Clarifying the Nature of Risk Factors in Schizophrenia

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Invited Paper

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Raulin (EPA, 1996)

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- **What is Schizophrenia?**

Schizophrenia

- A Bio/psycho/social Disorder that has Proved to be a Real Puzzle
- Devastating Cost
  - » Afflicts 1% of Population
  - » 800,000 Treated each year in U.S.
  - » Annual Hospitalization Costs ($30 billion)
  - » Lost Productivity (over $10 billion per year)
  - » Human toll on both patients and family

Meehl's Model

- Diathesis/Stress Model
  - » Schizotaxia: *hypothesized genetic risk factor*
  - » Schizotype: *individual with the risk factor*
  - » Schizophrenic: *decompensated schizotype*
- Detecting Schizotypy is Key to
  - » tracing genetic transmission mechanisms
  - » understanding environmental risk factors

- What is Schizophrenia?
- **Early Research on Schizotypy**

Detecting Schizotypy

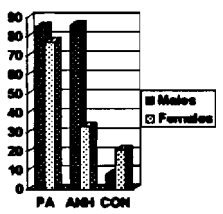
- Schizotypal Signs (Meehl, 1964)
- Chapman et al. Scales
  - » High Quality Psychometric Instruments Physical and Social Anhedonia; Perceptual Aberration; Magical Ideation; Cognitive Slippage; Intense Ambivalence
- Behavioral High Risk Paradigm (Chapman, Chapman, Raulin, & Edell, 1978)

Interview Study

- Three Groups (High Scorers on Physical Anhedonia, Perceptual Aberration, and Control Subjects)
- Blind Clinical Interviews
- Findings
  - » Anhedonics showed poor social functioning
  - » Perceptual Aberrators reported a variety of psychotic-like symptoms

Chapman, Chapman, Raulin, & Edell (1978); Chapman, Edell, & Chapman (1980)

Rorschach Study



- Less susceptible to response set biases
- Three Groups
  - PA=Perceptual Aberration; ANH=Physical Anhedonia; CON=Controls
- Graphed: % scoring above 12 on the Delta Percentage Index

Chapman, Chapman, Raulin, & Edell (1978); Edell & Chapman (1978)

Other Early Findings

- Greater Social Dysfunction (Haberman, Chapman, Numbers, & McFall, 1979; Numbers & Chapman, 1982)
- Impaired Social Perception (Raulin and Henderson, 1987)
- Deviant MMPI Profiles (Chapman, Chapman, & Miller, 1982; Raulin, Van Slyck, & Rourke, 1983)
- Communication Effectiveness (Martin & Chapman, 1982)
- Deviant Eye Tracking (Simons & Katkin, 1985)

- What is Schizophrenia?
- Early Research on Schizotypy
- **The Nature of the Risk**
  - » Hypothesized Causal Chains
  - » How Serious is the Risk?

Hypothesized Causal Chain

- Mechanism to go from Genetic Risk Factor to Schizophrenia
- Characteristics of Risk Factor
  - » must be both subtle and pervasive
- Studying Different Points the Causal Chain
  - » microscopic (e.g., basic processing deficits)
  - » macroscopic (e.g., higher level functioning deficits such as social dysfunction)

Perceptual Processing

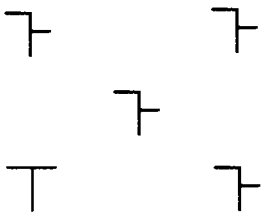
- Preattentive Perceptual Organization
  - » stimulus organization in the first few milliseconds
  - » deficient in schizophrenia (Place & Gilmore, 1980)
- Subtle and Pervasive
- Would such a deficit show up in our Schizotypes?

Raulin (EPA, 1996)

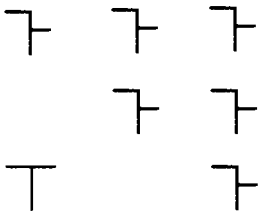
Silverstein Dissertation

- Four Groups (Physical Anhedonics, Perceptual Aberrators, Depressed Control Subjects, and Normal Control Subjects)
- Three Studies, Each using a Different Paradigm
  - » Speeded Classification Paradigm
  - » Visual Suffix Effect
  - » Configural Superiority Effect

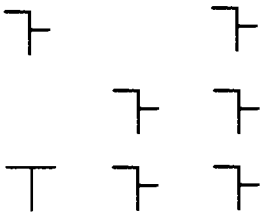
Speeded Classification #1



Speeded Classification #2



Speeded Classification #3



Visual Suffix

(1) 625084

(2) 6250840

(3) 625084000

(4) 625084#

(5) 625084^{0}

(6) 625084$^{000}_{000}$

Configural Superiority

Condition 1 Condition 2

(vs.) ((vs.)(

Results

- Had expected the largest deficits in anhedonic subjects
- No Group Differences in Any of the Three Paradigms
- Adequate to Excellent Power in Each Paradigm

