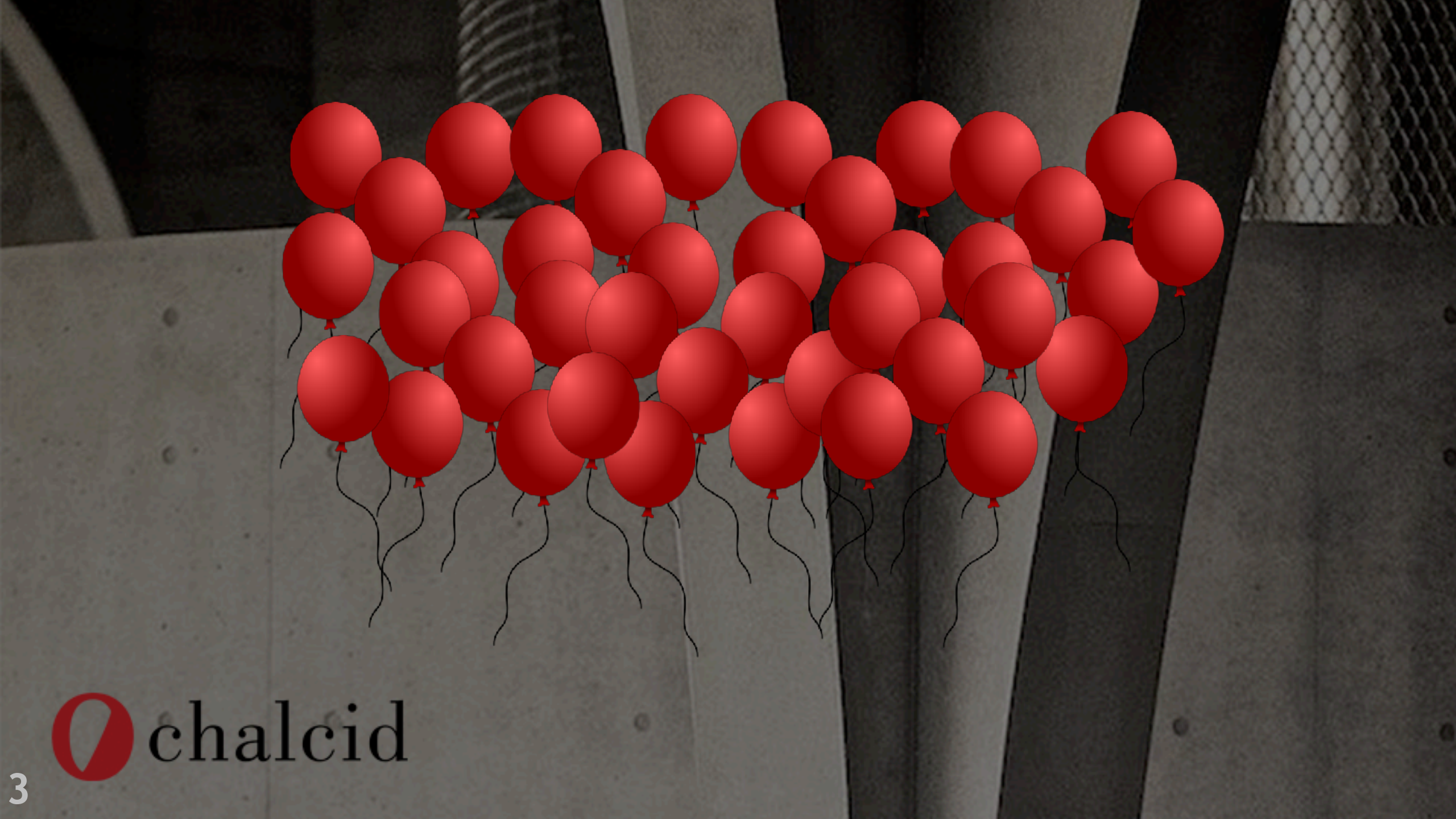
chalcid

chalcid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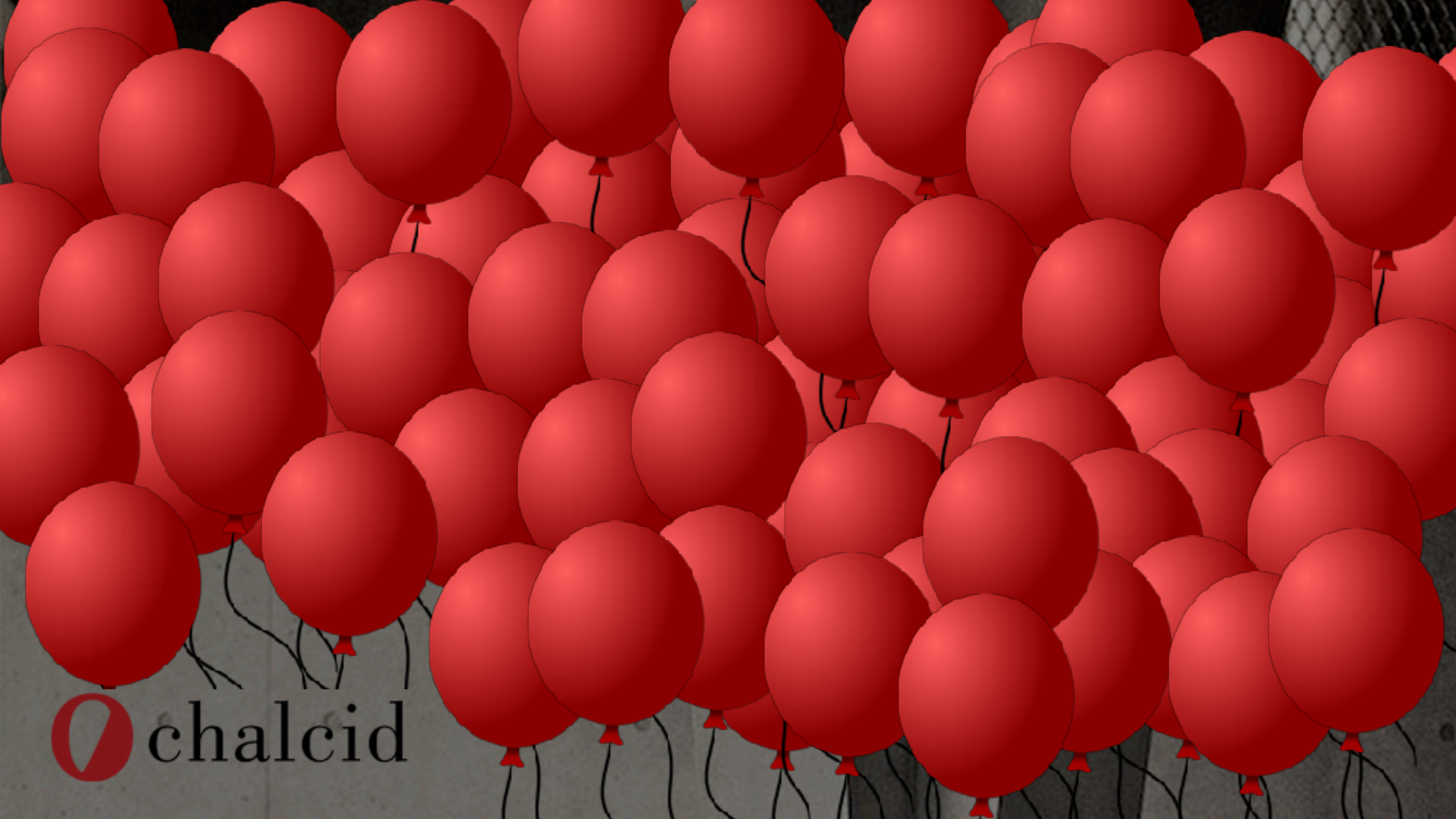
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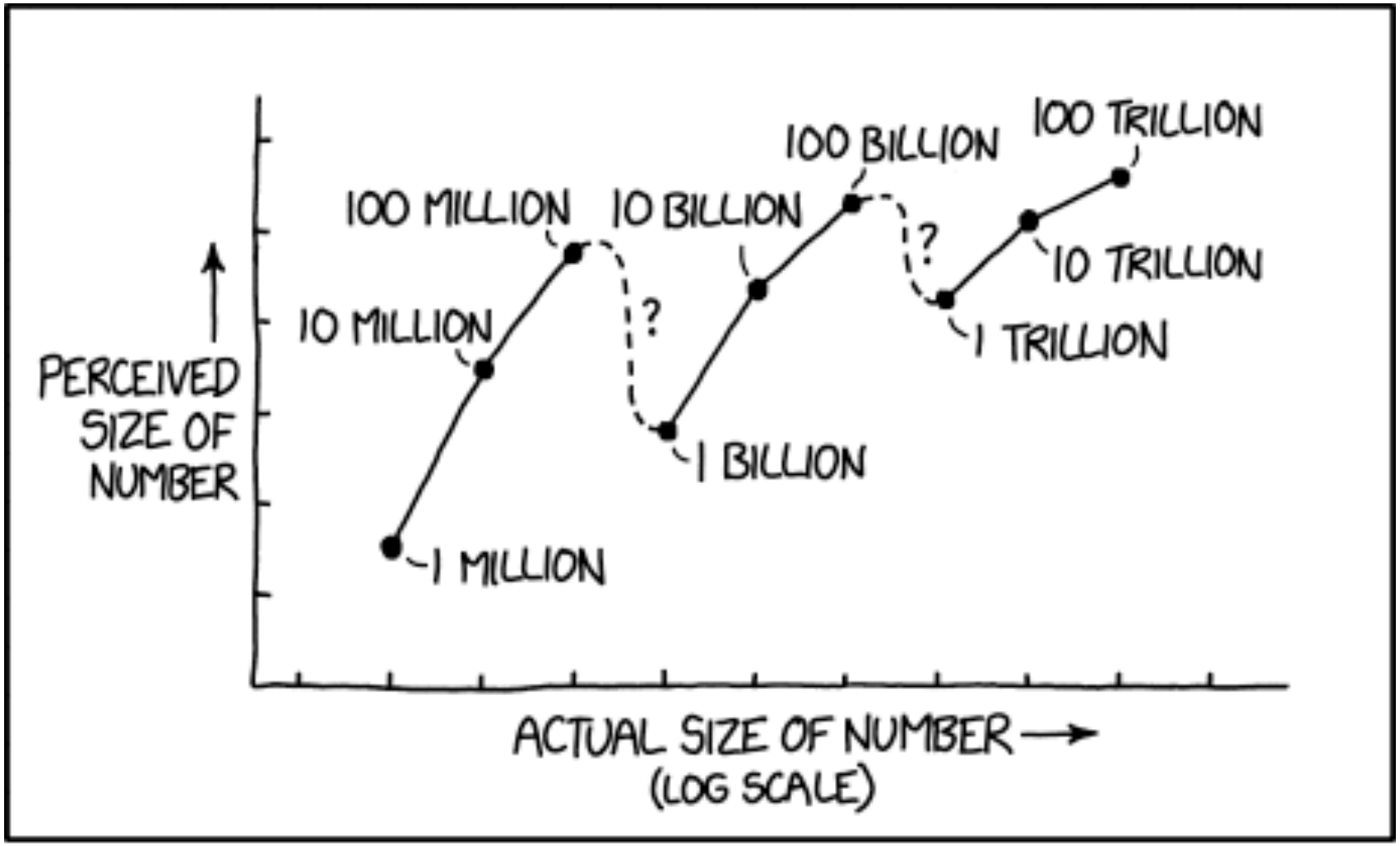
https://xkcd.com/2091/



