A Too-Brief Tour of Topics

John Langford

Quantum Compression

Crypto

Game Theory

Probabilistic Planning

Learning theory

Machine Learning

Quantum Compression

Classical compression/decompression algorithm + compiler = quantum compression/decompression algorithm.

Quantum Compression

Crypto

Steganography (with Luis von Ahn and Nick Hopper)

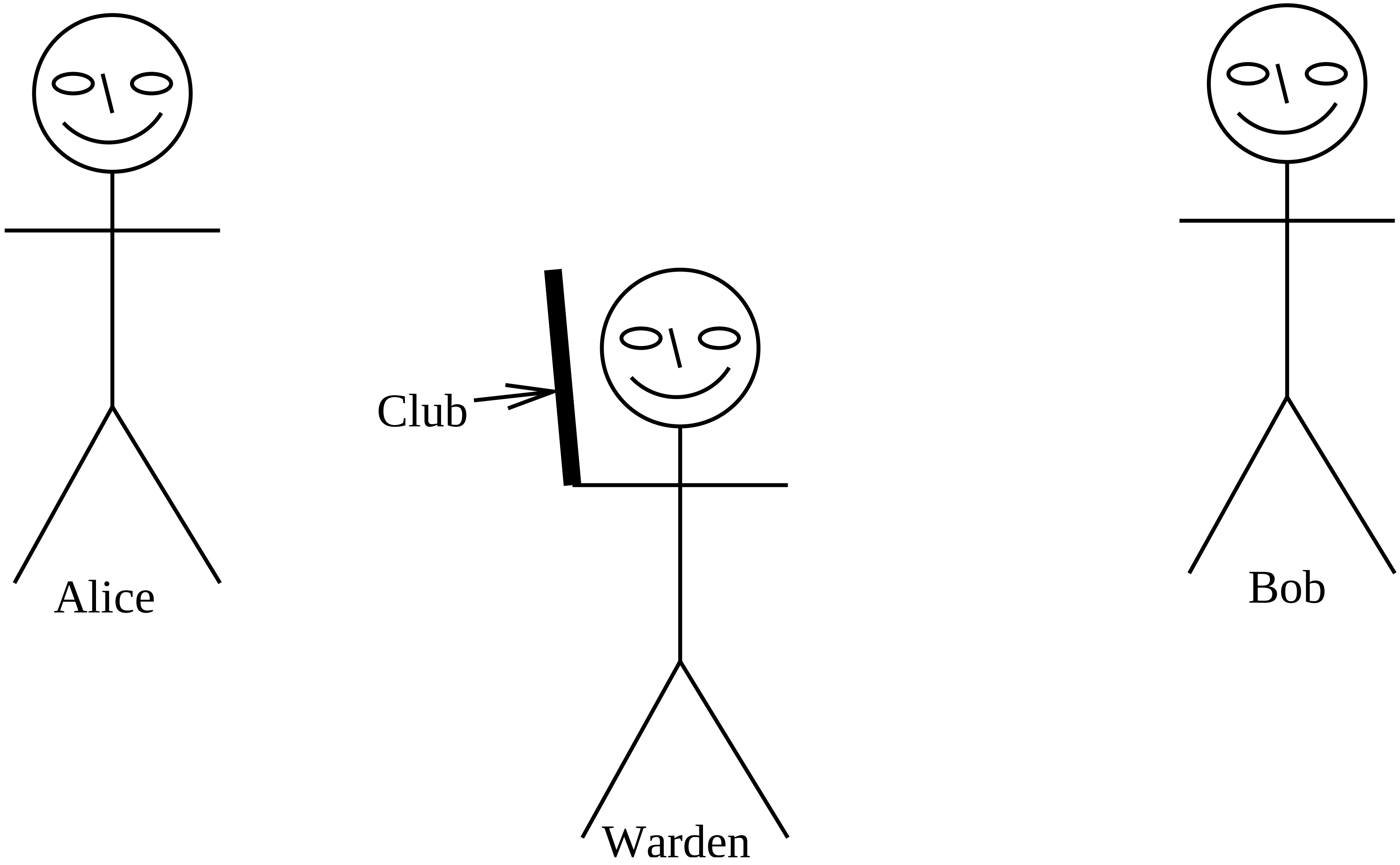
CAPTCHA (Luis, Manuel Blum, and Nick)

