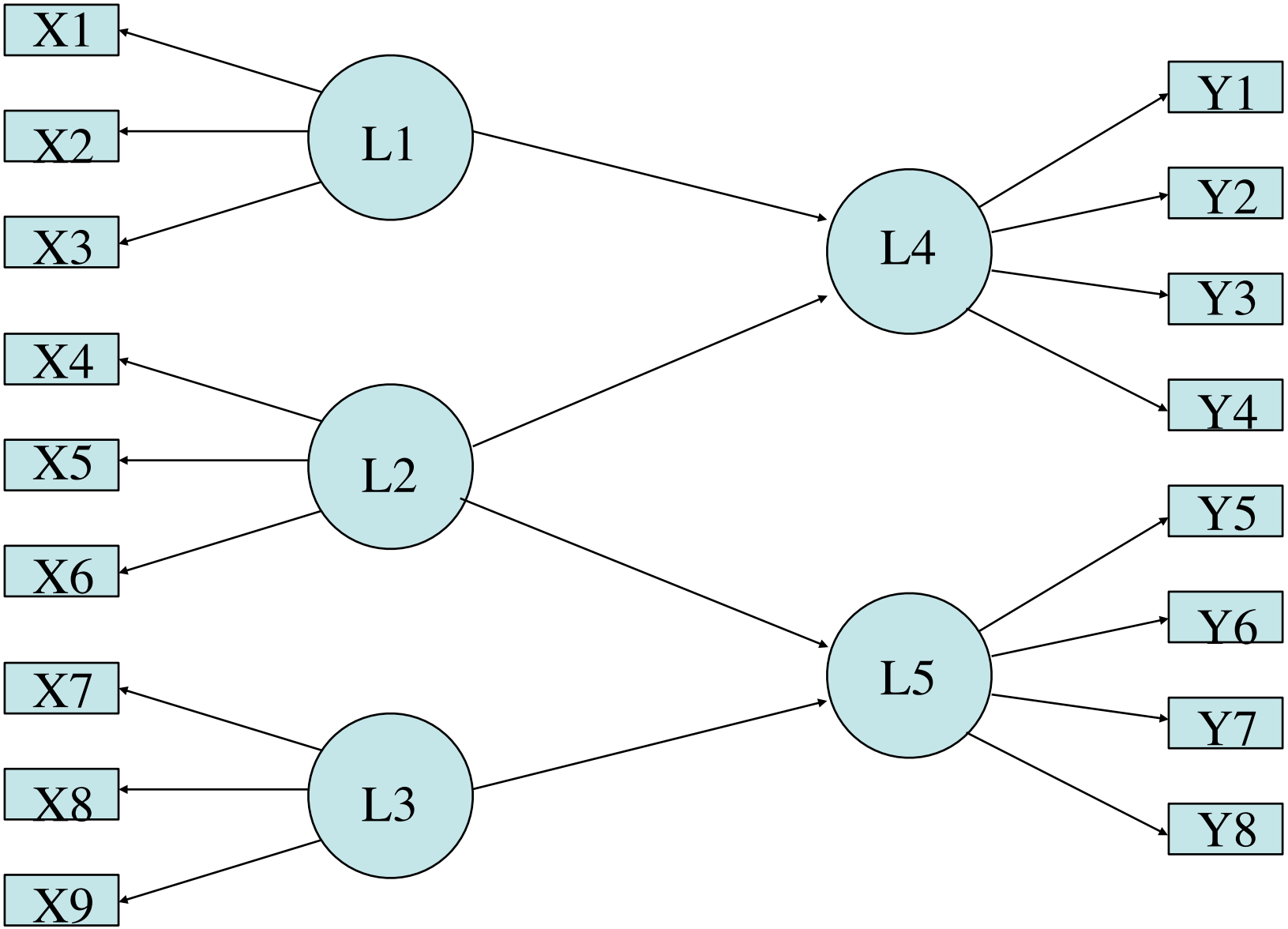
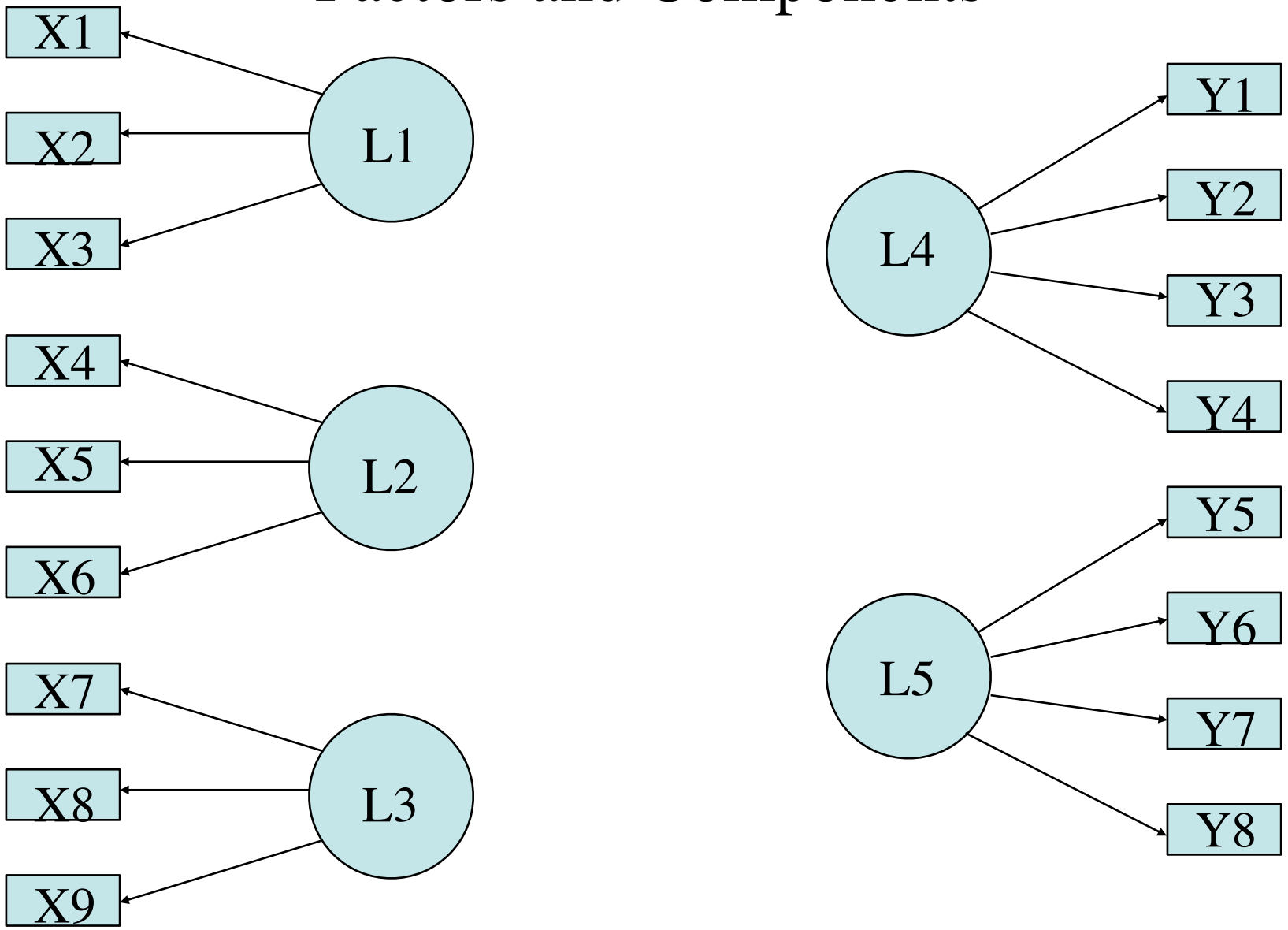
Scale Construction

