

Mixture Modeling with Latent Gold

W. Justin Dyer, Ph.D.

School of Family Life

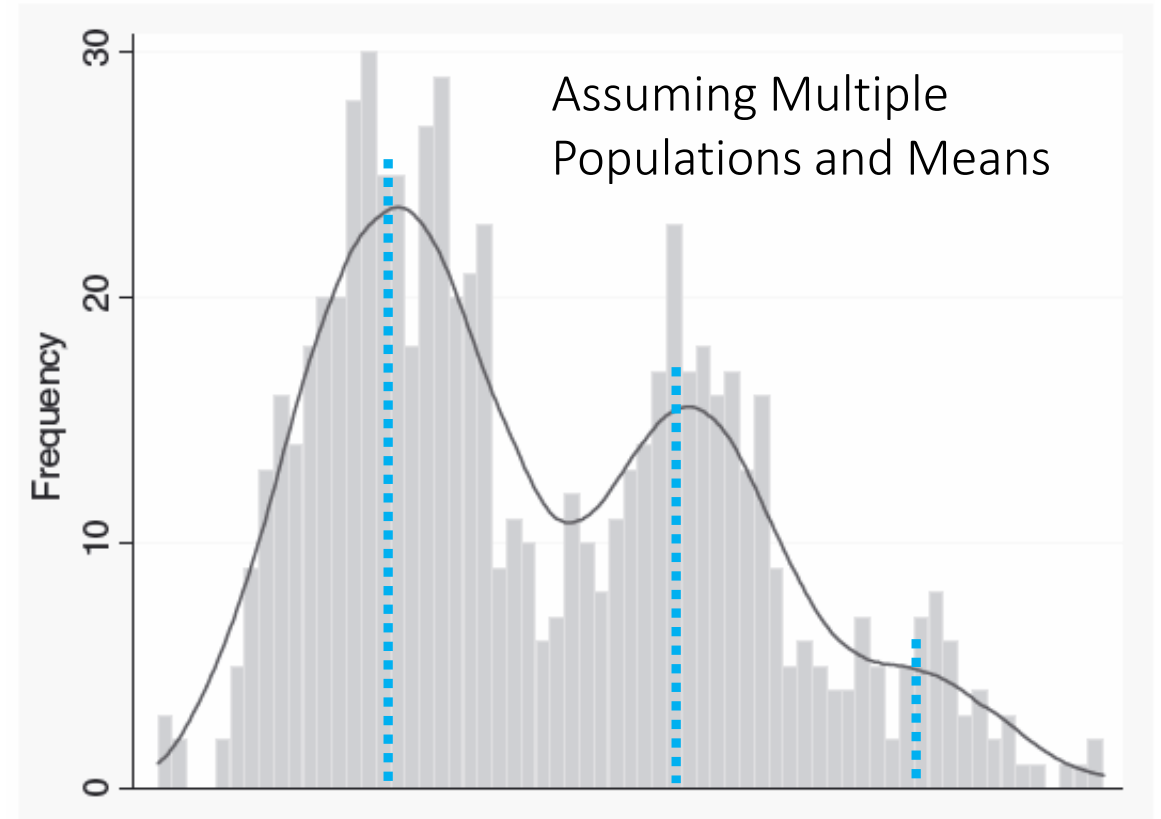
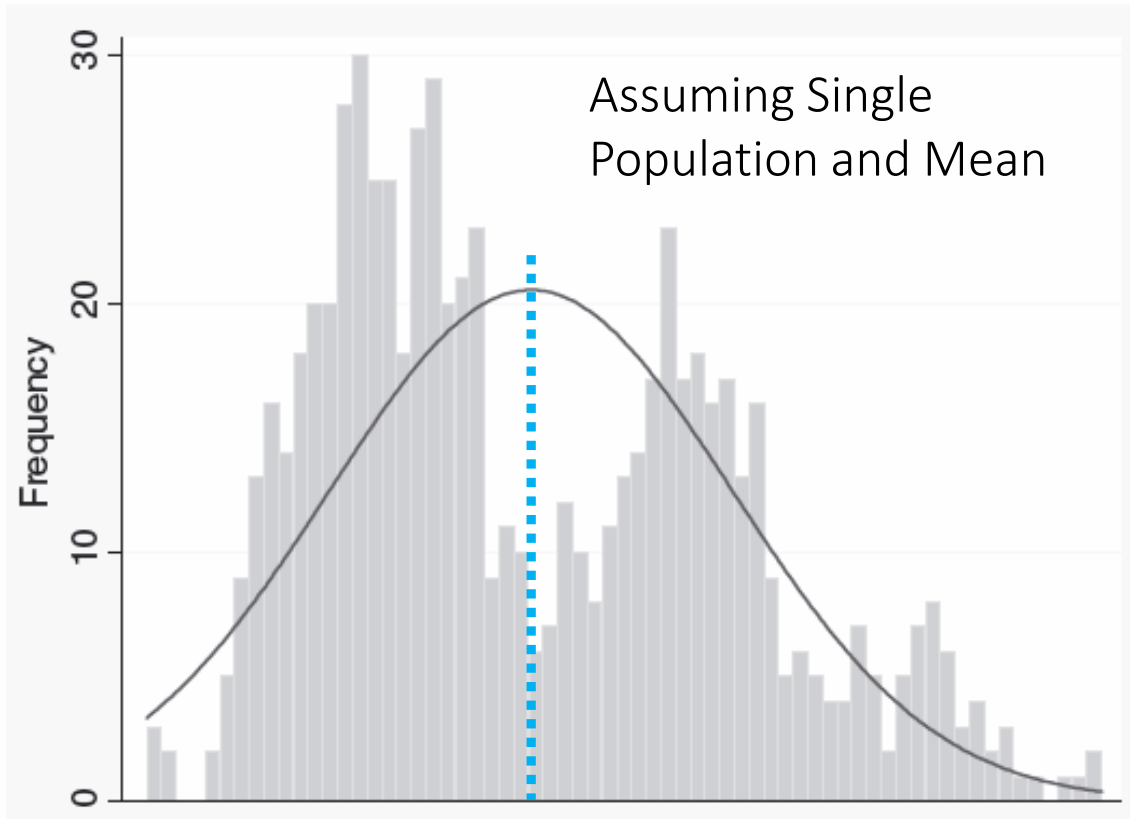
What is a Mixture Model?

