Can ecologically-relevant stimuli improve cognitive performance among adversity-exposed youth?

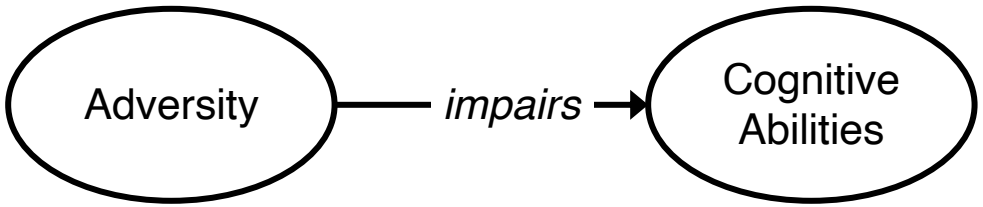
Hidden Talents in Context

Ethan Young
Willem Frankenhuis
Danielle J. DelPriore
Bruce Ellis

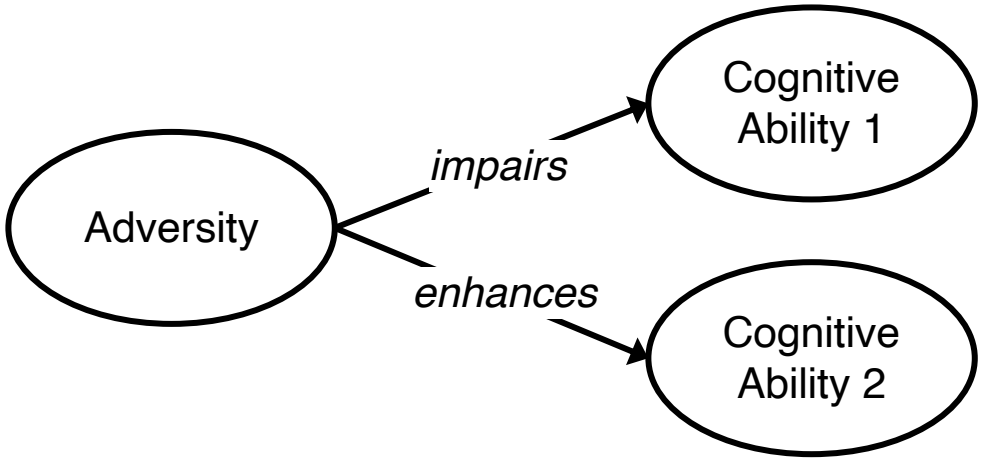



Cognition in Harsh Environments

Deficit Model



Hidden Talents Approach

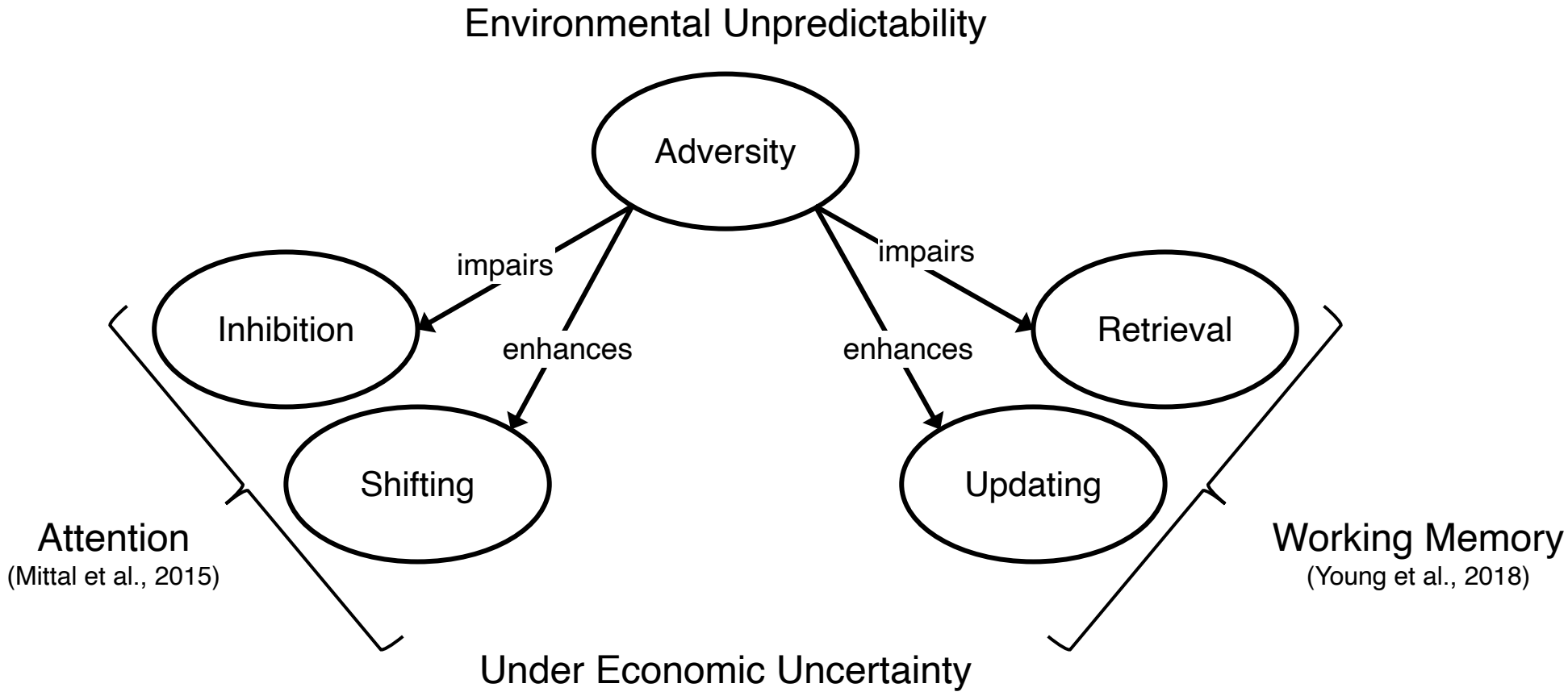


people develop abilities that are ***ecologically relevant*** to their lived experience

Blair et al., 2011
Bradley & Corwyn, 2002
Farah et al., 2006
Hackman et al., 2014

Ellis et al., 2017
Ellis et al., 2020
Frankenhuis & de Weerth, 2013
Frankenhuis et al., 2020

Ecologically Relevant *Contexts*



Limitations

- Sample populations
  - Student and community samples
  - Possible restricted range
- Measurement of adversity
  - Limited to retrospective-self reports
  - Focused on environmental unpredictability
- Limited or unclear practical relevance

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Current Study

Sample data from a ***broad range*** of socioeconomic conditions

- Mean age 13.6 (.8)
- 43% economically disadvantaged
  - Reduced-price or free lunch
  - Fee waivers
  - Homelessness (N = 32)