TALKING ABOUT LARGE NUMBERS IS HARD

Thinking in Terms of Distance

10^6 mm = 1 km

Thinking in Terms of Distance

10^6 m = 1000 km

Thinking in Terms of Time

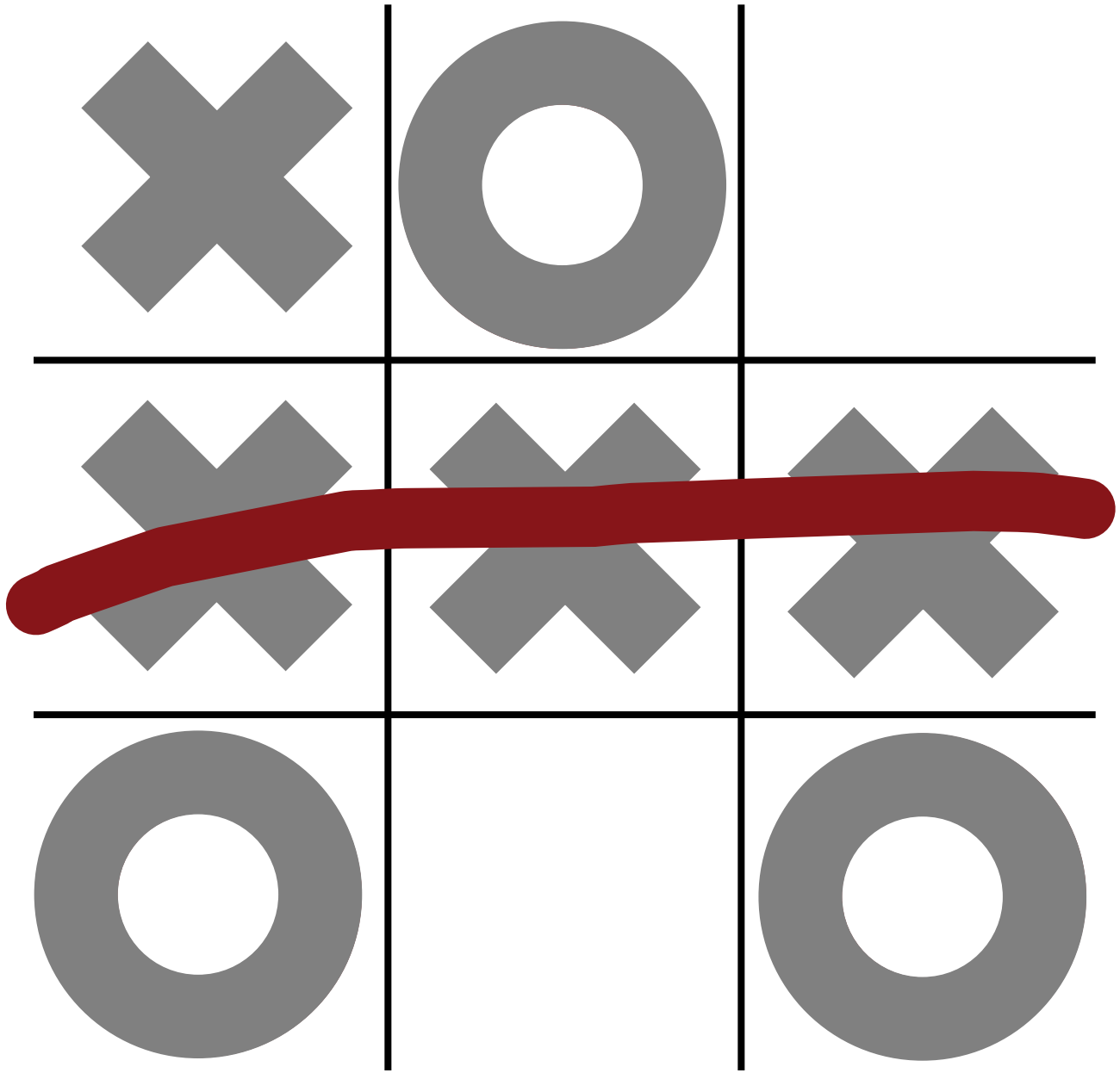
2^{32} = 4,294, 967,295

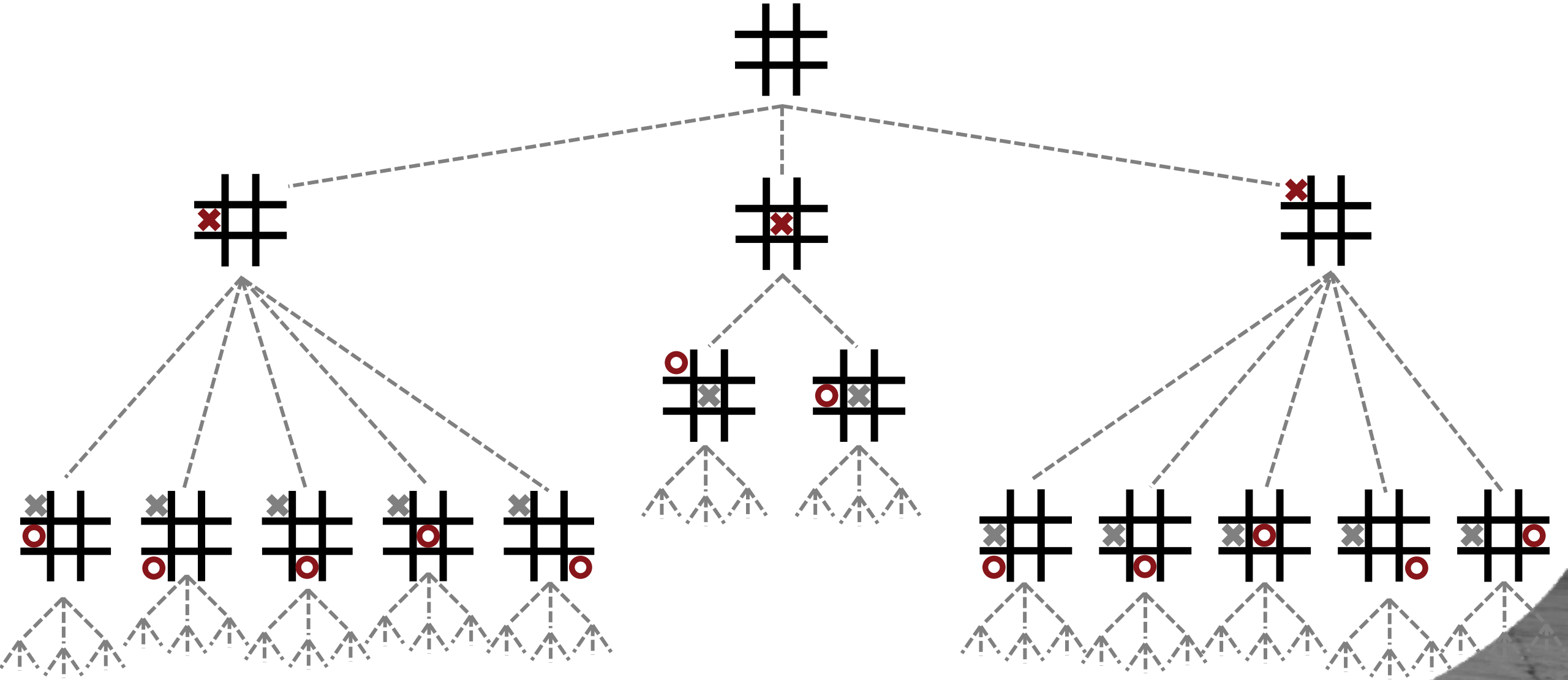
49 days & 17 hours

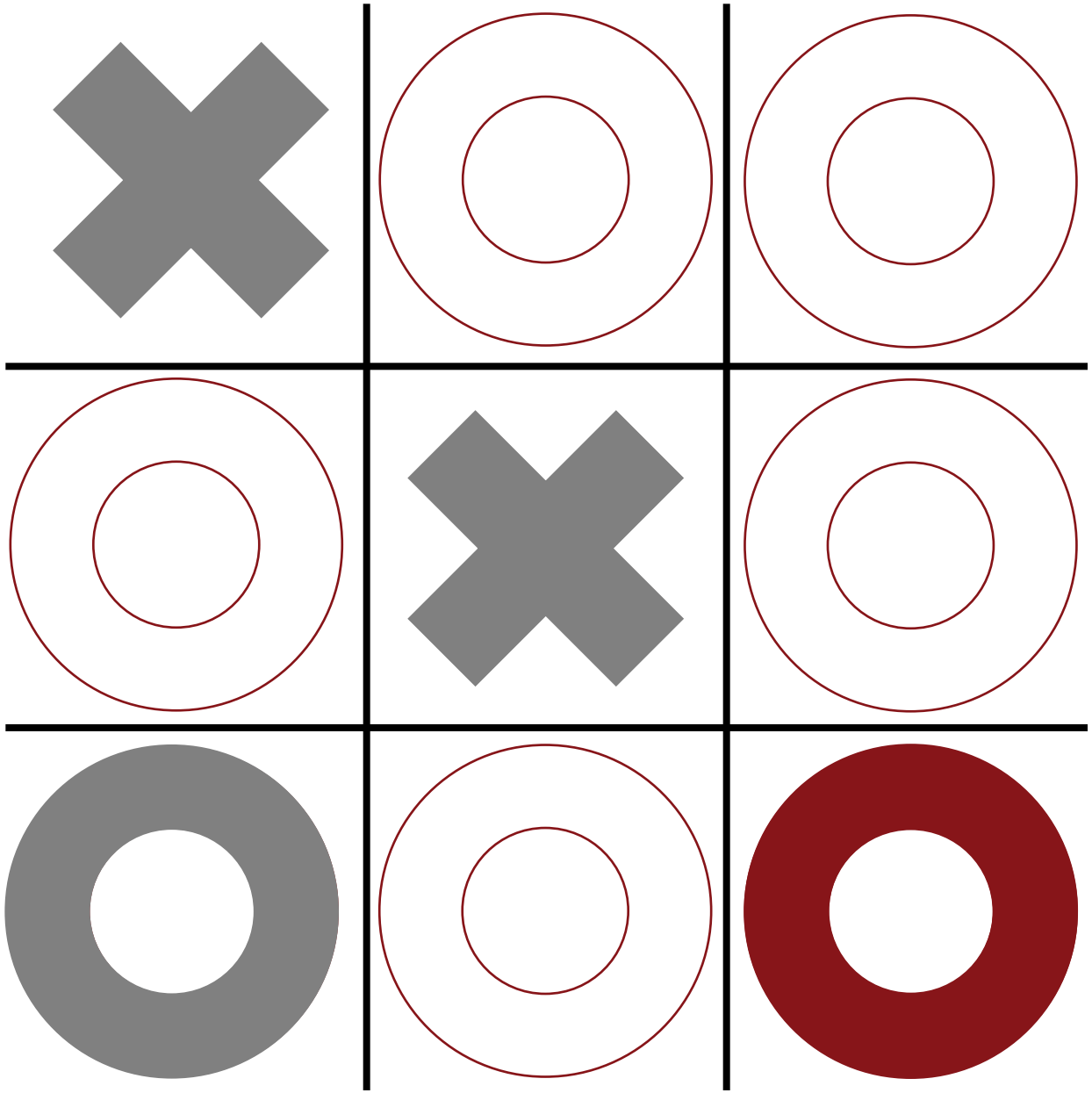
Thinking in Terms of Time

