2. Introduction to Puzzles & Games

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Origins of puzzles & games

Johan Huizinga’s Homo Ludens

Roger Caillois’s Man, Play and Games

A survey of puzzles

- Word puzzles
- Logic puzzles
- Chessboard puzzles
- Mechanical puzzles

A survey of games

Bibliography
Origins of puzzles & games

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Les Evans, *Children's Games*. Poster commissioned by Play Wales (www.playwales.org.uk)
Johan Huizinga’s *Homo Ludens*

*Play is older than culture, for culture, however inadequately defined, always presupposes human society, and animals have not waited for man to teach them their playing …*

*Here we have at once a very important point: even in its simplest forms on the animal level, play is more than a mere physiological phenomenon or a psychological reflex. It goes beyond the confines of purely physical or purely biological activity. It is a significant function — that is to say, there is some sense to it. In play there is something “at play” which transcends the immediate needs of life and imparts meaning to the action. All play means something.*

From Johan Huizinga, 1950 [4].
The nature of play (Huizinga)

- *Play* is fun. (Fun is an aesthetic quality, like beauty that resists logical analysis.)
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Two categories of *play*:
- A contest for something, (e.g., a competitive game or puzzle), or
- A representation of something (e.g., playing make believe, dance, or a dramatic performance)
The language of play (Huizinga)

Ancient Greece:

- the suffix -inda denotes a child’s game:
  - sphairinda: a ball game,
  - helkustinda: tug-of-war,
  - streptinda: a throwing game,
  - basilinda: king of the castle.

- paidia: “light-hearted” (or child-like) play

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Ancient India (Sanskrit):

- *krīdati*: play.
- *divyati*: gambling.

Ancient America (Blackfoot):

- *koani*: a children’s game.
- *kachtsi*: a game with rules (chance or skill).
- *skets* or *skits*: to win a game.

Play is universal!

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“Culture arises in the form of play.”

Real civilization cannot exist in the absence of a certain play-element, for civilization presupposes limitation and mastery of the self, the ability not to confuse its own tendencies with the ultimate and highest goal, but to understand that it is enclosed with certain bounds freely accepted. Civilization will, in a sense, always be played according to certain rules, and true civilization will always demand fair play . . .

True play knows no propaganda; its aim is in itself, and its familiar spirit is happy inspiration.

From Johan Huizinga, 1950 [4].
# Roger Caillois’s Classification of Games

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From Roger Caillois, 1961 [2].
A survey of puzzles

- Word puzzles
A survey of puzzles

- Word puzzles
  - riddles.
    - Q: “What is the difference between a flea and an elephant?”
A survey of puzzles

- Word puzzles
  - riddles.
    
    Q: “What is the difference between a flea and an elephant?”
    A: “An elephant can have fleas, but a flea can’t have elephants.”
A survey of puzzles

Word puzzles

- riddles.
- palindromes:
A survey of puzzles

- Word puzzles
  - riddles.
  - palindromes:
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A survey of puzzles

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A survey of puzzles

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  - cryptograms
A survey of puzzles

Word puzzles

- riddles.
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- puns
- tongue twisters
- crossword puzzles (December 21, 1913 issue of *The New York World.*)
- cryptograms
Word Puzzles: gmasran → anagrams

There are five houses.
The Englishman lives in the red house.
The Spaniard owns the dog.
Coffee is drunk in the green house.
The Ukrainian drinks tea.
The green house is immediately to the right of the ivory house.
The Old Gold smoker owns snails.
Kools are smoked in the yellow house.
Milk is drunk in the middle house.
The Norwegian lives in the first house.
The man who smokes Chesterfields lives in the house next to the man with the fox.
Kools are smoked in the house next to the house where the horse is kept.
The Lucky Strike smoker drinks orange juice.
The Japanese smokes Parliaments.
The Norwegian lives next to the blue house.

Now, who drinks water? Who owns the zebra?
Sudoku logic puzzles
A survey of puzzles

- Word puzzles
- Logic puzzles
- Route finding puzzles
Route finding puzzles: Mazes

Route finding puzzles: Mazes

A survey of puzzles

- Word puzzles
- Logic puzzles
- Route finding puzzles
- Chessboard puzzles
Chessboard puzzle: the eight-queens

Can one place eight queens on a standard chessboard so that no pair of pieces attack one another?
Chessboard puzzle: the eight-queens

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Can one place eight queens on a standard chessboard so that no pair of pieces attack one another? Can it be done?
Chessboard puzzle: the eight-queens

Can one place eight queens on a standard chessboard so that no pair of pieces attack one another? Yes. Here is one of the 92 solutions.
Chessboard puzzle: knight’s tour

