HUDK 4050:CORE METHODS IN EDM

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U.S. Department of Education

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Inference

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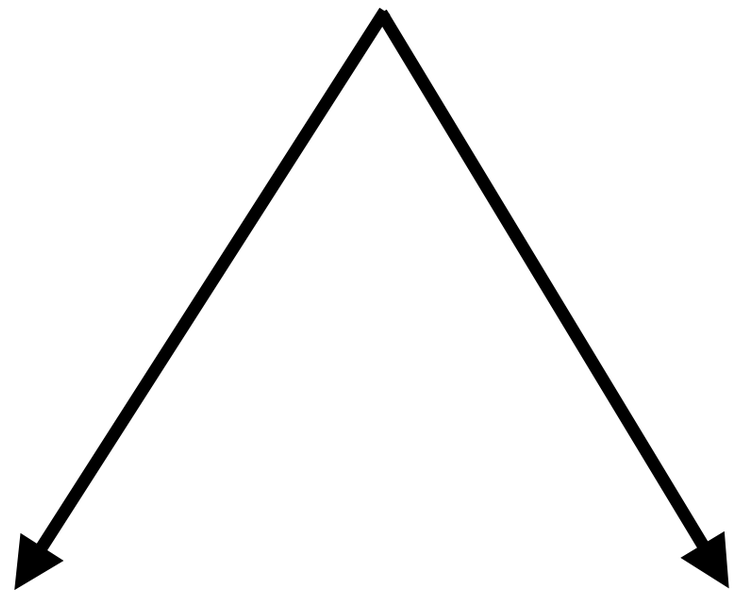
“Statistics is the study of uncertainty”

