Quantitative Social Science Methods, I, Lecture Notes: Anchoring Vignettes for Interpersonally Incomparable Survey Responses

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Readings

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- "Enhancing the Validity and Cross-cultural Comparability of Measurement in Survey Research" Gary King; Christopher J.L. Murray; Joshua A. Salomon; and Ajay Tandon, *American Political Science Review*, 2004

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- "Comparing Incomparable Survey Responses: Evaluating and Selecting Anchoring Vignettes" Gary King and Jonathan Wand, *Political Analysis*, 2007

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- "Improving Anchoring Vignettes: Designing Surveys to Correct Interpersonal Incomparability" Daniel Hopkins and Gary King, *Public Opinion Quarterly*, 2010

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- "Engaging Private and Information Technology in a Digital Age" National Research Council, j.mp/PrivInfoAge, 2007: p.86ff

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  - Ethiopians and Danes report being equally healthy
  - "Individuals understand the 'same' questions in vastly different ways." (Brady, 1985)

Anchoring Vignettes: Political Efficacy Through Voting

How much say [does ‘name’ / do you] have in getting the government to address issues that interest [him / her / you]?

(a) Unlimited say, (b) A lot of say, (c) Some say, (d) Little say, (e) No say at all

Anchoring Vignettes: Political Efficacy Through Voting

- "[Alison] lacks clean drinking water. She and her neighbors are supporting an opposition candidate in the forthcoming elections that has promised to address the issue. It appears that so many people in her area feel the same way that the opposition candidate will defeat the incumbent representative."

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- "[Jane] lacks clean drinking water because the government is pursuing an industrial development plan. In the campaign for an upcoming election, an opposition party has promised to address the issue, but she feels it would be futile to vote for the opposition since the government is certain to win."

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- "[Jane] lacks clean drinking water because the government is pursuing an industrial development plan. In the campaign for an upcoming election, an opposition party has promised to address the issue, but she feels it would be futile to vote for the opposition since the government is certain to win."
- "[Moses] lacks clean drinking water. He would like to change this, but he can't vote, and feels that no one in the government cares about this issue. So he suffers in silence, hoping something will be done in the future."

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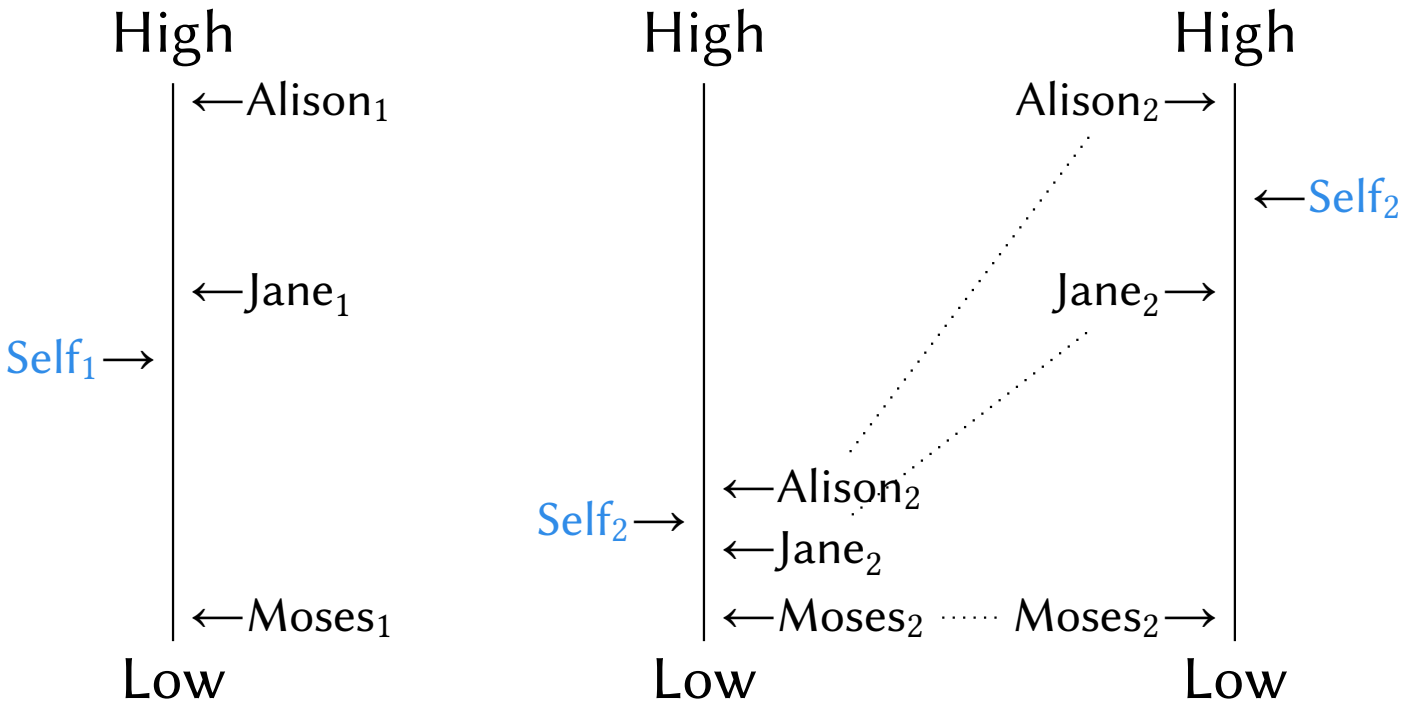
Who has More Political Efficacy: R_1 or R_2?



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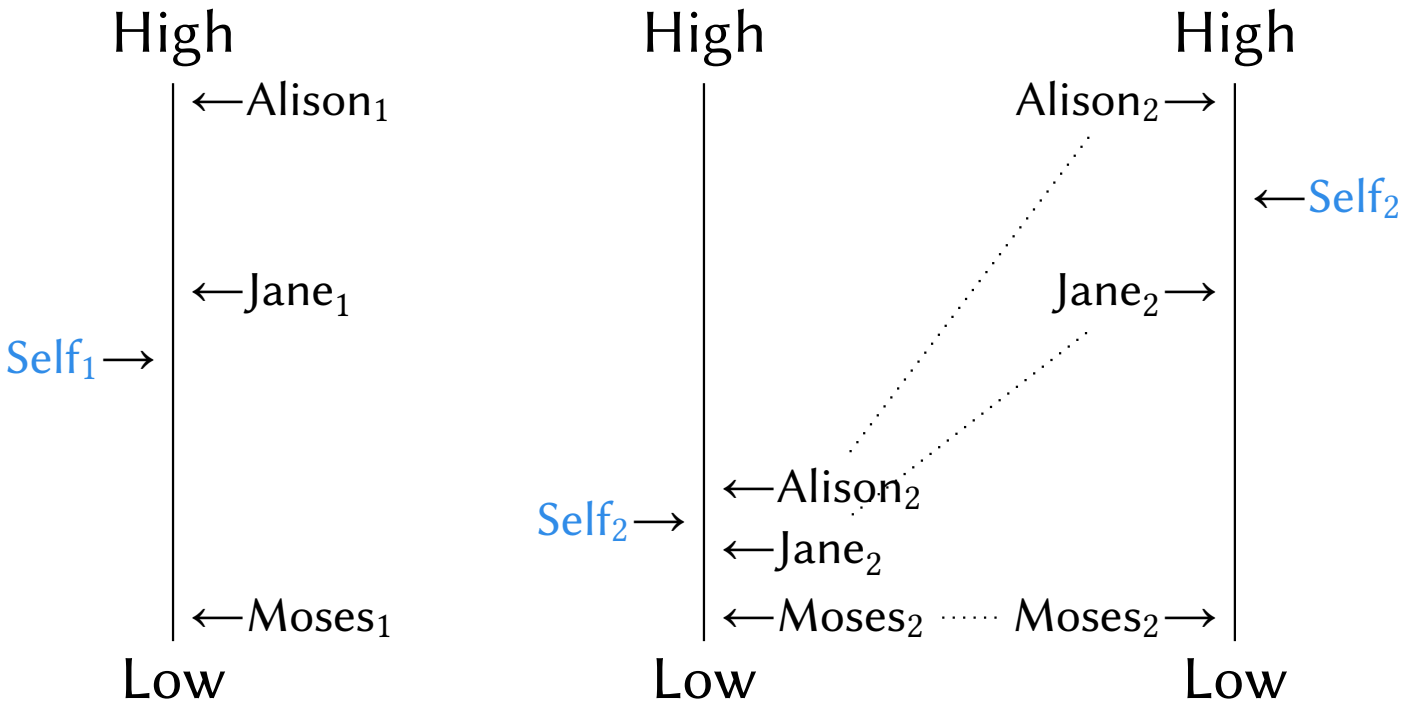