Silverstein, Raulin, Pristach, & Pomerantz (1992)

Communicating Emotion

- Most Emotional Expression is Nonverbal
  - » Facial expressions, posture, tone of voice
- Critical to Social Interaction
  - » Some messages are strictly nonverbal
  - » Nonverbal cues often modify verbal messages
- Deficient in Patients with Schizophrenia
- A Likely Causal or Contributory Factor

Sobota Dissertation

- Three Groups (Anhedonics, PerMags, and Controls)
- Several Dependent Measures
  - » Perception (Profile of Nonverbal Sensitivity Test)
  - » Expression (Affective Communication Test)
  - » Secondary Social Variables (Liking People; Social Anxiety; Interpersonal Success)

Sobota & Raulin (1991)

Results

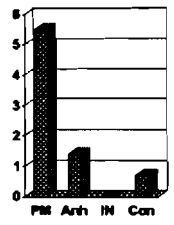
- No Deficits Found in Perception of Nonverbal Emotional Cues
- Anhedonics Reported Being Less Emotionally Expressive
- Secondary Social Variables
  - » PerMags more anxious but still successful
  - » Anhedonics less successful but not anxious
  - » Both groups reported liking people less

How Serious is the Risk?

- Initial Data Show
  - » Some subjects do show signs reported retrospectively by patients with schizophrenia
  - » These subjects show some, but not all, of the characteristics found in schizophrenic patients
- Only One Way to Evaluate Risk
  - » Longitudinal Study

Follow-up Study

- Four Groups (Physical Anhedonia, PerMag, Impulsive Nonconformity, Controls)
- 95% Success in Retesting 10-12 years after Initial Evaluation
- % Psychotic (excluding major depression)



Chapman, Chapman, Kwapil, Eckblad, & Zinser (1994)

- What is Schizophrenia?
- Early Research on Schizotypy
- The Nature of the Risk
  - » Hypothesized Causal Chains
  - » How Serious is the Risk?
- **Dimension or Category of Risk?**

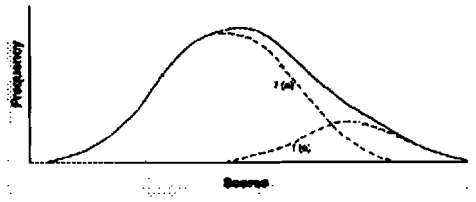
Meehl's Schizotypy

- Schizotaxia, Schizotypy, Schizophrenia
- A Taxonic Theory
- Difference in Kind, Not Just Degree
- A Theoretical Proposition, But Also an Empirically Testable Hypothesis

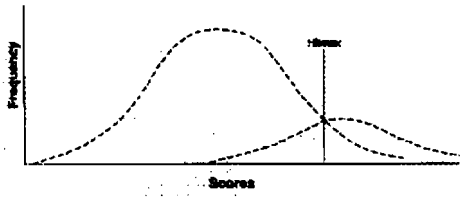
Taxometric Search

- Meehl and Colleagues
- Based on Expected Mathematical Relationships
- We have used several procedures
  - » MAMBAC (Mean above and below a cut)
  - » MAXCOV (Maximum Covariance)
  - » MAXSLOPE (Maximum Slope)

