Quality of Interviewer Observations of Neighborhood Characteristics

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1. Motivation

- Direct observation of neighborhood environments used in Urban Sociology and Social Epidemiology.
- Indicators of "disorder" and "decay" found correlates of individual outcomes:
  - Violent crime, fear of crime and risk perception (Wilson and Kelling 1982; Taylor et al. 1985; Sampson and Raudenbush 1999; Taylor 2001)
  - Depression, psychological distress, child and adolescent mental health, physical function in the elderly, psychological well-being, physical activity and smoking, and mortality among others (Cohen et al., 2000; Ross et al., 2000; Ross, 2000; Sampson et al., 2002; Caughy et al., 2003).
- Typically collected using special forms:
  - *Neighborhood Observation Forms* (LA FANS, PHDCHN, etc.)
  - *Facilities Checklist* (ELS-2002)
- Direct observation of neighborhood environments only recently used in Survey Methodology.
- Indicators of "disorder" and "decay" found correlates of:
  - survey cooperation (Kreuter et al. 2007, Casas-Cordero 2010)
- Typically collected using single questions in Call Record Forms:
  - NSFG, SCF, NICHD
  - NatCen Surveys: BCS, BES, BSA
  - European Social Survey (ESS)

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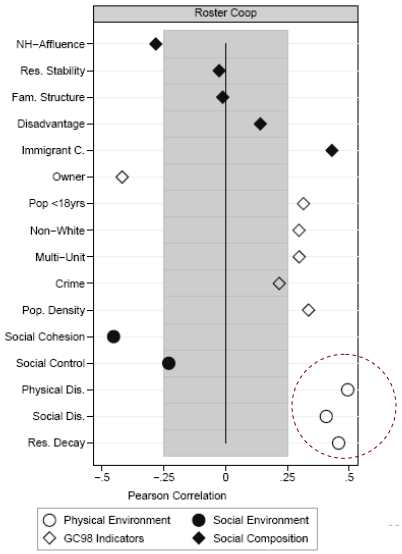
1. Motivation



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2a. Insights from Urban Sociology

- Measurement of "ecological" constructs
  - Level of Observation
  - Level of Aggregation
- Psychometrics → Ecometrics
  - Factor Analysis
  - Generalizability Theory
  - Item Response Theory
- Methods of data collection
  - Administrative Records (e.g. % boarded up HU from Census)
  - Respondents Self-Reports
  - Systematic Social Observations

2b. Insights from Survey Methodology

- Interviewers affect data:
  - Fixed / Random effects
  - Missing data
- Methods to assess ME:
  - Classical Methods (% agreement, I, GDR, Corr, kappa)
  - Latent Class Analysis (ϕ,π,θ)
  - MTMM
- Interviewers influence:
  - Respondent participation (P) and responses (Y)
  - Interviewer direct observations
    - Respondent characteristics / attitudes
    - Housing Unit
    - Neighborhood characteristics

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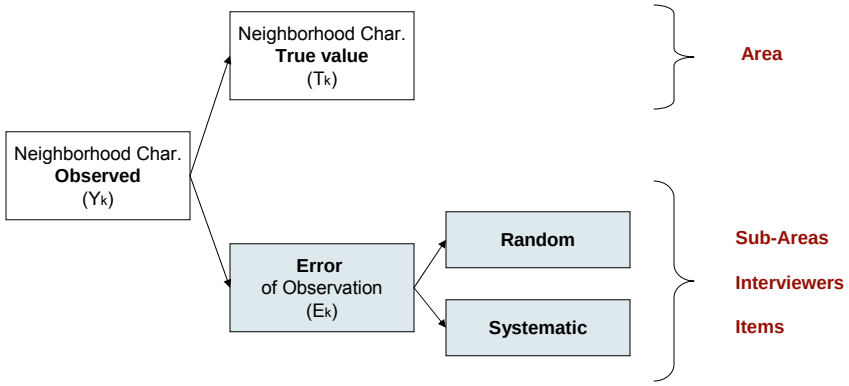
Model of ME in Neighborhood Observations made by Survey Interviewers



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3. Research Questions

1. What factors influence the assessment of neighborhood environments?
   - E.g.: area, interviewer, occasion
   - Are these influences fixed or random?
2. Do different factors affect different neighborhood constructs (Ys)?
   - E.g.: physical disorder, residential decay
   - What is the effect on scales and items?
3. Are these influences different at different levels of aggregation?
   - E.g.: tract level, block level, block face level?

