

A Multilevel Structural Equation Model on the Social Axioms



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Effects of culture



- ⌘ Hofstede (1980): culture as “the collective programming of the mind which distinguishes the members of one human group from another”
- ⌘
- ⌘ People within the same culture share similar languages, beliefs, values and other psychological attributes
- ⌘ People are nested within cultures in a multilevel perspective
- ⌘ Key issues:
 - ⌘ What are cross-cultural differences?
 - ⌘ Are there universal psychological processes across cultures?

Two approaches



⌘ Culture-level analysis: Hofstede (1980)

- ☒ Four cultural dimensions on work-related values, namely, individualism, power distance, uncertainty avoidance and masculinity

⌘ Individual-level analysis: Schwartz and Bilsky (1987)

- ☒ Fifty-six values that could be grouped into ten broad clusters (Schwartz value survey)

Availability of cross-cultural data



- ⌘ Collecting large cross-cultural data sets becomes possible
- ⌘ For instance,
 - ☒ Subjective well-being (Diener & Diener, 1995)
 - ☒ Work related values (Hofstede, 1980)
 - ☒ Leadership (House et al., 2002)
 - ☒ World values survey (Inglehart, Basañez, & Moreno, 1998)
 - ☒ Social values and attitudes (International Social Survey Program, 1997)
 - ☒ Schwartz value survey (Schwartz, & Sagie, 2000)
 - ☒ Social axioms (Leung et al., 2002)
- ⌘ These large cross-cultural data sets provide much richer information than conventional two-country comparison.

Problems/Opportunities in large cross-cultural data?



⌘ Problems:

- ☒ Data are non-independent (Raudenbush & Bryk, 2002)
- ☒ Both individual-level and culture-level analyses are incomplete

⌘ Opportunities:

- ☒ More realistic conceptualization of theories on cultures and people within cultures (Chao, 2000)
- ☒ Enable researchers to develop theories capturing the dynamic processes at different levels (Klein, Tosi, & Cannella, 1999)

Two objectives of the present study



- ⌘ 1. Methodology: Propose to use structural equation modeling (SEM) to investigate cross-cultural differences
- ⌘ 2. Content: Study the universality of the social axioms.

Structural equivalence of individual-level across cultures



- ⌘ Structural equivalence: the same construct is measuring the same thing in different cultures (van de Vijver & Leung, 1997)
- ⌘ If the measurement is equivalent, it has the same meaning and psychometric properties in another culture.
- ⌘ EFA with procrustes or target rotations (van de Vijver & Leung, 1997)

An SEM approach



- ⌘ Cheung and Chan (2002) proposed a SEM approach, termed meta-analytic structural equation modeling (MASEM), to test the structural equivalence across studies.
 - ☒ Step 1: Test the homogeneity of correlation matrices with multiple-group SEM
 - ☒ Step 2: Test the proposed model
- ⌘ It performs better than averaging correlations (Hunter & Schmidt, 1990), averaging Fisher's z scores (Hedges & Olkin, 1983) and Generalized Least Squares (Becker, 1992).

Functional equivalence across individual- and culture-levels



- ⌘ Similarity of meaning at both levels as a prerequisite for cross-level comparison (van de Vijver & Poortinga, 2002).
- ⌘ Functional equivalence: the constructs have similar correlates with other variables at both levels.
- ⌘ EFA with procrustes or target rotations (van de Vijver & Poortinga, 2002)

An SEM approach

- ⌘ Multilevel SEM (MSEM; Cheung & Au, in press) can be used to assess functional equivalence directly.
 - ☑ Separate models for the within- and between-data
 - ☑ If the same model fits well at both levels, the measurement is functional equivalent