Multiple methods, multiple problems

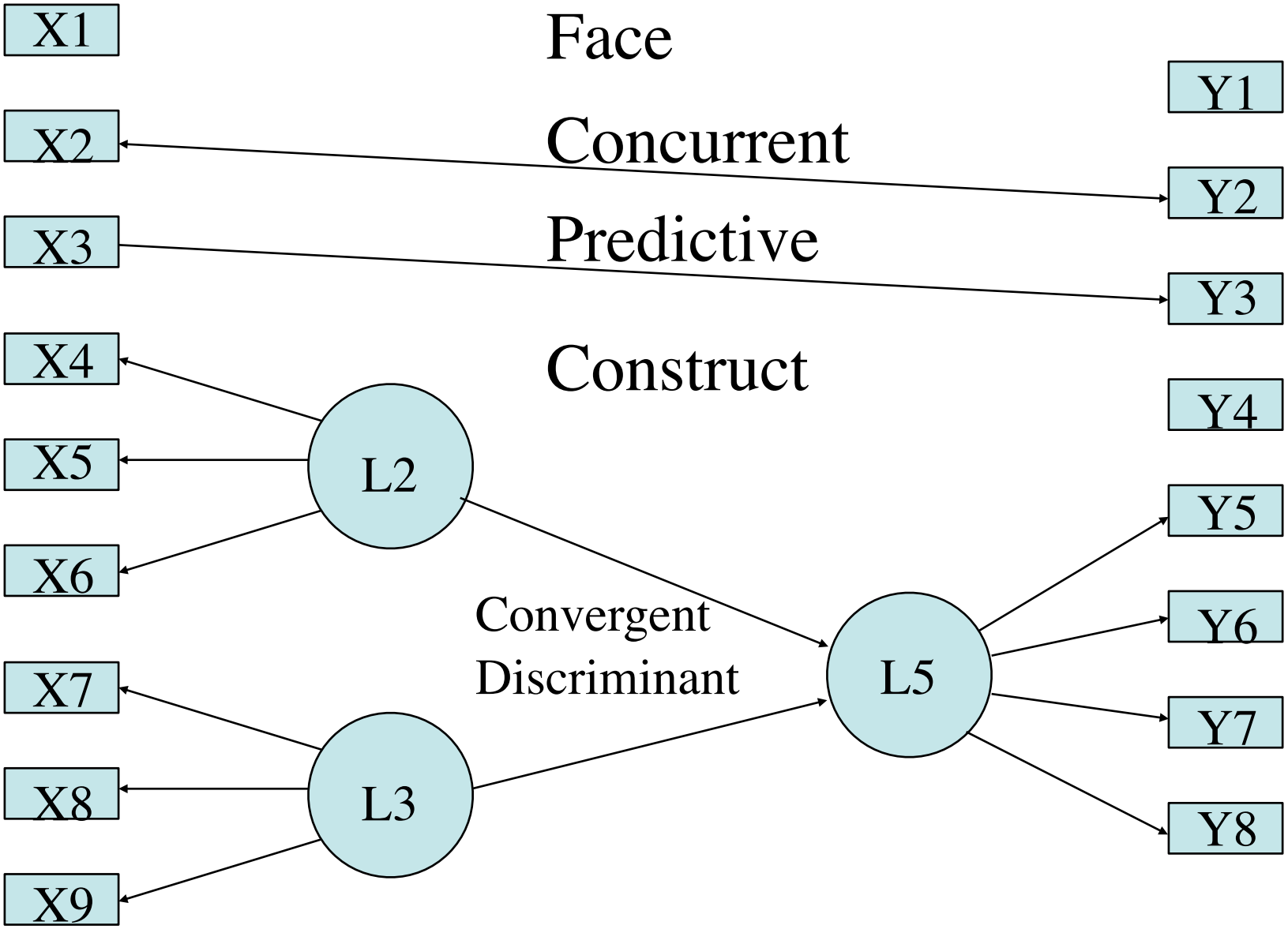
Psychometric Theory: A conceptual Syllabus