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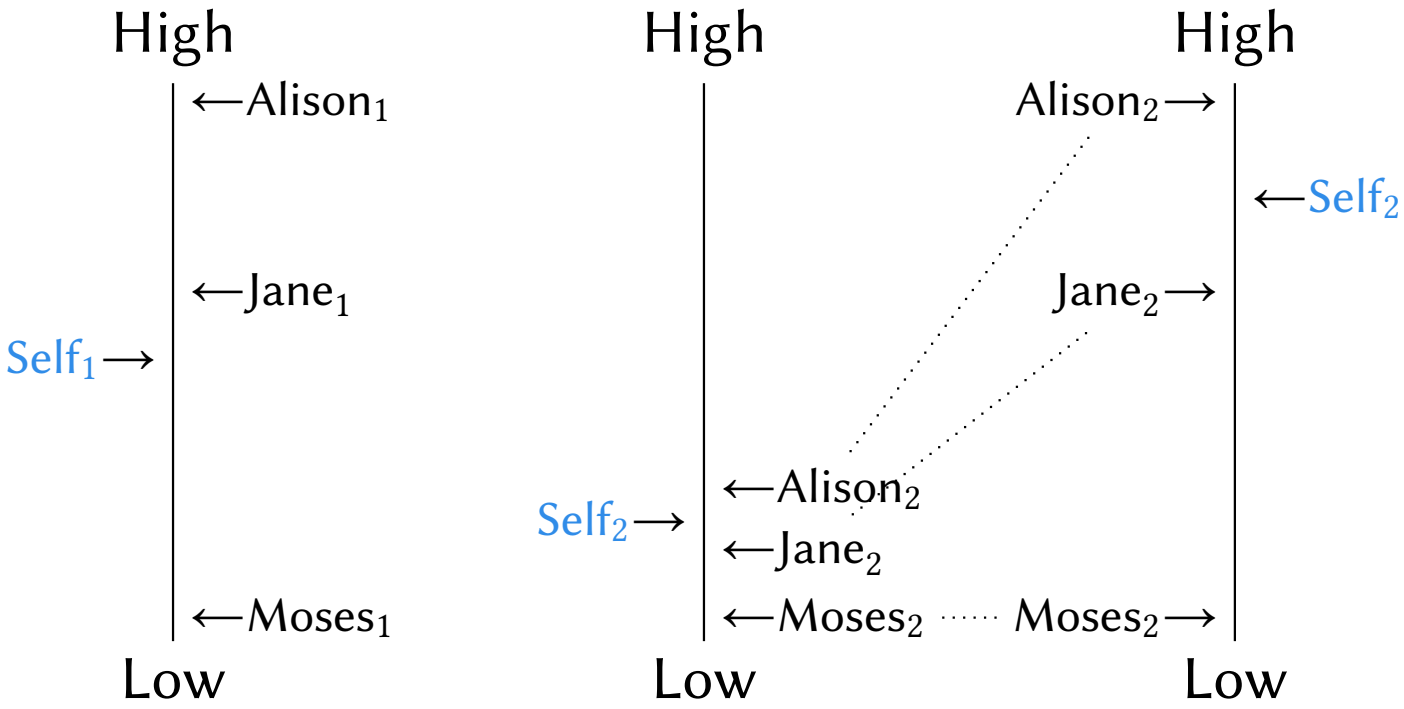

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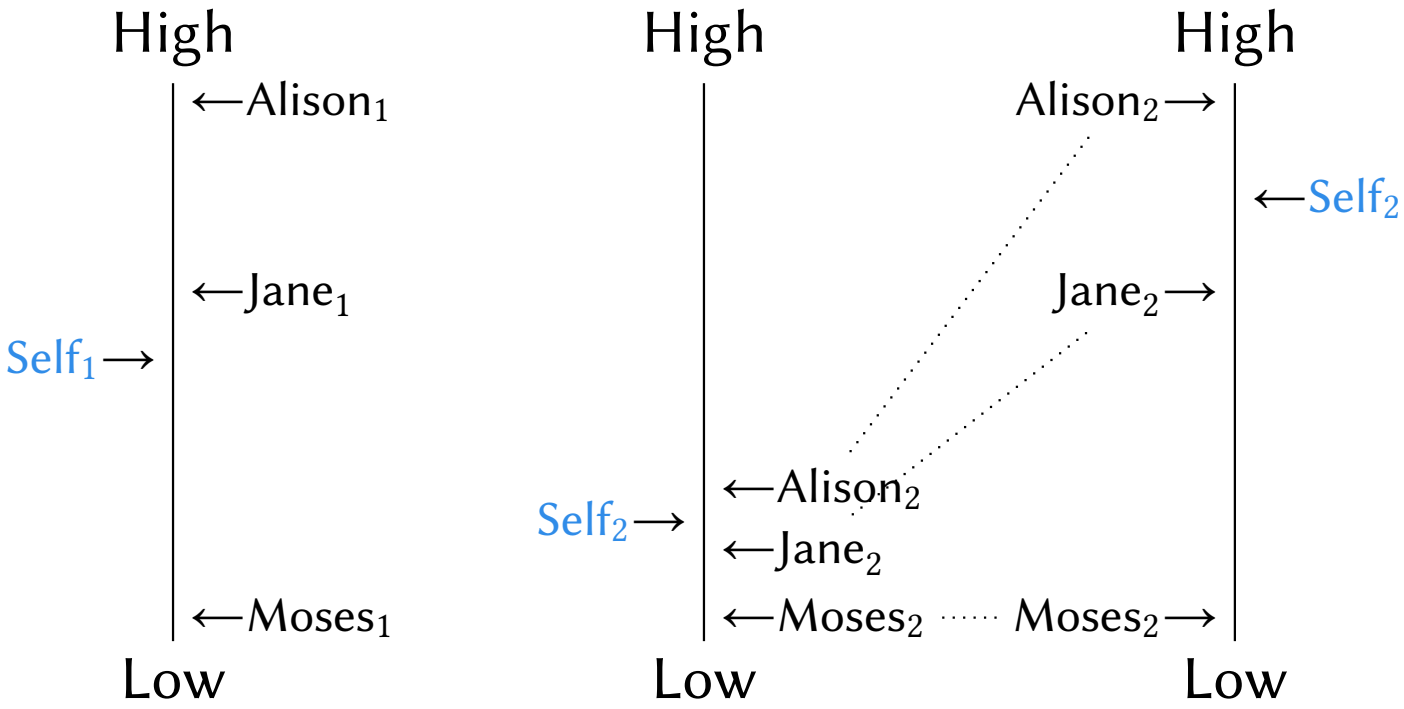

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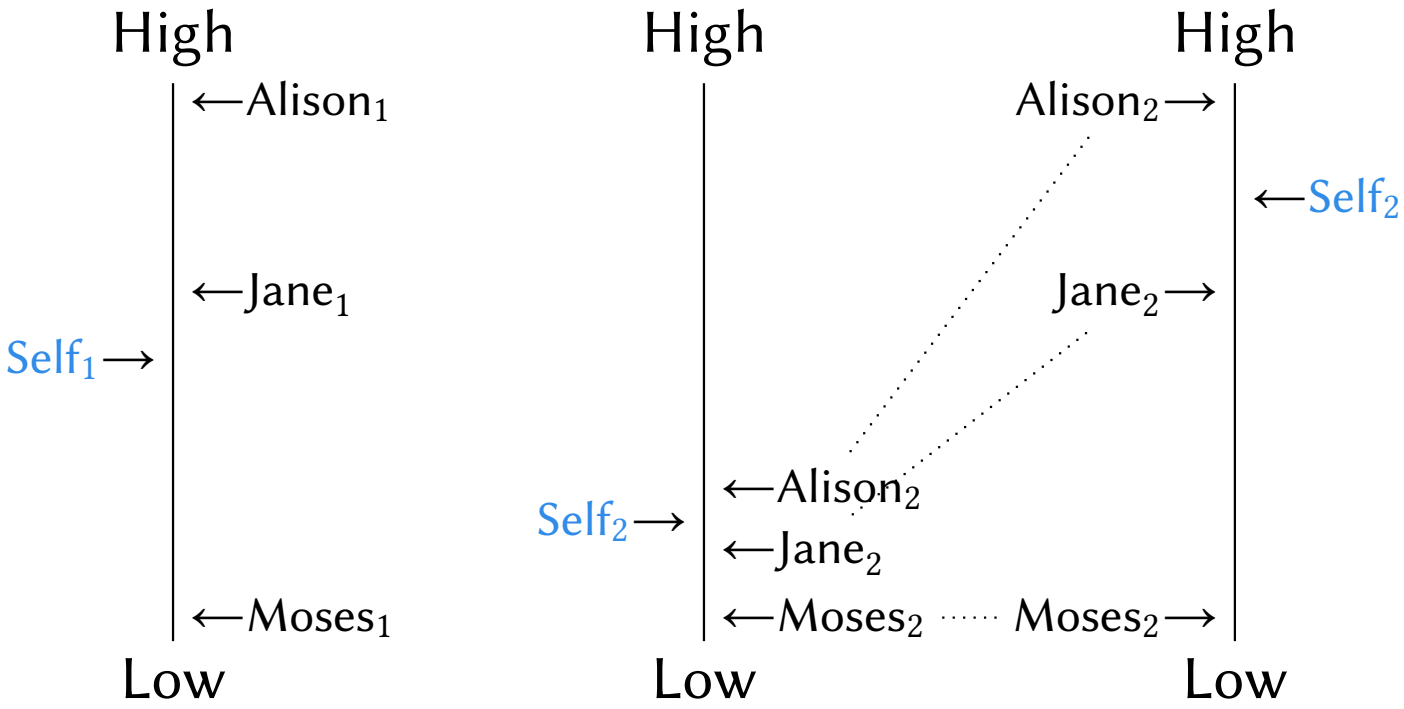

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- Quiz: How do we know true vignette assessments are fixed over respondents? We create the anchors (Alison, Jane, Moses)!

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- In other words: we allow response-category DIF but assume stem question equivalence

