Response or Recall Bias?

Choosing Between the True and Retrospective Pretest

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RESEARCH & EVALUATION

Biases in Pretests

Pretest

Posttest

Biases in Pretests

True

Response Shift Bias

1. **Reconceptualization**: definitions of the construct change over time
2. **Reprioritization**: the values assigned to the scale change over time
3. **Recalibration**: understanding of the response scale changes over time

Biases in Pretests

Pretest

Posttest

Retrospective

Posttest

Biases in Pretests

True

Response Shift Bias

1. **Reconceptualization**: definitions of the construct change over time
2. **Reprioritization**: the values assigned to the scale change over time
3. **Recalibration**: understanding of the subject matter changes over time

Retrospective

Recall/Recollection Bias

1. **Recall**: remembering former state as better or worse than it actually was
2. **Present State Effect**: using info on current state to reconstruct former
3. **Implicit ToC**: reconstructing memory based on current state & assumptions

Biases in Pretests

Pretest

Posttest

Retrospective

Posttest

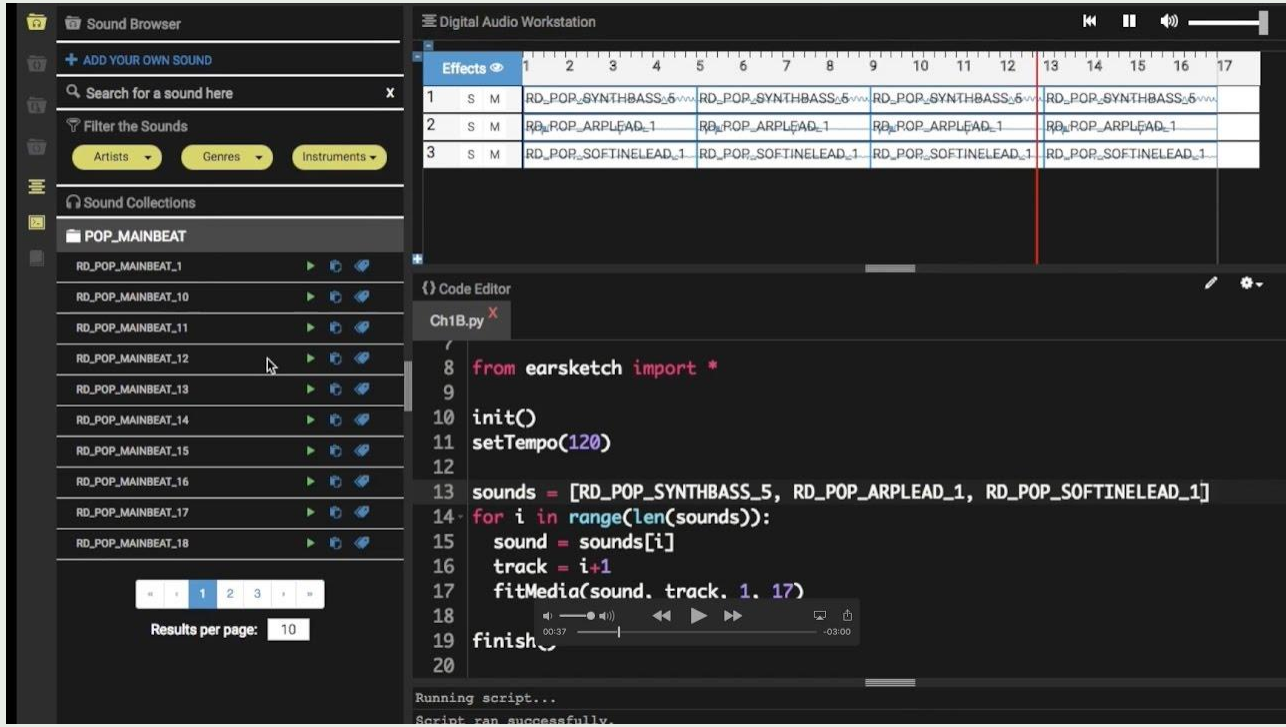
Retrospective

Pretest

Posttest

Our Data

Pretest	n = 642
Retrospective	n = 548
Posttest	n = 504

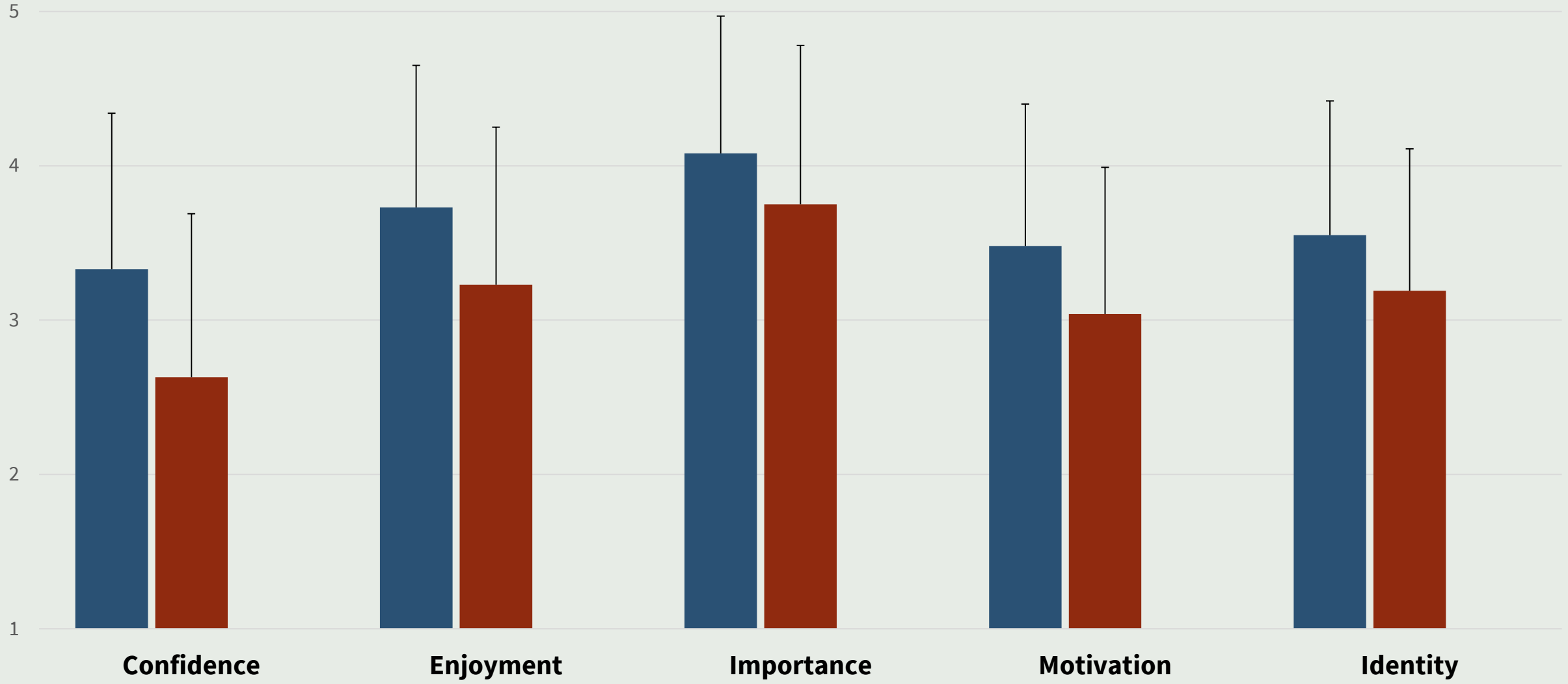


Attitudes Towards Computing scale

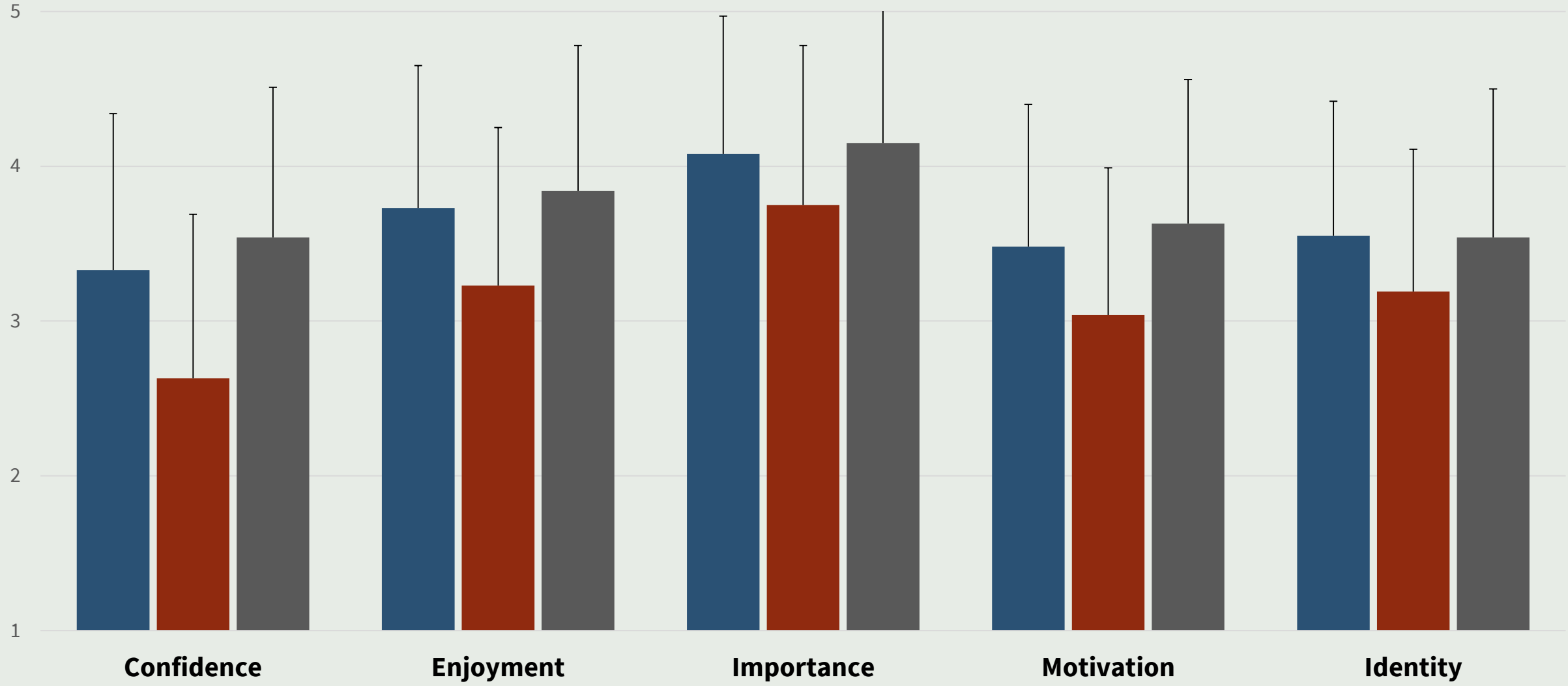
(Wanzer, McKlin, Edwards, Freeman & Magerko, 2019)