Techniques of Data Reduction: Factors and Components



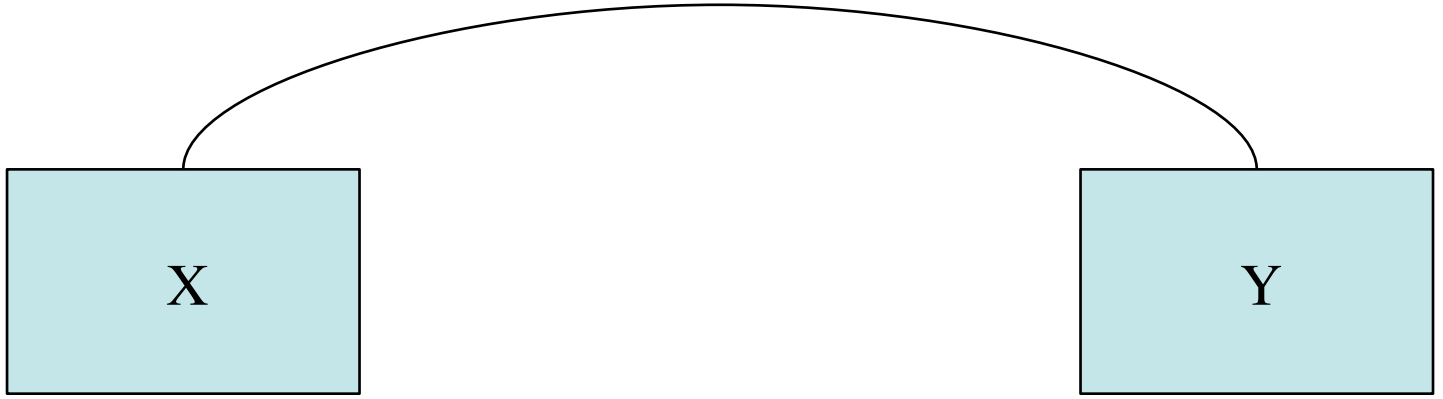
Types of Validity: What are we measuring



Face (Faith Validity)

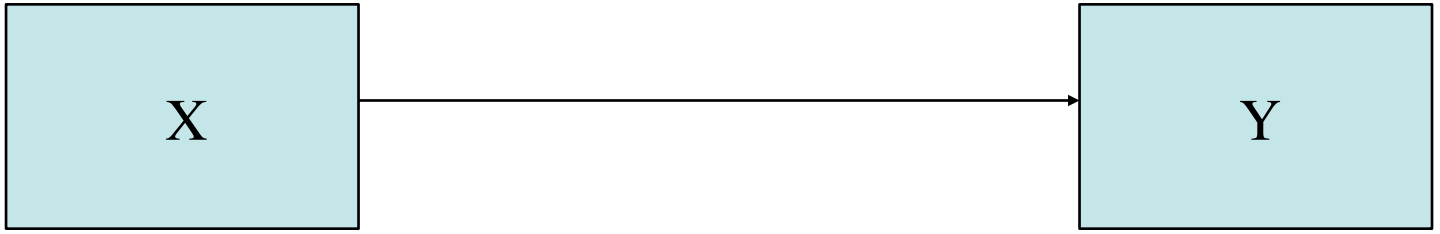
- Representative content
- Seeming relevance

Concurrent Validity



- Does a measure correlate with the criterion?
- Need to define the criterion.
- Assumes that what correlates now will have predictive value.

Predictive Validity



- Does a measure correlate with the criterion?
- Need to define the criterion.
- Requires waiting for time to pass.

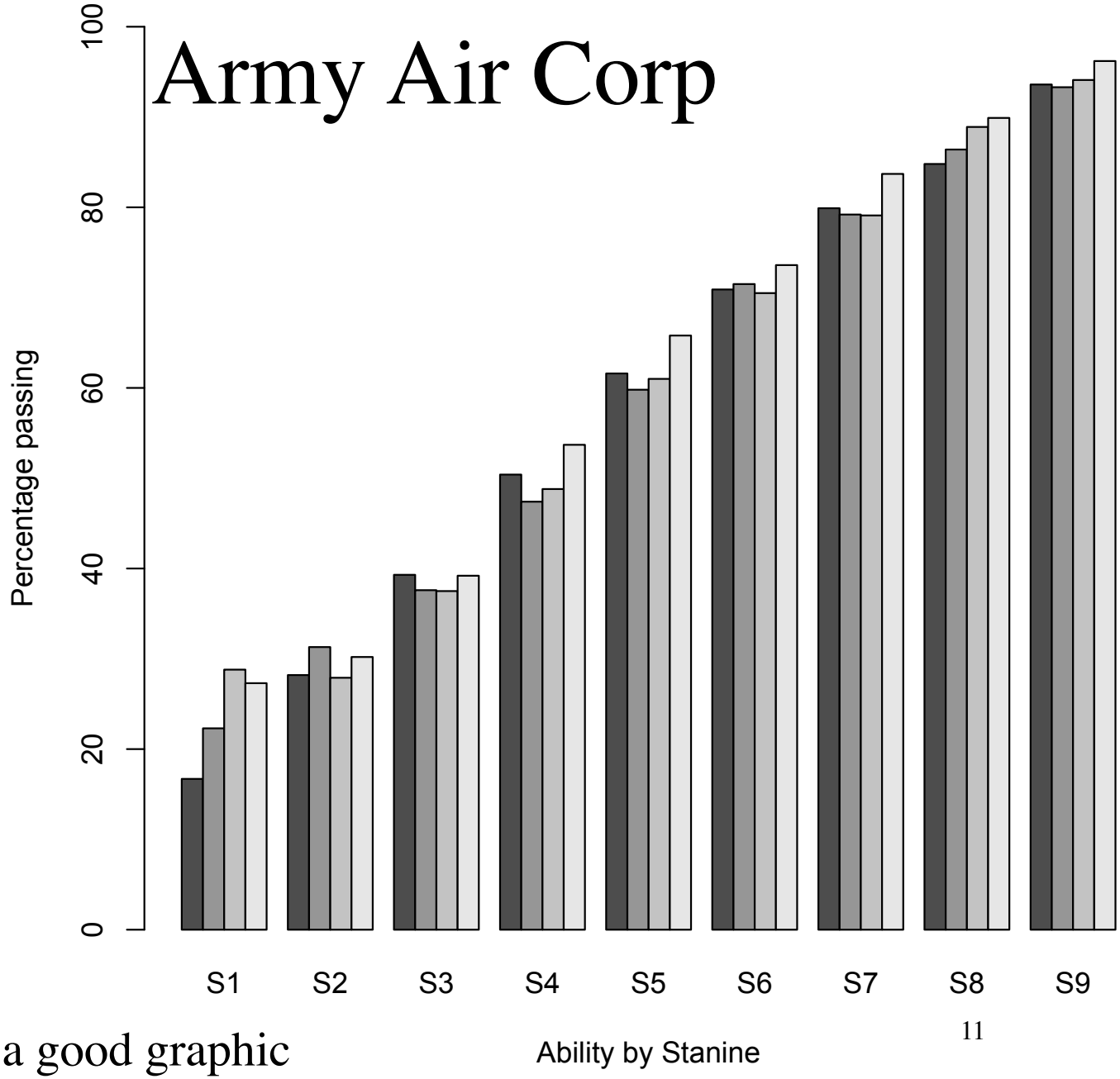
Type of correlation

- Continuous predictor, continuous criterion
  - Regression, multiple regression, correlation
  - Slope of regression implies how much change for unit change in predictor
- Continuous predictor, dichotomous criterion
  - point bi-serial correlation
- Dichotomous predictor, dichotomous outcome
  - Phi

