

# The Use of Formal Models in the Sociology of Culture



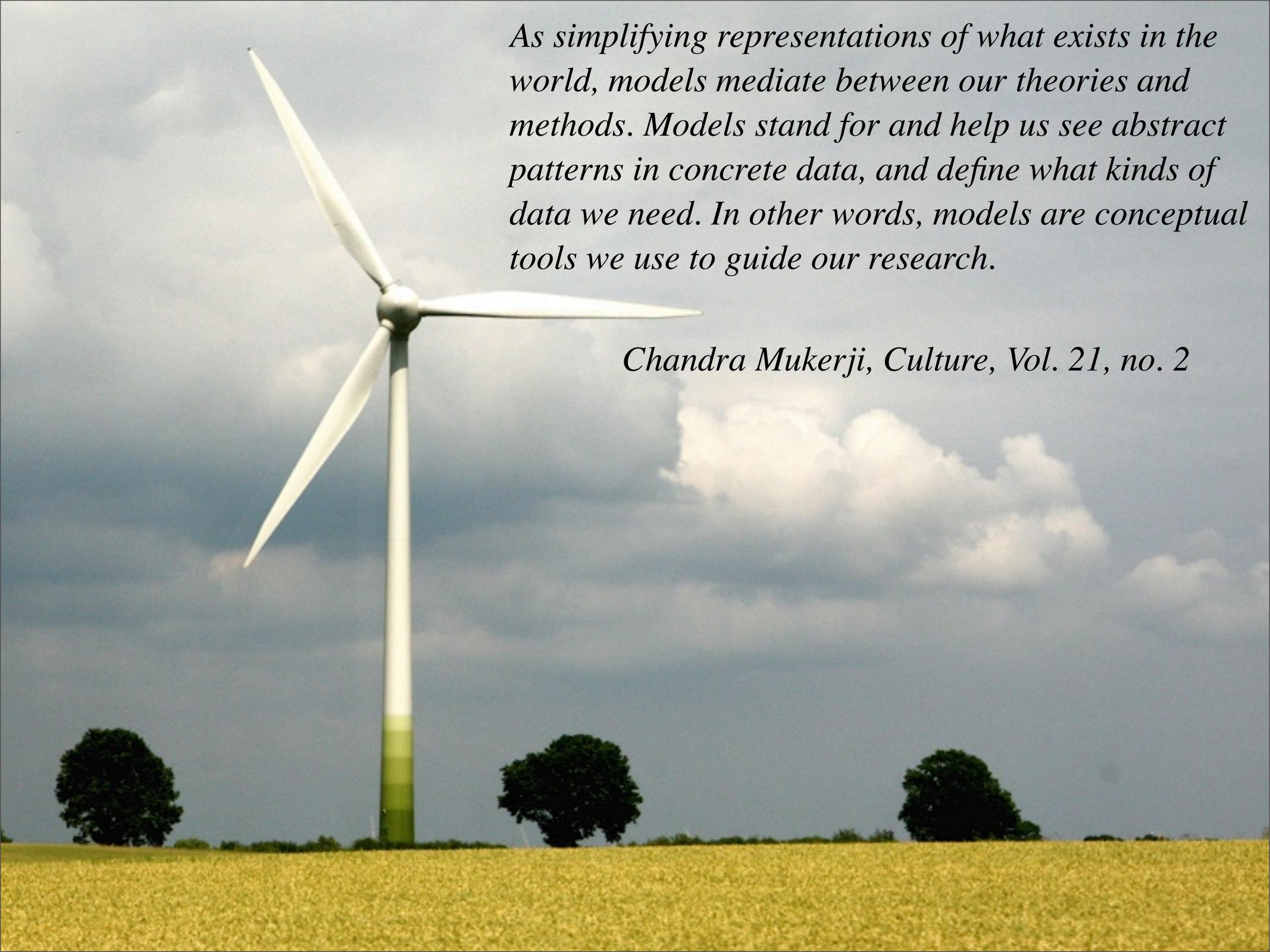
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*UC Santa Barbara*

*Prepared for ASA Culture Section  
20th Anniversary Mini-conference*

*on Cultural Models*

*August 15, 2007*



*As simplifying representations of what exists in the world, models mediate between our theories and methods. Models stand for and help us see abstract patterns in concrete data, and define what kinds of data we need. In other words, models are conceptual tools we use to guide our research.*

*Chandra Mukerji, Culture, Vol. 21, no. 2*

# I. A Brief History of Formal Models in the Sociology of Culture

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## A. Culture, Social Organization and Formalization 1930-1960

- Simple Statistical Models
- Little or no distinction social/cultural
- Largely Deductive

## B. Post-Parsons: The Epistemological Break

- Phenomenological Turn/Sophisticated Measures
- Culture Left Aside (Formal Models)
- Largely Inductive

# C. 1975 — Peterson & Berger

## Production of Culture (see last slide for cites)

Culture, Social Organization & Formal Modeling Together Again (w/ Focus on Measuring Social Organization of Culture)

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AMERICAN SOCIOLOGICAL REVIEW

Table 1. Number of Firms and Market Shares in the Weekly Top Ten of the Popular Music Single Record Market by Year

Column	1	2	3	4	5	
	Year	Labels	Firms	Firms with Only One Hit	Concentration Ratio	
					4 Firm	8 Firm
1948	11	11	5	81	95	
1949	9	8	3	89	100	
1950	11	10	3	76	97	
1951	10	8	2	82	100	
1952	12	11	5	77	95	
1953	12	11	3	71	94	
1954	13	12	4	73	93	
1955	16	14	7	74	91	
1956	22	20	10	66	76	
1957	22	27	8	49	65	

# D. 1982 – DiMaggio Cultural Capital (see last slide for cites)

Treated Culture as Equivalent to other resource attributes of individuals

Table 3. Results of Regression of Grades on Ability (1), Father's Education (2), Cultural Capital (3), Middlebrow Activity (4), and Cultural Interests (5) for Male and Female Eleventh Graders

Dependent Variable		1	2	3	4	5	R <sup>2</sup>	Increase in R <sup>2</sup> with Vars. 3–5	Reduction in beta of father's education with Vars. 3–5
<i>MALES</i>									
Grades in All Subjects	B	.5078	.1158	2.2330	.1488	-.1256	.1228	.0286	.0202
	s.e.	.0623	.0971	.4330	.4830	.3830			
	beta	.2791***	.0409	.1706***	.0106	-.0113			
Grades in English	B	.0493	.0223	.2730	-.0025	.0412	.1034	.0310	.0211
	s.e.	.0077	.0120	.0540	.0603	.0476			
	beta	.2255***	.0660	.1716***	-.0015	.0309			
Grades in History	B	.0715	.0012	.2646	-.0059	.0259	.1279	.0254	.0193
	s.e.	.0080	.0125	.0561	.0627	.0495			
	beta	.3096***	.0033	.1577***	-.0033	.0184			
Grades in Mathematics	B	.0510	.0189	.1685	.0133	-.0387	.0723	.0102	.0124
	s.e.	.0082	.0128	.0575	.0625	.0507			
	beta	.2223***	.0531	.1011**	.0075	-.0277			
N = 809									
<i>FEMALES</i>									
Grades in All Subjects	B	.5988	.0939	2.4314	.4223	-.1250	.1897	.0338	.0297
	s.e.	.0575	.0852	.3887	.3925	.3361			
	beta	.2791***	.0409	.1706***	.0106	-.0113			

## II. Renaissance of Formal Models in Sociology of Culture

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Extensive Proliferation Formal Models

(1980's until now) but includes series of Variations & Alternative Trajectories.

