Scientific Writing
Session 1

Jaroslav Hlinka

Institute of Computer Science, Academy of Sciences of the Czech Republic
hlinka@cs.cas.cz

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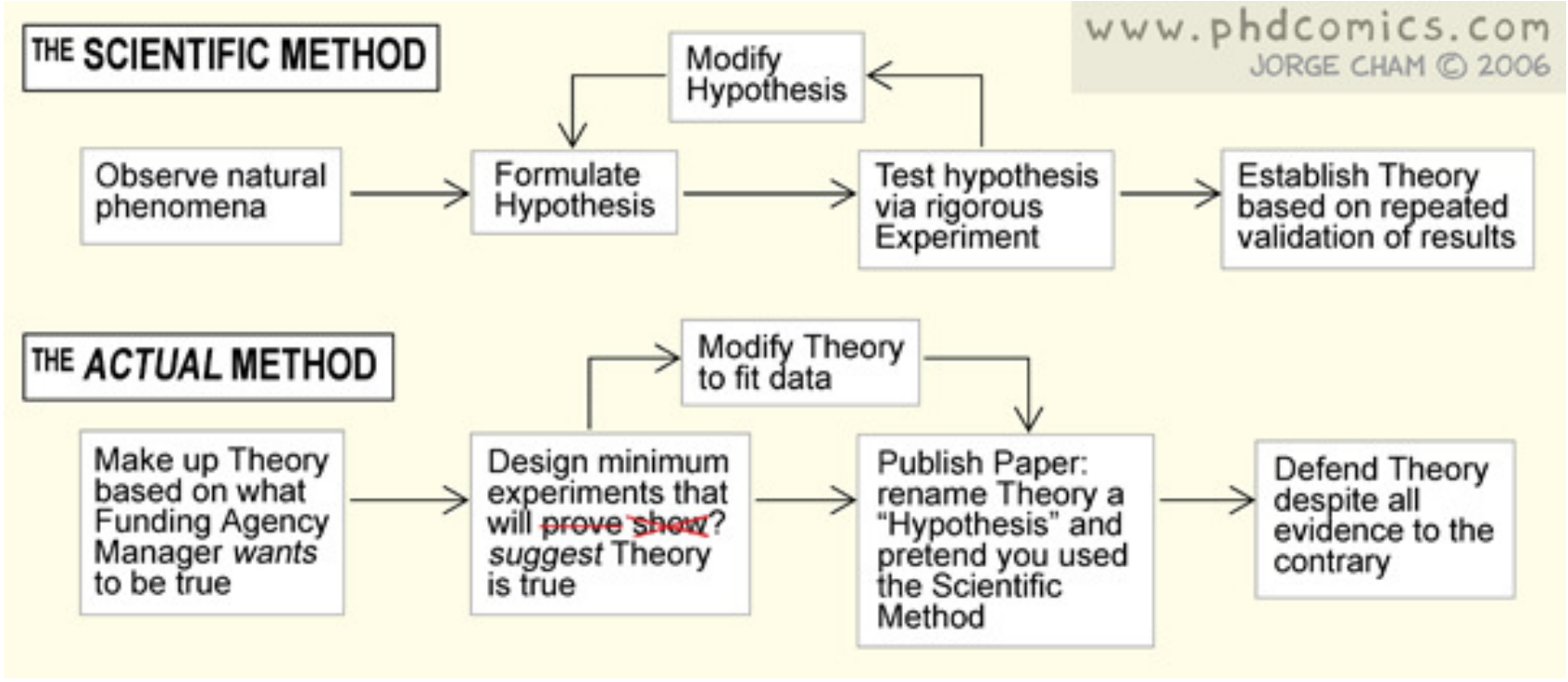
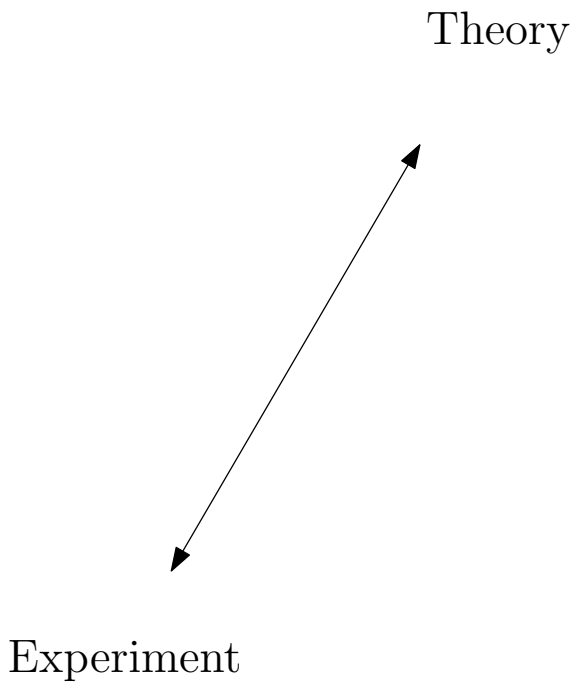
About the course

