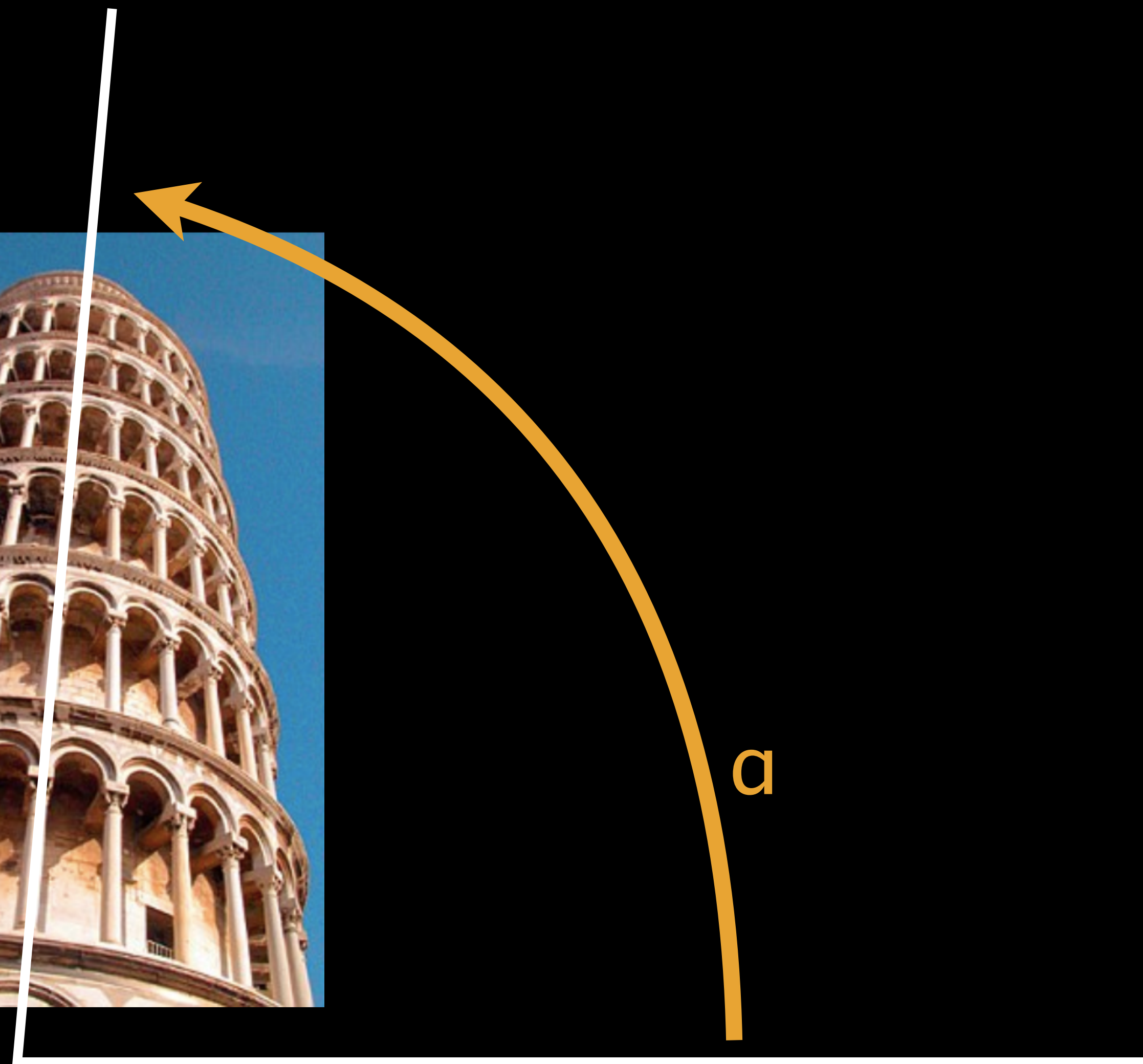


A Pragmatic Approach to Biases in Visual Data Analysis

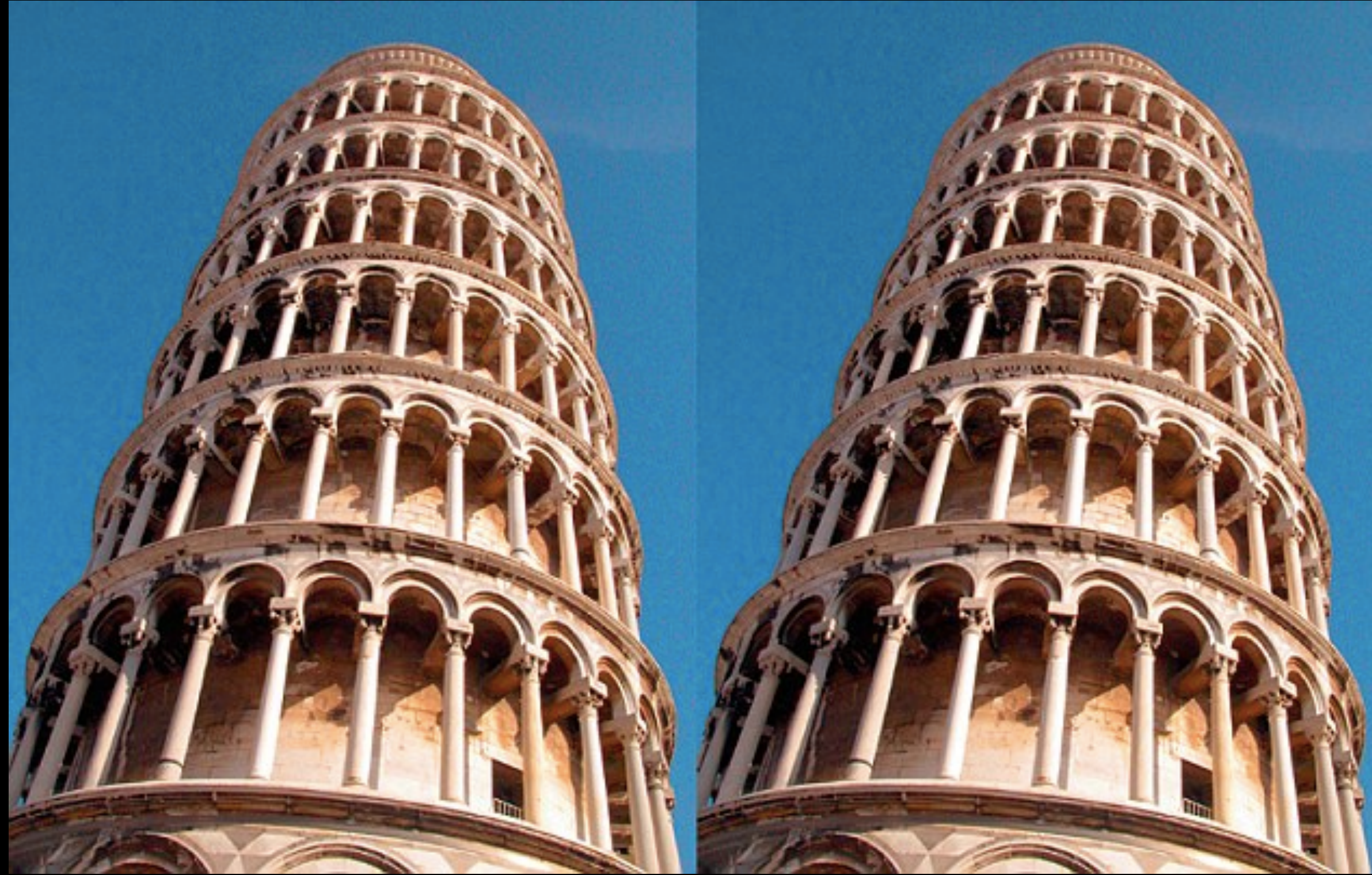
Toni Verbeiren
Ryo Sakai & Jan Aerts

Errors & Biases