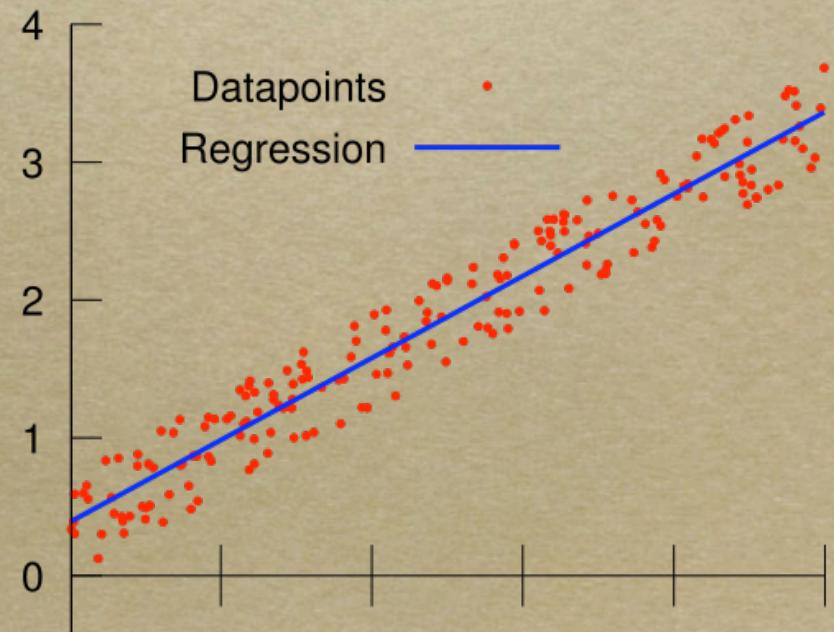
Variations in:

- (A) Formal Model Traditions
- (B) Measurement Approaches to Culture
- (C) Aspects, Arenas, Features of Culture
- (D) Relation of Culture to Social Organization

# A. Variations in Formal Modeling Traditions

## 1. Linear Model Tradition

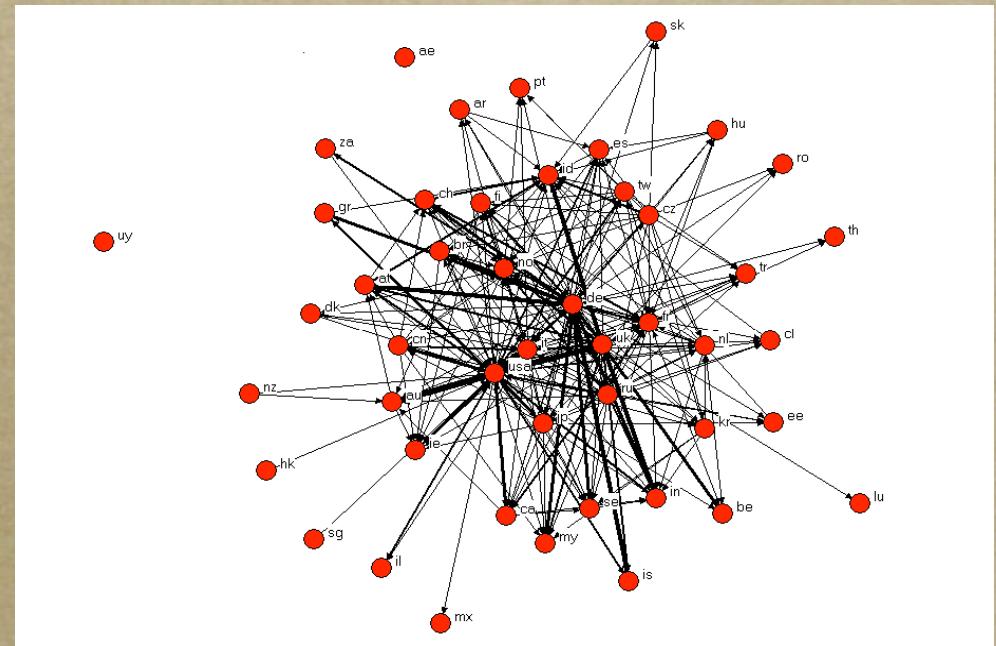
- (usually) presumes linear metric (measures)
- Relies on Probability Theory (medium/large N)
- Co-variation is basis for Analytic Assessment
- A “model” (in regression analysis)
- $$Y = B_0 + B_1X_1 + B_2X_2 + B_NX_N + E$$
- Dominant Tradition
- Very Sophisticated
- Privileges Causal Logic