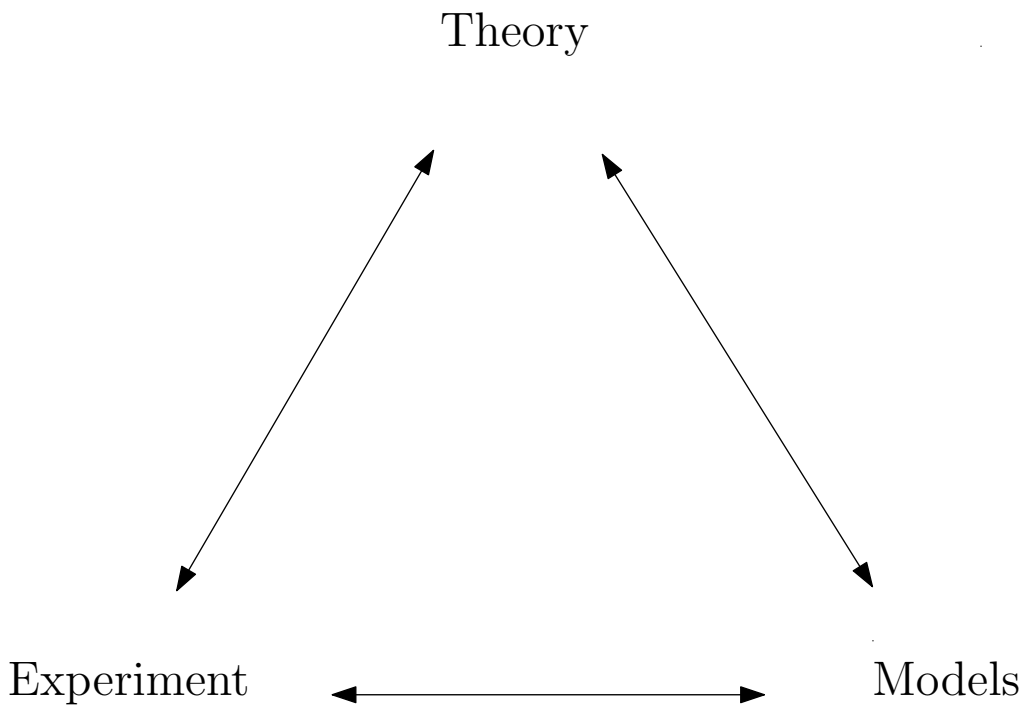
Scientific method



Scientific process - what I learned



Scientific process - what I experienced



Anatomy of a research project/paper

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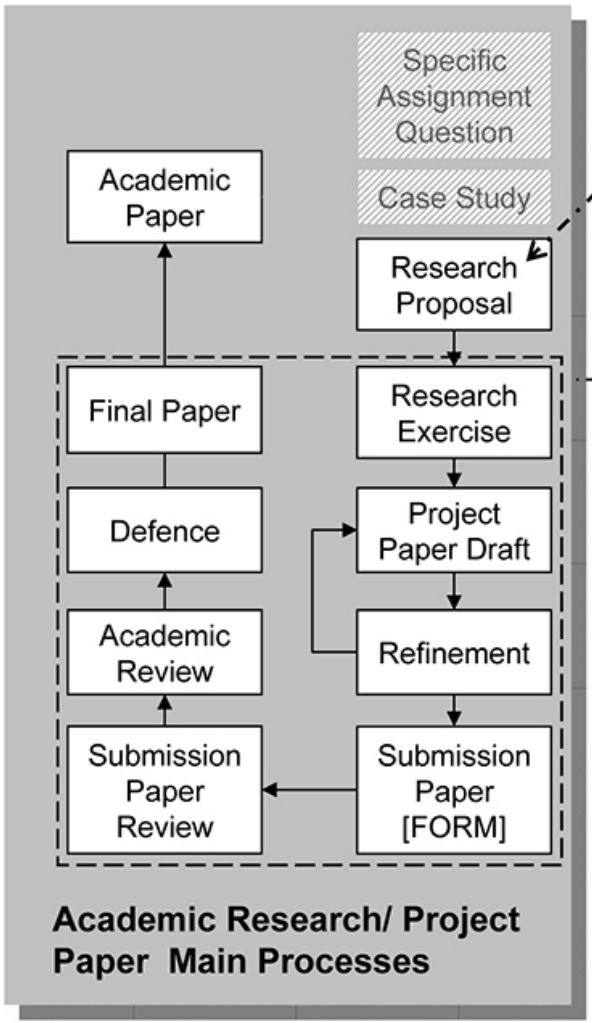