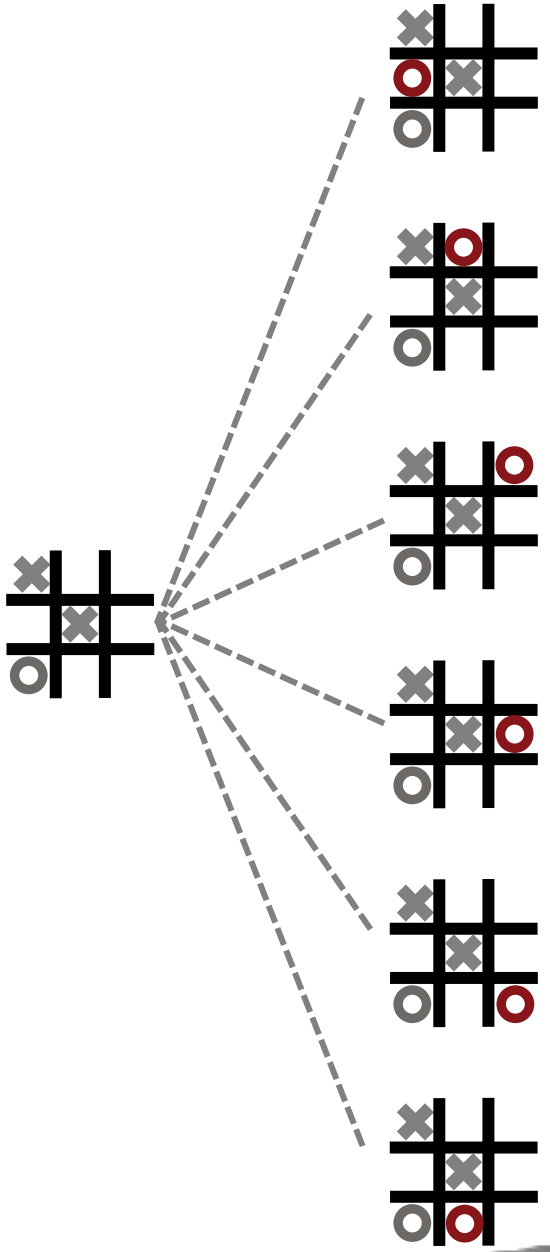
2^{64}

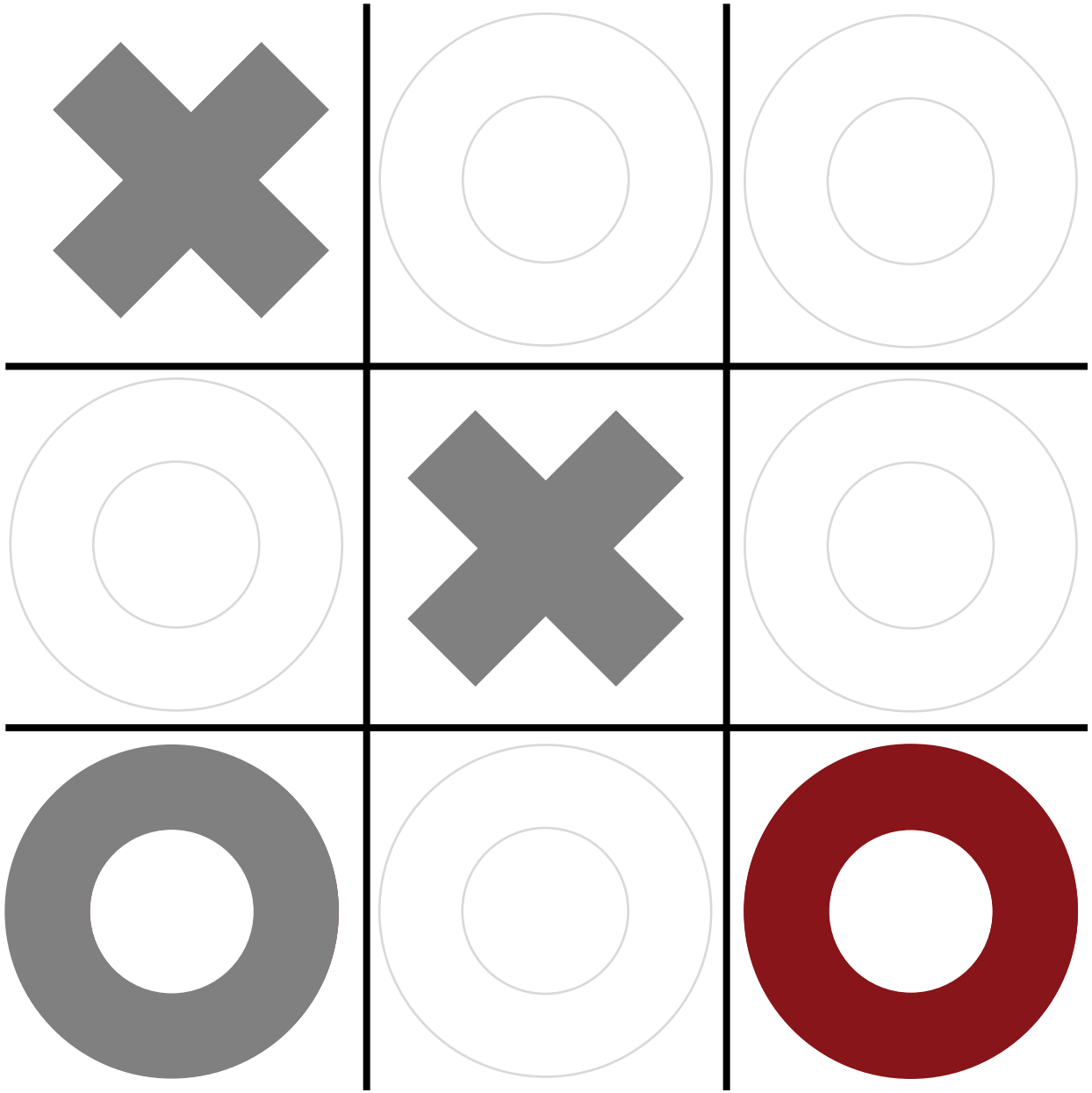
580 million years

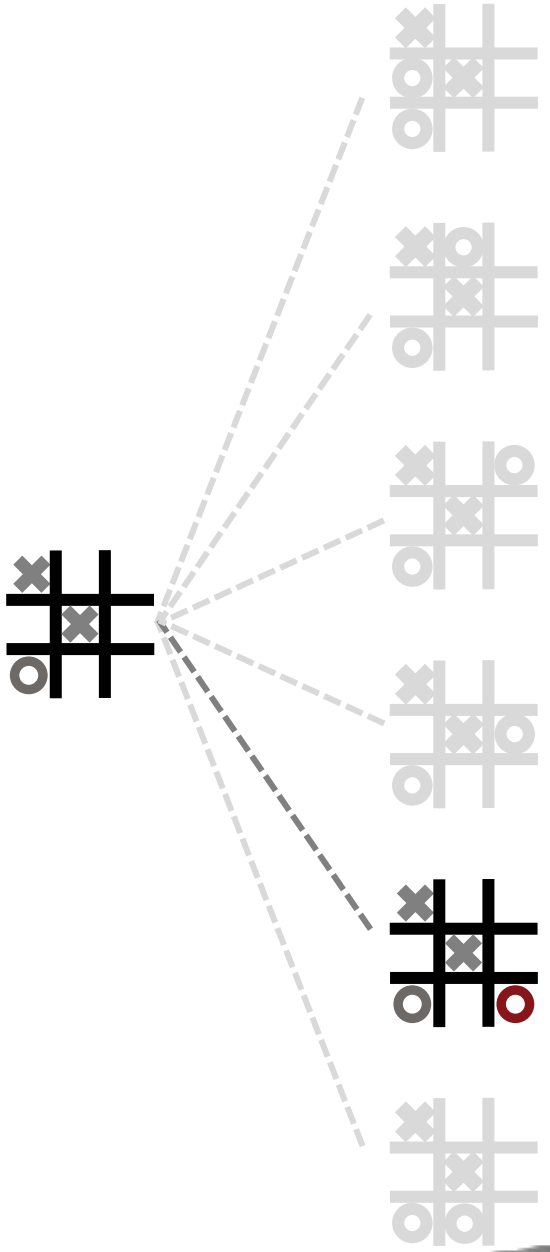


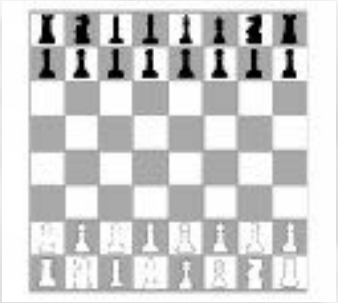




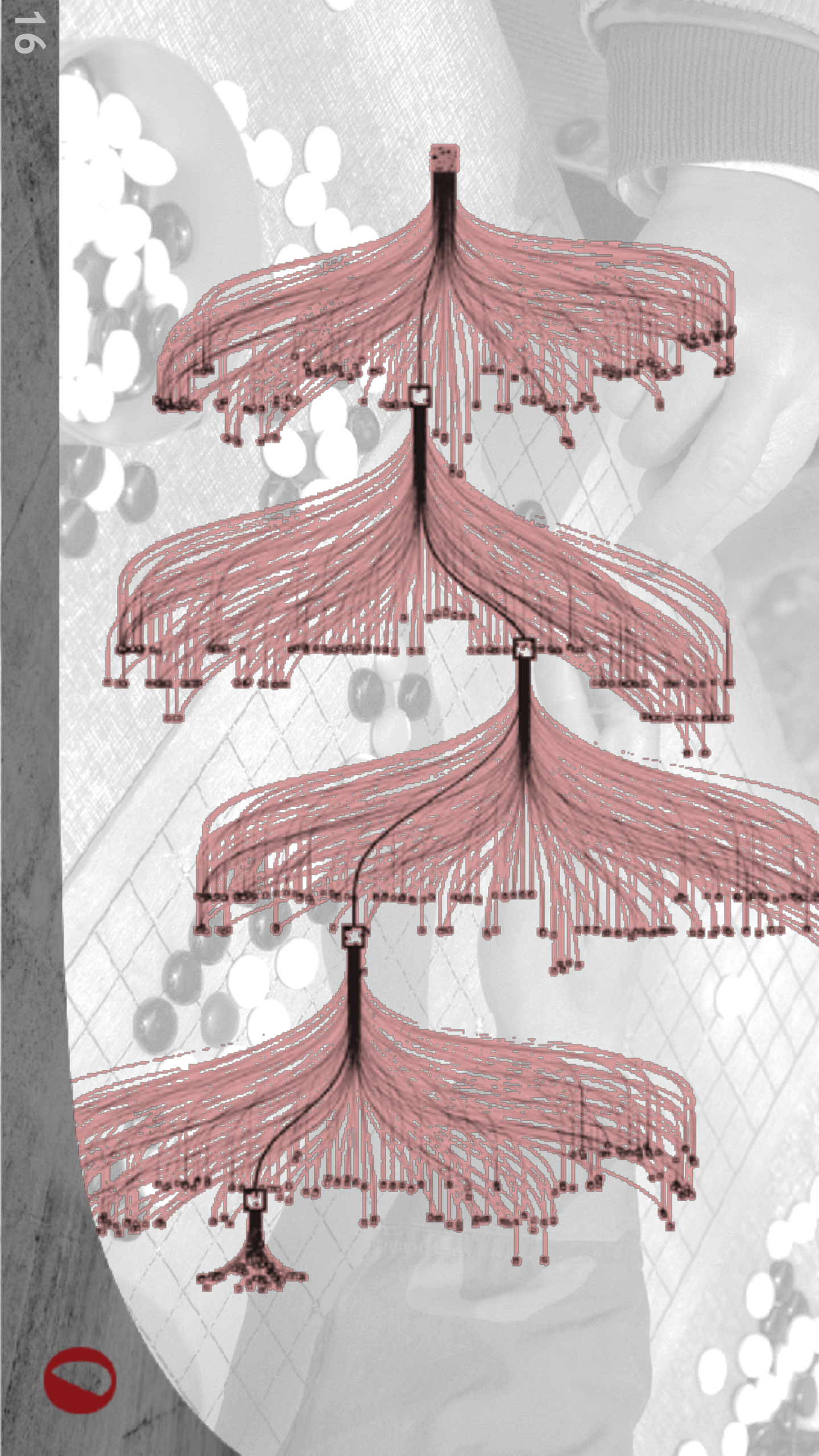


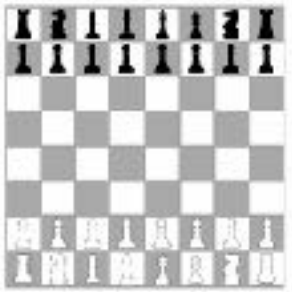


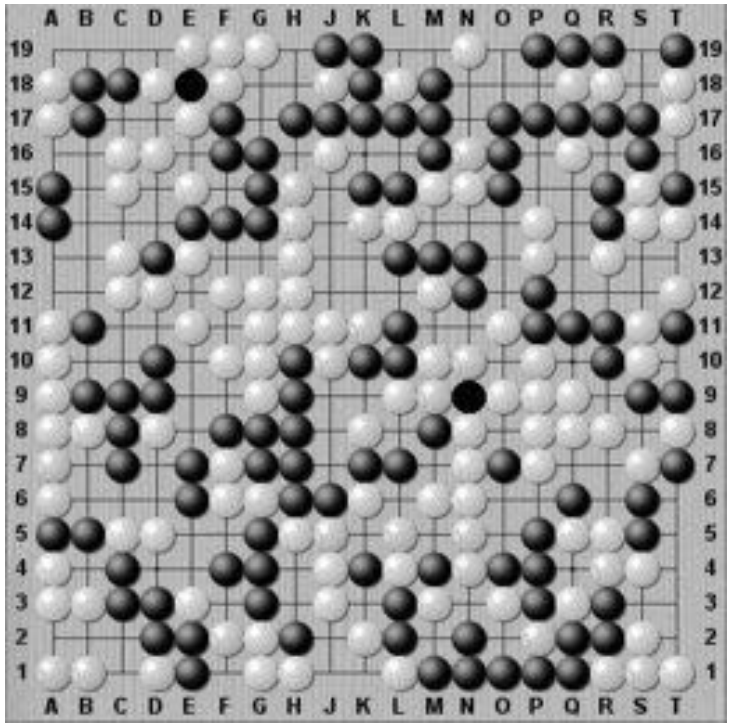




Beyond 10^{120}