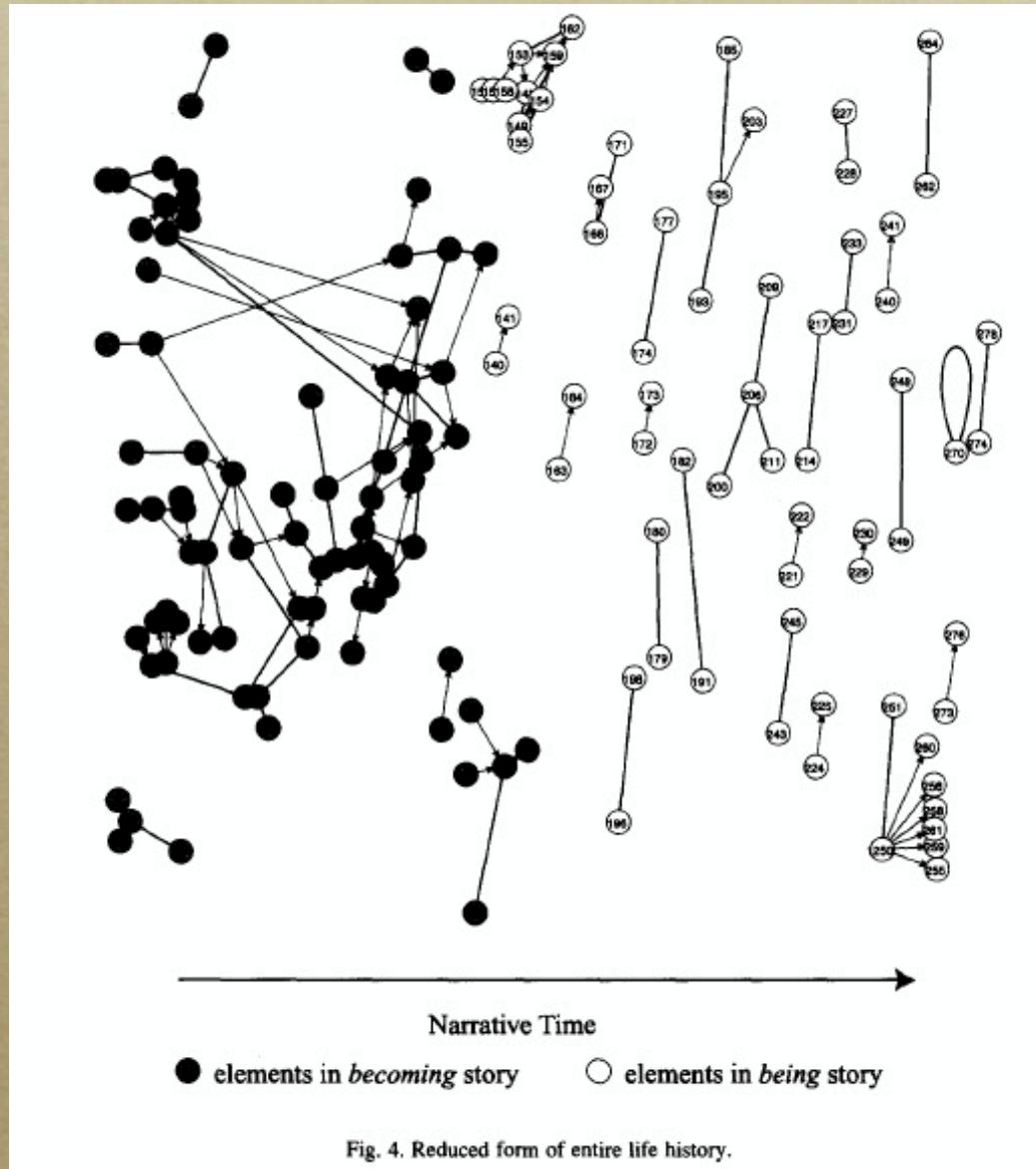
# A. Variations in Formal Modeling Traditions

## 2. Network Analysis Tradition

- relies upon relational data (“tie” measures)
- Discrete Mathematics (small/medium N)
- Relational Identity privileged over attribute Identity
- A “model” (emphasizes either network position or role structure)
- Increasingly mainstream
- Has virtue of mapping onto semiotic theory of structure as relations of similarity/difference
- Privileges Structural Reductions

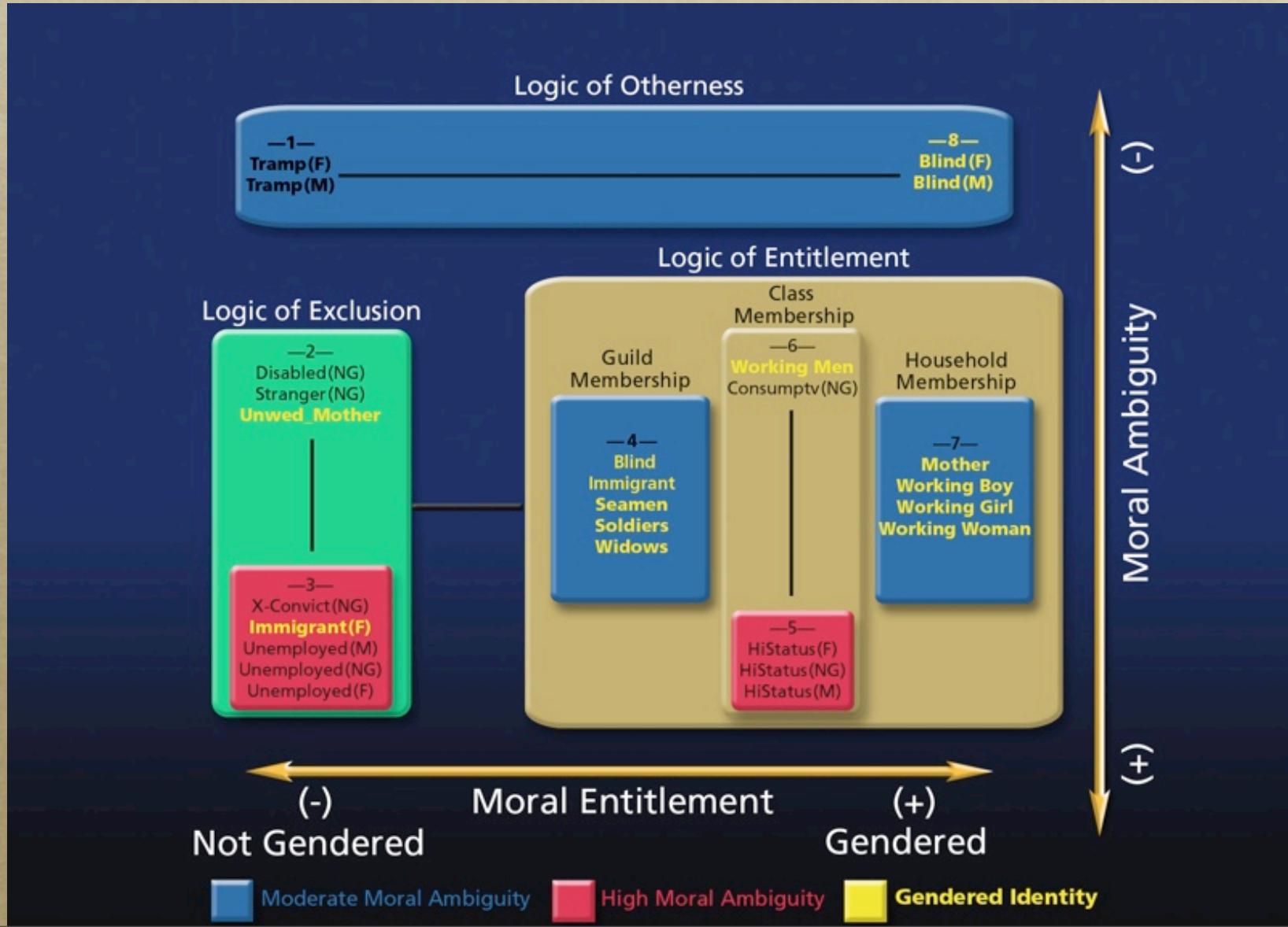


## 2. Network Analysis Tradition: Ex. Bearman & Stovel (Network Model). (see last slide for cites)



## 2. Network Analysis Tradition: Ex. Mohr (Blockmodel).

(see last slide for cites)