Measure ***multiple dimensions*** of adversity

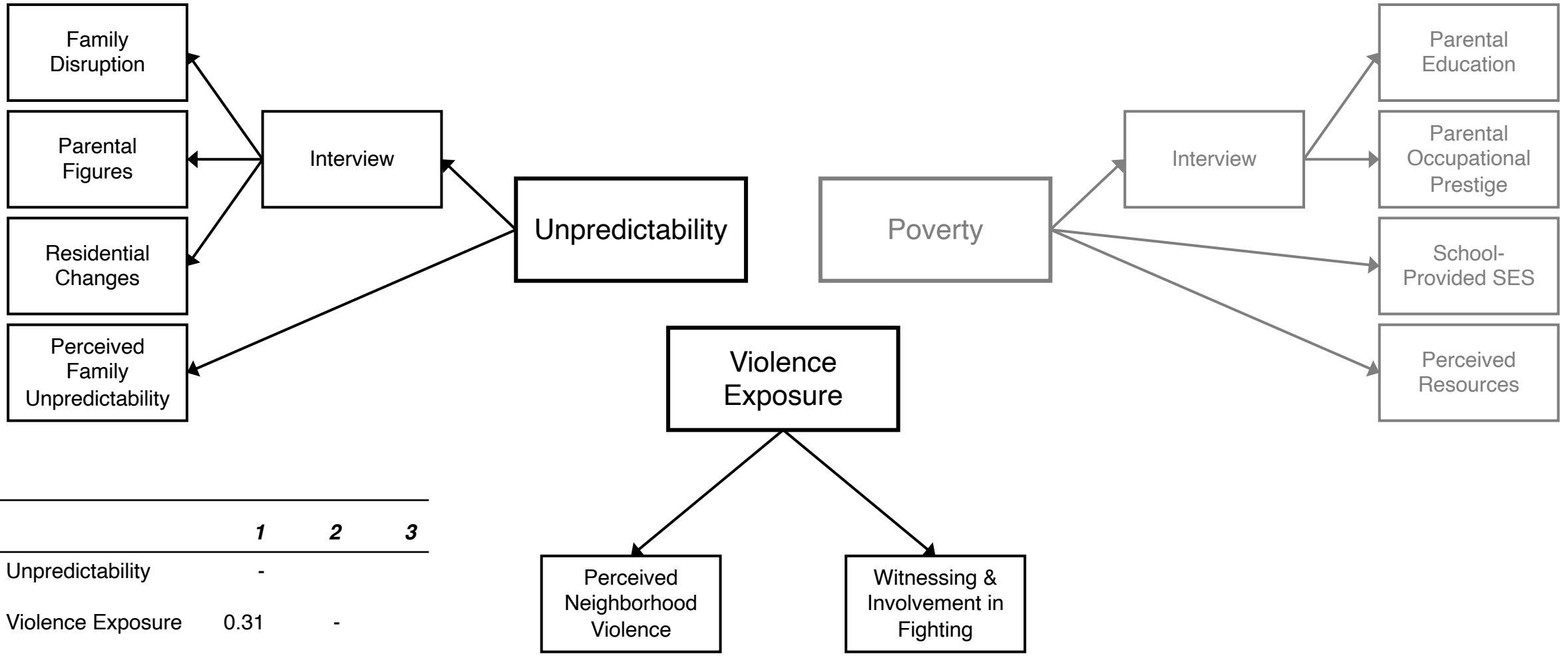
- Environmental Unpredictability
- Exposure to Violence
- Poverty Exposure

Compare performance on tasks with ***abstract*** versus ***ecologically relevant*** content

- Attention-Shifting
- Working Memory Updating

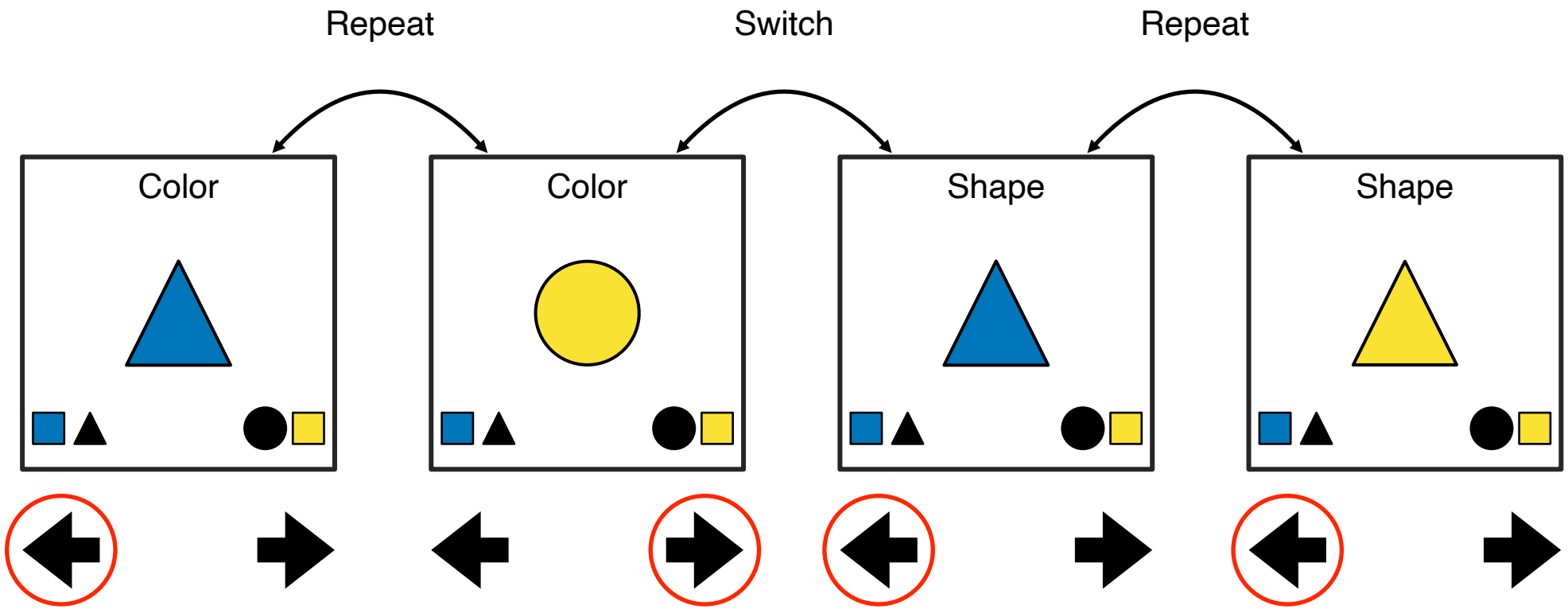
Analyze performance using ***multiverse analysis***