THE DIFFICULTY OF MAKING DECISIONS
chalcid







Deep Blue
Kasparov

1997

4:1 AlphaGo
Lee Sodol

2016

60:0 AlphaMaster
Go Professionals

Jan
2017

89:11 AlphaGo Zero
AlphaMaster

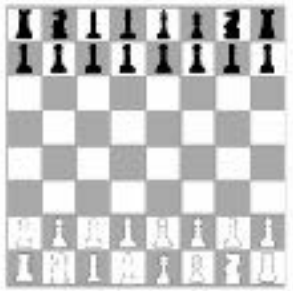
Oct
2017

60:40 Alpha Zero
AlphaMaster

Dec
2017

Deep Blue
Kasparov

1997

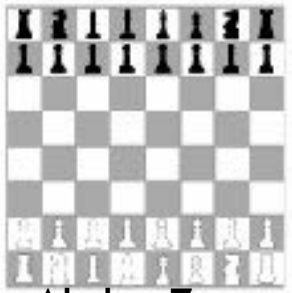


Alpha Zero
Stockfish 8

Dec
2017

4:1 AlphaGo
Lee Sodol

2016



Alpha Zero
StockFish 9
155 – 839 - 15

2018

60:0 AlphaMaster
Go Professionals

Jan
2017

5:0 AlphaStar
MaNa

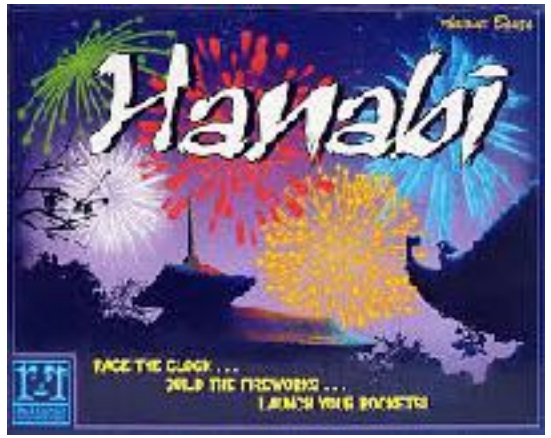
Dec
2018

89:11 AlphaGo Zero
AlphaMaster

Oct
2017

60:40 AlphaGo Zero
AlphaMaster

Dec
2017



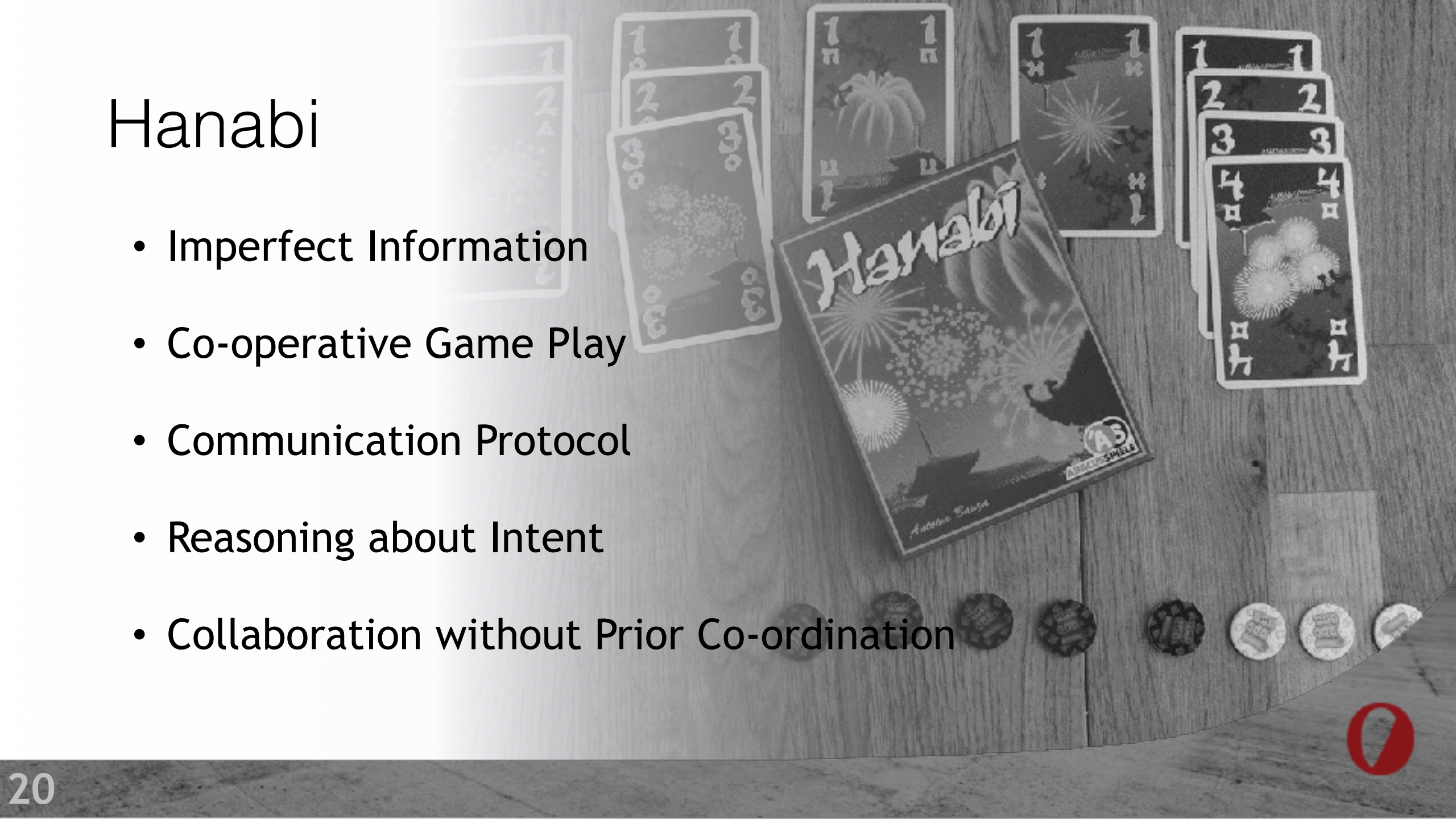
Hanabi

???

