KŌNIGSWEG

Game Theory

to the Rescue When Hard Decisions Are to Be Made

Alexander C. S. Hendorf

 @hendorf

EuroPython 2016, Bilbao

KÖNIGSWEG

Alexander C. S. Hendorf

CTO Königsweg GmbH

EuroPython organizer + program chair

mongoDB Community master 2016, MUG Leader

Speaker, Trainer...

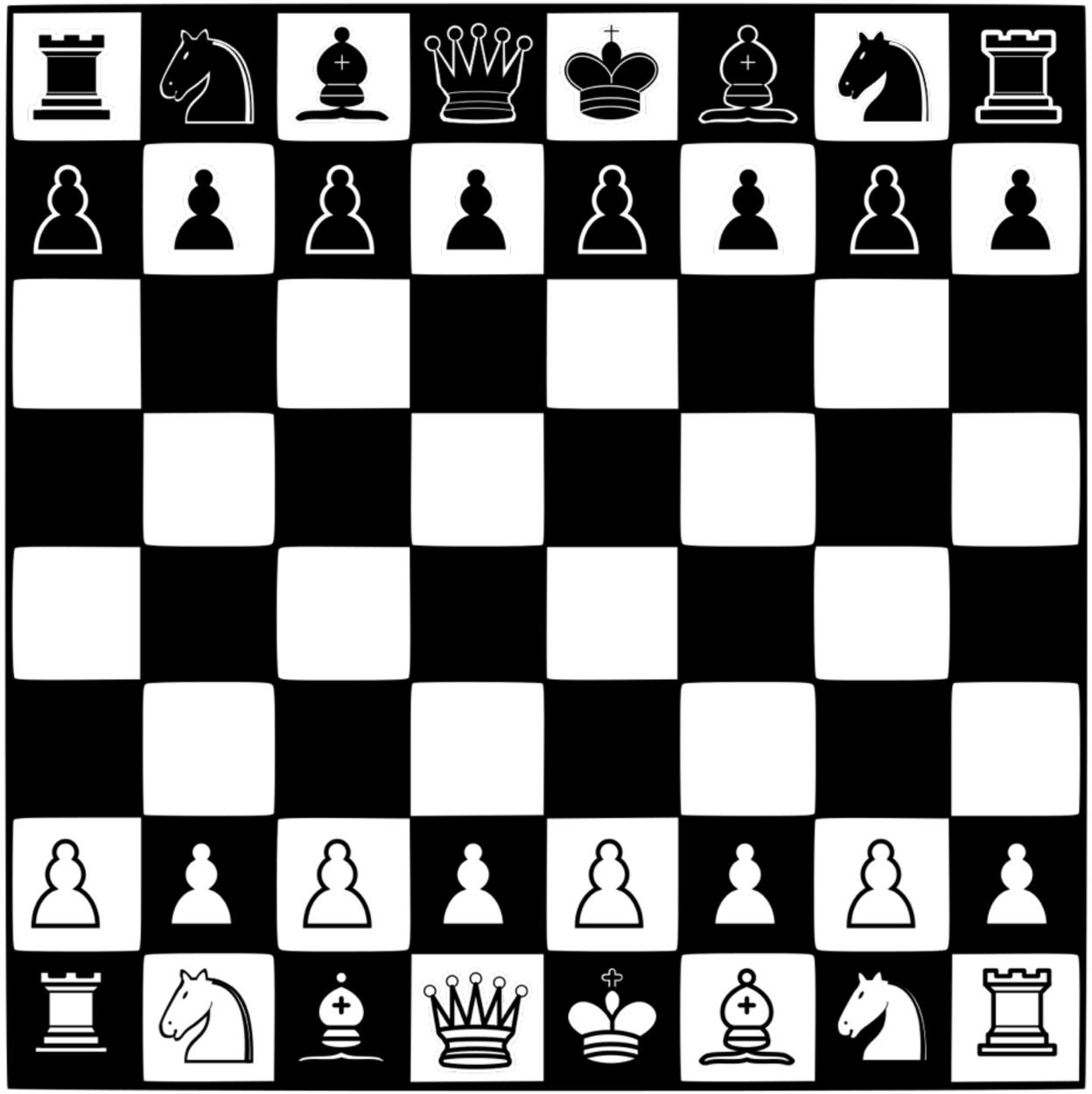
Hobbies: see above

@hendorf

Game Theory

Game Theory

Game Theory



If game theory is about anything, it’s about anticipating how others will act.

About Strategy.

1713 First known mention in "*Waldegrave*" letter

1838 Antoine Augustin Cournot

"Recherches sur les principes mathématiques de la théorie des richesses"

1913 Ernst Zermelo

"Über eine Anwendung der Mengenlehre auf die Theorie des Schachspiels"

1928 John von Neumann

"Zur Theorie der Gesellschaftsspiele" paper

1944 "Theory of Games and Economic Behavior" book

co-authored with Oskar Morgenstern

1950 *Prisoner's dilemma* - Merrill Flood & Melvin Dresher

John Nash - *Nash equilibrium*

By LANL [Public domain or Public domain], via Wikimedia Commons

If game theory is about anything, it’s about anticipating how others will act.

About Strategy.

Zero Sum Games

Winner and loser

Zero Sum Games

Winner and loser

B wins if count of fingers is odd

A wins if count of fingers is Even		1	2
	1	1, -1	-1, 1
	2	-1, 1	1, -1

strategic form

Zero Sum Games

Winner and loser

Zero Sum Games

Winner and loser

Nonzero Sum Games

Synergy - everyone gains

Nonzero Sum Games

Synergy - everyone gains

Nonzero Sum Games

Synergy - everyone gains

A and B gain if count of fingers is equal

	1	2
1	2, 2	1, 1
2	1, 1	2, 2

Games with Perfect Information

Chess, Go, Tic Tac Toe

Games with Incomplete Information

Life

Prisoners' Dilemma

Prisoners' Dilemma

Prisoners' Dilemma

	Confess	Keep quiet
Confess	-5, -5	0, -20
Keep quiet	-20, 0	-1, -1

Prisoners' Dilemma

Prisoners' Dilemma

	Confess	Keep quiet
Confess	-5, -5	0, -20
Keep quiet	-20, 0	-1, -1

Gambit

http://gambit.sourceforge.net/gambit15/index.html

Evolving strategies for an Iterated Prisoner's Dilemma tournament

Martin Jones

http://mojones.net/evolving-strategies-for-an-iterated-prisoners-dilemma-tournament.html

Game Theory - Stanford / Coursera

Matthew O. Jackson, Kevin Leyton-Brown, Yoav Shoham

https://www.coursera.org/learn/game-theory-1

KŌNIGSWEG

Alexander C. S. Hendorf
@hendorf