Errors & Biases







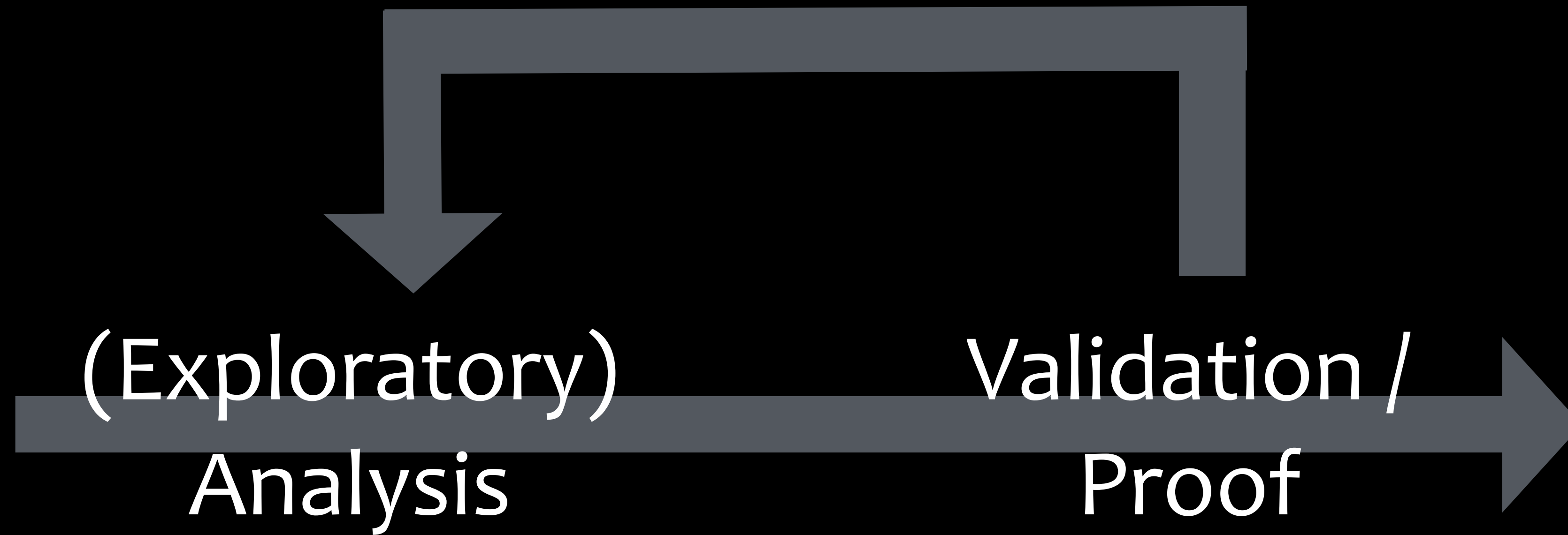
Errors & Biases

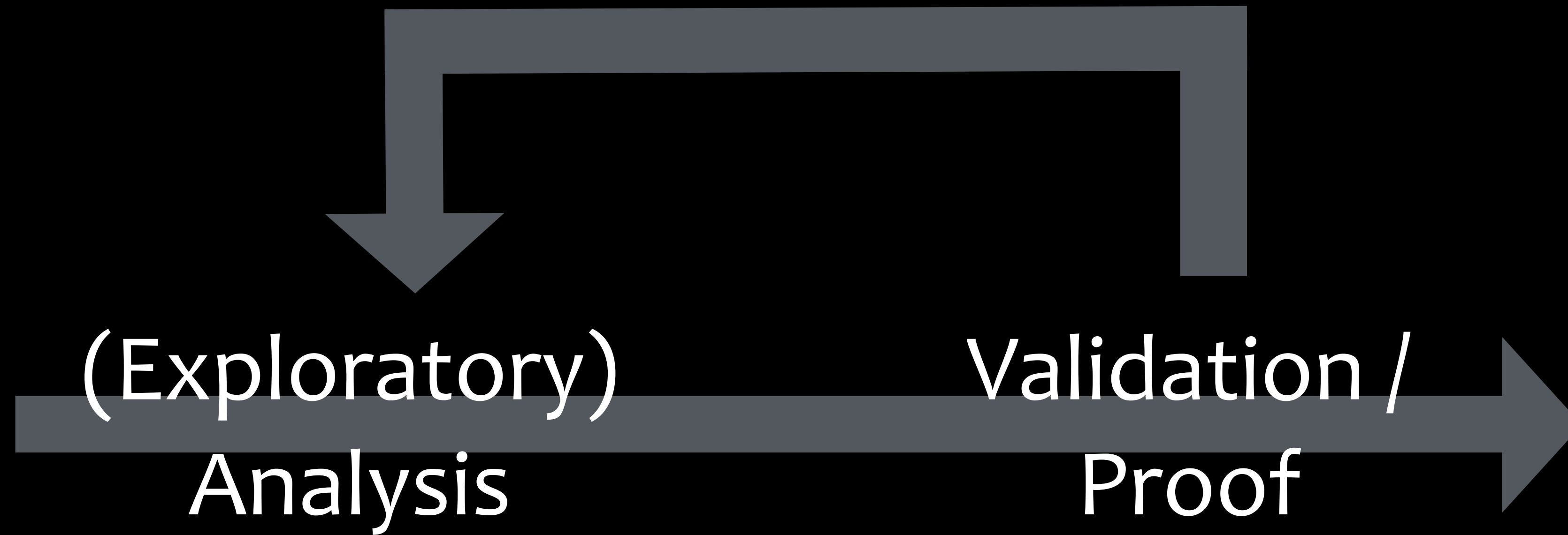
Errors

&

~~Biases~~
Patterns

Biases & Pragmatism





Time spent

. . . but what with biases ?

