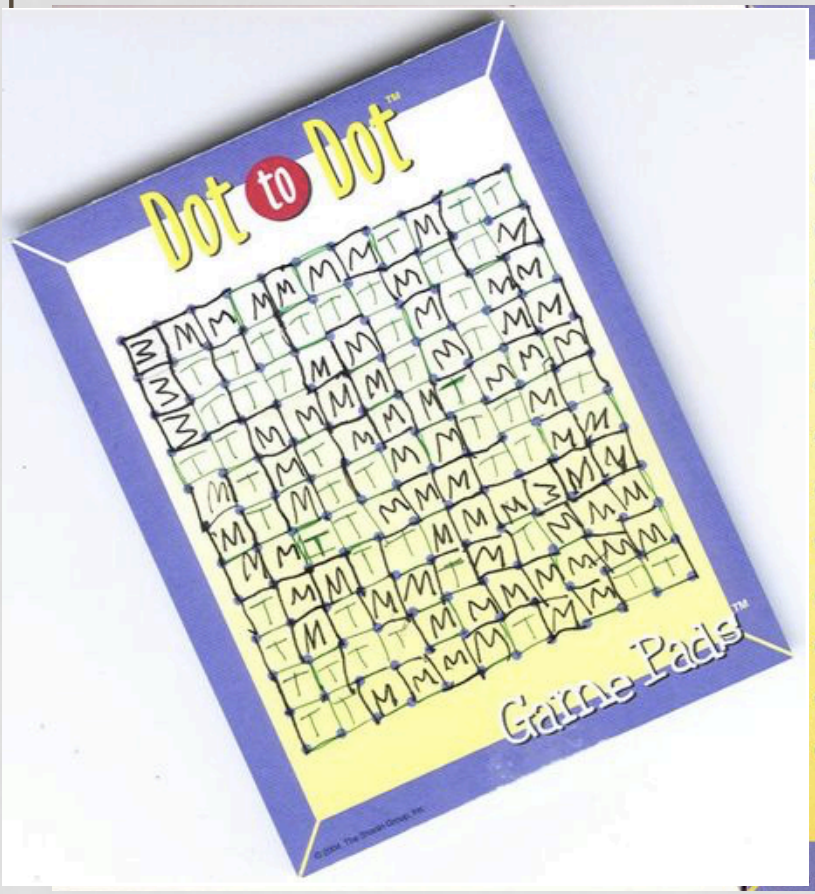
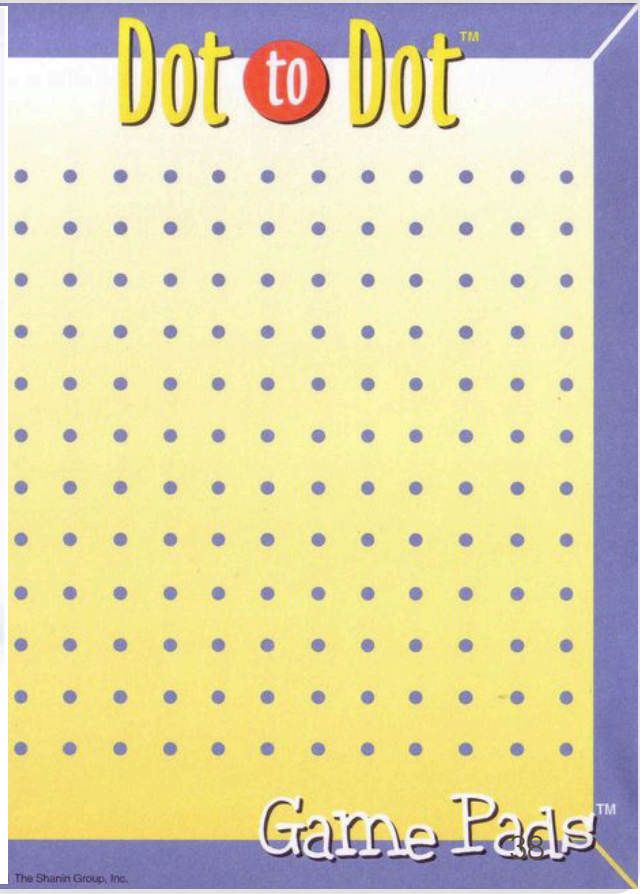
DOTS AND BOXES

Dots and Boxes is also known as :

- Dot to Dot





DOTS AND BOXES

Dots and Boxes is also known as :

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- Box It

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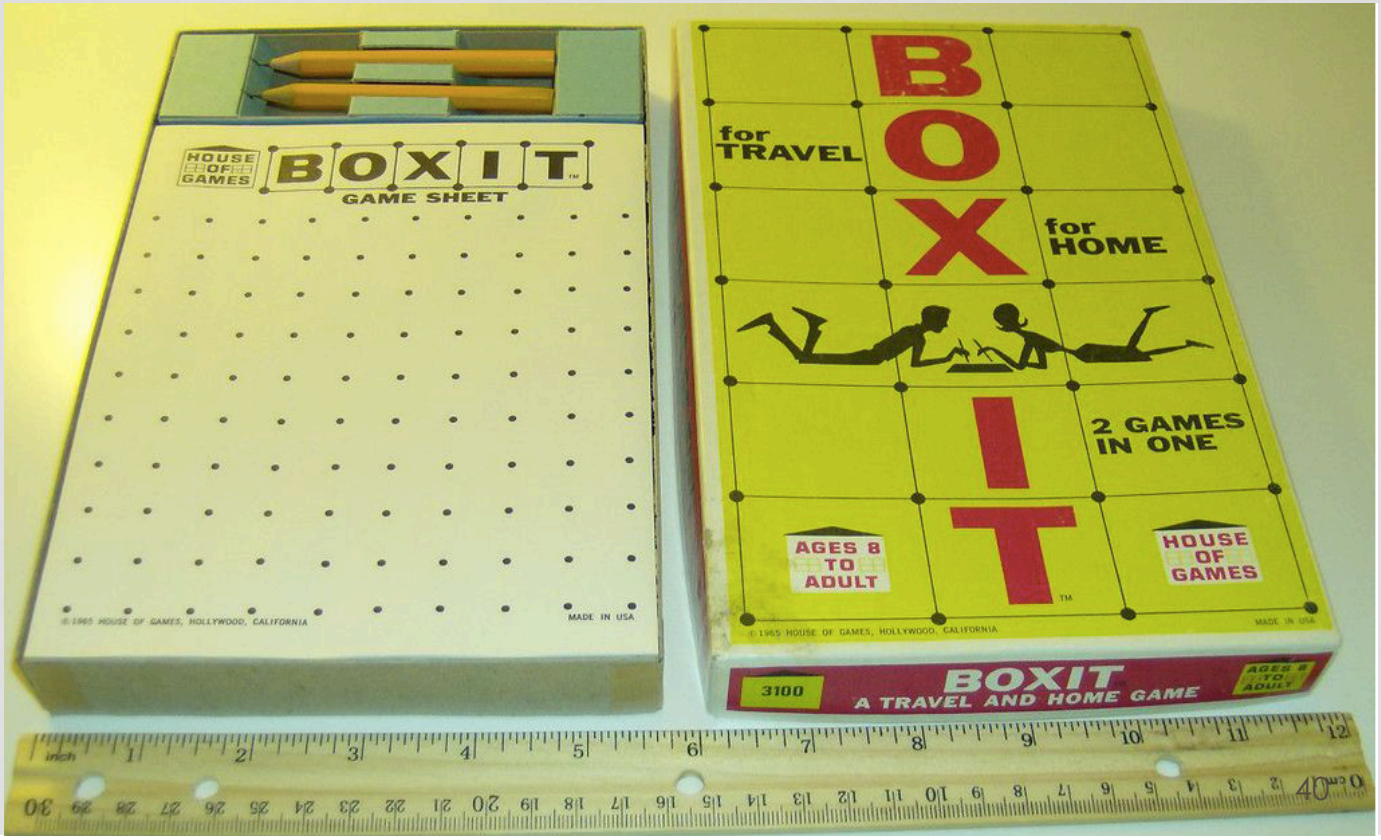

Dots and Boxes i

- Dot to Dot
- Box It

NUMBER OF PLAYERS: Two or more may play.

OBJECT OF GAME: To complete the most boxes.

HOW TO PLAY: Use one game sheet only. Each player, in turn, draws a vertical or horizontal line between two dots next to one another. (Fig. 1) Avoid putting the third side on any possible box, so that an opponent cannot complete a box. When a player completes a box he puts his initial in it to show that he won the box. For each box you complete you get an extra turn.

SCORING:

Player with the most box

(Fig. 1)

HOW TO PLAY BOXIT™ TRIANGLES

NUMBER OF PLAYERS: Two or more may play.

OBJECT OF GAME: To score most points.

HOW TO PLAY: Use one game sheet. Follow same rules as for BOXIT, except that players can also make diagonal line between two adjacent dots. (Fig. 2) This is a more difficult way to play BOXIT, because now a player must avoid putting either the second side on a possible triangle as well as the third side on a possible box. If a box is completed without a triangle, a triangle may not be added. When the game sheet is filled the game ends.

SCORING:

Each triangle is 5 points. Each box is 5 points. If the same player wins two triangles that make a box he gets 5 points for each triangle and 10 points extra for the box. Each player adds his score and the one with most points wins.

(Fig. 2)

Enjoy BOXIT™ Then play 6 STEPS™ and UPSCOPE™

other Fun Games by the HOUSE OF GAMES

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DOTS AND BOXES

Dots and Boxes is also known as :

- Dot to Dot
- Box It
- Squares

DOTS AND BOXES

DOTS AND BOXES

Dots and Boxes is also known as :

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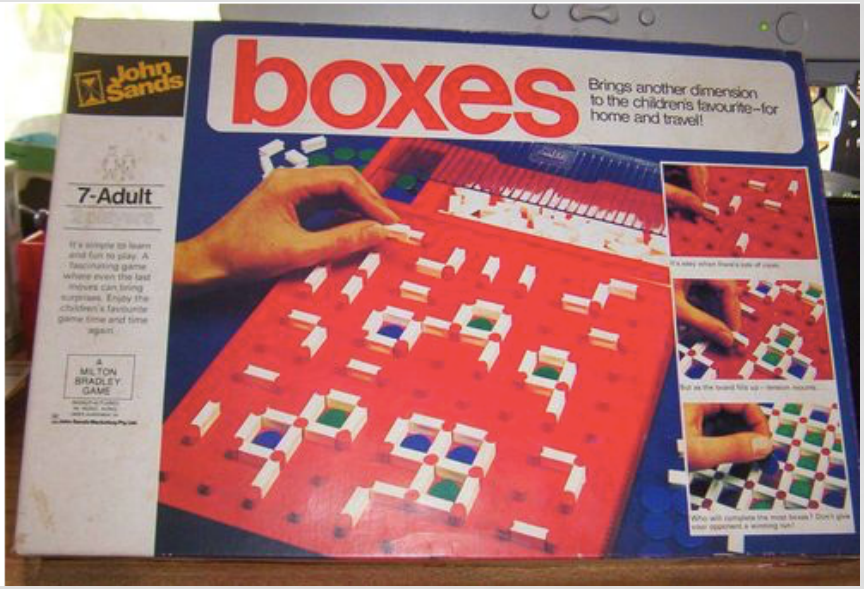
- Boxes (Kamertje verhuren (BE), Square (DE), Les petits carrés (FR)…)

DOTS AND BOXES



DOTS AND BOXES

Dots and Boxes is also known as :

- Dot to Dot
- Box It
- Squares
- Boxes (Kamertje verhuren (BE), Square (DE), Les petits carrés (FR)…)
- Stake Your Claim

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- Squares
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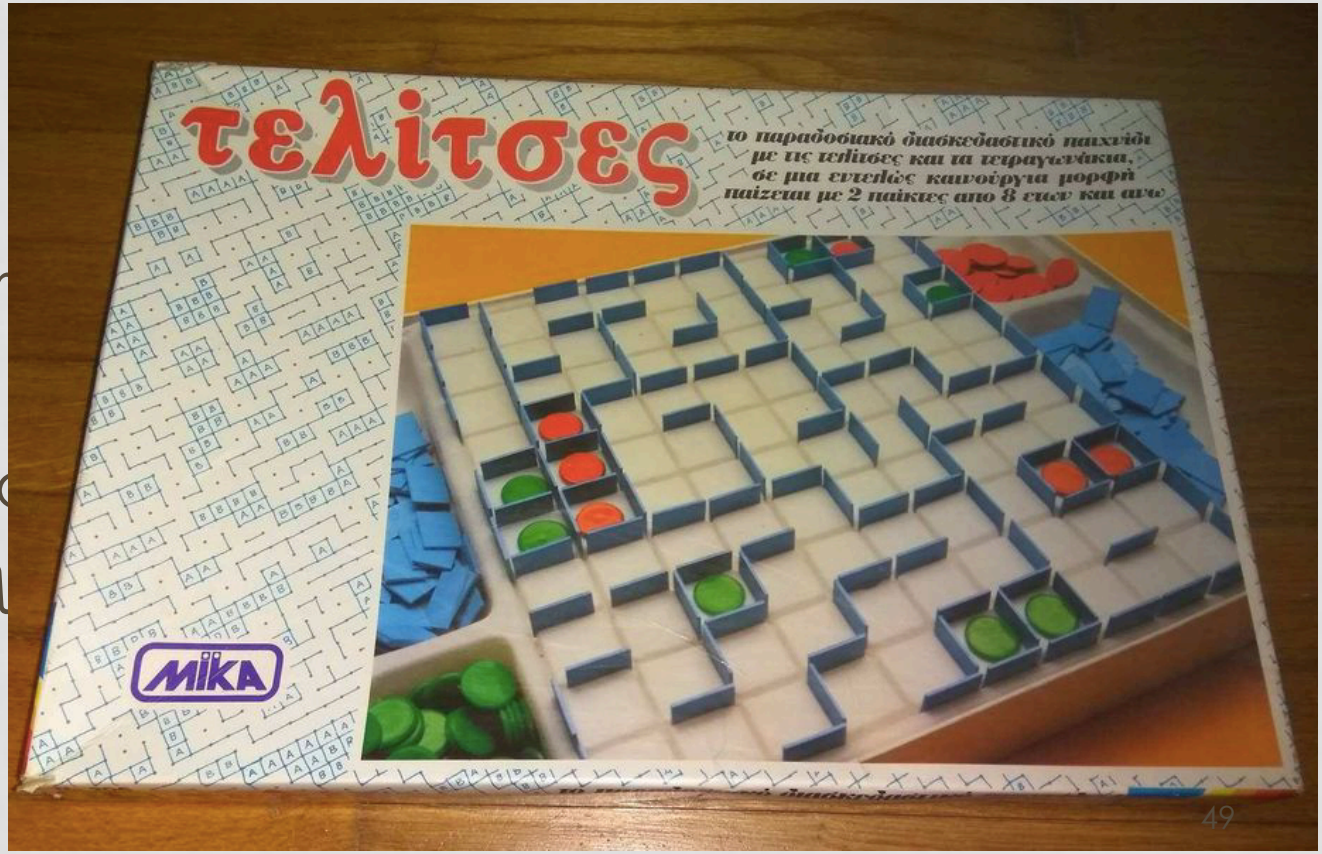

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- Squares
- Boxes (Kamertje verhuren (BE), Square (DE), Les petits carrés (FR)…)
- Stake Your Claim
- Telitses (τ ε λ ι τ σ ε ς)
- and many others…

The original game/name…

The original game/name…


LA PIPOPIPETTE

JEU DE COMBINAISONS

Dédié aux Élèves de l'X

PAR UN ANTIQUE

EDOUARD LUCAS (1842 – 1891)

French arithmetician.

He published a lot of works on arithmetics and its applications, such as recreational mathematics.