Dimensions of Adversity



	1	*2*	*3*
1. Unpredictability	-		
2. Violence Exposure	0.31	-	
3. Poverty	0.37	0.37	-

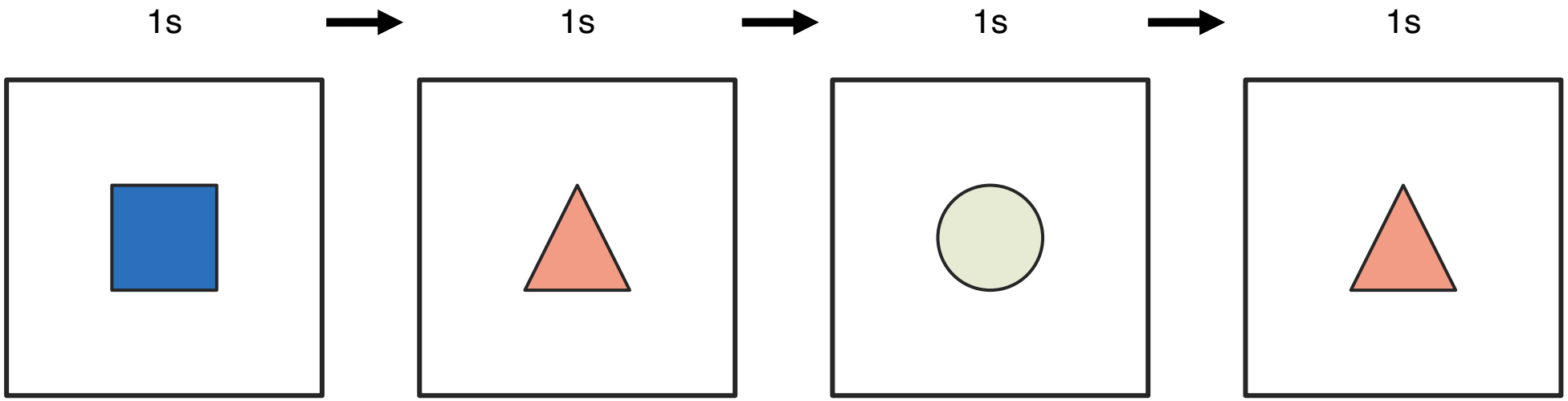
Abstract Attention-Shifting



$M_{repeat} - M_{switch}$ = ***Switch Cost*** (smaller is better)