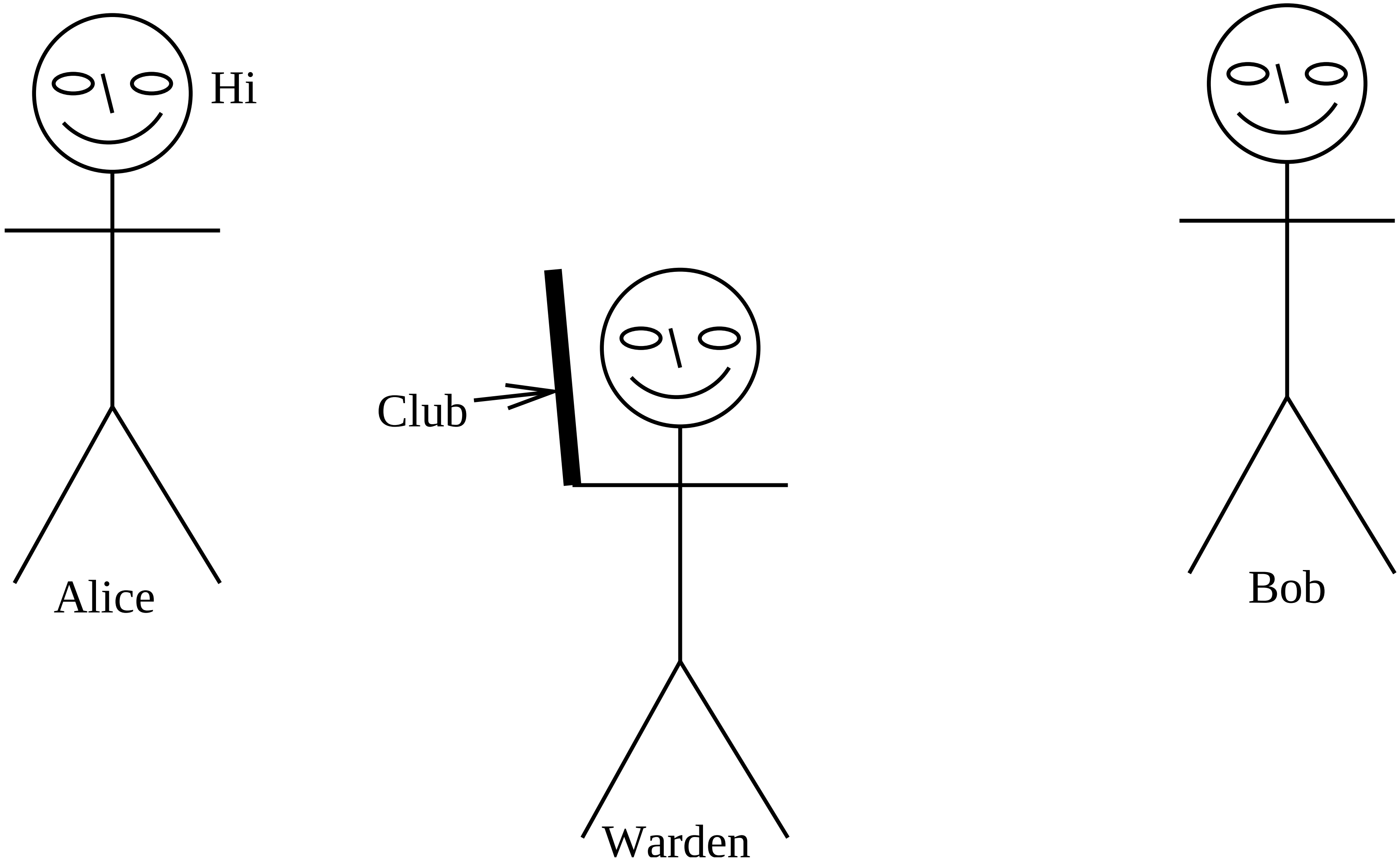
Game Theory

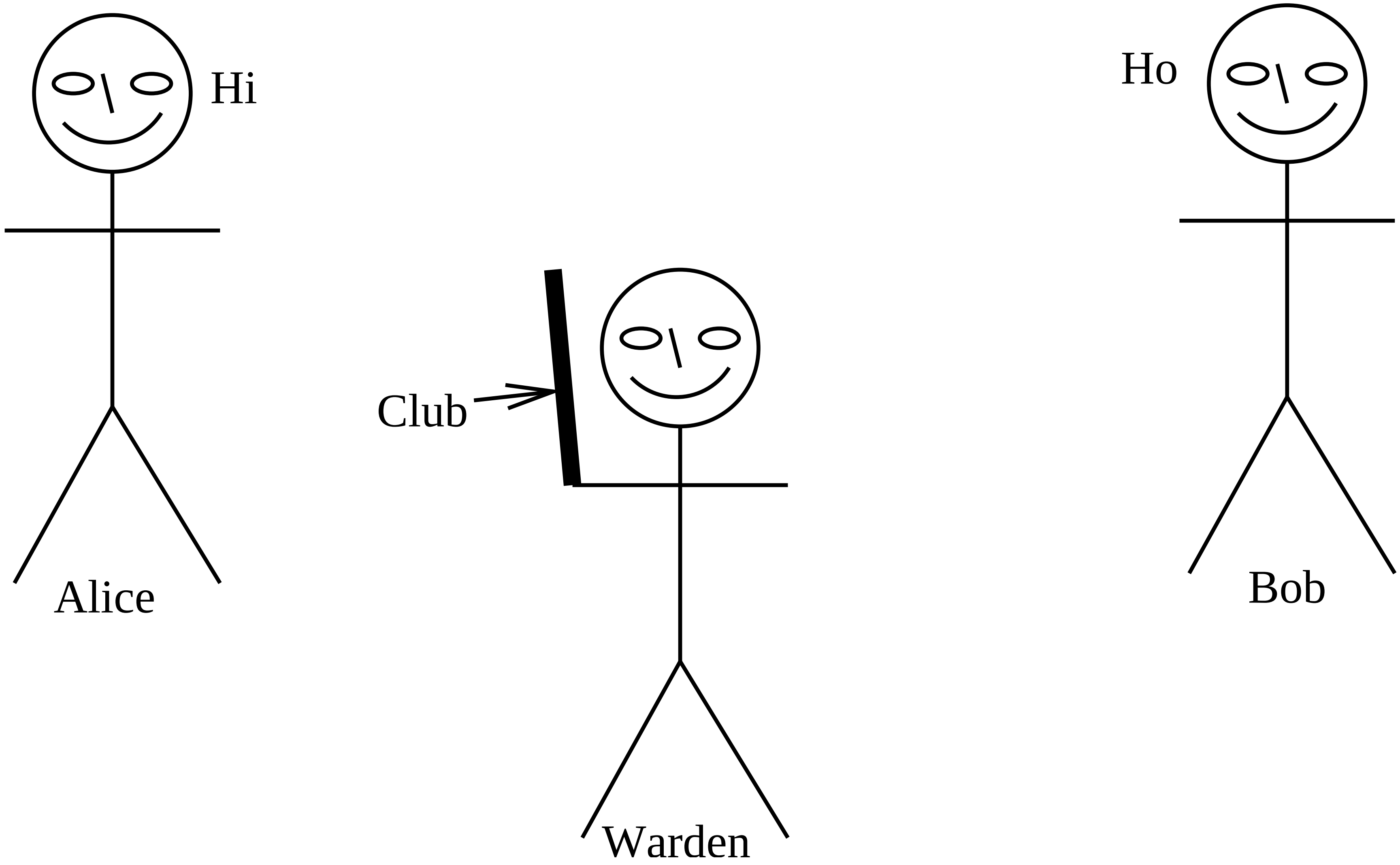
Probabilistic Planning

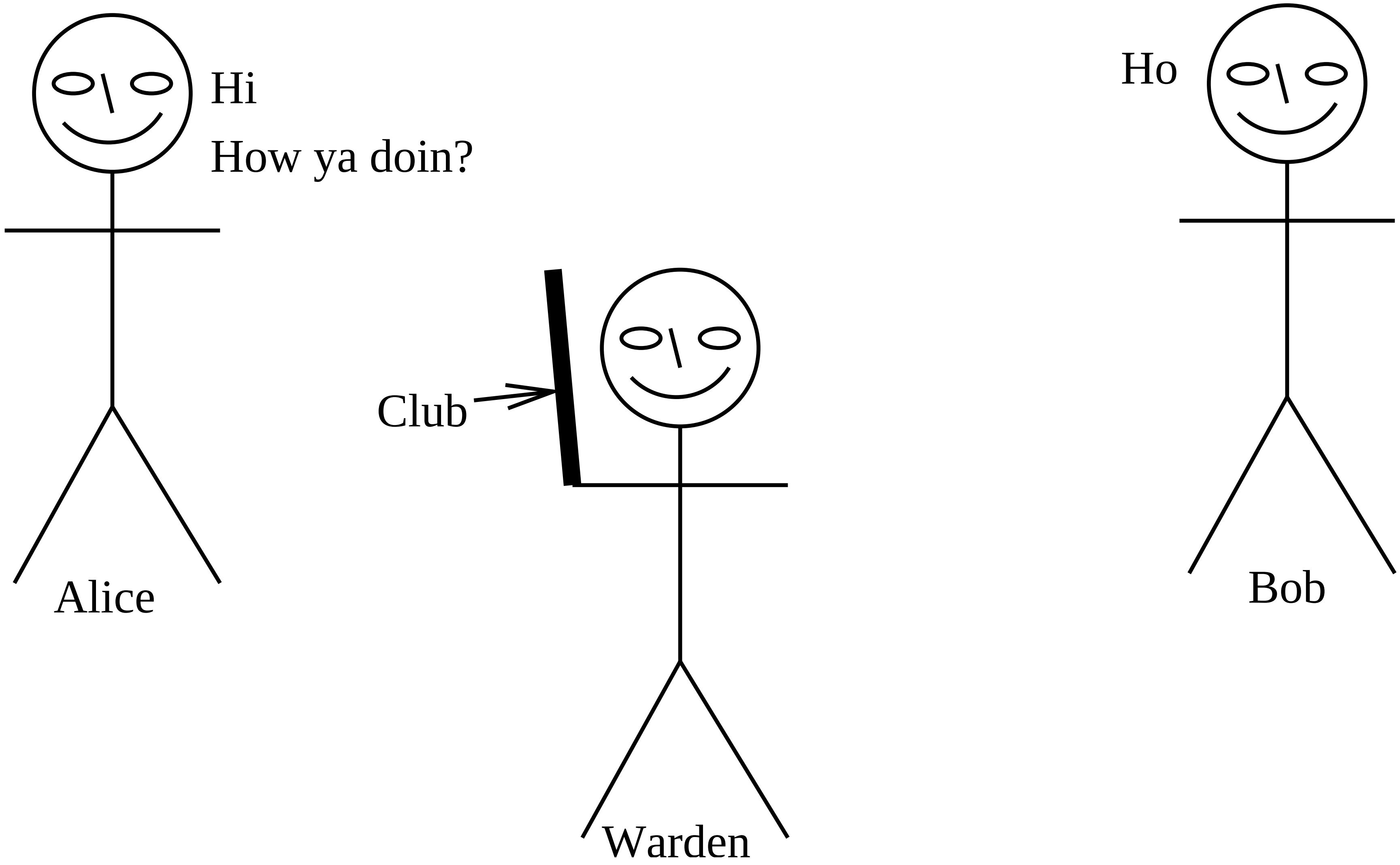
Learning theory

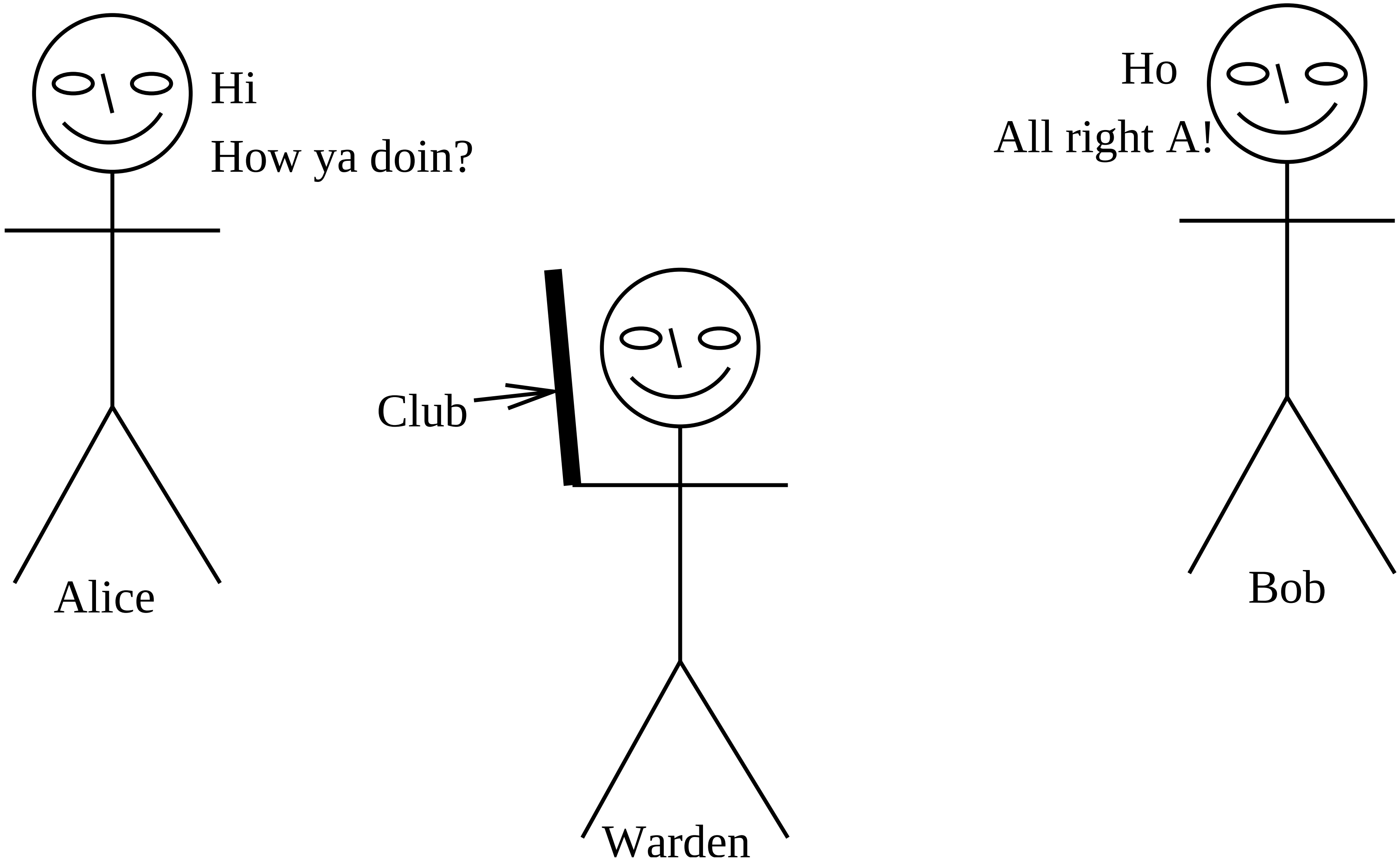
Machine Learning

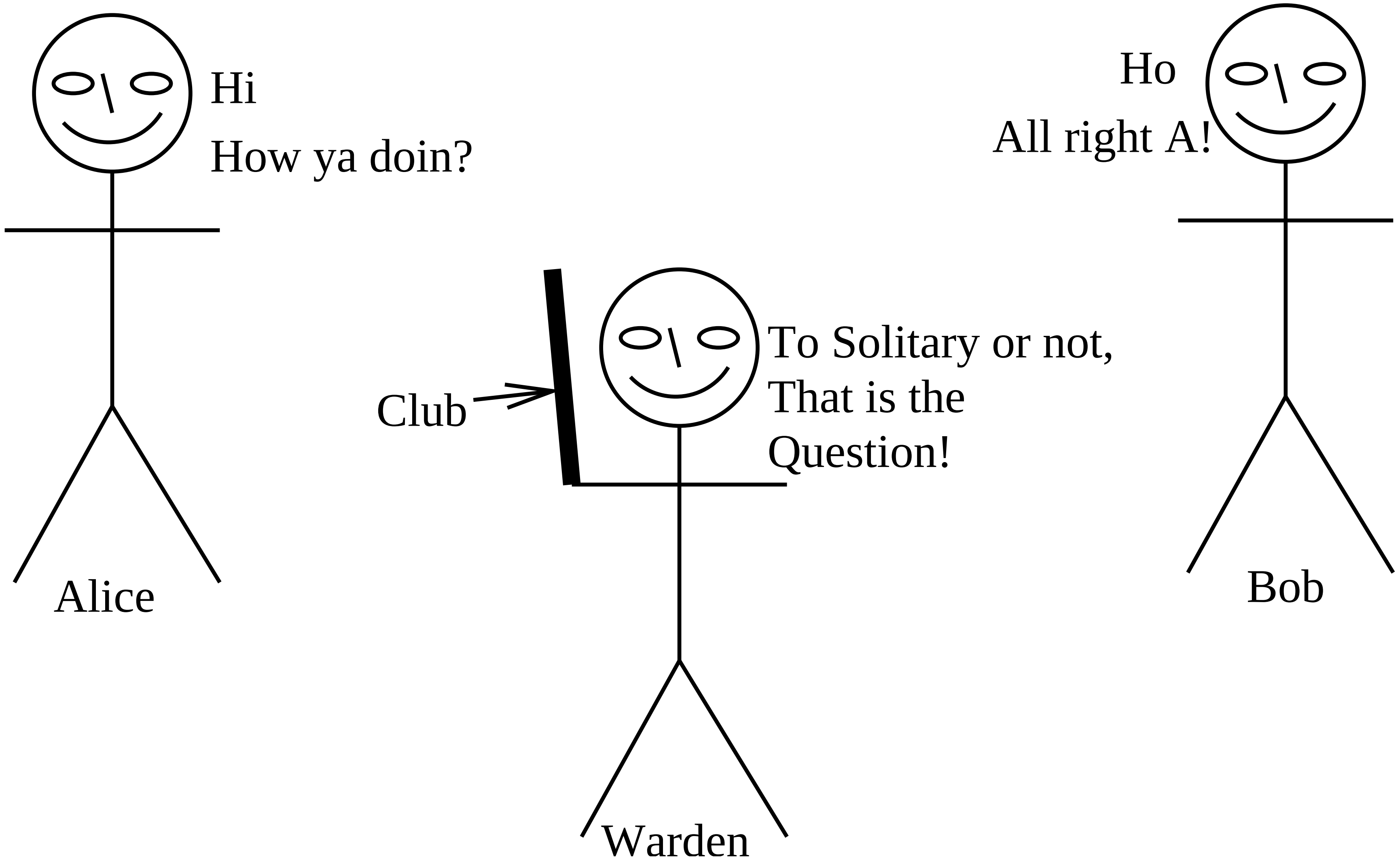

Alice
Club
Warden
Bob