Le jeu de l'école polytechnique

« nouveau jeu de combinaison assez original »

« a new game of combination, quite original »

« Ce jeu nous a paru assez curieux pour en donner ici la description ; mais jusqu'à présent, nous ne connaissons pas d'observations, ni de remarques assez importantes pour en dire davantage. »

« This game seemed curious enough to give the description here; but so far, we do not know any comments or remarks important enough to say more. »

Récréations mathématiques, Vol. 2, 1883

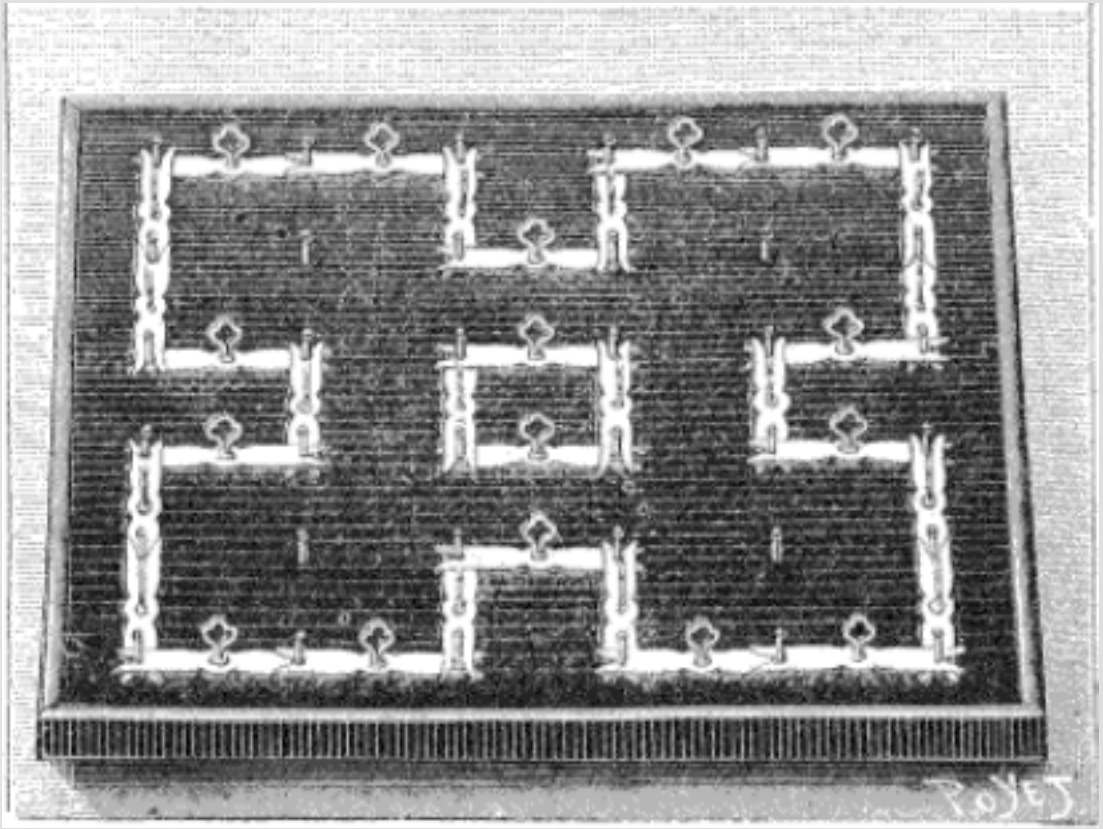
La Pipopipette

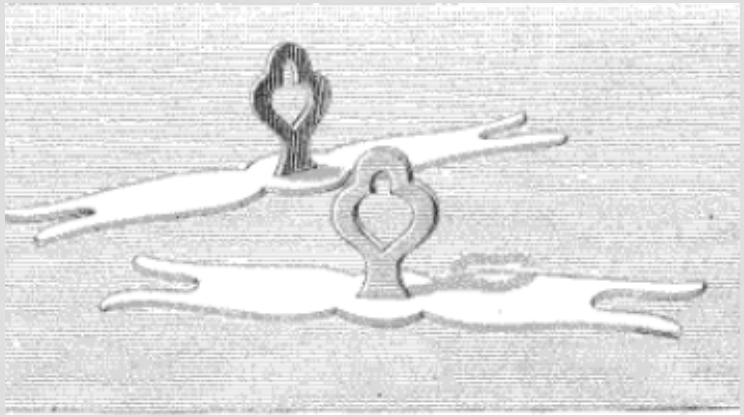
« *La Pipopipette est un jeu fort original dont les combinaisons ne laissent rien au hasard et qui peut se jouer à deux, trois, quatre personnes ou plus.* […] *elle a été imaginée à l'École Polytechnique par plusieurs de mes anciens élèves de Spéciales. C'est donc avec toute justice que je suis heureux de leur dédier ce jeu.* […] *En la voyant, il s'écrieront : Ah ! saperlipopette ! Belle Pipopipette !* »

« *The Pipopipette is a very original game whose combinations leave nothing to chance and can be played by two, three, four or more people. […] it was imagined at the École Polytechnique by several of my former students of Spéciales. It is with all justice that I am happy to dedicate this game to them. […] On seeing it, they will exclaim: Ah! saperlipopette! Beautiful Pipopipette!* »

Jeux scientifiques pour servir à l'Histoire, à l'Enseignement et à la Pratique du calcul et du dessin, 1889

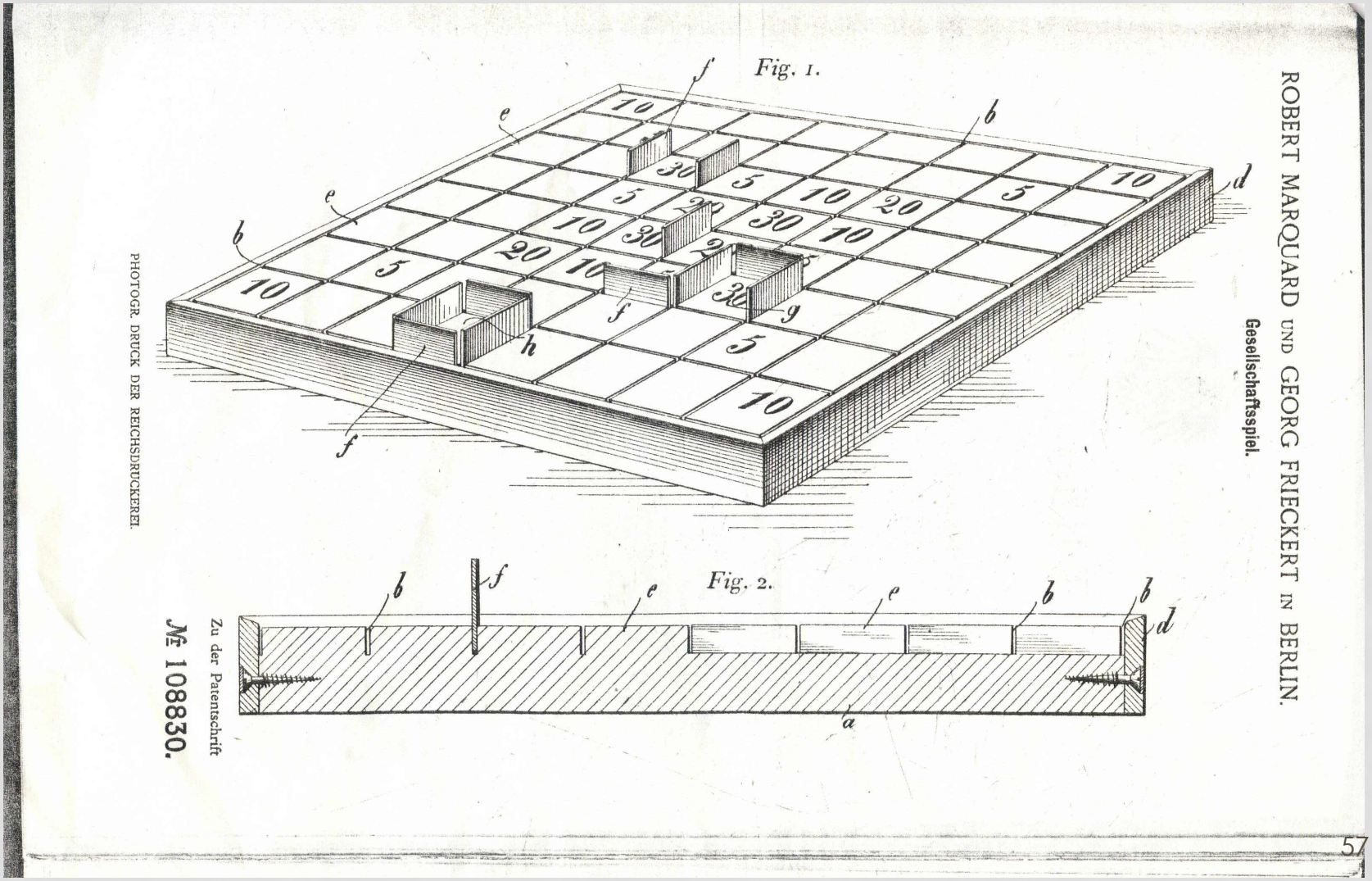
La Pipopipette





Overall view of the board (5 by 5) and detailed bars that connect two dowels.
In: *La Nature*, n°853, 5 Octobre 1889, *Nouveaux jeux scientifiques de M. E. Lucas*

GERMAN PATENT 1899



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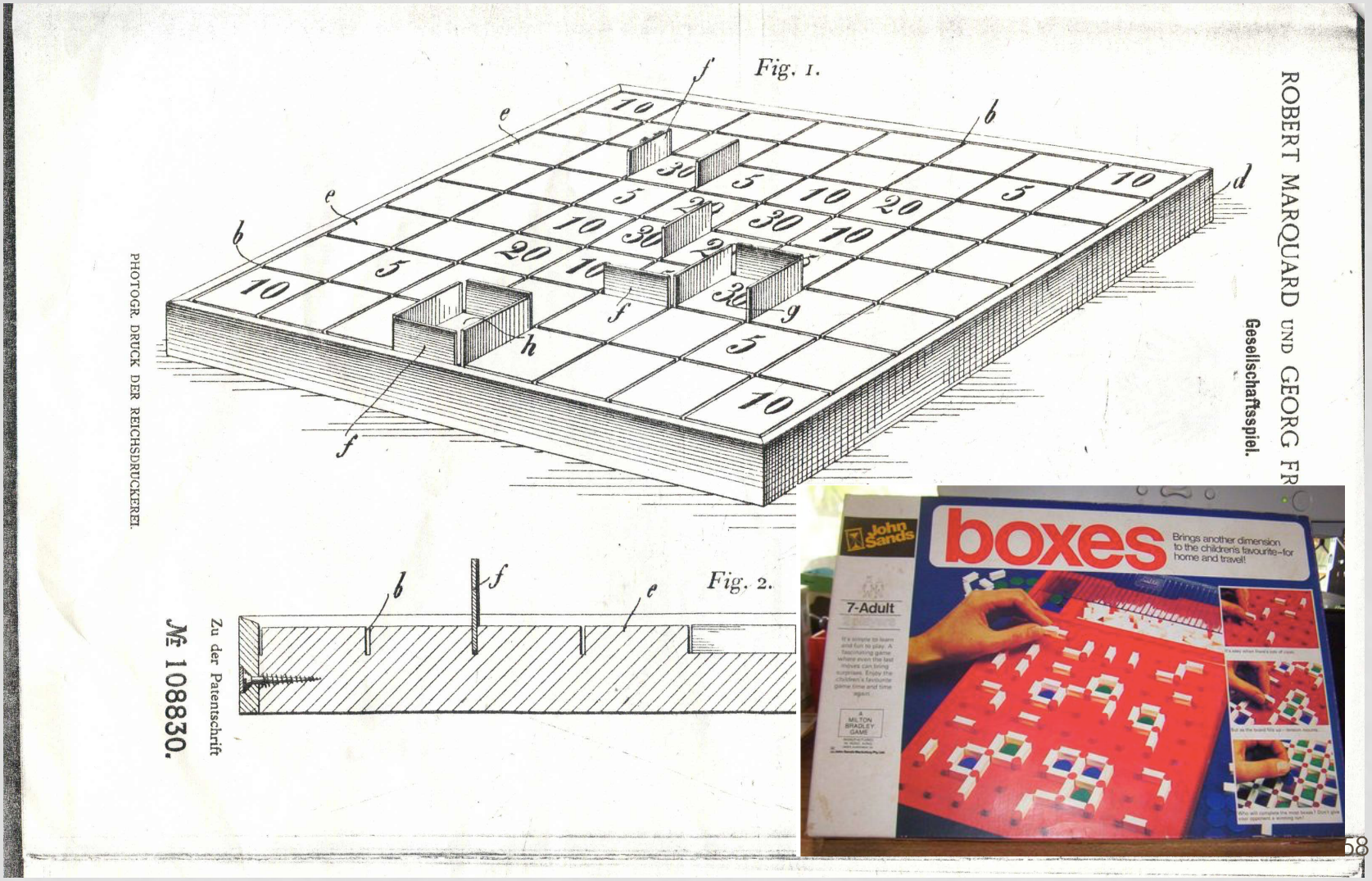

A MAGAZINE OF A THOUSAND GIRLS

THE LADIES' HOME JOURNAL

DRAWN BY HARRISON FISHER

JUNE 1903 TEN CENTS

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Made ready to use in ten beautiful colors. You can apply it.

If your dealer does not handle Creolite, we will ship it to you express paid at the following prices:

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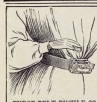

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Summer Session, Atlantic City, N. J.

Indoor Fun for Rainy Evenings

The Game of Spin-Spin

By Mrs. W. J. Staudlee

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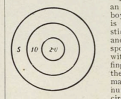


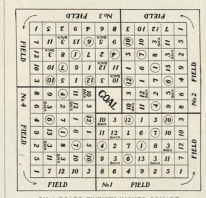
PLAYED WITH A HOME-MADE TOP

Now make a top from an empty spool. Every boy knows how. The top is made with a piece of stick about an inch long and one end of an empty spool, and may be spun with the thumb and forefinger. Place the top on the dot in the circle marked 20 and spin. The number of the line or circle the top dies on is the number you score. For instance, if in the circle or on the line marked 10, you score ten, and so on. If the top dies clear over the line marked 5 you score nothing. The first one to score one hundred wins the game. Any number of children can play at a time.

The Game of 91

By Frank Hanson

THERE should be a game board twenty inches square giving a field two inches wide; each square should measure an inch and a half and be numbered. The articles used in playing may be checkers or large buttons, but I would suggest blocks of rubber about three-quarters of an inch square. The mode of using these blocks is by snapping them with the fingers, endeavoring, of course, to make them fall upon certain numbers. When the rubber does not fall upon a square the player loses his turn. The object of the game is to score ninety-one points and enter the goal on the next move. Each player must confine his moves to one of the four spaces indicated by the heavy lines.



ON A BOARD TWENTY INCHES SQUARE

Commence by placing a block in the field. Each player makes one move, and any player may make his first move upon any outside numbers he wishes. The next player does likewise, and so the game continues until it is finished.

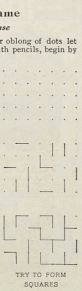
Make your moves by placing your finger on the board against your block, snapping it as nearly as possible to where you wish it to be.

Should a player score sixty or any large number of points and then get on one of the back numbers he is put back as many points as the back number indicates. For instance, if you have forty-five and fall upon 12 BACK you will have to go back to 33. If a player at any time gets upon one of the ring numbers he begins over again, having the points indicated by the number to score, before he can commence to count. Should a player get more than ninety-one points he must go back to his last number; thus, if you have eighty-eight and get upon 6 you must go back to 88. A player may—if his score is too large—move upon a back number, so that he may have another chance to secure the numbers which will help him to win the game.