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4. Data and Methods

- Los Angeles Family and Neighborhood Study (L.A. FANS)
  - Neighborhood observations (April 2000 – May 2001)
- Sample design
  - 65 Census tracts → 422 Census blocks → 4,100 households
  - Oversample 'poor' tracts & HH with children
- Data sets
  - Neighborhood Observation Forms (NOF)
    - (a) cover page, (b) block observations, (c) alley observations
  - Interviewer Questionnaire
  - Survey Questionnaires (HH, adult, child, etc.)
  - Administrative Records (e.g. Census SF-3)

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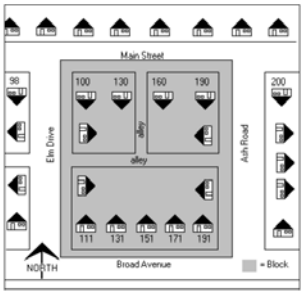
- NOF Protocol
  1. Collect data during your first visit to the block.
  2. Drive around the entire block.
  3. Walk down each block face and record the characteristics at the end of the walk.



- Output
  - 422 blocks rated on 2-6 occasions
    - 100% on 2 occasions, 77% on 3+
  - 2,029 unique block faces rated on 2-6 occasions
    - Ratings available for a total of 5,966 block faces
  - 35 interviewers

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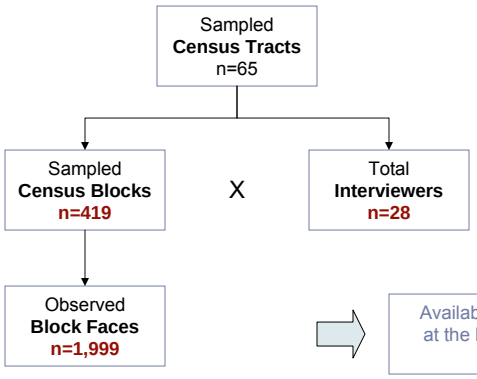
Data Structure & Cases



- Analytic Data has:
  - Only 2 ratings per block
  - Only interviewers that completed assessments in more than 5 blocks

Available assessments at the Block Face level n=5,966

Analytic Data set at the Block Face level n=3,998

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Dependent Variable(s)

- 4 scales of physical environment
  - Physical Disorder (8 items)
  - Social Disorder (7 items)
  - Residential Decay (5 items)
  - Residential Security (5 items)
- Development of scales
  - Dichotomize 4-category Likert scales → Binary Indicators (0,1)
  - Average by geography level → Percentages (%)
- Levels of aggregation
  - Block Face level (n=1,999)
  - Block level (n=419)
  - Tract level (n=65)

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Neighborhood Scales & Items

Scales and Items	Perc.
(1) Physical Disorder	**42.2%**
abandoned cars on street	9.9%
trash or junk on street	56.4%
garbage, litter or broken glass on street	**78.6%**
needles, syringes, condoms or drug re-items on street	**4.0%**
empty beer containers or liquor bottles on street	24.1%
cigarettes or cigar butts or discarded packages on street	63.9%
graffiti on buildings, sidewalks, walls or signs	59.4%
painted-over graffiti on buildings, sidewalks, etc	41.0%
(2) Social Disorder	**2.8%**
saw group appear to be gang on the block	1.0%
saw adults loitering, congregating or hanging out on block	**10.2%**
saw prostitutes on the block	0.5%
saw homeless people or people begging on the block	2.4%
saw people selling illegal drugs on the block	0.6%
saw people drinking alcohol openly on the block	2.6%
saw intoxicated people on the block	1.8%

Tract level aggregates n=65

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Scales and Items	Perc.
(3) Residential Decay	**53.4%**
condition of residential buildings (rev coded)	87.9%
# houses/appts burned out, boarded up, or abandoned	11.2%
# vacant lots on the block	17.1%
# houses/appts w/peeling paint or damaged exterior walls	69.9%
# houses/appts well tended yards or gardens (rev coded)	81.1%
(4) Residential Security	**45.1%**
# houses/appts w/window bars or gratings on doors/windows	67.2%
# houses/appts w/sign private security	47.6%
# houses/appts w/sign protected by dog	31.2%
# houses/appts w/security gates or security fences	62.7%
sign of neighborhood watch in area	16.7%

