Latent Class Measurement Model

- LCA model with *r* observed binary items, *u*, has a categorical latent variable *c* with *K* classes (*c = k; k = 1, 2,…, K*). The marginal item probability for item an $u_j = 1$,

$$P\left(u_j = 1\right) = \sum_{k=1}^{K} P(c = k) P(u_j = 1 \mid c = k)$$

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LCA: Two sets of parameters

$$P\left(u_j = 1\right) = \sum_{k=1}^{K} P(c = k) P(u_j = 1 \mid c = k)$$

STRUCTURAL: Population proportion of each class.

This is the relative class size: How big each class is.
E.g., class 1 is 45% of the population

MEASUREMENT: Conditional item probabilities

These are the parameters that define classes. Think of these like the factor loading, as they are how the items relate to the latent variable

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Latent Class Measurement Model

- Assuming **conditional independence**, the joint probability of all the *r* observed items is

$$P\left(u_1, u_2, \ldots, u_r\right) = \sum_{k=1}^{K} P(c=k) P(u_1 \mid c=k) P(u_2 \mid c=k) \ldots . P(u_r \mid c=k)$$

This is the *default* in Mplus! What does this assumption mean? Is it necessary for the model to be identified? When, if ever, would we relax this assumption?

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