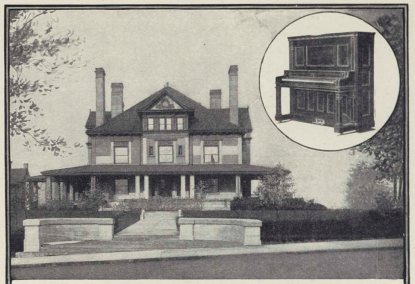
The Dot Game

By C. E. Ganse

HAVING formed a square or oblong of dots let the children, provided with pencils, begin by joining consecutive dots, but in such a way as to prevent one another from making a complete square. For a while this is easy, but presently the places are so few where one can mark without letting the next player get a square that careful search must be taken to find a place. Finally they are all gone. The next player completes a square, and, as a reward, is allowed to join two other dots. Very likely he gets a second square, perhaps several. When he can get no more he still must join another pair of dots, and that permits the following player to score. When any one forms a square he writes in it the initial of his name, or other distinguishing mark. By this arrangement the score is readily counted.



TRY TO FORM SQUARES



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A MAGAZINE OF A THOUSAND GIRLS

THE LADIES' HOME JOURNAL

DRAWN BY HARRISON FISHER

JUNE 1903 TEN CENTS

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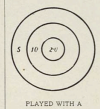
By Mrs. W. J. Staudlee

THE game of "spin-spin," outlined below, cannot fail to interest and amuse. Take a large square board or a piece of pasteboard, and chalk or mark with ink the design illustrated. The size of circles must depend on the size of the board. Circles of colored paper may be used if desired.



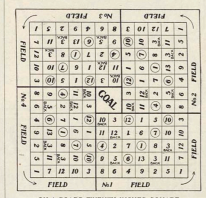
PLAYED WITH A HOME-MADE TOP

Now make a top from an empty spool. Every boy knows how. The top is made with a piece of stick about an inch long and one end of an empty spool, and may be spun with the thumb and forefinger. Place the top on the dot in the circle marked 20 and spin. The number of the line or circle the top dies on is the number you score. For instance, if in the circle or on the line marked 10, you score ten, and so on. If the top dies clear over the line marked 5 you score nothing. The first one to score one hundred wins the game. Any number of children can play at a time.

The Game of 91

By Frank Hanson

THERE should be a game board twenty inches square giving a field two inches wide; each square should measure an inch and a half and be numbered. The articles used in playing may be checkers or large buttons, but I would suggest blocks of rubber about three-quarters of an inch square. The mode of using these blocks is by snapping them with the fingers, endeavoring, of course, to make them fall upon certain numbers. When the rubber does not fall upon a square the player loses his turn. The object of the game is to score ninety-one points and enter the goal on the next move. Each player must confine his moves to one of the four spaces indicated by the heavy lines.



ON A BOARD TWENTY INCHES SQUARE

Commence by placing a block in the field. If player makes one move, and any player may his first move upon any outside numbers he The next player does likewise, and so th continues until it is finished.

Make your moves by placing your fin the board against your block, snapping it arly as possible to where you wish it to be.

Should a player score sixty or any number of points and then get on one of th ck numbers he is put back as many points as th ack number indicates. For instance, if you forty-five and fall upon 12 BACK you will go back to 33. If a player at any time upon one of the ring numbers he begins again, having the points indicated by the s score, before he can commence to count. yer get more than ninety-one points back to his last number; thus, if you have ight and get upon 6 you

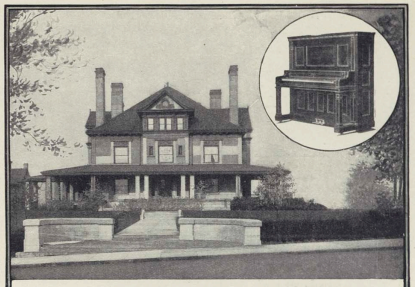
That he may have another chance to secure the numbers which will help him to win the game.

The Dot Game

By C. E. Ganse

HAVING formed a square or oblong of dots let the children, provided with pencils, begin by joining consecutive dots, but in such a way as to prevent one another from making a complete square. For a while this is easy, but presently the places are so few where one can mark without letting the next player get a square that careful search must be taken to find a place. Finally they are all gone. The next player completes a square, and, as a reward, is allowed to join two other dots. Very likely he gets a second square, perhaps several. When he can get no more he still must join another pair of dots, and that permits the following player to score. When any one forms a square he writes in it the initial of his name, or other distinguishing mark. By this arrangement the score is readily counted.

TRY TO FORM SQUARES



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Senator Flinn, Politician, Steel Master and Capitalist, is one of Pittsburg's wealthiest and best known citizens. Senator Flinn has no exact duplicate of the specially designed piano made for President McKinley for the White House. It is after the celebrated Chippendale style of furniture and was ordered through Mr. S. Hamilton, of Pittsburg. The above view is one of a series of representative American homes in which A. B. CHASE Pianos delight their occupants.

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We will make you a piano to correspond architecturally and artistically with the furnishings of your home.

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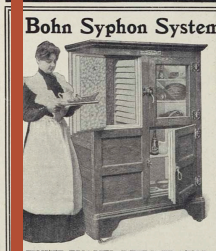

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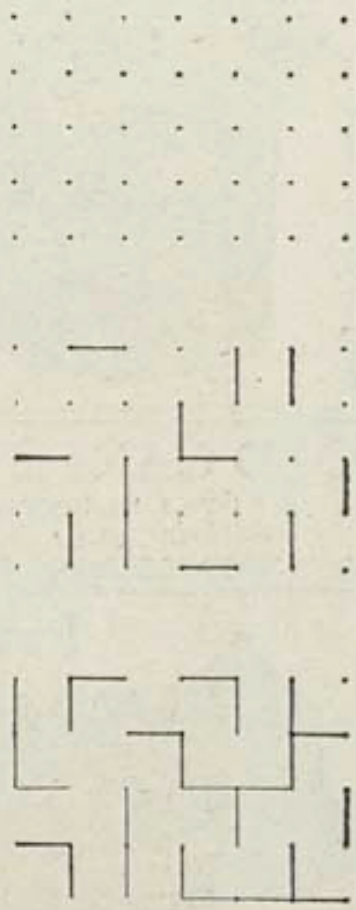
The Dot Game

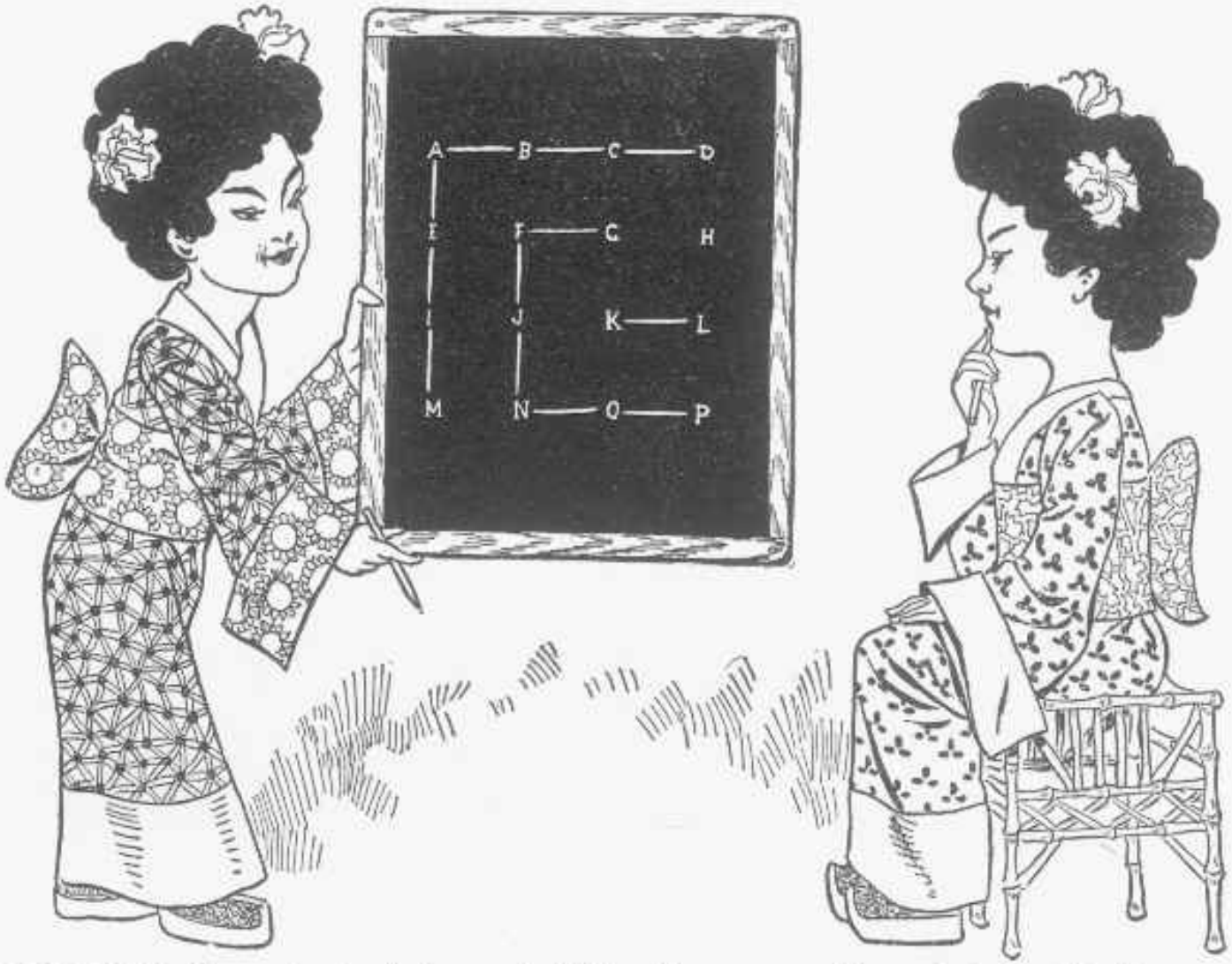
By C. E. Ganse

HAVING formed a square or oblong of dots let the children, provided with pencils, begin by joining consecutive dots, but in such a way as to prevent one another from making a complete square. For a while this is easy, but presently the places are so few where one can mark without letting the next player get a square that careful search must be taken to find a place. Finally they are all gone. The next player completes a square, and, as a reward, is allowed to join two other dots. Very likely he gets a second square, perhaps several. When he can get no more he still must join another pair of dots, and that permits the following player to score. When any one forms a square he writes in it the initial of his name, or other distinguishing mark. By this arrangement the score is readily counted.



TRY TO FORM SQUARES

THE BOXER'S PUZZLE



What about the theory?

La Pipopipette, theory

« Sa pratique, quoique facile donne lieu à des surprises continuelles ; mais sa théorie n'est pas connue. Cependant nous conseillons aux nombreux amateurs, qui vont l'étudier et le propager, d'éviter avec soin la formation par l'adversaire de lignes en zigzag ou en marches d'escalier. »

« His practice, though easy, gives rise to continual surprises; but his theory is not known. However we advise the many amateurs, who will study and propagate it, to carefully avoid the formation by the opponent of zigzag lines or steps. »

Jeux scientifiques pour servir à l'Histoire, à l'Enseignement et à la Pratique du calcul et du dessin, 1889

La Pipopipette, theory

« Je n'ai pas assez pratiqué ce jeu pour pouvoir rien affirmer. Mais il me semble que, pour le second, la meilleure défense consiste à jouer les coups symétriques de ceux du premier joueur, tout du moins jusqu'à ce qu'on arrive à la fermeture des carrés. À ce moment, on devra parfois déroger à la règle ; mais le plus souvent elle assurera, je crois, le gain de la partie. »

« I have not practiced this game enough to be able to say anything. But it seems to me that for the second, the best defense is to play the symmetrical moves of the first player, at least until we reach the closing of the squares. At this point, we will sometimes have to depart from the rule; but most often it will ensure, I believe, the win of the game. »

L'arithmétique amusante, 1895, p. 204 (posthumous)

La Pipopipette, theory

- Wilhelm Ahrens' *Altes und Neues aus der Unterhaltungsmathematik* (1918) :

La Pipopipette, theory

- Wilhelm Ahrens' *Altes und Neues aus der Unterhaltungsmathematik* (1918) :

Wir beginnen mit dem denkbar einfachsten Fall, dem der *2 × 2 Felder* (Fig. 37), die wir mit den in die Figur eingetragenen Zahlen bezeichnen, während die Randlinien zwischen den Feldern in der Weise gekennzeichnet werden sollen, daß beispielsweise die Randlinie zwischen *1* und *2* als *1,2* bezeichnet wird. Heißen die Spieler *A* und *B*, wobei *A* der Anziehende sein mag, so kann sich die Partie nur so abwickeln: *A* zieht eine Randlinie, und zwar ist es offenbar gleichgültig, welche, also etwa *1,2*. Darauf zieht *B 1,3*, besetzt somit Feld *1* und hat daher einen weiteren Zug, zieht also etwa *2,4* und besetzt so auch Feld *2*, zieht darauf schließlich *3,4* und besetzt damit auch die Felder *3* und *4*. *B* hat mithin alle vier Felder besetzt. Man sieht somit: Bei *2 × 2* Feldern siegt der Nachziehende unter Besetzung sämtlicher vier Felder. *B* kann sogar beinahe gar nicht anders als siegen; er müßte nämlich, wenn er absichtlich den Sieg verscherzen wollte, auf *A*: *1, 2* geradezu antworten mit dem törichten Zug: *3,4*, worauf *A* durch die Züge *1,3* und *2,4* alle vier Felder erobern würde.

Fig. 37.

La Pipopipette, theory

- Wilhelm Ahrens' *Altes und Neues aus der Unterhaltungsmathematik* (1918) :

Felder besetzen. Nachdem *B* nämlich *3,5* gezogen hat, handelt es sich nur noch um das Quadrat der 2×2 Felder, und es ist daher bei der völligen Symmetrie dieser Restfigur gleichgültig, welchen der Züge wir für *A* annahmen. Sagen wir, daß er *1,2* gezogen hat, so zieht *B* etwa der Reihe nach *1,3*; *2,4*; *3,4*, wie im Falle der Fig. **37**. Damit ist endgültig gezeigt, daß es für *A* keinen Eröffnungszug gibt, der seine Niederlage abwenden könnte, und wir dürfen somit sagen: Bei dem Spielrahmen der Fig. **38** (fünf Felder) siegt der Nachziehende.

Fig. 38.

La Pipopipette, theory

- Wilhelm Ahrens' *Altes und Neues aus der Unterhaltungsmathematik* (1918) :

Als letztes Beispiel wollen wir ein Gebiet von 3 × 3 Feldern (Fig. 41) studieren. *A* eröffnet mit *4,5* und gewinnt, wie wir alsbald erkennen werden. Wenn *B* als ersten Zug etwa *1,2* tut, so *A* der Reihe nach: *1,4* (Besetzung von *1*); *4,7* (Besetzung von *4*); *7, 8* (Besetzung von *7*). Es bleibt dann nur noch ein Gebiet von 2 × 3 Feldern; wir haben somit den Fall der Fig. 39 und, da *A* noch einen Zug zu tun hat, so siegt er unbedingt. — Im wesentlichen dieselben Verhältnisse haben wir, wenn der erste Zug von *B*, statt *1,2*, lautet: *1,4* oder *4,7* oder *7,8*. Damit sind denn für den ersten Zug von *B* alle die Möglichkeiten erledigt, die dem linken Streifen, der von den Feldern *1*, *4*, *7* gebildet wird, angehören, und wir haben in Anbetracht der Symmetrie nur noch folgende wesentlich verschiedene Fälle für den ersten Zug von *B* zu berücksichtigen:

1	2	3
4	5	6
7	8	9

Fig. 41.

