Probabilistic
Graphical
Models

Learning
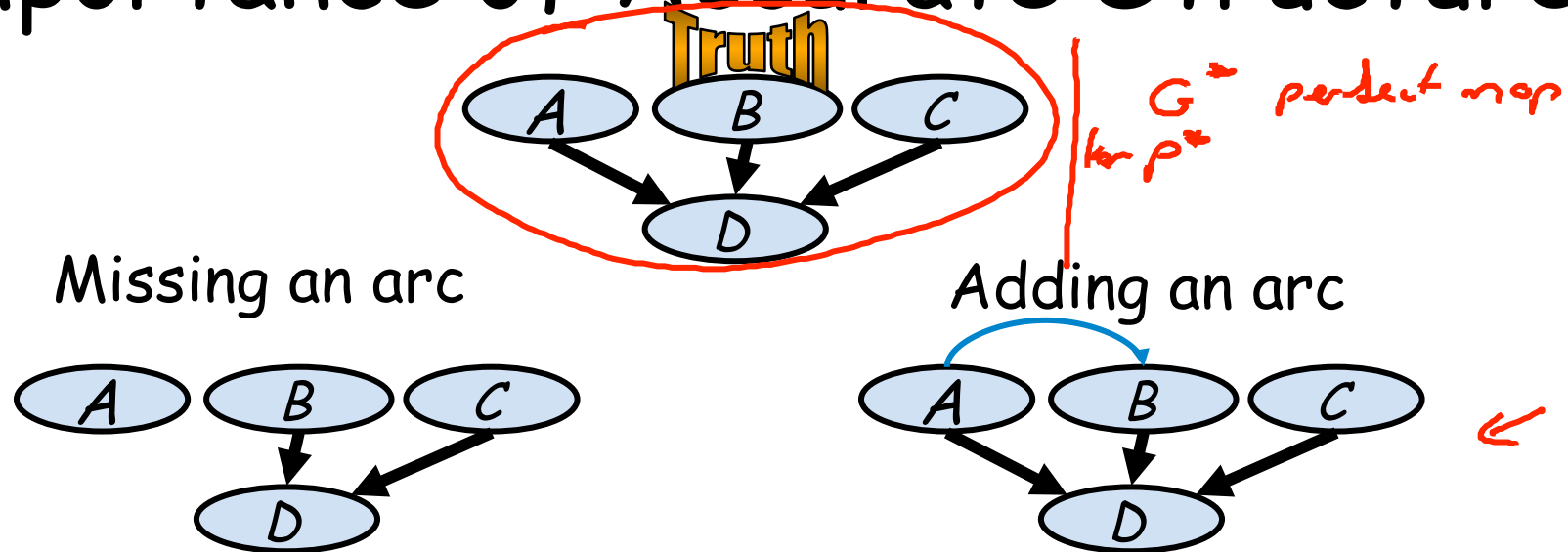
BN Structure

Structure Learning

Why Structure Learning

- To learn model for <u>new queries</u>, when <u>domain expertise</u> is not perfect

- For <u>structure discovery</u>, when inferring network structure is goal in itself

Daphne Koller

Importance of Accurate Structure

Truth

G^* perfect map for P^*

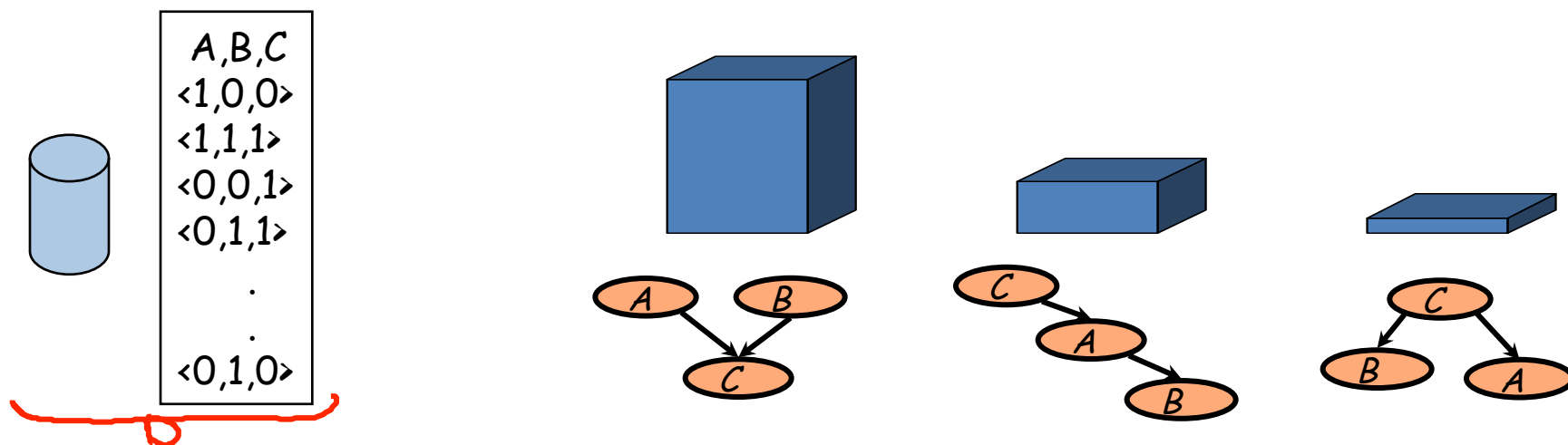**Missing an arc**

Adding an arc

- <u>Incorrect</u> independencies
- Correct distribution P*
  cannot be learned
- But could <u>generalize better</u>

- Spurious dependencies
- Can <u>correctly learn</u> P*
- <u>Increases #</u> of parameters
- <u>Worse generalization</u>

Score-Based Learning

optimization

Define <u>scoring function</u> that evaluates how well a structure matches the data

Search for a structure that maximizes the score

Daphne Koller