# A. Variations in Formal Modeling Traditions

## 3. Qualitative Comparative Analysis

- relies upon shared qualities (“configuration” measures)
- Discrete Mathematics (Boolean, Fuzzy Set) (small/medium N)
- Constellation of Qualities privileged over Attributes or Relations
- A “model” (systematic reduction of complexity through Boolean logic)
- Has advantage of minimizing loss due to measurement error

Case	A	B	C	O
1	0	0	0	0
2	0	0	1	0
3	0	0	2	0
4	0	1	0	0
5	0	2	2	1
6	1	0	1	0
7	1	1	0	1
8	1	2	0	1
9	1	2	1	1

Overall, for the outcome 0, the following minimizations are possible if the logical remainders are not included:

$A \circ B \circ C_0, A \circ B \circ C_1, A \circ B \circ C_2$  can be reduced to  $A \circ B \circ 0$

$A \circ B \circ C_1, A \circ B \circ C_2$  can be reduced to  $B \circ C_1$

If the logical remainders are included and rule (4) is applied, the following reductions are possible:

$A \circ B \circ C_0, A \circ B \circ C_1, A \circ B \circ C_2$  can be reduced to  $A \circ B \circ 0$

$A \circ B \circ C_0, A \circ B \circ C_2$  can be reduced to  $A \circ C_0$

$A \circ B \circ C_1, A \circ B \circ C_2$  can be reduced to  $B \circ C_1$

$A \circ B \circ C_2$  can be reduced to  $B \circ C_2$

$A \circ B \circ C_1$  can be reduced to  $A \circ C_1$

$A \circ B \circ C_0$  can be reduced to  $B \circ C_0$

## B. Variations in Intensity of Cultural Measurement

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1. Varies from:

Unmeasured <-----> Richly Measured

- Unmeasured (or indirectly measured) (e.g., Production of Culture & New Institutional Modeling Traditions).
- Richly Measured (For example, “Cultural Classification Systems in Transition” Susanne Janssen, et. al. at University of Rotterdam, comprehensive coverage of newspaper coverage of arts and culture in 5 countries, 1955-2005).

## C. Variations in Aspects, Arenas, Features of Culture being Measured.

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1. Varies across levels:

Individual-Group-Organization-Field-Nation

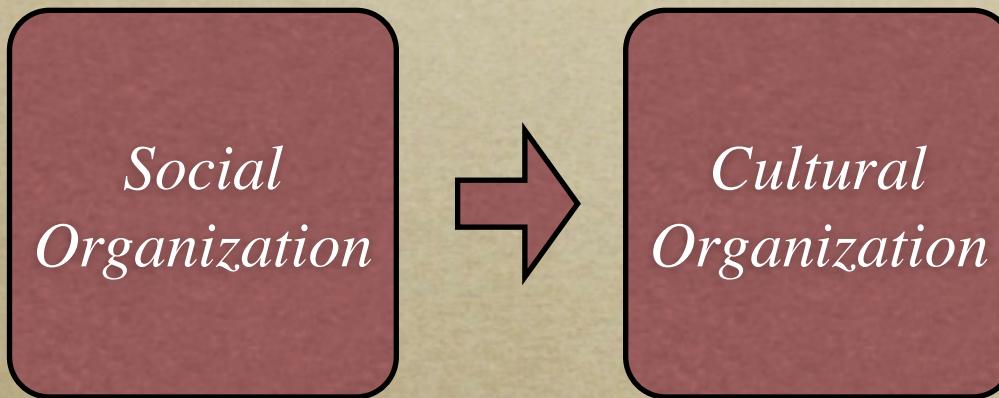
2. Varies across domains:

Purely Mental <----> Purely Material

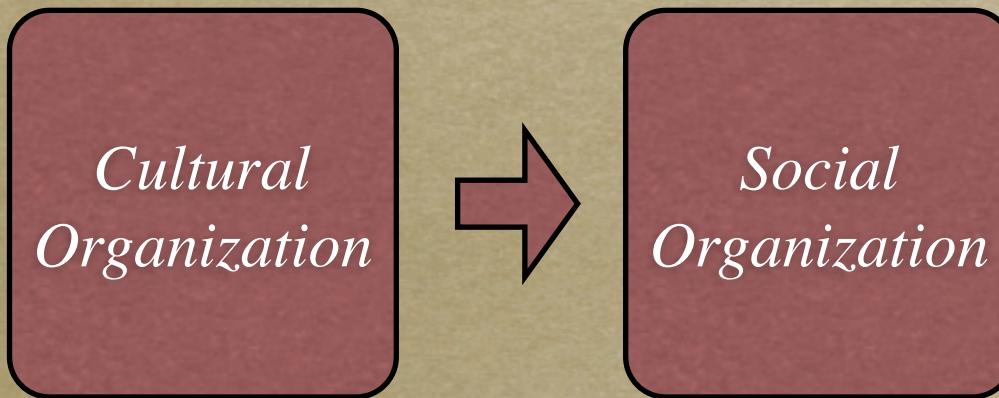
## D. Variations in Role of Culture within the model.

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### 1. Peterson & Berger (Production of Culture):



### 2. DiMaggio (Cultural Capital)



## D. Variations in Role of Culture within the model.

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### 3. Meaning Mapping:

- Emphasizes internal organization of cultural forms
- Helps to advance the field through discerning complexity and internal logic of meaning systems