Is it possible for a single knight to visit every square of the board, and return to its original location in exactly 64 moves? A knight has at most eight legal moves.
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Is it possible for a single knight to visit every square of the board, and return to its original location in exactly 64 moves? One of the 13,267,364,410,532 (closed & undirected) knight’s tours. [5]
A survey of puzzles

- Word puzzles
- Logic puzzles
- Route finding puzzles
- Chessboard puzzles
- Planar arrangements
Planar arrangements: Tangrams

A Chinese ivory tangram puzzle, 19th century. (Jerry Slocum, 2003 [7]).
A survey of puzzles

- Word puzzles
- Logic puzzles
- Route finding puzzles
- Chessboard puzzles
- Planar arrangements
- Mechanical puzzles
Mechanical Puzzles

Classification Scheme of Slocum and Botermans (1986) [8]:

- **Dexterity Puzzles**: Rolling marble (or ball bearing) puzzles, Labyrinth puzzle.
- **Put-together puzzles**: e.g., pentominoes, teaser puzzle, tangrams, eight queens, magic squares, soma cube, 3d-jigsaw puzzles, puzzle rings.
- **Take-apart puzzles**: Chinese puzzle balls, torpedo puzzle, japanese trick boxes,
- **Interlocking solid puzzles**: wooden burr puzzles, Altekruse puzzle, Stuart Coffin’s puzzles.
- **Disentanglement puzzles**: Chinese Rings, Torpedo Puzzle.
- **Sequential movement puzzles**: peg solitaire, Tower of Hanoi, shunting puzzles, sliding block puzzles, Rubik’s cube, etc.
- **Puzzle Vessels:**
- **Vanishing Puzzles**: Geometric disssections.
- **Impossible Objects**
- **Folding Puzzles**: hexaflexagons
Dexterity Puzzle (c. 2500 BCE)

From http://puzzlemuseum.com/faqs/oldestpz.htm
(Image Copyright ©1996/2000 James Dalgety.)
W. Altekruse invented a 12 piece puzzle in 1890. Stewart Coffin discovered 14, 36, and 38 piece variations. (Slocum and Botermans, 1986 [8]).
Sliding Block Puzzles
A survey of puzzles

- Word puzzles
- Route finding puzzles
- Chessboard puzzles
- Planar arrangements
- Mechanical puzzles
- “Impossible objects”
Impossible object 1

Author: Gary Foshee, from Slocum and Botermans, 1986 [8].
Impossible object 2

Author: Gary Foshee, from Slocum and Botermans, 1986 [8].
Types of Games

- Word games
- Games of chance
- Combinatorial games
- Games of decision
Types of Games

- Word games
  - Scrabble
- Games of chance
- Combinatorial games
- Games of decision
Types of Games

- Word games
- Games of chance
  - Dicing (hazard, craps)
  - Lotteries
  - Bridge, hearts, spades, gin rummy, etc.
  - Poker, blackjack, roulette
  - Horseraces
  - Royal game of Ur, senet
  - Parchisi
  - Backgammon
- Combinatorial games
- Games of decision
Royal game of Ur (c. 2500 BCE)

British Museum, London.
Queen Nefertari playing senet. Scene from the 17th Chapter of *The Book of the Dead*. Wallpainting, 19th Dynasty c. 1290–1220 BC. Tomb of Nefertari, Valley of the Queens, Thebes, Egypt. Photo Credit: Werner Forman / Art Resource, NY
Dice games

Two women playing with “knucklebones” *(tali or astragals).* Hellenistic, 330 BCE. (British Museum, London)
Card games

Georges de la Tour, *The Cheat with the Ace of Diamonds*, late 1620s. Louvre, Paris, (Photo: Giraudon).
Card games

Georges de la Tour, *The Cheat with the Ace of Clubs*, late 1620s. Kimbell Art Museum, Fort Worth, Texas.

This painting, together with its partner on the previous slide, represents what may be the most valuable “Can you spot the difference?” puzzle on the planet.
Types of games

- Word games
- Games of chance
- Combinatorial games
  - tic tac toe, 2D, 3D, …
  - nim & hackenbush
  - dots and boxes, sprouts
  - mancala, bao
  - chess, chess variants
  - checkers, draughts
  - reversi othello
  - hex, bridg-it
  - halma, chinese checkers
  - Kensington
  - nine men’s morris
  - go

- Games of decision
Go or Wei Chi

Go or Wei Chi

Oldest known go board. From Arther M. Sackler Gallery, 2004 [6].
Mancala

From Jean-Marie L'Hôte 1994 [3].
Boardgames from World War II

From www.bbc.uk.co

From www.dailymail.co.uk
Types of games

- Word games
- Games of chance
- Combinatorial games
- Games of decision
  - Rock, paper, scissors
  - Prisoner’s dilemma
  - Russian roulette
Bibliography


