Multilevel Modeling with Continuous and Categorical Latent Variables

- **Multilevel Regression**
- **Multilevel CFA, SEM**
  Multilevel Growth Modeling
- **Multilevel discrete-time survival analysis**

- **Multilevel regression mixture analysis (CACE)**
- **Multilevel latent class analysis**
- **Multilevel growth mixture modeling**

EXAMPLE 10.1: TWO-LEVEL MIXTURE REGRESSION FOR A CONTINUOUS DEPENDENT VARIABLE

```
TITLE:      this is an example of a two-level mixture
            regression for a continuous dependent
            variable
DATA:       FILE IS ex10.1.dat;
VARIABLE:   NAMES ARE y x1 x2 w c clus;
            USEVARIABLES = y x1 x2 w;
            CLASSES = c (2);
            WITHIN = x1 x2;
            BETWEEN = w;
            CLUSTER = clus;
ANALYSIS:   TYPE = TWOLEVEL MIXTURE;
            STARTS = 0;
MODEL:
            %WITHIN%
            %OVERALL%
            y ON x1 x2;
            c#1 ON x1;
            %c#1%
            y ON x2;
            y;
            %BETWEEN%
            %OVERALL%
            y ON w;
            c#1 ON w;
            c#1*1;
            %c#1%
            [y*2];
OUTPUT:     TECH1 TECH8;
```
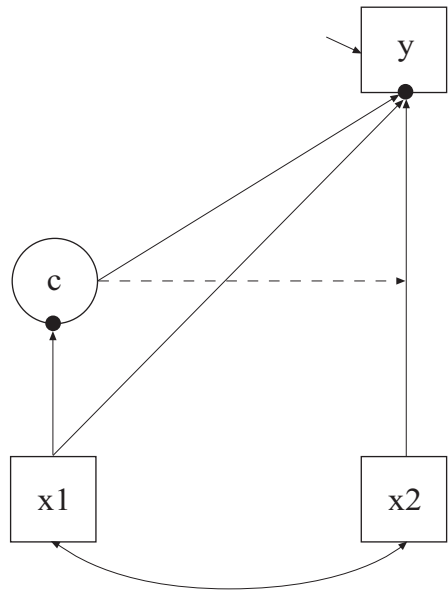
Within
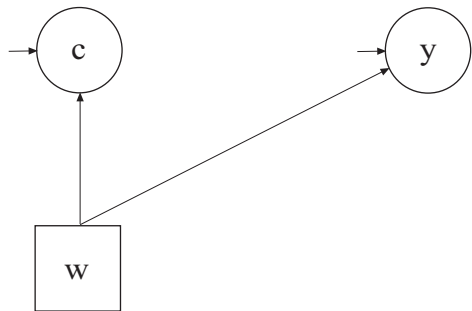
Between