- Mixture modeling is a method used to group individuals based on a particular characteristic or set of characteristics.
- Statistically, these characteristics are the estimated parameters for any model.
 - Means
 - Variances
 - Regression parameters
 - Factor loadings
- With current advances in mixture modeling, just about any model you can think of can be made a mixture model.

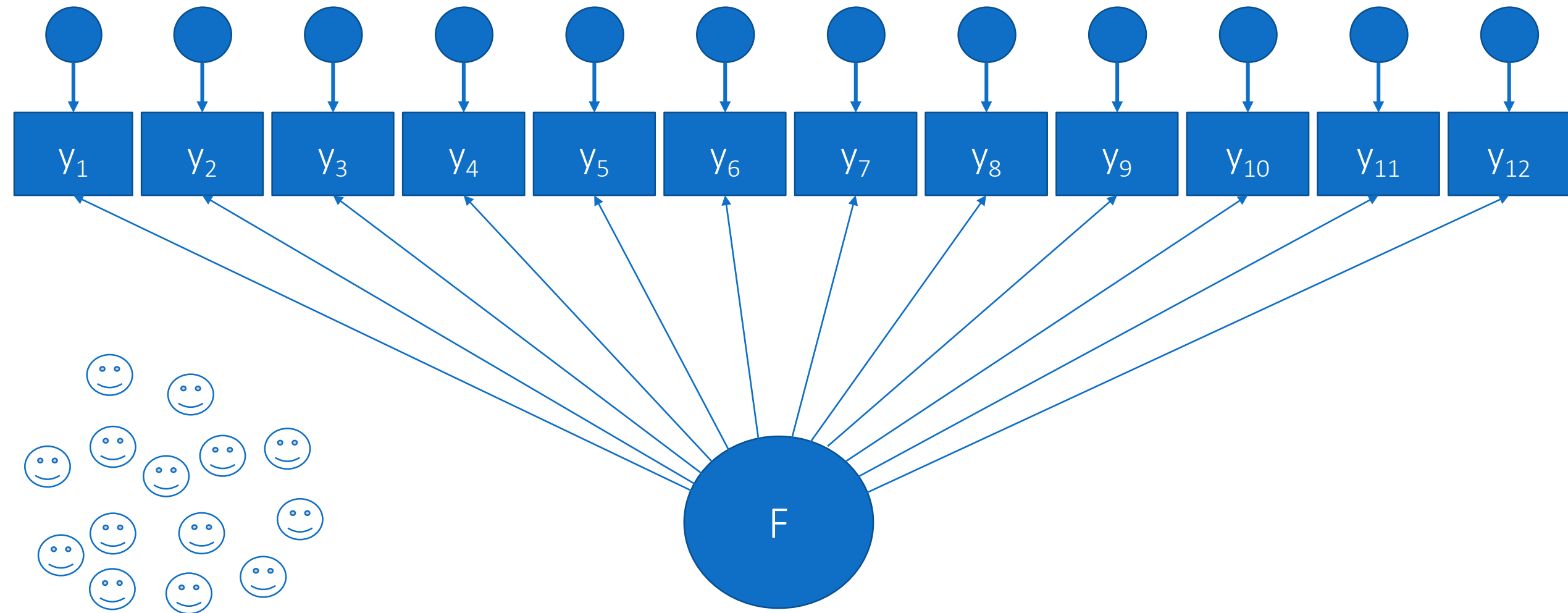
When an Overall Mean Doesn't Make Sense

The mean (or average) can often be misleading.

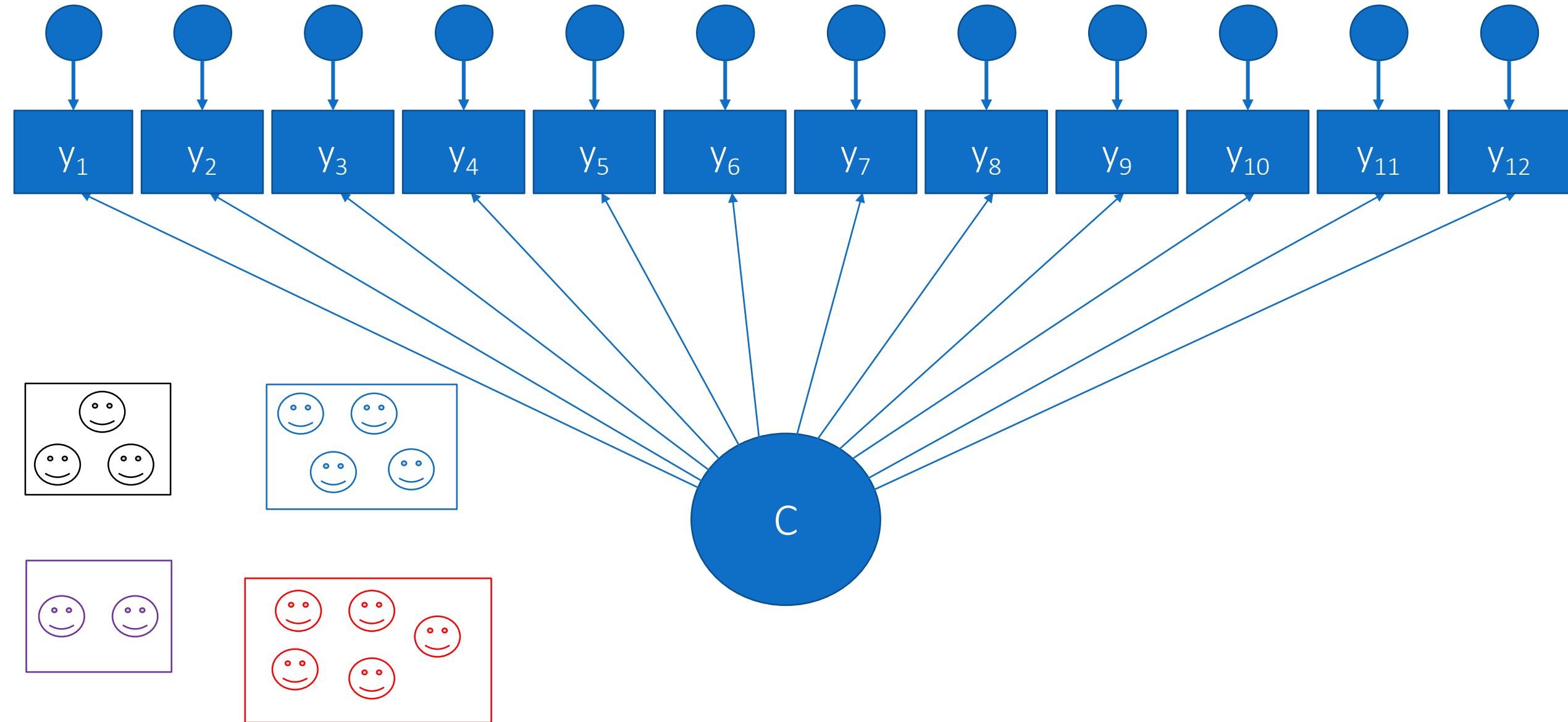
Is there a single “population” with a single mean or are there multiple populations each with their own mean?