Classics in Selection/Assessment

- Gideon's selection of soldiers
- OSS and Army Air Corps selection studies
- Kelly and Fiske (1950) selection of psychology students
- Astronaut selection
- Peace Corps selection

Gideon's assessment technique



r = .45

The power of a good graphic

Kelly and Fiske (1950)

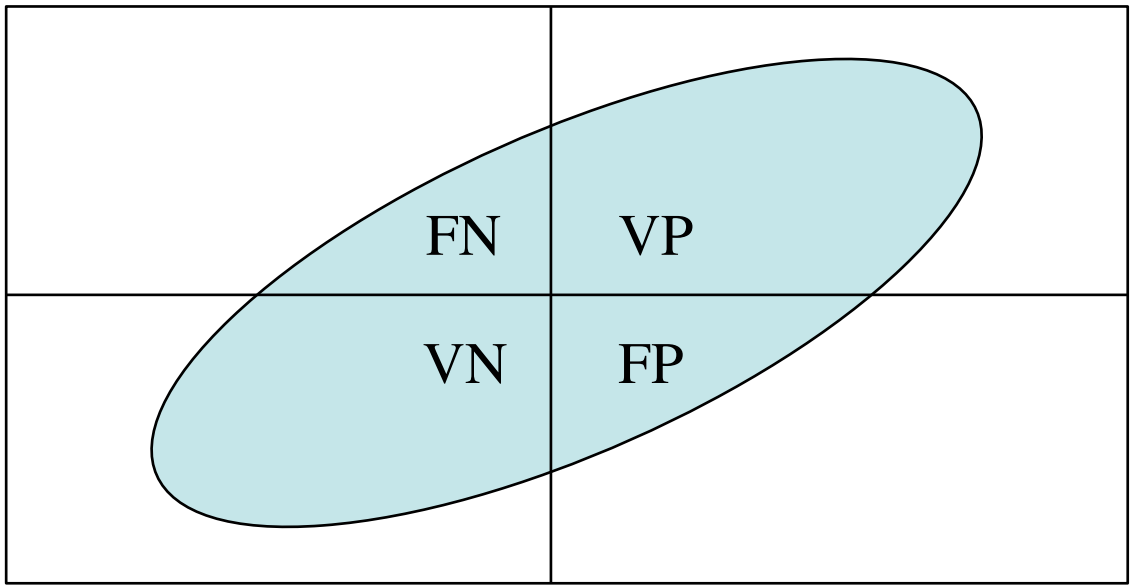
- Multiple predictors of graduate school performance: Kelly and Fiske (1950), Kuncel et al. (2001)
- Multiple predictors

- Ability, Interests, temperament (each with r ≈ .2 -.25) have multiple R of .4-.5

Predictive and Concurrent Validity and Decision Making

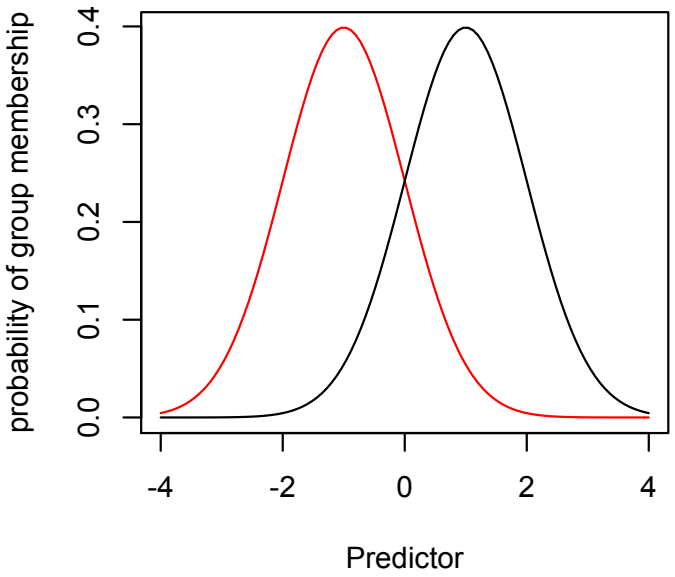
Hit Rate = Valid Positive + False Negative

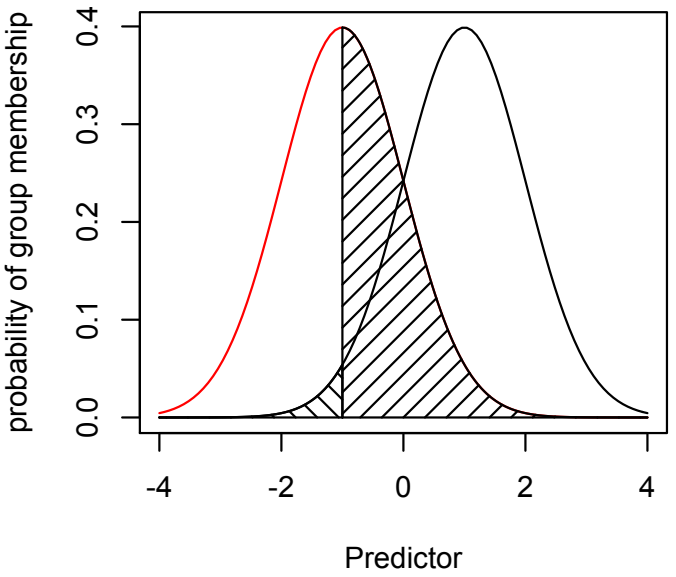
Selection Ratio = Valid Positive + False Positive