Tract level aggregates
n=65

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Analysis Plan

1. Classical Analysis of Reliability
   - 4 Scales and 25 Items
   - Reliability: Pearson correlation, % agreement, kappa
   - By level of aggregation (tract, block, block face)
   - By subgroup (interviewer char., block char.)
2. Analysis of Variance
   - 4 Scales
   - Random effects (ICC): tracts, blocks, interviewers, occasions
3. Ecometric Analysis
   - 4 Scales
   - Random effects (ICC): tracts, blocks, interviewers, occasions
   - Fixed effects (β): interviewer char, block char, items
   - Reliability (λ)

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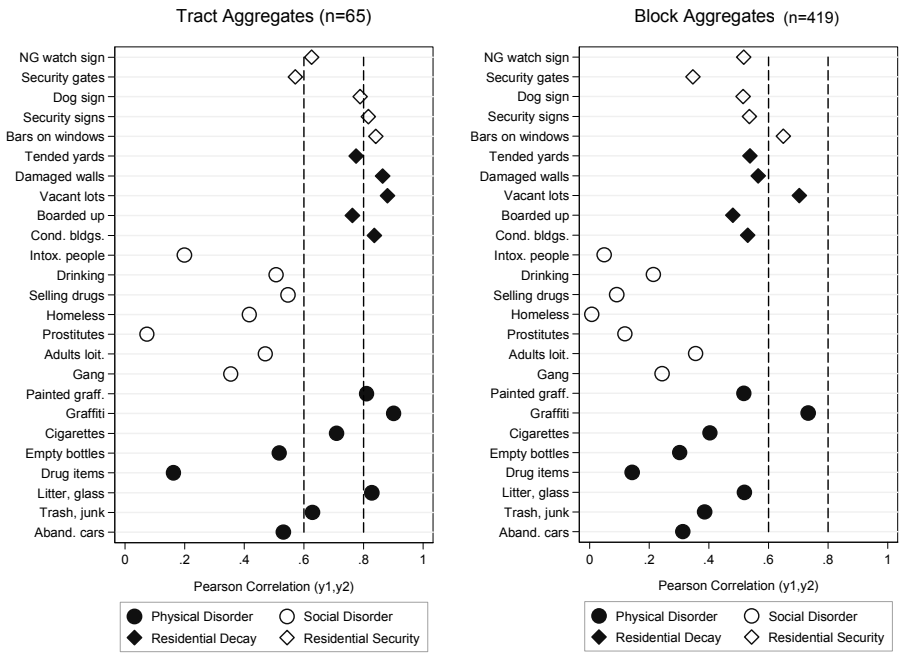
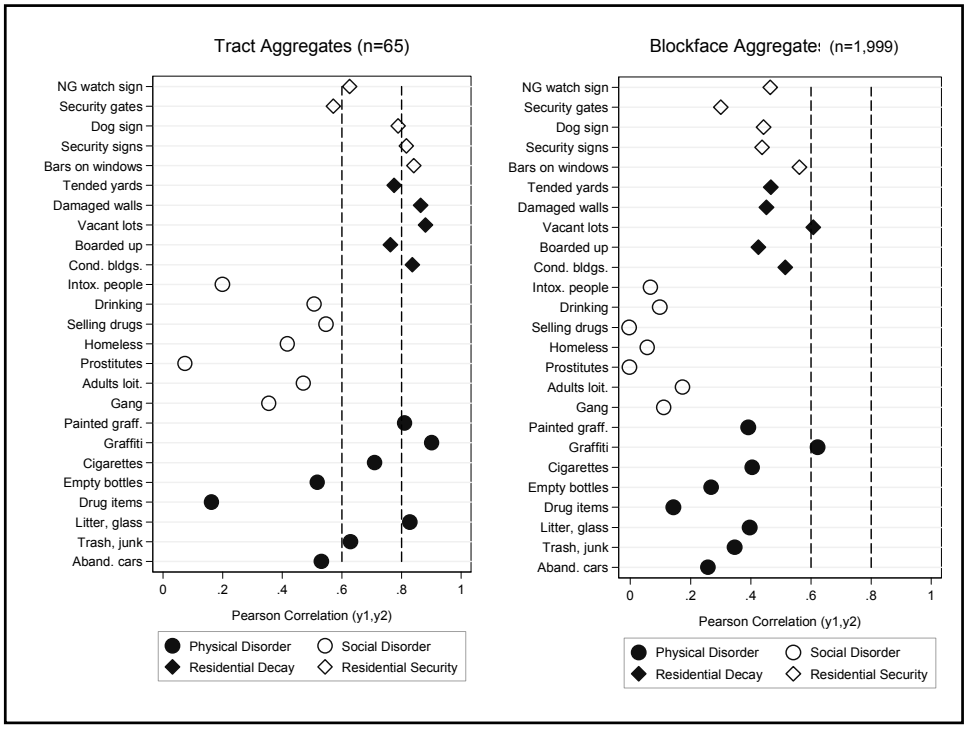
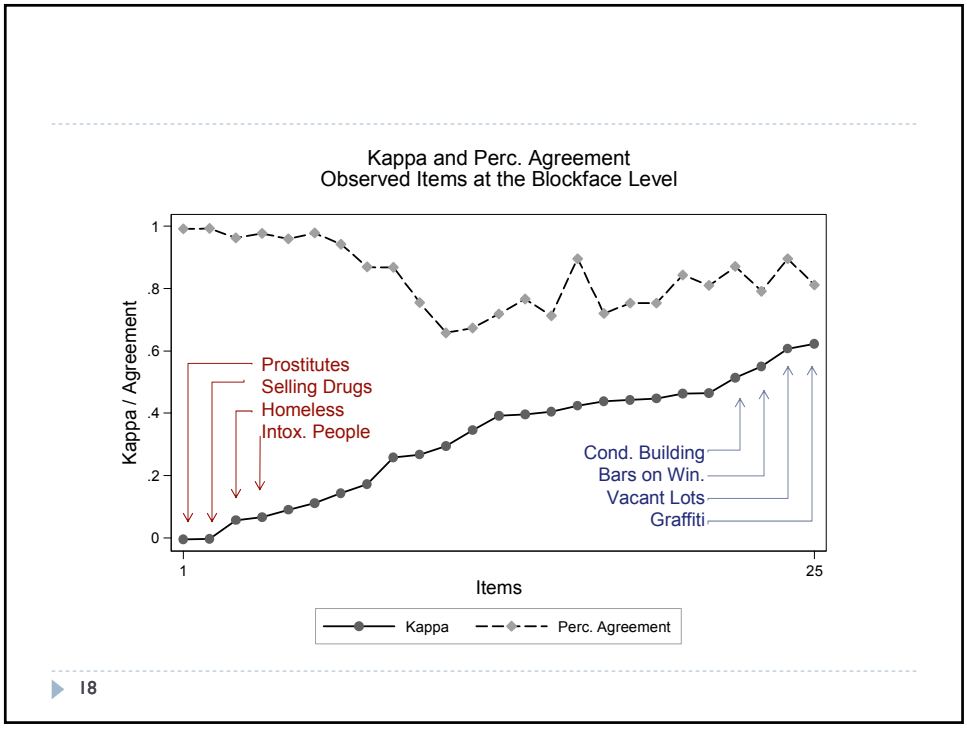
5. Results I