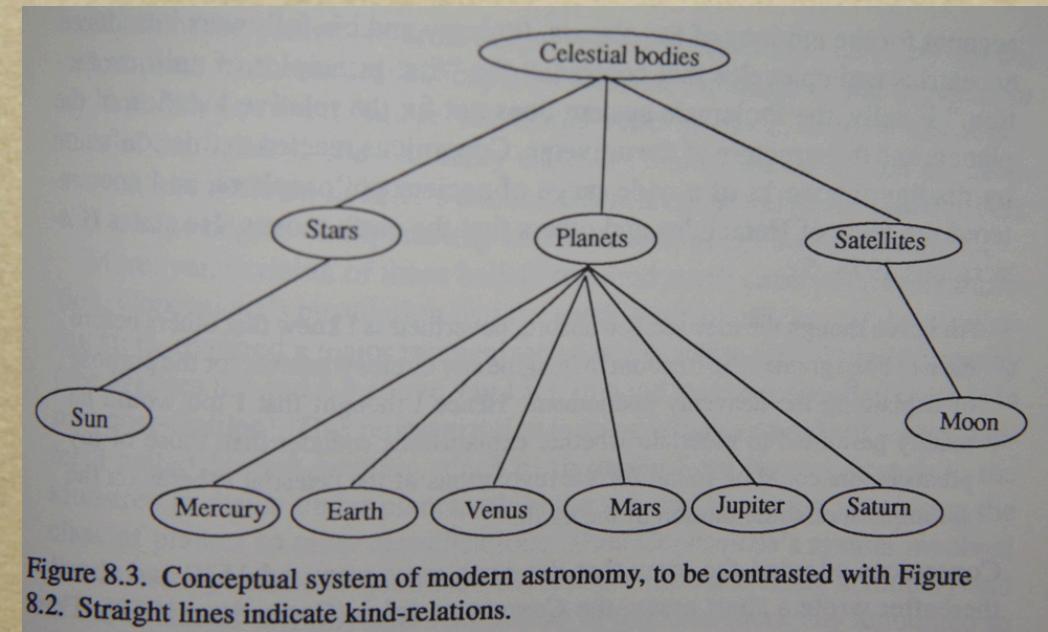
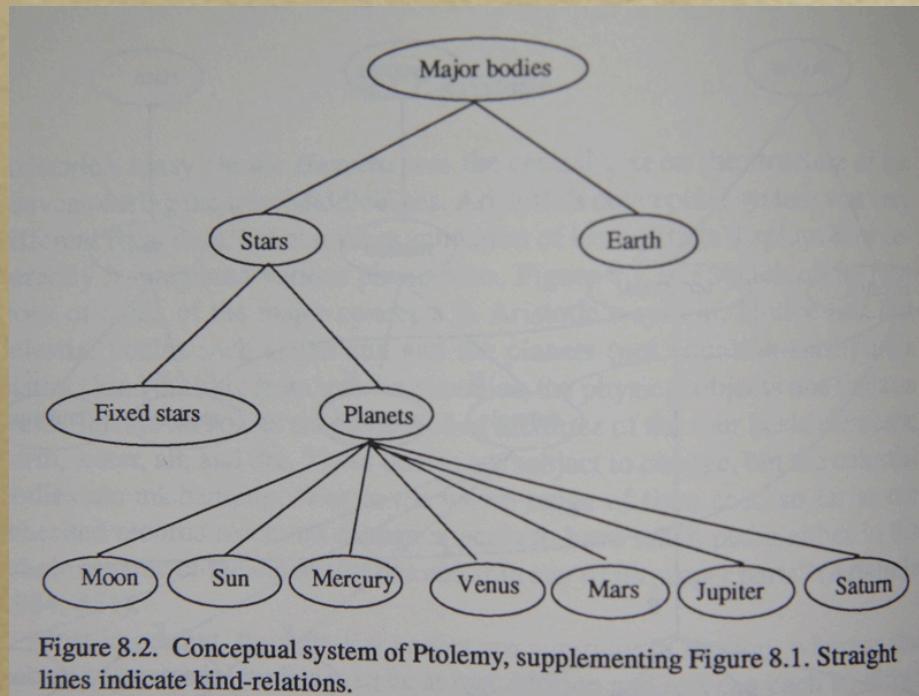


*Cultural  
Organization*

# D. Variations in Role of Culture within the model.

3. Ex: Paul Thagard, *Conceptual Revolutions*. (see last slide for cites)

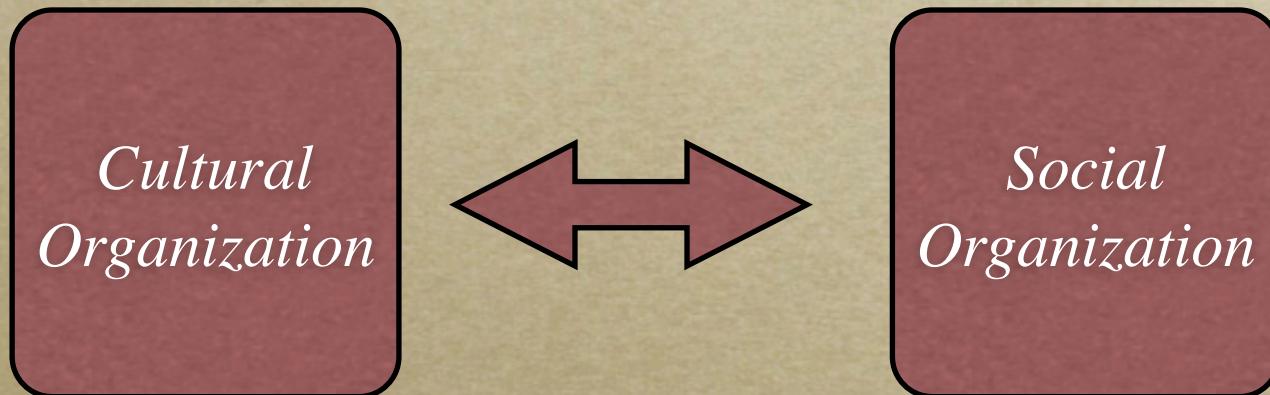
- Kind-Relation & Part-Relation Hierarchies  
Computational Algorithm with Boolean Logics