1. Confidence ω = .815
2. Enjoyment ω = .667
3. Importance ω = .807
4. Motivation ω = .822
5. Identity ω = .815

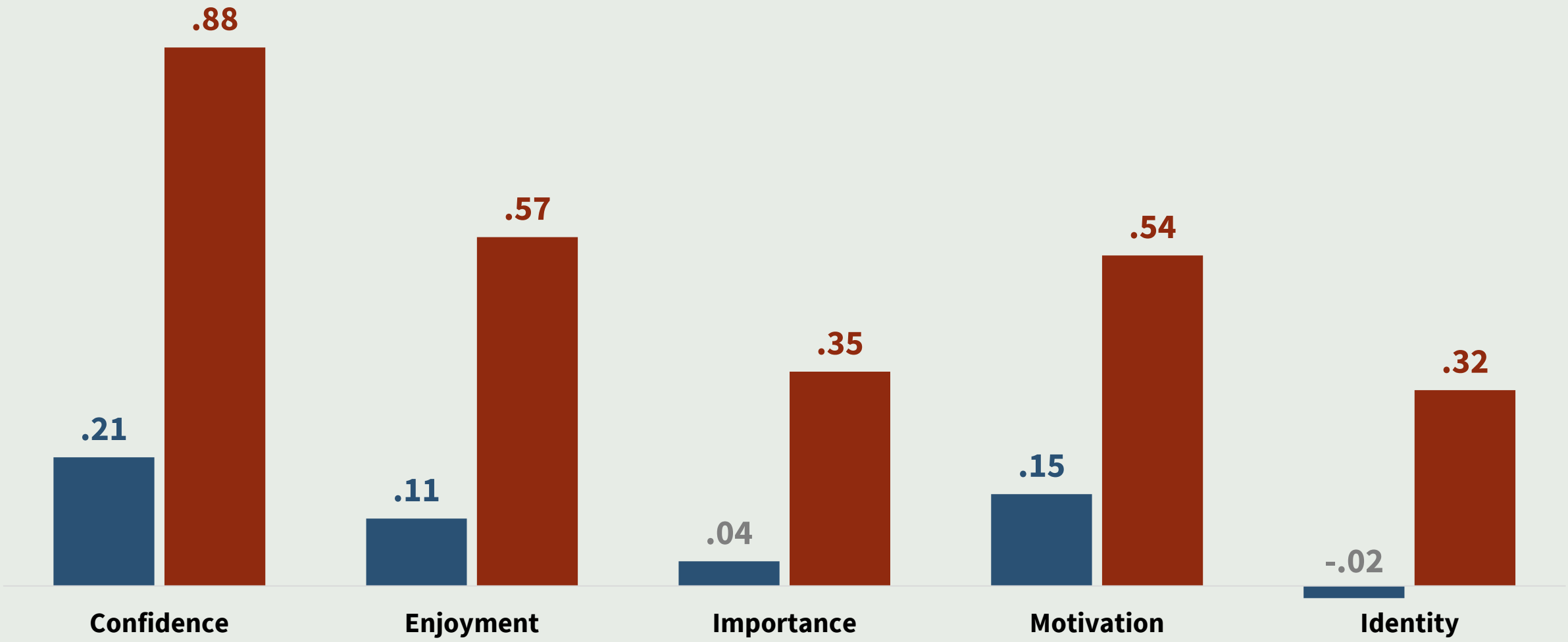
Pretest and Retrospective Means



Pretest, Retrospective, and Posttest Means



Cohen's d effect sizes for true & retrospective pretests to posttest



Pretests

True

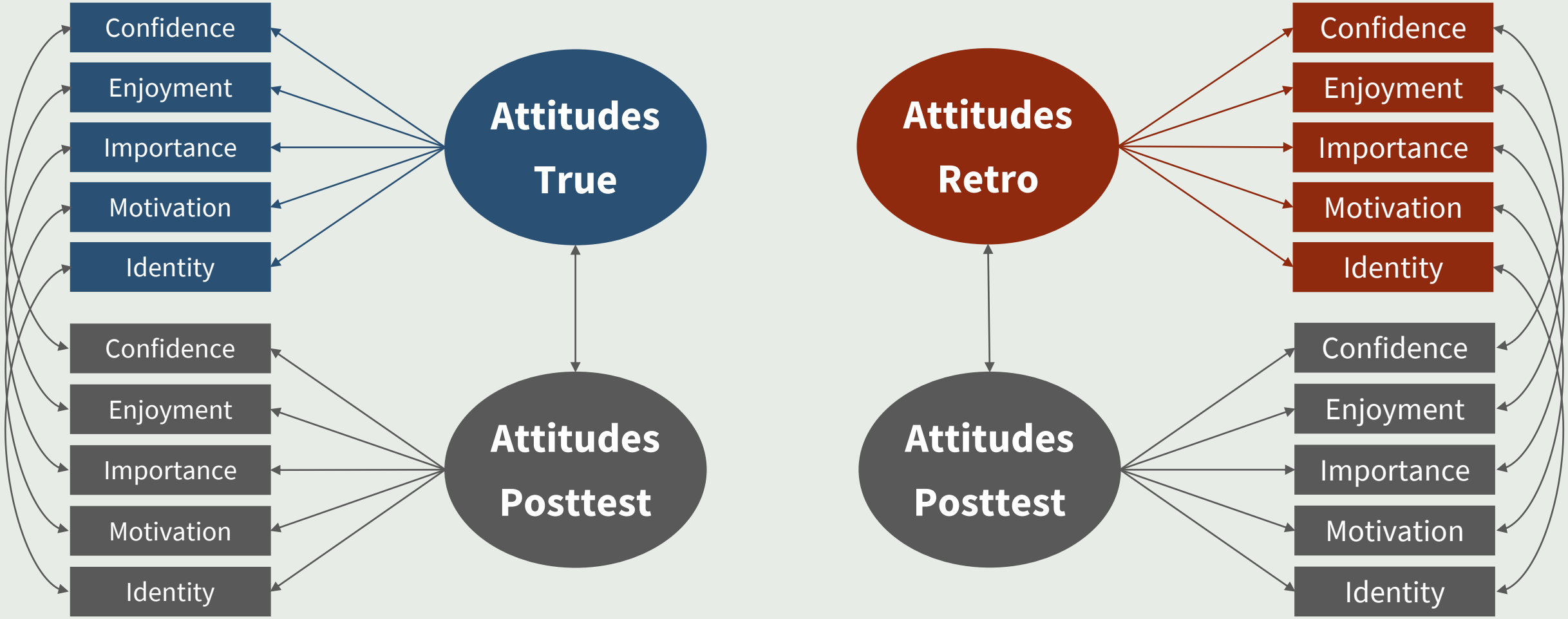
Retrospective

Measurement Invariance

Determining whether the same underlying construct is being measured across groups or **across time**