Continuous Factor



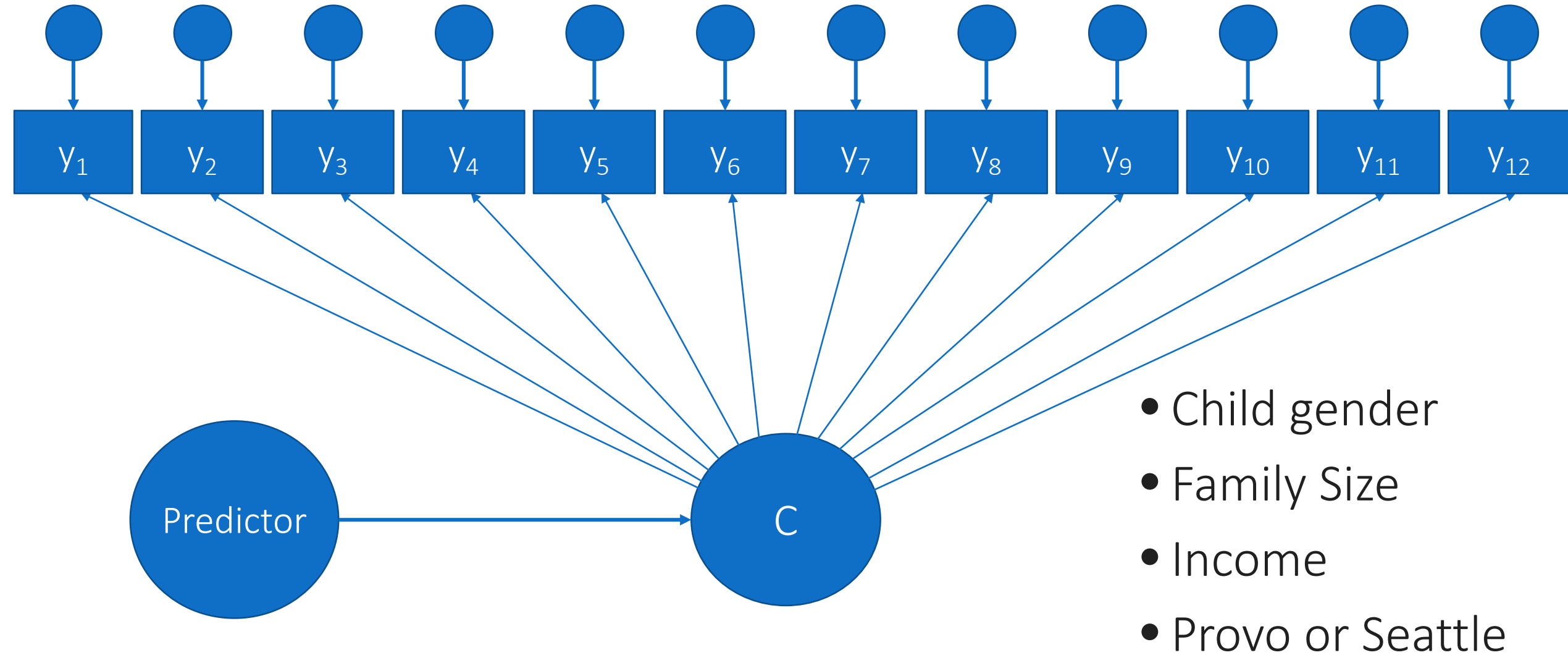
Unordered Categorical Factor (Latent Class)



