# Dingy Output

*Tests of Distinguishability and Nonindependence*

# 1. Text

CAUTION: If you do decide to use information contained here in a paper,   
please make sure that you acknowledge that you have used this program. Also   
should you decide to use the exact text included here, you will need to put   
quotes around that material to avoid plagiarism. Although great effort has   
been undertaken to ensure the accuracy of results, no complete guarantee can   
be about their accuracy. It is your responsibility to check the results and   
text for accuracy. If you do find an error, please report it to David A.   
Kenny.  
  
 Tests of Distinguishability  
  
 The focus of this analysis is to determine whether role makes a   
statistical difference in the data, and if it does, what is that difference.   
That is, are there differences between the Father and the Mother for the   
mixed variables Quality relationship? There are 82 dyads in the sample and   
no missing data. The analyses employ the method of structural equation   
modeling using the computer program lavaan. The means and standard   
deviations of each variable for both the Father and the Mother are presented   
in Table 1. Note that the estimates are maximum likelihood estimates and so   
the standard deviations are a bit larger than conventional estimates.  
  
 There are two ways in which role can make a difference. They are   
differences between the variables in their means and their variances. That   
is, are there mean or variance differences between the Father and the Mother   
for the mixed variable Quality relationship? For instance, the means and   
variances of Quality relationship might differ for the Father and the Mother.   
 Because there is just one mixed variable and no between- or within-dyads   
variables, there are no correlations that can differ for the Father and the   
Mother .  
  
 Dingy estimates several models and compares their fit to determine the   
best fitting model. To compare models, Dingy uses the chi square test, the   
chi square difference test, the Root Mean Square Error of Approximation or   
RMSEA, and the Sample Size Adjusted Bayesian Information Criterion or SABIC.   
With large sample sizes, the chi square tests have so much power that they   
are almost always statistically significant. Because the sample size for   
this analysis would not be considered large, the chi square tests may be   
informative. Here the RMSEA must be less than 0.08 to be considered a   
good-fitting model. The SABIC is a "badness of fit" index with smaller   
values indicating better fit. Its absolute value is not interpretable, but   
values for different models can be compared. One advantage of the SABIC is   
that a value can be computed for the model of full distinguishability even   
though it is a saturated model with zero degrees of freedom. To learn more   
about these measures of fit, go to davidakenny.net/cm/fit.htm (reverse the   
slashes).  
  
 Table 2 provides the measures of fit for three models which allow for   
different types of distinguishability and Table 3 presents the tests of   
hypotheses of equal means and variances. To begin, the test that the means   
for each variable are equal (Model I versus Model II) is statistically   
significant (chi-square(1) = 7.22, p = .007). Thus, there is evidence that   
the means are unequal. The test that the variances (Model II versus Model   
III) are equal is not statistically significant (chi-square(1) = 0.77, p =   
.379). Thus, the data are consistent with the hypothesis that the variances   
are equal.  
  
 Test of Nonindependence  
  
 Additionally, there is the question of whether the scores of the Father   
and the Mother are correlated, i.e., nonindependent. There is one   
correlation between the scores of the Father and the Mother, and the null   
hypothesis is that this correlation is zero. Table 4 contains the results   
from these tests. (Note that SABIC(Sat) refers to the SABIC for the   
saturated model.) Treating dyad members as distinguishable, there is good   
evidence that there is nonindependence or correlation between the scores of   
the Father and the Mother. Alternatively, if we treat dyad members as   
indistinguishable, there is good evidence that there is nonindependence or   
correlation between the scores of the Father and the Mother.

# 2. Tables

Table 1: Descriptive Statistics for the Father and the Mother

Member Father Mother   
 Mean SD Mean SD  
Quality relationship 5.061 0.902 4.768 0.824

Table 2: Tests of Different Types of Distinguishability

Model Equal Means Equal Variances chi square df p RMSEA SABIC  
 I Yes Yes 7.994 2 .018 0.191 11.752  
 II No Yes 0.773 1 .379 0.000 5.784  
 III No No 0 6.264

Table 3: Tests of Hypotheses of Different Types of Distinguishability

Test chi square df p value  
 Means I versus II 7.221 1 .007  
Variances II versus III 0.773 1 .379

Table 4: Tests of Nonindependence across the Father and the Mother  
   
 chi square df p value RMSEA SABIC SABIC(Sat)  
 Distinguishable 12.651 1 <.001 0.377 17.662 6.264  
Indistinguishable 9.959 1 .002 0.331 12.465 3.758

# 3. lavaan Output

Test of Distinguishability or the I-SAT Model

lavaan (0.5-23.1097) converged normally after 13 iterations  
  
 Number of observations 82  
  
 Number of missing patterns 1  
  
 Estimator ML  
 Minimum Function Test Statistic 7.994  
 Degrees of freedom 2  
 P-value (Chi-square) 0.018

lhs op rhs label est se z pvalue ci.lower ci.upper  
1 EWB\_A\_2 ~1 m1 4.915 0.079 62.092 0.000 4.760 5.070  
2 EWB\_A\_1 ~1 m1 4.915 0.079 62.092 0.000 4.760 5.070  
3 EWB\_A\_2 ~~ EWB\_A\_2 v1 0.768 0.090 8.578 0.000 0.592 0.943  
4 EWB\_A\_1 ~~ EWB\_A\_1 v1 0.768 0.090 8.578 0.000 0.592 0.943  
5 EWB\_A\_2 ~~ EWB\_A\_1 0.260 0.090 2.901 0.004 0.084 0.435  
 std.lv std.all  
1 4.915 5.609  
2 4.915 5.609  
3 0.768 1.000  
4 0.768 1.000  
5 0.260 0.338