... but what with biases?

~~Occurrence?~~

What is the effect?



snake



no snake

**snake
noticed**

***no snake*
noticed**



snake



no snake

snake
noticed

ok

ERROR

no snake
noticed

ERROR

ok

Occurrence



snake



no snake

snake
noticed

ok

People easily react
to snake-like forms

no snake
noticed

ERROR

ok

Occurrence



snake



no snake

snake
noticed

RUN !

no snake
noticed

ok

Effect



snake



no snake

snake
noticed

RUN !

RUN !

no snake
noticed

ok

Effect



snake



no snake

snake
noticed

RUN !

RUN !

no snake
noticed



ok

Effect



snake



no snake

snake
noticed



no snake
noticed



Effect



snake



no snake

**snake
noticed**



**False Positive
= Type I**

**no snake
noticed**

**False Negative
= Type II**



... but what with biases ?

Applied ...

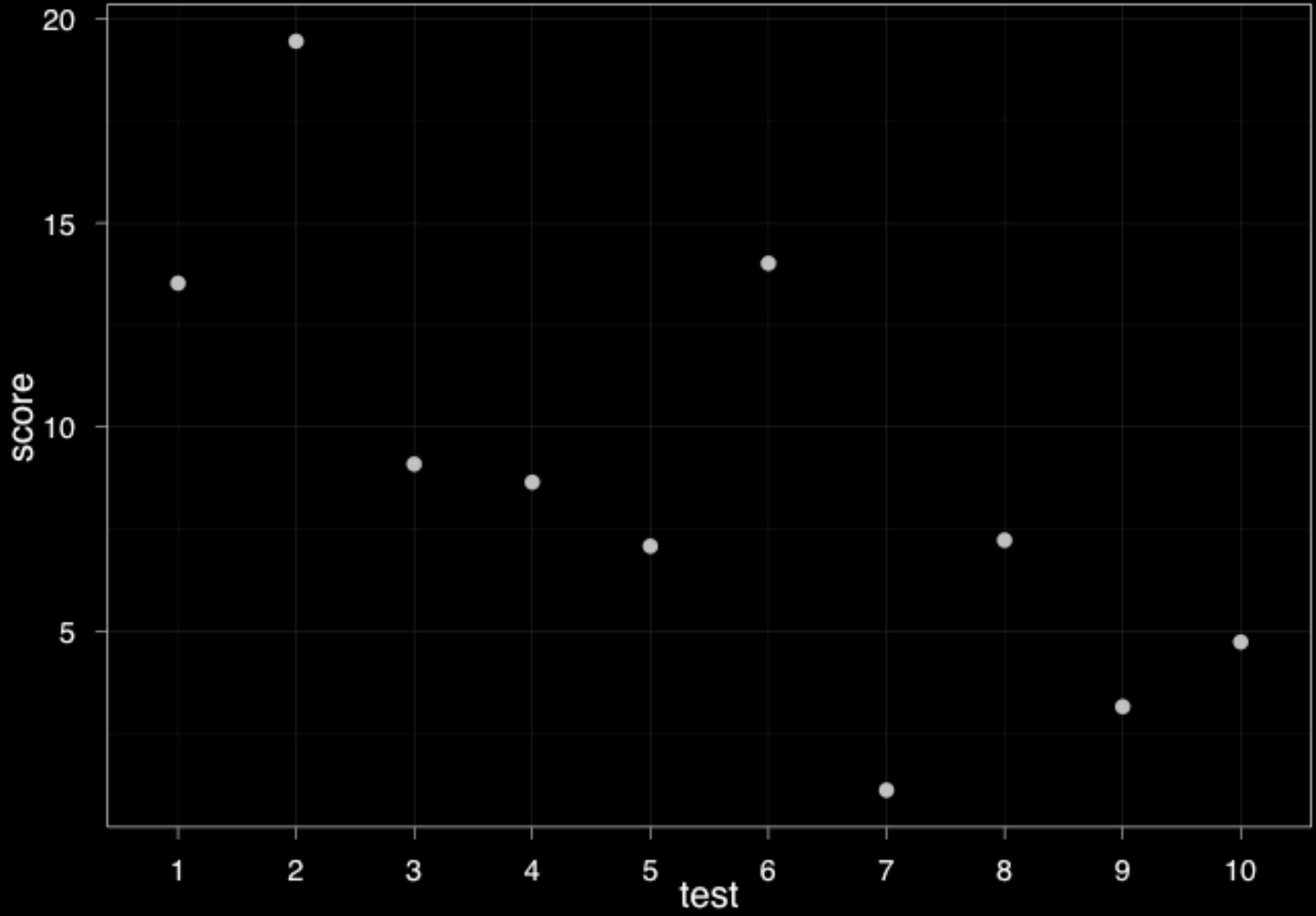
	pattern exists	pattern doesn't exist
pattern noticed	to be validated	
no pattern noticed		

	pattern exists	pattern doesn't exist
pattern noticed	to be validated	to be validated
no pattern noticed		