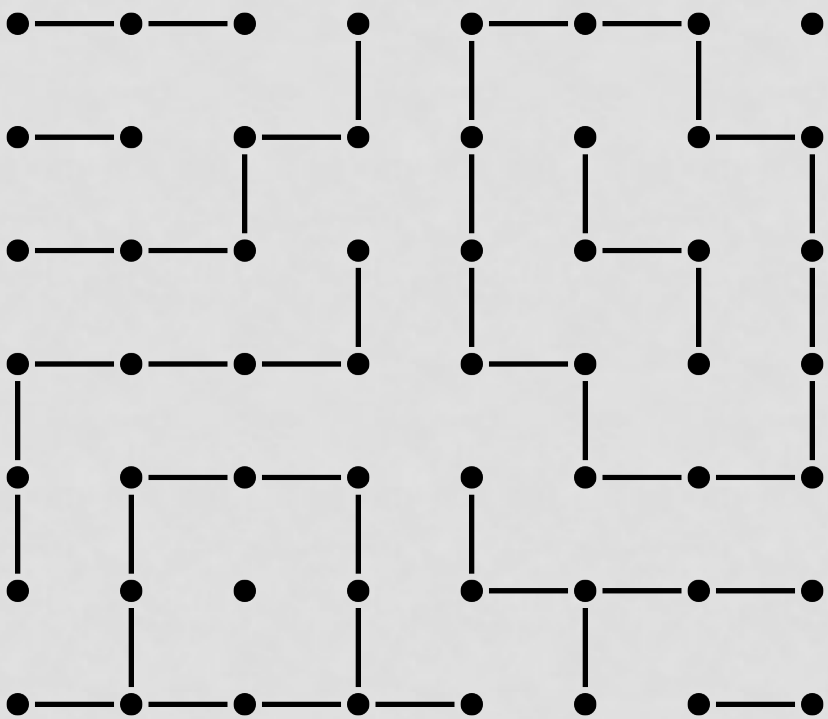
I. *2,3*;
II. *3,6*;
III. *2,5*;
IV. *5,6*.

La Pipopipette, theory

- John Holladay: "A Note on the Game of Dots", *American Mathematical Monthly*, 1966 :

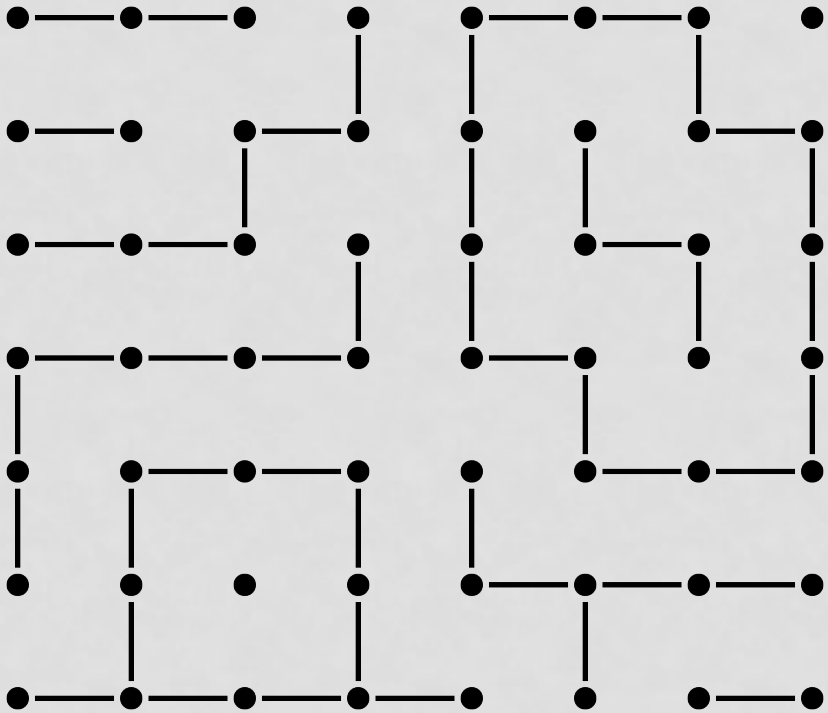
La Pipopipette, theory

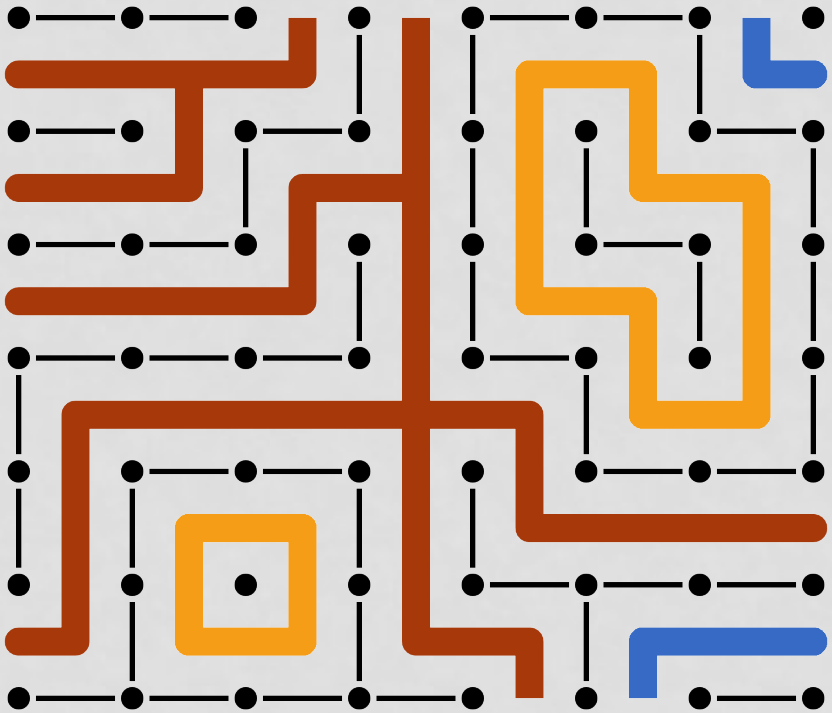
- John Holladay: "A Note on the Game of Dots", *American Mathematical Monthly*, 1966 :



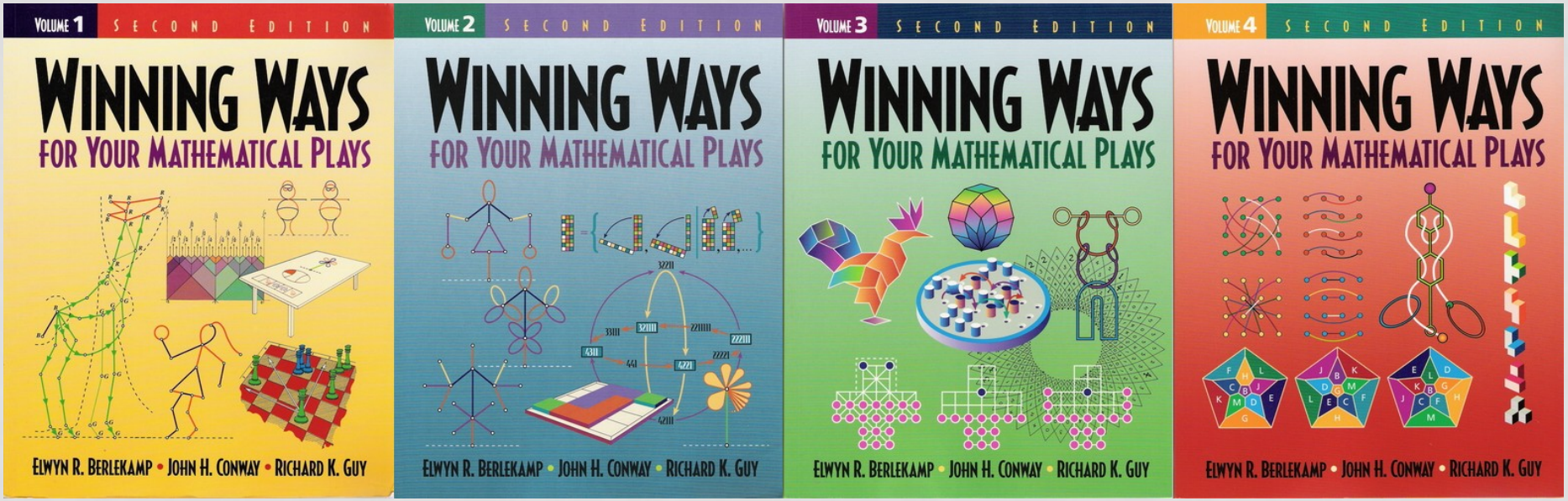
La Pipopipette, theory

- John Holladay: "A Note on the Game of Dots", *American Mathematical Monthly*, 1966 :

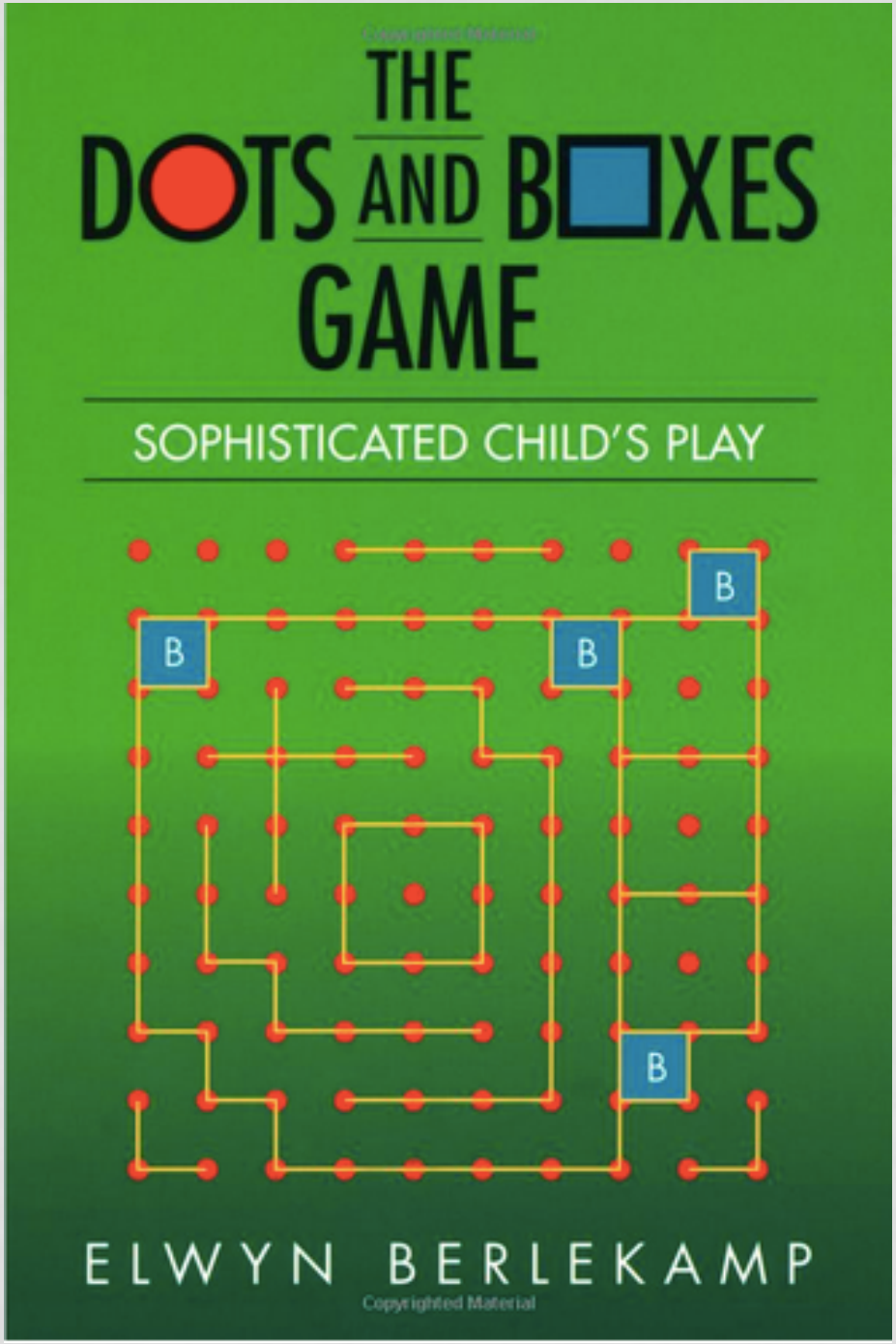


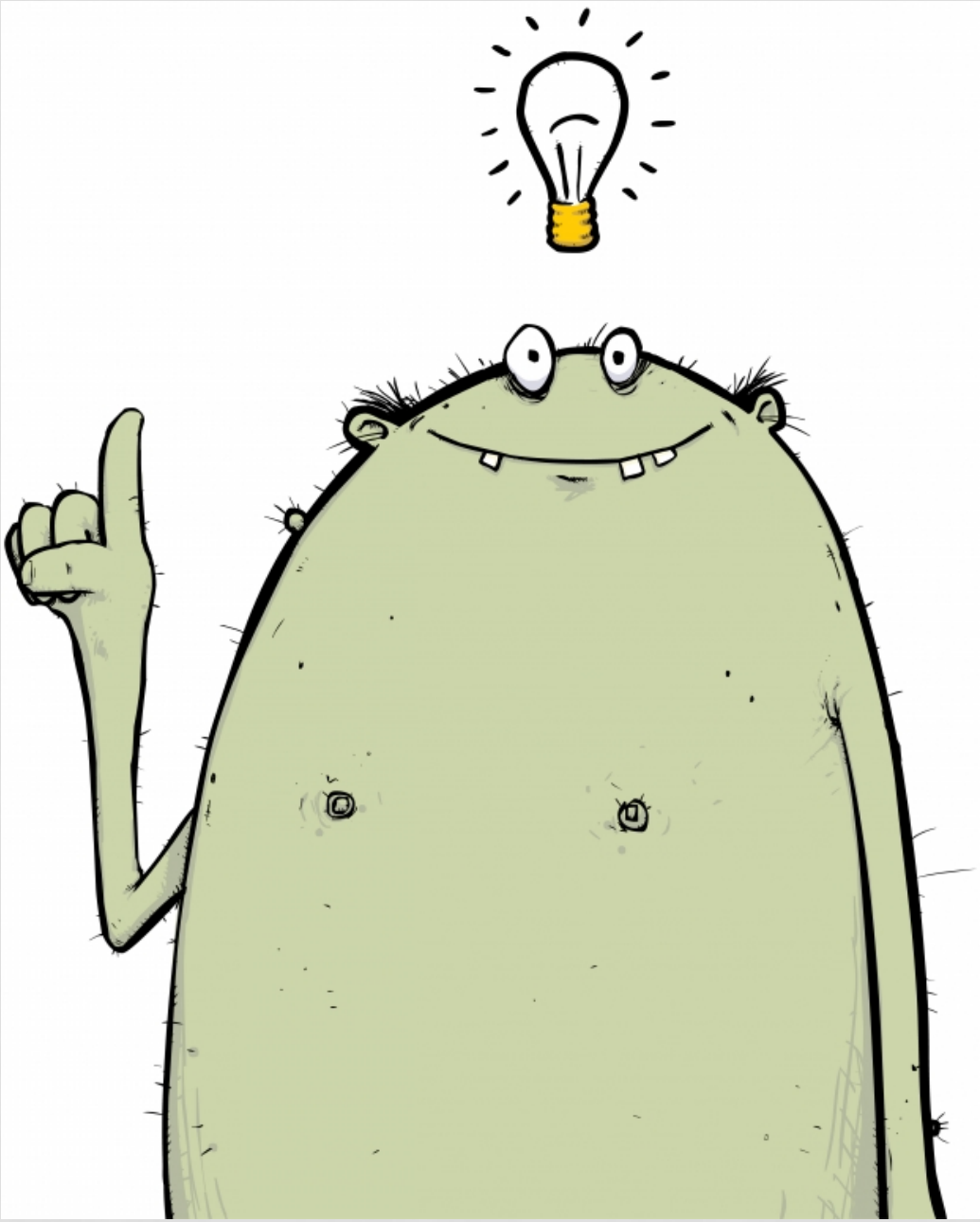


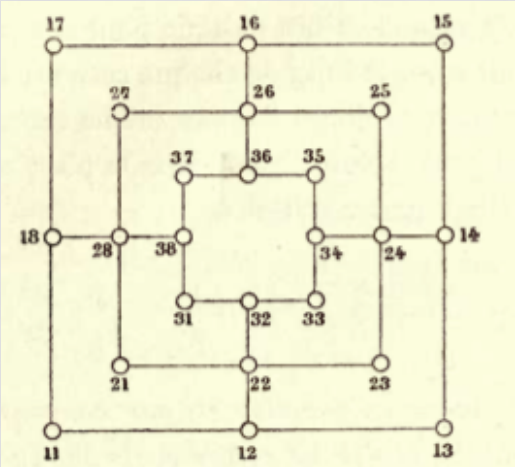
Winning Ways for Your Mathematical Plays