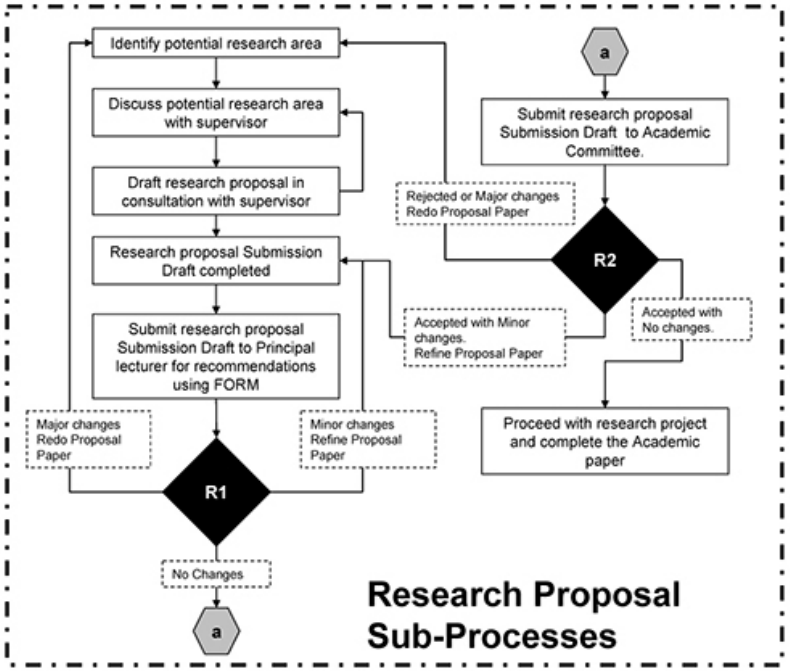

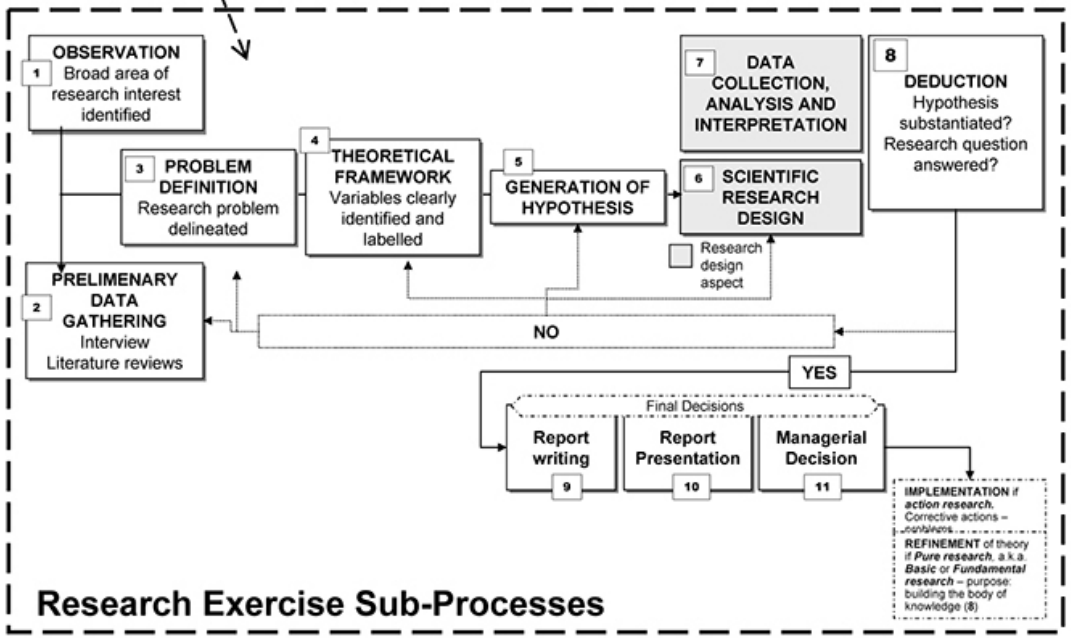

Source: adapted from **Faisal, 2005; Sekaran, 