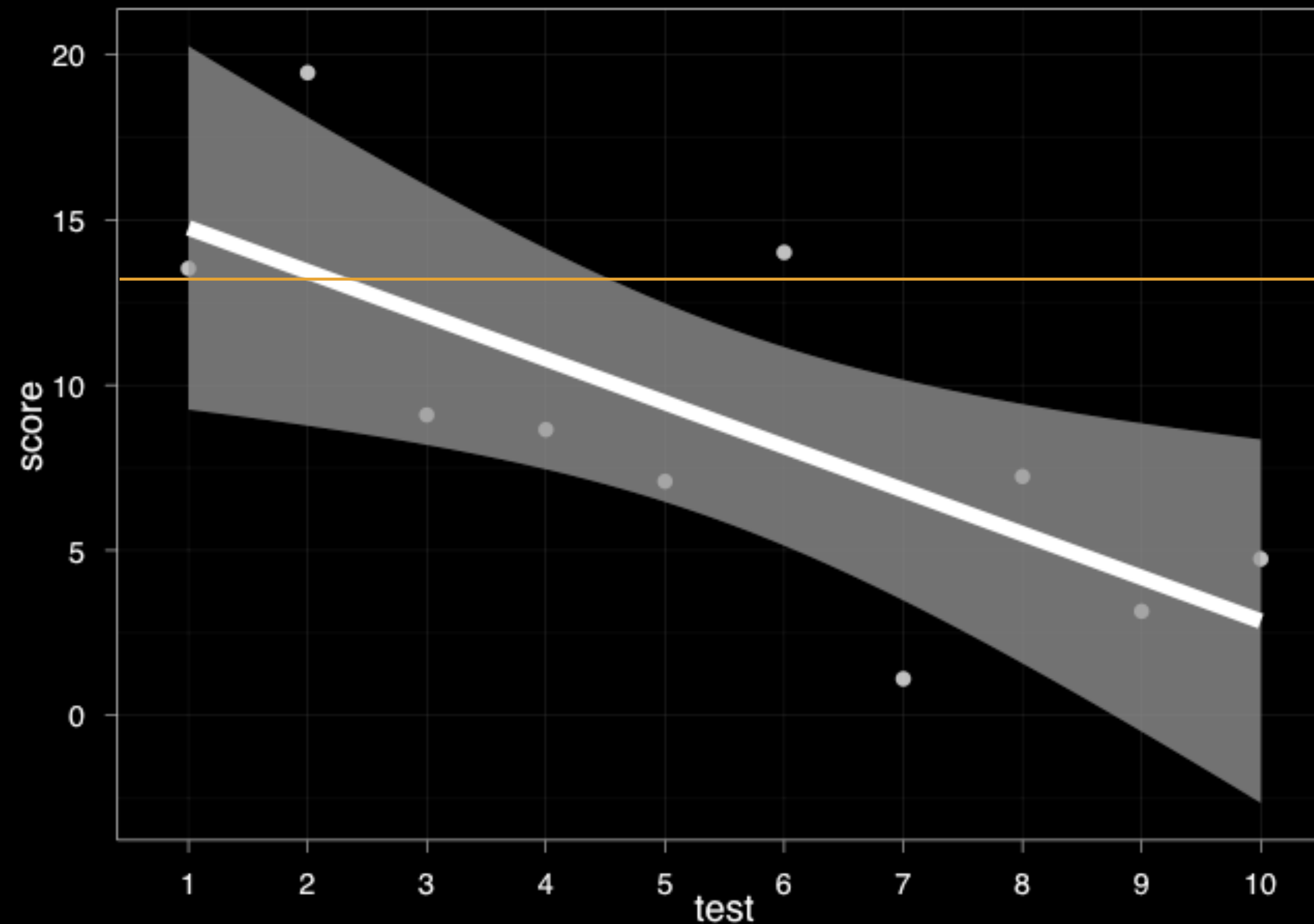
	pattern exists	pattern doesn't exist
pattern noticed	to be validated	to be validated
no pattern noticed	missed opportunity	

Validation ...

1	1	3	.	5
2	1	9	.	4
3	9	.	1	
4	8	.	7	
5	7	.	1	
6	1	4		
7	1	.	1	
8	7	.	2	
9	3	.	2	
1 0	4	.	7	

