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11.220 Quantitative Reasoning & Statistical Methods for Planners I Spring 2009

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Quantitative Reasoning and Statistical Methods

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Let's put this in perspective: a pile of hamburgers from the earth to the sun and back, *two and a half times!*

That's a lot of hamburgers!

Population of the country: 300,000,000

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The debt is approximately \$35,000 for every man, woman, and child. Ugh.

Definition

observation = signal + noise + bias

We want measurements that are:

- reliable and reproducible (reduce noise)
- unbiased (reduce bias)
- related to our concepts (increase signal — more on this when we talk validity)

Reliability

Would give the same result for the same phenomenon if measured again

Threats (things that increase “noise”)

- lack of precision/accuracy
- subjectivity (even without bias)—leads to poor precision

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Bias

Incorrect in a consistent or patterned way

Likely problems

- subjectivity
- can be precise and non-subjective, but still biased
- other problems related to research design

Wikipedia lists the following, just related to statistics and research design:

- Internal validity
- External validity
- Ecological validity
- Population validity
- Construct validity
- Intentional validity
- Representation validity or translation validity
- Content validity
- Face validity
- Observation validity
- Criterion validity
- Concurrent validity
- Predictive validity
- Convergent validity
- Discriminant validity
- Social validity
- Statistical conclusion validity

For now, let's just worry about these broad ideas:

- internal validity: does the experiment actually show what it seems to show?
- external validity: is it generalizable?
- construct validity (related to external, but different): does it actually relate to our theoretical model?

- Nominal
- Ordinal
- Interval
- Ratio

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Mnemonic: “NOIR”

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N.B.

- don't confuse with accuracy/precision
- don't confuse with discrete v. continuous

	Basketball	Playground	Skatepark	Tennis	Passive
men	8	2	4	3	3
women	11	16	9	17	7
children	1	2	7	0	0

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men	8	2	4	3	3
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children	1	2	7	0	0

	Basketball	Playground	Skatepark	Tennis	Passive
men	.40	.10	.20	.15	.15
women	.55	.80	.45	.85	.35
children	.05	.10	.35	.00	.00

We've narrowed it down to the following two options:

	Basketball	Skatepark
men	.40	.20
women	.55	.45
children	.05	.35

	men	women	children
Basketball	8	11	1
Playground	2	16	2
Skatepark	4	9	7
Tennis	3	17	0
Passive	3	7	0

	men	women	children
Basketball	8	11	1
Playground	2	16	2
Skatepark	4	9	7
Tennis	3	17	0
Passive	3	7	0

	men	women	children
Basketball	0.40	0.18	0.10
Playground	0.10	0.27	0.20
Skatepark	0.20	0.15	0.70
Tennis	0.15	0.28	0.00
Passive	0.15	0.12	0.00