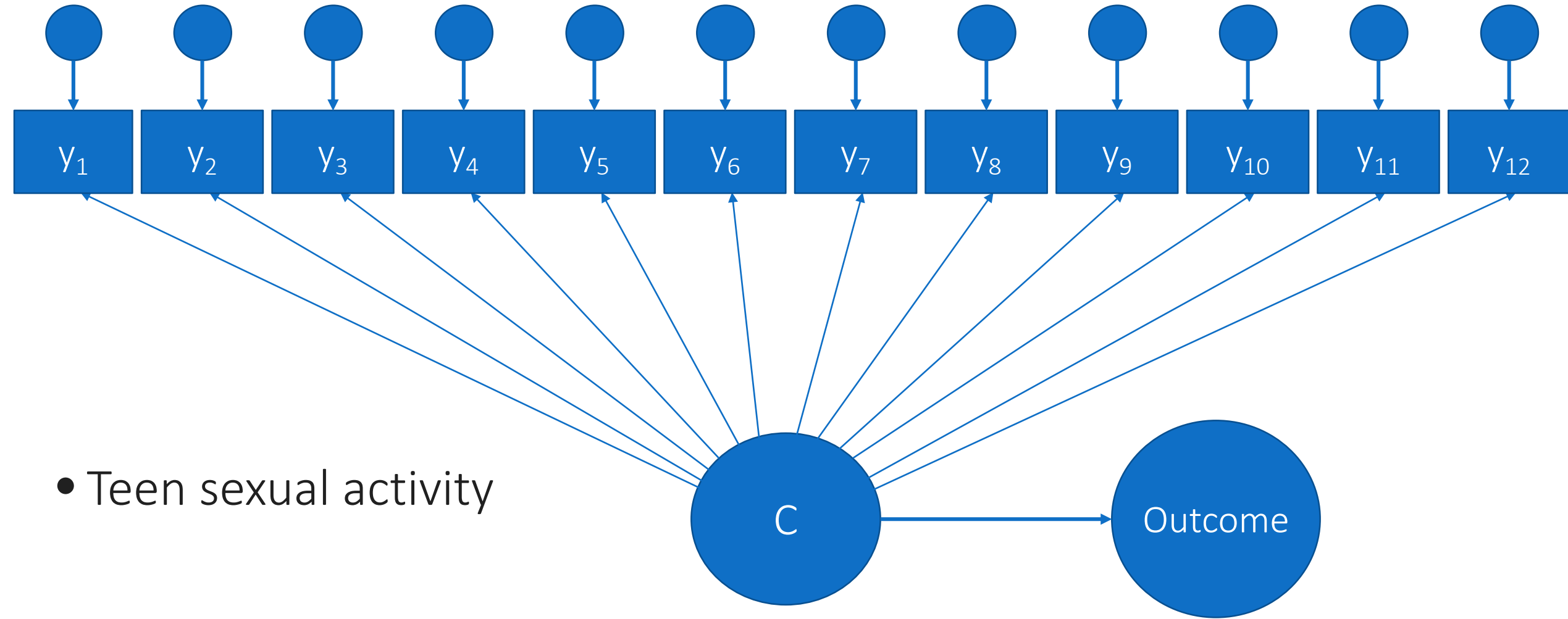
Latent Class/Profile Analysis

- Are there different “Profiles” or “Classes” of mother and father parenting styles?
- Parenting Style Dimensions
 - Authoritative
 - *Warmth and Support*
 - *Reasoning/Induction*
 - *Democratic participation*
 - Authoritarian
 - *Physical Coercion*
 - *Verbal hostility*
 - *Non-reasoning / Punitive*

Predictor Variables



Predictor Variables



Mixture Regression

- Are there groups which differ in their regression parameters?