Comparing Political Efficacy in Mexico and China

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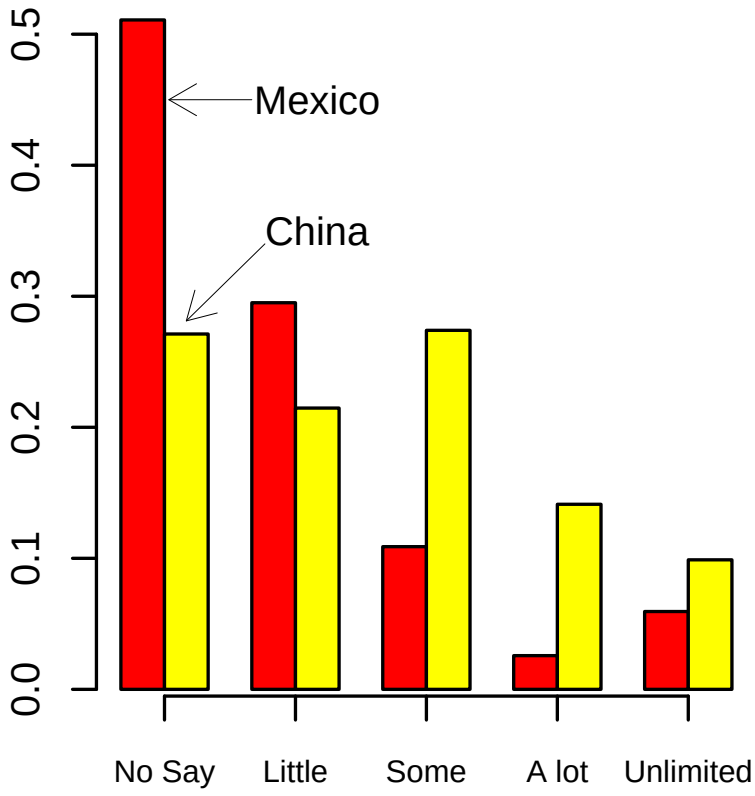
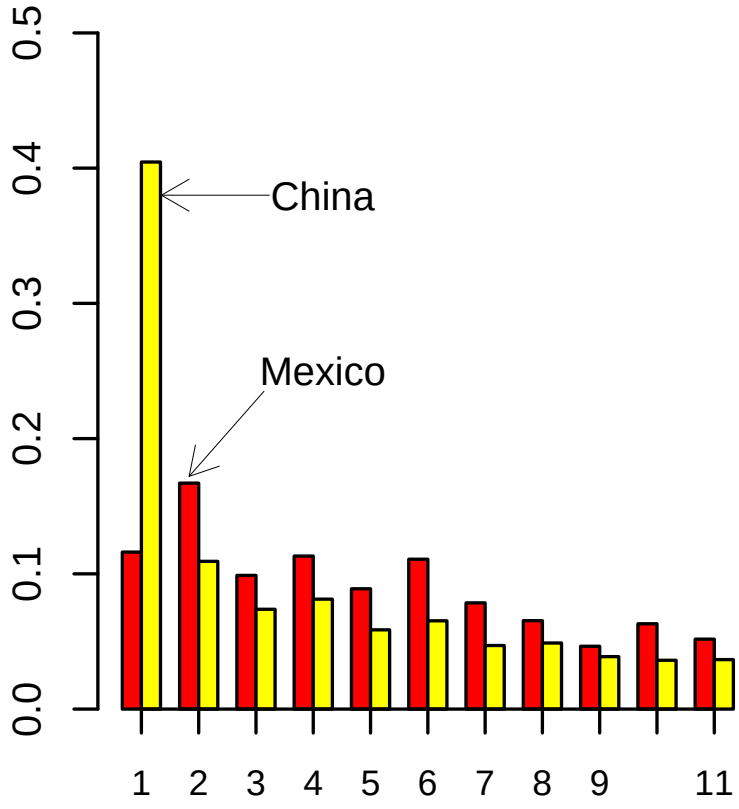
China

How much say do you have getting government to address issues that interest you?

Nonparametric Estimates of Political Efficacy



observed categorical self-assessments



C, our nonparametric DIF-corrected estimate of the same distribution

Ties and Inconsistencies Produce *Ranges*

Survey	1:	2:	3:	4:	5:	
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Inconsistencies:						
$y < z_2 < z_1$	T					$\{1\}$
$y = z_2 < z_1$	T			T		$\{1,2,3,4\}$

Ties and Inconsistencies Produce *Ranges*

Survey	1:	2:	3:	4:	5:	
Responses	$y < z_1$	$y = z_1$	$z_1 < y < z_2$	$y = z_2$	$y > z_2$	C
Scalars:						
$y < z_1 < z_2$	T					$\{1\}$
$y = z_1 < z_2$		T				$\{2\}$
$z_1 < y < z_2$			T			$\{3\}$
$z_1 < y = z_2$				T		$\{4\}$
$z_1 < z_2 < y$					T	$\{5\}$
Ties:						
$y < z_1 = z_2$	T					$\{1\}$
$y = z_1 = z_2$		T		T		$\{2,3,4\}$
$z_1 = z_2 < y$					T	$\{5\}$
Inconsistencies:						
$y < z_2 < z_1$	T					$\{1\}$
$y = z_2 < z_1$	T			T		$\{1,2,3,4\}$
$z_2 < y < z_1$	T				T	$\{1,2,3,4,5\}$

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Responses	$y < z_1$	$y = z_1$	$z_1 < y < z_2$	$y = z_2$	$y > z_2$	C
Scalars:						
$y < z_1 < z_2$	T					$\{1\}$
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$z_2 < z_1 < y$					T	$\{5\}$

A Likelihood for Scalar or Vector Responses

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Parametric likelihood used in a nonparametric methodology

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- Define an unobserved variable: $Y_i \sim \text{Normal}(x_i\beta, 1)$

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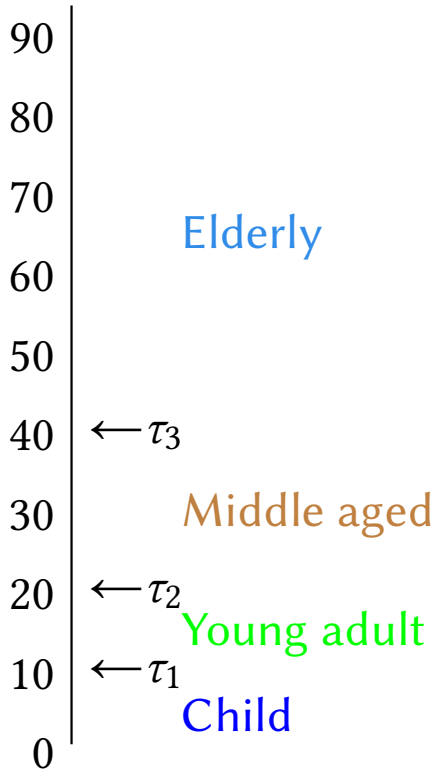
- Quiz: Do you know how to form the likelihood function?

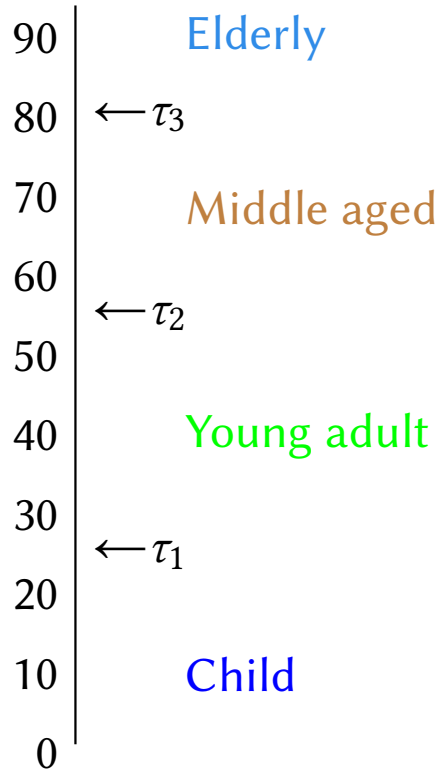
Categorizing Years of Age

Categorizing Years of Age

Respondent 1



Respondent 2



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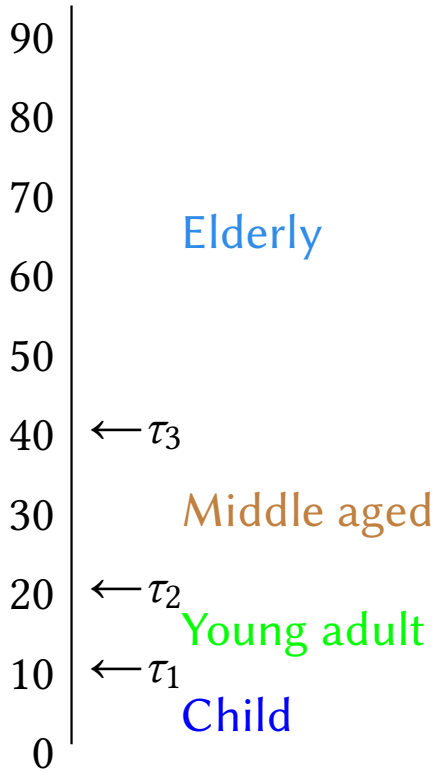
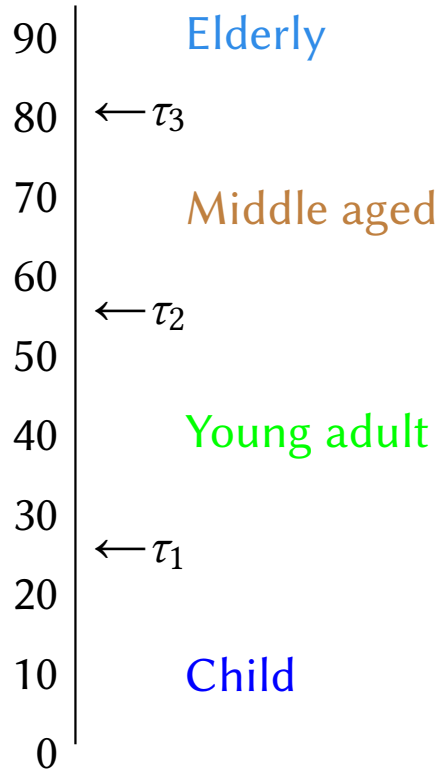
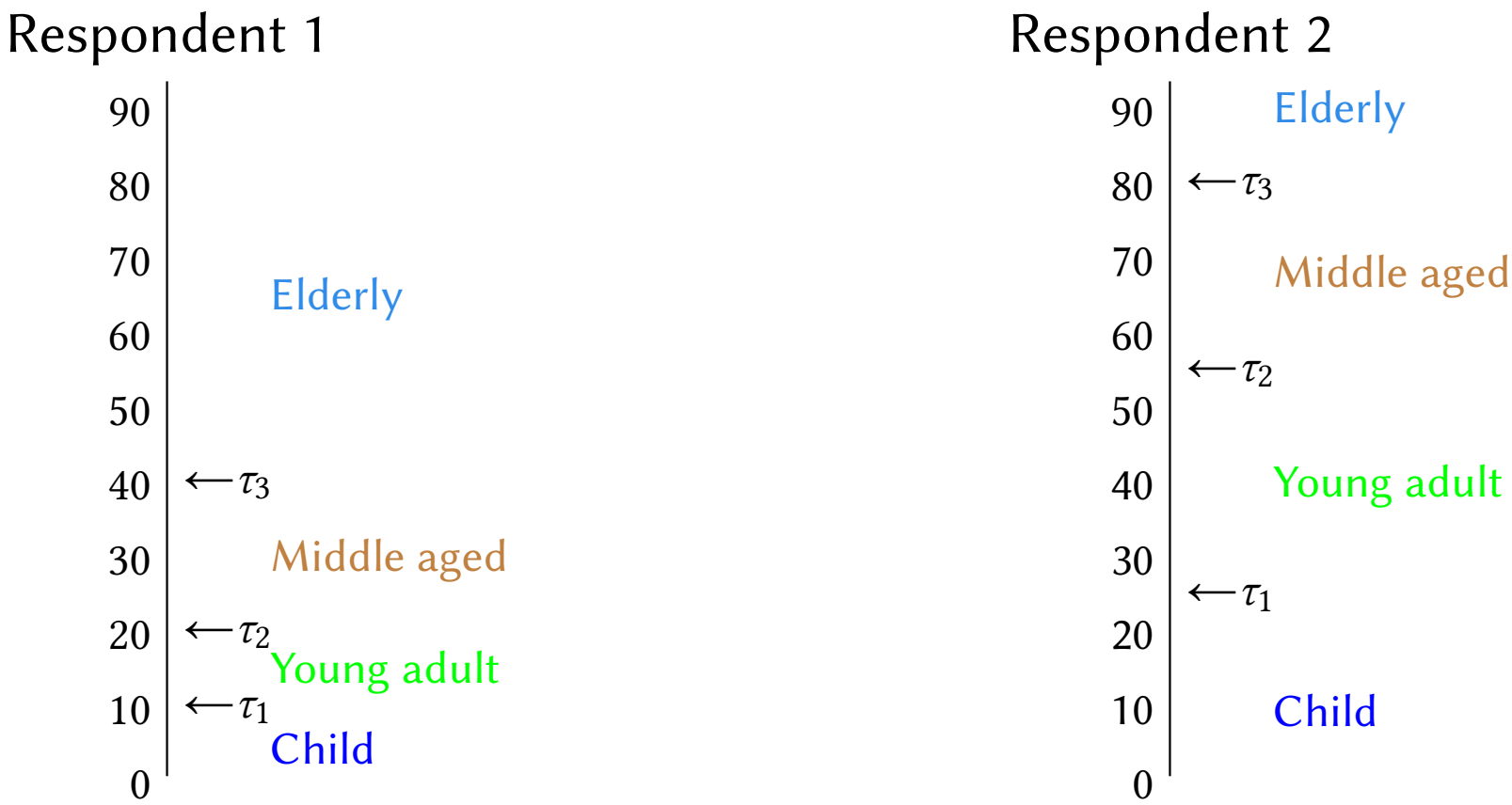