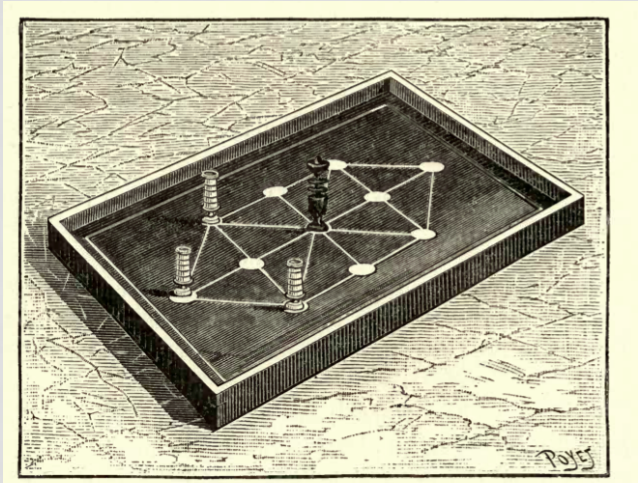
(1966-1982)


THE
DOTS AND BOXES
GAME
SOPHISTICATED CHILD'S PLAY
B
B
B
B
ELWYN BERLEKAMP

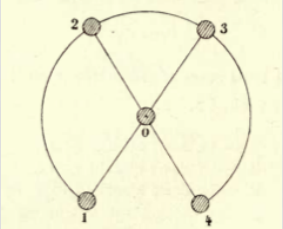




Notation de la Marelle triple.

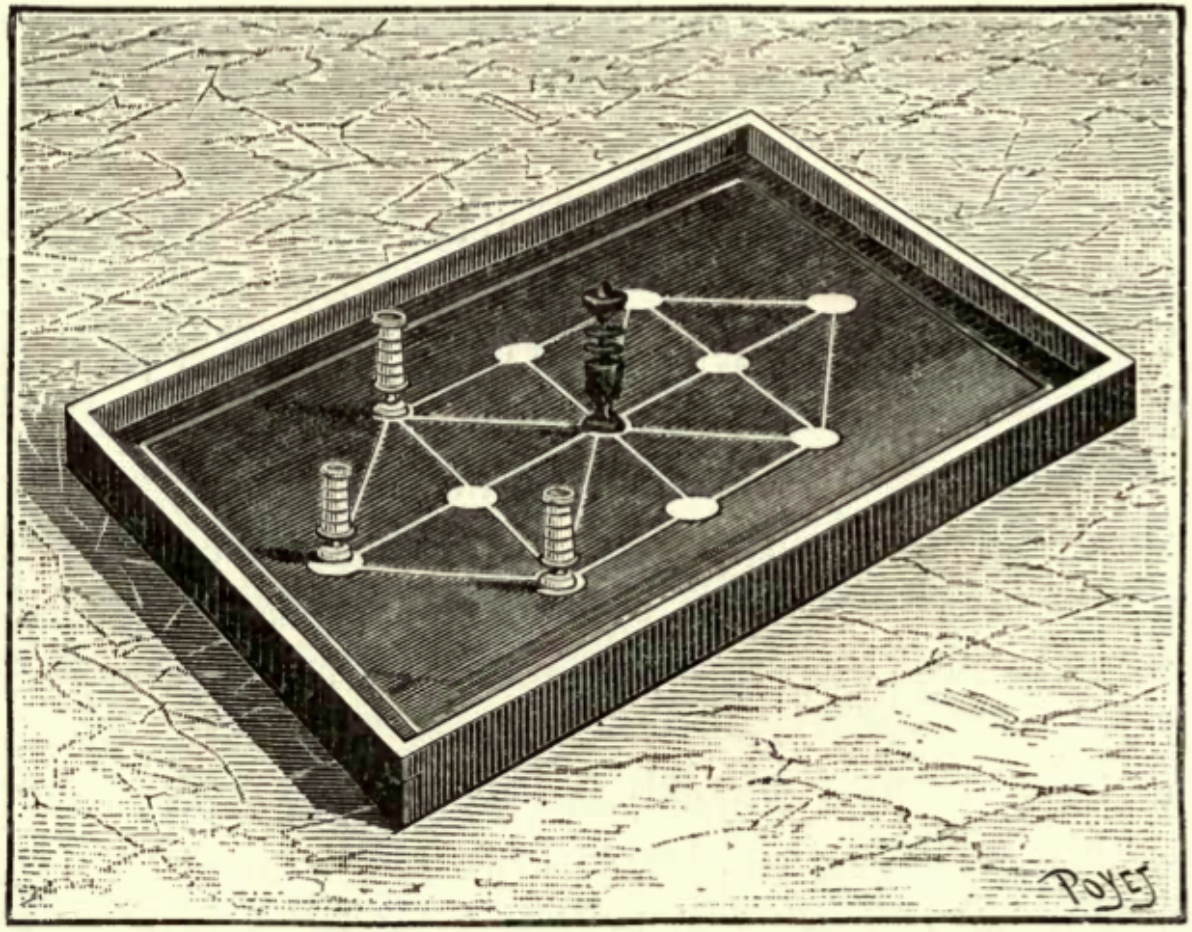

Le nouveau jeu militaire.

Other "Jeux de combinaisons" at the end of the 19th century



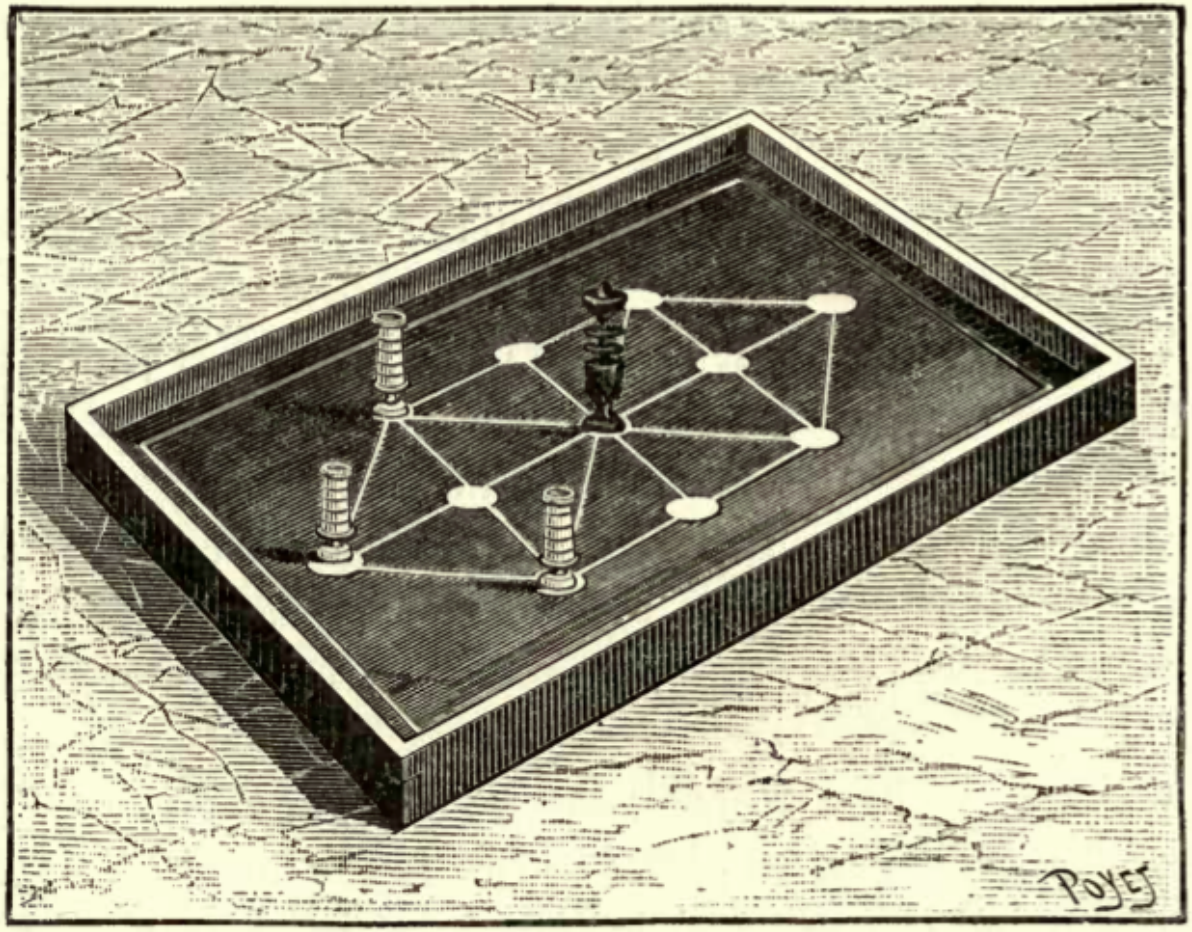
Le Fer à cheval.

Le jeu militaire (Vol. 3, 1893)



Le nouveau jeu militaire.

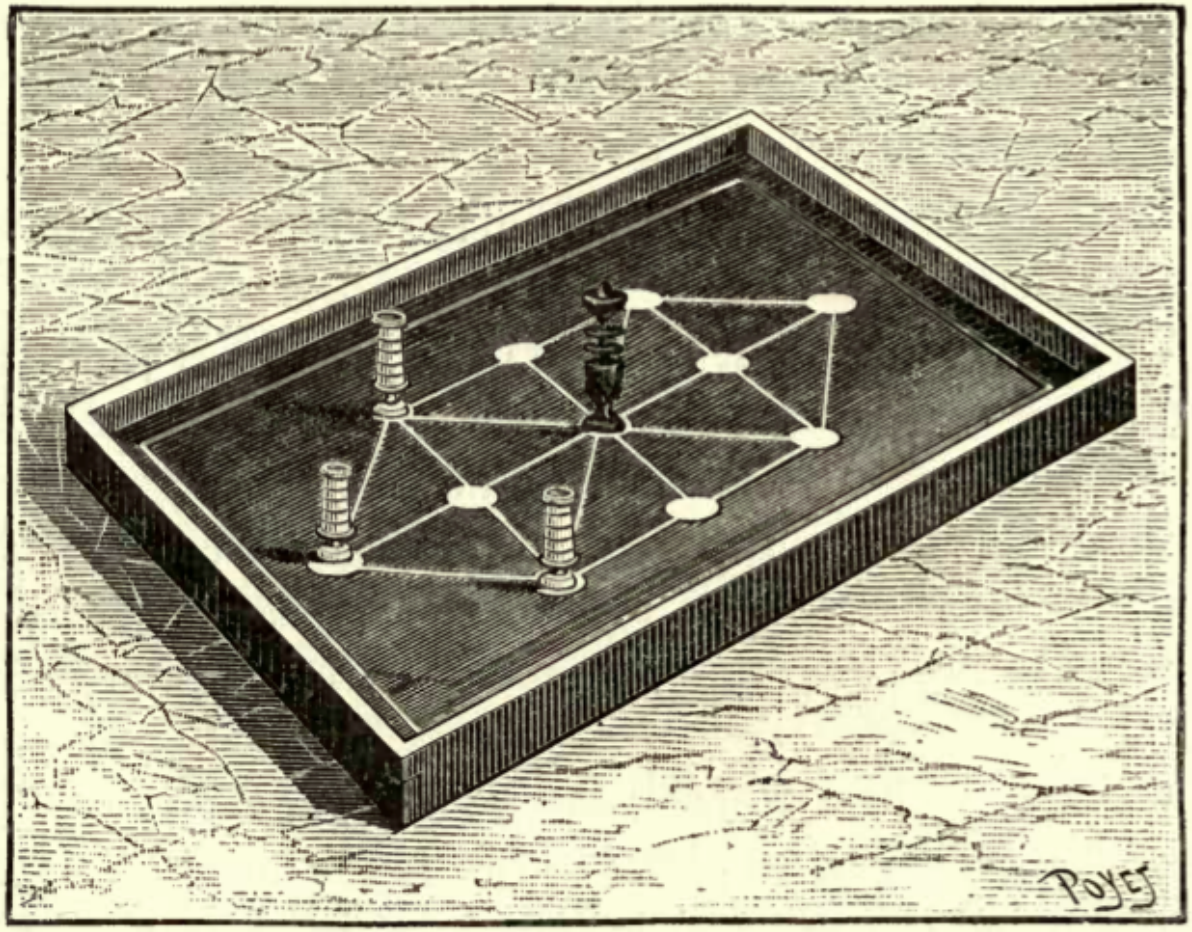
Le jeu militaire



Le nouveau jeu militaire.

« Less difficult than chess, the 'Jeu militaire' is among the most instructive ones, and deserves to be recommended as a very useful distraction for officers and non-commissioned officer. »

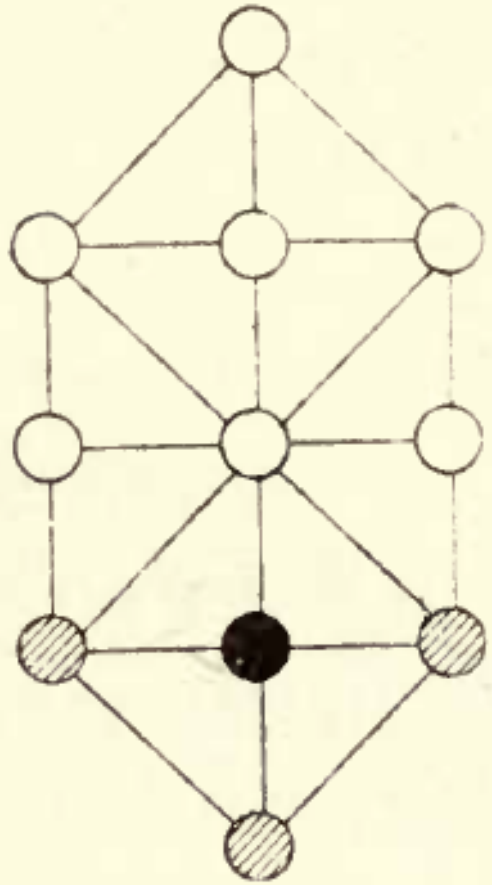
Le jeu militaire



Le nouveau jeu militaire.