Hi
Club
Alice
Warden
Bob

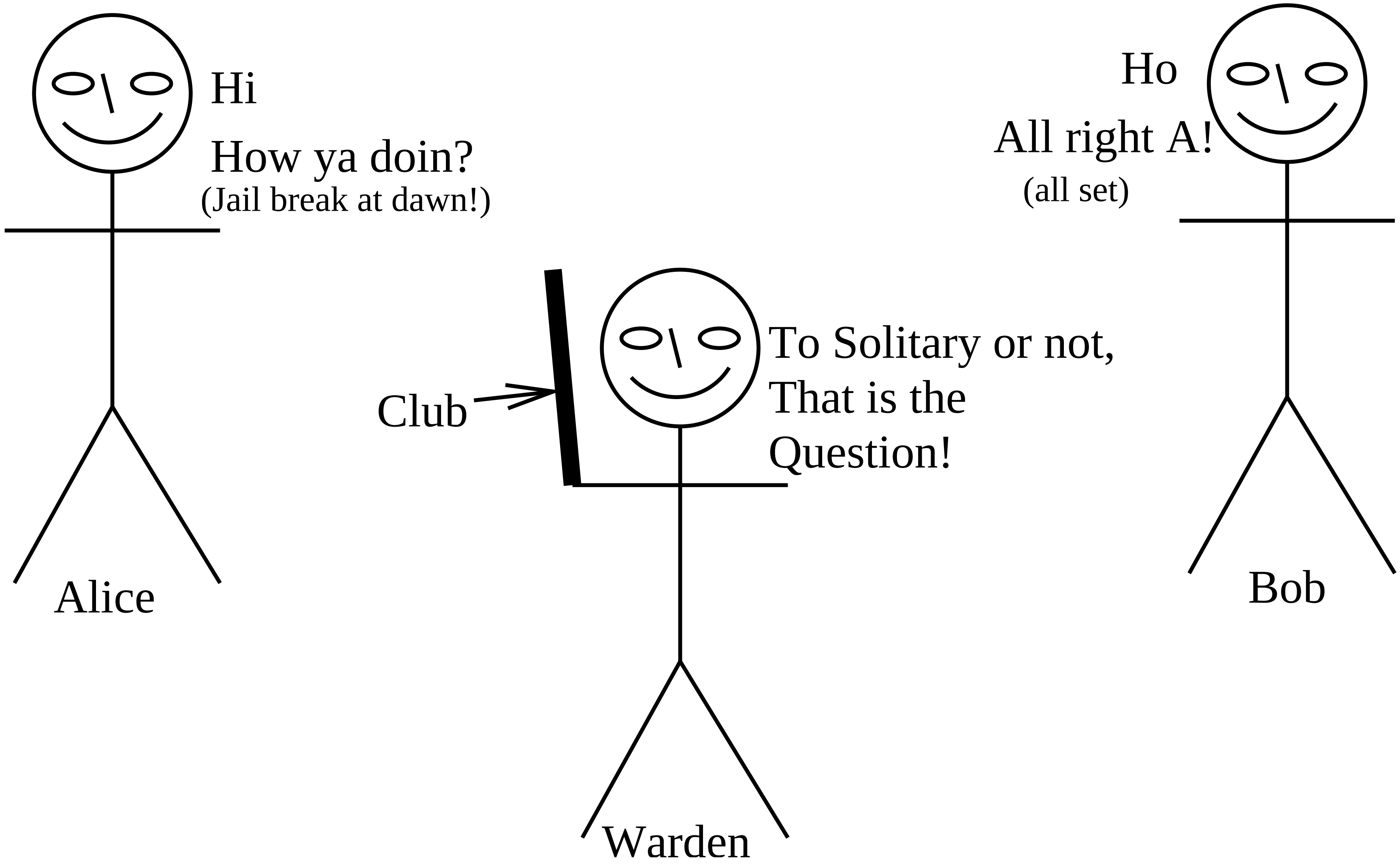

Hi
Alice
Club
Warden
Ho
Bob


Hi
How ya doin?
Ho
Club
Alice
Warden
Bob


Hi
How ya doin?
Alice
Club
Warden
Ho
All right A!
Bob



Hi
How ya doin?
Ho
All right A!
Club
To Solitary or not,
That is the
Question!
Alice
Warden
Bob


Hi
How ya doin?
(Jail break at dawn!)
Alice
Club
To Solitary or not,
That is the
Question!
Warden
Ho
All right A!
(all set)
Bob

Quantum Compression Crypto

Game Theory Probabilistic Planning

Correlated Equilibria on Graphical Games

(With Michael Kearns, Sham Kakade, Luis Ortiz)

Learning theory Machine Learning

Correlated Equilibria on Graphical Games

Correlated Equilibria = Nash Equilibria with independence constraint removed.

There exists poly(graphical game) calculation of Correlated Equilibria.

All Correlated Equilibria (up to payoff equivalence) are representable using poly(graphical game) bits.