2003** and **Welman & Kruger, 1999.**

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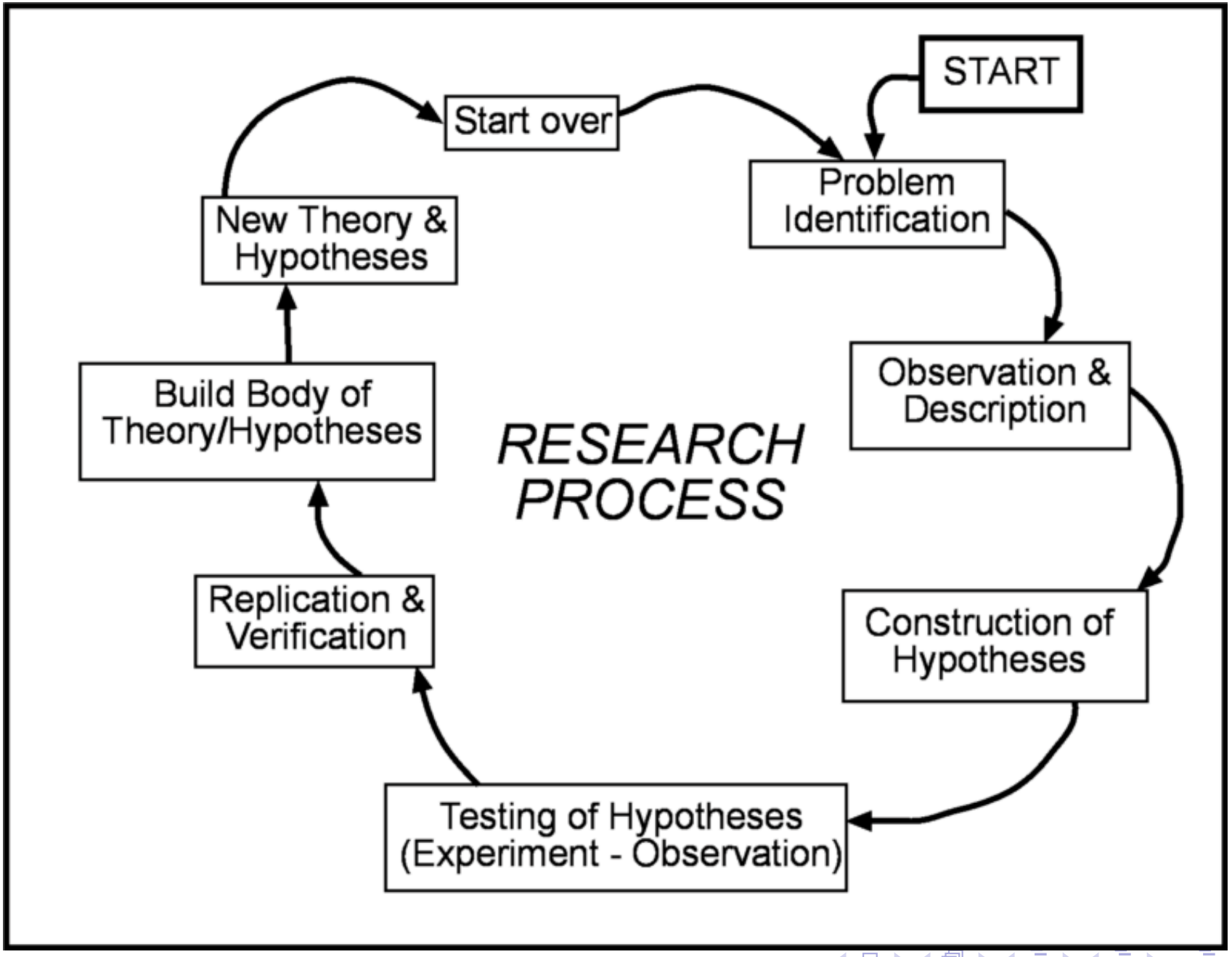