Respondent 2



- If thresholds vary: categorical answers are meaningless

Categorizing Years of Age



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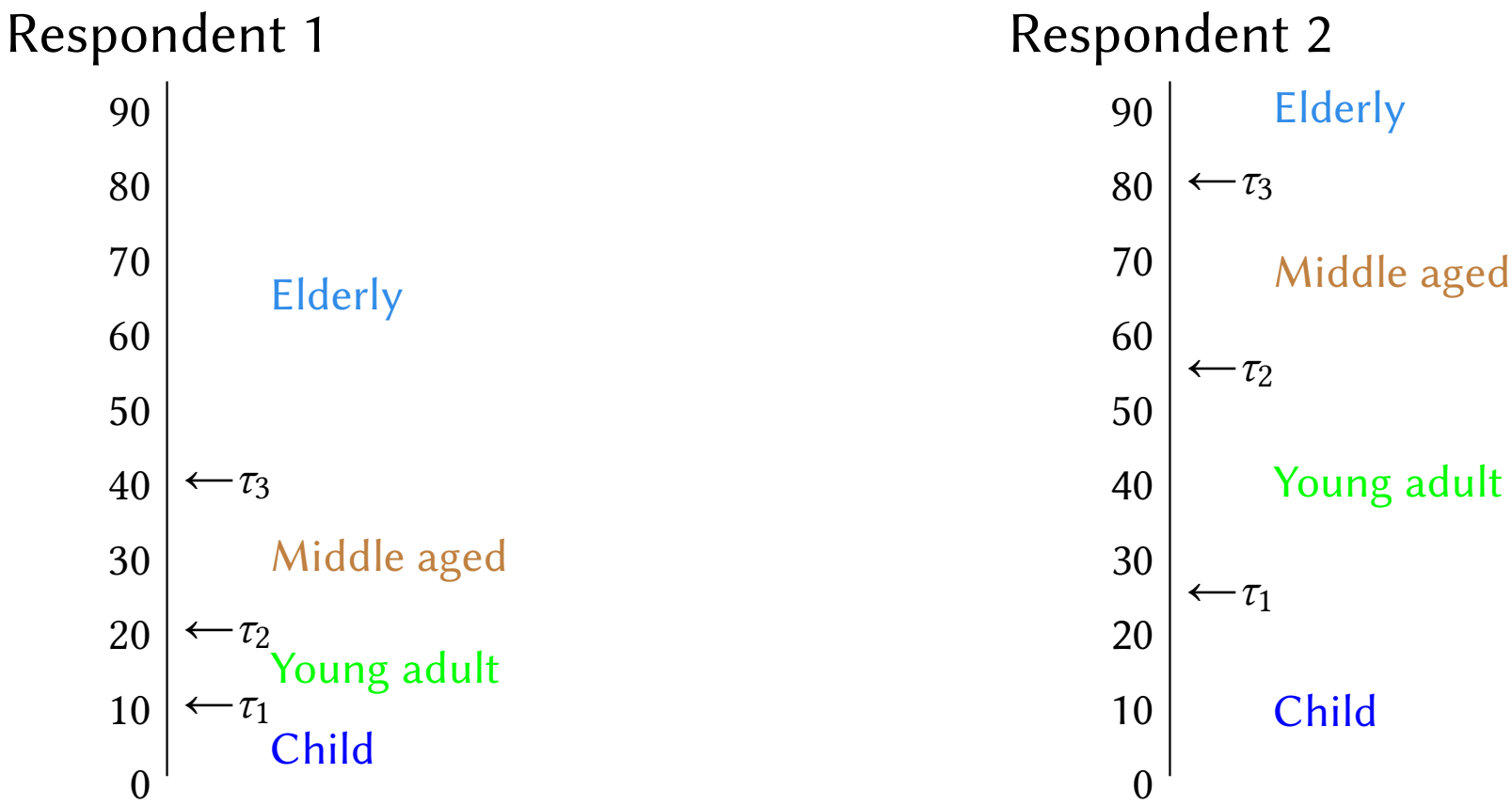
Categorizing Years of Age



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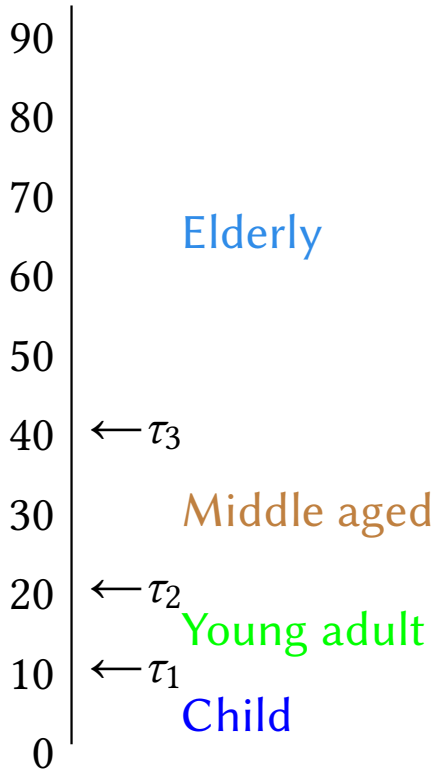
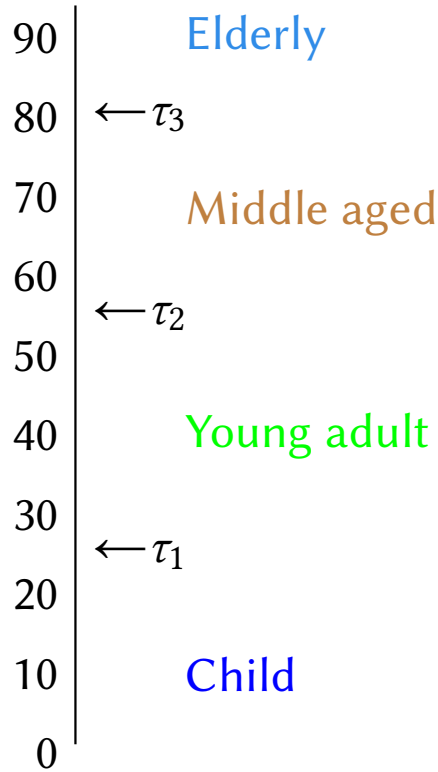
- Quiz: What information would identify the τ_i's?

Categorizing Years of Age

Respondent 1



Respondent 2



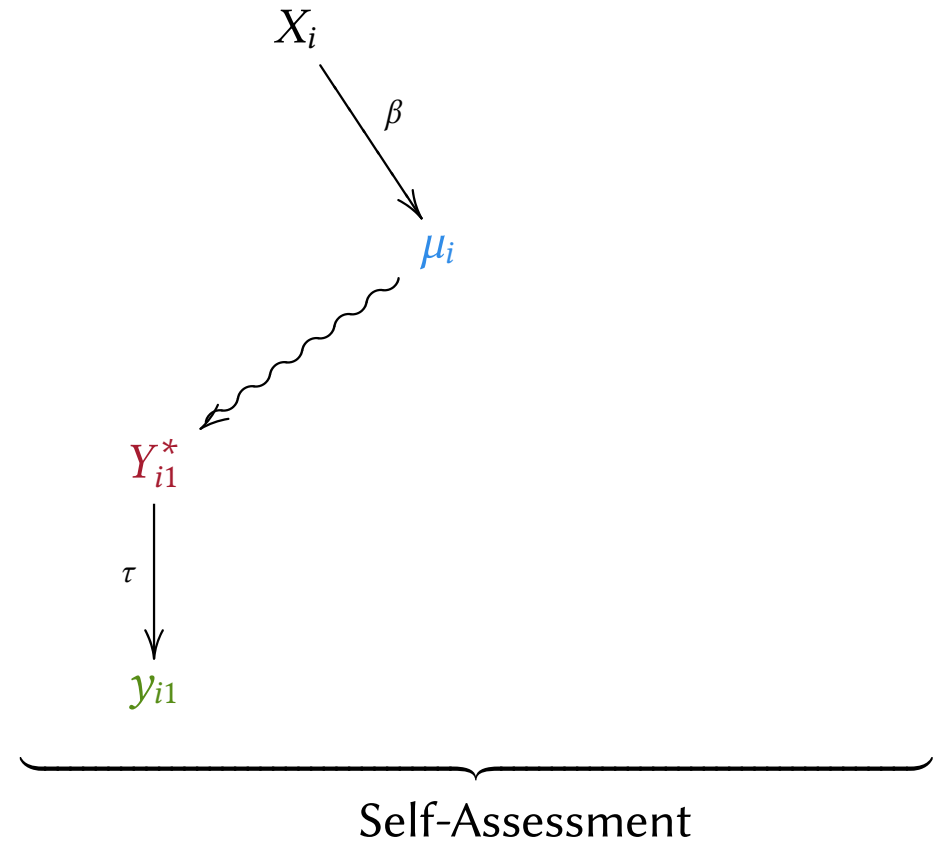
- If thresholds vary: categorical answers are meaningless
- Quiz: In Ordered Logit, can we subscript τ_i by person?
- Quiz: What information would identify the τ_i's?
- A parametric model works by estimating the thresholds