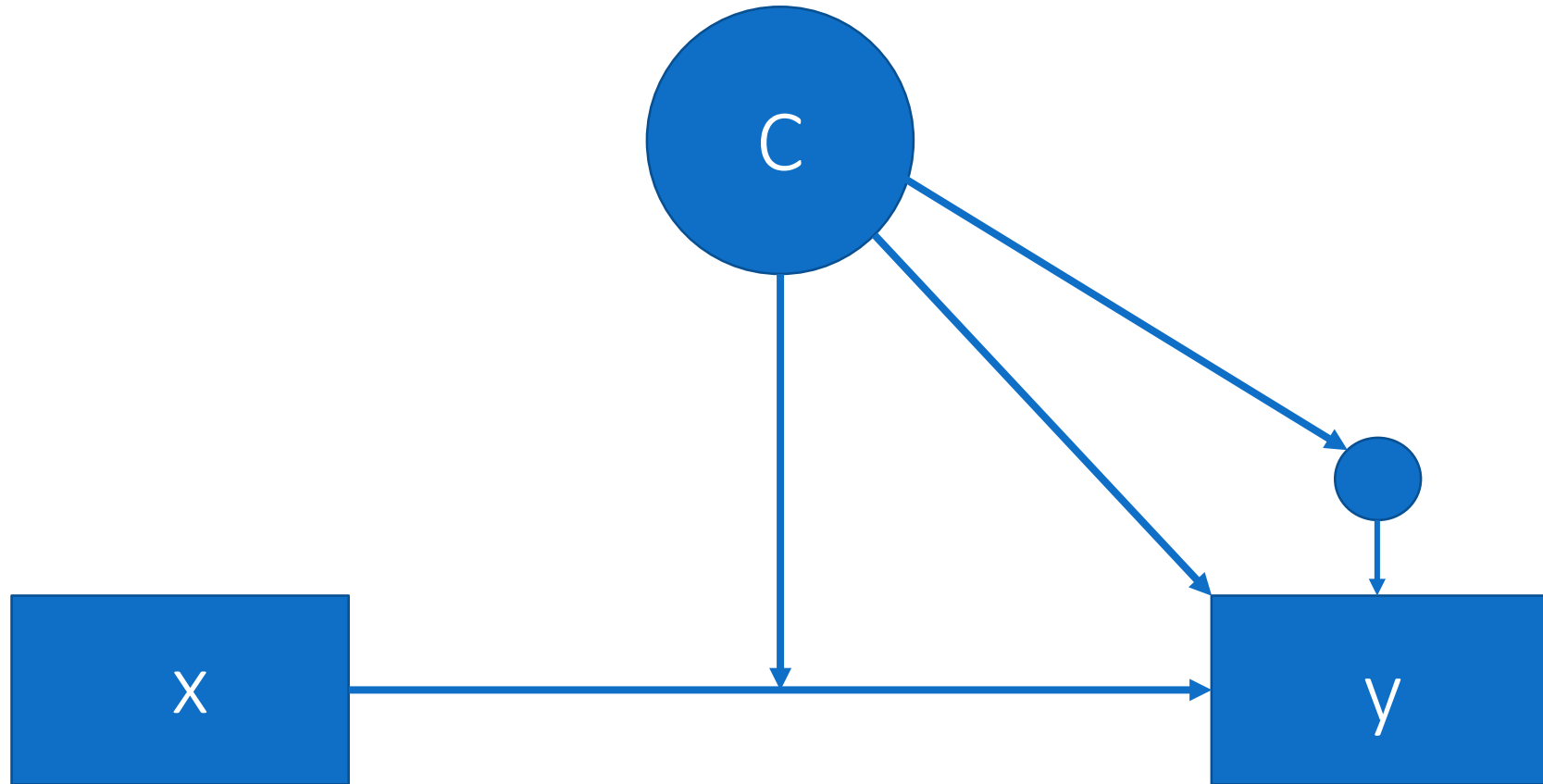
Table 1. *Four-Class Mixture Regression Results: Child Aggression at Wave 4 (N = 214)*

Parameter	Class 1			Class 2			Class 3			Class 4		
	<i>b</i>	<i>SE</i>	β	<i>b</i>	<i>SE</i>	β	<i>b</i>	<i>SE</i>	β	<i>b</i>	<i>SE</i>	β
Intercept	0.20	0.01*		-0.12	0.09		-1.29	0.11***		1.49	0.08***	
Incarceration	0.00	0.10	.01	0.52	0.10***	.45	0.62	0.10***	.79	-1.08	0.09***	-.94
Propensity	-1.30	0.36***	.62	1.34	0.32***	.51	2.38	0.45***	.74	0.29	0.28	.48
Aggression at W3	0.87	0.09***	-.24	0.56	0.09***	.35	0.61	0.09***	.66	0.56	0.09***	.09
R^2		.44			.70			.88			.94	
% of sample		62.31			22.82			7.90			6.97	

Note: Coefficients are unstandardized. W3 = Wave 3.

* $p < .05$. *** $p < .001$.

Mixture Regression



- Example:
 - RQ: Are there some kids who benefit more from father involvement than others?

Why Latent Gold?

- Compare *any* two nested models with an bootstrap ll-diff test.
 - *Mplus only lets you compare a model with the same model with one fewer classes.*
- Nice point-and-click interface (can generate syntax from)
- Fit multiple models
- Organized output
- Handles multilevel and complex survey data
- Handles numerous distributions
- Can specify nominal independent variables
- When you can't get Mplus to work
- Easy to include interactions (Stata style)