## D. Variations in Role of Culture within the model.

### 3. Duality Studies:

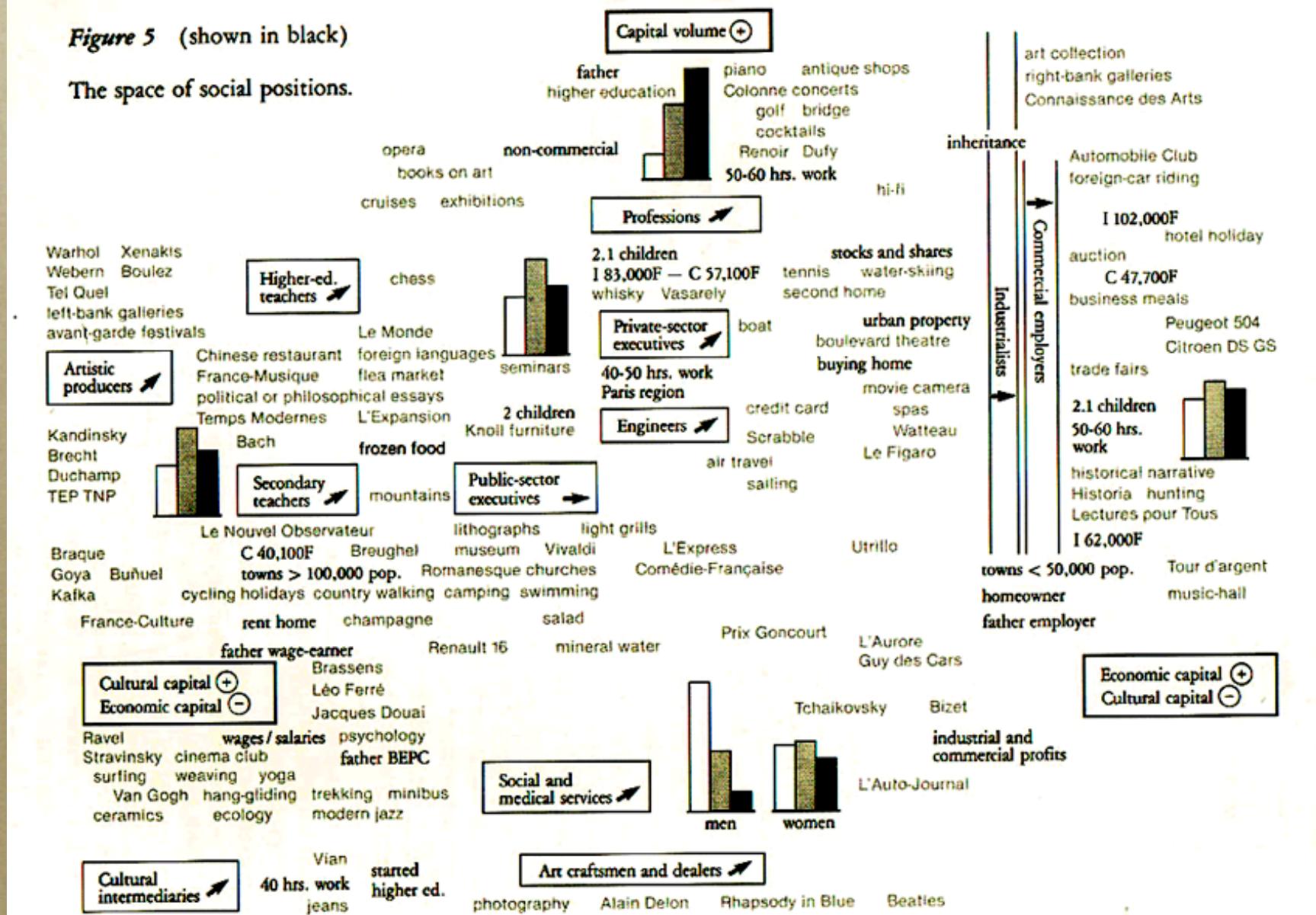
- Views two orders as mutually constitutive (neither is prior or independent)



### 3. Duality Studies: ex. Bourdieu, *Distinction*. Correspondence Analysis (Linear Model)

*Figure 5* (shown in black)

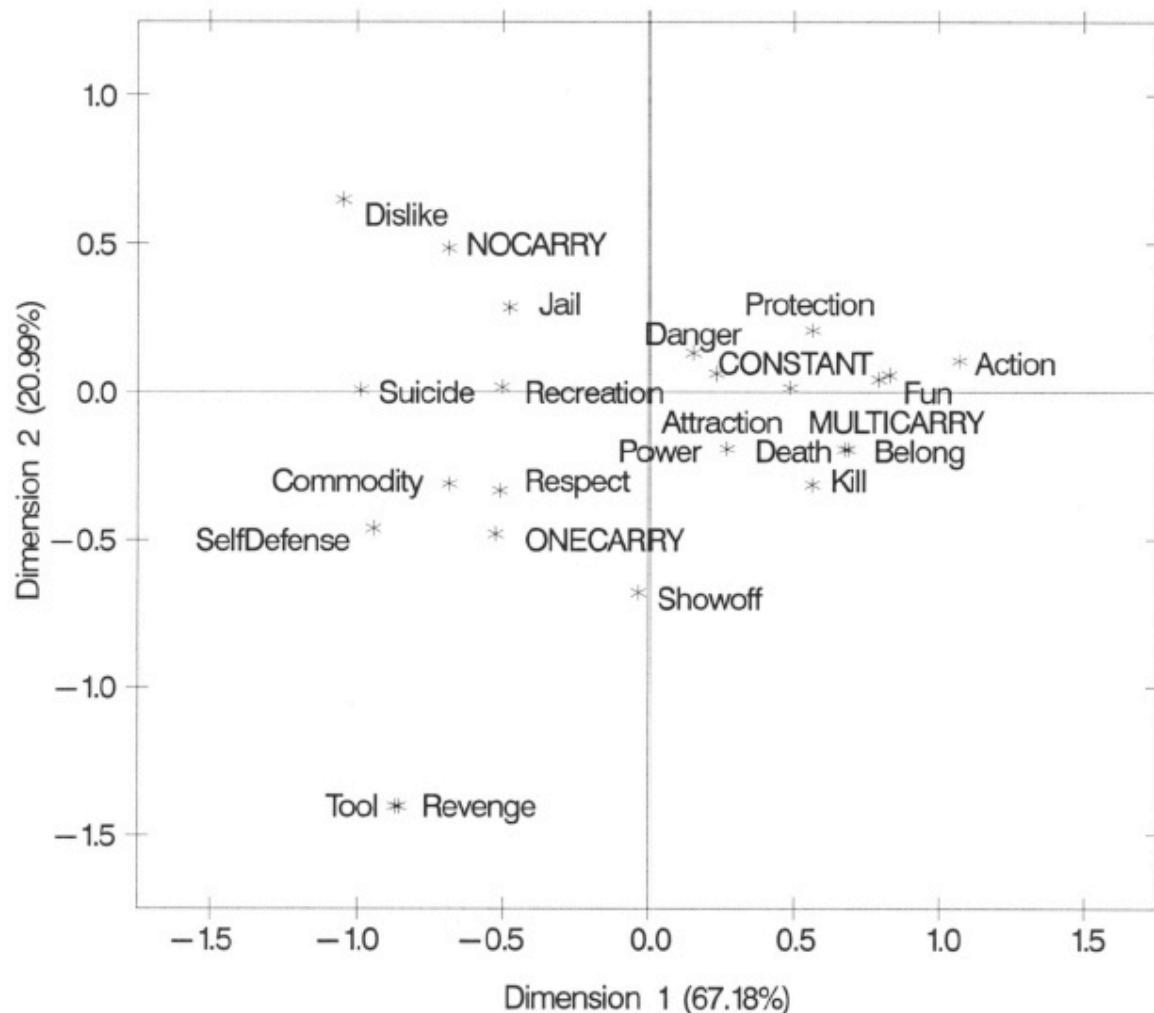
## The space of social positions.