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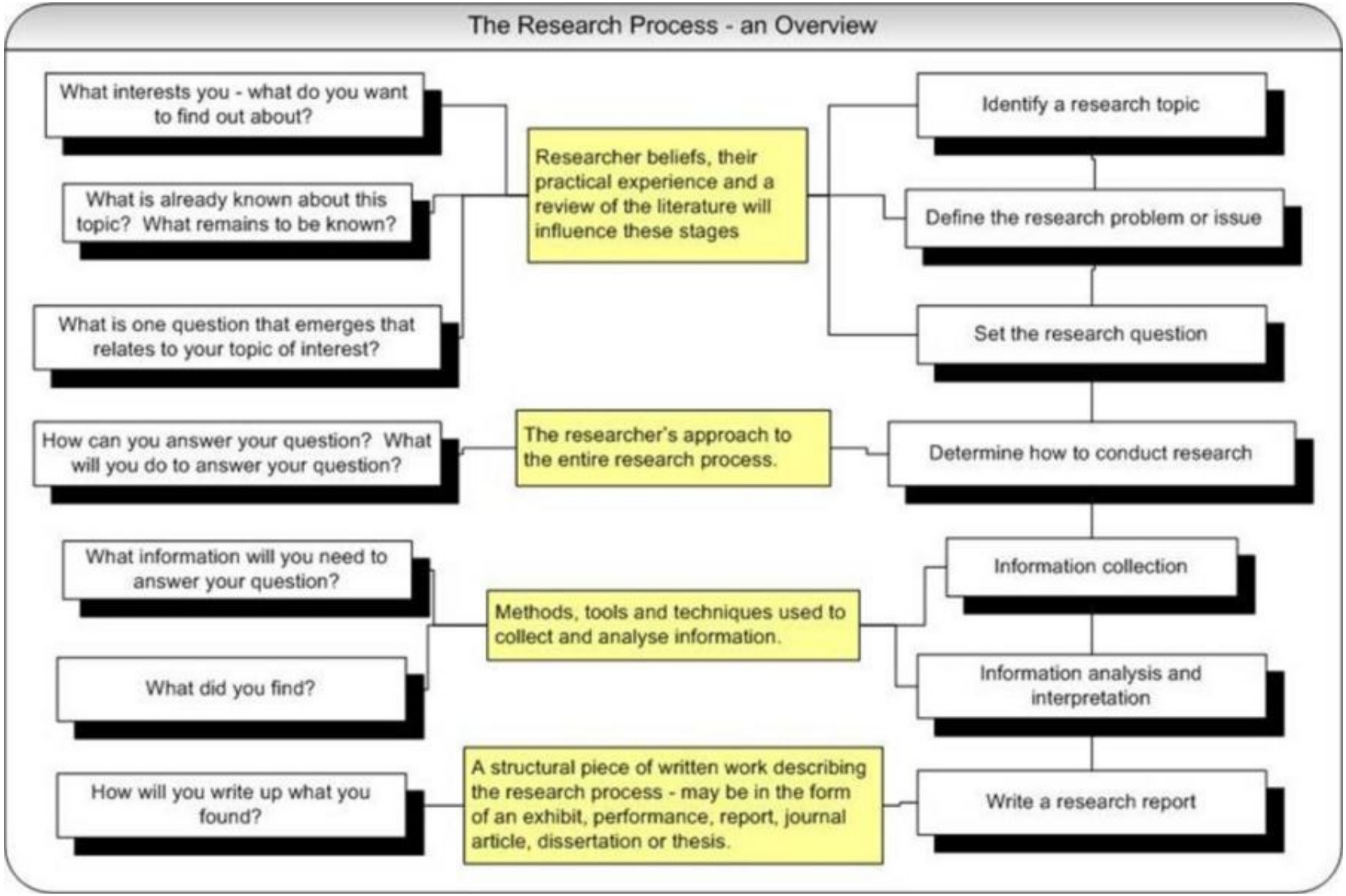