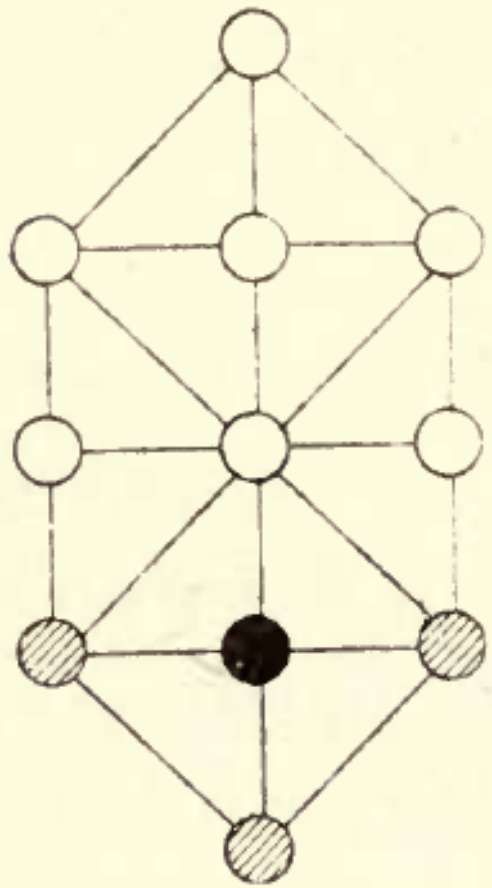
« Bonuses of hundred 'francs' are offered by the inventor to the persons who will win as many games as himself, and bonuses of thousand 'francs' to those who would win more than half of them. »

Le jeu militaire: rules



Position initiale.

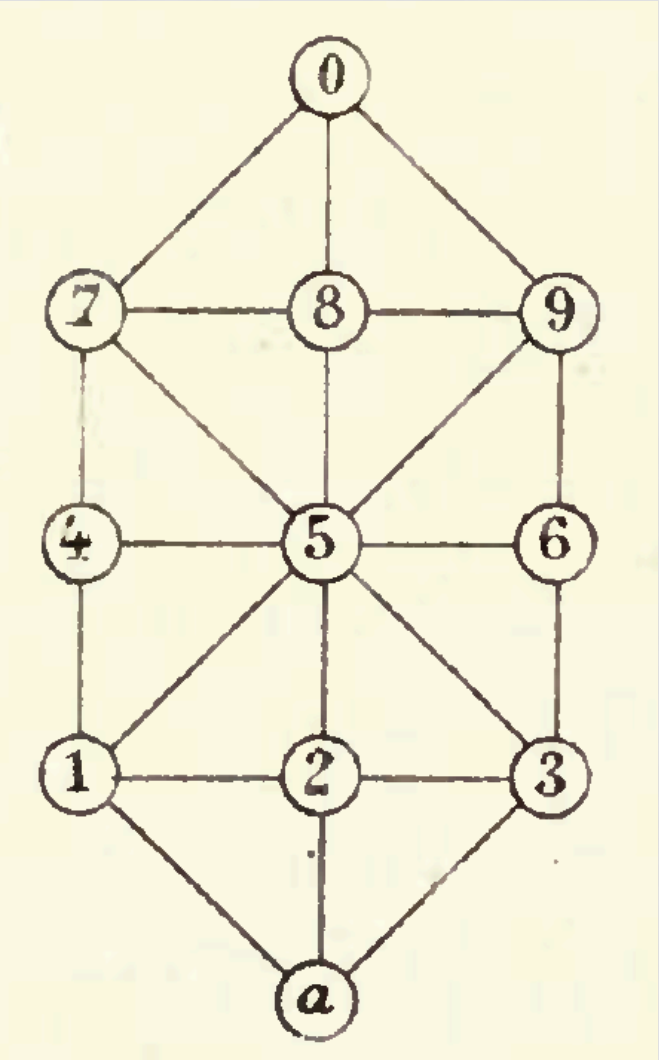
Le jeu militaire: rules



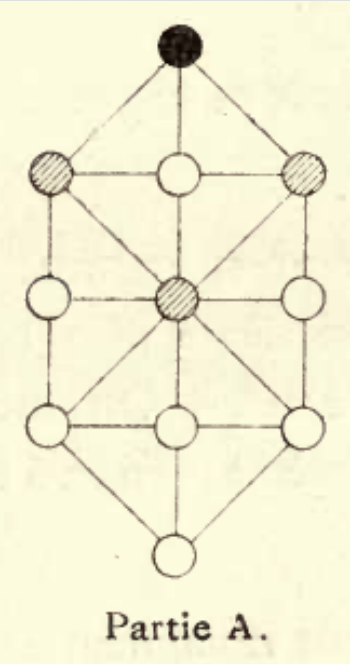
Position initiale.

- The army = black token (J1)
- The towers = white tokens (J2)
- Aim of the army: not be blocked by the towers.
- Aim of the towers: block the army.
- Moves : the army(J1) can move one step in any direction. Towers can move only forward and laterally (one tower at a time).

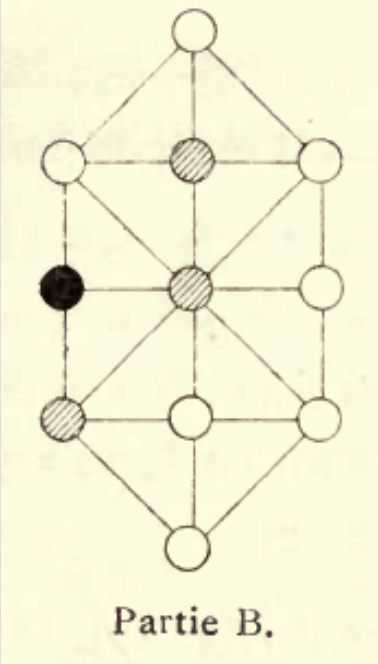
Le jeu militaire



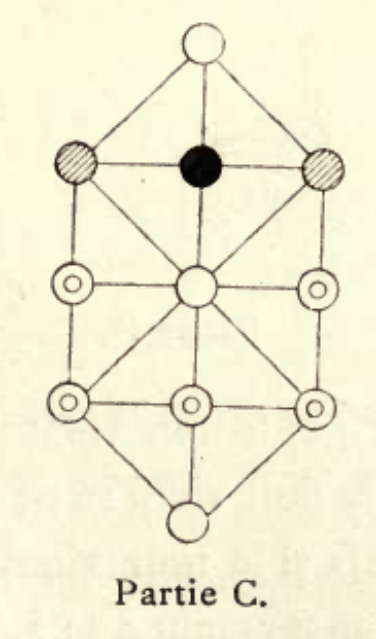
- Positions are numbered.
- Initial position: black on 2 and whites on 1, *a* and 3.
- <u>Notation</u> : 1*a*3 – 2



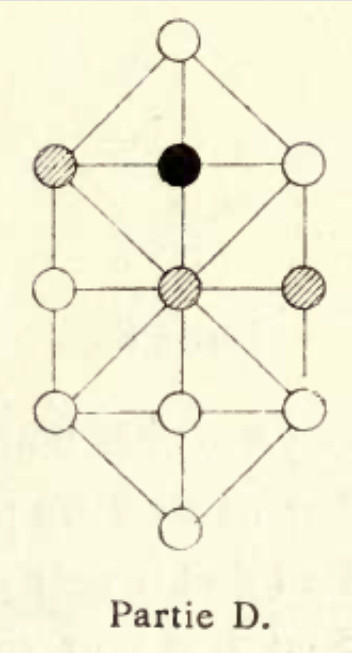
Partie A.



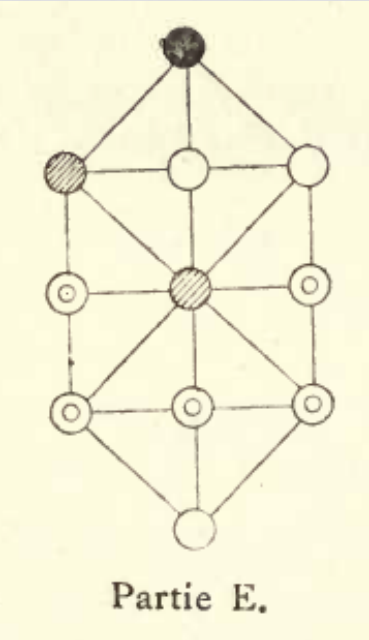
Partie B.



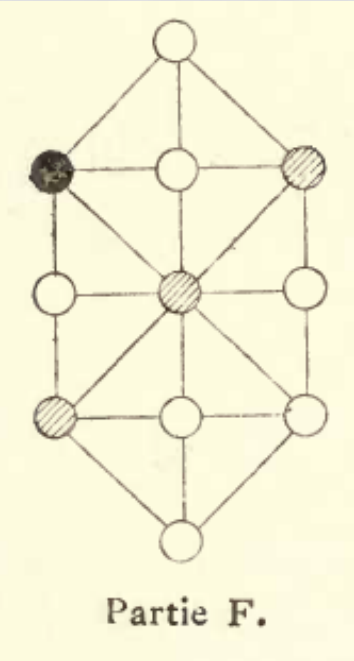
Partie C.



Partie D.

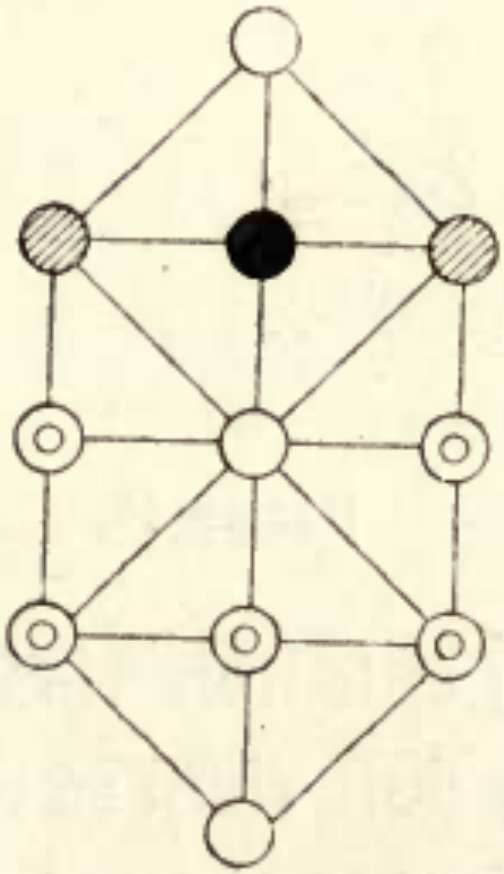


Partie E.



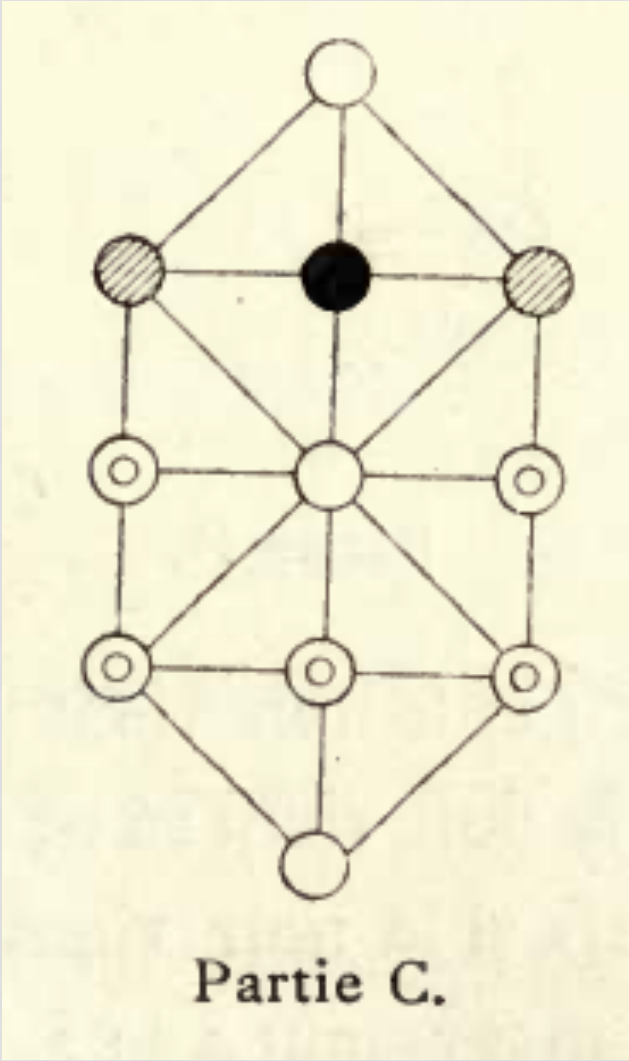
Partie F.

Le jeu militaire: example 1



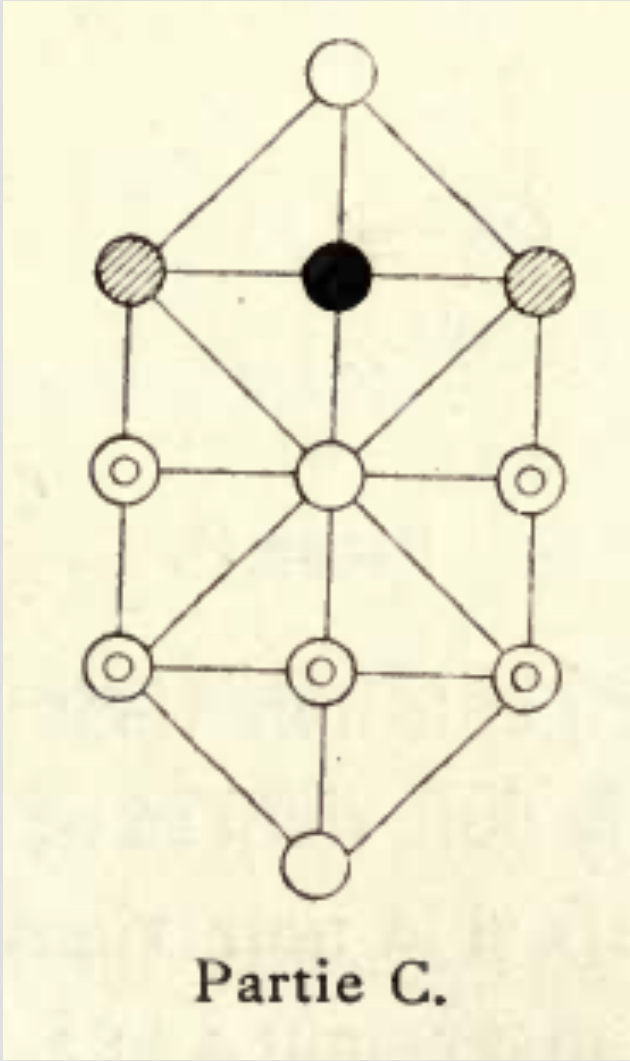
Partie C.

Le jeu militaire: example 1



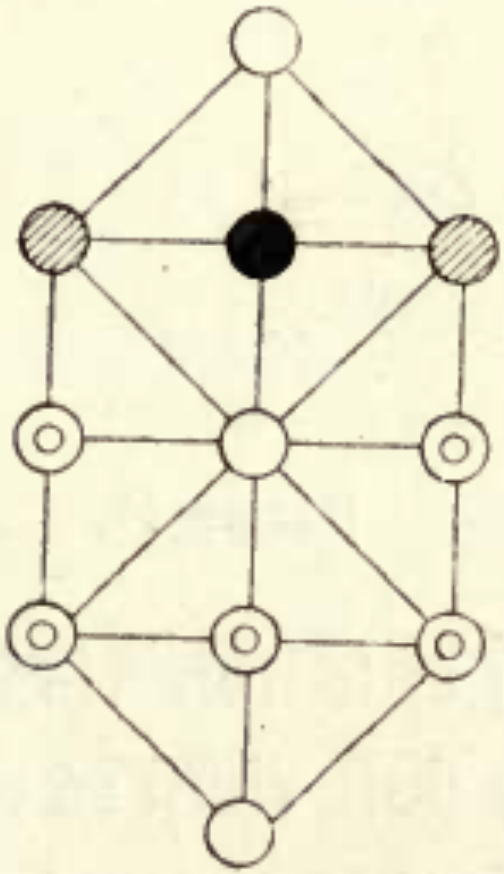
- White wins in two moves.
- (The 3rd tower can be anywhere on the spotted positions.)