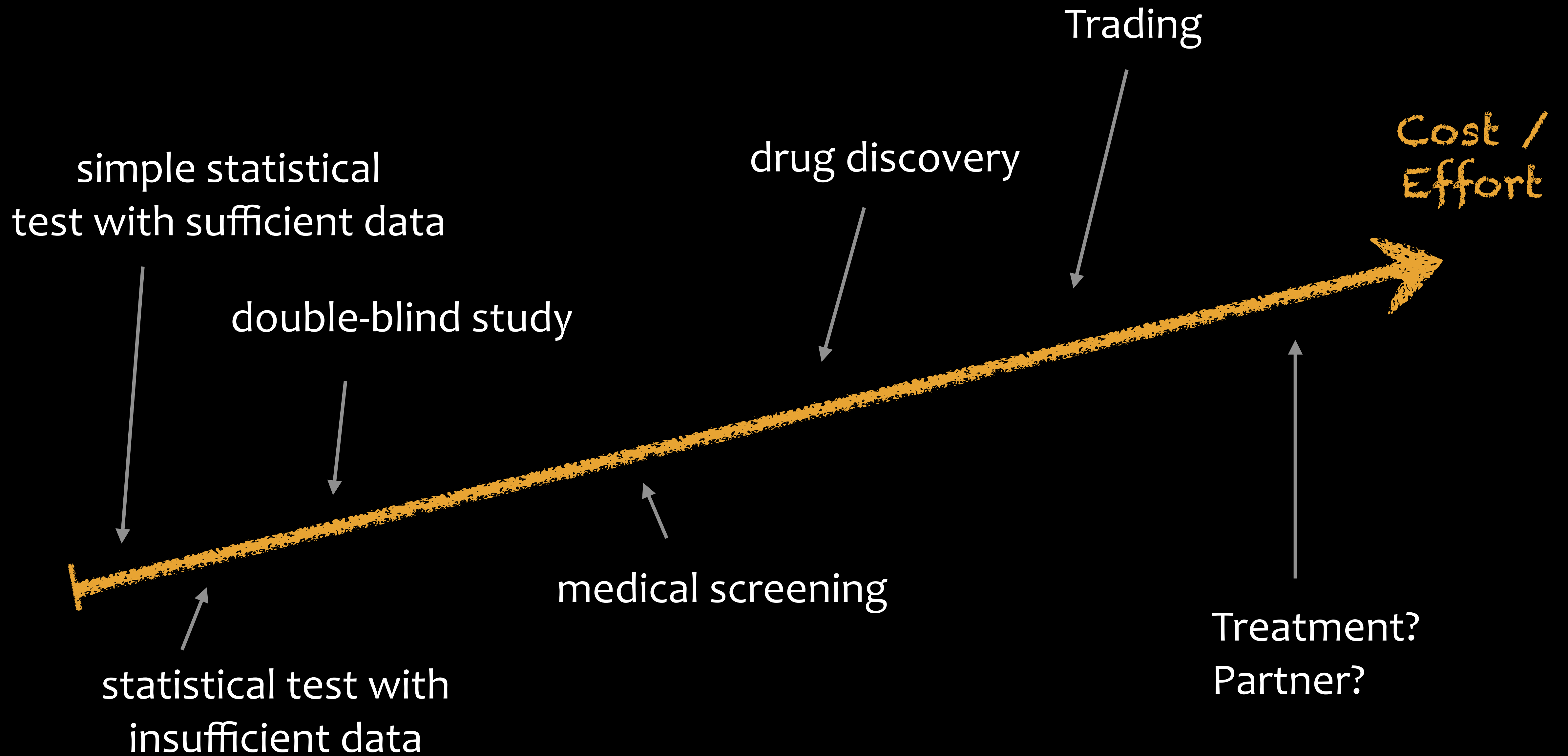


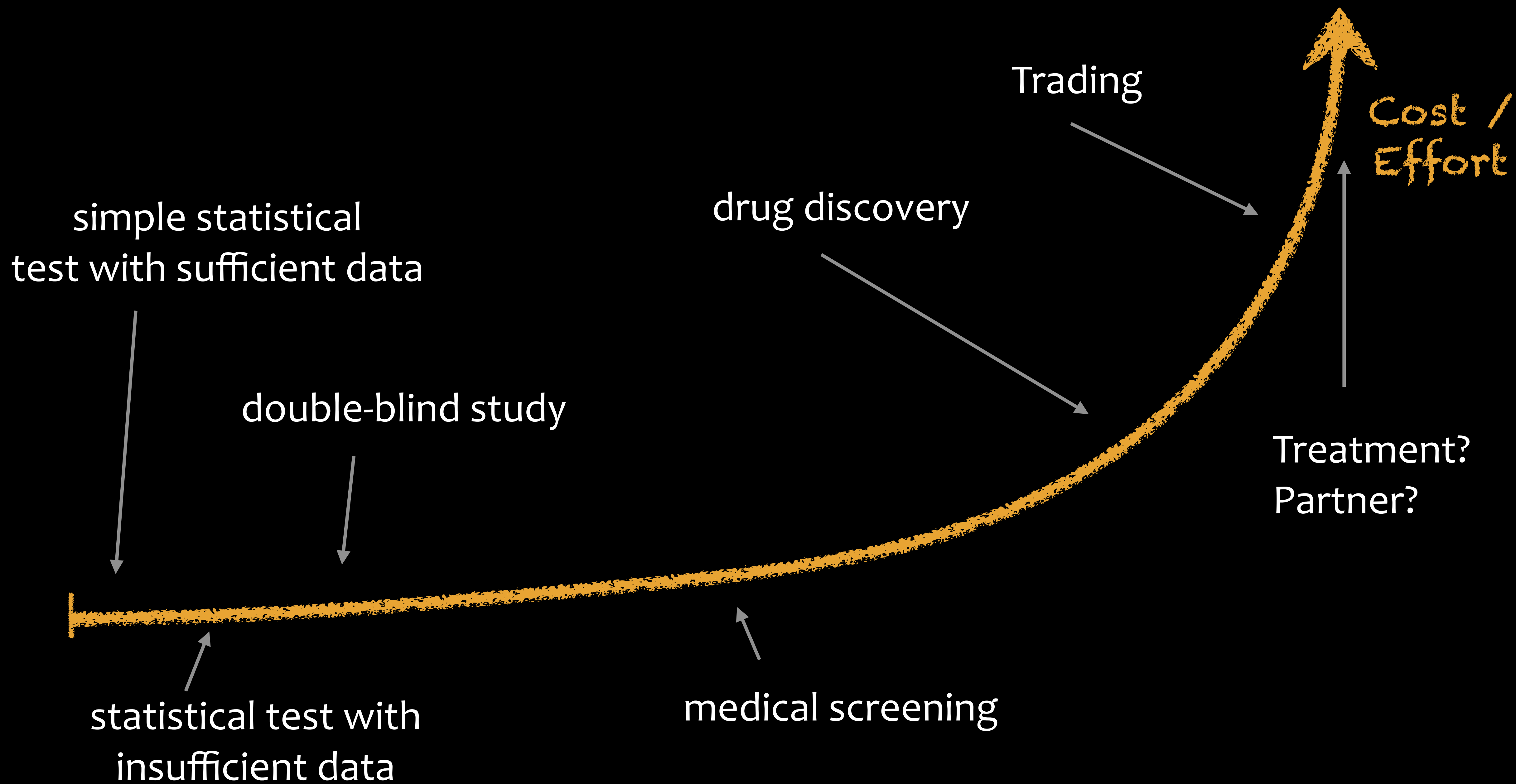
Independent normal variables
mean: 13, variance: 10