Statistical Model: Visual Summary

Actual:

Perceived:

Reported:



- An ordinal probit model,

Statistical Model: Visual Summary

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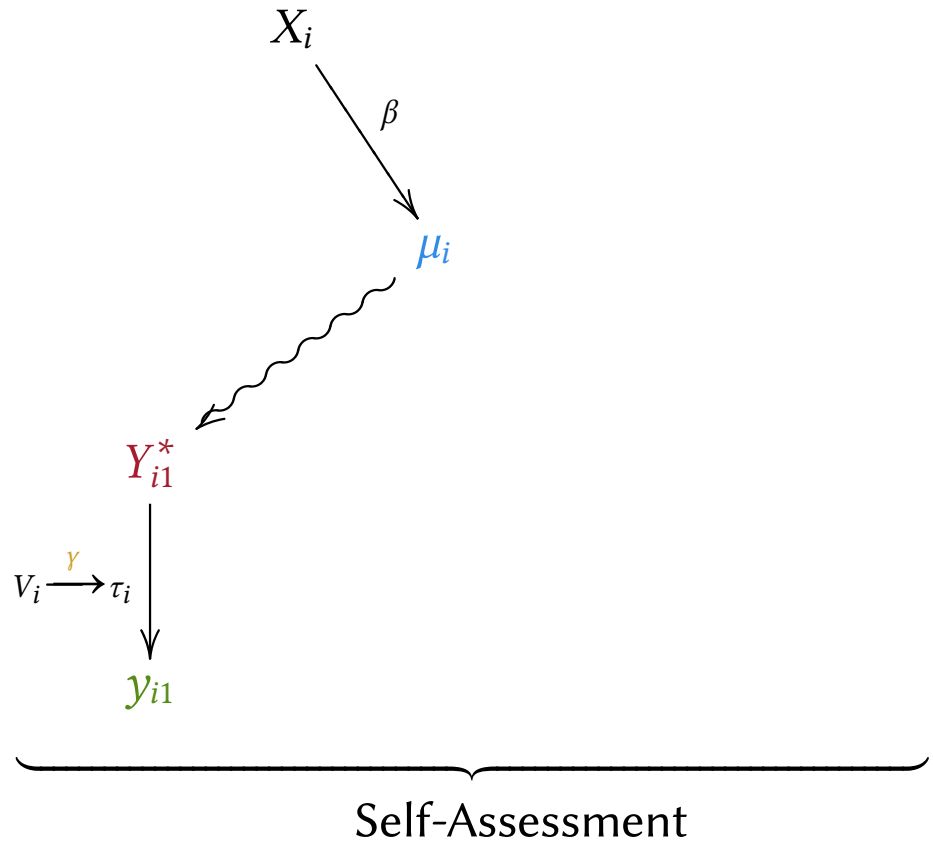
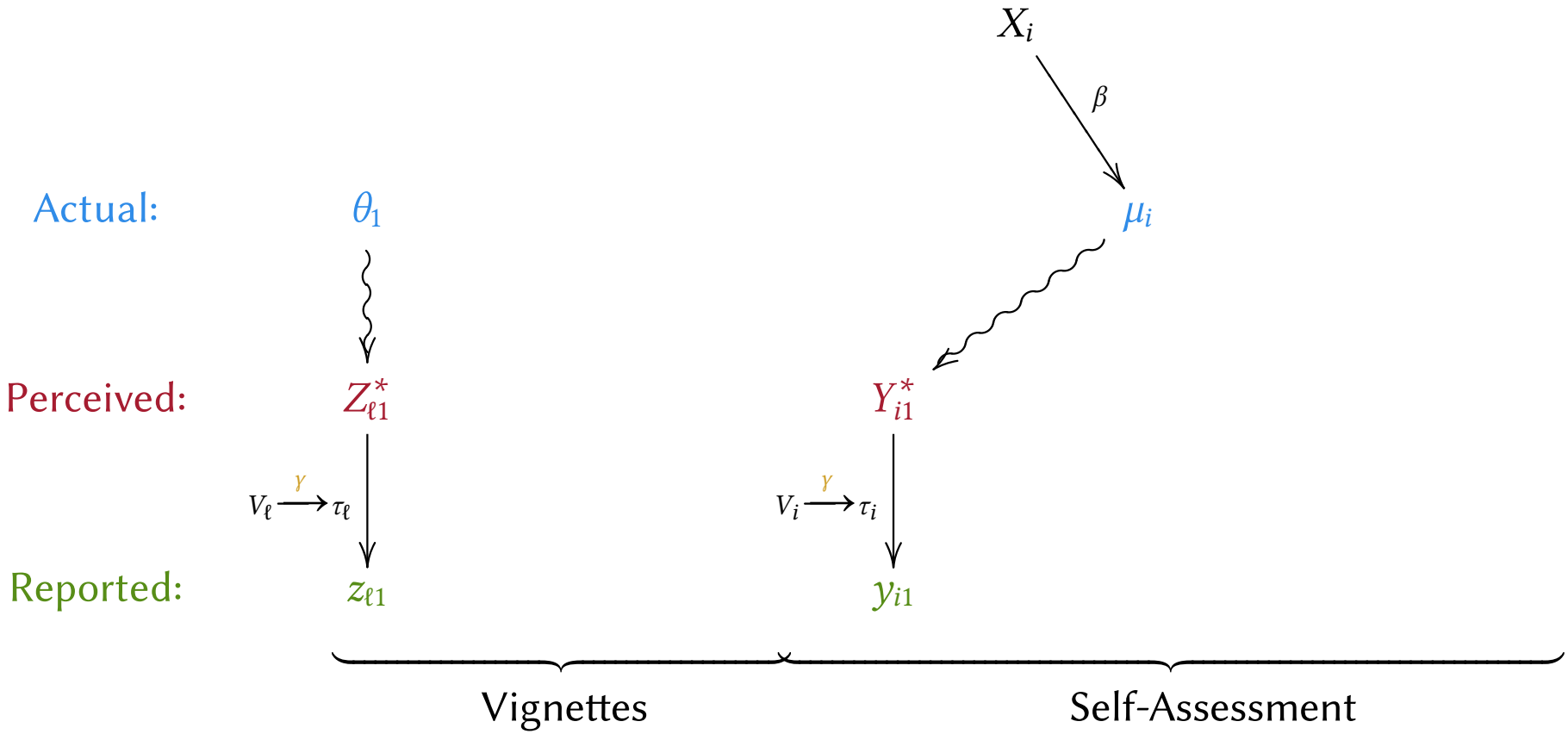