### 3. Duality Studies: ex. Harcourt, *Gun Use*. Correspondence Analysis (Linear Model)

FIGURE 2. CORRESPONDENCE ANALYSIS OF THE MEANINGS OF GUNS BY CARRYING STATUS

The Social Meaning of Guns in Relation to Carrying Status (T2V2byCarrying)



### 3. Duality Studies: ex. Breiger, *Supreme Court*. Lattice Analysis Structural Articulation (Network Model)

(see last slide for cites)

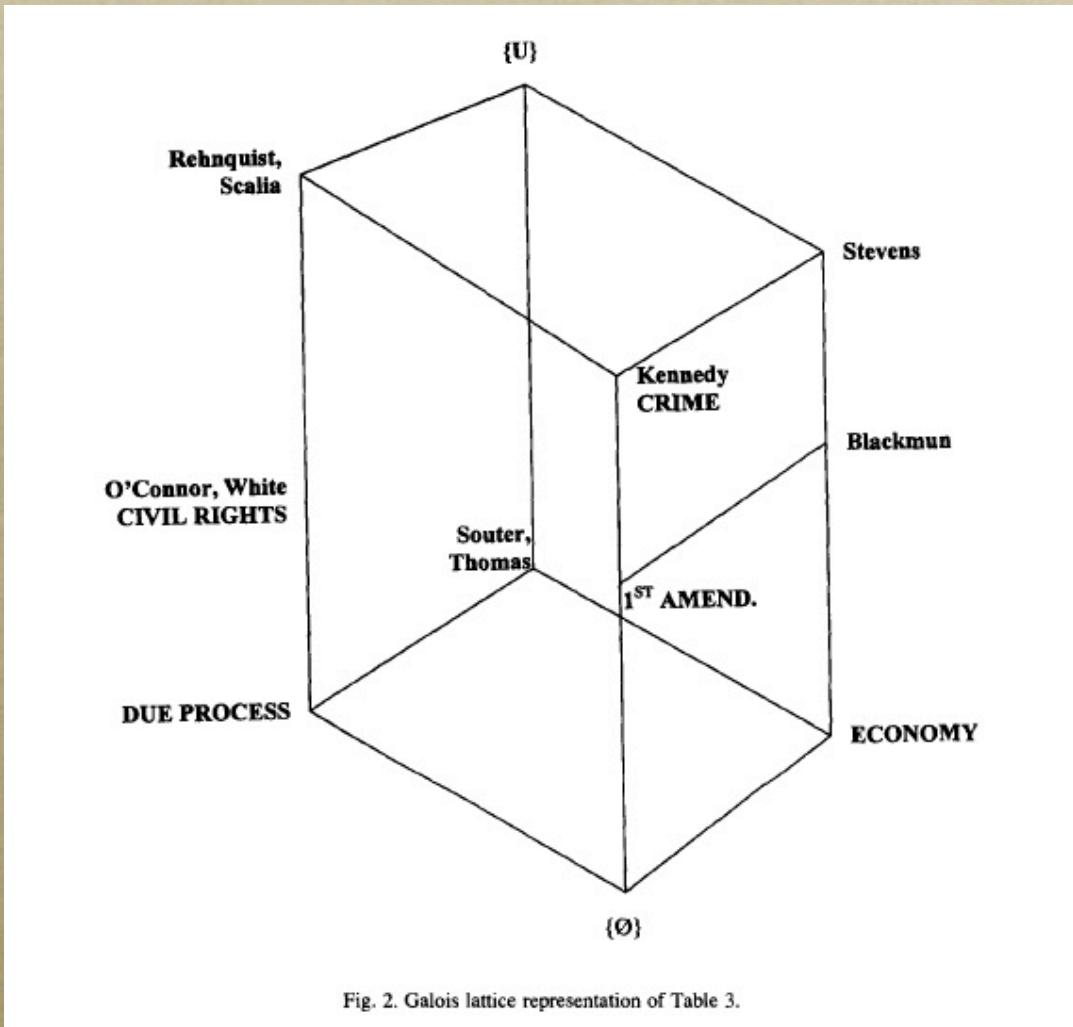
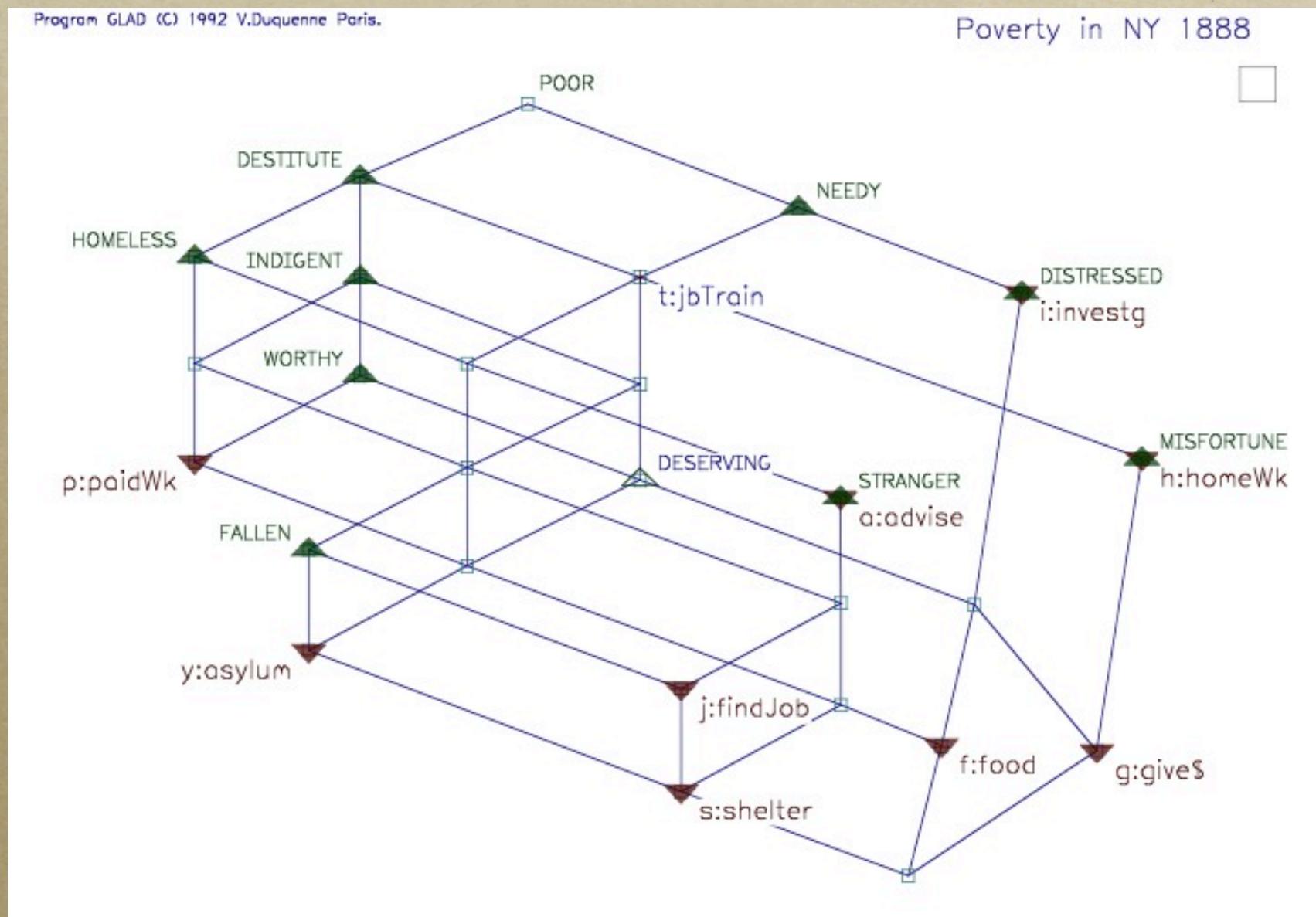


Fig. 2. Galois lattice representation of Table 3.