StarCraft

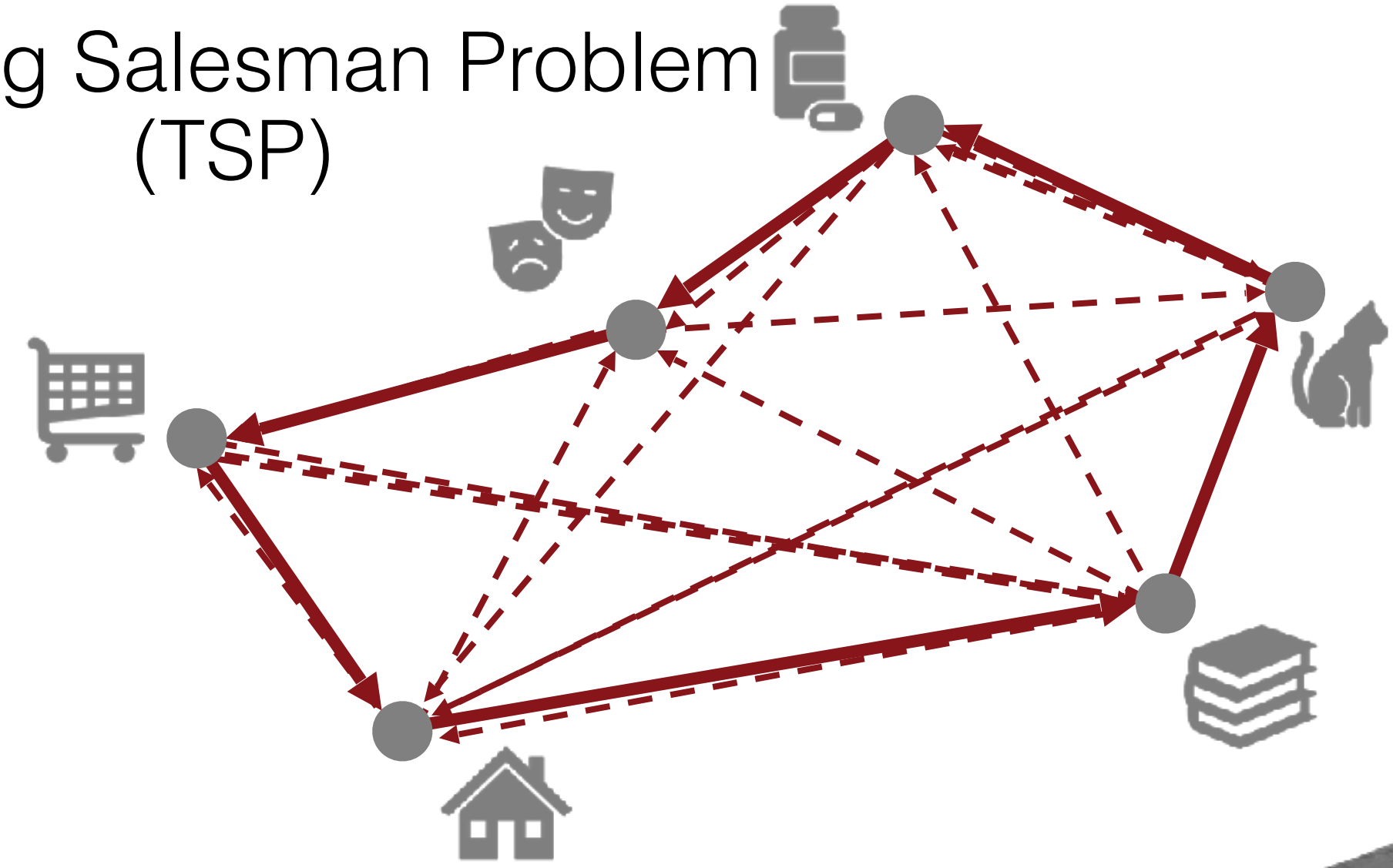
- Imperfect Information
- Real-Time
- Long-term Planning
- 10^{26} Actions at each time step