Used within Confirmatory Factor Analysis (CFA) or Structural Equation Modeling (SEM)

Measurement Invariance

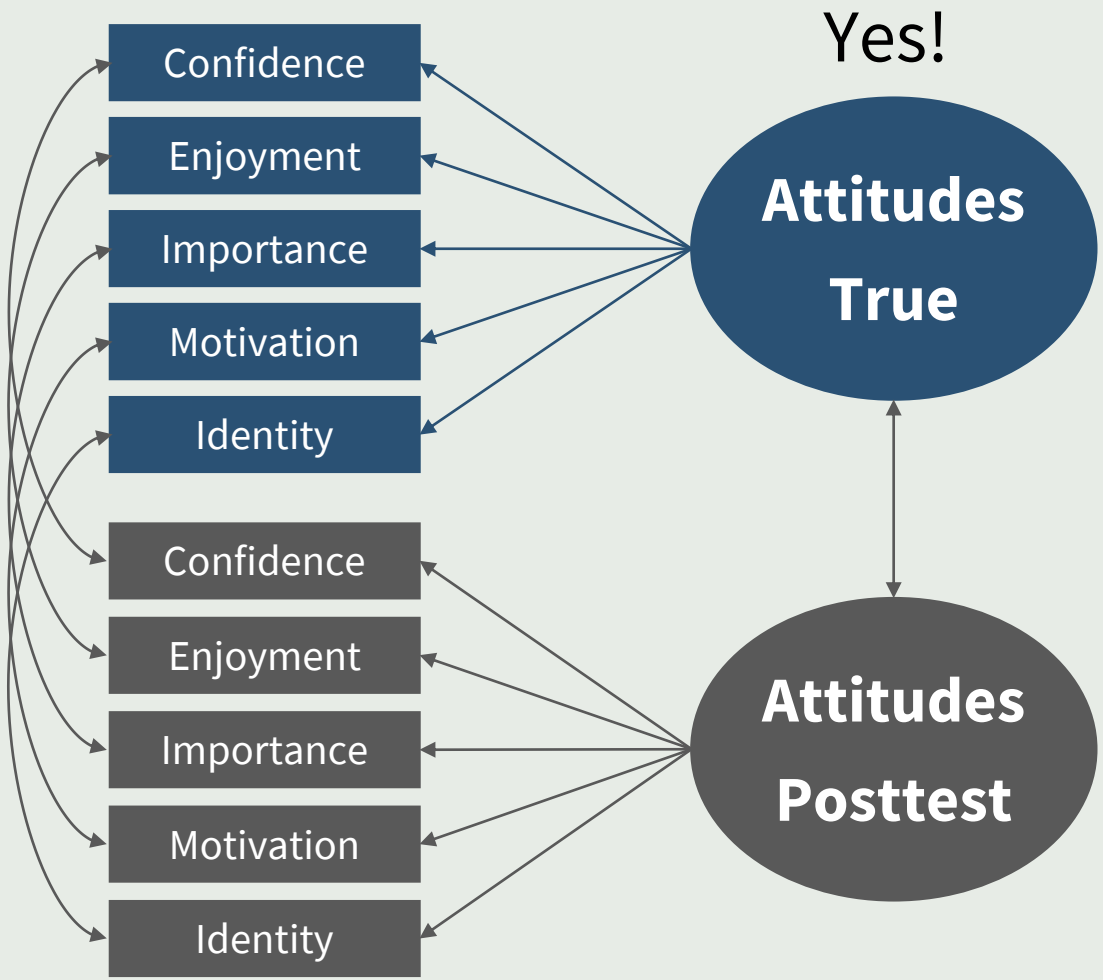


Measurement Invariance

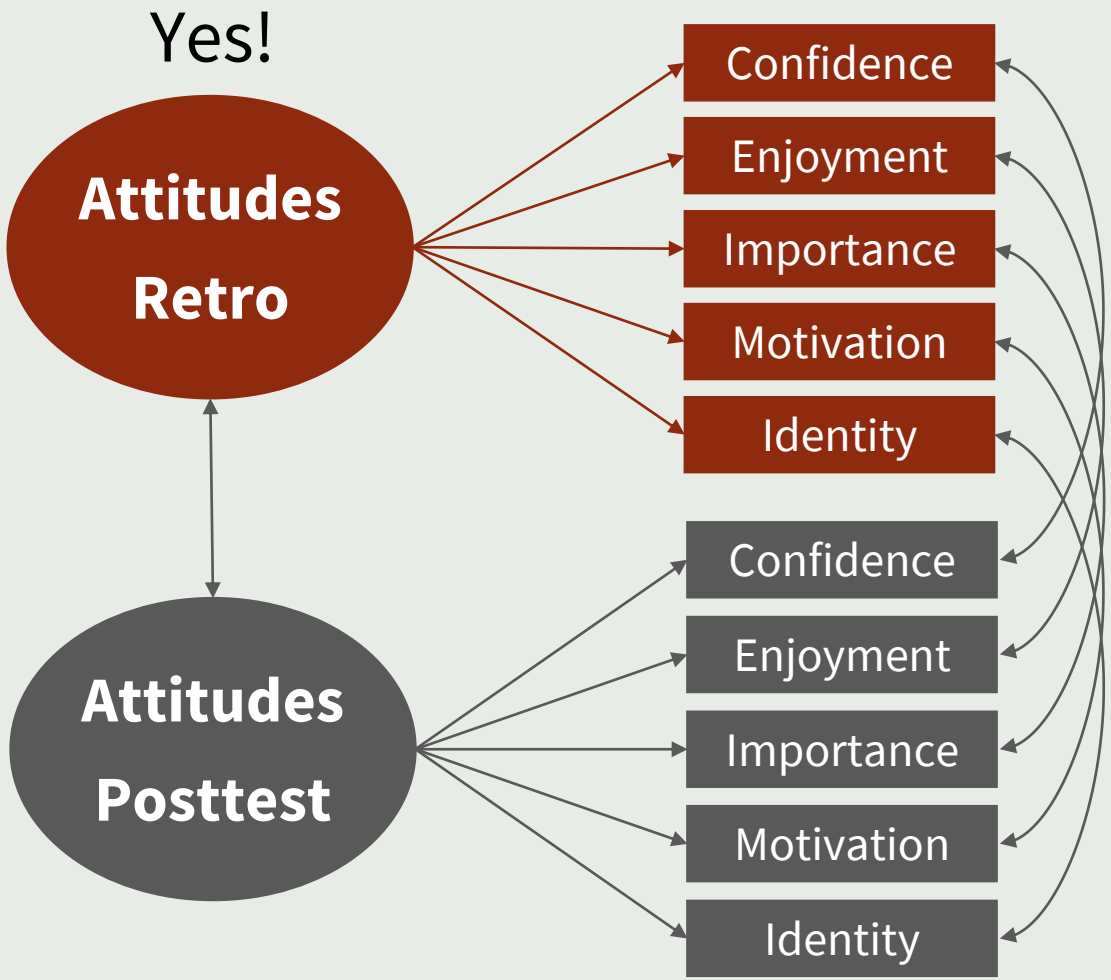
Invariance	What is constrained?	If variant, which response shift bias?