– LJ Savage, 1977

Variation



Patterns

Uncertainty

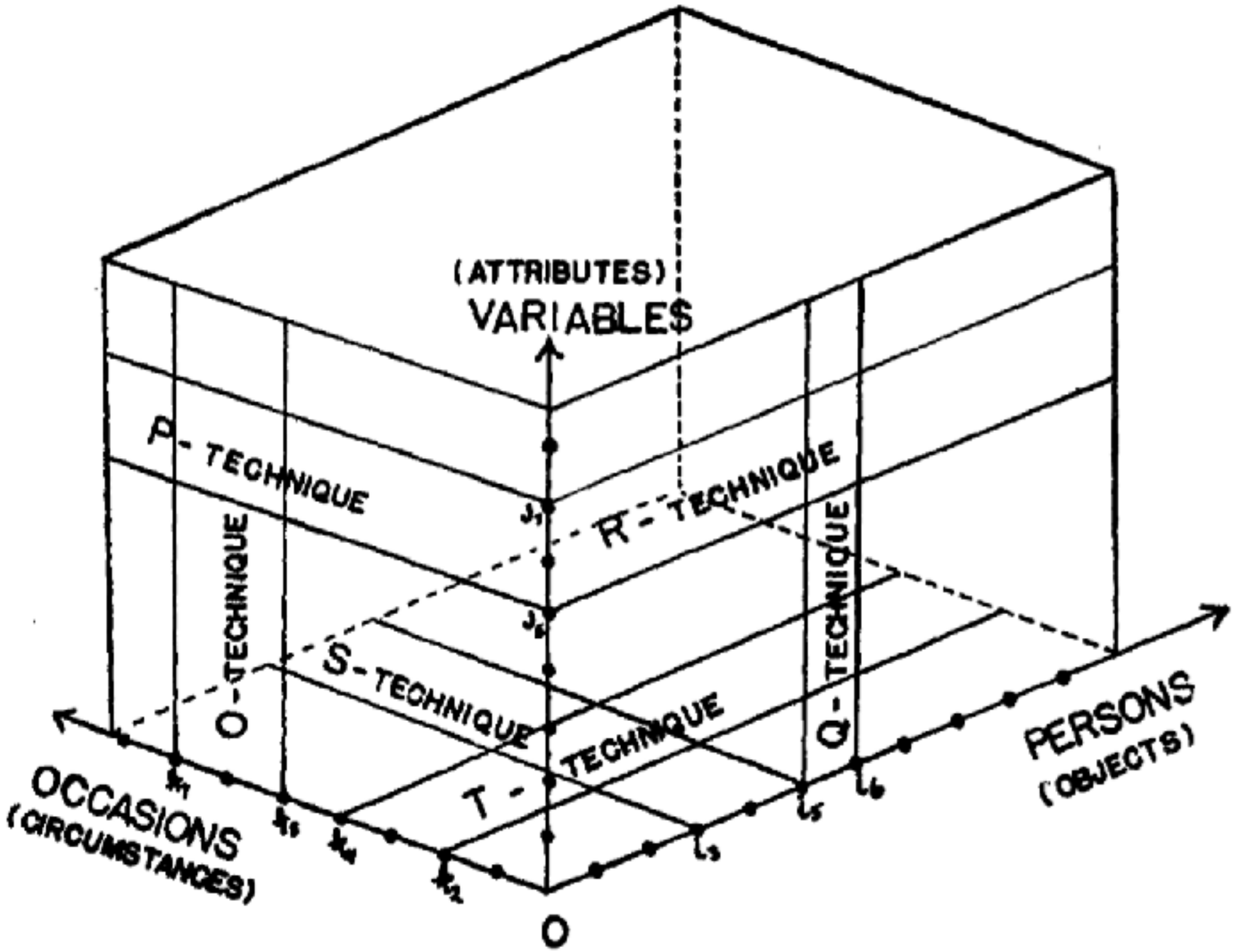


FIG. 1. THE COVARIATION CHART

Cattell, 1952

Swimming

Experimental Psych

Context

Classroom

Ed Stat, Economics

Bad

Spell “cat”