$$y_{gi} = y_g + y_w$$

$$\Sigma_T = \Sigma_B + \Sigma_W$$

A study on the Social Axioms

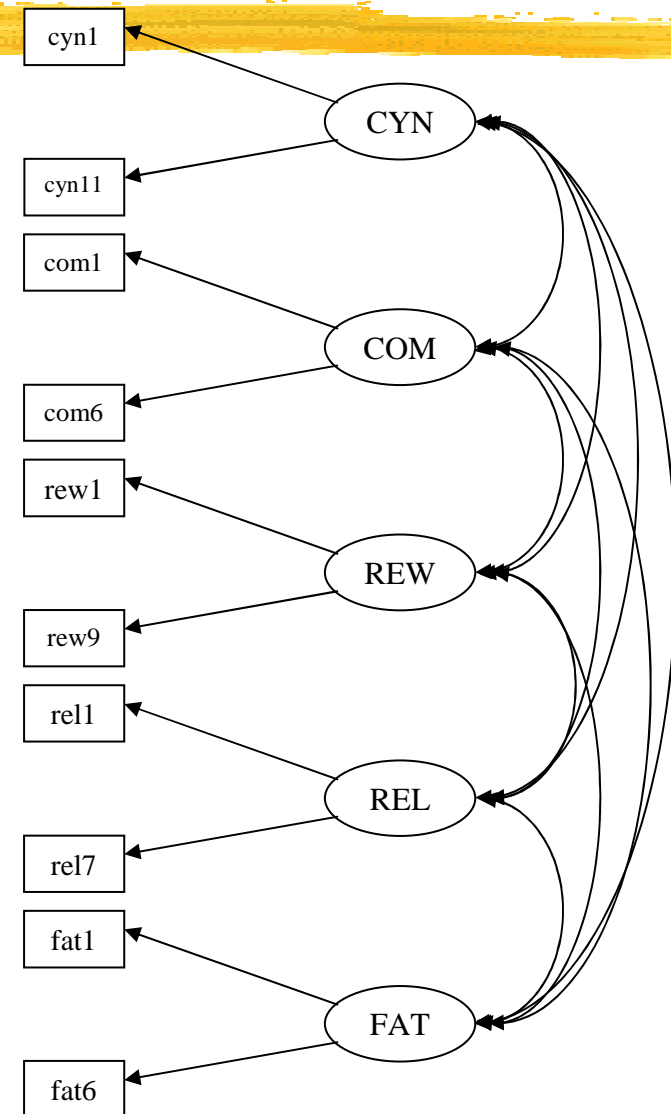


- ⌘ Leung et al. (2002) initiated a project on social axioms or general beliefs.
- ⌘ Social axioms: the basic premises that people endorse and use to guide their behavior in different situations.
- ⌘ Five general factors at the individual level, namely, *social cynicism, social complexity, reward for application, religiosity* and *fate control*.

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- ⌘ Social cynicism: e.g., “Powerful people tend to exploit others.”
 - ⌘ Social complexity: e.g., “People may have opposite behaviors on different occasions.”
 - ⌘ Reward for application: e.g., “Knowledge is necessary for success.”
 - ⌘ Religiosity: e.g., “Belief in a religion helps one understand the meaning of life.”
 - ⌘ Fate control: e.g., “Individual characteristics, such as appearance and birthday, affect one’s fate.”