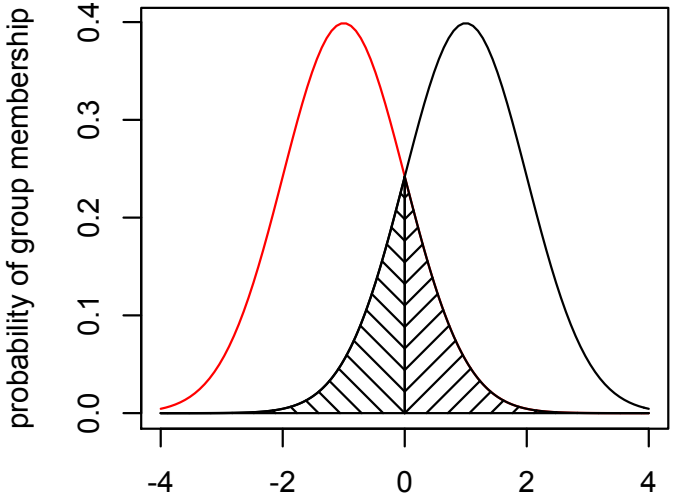
Phi =(VP - HR*SR) /sqrt(HR*(1-HR)*(SR)*(1-SR)

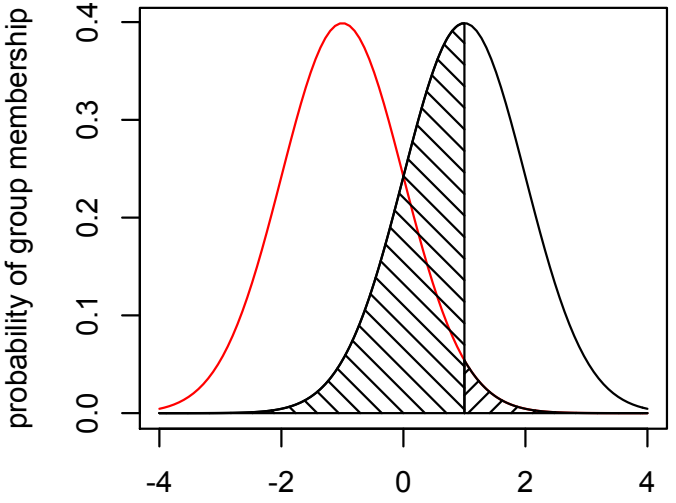
Validity as decision making



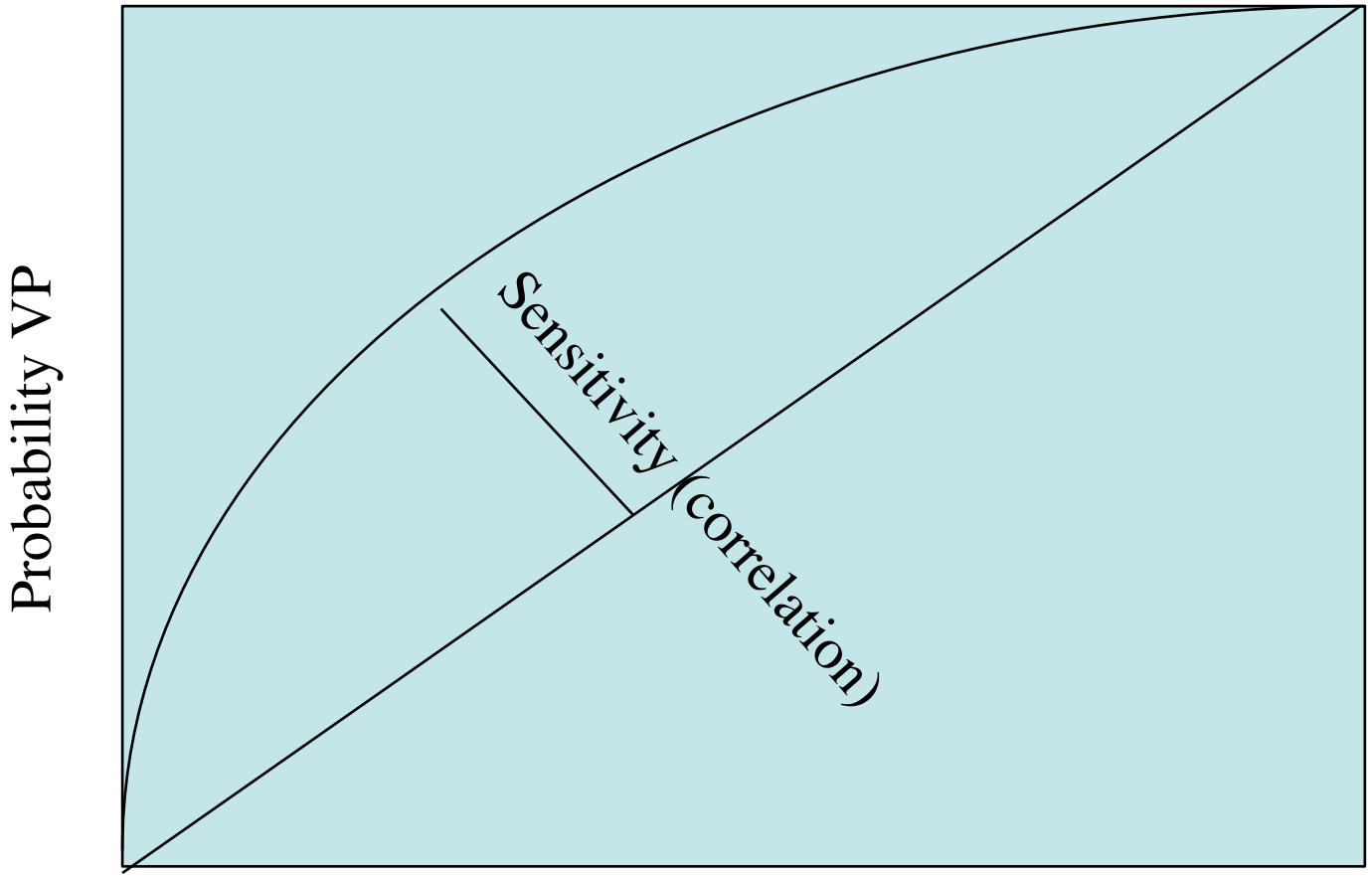


Trading off Valid positives for False Positives





Decision Theory and Signal Detection



Signal detection theory

- d prime and beta
  - d prime maps to the correlation
  - beta maps to selection ratio
- type I and type II error
  - Need to consider utility of types of error

Predictive Validity and Decision Theory

			State of world
	FN	VP	Hit rate
	VN	FP	1-HR
Decision	1-SR	Selection Ratio	

Predictive Validity, Utility and Decision Theory

			State of world
	FN *U_{FN}	VP *U_{VP}	Hit rate
	VN *U_{VN}	FP* U_{FP}	1-HR
Decision	1-SR	Selection Ratio	