Friedman et al., 2008
Mittal et al., 2015
Miyake & Friedman, 2012

Abstract Working Memory Updating



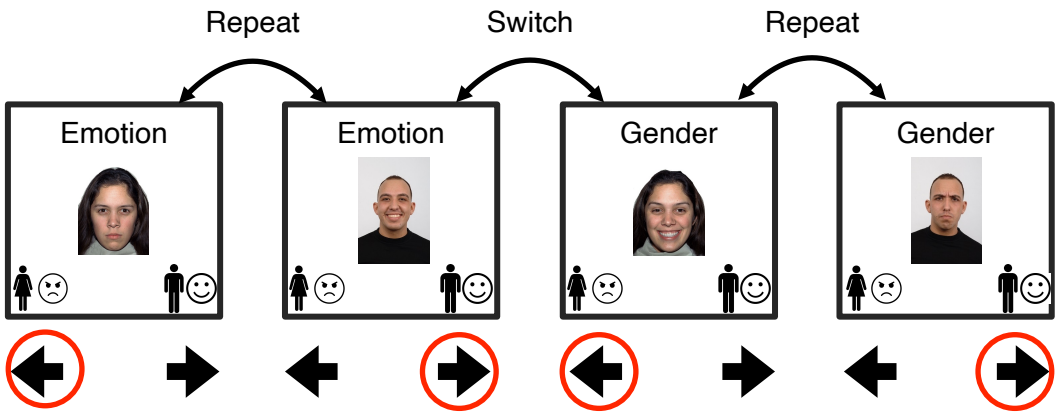
Triangles:	0	1	1	2
Circles:	0	0	1	1
Squares:	1	1	1	1

Proportion Correct (higher is better)

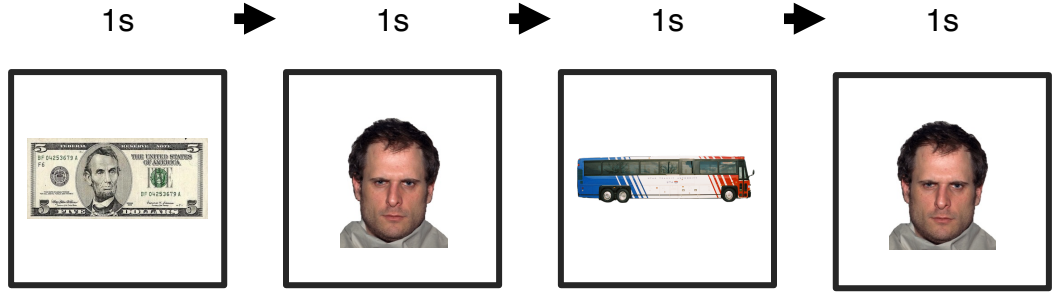
Unsworth & Engle, 2008
Unsworth et al., 2015
Young et al., 2018

Ecologically Relevant *Content*

Attention-Shifting
with real-world stimuli



Working Memory Updating
with real-world stimuli



Faces:	0	1	1	2
Buses:	0	0	1	1
Bills:	1	1	1	1

Replace abstract content with the real-world content

NimStim library (Tottenham et al., 2009), Radboud Faces Database (Langner et al., 2010).