Configural	Nothing	Reconceptualization

Piwowar & Thiel (2014) Evaluating response shift in training evaluation… *Evaluation Review, 38*(5), 420-488.

Configural Invariance



χ^2 (29) = 74.59, CFI = .98, RMSEA = .06, SRMR = .03



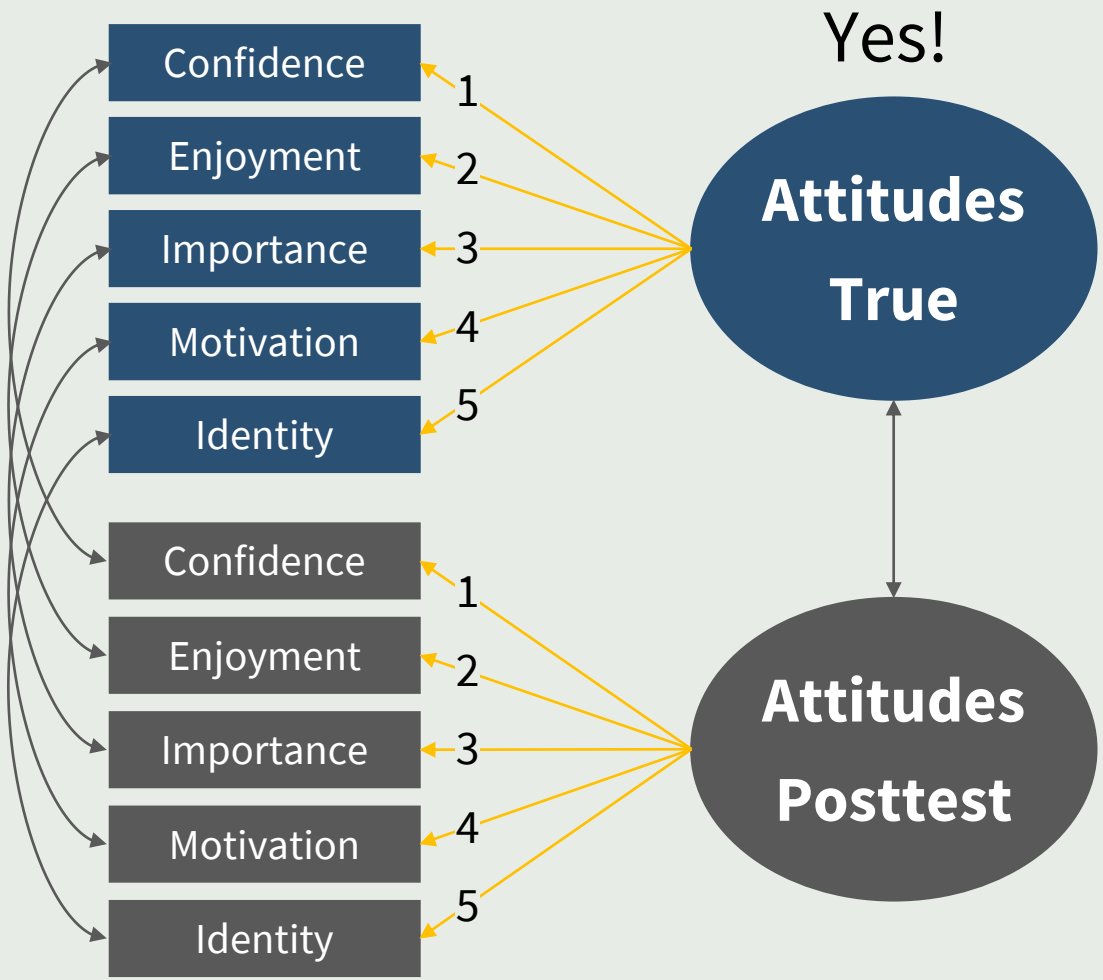
χ^2 (29) = 123.35, CFI = .98, RMSEA = .08, SRMR = .06