Social Psych

Good

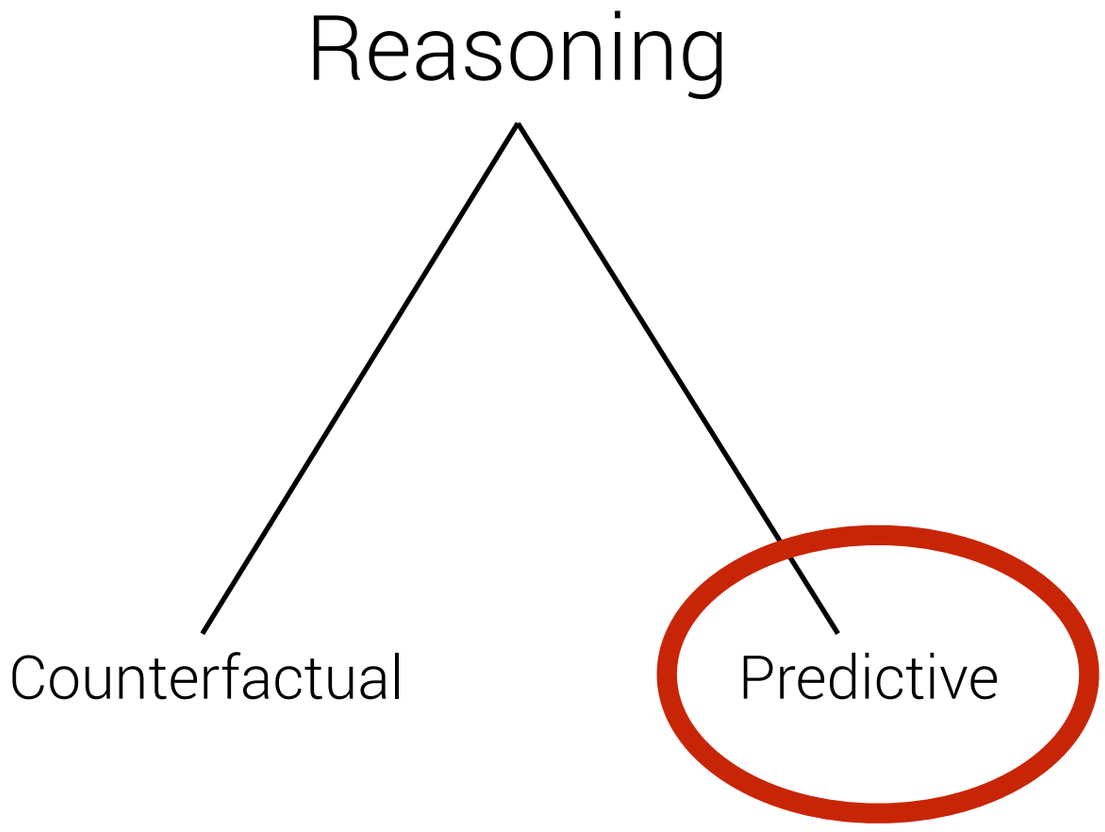
Behavior

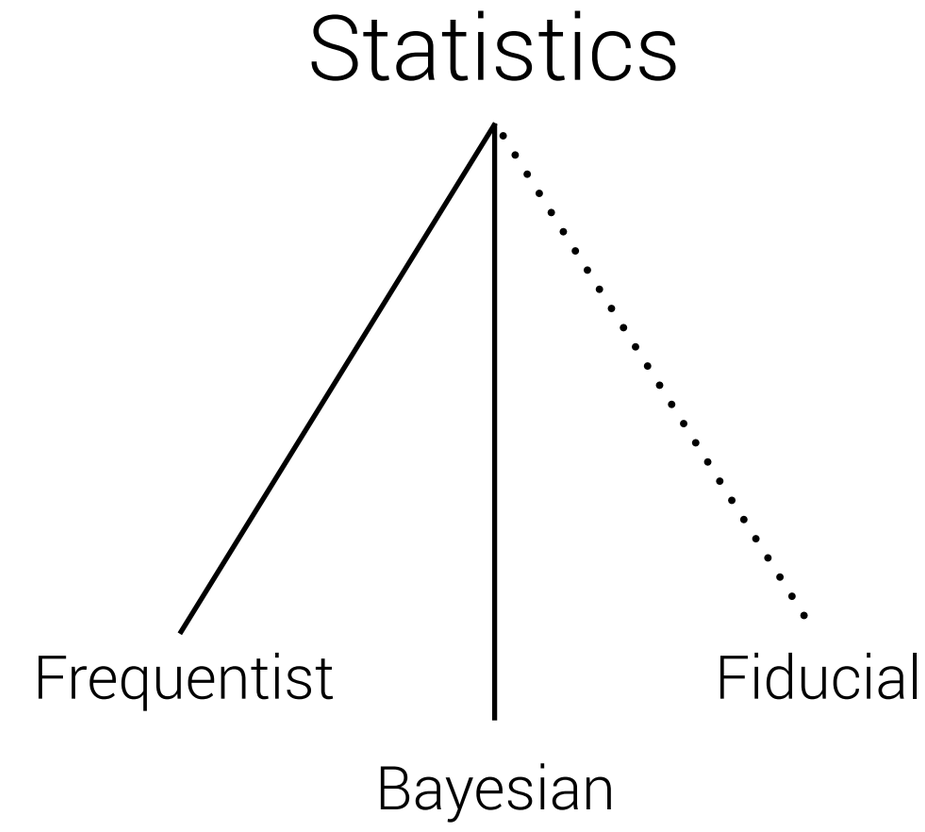
1 2 3 4 5 6 7 8 …

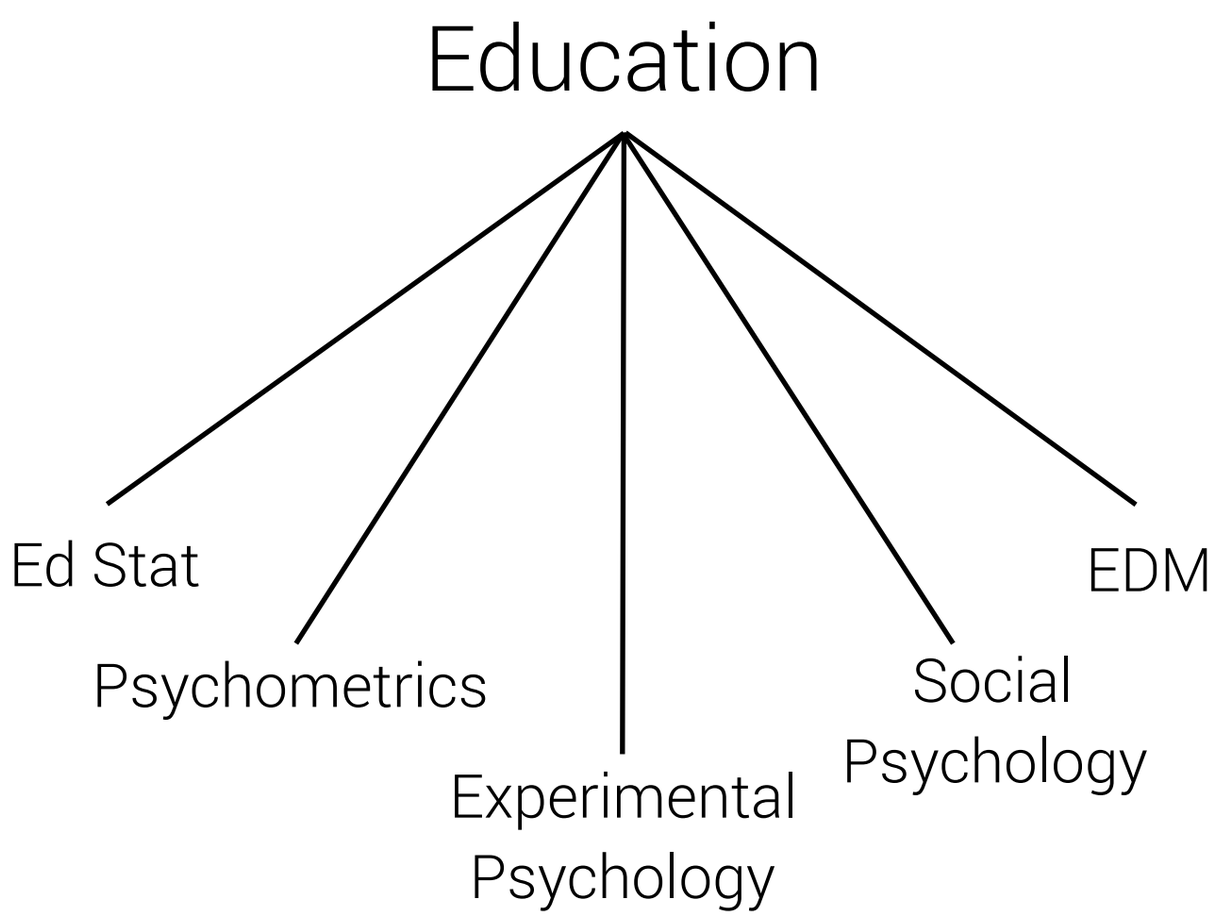