Quantum Compression　　　Crypto

Game Theory　　　Probabilistic Planning

Probabilistic Graphplan (with Avrim Blum)

Learning theory　　　Machine Learning

Probabilistic Graphplan

Graphplan (Avrim Blum and Merrick Furst) = first compiling AI planner

Probabilistic Graphplan = extension from "DP" to "MDP" domains

Quantum Compression

Crypto

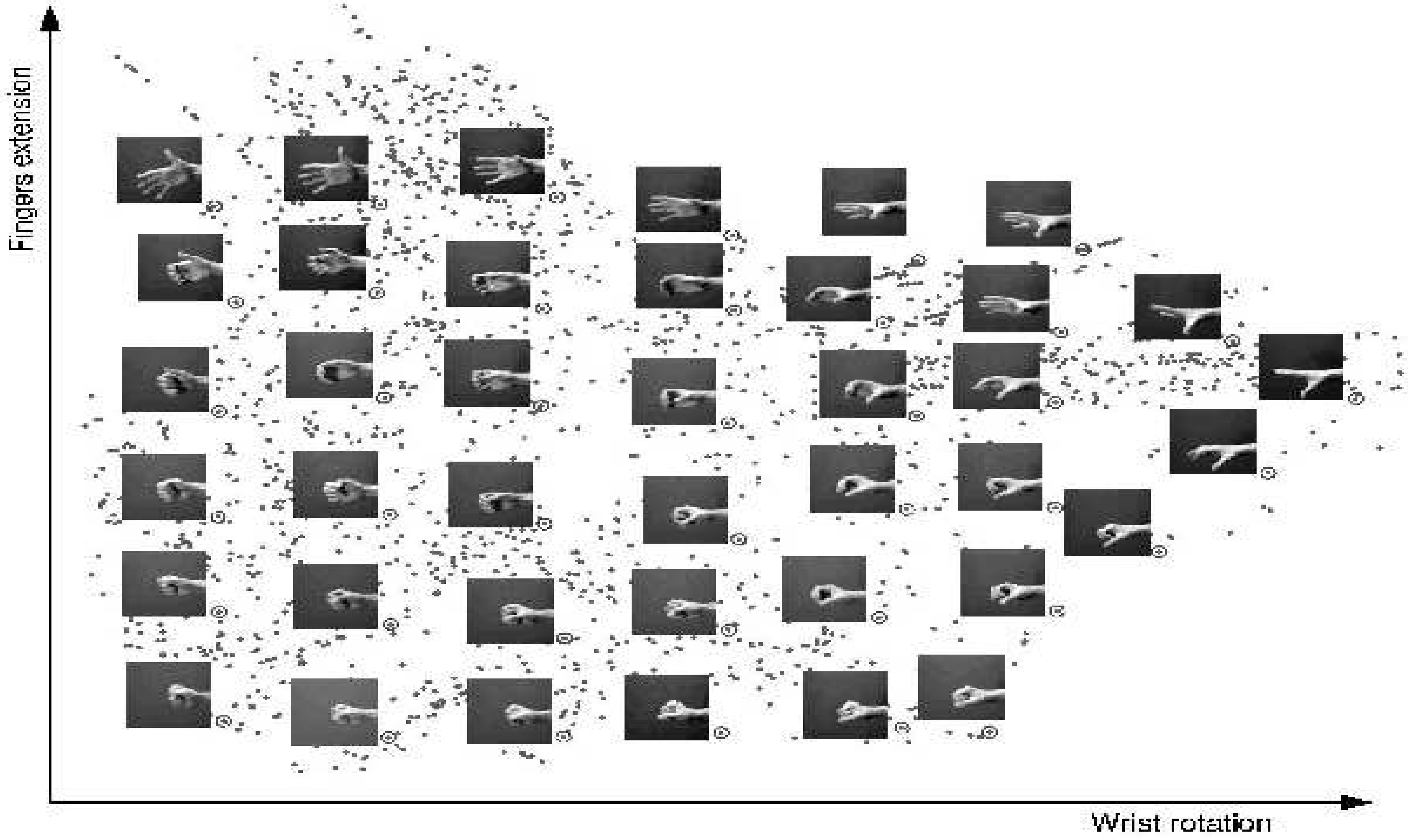
Game Theory

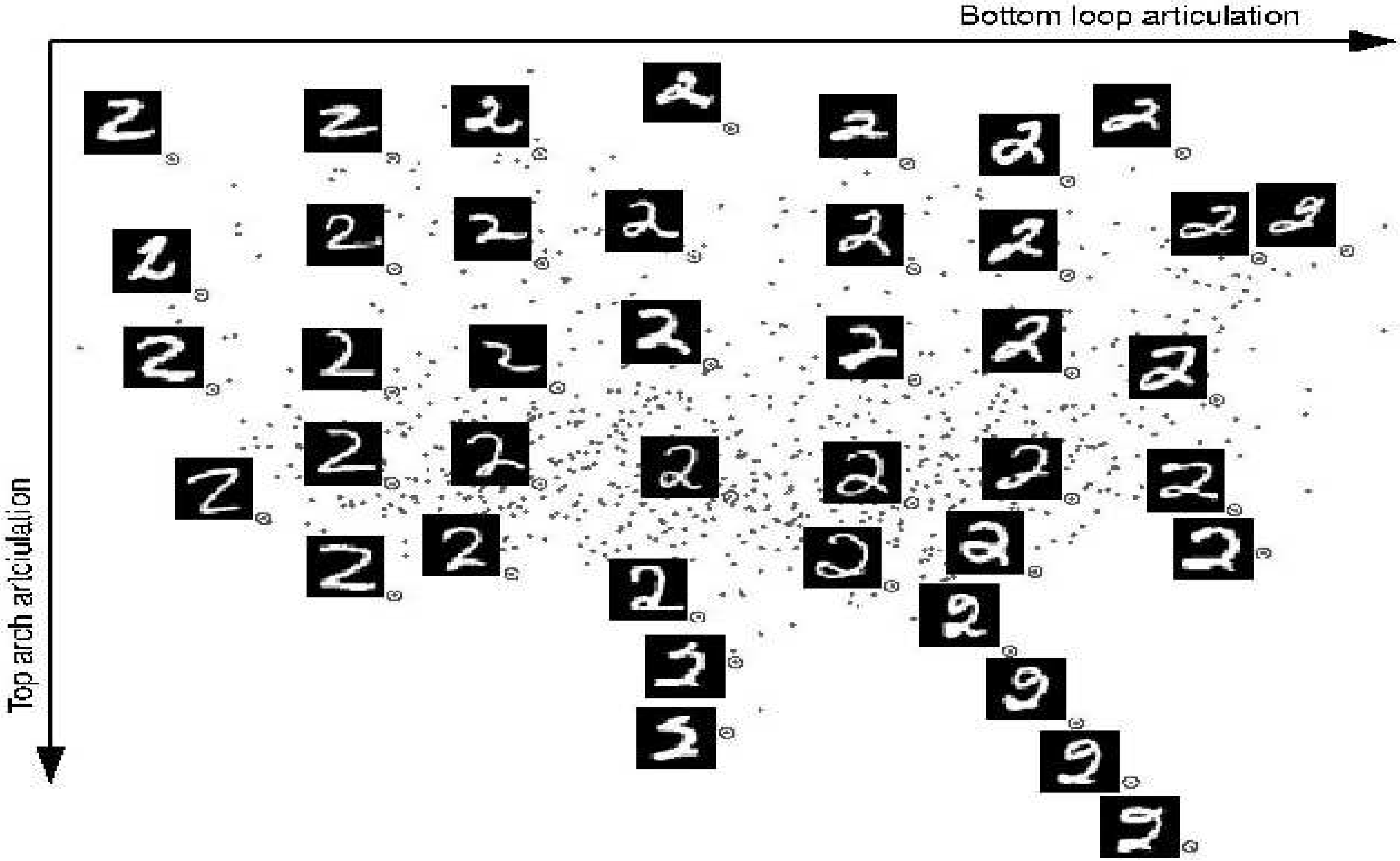
Probabilistic Planning

Learning theory

Machine Learning

Isomap (with Josh Tenenbaum and Vin de Silva)
Metric E^3 (with Michael Kearns and Sham Kakade)