Measurement Invariance

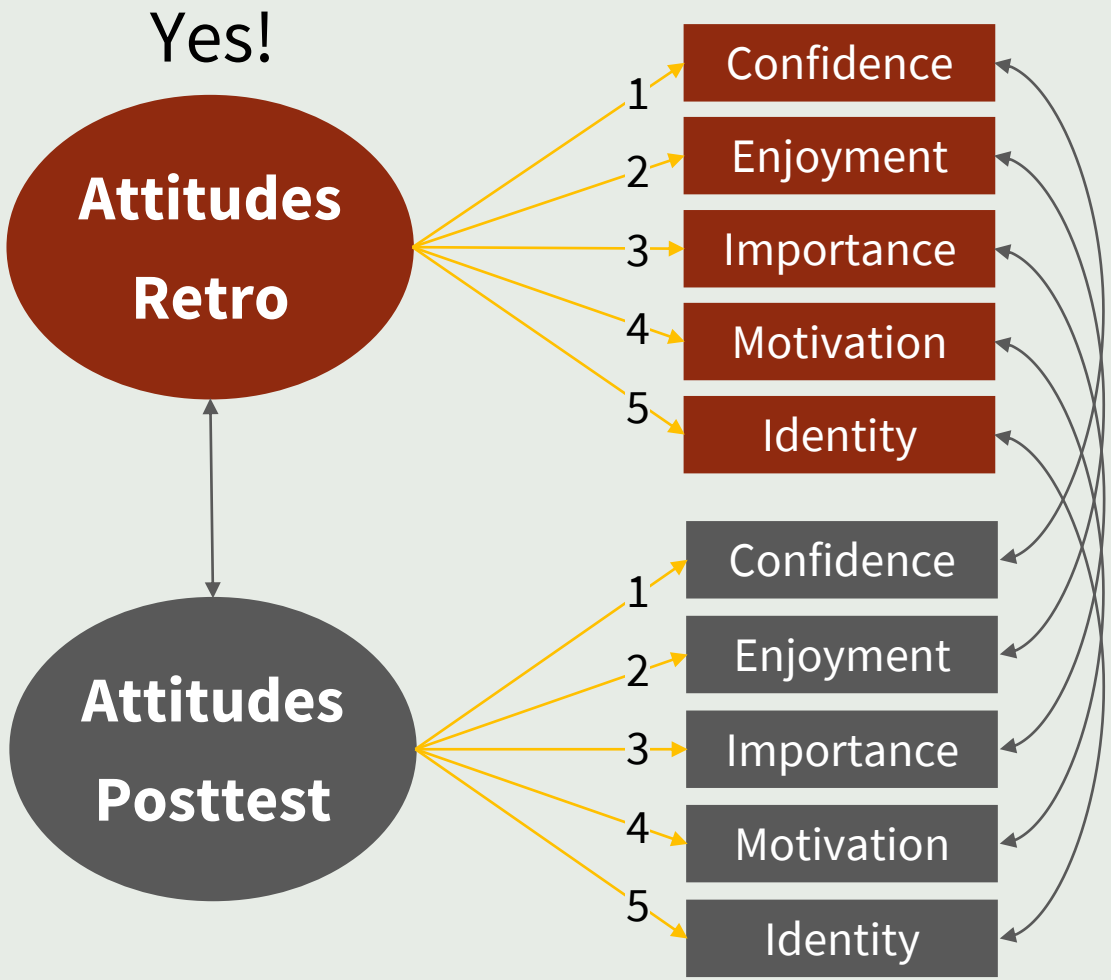
Invariance	What is constrained?	If variant, which response shift bias?
Configural	Nothing	Reconceptualization
Weak	Factor Loadings	Reprioritization

Piwowar & Thiel (2014) Evaluating response shift in training evaluation… *Evaluation Review, 38*(5), 420-488.