1 2 3 4 5 6 7 8 9 …

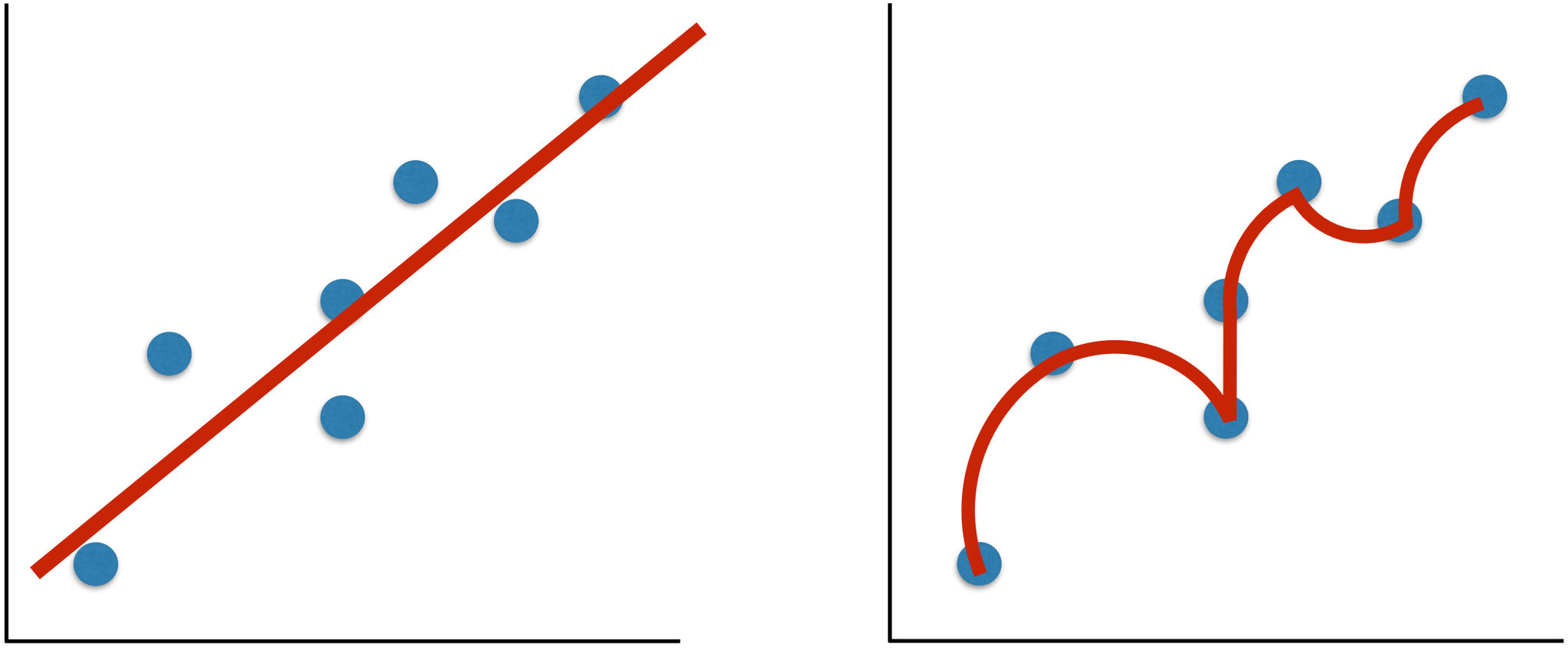
Psychometrics/ BKT

Adaptive


Reasoning
Counterfactual
Predictive


Statistics
Frequentist
Bayesian
Fiducial