- An ordinal probit model,
- with varying thresholds,

Statistical Model: Visual Summary



- An ordinal probit model,
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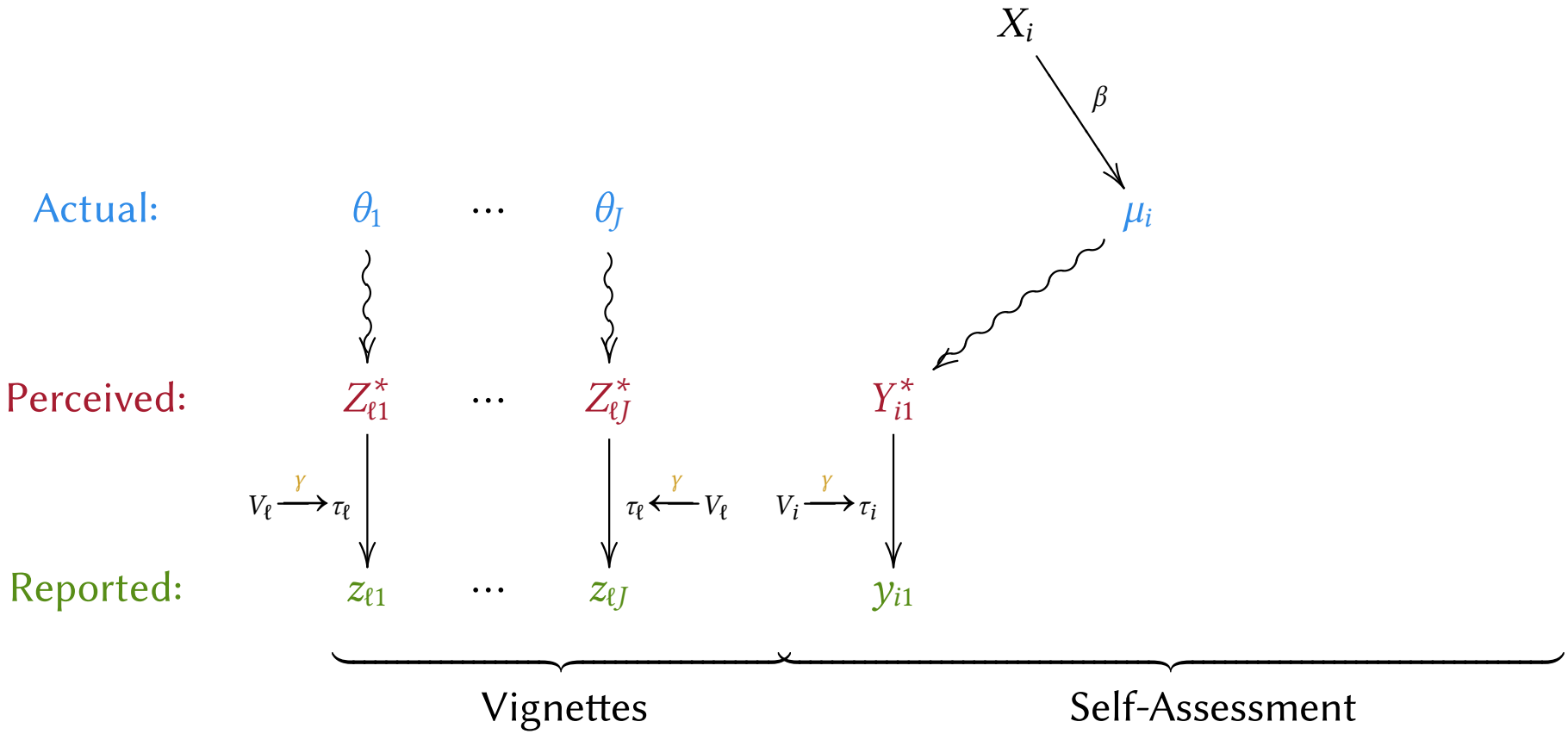
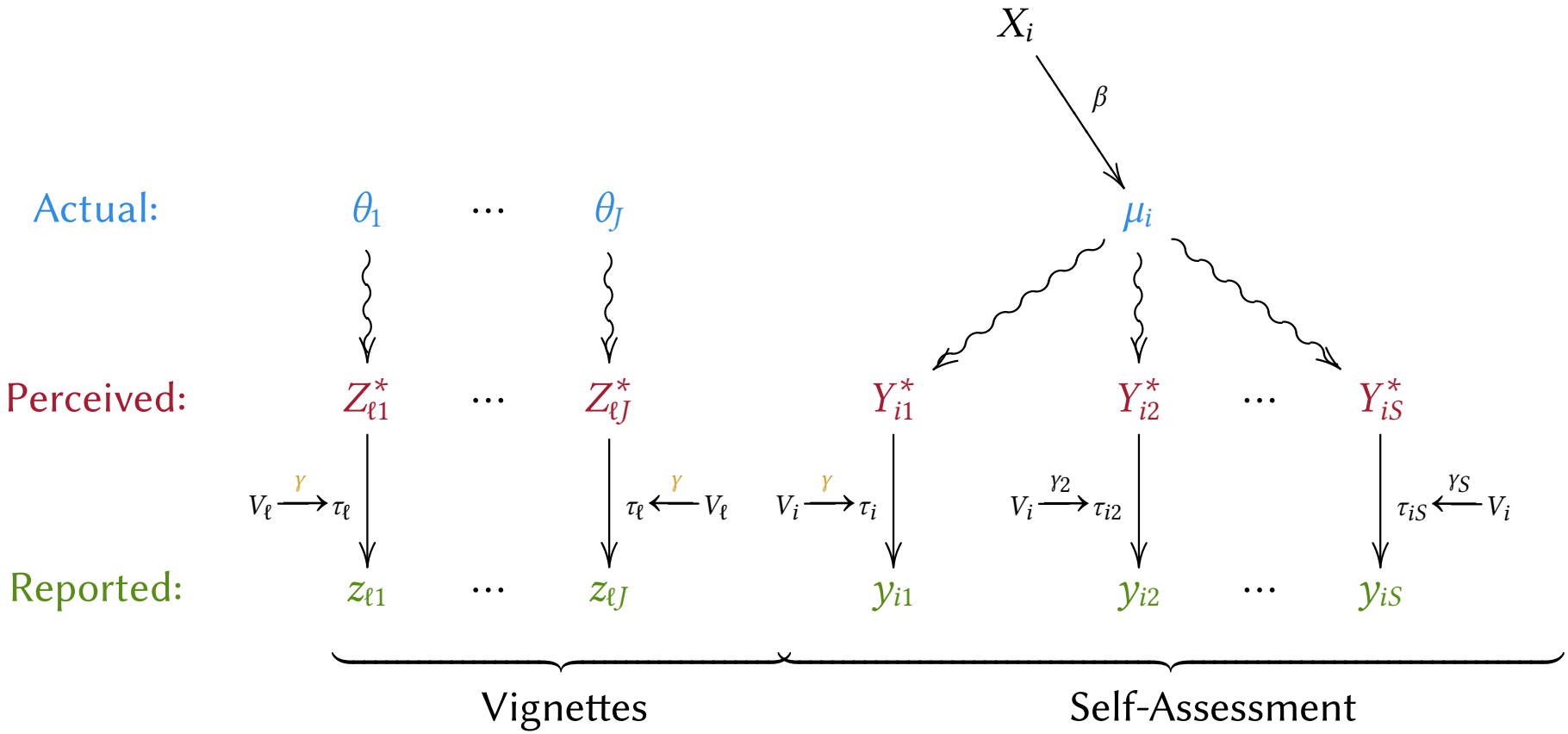
- a vignette for identification (with the same γ),

Statistical Model: Visual Summary



- An ordinal probit model,
- with varying thresholds,
- a vignette for identification (with the same γ),
- more vignettes for better discrimination,

Statistical Model: Visual Summary



- An ordinal probit model,
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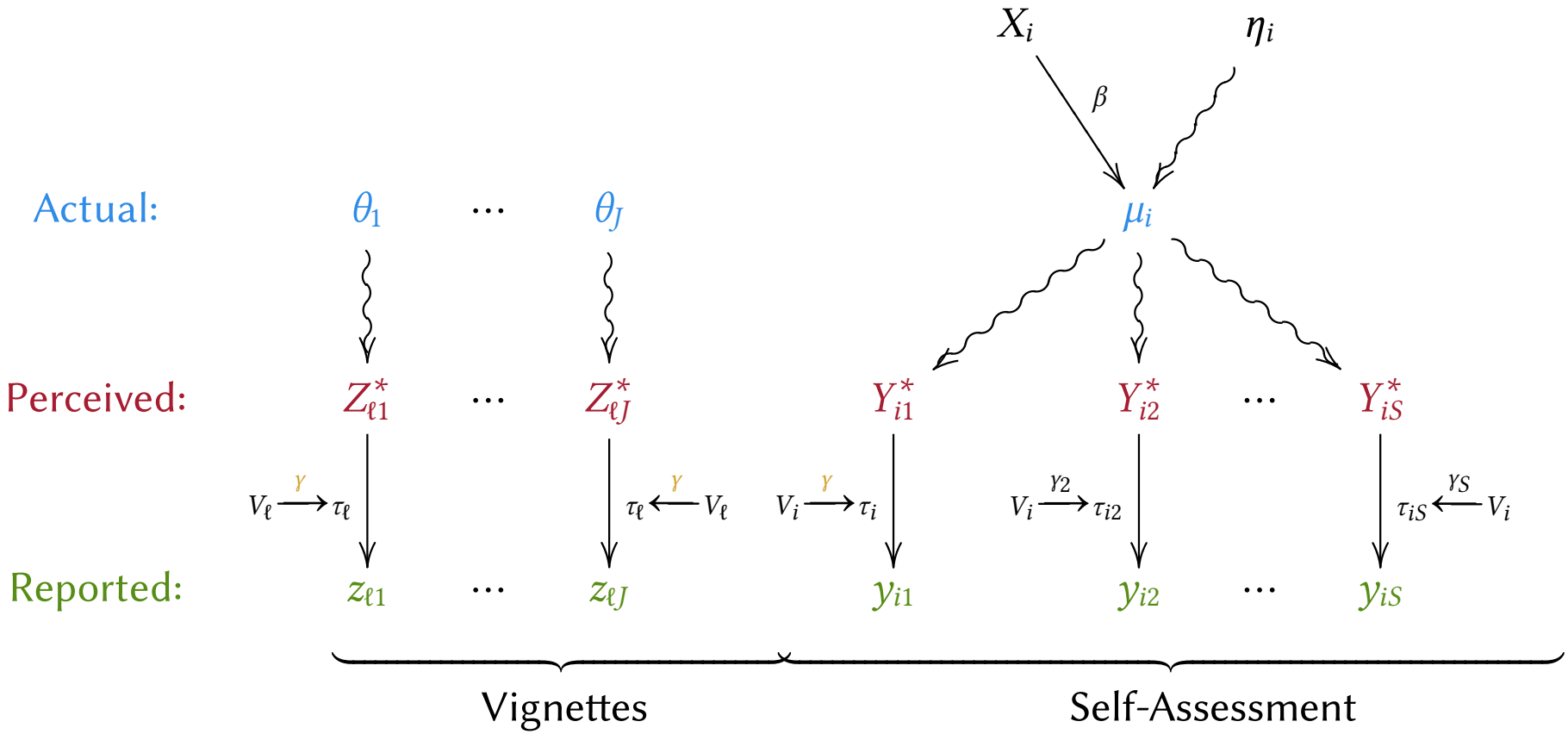
Statistical Model: Visual Summary



- An ordinal probit model,
- with varying thresholds,
- a vignette for identification (with the same γ),
- more vignettes for better discrimination,
- optional multiple self-assessment questions for more efficiency,
- and an optional random effect.