Weak Invariance



$\Delta\chi^2$ (4) = .75, ΔCFI = .00, ΔRMSEA = .00, ΔSRMR = .00



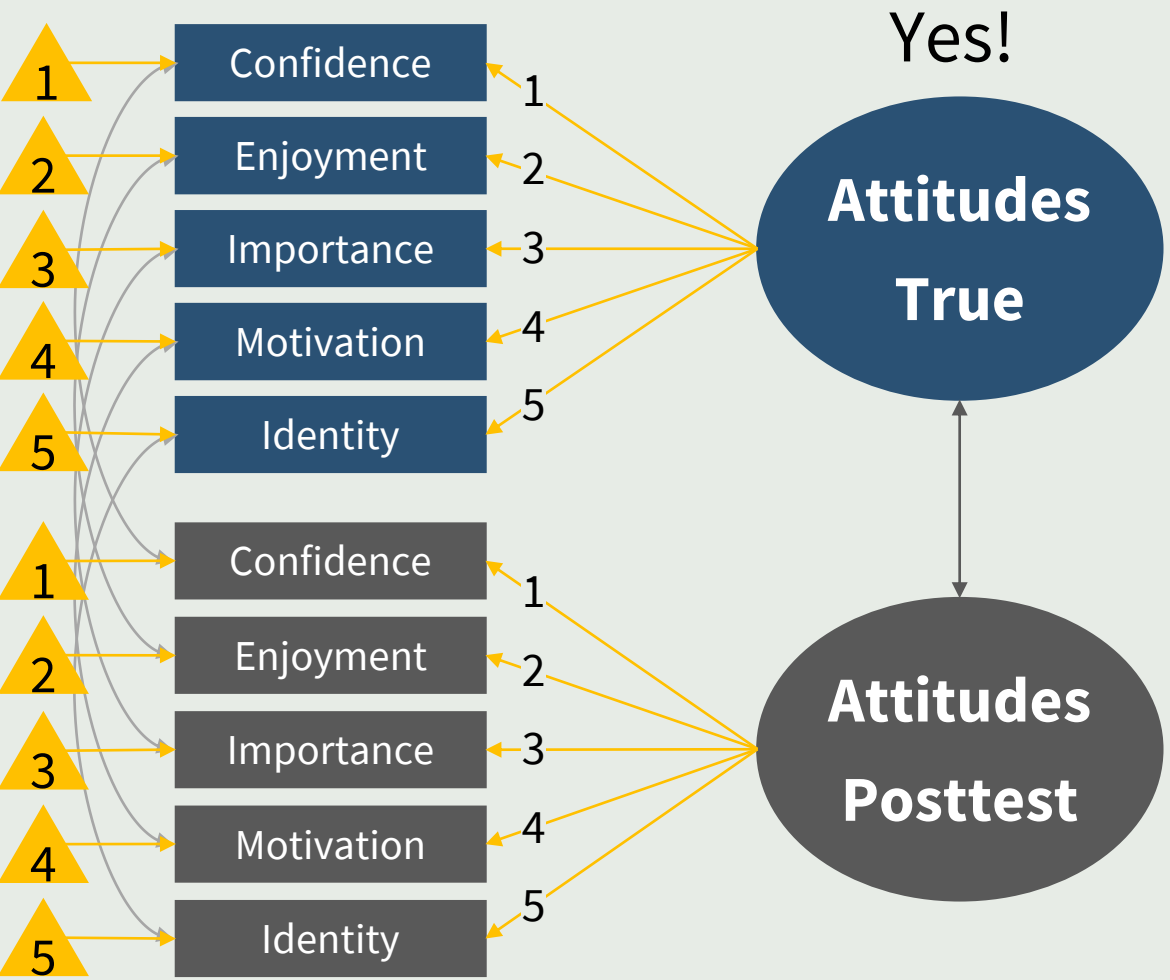
$\Delta\chi^2$ (4) = 4.64, ΔCFI = .00, ΔRMSEA = .00, ΔSRMR = .00

Measurement Invariance

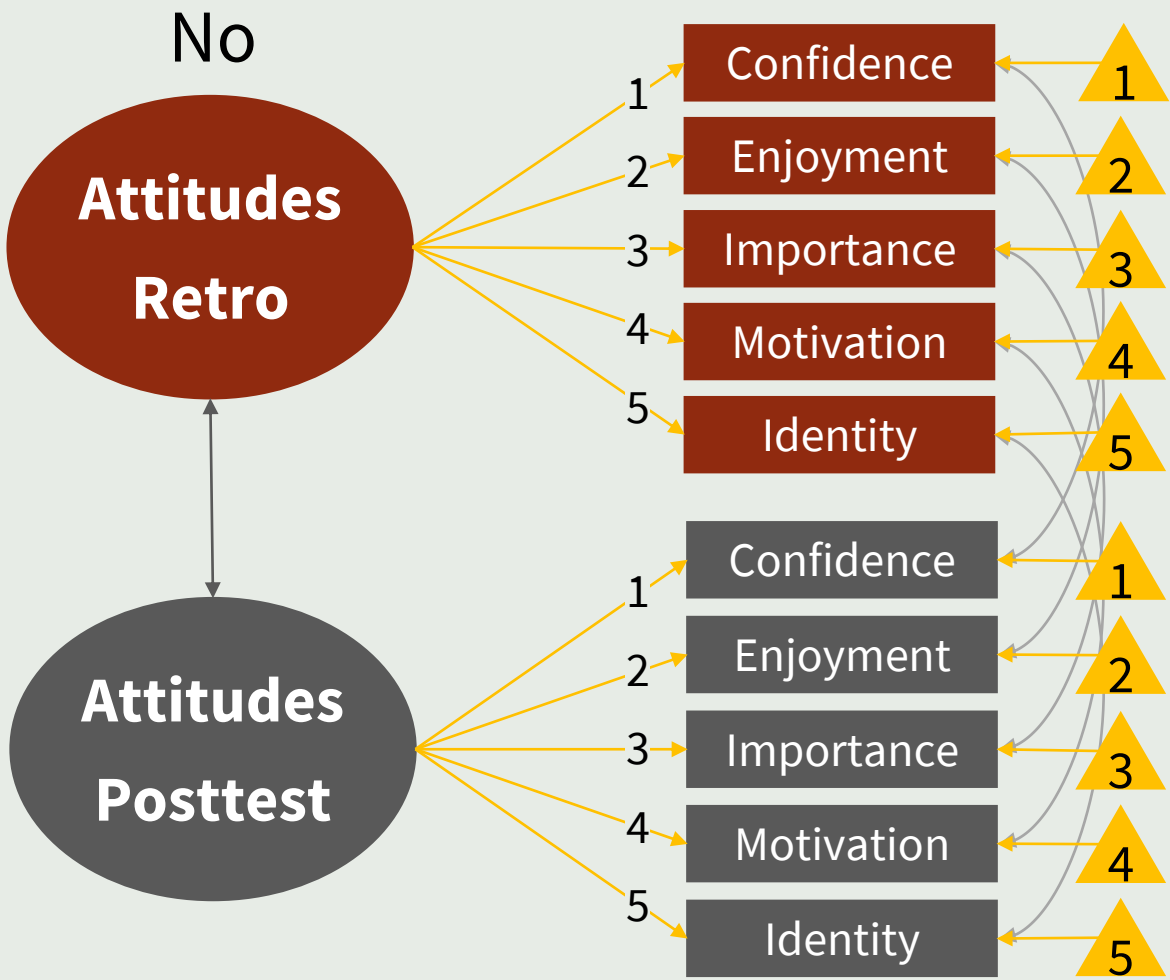
Invariance	What is constrained?	If variant, which response shift bias?
Configural	Nothing	Reconceptualization
Weak	Factor Loadings	Reprioritization
Strong	Intercepts	Uniform Recalibration

Piwowar & Thiel (2014) Evaluating response shift in training evaluation… *Evaluation Review, 38*(5), 420-488.