Education
Ed Stat
Psychometrics
Experimental Psychology
Social Psychology
EDM



Which is more “accurate”?

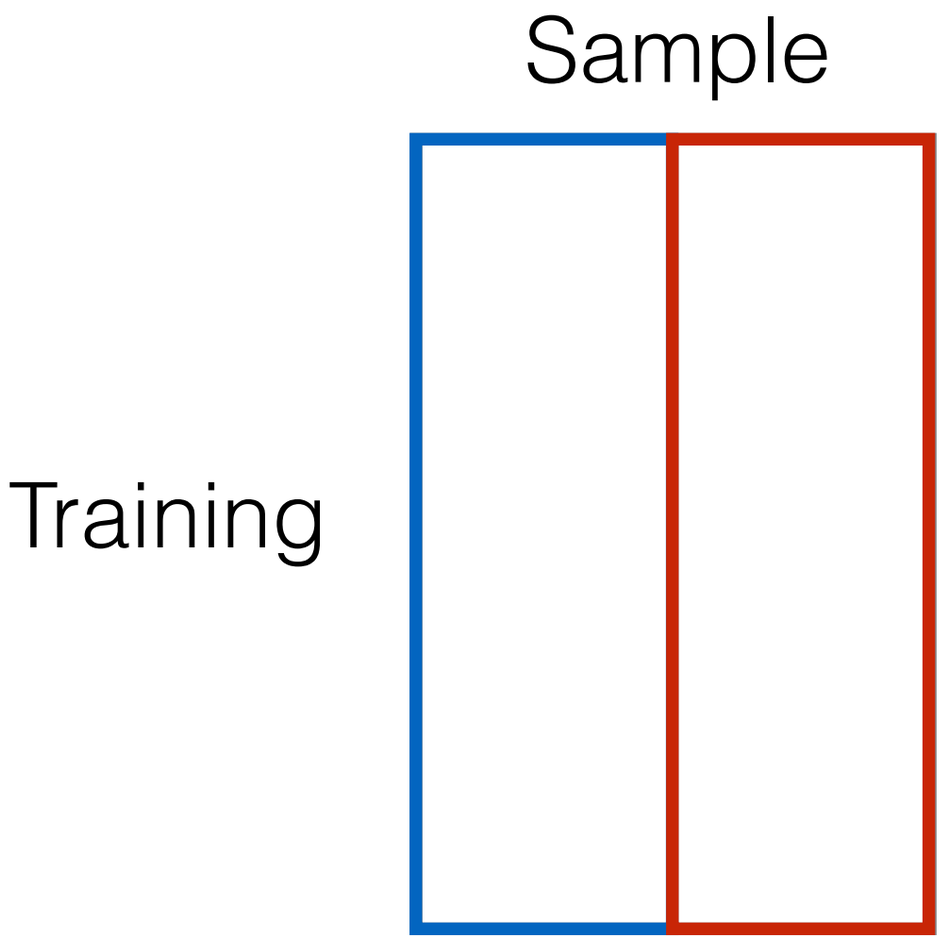
Which is more “useful”?