Utility of test = VP *U_{VP} + VN *U_{VN} + FN *U_{FN} + FP* U_{FP} - Cost of test

Decisions for institutions, advice for individuals

			State of world
	FN *U_{FN}	VP *U_{VP}	Hit rate
	VN *U_{VN}	FP* U_{FP}	1-HR
Decision	1-SR	Selection Ratio	

Utility of test = VP *U_{VP} + VN *U_{VN} + FN *U_{FN} + FP* U_{FP} - Cost of test

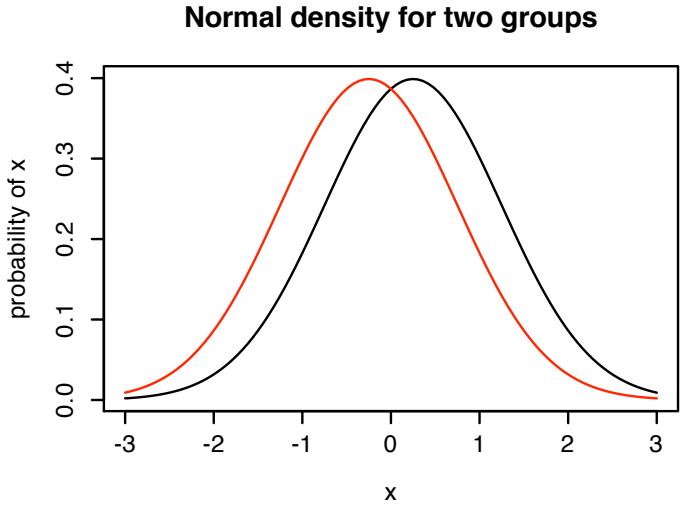
Decision making and the benefit of extreme selection ratios

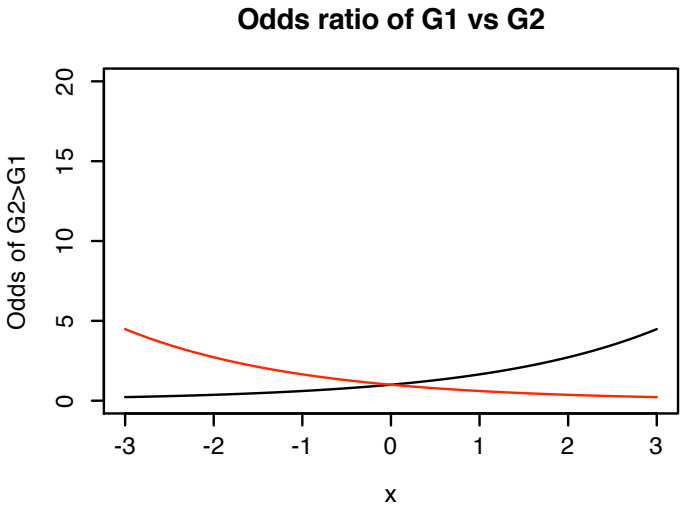
- Typical traits are approximated by a normal distribution.
- Small differences in means or variances can lead to large differences in relative odds at the tails
- Accuracy of decision/prediction is higher for extreme values.
- Do we infer trait mean differences from observing differences of extreme values?

- (code for these graphs at personality-project.org/r/extreme.r)

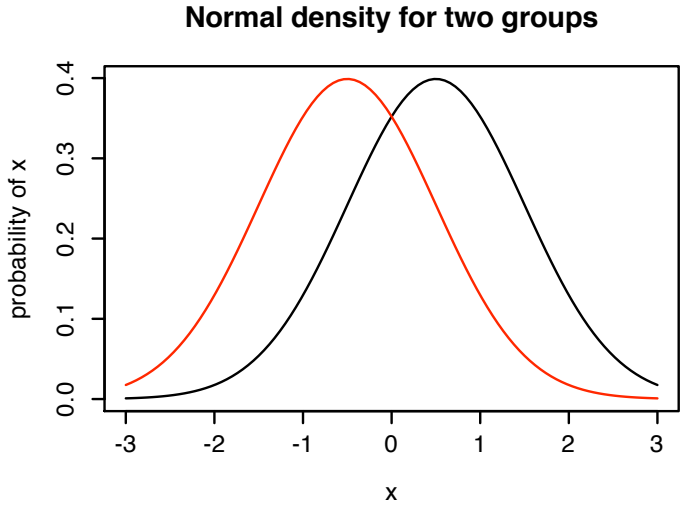
Odds ratios as f(mean difference, extremity)