Le jeu militaire: example 1



- White wins in two moves.
- (The 3rd tower can be anywhere on the spotted positions.)
- ➢ White plays the 3rd tower on the center (5)
- ➢ Black plays on 0.
- ➢ White moves the tower from 5 to 8.

Le jeu militaire: example 1



Partie C.

- White wins in two moves.
- (The 3rd tower can be anywhere on the spotted positions.)

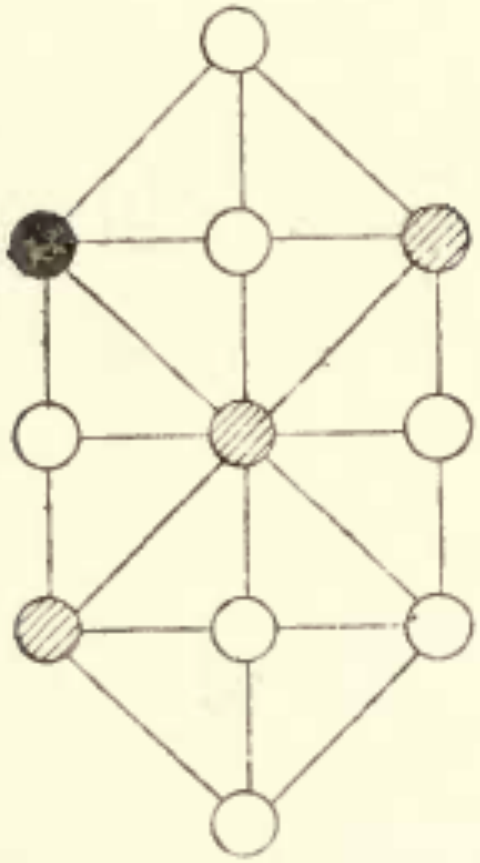
➢ White plays the 3rd tower on the center (5)

➢ Black plays on 0.

➢ White moves the tower from 5 to 8.

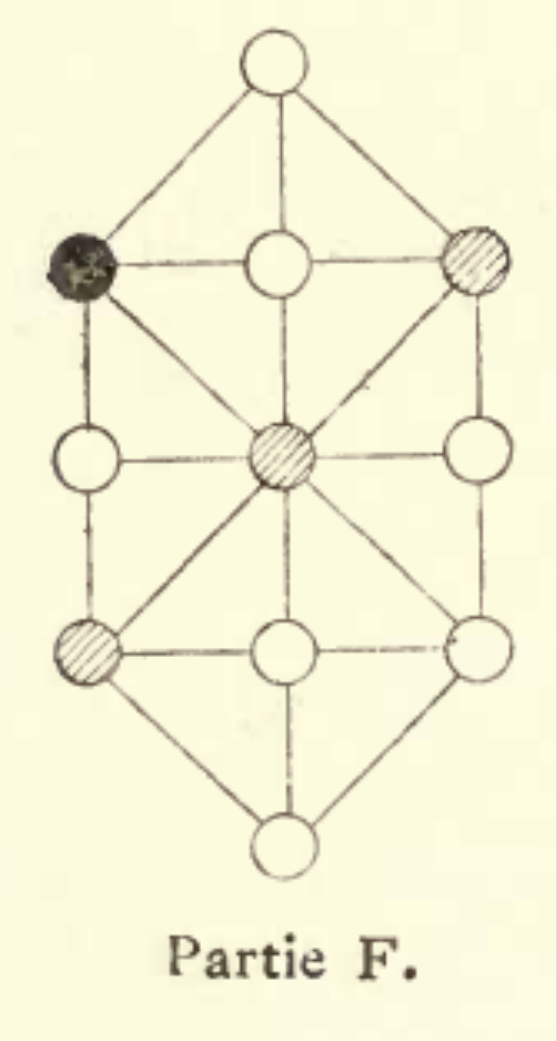
<u>Notation</u>: 179 - 8

Le jeu militaire: example 2



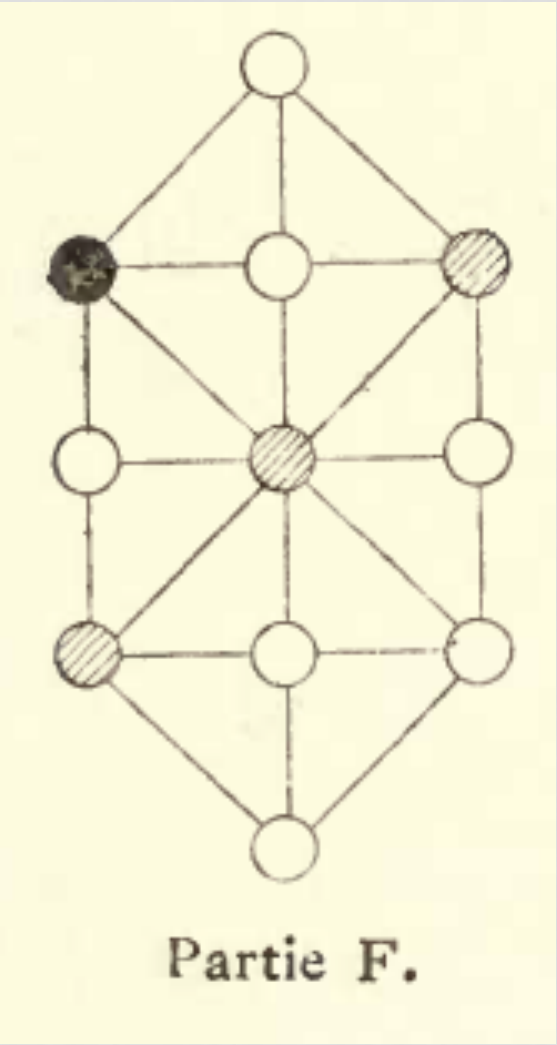
Partie F.

Le jeu militaire: example 2



- White wins in three or four moves.

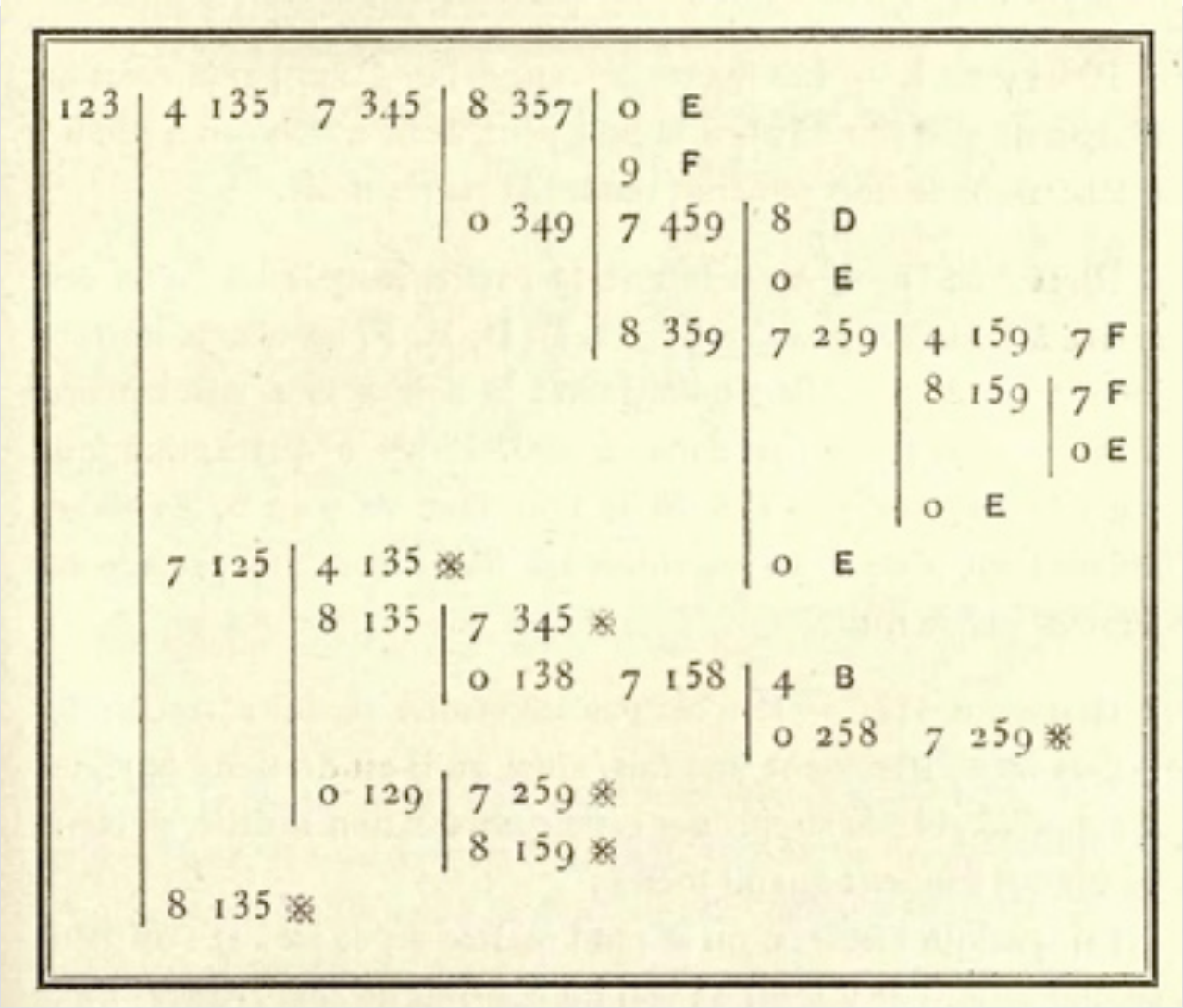
Le jeu militaire: example 2



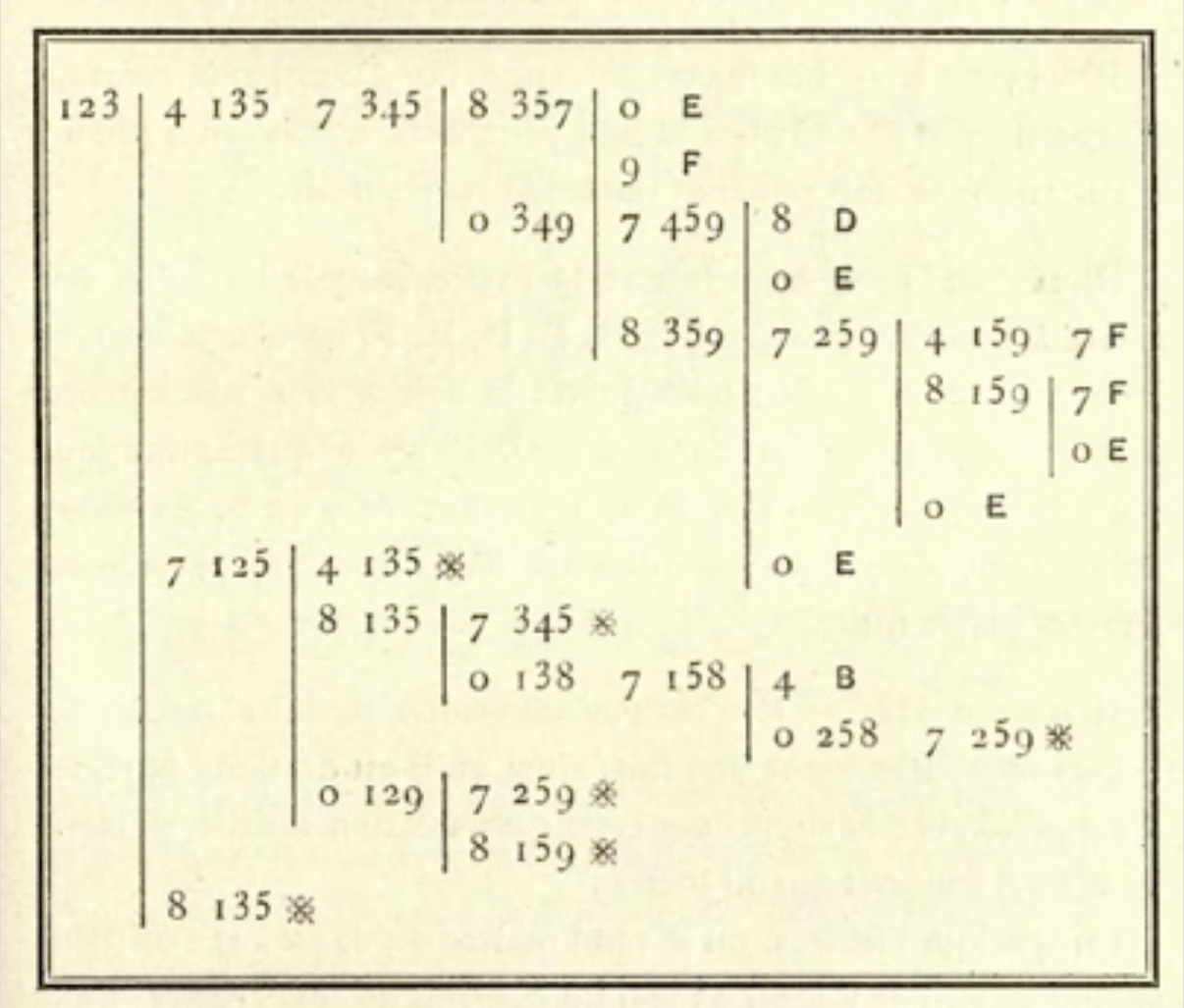
- White wins in three or four moves.