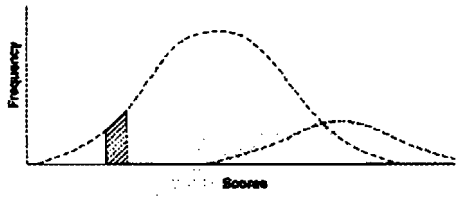
Taxon Search Logic #1



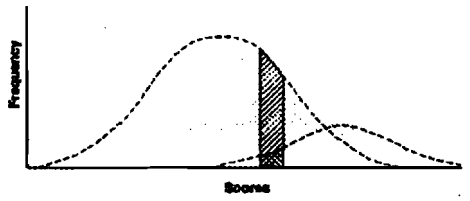
Taxon Search Logic #2



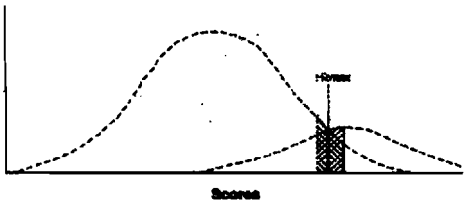
Taxon Search Logic #3



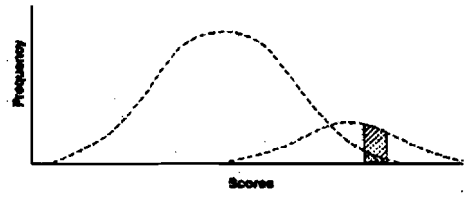
Taxon Search Logic #4



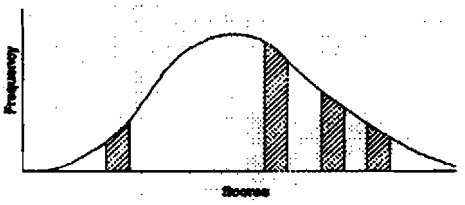
Taxon Search Logic #5



Taxon Search Logic #6



Taxon Search Logic #7



Sample and Measures

- 5255 Subjects
  - » 2752 Males
  - » 2503 Females
- Completed Protocols and Low Infrequency Scores
- Perceptual Aberration
- Magical Ideation
- Cognitive Slippage
- Infrequency Scale

MAMBAC

- Mean Above and Below a Cut
- Sensitive to the Existence of Taxonicity
- Procedure
  - » Sliding Cut on One of Two Indicators
  - » Mean Difference on Second Indicator for those Above and Below the Cut
  - » Difference at Point of Maximum Discrimination (i.e., HITMAX)

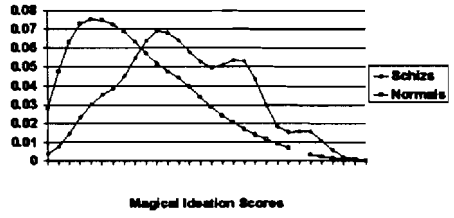
MAXCOV

- Requires 3 Indicators that are Pairwise Uncorrelated Within Taxa
- Procedure
  - » Sliding Interval on Variable X
  - » Compute Cov_{YZ} for Each Interval
  - » Maximum Covariance at HITMAX

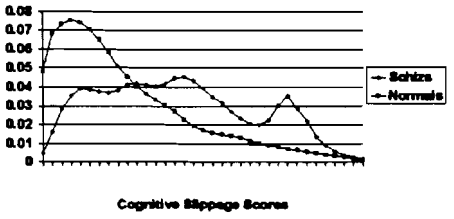
Base Rate Estimates

- Schizotypy Base Rate Estimates
  - » Perceptual Aberration (7%)
  - » Magical Ideation (10%)
  - » Cognitive Slippage (8%)
- Consistent with
  - » Each Other
  - » Other Data (Lenzenweger & Korfine, 1992)
  - » Expected Values from Genetic Models

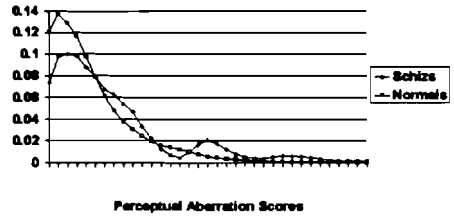
Latent Distributions



Latent Distributions



Latent Distributions



MAXSLOPE Procedure

- Same Principle as MAXCOV
- Graphical Procedure
- Slope is Maximal at HITMAX
- Results were Disappointing
- MAXSLOPE is either
  - » less powerful
  - » less robust to violations of assumptions

Taxometric Search Summary

- Suggestive of an Underlying Taxonomy
- Latent Distributions Suggests These Scales do a Poor Job of Discriminating the Taxonomy
- Solution: Improve the Scales!

Scale Refinement

- Item Analysis to Refine Scales
- Test Procedures with
  - » Our sample of 5000+ subjects
  - » Using Monte Carlo techniques
- Be Sensitive to Possible Artifacts
- Monte Carlo Studies to Determine the Risk of Psychometric Artifact

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- What is Schizophrenia?
- Early Research on Schizotypy
- The Nature of the Risk
  - » Hypothesized Causal Chains
  - » How Serious is the Risk?
- Dimension or Category of Risk?
- **Future Research Directions**

Future Research

- Refine the Detection of Schizotypy
- More Sensitive Detection of the Schizotype Will Increase Power in Studies of Both Biological and Cognitive Variables
- Study Compensated Schizotypes for Clues as to Protective Factors

Taxometric Search

- Scale Refinement
- Monte Carlo Studies of
  - » detecting artifactual findings
  - » refining taxometric search procedures to increase their sensitivity (using iterative procedures)
- Developing New Strategies or More Effective Variations of the Old Strategies

Conclusions

- Still a Challenging Puzzle
- Research as an Iterative Process
  - » Theorize
  - » Measure
  - » Test Theory
  - » Refine Both Theory and Measures
  - » Repeat Until You Get It Right or Prove It Wrong