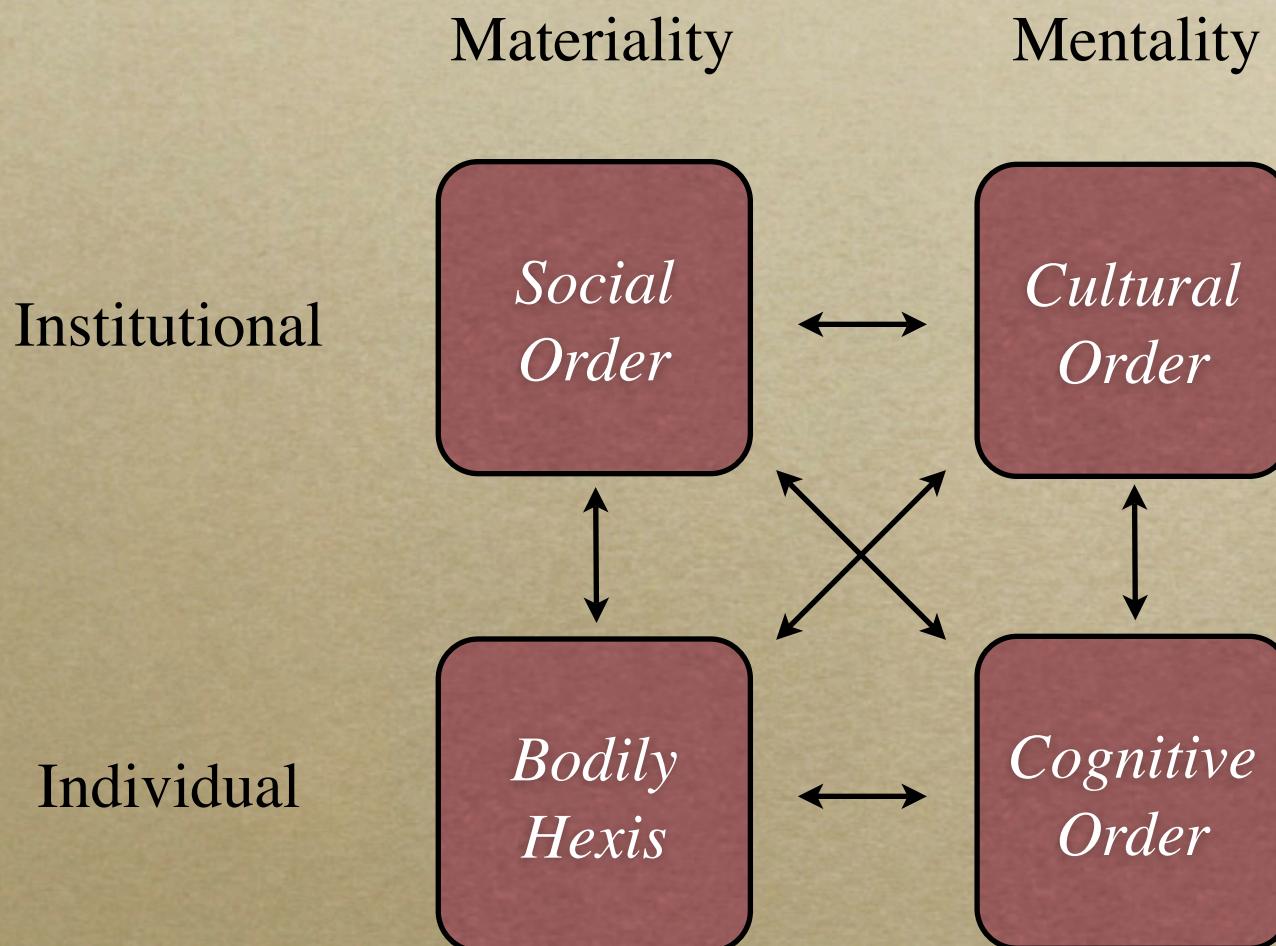
### 3. Duality Studies: ex. Mohr & Duquenne Lattice Analysis structural articulation (Network Model)

(see last slide for cites)



# D. Variations in Role of Culture within the model.

## 3. Duality Studies: Multiple Sites



# III. Conclusion

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(A) Come very long way since 1975,  
still have a very long way to go.

(B) Have seen shift toward:

- Variety of different modeling traditions
- Increasing intensity of measuring culture
- Increase in variety of cultural components being measured
- Shift from causal logic to other (especially) dual logic

# III. Conclusion

## **(C) Many Advantages to Formal Analysis**

- Allows for higher level of complexity be managed
- Math enables varieties of structure preserving reductions
- Possible to formally assess efficacy, purity and efficiency of structural preserving reductions
- Replicability allows faster technology diffusion as well as greater effectiveness, efficiency of challenges

## **(D) Disadvantages also:**

- Measurement distorts (necessarily)
- Models enable & constrain (necessarily)
- Goal should be to pursue modeling strategies maximize benefits,

# IV. Citations

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- **Cycles in Symbol Production: The Case of Popular Music.** Richard A. Peterson, David G. Berger *American Sociological Review*, Vol. 40, No. 2 (Apr., 1975), pp. 158-173.
- **Cultural Capital and School Success: The Impact of Status Culture Participation on the Grades of U.S. High School Students.** Paul DiMaggio *American Sociological Review*, Vol. 47, No. 2 (Apr., 1982), pp. 189-201.
- **Becoming a Nazi: A model for narrative networks.** Peter S. Bearman and Katherine Stovel, *Poetics*, Volume 27, Issues 2-3, March 2000, pp 69-90.
- **The Discourses of Welfare and Welfare Reform.** John Mohr Pp. 346-363 in the *The Blackwell Companion to the Sociology of Culture*, edited by Mark Jacobs and Nancy Hanrahan. Oxford, U.K.: Blackwell Publishers, 2004.
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- **The Duality of Culture and Practice: Poverty Relief in New York City, 1888-1917.** John W. Mohr and Vincent Duquenne. *Theory and Society*, (April/June, 1997) Vol. 26/2-3: 305-356.