Anatomy of a research project/paper

- Wow! Hmmm?! I need to know this!
-
- Do I really care? Why?
- Does anybody know already?
- How could I find out?
- Let's gather some evidence!
- So what have I learned?
- But what if?
- The answer is 42! Wow!? Hmmm!

Anatomy of a research project/paper

- Wow! Hmmm?! I need to know this! **Title**
- I need to tell everybody! **Abstract**
- Do I really care? Why? **Introduction I.**
- Does anybody know already? **Introduction II.**
- How could I find out? **Methods**
- Let's gather some evidence! **Data**
- So what have I learned? **Results**
- But what if? **Discussion**
- The answer is 42! Wow!? Hmmm! **Conclusion**

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- time for new topics and coalitions till 03/03

Analysing evidence: methodology notes

- reliability and validity

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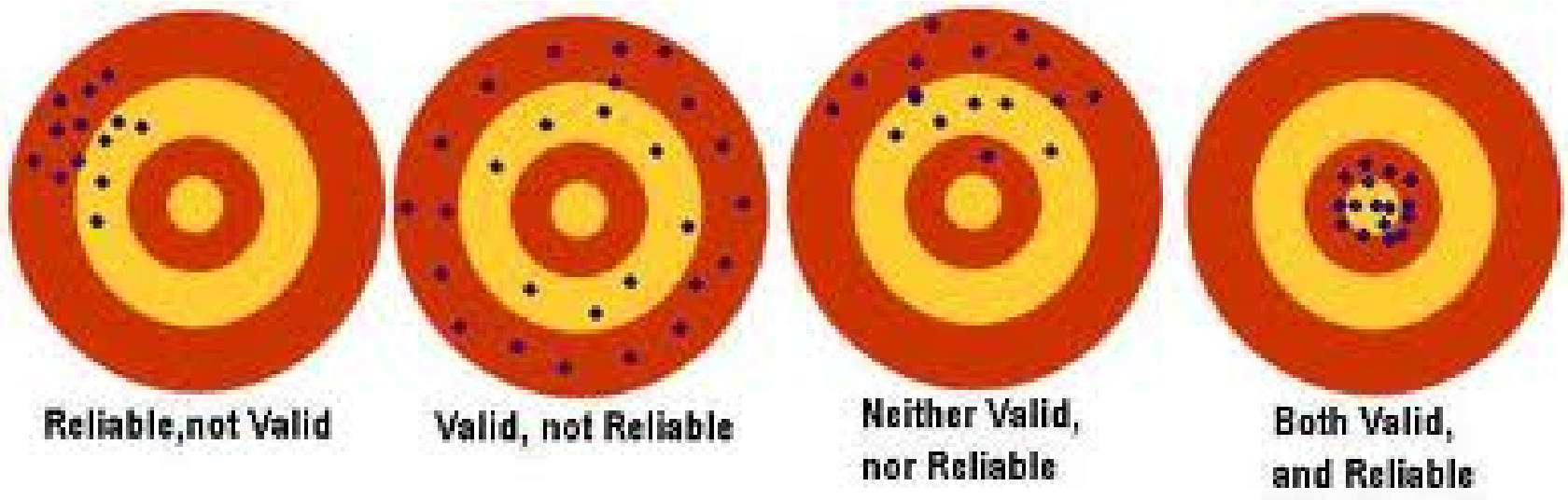