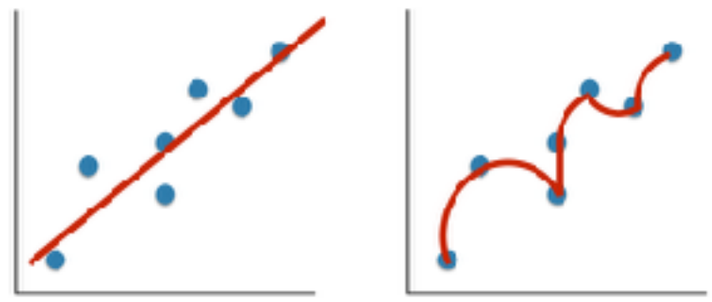
How can we tell?

Cross Validation

- Estimate how accurately a predictive model will perform in practice
- Give an insight on how the model will generalize to an independent dataset

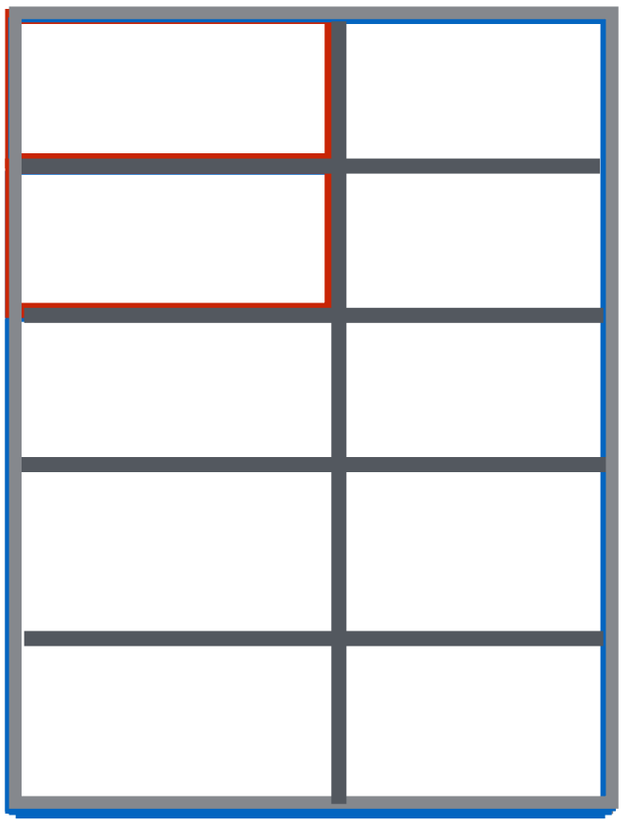
Hold-out Validation

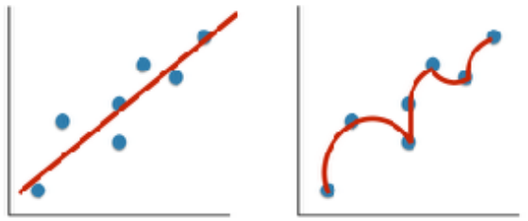




Problem: very dependent on which data are in each group

K-Fold Cross Validation





Training 1	5	2
Training 2	4	2
Training 3	3	1
Training 4	5	4
Training 5	4	2
	4.2	2.2

Calculate how accurate we are in each “fold” and average the answer

Activity

1. Everyone choose a preference: cats or dogs
2. Count how many in each category at your table
3. Write on the board the answer for each table
4. Table 1 is the prediction of Table 2, Table 3 is the prediction of Table 4, etc.
5. What is the error rate of all the predictions?