EXAMPLE 10.2: TWO-LEVEL CFA MIXTURE MODEL WITH CONTINUOUS FACTOR INDICATORS

```
TITLE:     this is an example of a two-level CFA
           mixture model with continuous factor
           indicators
DATA:      FILE IS ex10.2.dat;
VARIABLE:  NAMES ARE y1-y5 c clus;
           USEVARIABLES = y1-y5;
           CLASSES = c (2);
           CLUSTER = clus;
ANALYSIS:  TYPE = TWOLEVEL MIXTURE;
           STARTS = 0;
MODEL:
           %WITHIN%
           %OVERALL%
           fw BY y1
           y2 (1)
           y3 (2)
           y4 (3)
           y5 (4);
           %BETWEEN%
           %OVERALL%
           fb BY y1
           y2 (1)
           y3 (2)
           y4 (3)
           y5 (4);
           c#1*1;
           %c#1%
           [fb*2];
OUTPUT:    TECH1 TECH8;
```
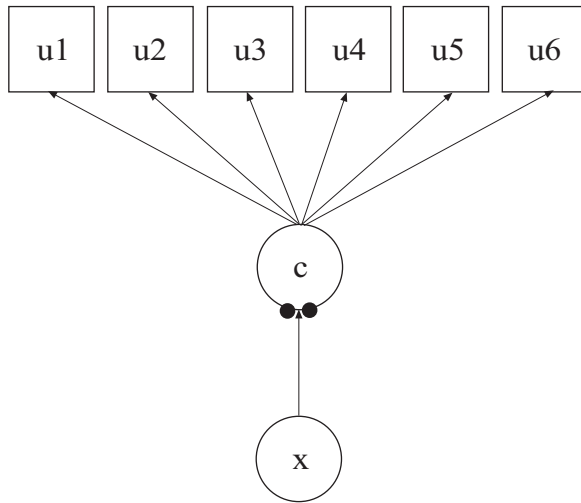
Within
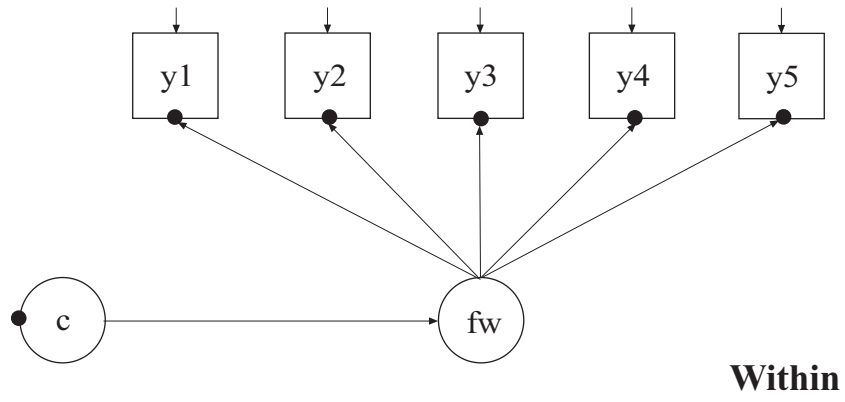
Between
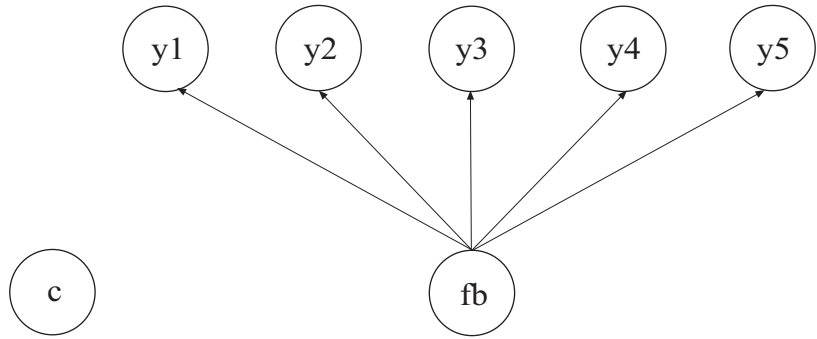
EXAMPLE 10.3: TWO-LEVEL LCA WITH CATEGORICAL LATENT CLASS INDICATORS WITH COVARIATES

```
TITLE:      this is an example of a two-level LCA with
            categorical latent class indicators with
            covariates
DATA:       FILE IS ex10.3.dat;
VARIABLE:   NAMES ARE u1-u6 x w c clus;
            USEVARIABLES = u1-u6 x w;
            CATEGORICAL = u1-u6;
            CLASSES = c (3);
            WITHIN = x;
            BETWEEN = w;
            CLUSTER = clus;
ANALYSIS:   TYPE = TWOLEVEL MIXTURE;
MODEL:
            %WITHIN%
            %OVERALL%
            c#1 c#2 ON x;
            %BETWEEN%
            %OVERALL%
            f BY c#1 c#2;
            f ON w;
OUTPUT:     TECH1 TECH8;
```
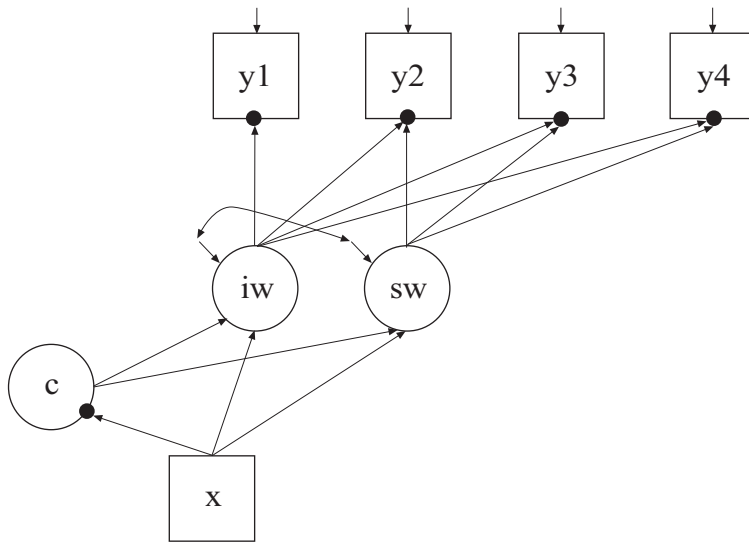
Within

- -

Between
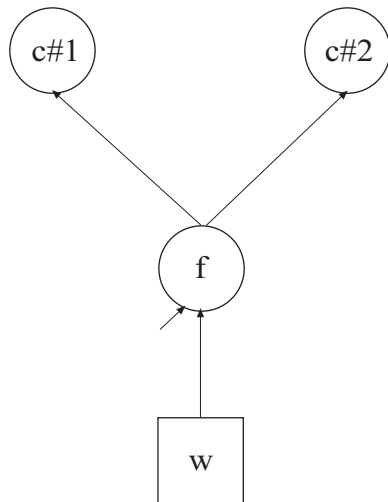
EXAMPLE 10.4: TWO-LEVEL GMM FOR A CONTINUOUS OUTCOME (THREE-LEVEL ANALYSIS)

```
TITLE:      this is an example of a two-level GMM for
            a continuous outcome (three-level
            analysis)
DATA:       FILE IS ex10.4.dat;
VARIABLE:   NAMES ARE y1-y4 x w c clus;
            USEVARIABLES = y1-y4 x w;
            CLASSES = c (2);
            WITHIN = x;
            BETWEEN = w;
            CLUSTER = clus;
ANALYSIS:   TYPE = TWOLEVEL MIXTURE;
            STARTS = 0;
MODEL:
            %WITHIN%
            %OVERALL%
            iw sw | y1@0 y2@1 y3@2 y4@3;
            iw sw ON x;
            c#1 ON x;
            %BETWEEN%
            %OVERALL%
            ib sb | y1@0 y2@1 y3@2 y4@3;
            y1-y4@0;
            ib sb ON w;
            sb@0;
            c#1 ON w;
            c#1*1;
            %c#1%
            [ib sb];
            %c#2%
            [ib*3 sb*1];
OUTPUT:     TECH1 TECH8;
```

Within

Between