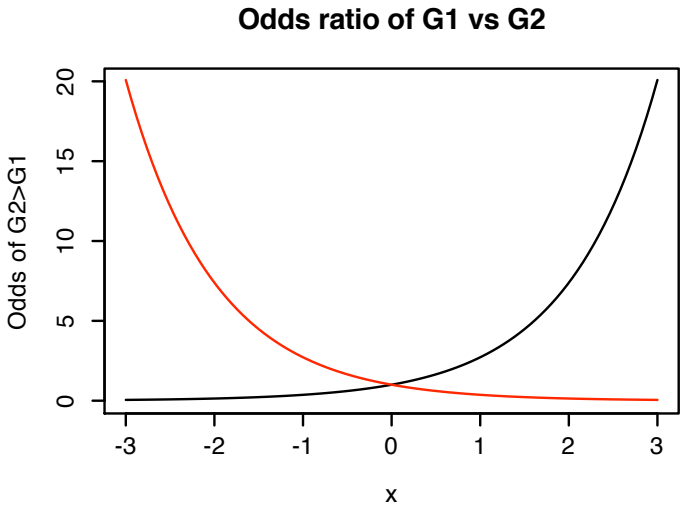
Difference =.5 sigma





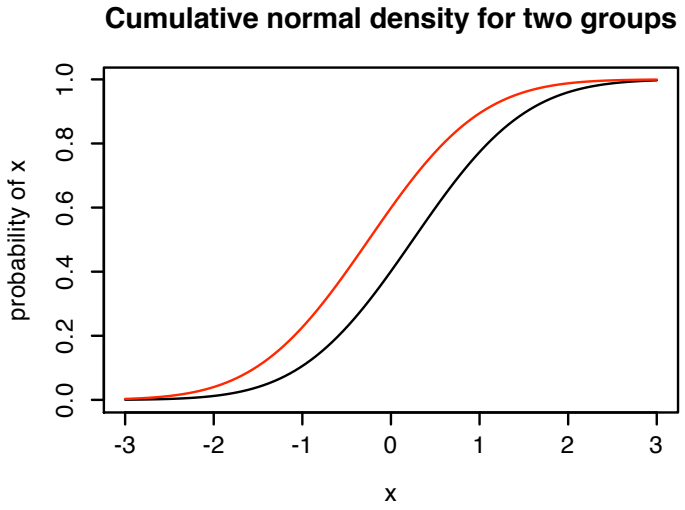
Difference =1.0 sigma

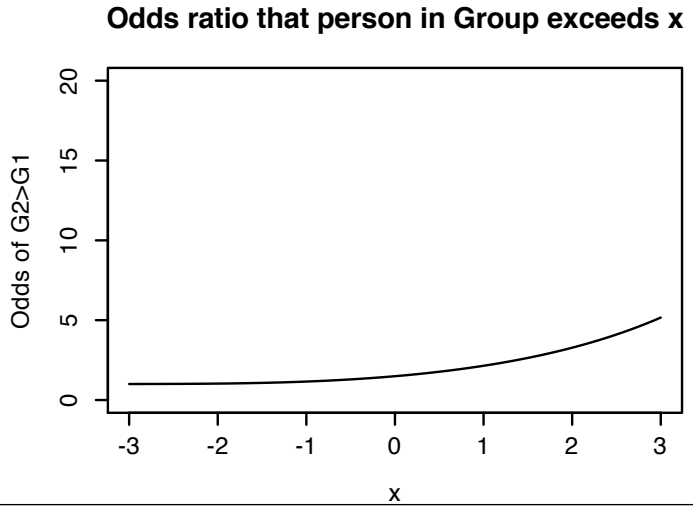




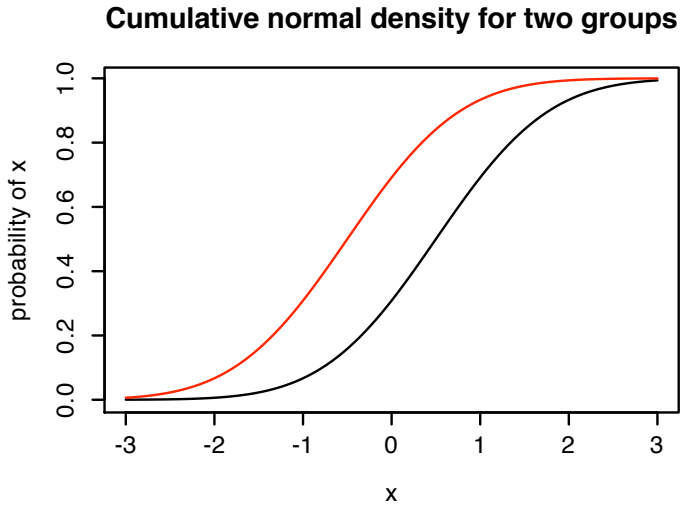
The effect of group differences on likelihod of extreme scores