Robust Learning (with Joseph O'Sullivan, Rich Caruana, and Avrim Blum)
Infinite State Hidden Markov Models (with Sebastian Thrun)
Risk Sensitive Particle Filters (with Sebastian Thrun and Vandi Verma)


Fingers extension
Wrist rotation


Bottom loop articulation
Top arch articulation

Quantum Compression

Crypto

Game Theory

Probabilistic Planning

Learning theory

Machine Learning

Tight True Error Bounds (Thesis)

Microchoice Bounds (with Avrim Blum)

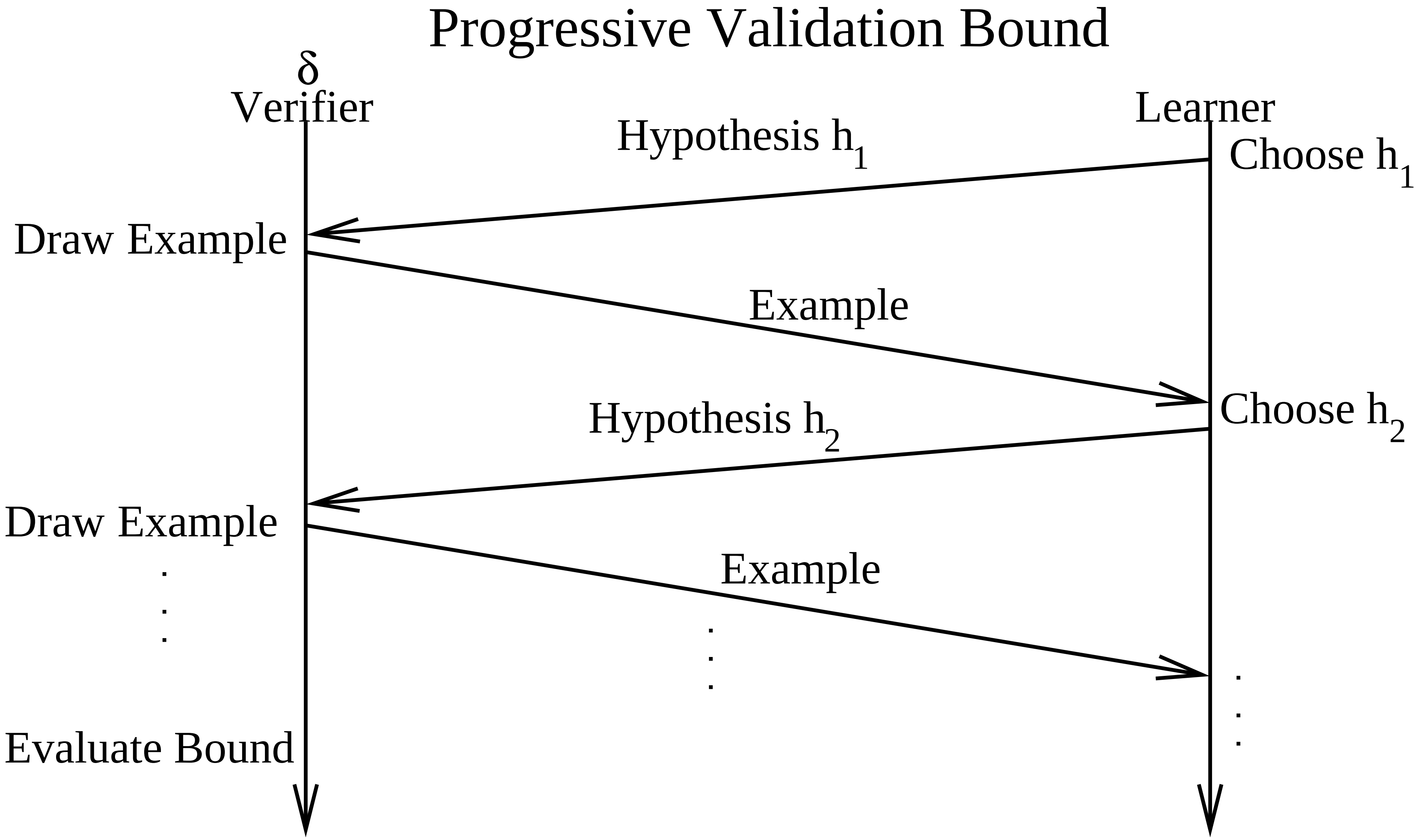
Shell Bounds (with David McAllester)