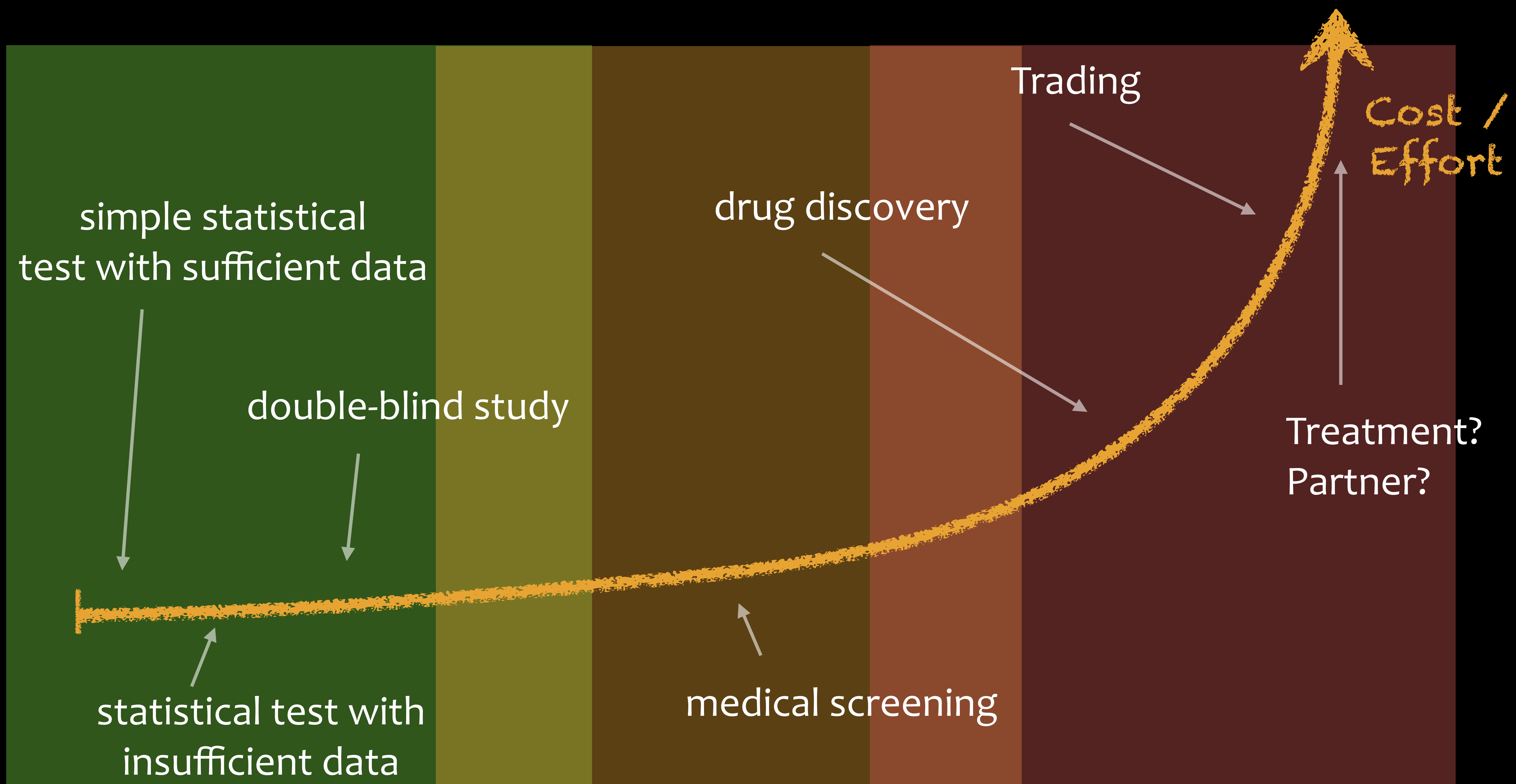


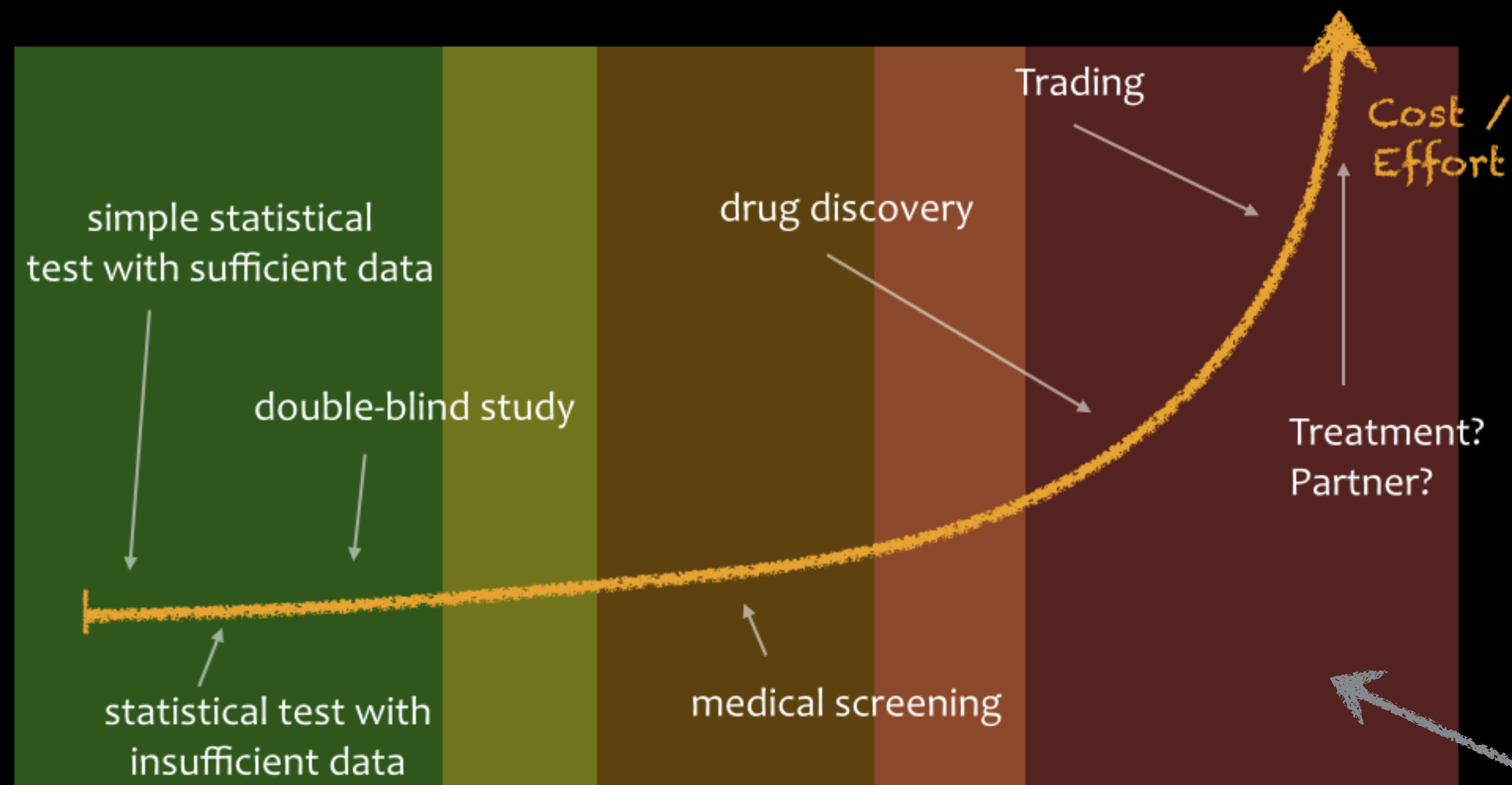
$$P(>10 \text{ on next exam}) = 62\%$$

Validation Cost







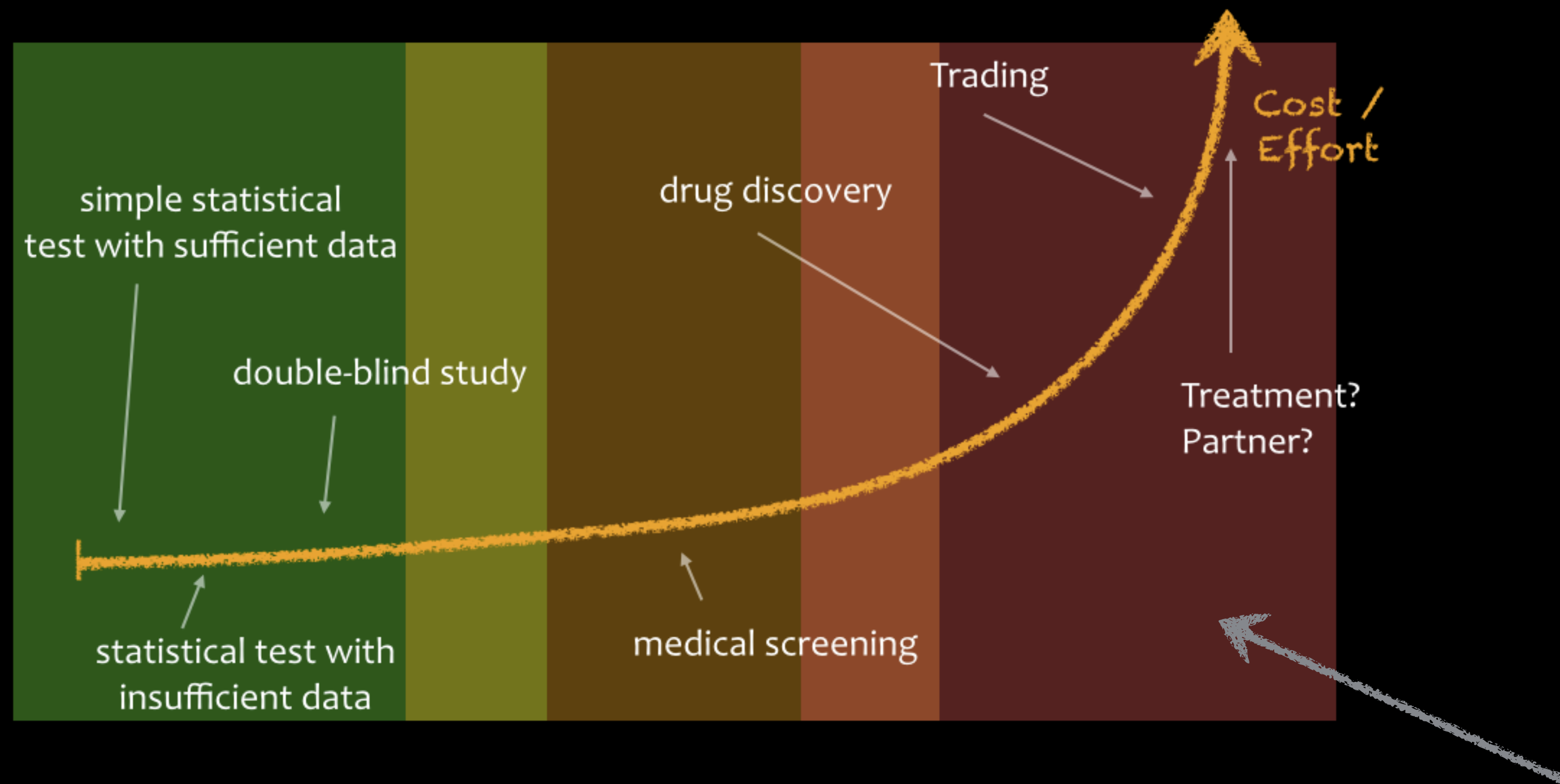


Black Swans ?