Methodology notes - types of validity

Criterion validity

- Divided into concurrent (other criteria assessed simultaneously) and predictive (predicting future or past events) sub-areas
- Deals with whether the assessment scores obtained for participants are related to a criterion outcome measure
- For example for predictive, do SAT scores predict post-secondary perfomance?

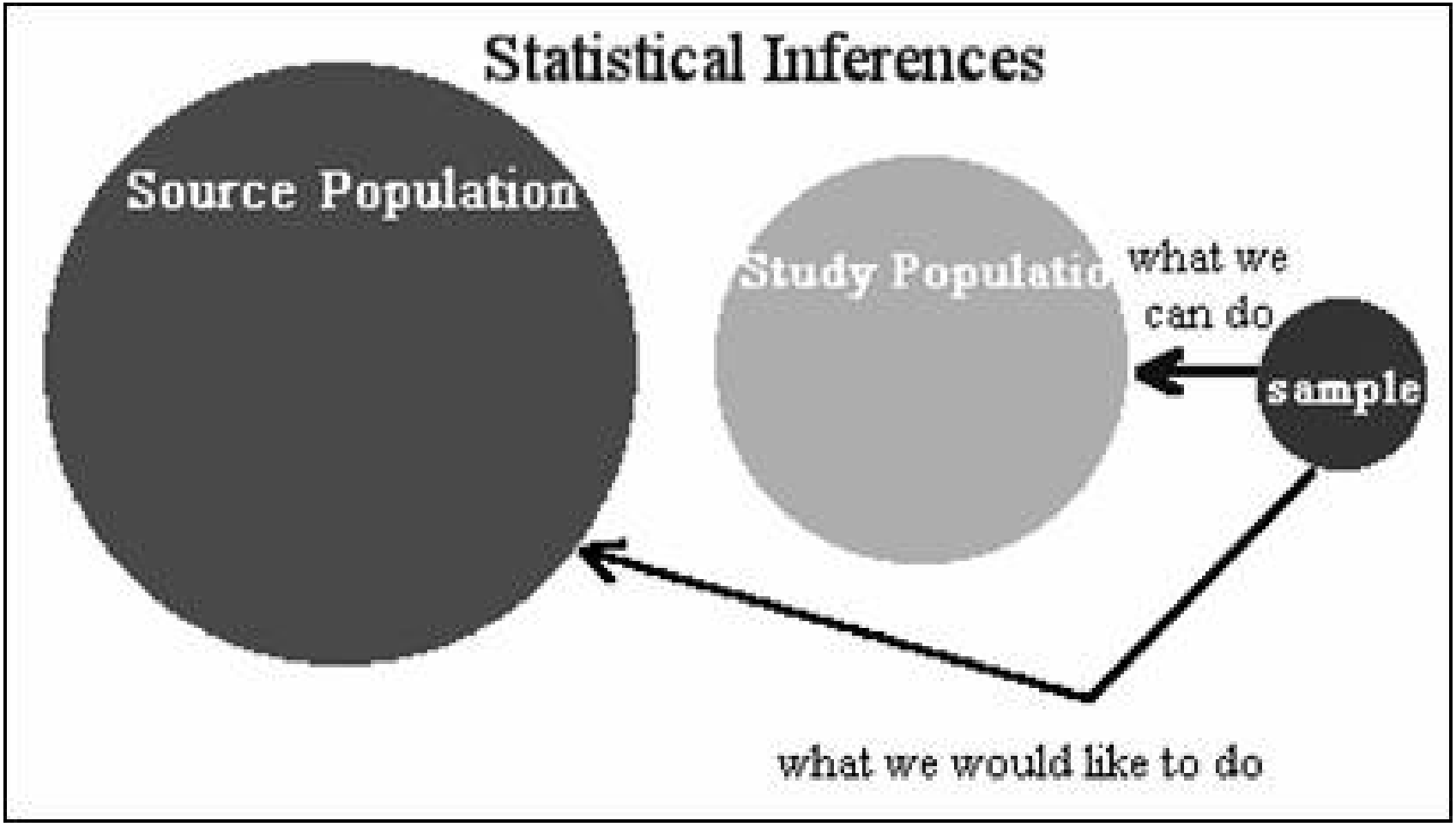
Content validity

- Deals with whether the assessment content and composition is appropriate given what is being measured (e.g., does the test reflect the knowledge/skills required to do a job or demonstrate that one grasps the course material)
- For example, is there an appropriate representation of questions from each topic area on the assessment that reflect the curriculum that is being taught
- Related to but not to be confused with "face validity"

Construct validity

- Deals with whether the assessment is measuring the correct construct (trait/attribute/ability/skill)
- For example, is this human biology exam actually measuring human biology constructs

Methodology notes - sample representativity



Methodology notes - statistical methods

Variable	Test
Nominal	McNemar's Test
Ordinal (Ordered categories)	Wilcoxon
Quantitative (Discrete or Non-Normal)	Wilcoxon
Quantitative (Normal*)	Paired *t* test

Methodology notes - statistical methods

		Outcome variable					
		Nominal	Categorical (>2 Categories)	Ordinal	Quantitative Discrete	Quantitative Non-Normal	Quantitative Normal
Input Variable	Nominal	X^2 or Fisher's	X^2	X^2-trend or Mann - Whitney	Mann-Whitney	Mann-Whitney or log-rank[a]	Student's *t* test