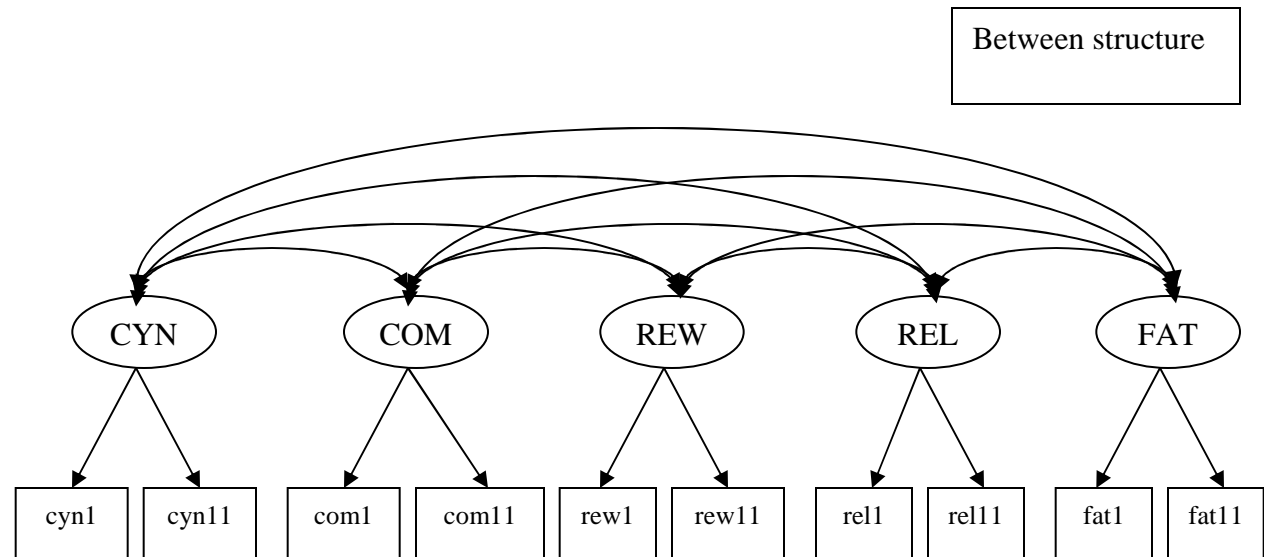
Research questions

- ⌘ 1. Structural equivalence: Is the five-factor model universal at the individual-level across cultures?

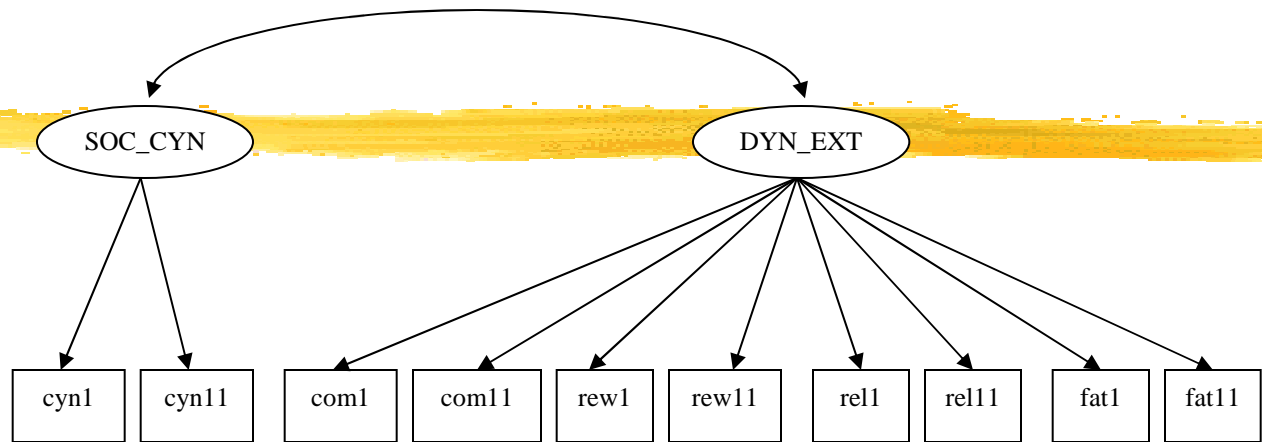


⌘ 2. Functional equivalence: Is the meaning of the constructs the same at different levels?