Self-Assessment Model Component ($i = 1, \ldots, n$)

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Vignette Model Component ($\ell = 1, \ldots, N$)

Self-Assessment Model Component ($i = 1, \ldots, n$)

- Actual: $\mu_i = X_i\beta + \eta_i,$ with random effect $\eta_i \sim N(0, \omega^2)$

Vignette Model Component ($\ell = 1, \ldots, N$)

Self-Assessment Model Component ($i = 1, \ldots, n$)

- Actual: $\mu_i = X_i\beta + \eta_i$, with random effect $\eta_i \sim N(0, \omega^2)$
- Perceived: $Y_{i1}^* \sim N(\mu_i, 1) \quad \ldots \quad Y_{iS}^* \sim N(\mu_i, 1)$

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- Reported (observation mechanism):

$$y_{i1} = k \quad \text{if } \tau^{k-1}_{i1} \leq Y^*_{i1} < \tau^k_{i1}$$
$$\vdots$$
$$y_{iS} = k \quad \text{if } \tau^{k-1}_{is} \leq Y^*_{is} < \tau^k_{is}$$

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- where $\tau^1_{is} = \gamma_1 V_i, \quad \tau^k_{is} = \tau^{k-1}_{is} + e^{\gamma_k V_i}, \quad (k = 2, \ldots, K_s)$

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Vignette Model Component ($\ell = 1, \ldots, N$)

- Actual: $\theta_1, \ldots, \theta_J$

Self-Assessment Model Component ($i = 1, \ldots, n$)

- Actual: $\mu_i = X_i\beta + \eta_i$, with random effect $\eta_i \sim N(0, \omega^2)$
- Perceived: $Y_{i1}^* \sim N(\mu_i, 1) \quad \ldots \quad Y_{iS}^* \sim N(\mu_i, 1)$
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$$y_{i1} = k \quad \text{if } \tau_{i1}^{k-1} \leq Y_{i1}^* < \tau_{i1}^k$$
$$\vdots$$
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- where $\tau_{is}^1 = \gamma_1 V_i, \quad \tau_{is}^k = \tau_{is}^{k-1} + e^{\gamma_k} V_i, \quad (k = 2, \ldots, K_s)$

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- where $\tau^1_{\ell s} = \gamma_1 V_\ell, \quad \tau^k_{\ell s} = \tau^{k-1}_{\ell s} + e^{\gamma_k V_\ell} \quad (k = 2, \ldots, K_s)$

Self-Assessments v. Medical Tests

Self-Assessment: In the last 30 days, how much difficulty did [you/name] have in seeing and recognizing a person you know across the road (i.e. from a distance of about 20 meters)?

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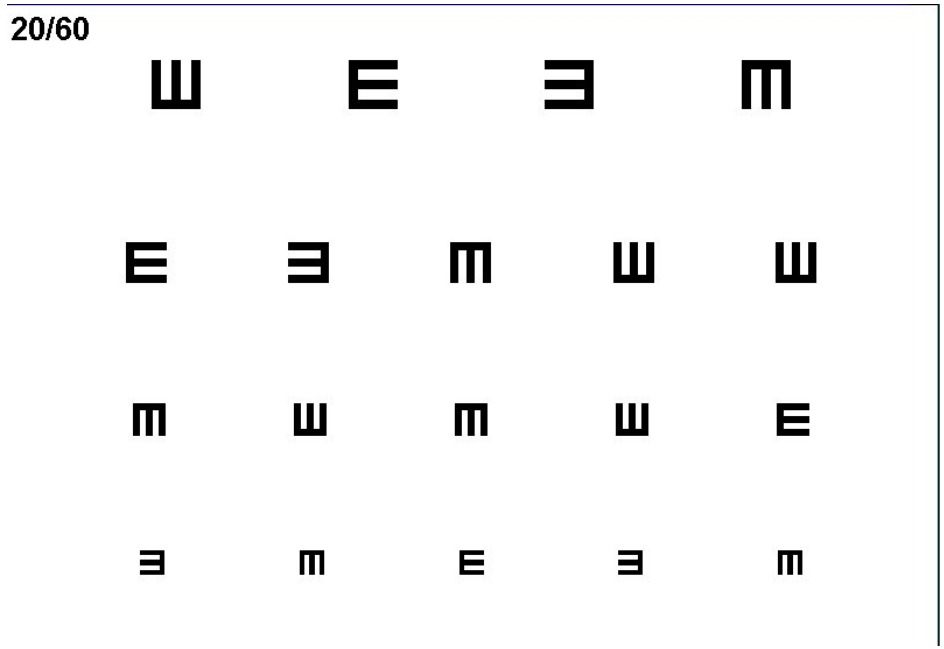
The Snellen Eye Chart Test:



Fixing DIF in Self-Assessments of Visual (Non)acuity

	Snellen Eye Chart		Ordinal Probit		Chopit	
	Mean	(s.e.)	μ	(s.e.)	μ	(s.e.)
Slovakia	8.006	(.272)	.660	(.127)	.286	(.129)
China	10.780	(.148)	.673	(.073)	.749	(.081)
Difference	−2.774	(.452)	−.013	(.053)	−.463	(.053)

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- (Better to calculate QOIs! The articles explain how.)

Fixing DIF in China and Mexico

Fixing DIF in China and Mexico

		Ordinal Probit		Chopit	
Eqn.	Variable	Coeff.	(s.e.)	Coeff.	(s.e.)
μ	China	.670	(.081)	−.362	(.090)
	age	.004	(.003)	.006	(.003)
	male	.087	(.076)	.113	(.081)
	education	.020	(.008)	.019	(.008)
Vignettes	θ_1			1.393	(.190)
	θ_2			1.304	(.190)
	θ_3			.953	(.189)
	θ_4			.902	(.188)
	θ_5			.729	(.188)
	$\ln \sigma$			−.238	(.042)

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- Ordered Probit: Chinese people have *more* political efficacy than Mexicans

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	θ_5			.729	(.188)
	$\ln \sigma$			−.238	(.042)

- Ordered Probit: Chinese people have *more* political efficacy than Mexicans
- Chopit: Chinese people have *less* political efficacy than Mexicans

DIF as Threshold Variation: Mexico v. China

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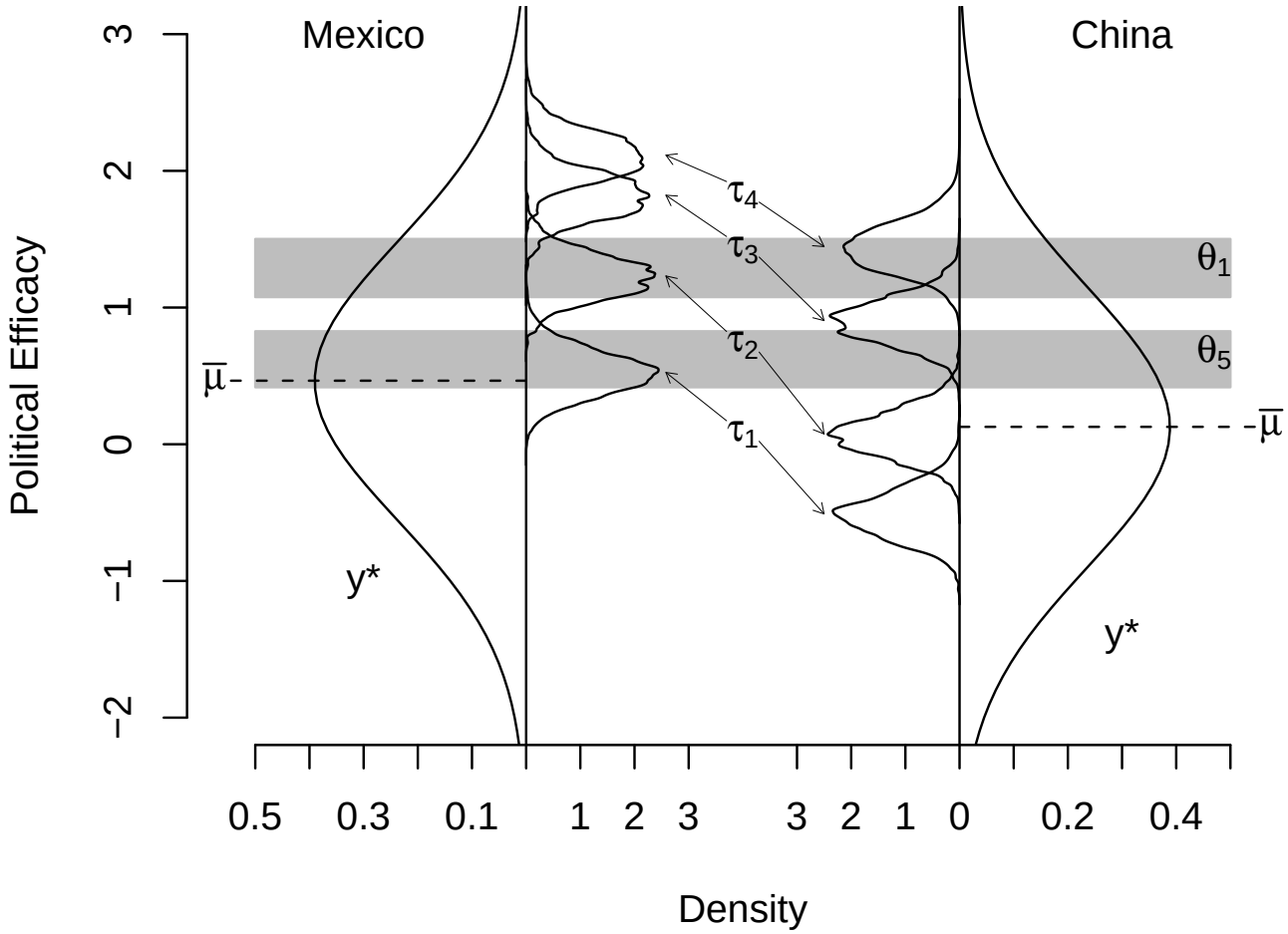