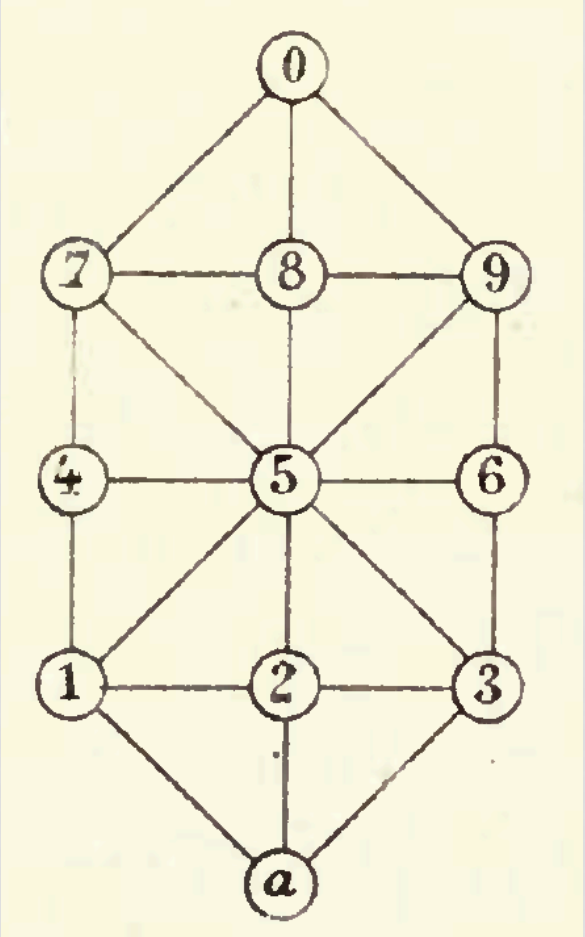
159	7	459			8	579	0	789	»	»
					0	479	8	579	0	789

Le jeu militaire: “the game tree”

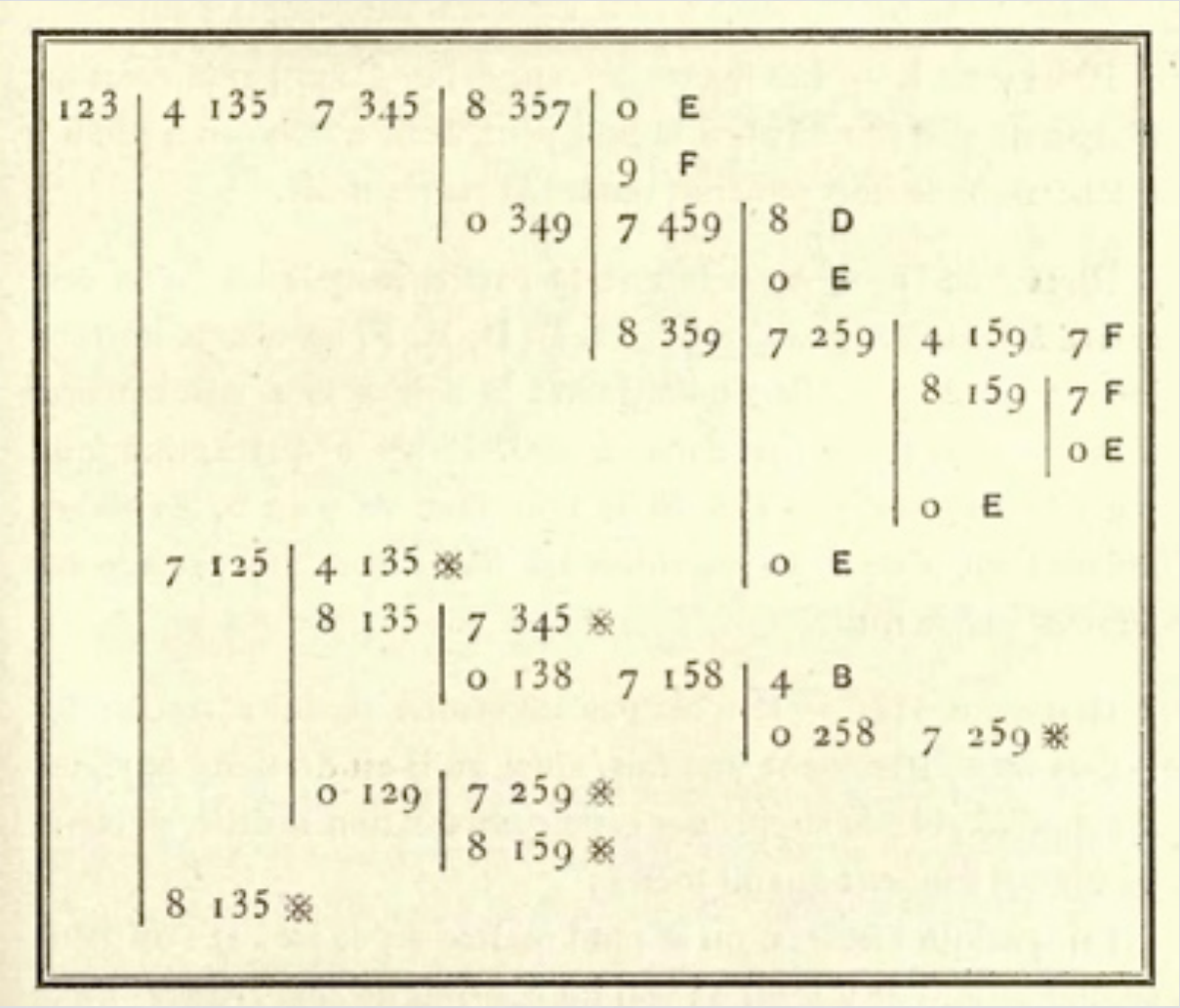


Le jeu militaire: “the game tree”



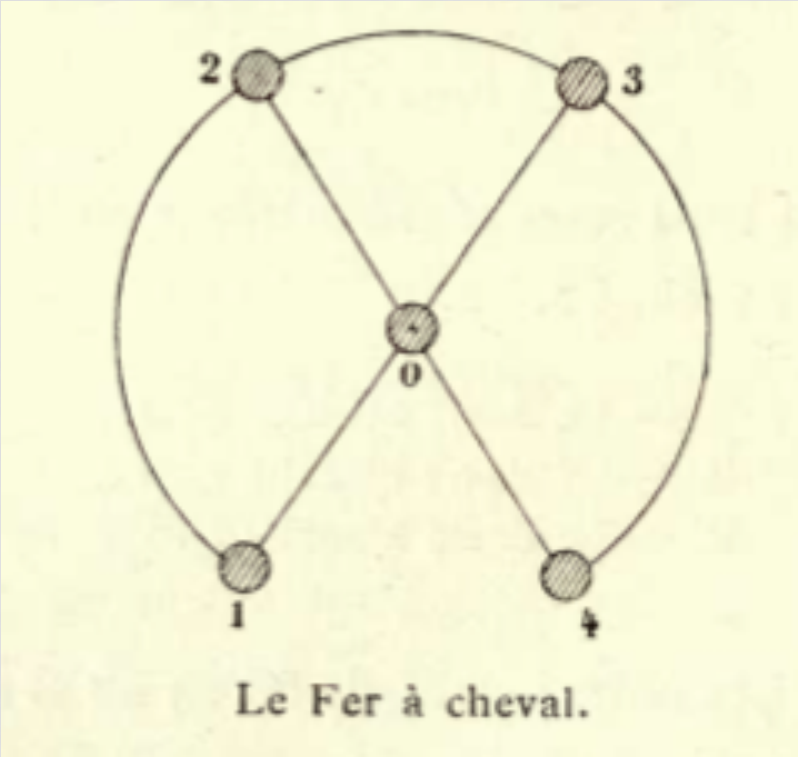


Le jeu militaire: “the game tree”



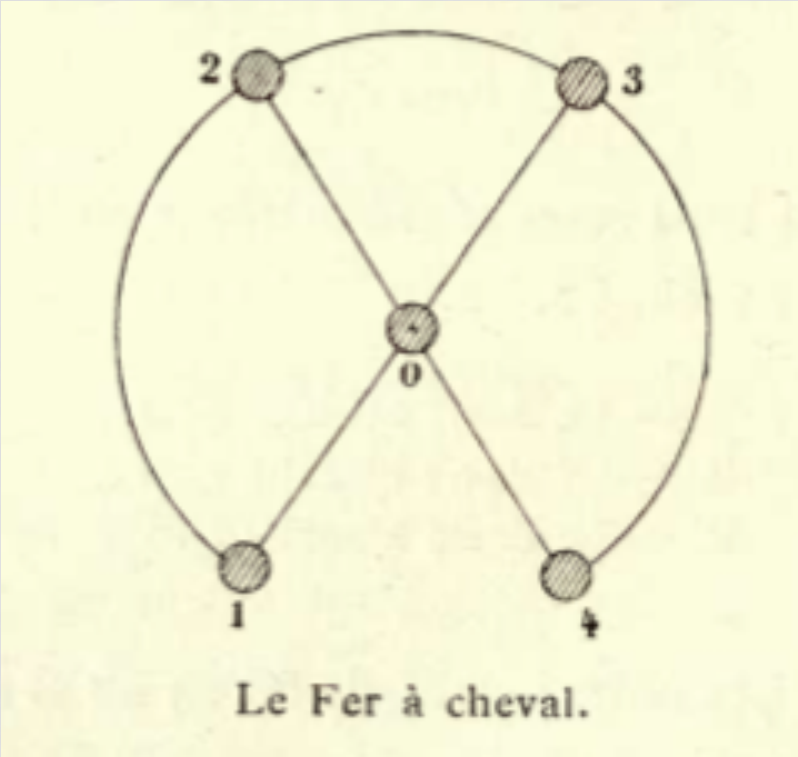
« In few hours we can master the game, and win the prize of hundred ‘francs’ offered by the leaflet as many times as we want. But it’s about finding the address of the banker; this problem is more difficult than the previous one. »

Le fer à cheval (the horseshoe)



The Horseshoe

Le fer à cheval (the horseshoe)

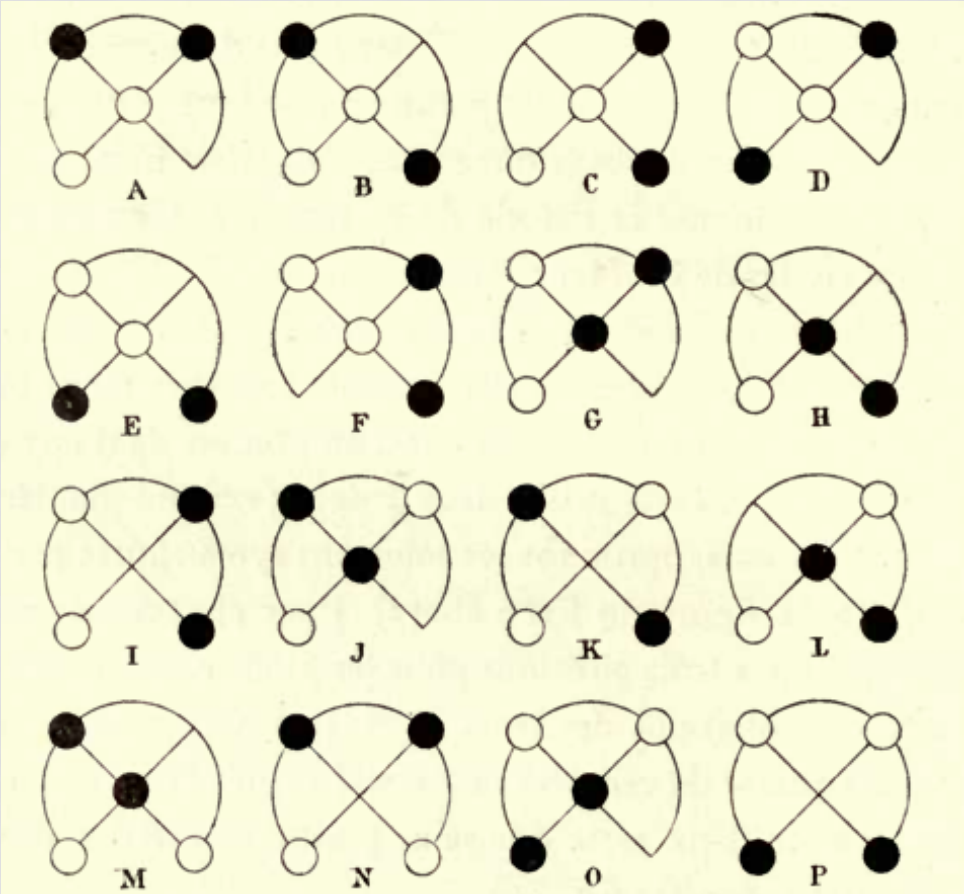


The Horseshoe

« The game is played by two players; each player has different colored tokens, white and black, for example. The two players alternately place their two tokens on an empty square, then, in turn, drag one of their pieces onto a neighboring position. The game is lost by the player who no longer moves any of his tokens and who has been blocked. »

Le fer à cheval (the horseshoe)

Sixteen games are possible (each named by a letter):

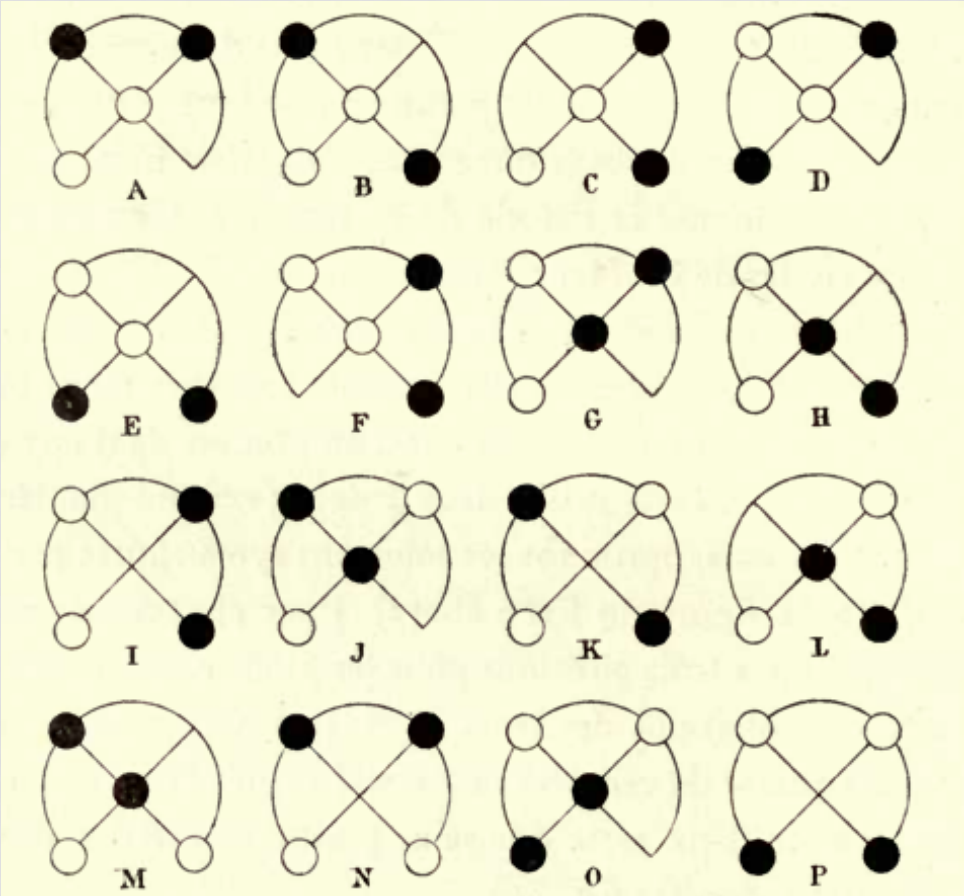


Les seize positions dans le Fer à cheval.

Le fer à cheval (the horseshoe)

Sixteen games are possible (each named by a letter):

- in 1 game Black wins: G
- in 2 games White wins: C and I
- the other 13 games are draws.



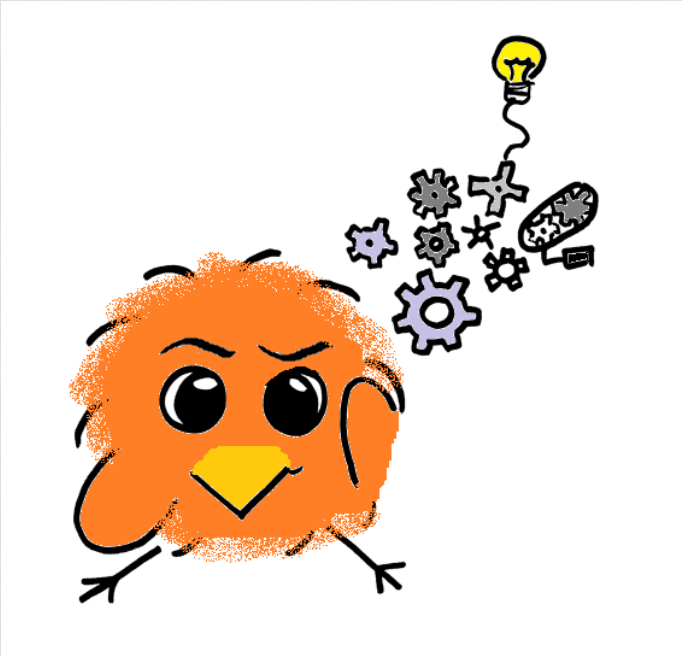
Les seize positions dans le Fer à cheval.

Conclusion

- At the beginning of the 20th century the term "jeu de combinaison" has a proper definition (similar to "combinatorial game").
- This part of the (hi)story is not very well known and is an alternative to the common Bouton-Sprague/Grundy-Conway timeline for CGT history.
- But, it is still difficult – as for games in general – to trace back the origins of a mathematical analyze of a game…

Thank you for your attention!

Any questions?



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