Models ?
Statistical analysis ?
Visualization ?

Errors & Biases

Heuristics

(Minimize the *harmful* effects of being wrong)



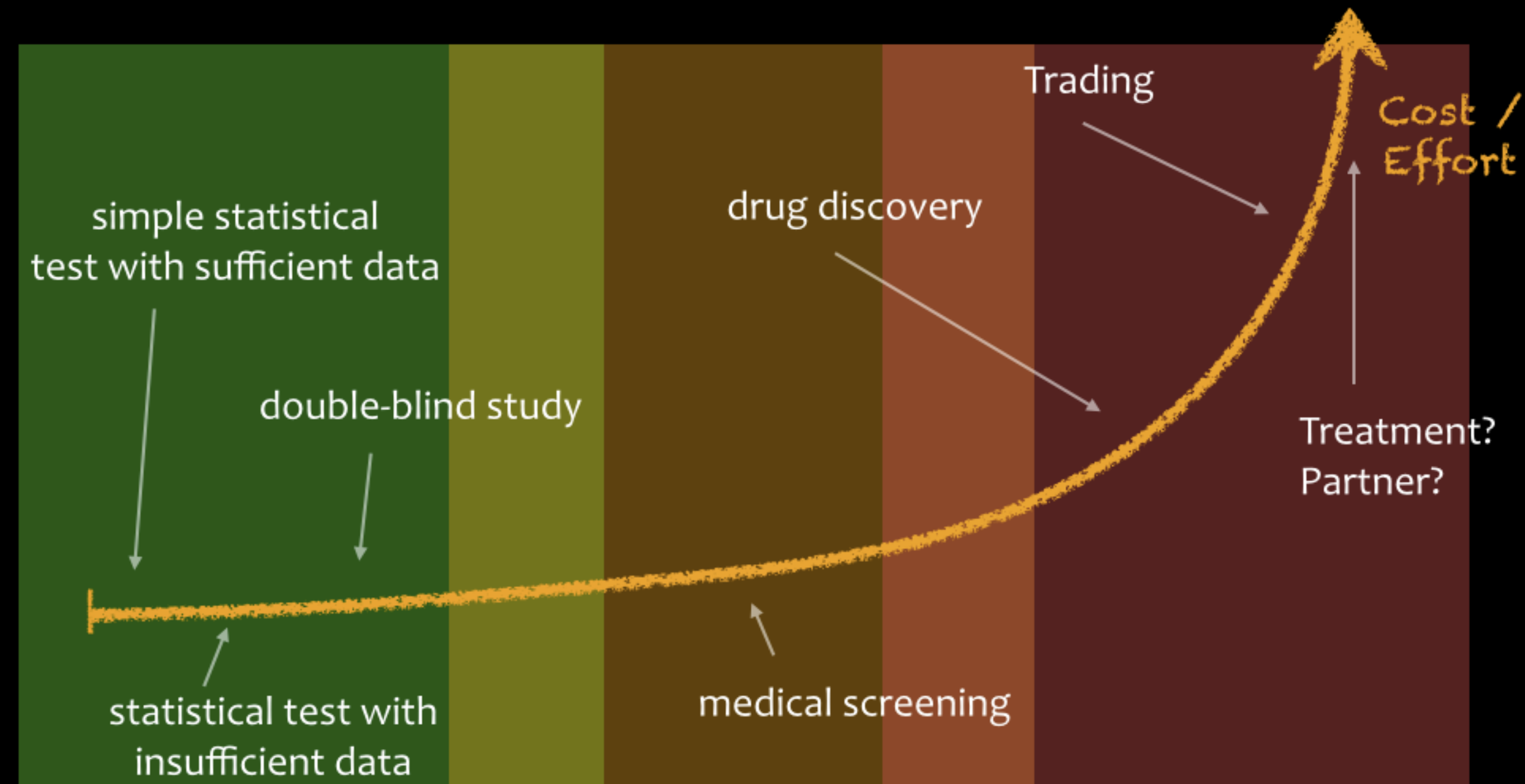
Encounter a snake

So ...