	Categorical (2>categories)	X^2	X^2	Kruskal-Wallis[b]	Kruskal-Wallis[b]	Kruskal-Wallis[b]	Analysis of variance[c]
	Ordinal (Ordered categories)	X^2-trend or Mann - Whitney	[e]	Spearman rank	Spearman rank	Spearman rank	Spearman rank or linear regression[d]
	Quantitative Discrete	Logistic regression	[e]	[e]	Spearman rank	Spearman rank	Spearman rank or linear regression[d]
	Quantitative non-Normal	Logistic regression	[e]	[e]	[e]	Plot data and Pearson or Spearman rank	Plot data and Pearson or Spearman rank and linear regression
	Quantitative Normal	Logistic regression	[e]	[e]	[e]	Linear regression[d]	Pearson and linear regression

Overly honest methods

http://thenode.biologists.com/overly-honest-methods/

- ”Here’s a typical plot of the data, by which I mean it was the prettiest one.”
- ”We added 888 uL because it’s a lucky number in China.”
- ”Samples were analyzed between 2 days and 6 months post-collection, depending on when the freezer got full.”
- ”We tried several statistical confidence test, randomly. Here is the one that gives the coolest results! ”
- ”The reaction was heated to reflux overnight because it was time to go to the pub.”
- ”The hypothesis and rationale behind testing these compounds in this model system is we already had them in our fridge”
- ”100 flies were dissected because that was all the undergraduate could manage”

Assignments

- finalize topics; email title and authors by March 03
- (optional) literature minireview of the topic - prepare a 15-30 minutes presentation