1st order five-factor model at culture level

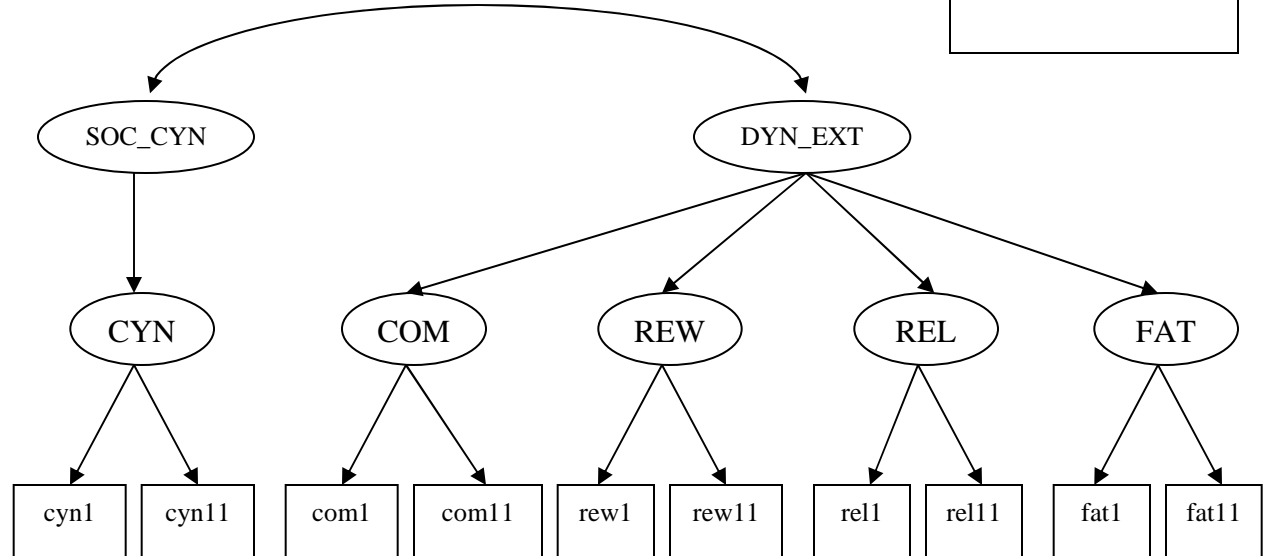


Between structure



1st order two-factor model at culture level

Between structure



2nd order two-factor model at culture level

Method



⌘ *Sample.* 7,590 university students from 40 nations (Leung & Bond, 2004).

⌘ *Items.*

☑ Social cynicism: 11 items

☑ Social complexity: 6 items

☑ Reward for application: 9 items

☑ Religiosity: 7 items

☑ Fate control: 6 items

Statistical analyses



⌘ Software

- ☒ LISREL 8.54 (Jöreskog & Sörbom, 2003): implement the MASEM procedures proposed by Cheung and Chan (2002)

- ☒ Mplus 3.01 (Muthén & Muthén, 2004): conduct MSEM

⌘ Criteria to evaluate the models (Hu & Bentler, 1998)

- ☒ TLI and CFI $\approx .95$

- ☒ RMSEA $\approx .06$ and SRMR $\approx .08$

Results: Structural equivalence

⌘ *Meta-analytic SEM.*

⊞ First stage: Homogeneity of correlation matrices

⊞ $\chi^2(28,899, N=7,590) = 41,132, p < .0001$

⊞ RMSEA = **0.047**

⊞ TLI = 0.79, CFI = 0.79

⊞ Second stage: Fitting a five-factor model

⊞ $\chi^2(692, N=7,590) = 6,653, p < .0001$

⊞ RMSEA = **0.034**, SRMR = **0.046**,

⊞ TLI = 0.68, CFI = 0.70.

⌘ Contradicting findings between RMSEA and SRMR vs. TLI and CFI

Which ones to rely on?



⌘ Rigdon (1996):

☑ RMSEA (less sensitive to sample size and estimation methods) may be more appropriate sometimes

⌘ Browne et al. (2002):

☑ CFI and TLI may indicate a poor fit model but indeed not

⌘ RMSEA and SRMR are more appropriate in evaluating the models

Factor correlations

	CYN	COM	REW	REL	FAT
CYN	1.00				
COM	0.13	1.00			
REW	0.10	0.36	1.00		
REL	-0.03	-0.04	0.20	1.00	
FAT	0.19	0.01	0.16	0.23	1.00

- ⌘ Our results show that the five-factor model fits at the individual-level across cultures.
- ⌘ Most factors are uncorrelated.

Results: Functional equivalence



⌘ ICCs.