Multiverse Analysis

Non-Arbitrary

Some alternatives better than others

Arbitrary

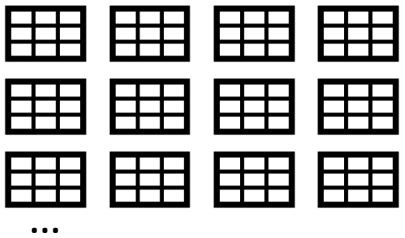
Equally defensible alternatives

6 arbitrary data decisions

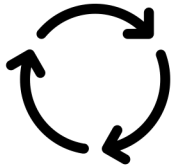
2 alternatives each

64 possible data sets

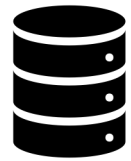
Multiverse of datasets



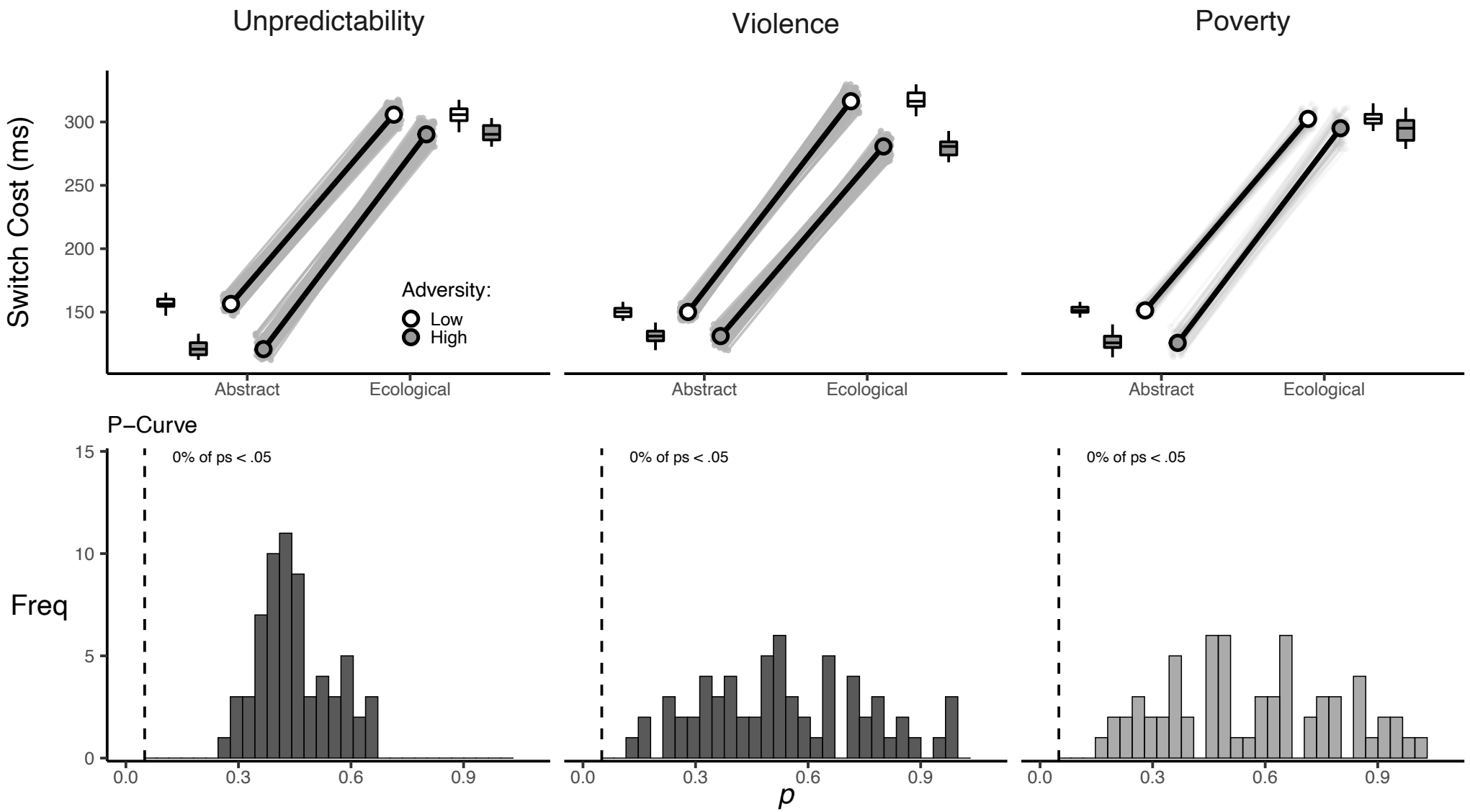
Iterate over data performing same analysis