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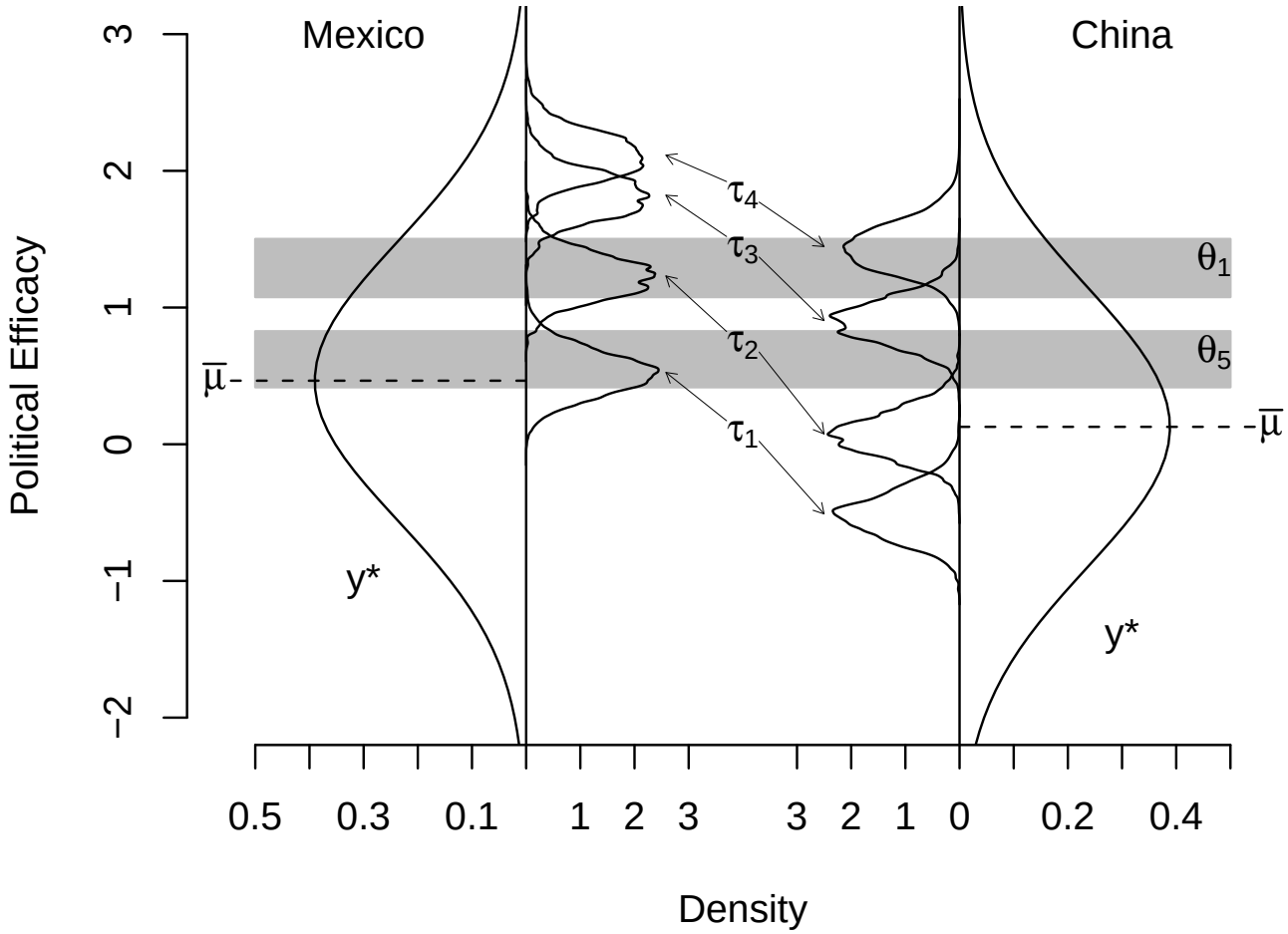

- Self-assessments: Actual (mean), μ; Perceived y^*

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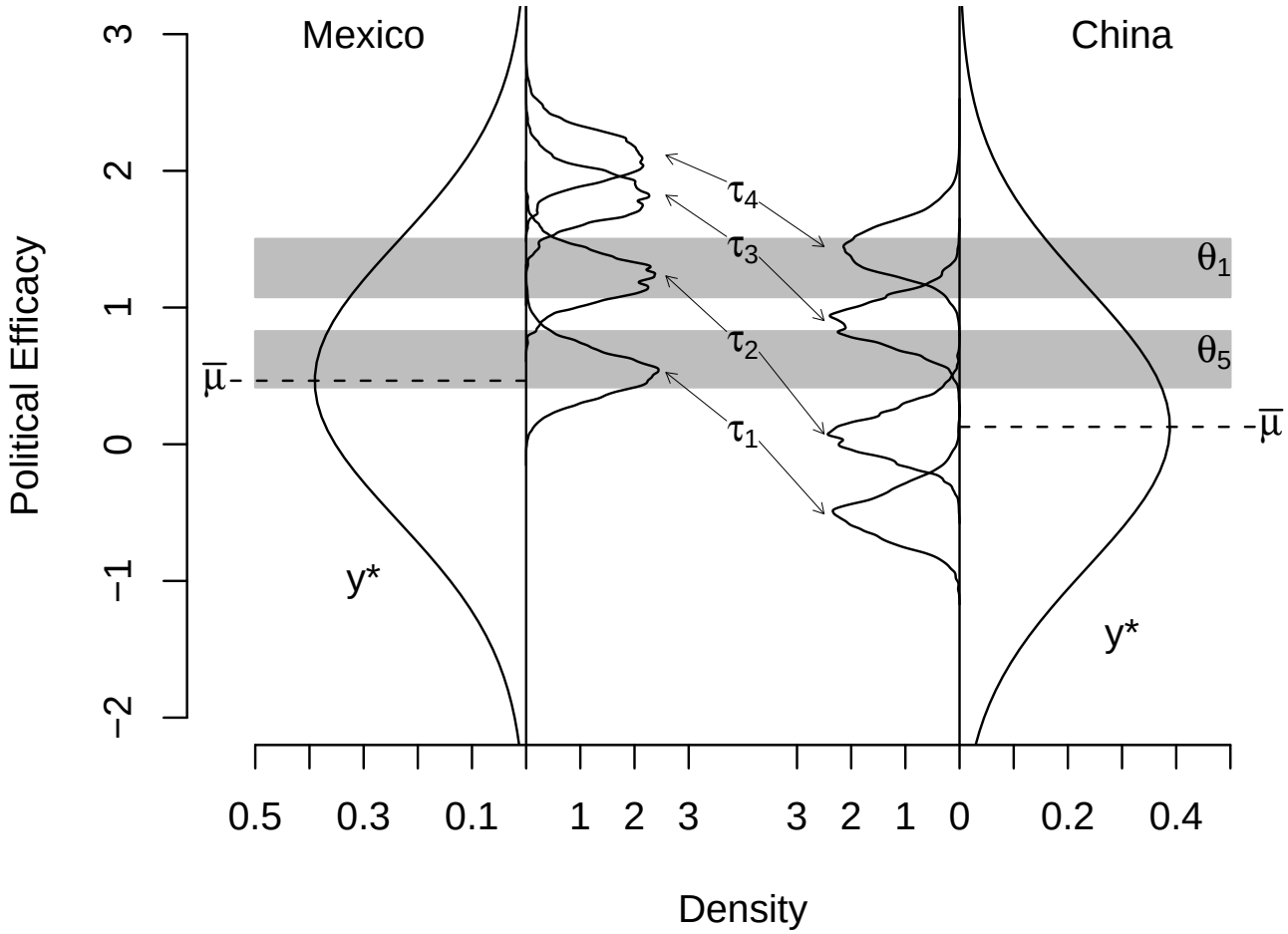

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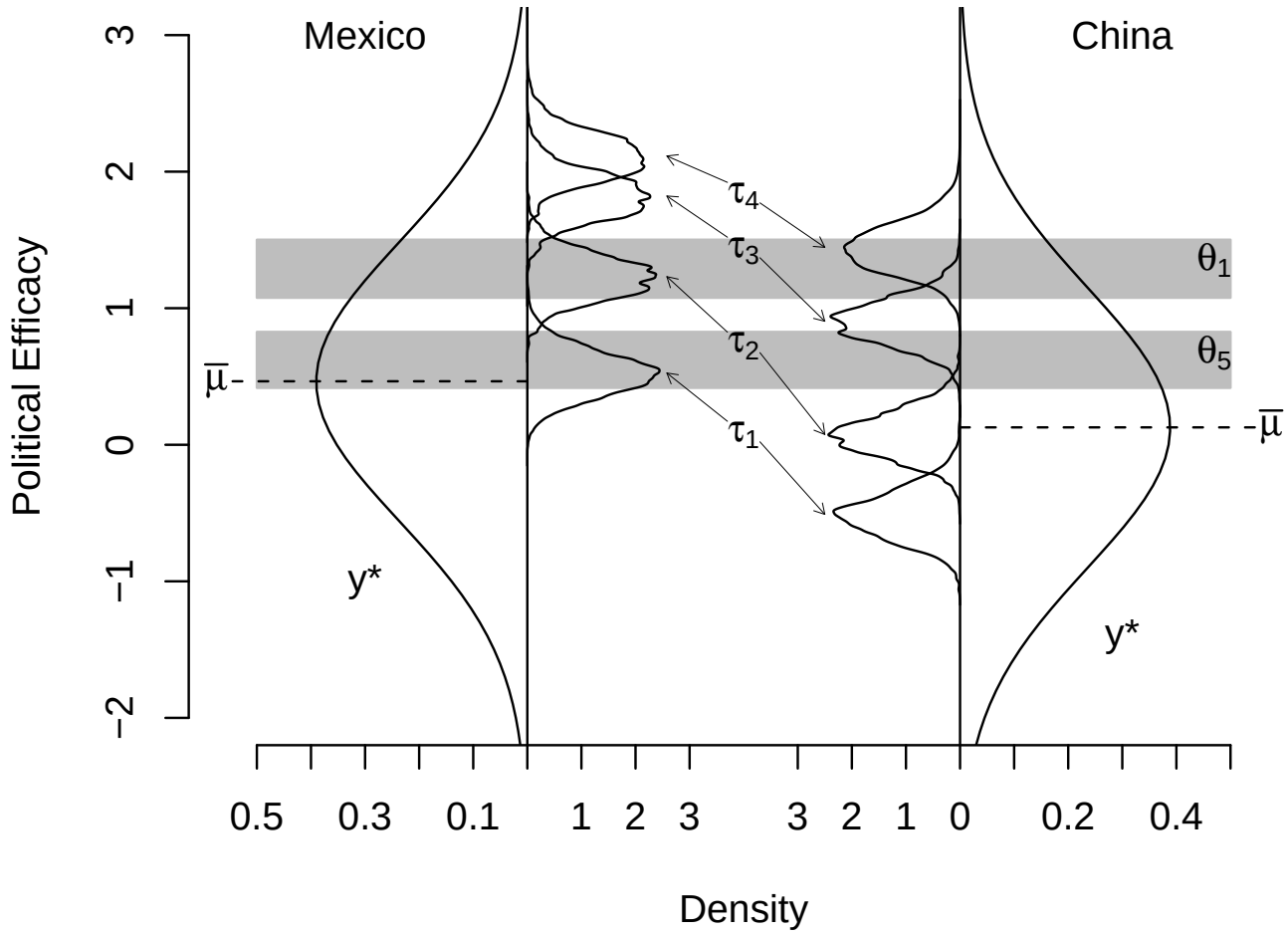

- Self-assessments: Actual (mean), μ; Perceived y^*
- Vignette Assessments: θ_1, θ_2
- Thresholds: Chinese have lower standards for satisfying τ_j

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