- ☒ Average intra-class correlation (ICC) for the variables is 0.12.
- ☒ People are more similar in the belief of *social complexity* (ICC=.07)
- ☒ People are more dissimilar in the belief of *religiosity* (ICC=.20)

Multilevel SEM

⌘ 1st order five-factor model:

☒ Nonconvergence problem (no solution)

⌘ 1st order two-factor model:

☒ RMSEA = 0.026, SRMR (between structure) = **0.152**,
SRMR (within structure) = 0.042

☒ CFI = 0.77, TLI = 0.75


☒ AIC = **780,372** and BIC = **781,800**

⌘ 2nd order two-factor model:

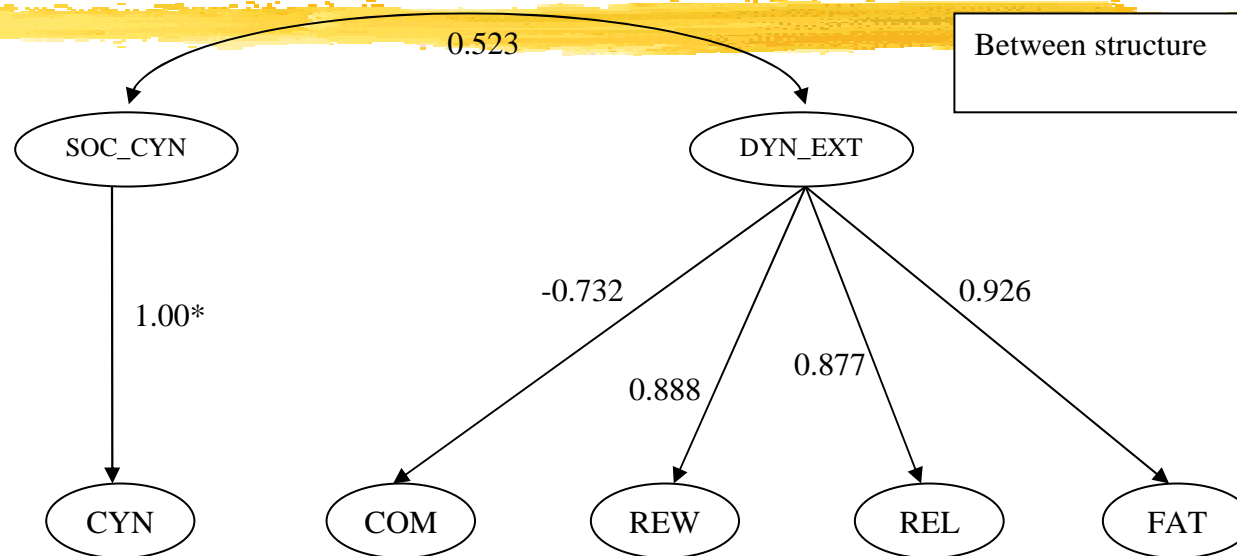
☒ RMSEA = 0.026, SRMR (between structure) = **0.148**,
SRMR (within structure) = 0.042,

☒ CFI = 0.77, TLI = 0.75

☒ AIC = **780,292** and BIC = **781,749**

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- ⌘ The 2nd order two-factor model fits a little bit better than the 1st order two-factor model.
 - ⌘ Within model is better than the between model

Factor structure at culture level



⌘ Societal cynicism: social cynicism

⌘ Dynamic externality: social complexity, reward for application, religiosity and fate control

Conclusion on Social Axioms



⌘ Structural equivalence:

- ☑ Social axioms are structurally equivalent across 40 cultures

⌘ Functional equivalence:

- ☑ Cynicism shows strong functional equivalence at both levels
- ☑ Other four factors are highly correlated at the country level while they are only slightly correlated at the individual level

Why not just EFA?



⌘ *Exploratory vs. confirmatory research*

- ☑ EFA for exploratory only
- ☑ SEM can be used for both exploratory and confirmatory research, e.g., modification indexes and specification search

⌘ *Measurement model vs. more sophisticated model*

- ☑ EFA is only for measurement model
- ☑ SEM can be used to test more sophisticated models, e.g., the 2nd order factor analysis model, binary and categorical variables

Conclusion



- ⌘ The level issue is critical in building cross-cultural theory
- ⌘ Structural and functional equivalence is essential in understanding how the psychological process operates at both levels
- ⌘ SEM is a flexible modeling tool which is very useful in cross-cultural research

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Thank you!