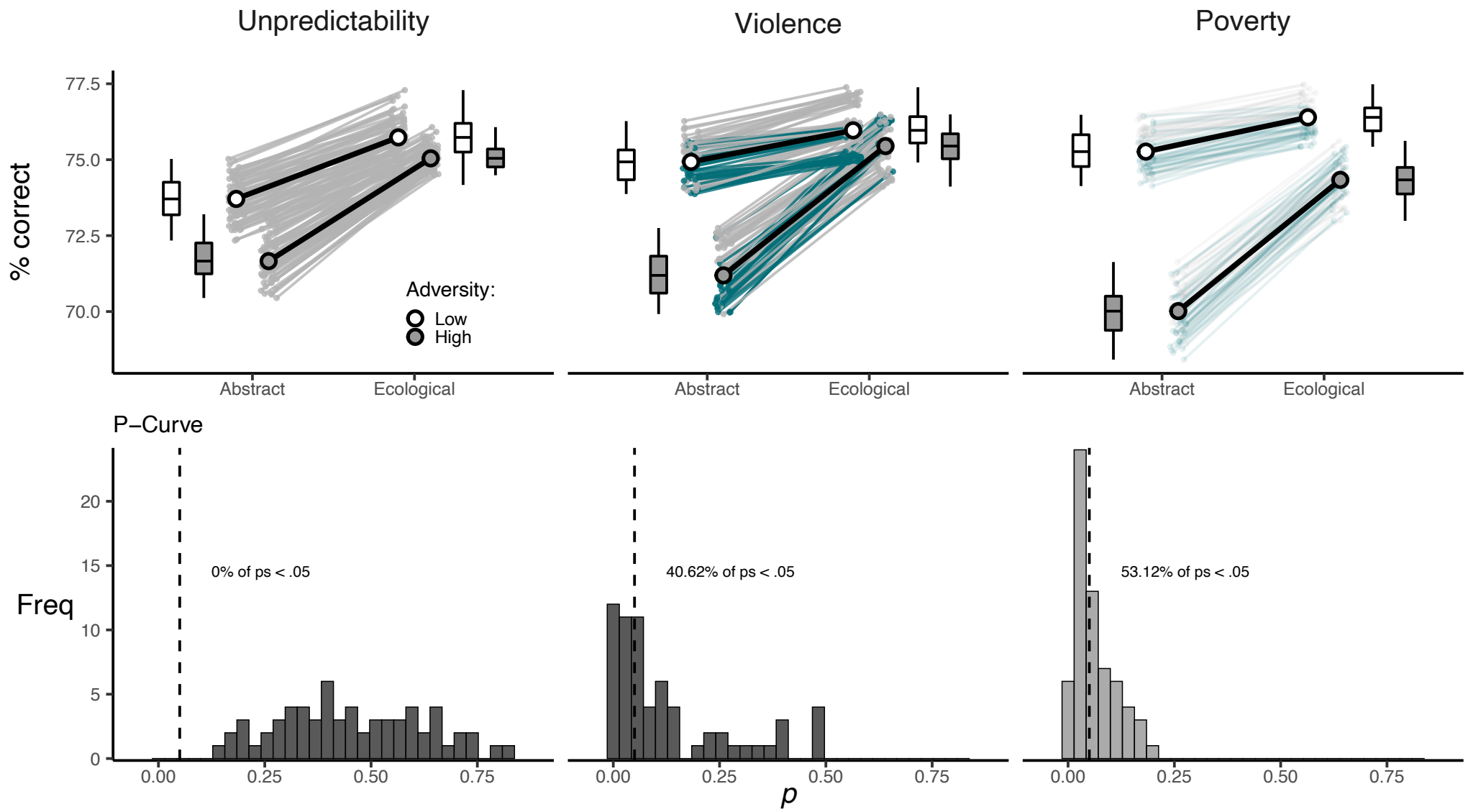
Compile Results



Attention-Shifting



Working Memory Updating



Can ecologically relevant stimuli improve task performance for people living in poverty?

Not for attention-shifting…

But it does for working memory updating!

Particularly for people exposed to violence and poverty…

At least under some analytic decisions…

Take-Aways

- Take-aways
  - Deficits are only one piece of the puzzle
  - People also develop ***adaptations*** to adverse conditions
  - Both processes may operate ***simultaneously***
  - Real-world content may ***equalize*** performance for people from adversity

- Multiverse Analysis
  - ***Transparently*** and ***systematically*** unpack your data
  - Provides future research with guidelines for data decisions
  - Come with some pretty cool plots ;)

James S. McDonnell Foundation

Robert Wood Johnson Foundation

Jacobs Foundation

Dutch Research Council