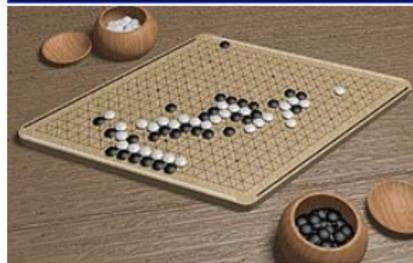
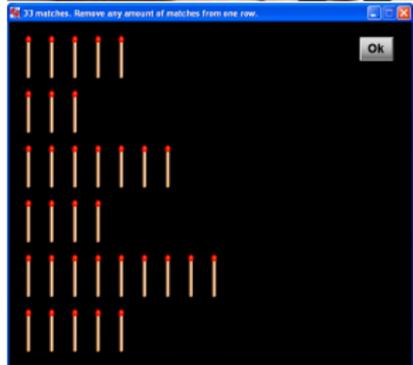
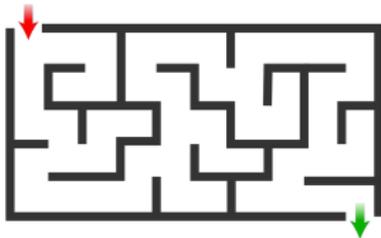
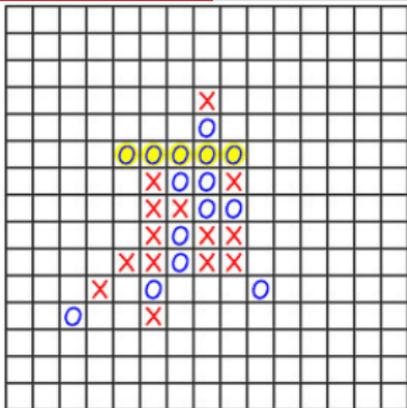
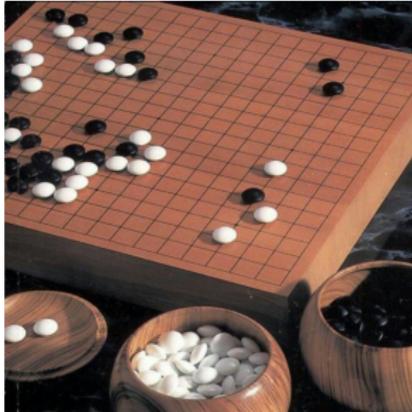


Computational Complexity and Games

Abdallah Saffidine

CSE, The University of New South Wales, Sydney, Australia.

July 3



UNDECIDABLE

⋮
2EXP

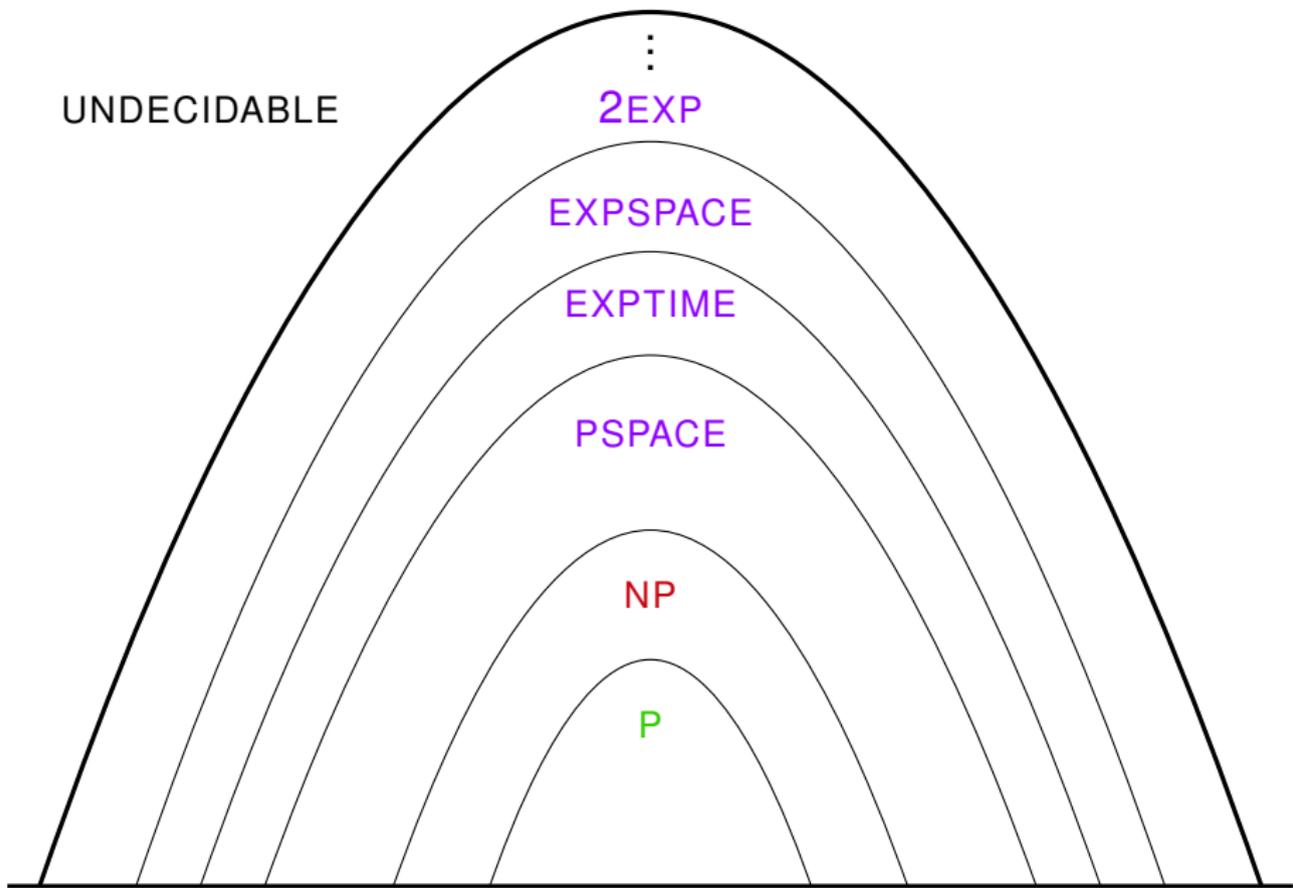
EXPSPACE

EXPTIME

PSPACE

NP

P



UNDECIDABLE

Magic
the
Gathering

⋮
2EXP

EXSPACE

EXPTIME

PSPACE

NP

P

Go

Lemmings

Candy Crush

Maze

Nim

Hex

Chess

Gomoku

Guessing the complexity of Games

	Cooperative	Adversarial
“Trivial”	Maze	Nim
Polynomial depth	Candy Crush	Hex, Gomoku
Exponential depth	Lemmings	Chess, Go
Unbounded depth	Magic the Gathering	

P_{TIME}

NP

P_{SPACE}

P_{SPACE}

EX_{TIME}

UNDECIDABLE

Current and Future Work

Current and Future Work

Parameterized Complexity (Tomorrow @ IAF!)

(Non-)trivial but highly structured games	→	FPT
Player 1 is blocked by Player 2	→	W[1]
Player 1 is forcing Player 2	→	CO-W[1]
Both have independent goals	→	AW[*]

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Games of Imperfect Information

Bridge, Poker

Hanabi

Starcraft, RTS Games

Kriegspiel, Phantom Go, ...

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Minesweeper (Computer Games Workshop @ IJCAI2017!)