Margin Bound (with Nimrod Meggido and Matthias Seeger)

Stochastic Margin Bound (with John Shawe−Taylor and Rich Caruana)

Progressive Validation (with Avrim Blum and Adam Kalai)

Reductions


Progressive Validation Bound
δ
Verifier
Learner
Hypothesis h_1
Choose h_1
Draw Example
Example
Choose h_2
Hypothesis h_2
Draw Example
Example
Evaluate Bound

Quantum Compression

Crypto

Game Theory

Probabilistic Planning

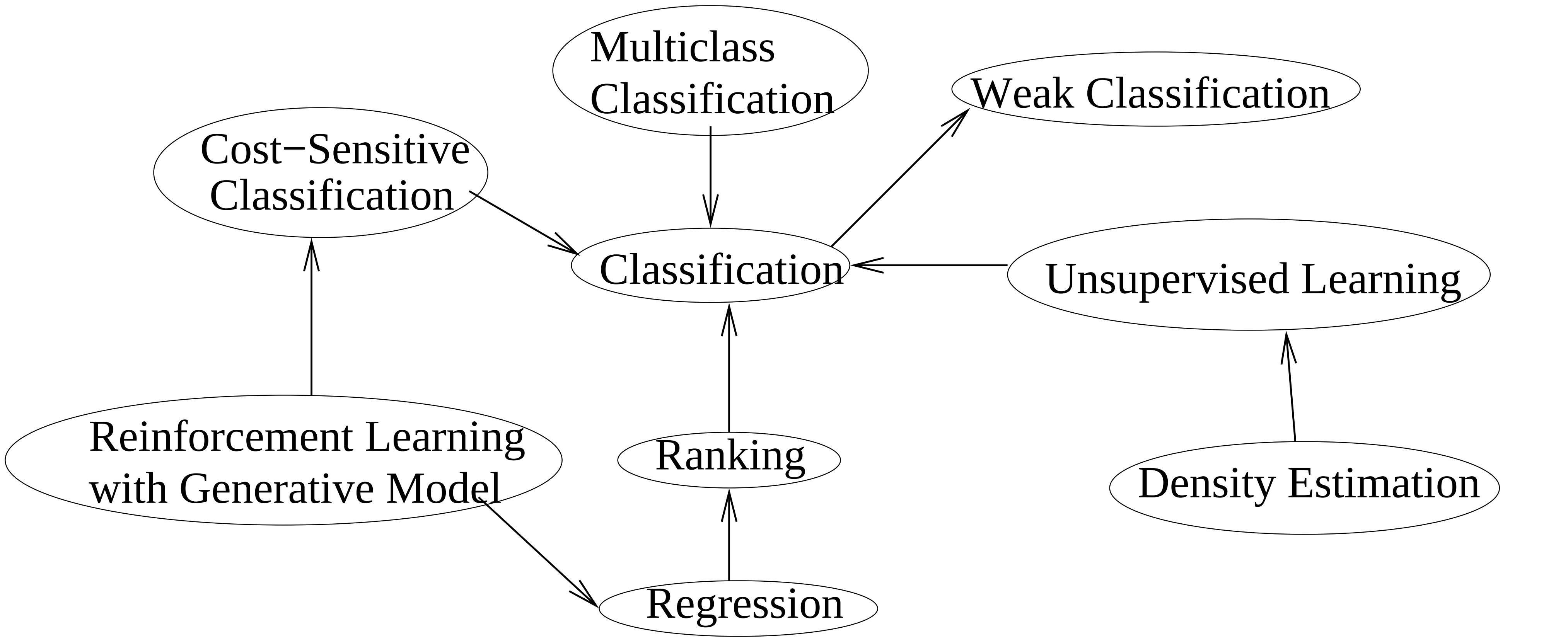
Learning theory

Machine Learning

Tight True Error Bounds (Thesis)

Reductions

- Regression + Generative Model = Reinforcement Learning (with Sham Kakade)
- Classification = Cost Sensitive Learning (with Bianca Zadrozny and Naoki Abe)
- Classification + Generative Model = Reinforcement Learning


Multiclass Classification
Weak Classification
Cost−Sensitive Classification
Classification
Unsupervised Learning
Reinforcement Learning with Generative Model
Ranking
Density Estimation
Regression

11:05AM z-181: grep Langford **/*.c /usr/src/linux-2.4

drivers/net/pcmcia/wavelan_cs.c: * Joseph O'Sullivan & John Langford (josullvn@cs.cmu.edu & jcl@cs.cmu.edu)