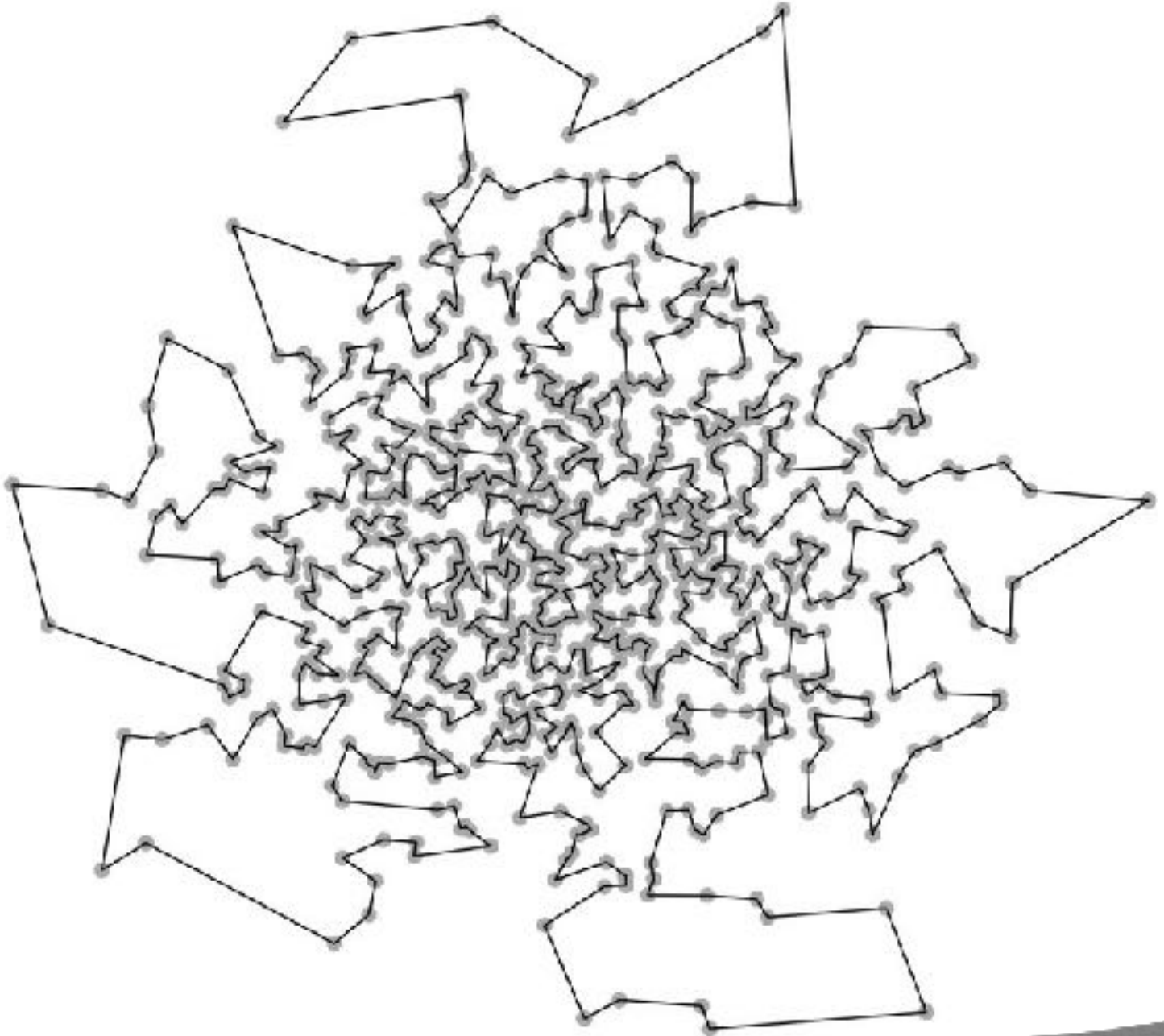
Hanabi

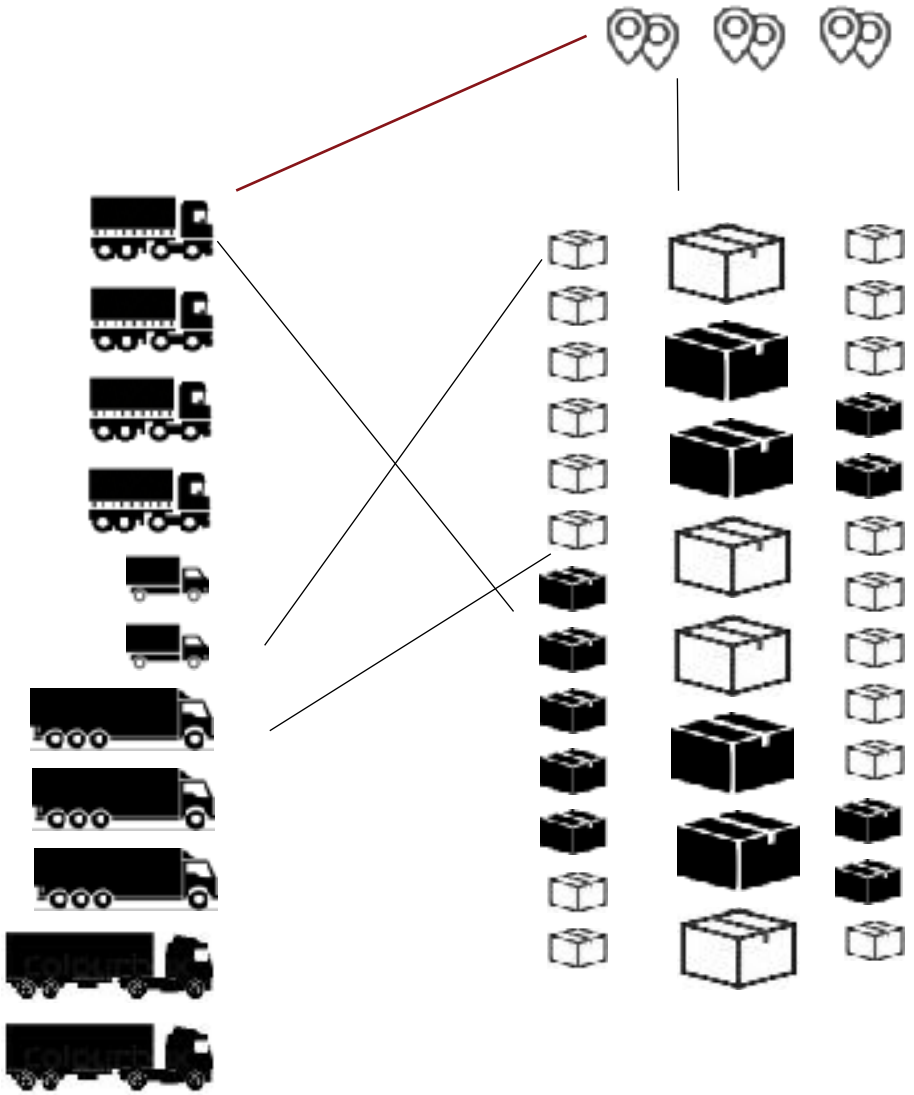


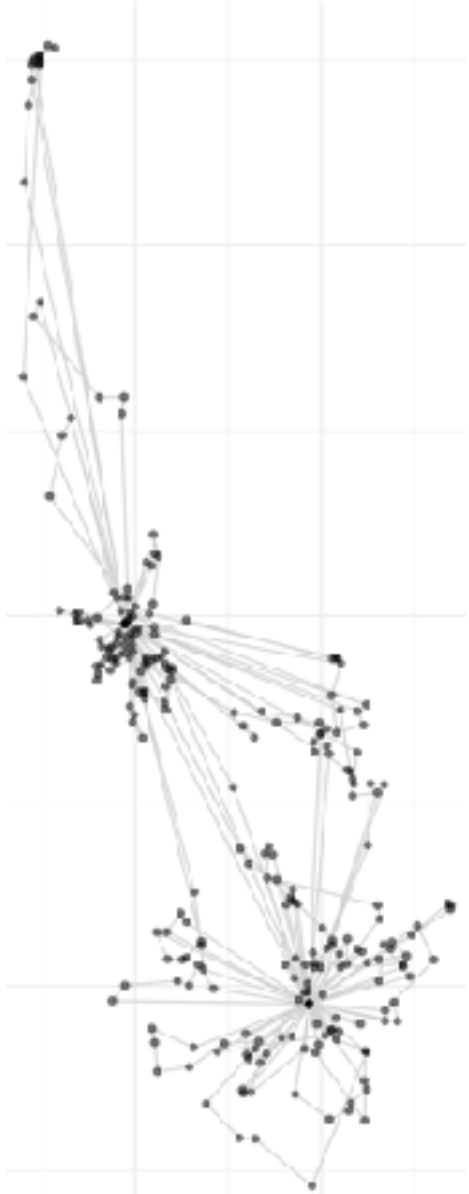
- Imperfect Information
- Co-operative Game Play
- Communication Protocol
- Reasoning about Intent
- Collaboration without Prior Co-ordination

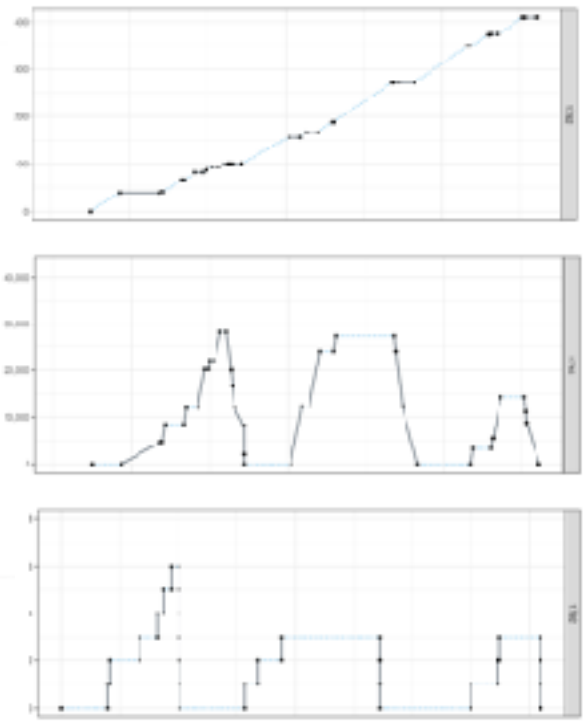
Travelling Salesman Problem (TSP)









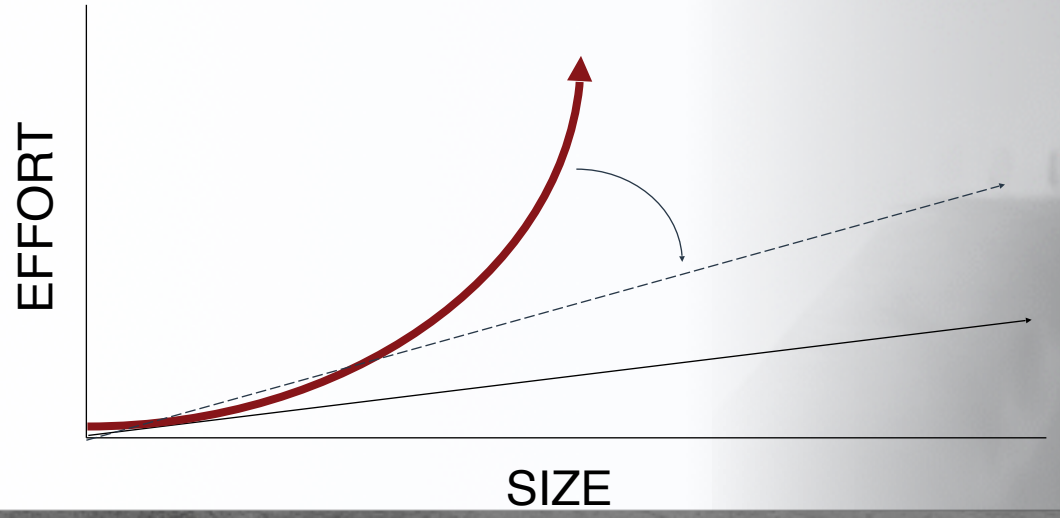


But why logistics

- We like discrete combinatorial optimisation problems
- A lot of graph theory can be thrown at problem
- Localisation and cutting plane methods
- Powerful heuristic search strategies
- ML for searching and tuning hyperparameters
- Much easier to manager compute resources needed

Why are hard problems hard?