Strong Invariance



$\Delta\chi^2$ (4) = 23***, ΔCFI = .00, ΔRMSEA = .01, ΔSRMR = .01



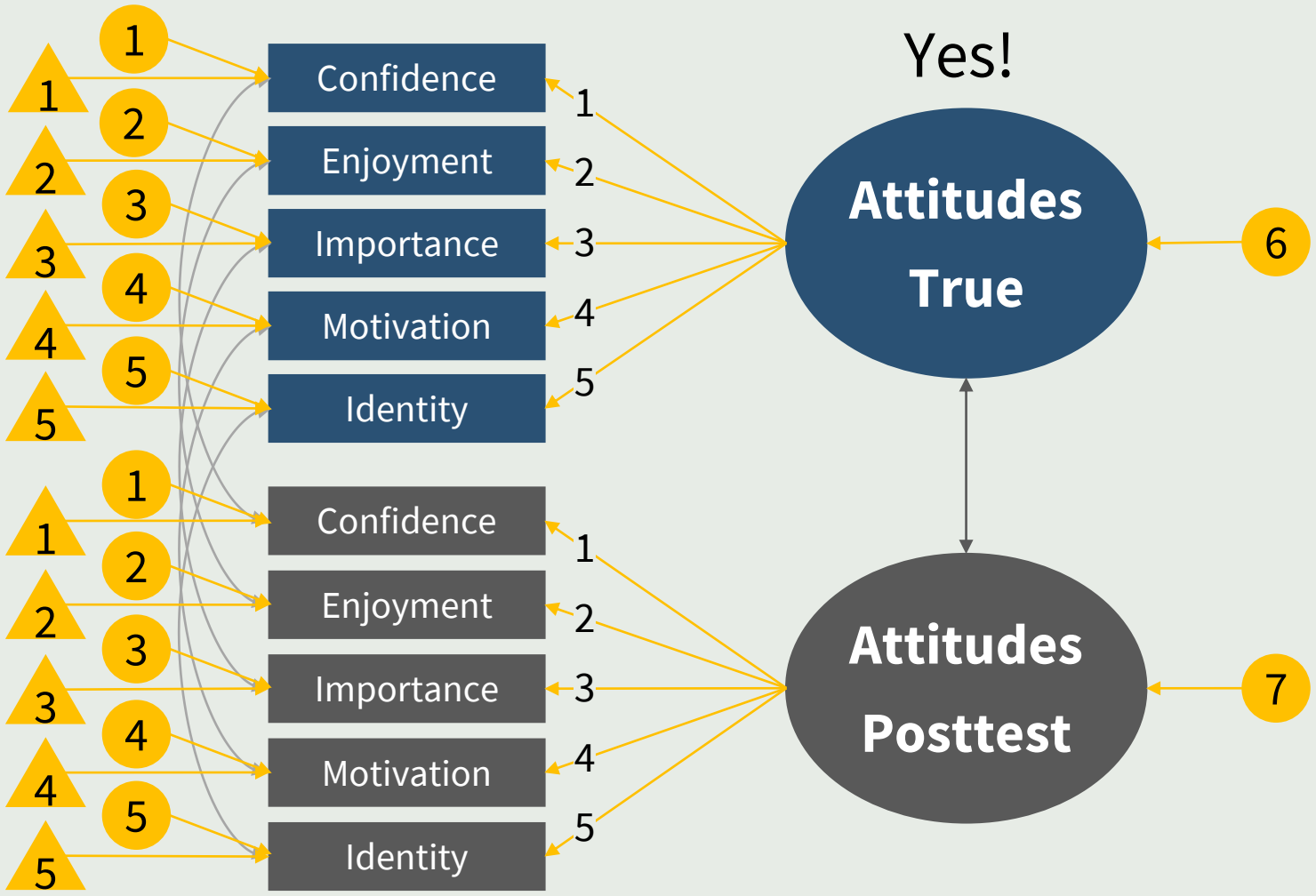
$\Delta\chi^2$ (4) = 122***, ΔCFI = .03, ΔRMSEA = .03, ΔSRMR = .04

Measurement Invariance

Invariance	What is constrained?	If variant, which response shift bias?
Configural	Nothing	Reconceptualization
Weak	Factor Loadings	Reprioritization
Strong	Intercepts	Uniform Recalibration
Strict	Variances	Non-Uniform Recalibration

Piwowar & Thiel (2014) Evaluating response shift in training evaluation… *Evaluation Review, 38*(5), 420-488.

Strict Invariance



$\Delta\chi^2$ (6) = 11, ΔCFI = .00, ΔRMSEA = .01, ΔSRMR = .00

Measurement Invariance

Invariance	True Pretest	Retrospective Pretest
Configural	Yes	Yes
Weak	Yes	Yes
Strong	Yes	No **Uniform Recalibration**
Strict	Yes **No Response Shift Bias**	--

Implications

1. Not sure if you have response shift bias? Check using measurement invariance techniques!
2. Supplement with qualitative data
3. Consider the timing & placement of the retrospective pretest
   - Before or after the posttest?
   - On the same or a different page as the posttest?
   - On the same or a different questionnaire as the posttest?

References & Contact

Bialosiewicz, Murphy, & Berry (2013) An introduction to measurement invariance testing: Resource packet for participants. Available on the AEA Public eLibary.

Piwowar & Thiel (2014) Evaluating response shift in training evaluation: Comparing the retrospective pretest with an adapted measurement invariance approach in a classroom management training program. *Evaluation Review, 38*(5), 420-448.

Jorgensen, Pornprasertmanit, Schoemann, & Rosseel (2019) semTools. R package version 0.5-2

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