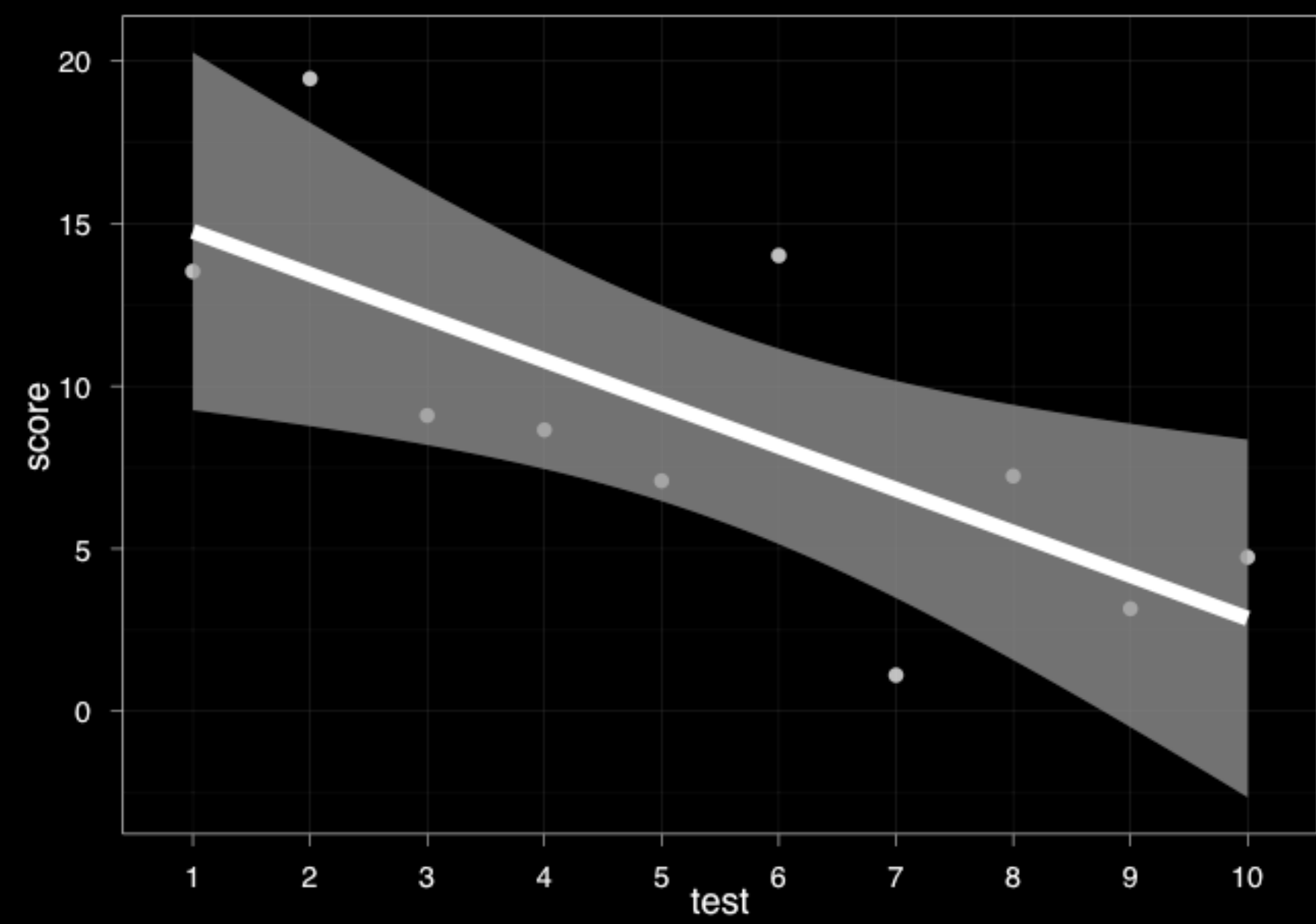
Be pragmatic !

Know the *region* you're in

Validation !

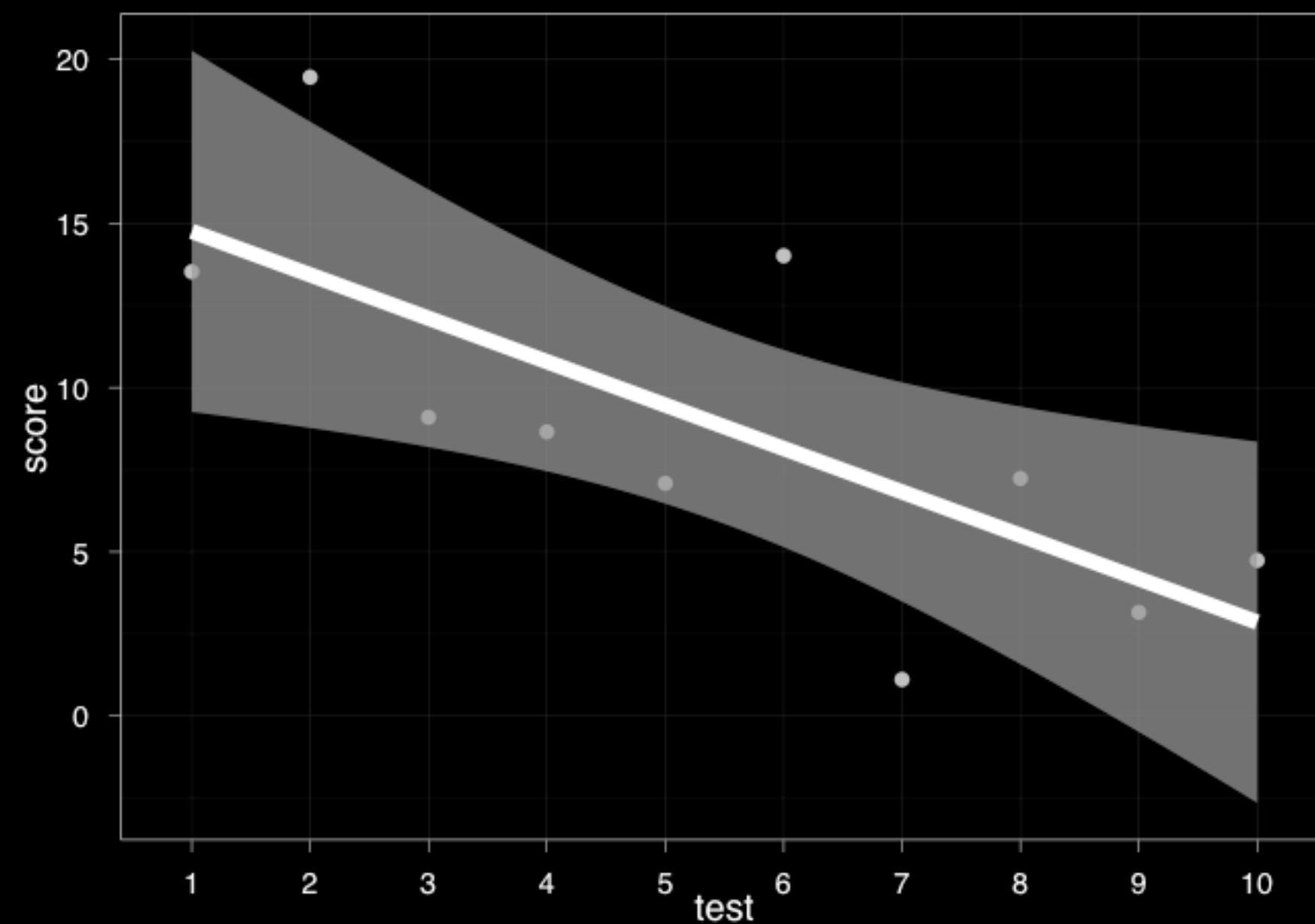


Heuristics



**‘Never trust the one who came
up with the artificial dataset’**

T. Verbeiren



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@tverbeiren