- Understand the problem
- Describe it to a computer
- Let the computer solve it
  - Hopefully automatically
  - Some problems are intractable

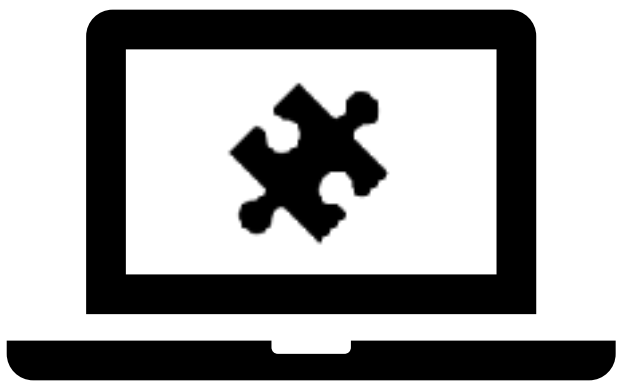


Relevance to Insurance

- Logistics problems - rep and broker planning
- New tools open up new product options
  - Reducing operational risk of fleets
  - Delivery risk profiles
- Allow us to view problems in a new light

Accessibility

- Studies
- One Off Problems
- Curious
- Build it into your own Tools
- Operationalism



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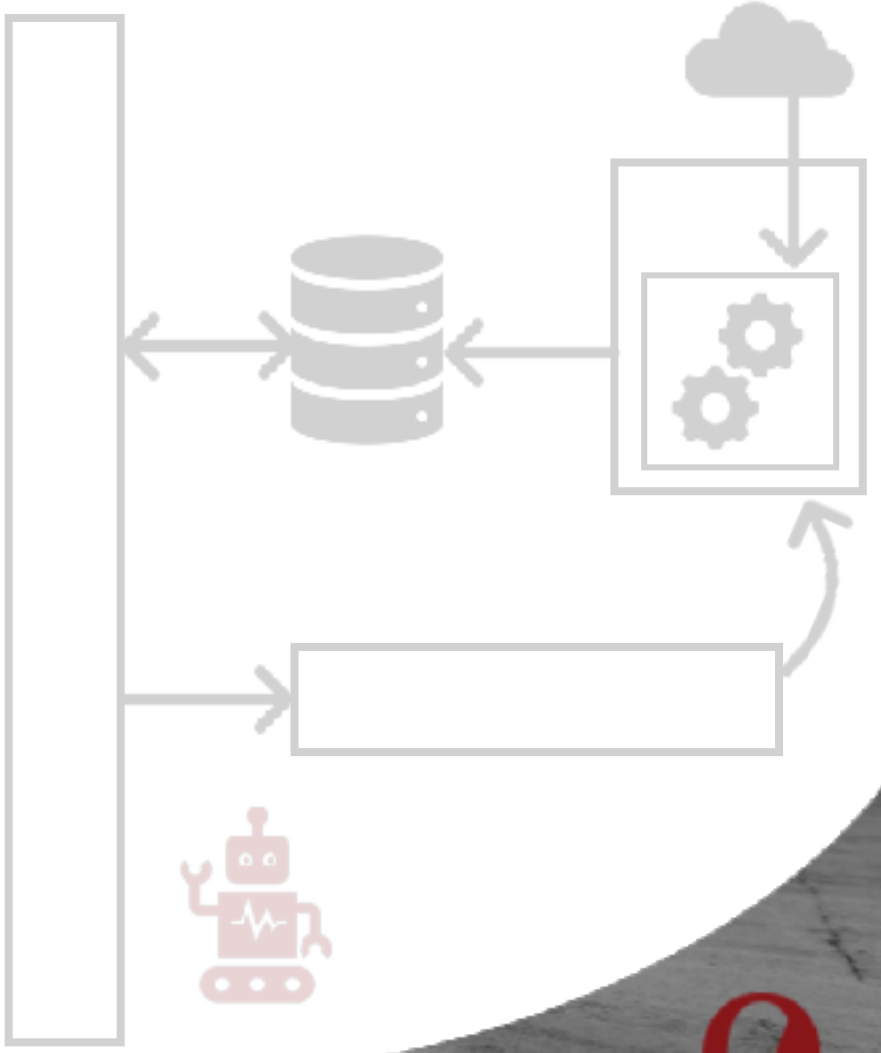
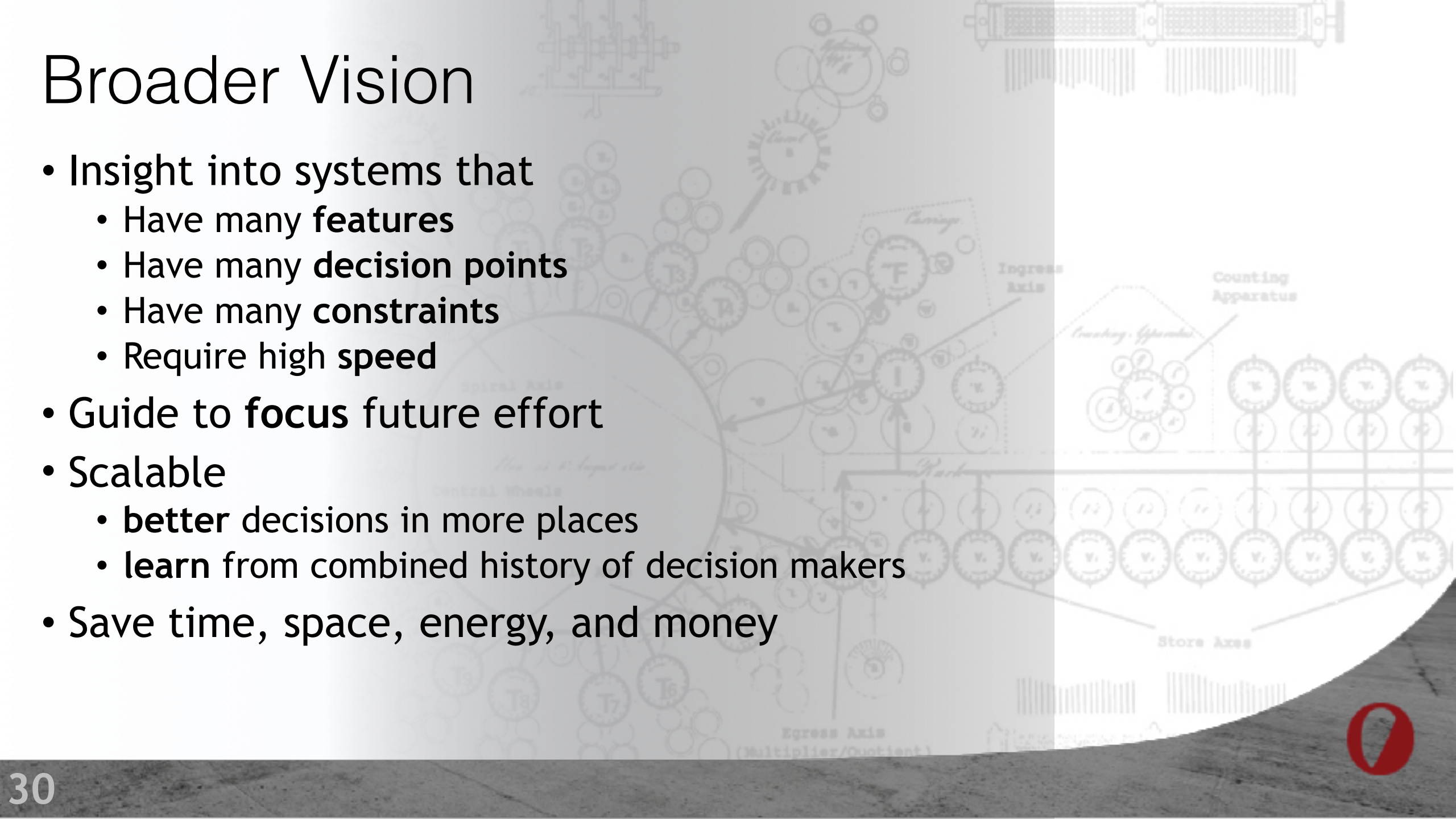


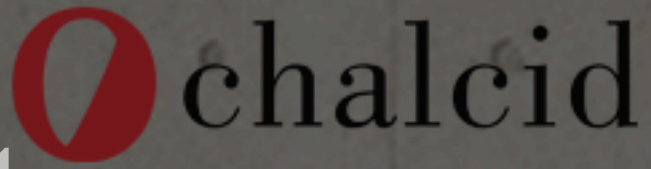
Broader Vision

- Insight into systems that
  - Have many **features**
  - Have many **decision points**
  - Have many **constraints**
  - Require high **speed**
- Guide to **focus** future effort
- Scalable
  - **better** decisions in more places
  - **learn** from combined history of decision makers
- Save time, space, energy, and money



Many things we call innovations are little more than the skillful accumulation of many little optimisations.

GARY KASPARO



Beyond 10^{120}
DAVID CLARK
GEMMA DAWSON
chalcid
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