- Classical Analysis of Reliability
  - Estimate of Pearson Correlation (4 scales).
  - Neighborhood characteristics assessed on 2 occasions. By level of aggregation.

Scales	Tract	Block	Block Face
Residential Security	0.741	0.553	0.504
Residential Decay	0.900	0.692	0.629
Social Disorder	0.663	0.353	0.194
Physical Disorder	0.896	0.728	0.682
n	65	419	1,999




Tract Aggregates (n=65)
Blockface Aggregates (n=1,999)
NG watch sign
Security gates
Dog sign
Security signs
Bars on windows
Tended yards
Damaged walls
Vacant lots
Boarded up
Cond. bldgs.
Intox. people
Drinking
Selling drugs
Homeless
Prostitutes
Adults loit.
Gang
Painted graff.
Graffiti
Cigarettes
Empty bottles
Drug items
Litter, glass
Trash, junk
Aband. cars
0
.2
.4
.6
.8
1
Pearson Correlation (y1,y2)
Physical Disorder
Social Disorder
Residential Decay
Residential Security


Kappa and Perc. Agreement
Observed Items at the Blockface Level
Kappa / Agreement
0
.2
.4
.6
.8
1
Prostitutes
Selling Drugs
Homeless
Intox. People
Cond. Building
Bars on Win.
Vacant Lots
Graffiti
1
25
Items
Kappa
Perc. Agreement
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Summary of Results (I)

- Neighborhood Scales
  - Reliability is different for different neighborhood scales
    - R(PD), R(RD) > R(SD), R(RS)
    - Pattern holds across levels of aggregation
  - Reliability decreased as level of aggregation decreases
    - R tract > R block > R block faces
    - Pattern holds across 4 scales
- Neighborhood Items
  - Variability in the estimates of reliability differs across neighborhood scales
    - Var(R(PD)), Var(R(SD)) > Var(R(RD)), Var(R(RS))
    - Pattern holds across levels of aggregation
  - Reliability decreased as level of aggregation decreases

6. Results II

- Analysis of Variance
  - Estimate of Intra-Cluster Correlation (ICC)
  - Tract-level aggregates on 2 occasions (n=65*2).

Variance Component	Physical Dis.	Social Dis.	Res. Decay	Res Security
Tract	**89%**	**66%**	**89%**	**69%**
Residual	11%	34%	11%	31%
Total	100%	100%	100%	100%

  - Estimate of Intra-Cluster Correlation (ICC)
  - Block face-level aggregates on 2 occasions (n=1,999*2).

Variance Component	Physical Dis.	Social Dis.	Res. Decay	Res Security
Tract	**53%**	**14%**	**42%**	**16%**
Residual	47%	86%	58%	84%
Total	100%	100%	100%	100%

Saturated Models

- Estimate of Intra-Cluster Correlation (ICC) for block face-level aggregates on 2 occasions (n=1,999*2)

Variance Components	Physical Disorder	Social Disorder	Residential Decay	Residential Security
Tract	**47%**	**12%**	**28%**	**12%**
Interviewers	**14%**	**6%**	**27%**	**10%**
Blocks	7%	4%	3%	10%
Itwer*Blocks	**<1%**	**3%**	**4%**	
Block Faces	--	--	--	--
Residual	32%	**75%**	38%	**68%**
Total	100%	100%	100%	100%

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Reduced Models

- Estimate of Intra-Cluster Correlation (ICC) for block face-level aggregates on 2 occasions (n=1,999*2)

Variance Components	Physical Disorder	Social Disorder	Residential Decay	Residential Security
Tract	**50%**	**12%**	**35%**	**13%**
Interviewers	--	8%	15%	--
Blocks	12%	--	--	10%
Itwer*Blocks	--	--	--	--
Block Faces	5%	9%	8%	**24%**
Residual	34%	**71%**	**42%**	**52%**
Total	100%	100%	100%	100%

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Summary of Results (II)

- Tract level component
  - % tract variance is different for different neighborhood scales
    - ICC(PD), ICC(RD) > ICC(SD), ICC(RS)
    - Pattern holds across levels of aggregation
  - PD has more tract level variance (ICC=50%).
    - Other scales show lower levels: ICC(RD)= 35%, ICC(RS)=13%, ICC(SD)=12%.
- Interviewer and Block level component
  - Overall effect small when compared to other sources of variation (~10%)
    - Interviewer effect stronger for PD and RS.
    - Block effect stronger for SD and RD.
- Block face and Residual (occasion) component
  - Block face effect strong for RS(24%).
  - Residual effect strong for SD (71%) and RD (52%).

7. Next Steps …

Implement Ecometric analysis:

- Add fixed effects to try to explain part of the random variation
  - Interviewer characteristics
  - Block characteristics
- Expand dataset to allow modeling of item responses
  - E.g. for Physical Disorder (8 items) create a "long" dataset with n=(1,999*2*8)=31,984 cases
  - Include 7 dummy variables at the lower level of the multilevel model
  - Dependent variable is binary indicator of presence of physical disorder
- Estimate Ecometric model
  - Lower level: 1-parameter Rash model
  - Higher levels: Random intercept model (fixed/random effects)

Thank You!

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