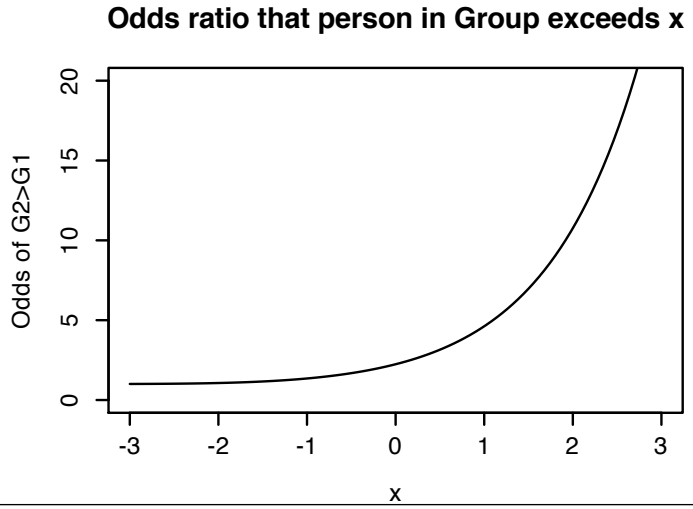
Difference =.5 sigma



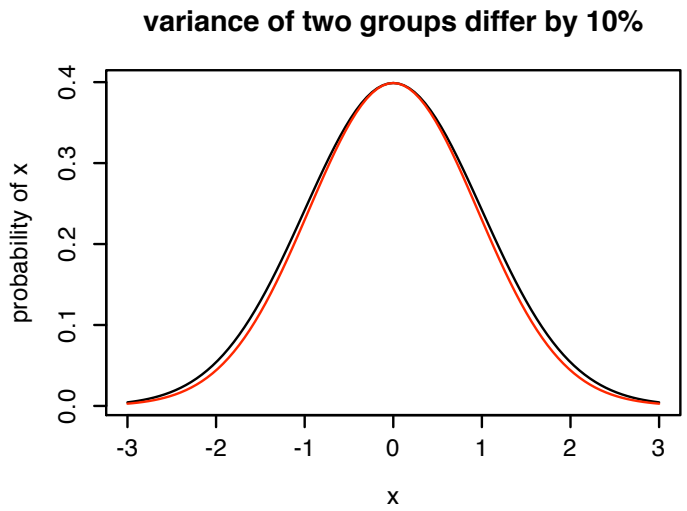


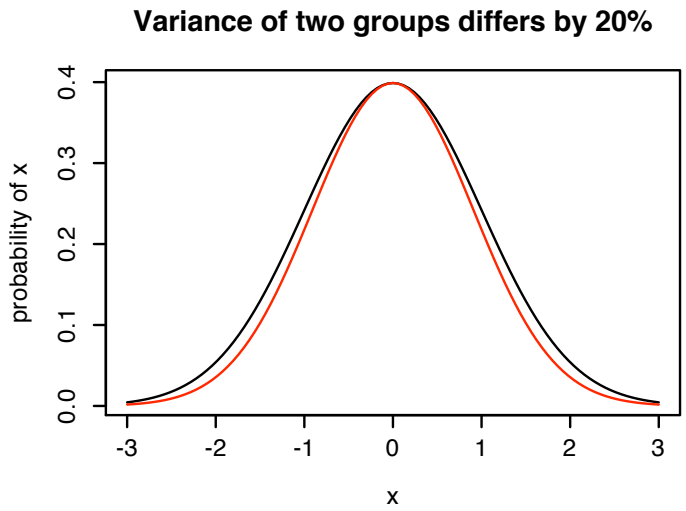
Difference =1.0 sigma

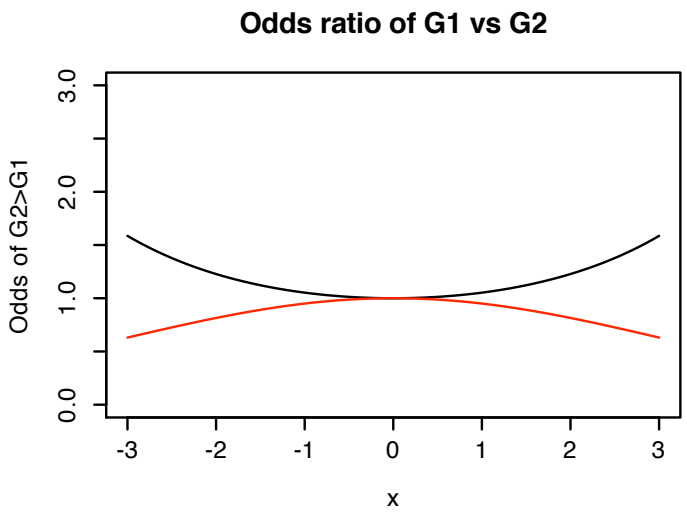


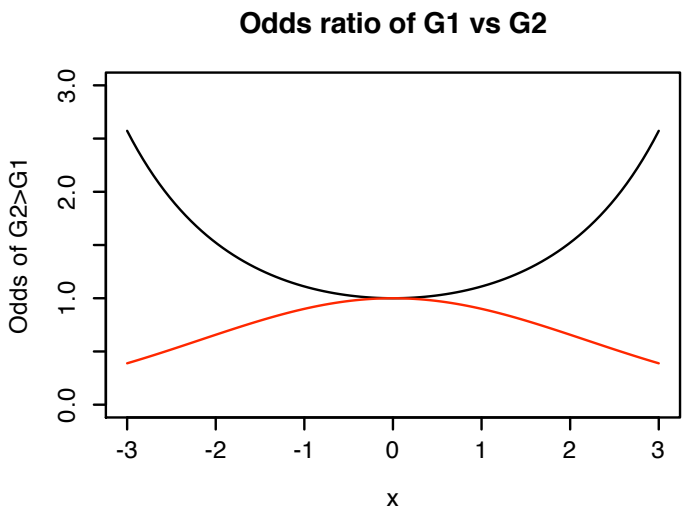


The effect of differences of variance on odds ratios at the tails





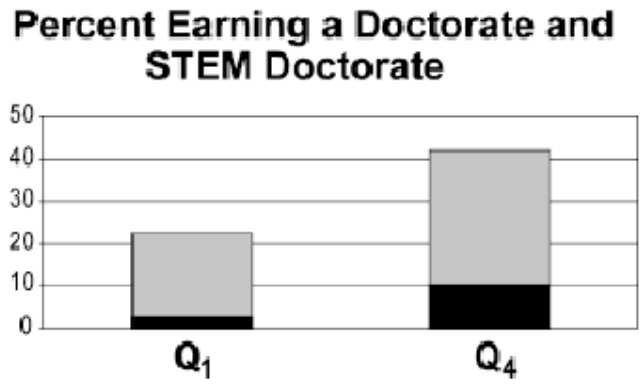


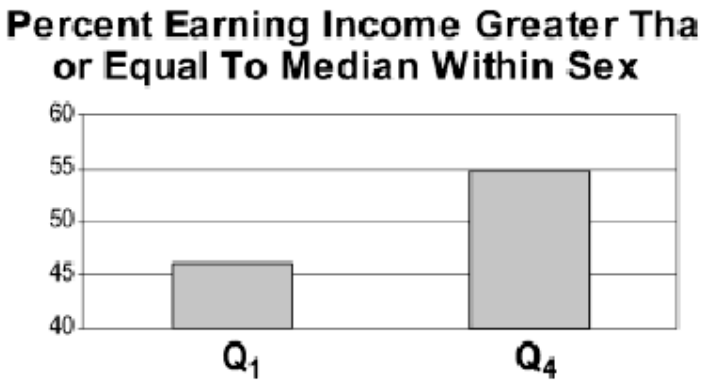


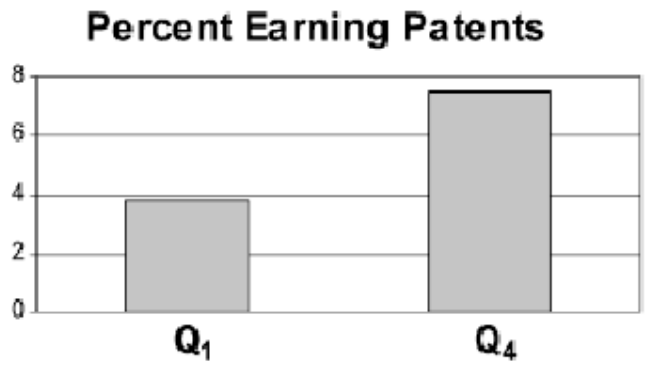
Restriction of range

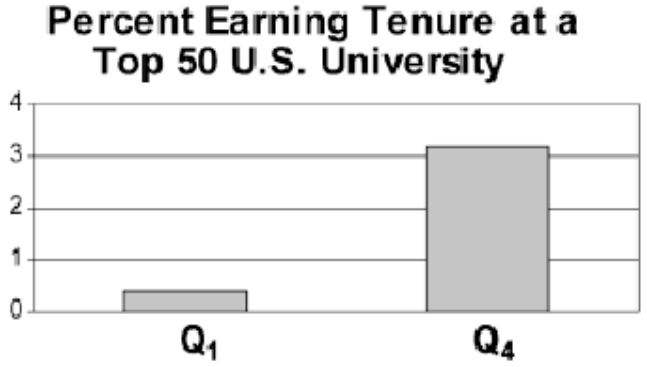
- Validity of SAT is partially limited by range restriction. (see Lubinski and Benbow)
- Consider giving SATs to 12-13 year olds
  - SAT M ≥ 390 or SAV V ≥ 370 (top 1 in 100)
  - SAT M ≥ 500 or SAV V ≥ 430 (top 1 in 200)
  - SAT M ≥ 700 or SAV M ≥ 430 (top 1 in 10,000)
  -

Predictions within top student group



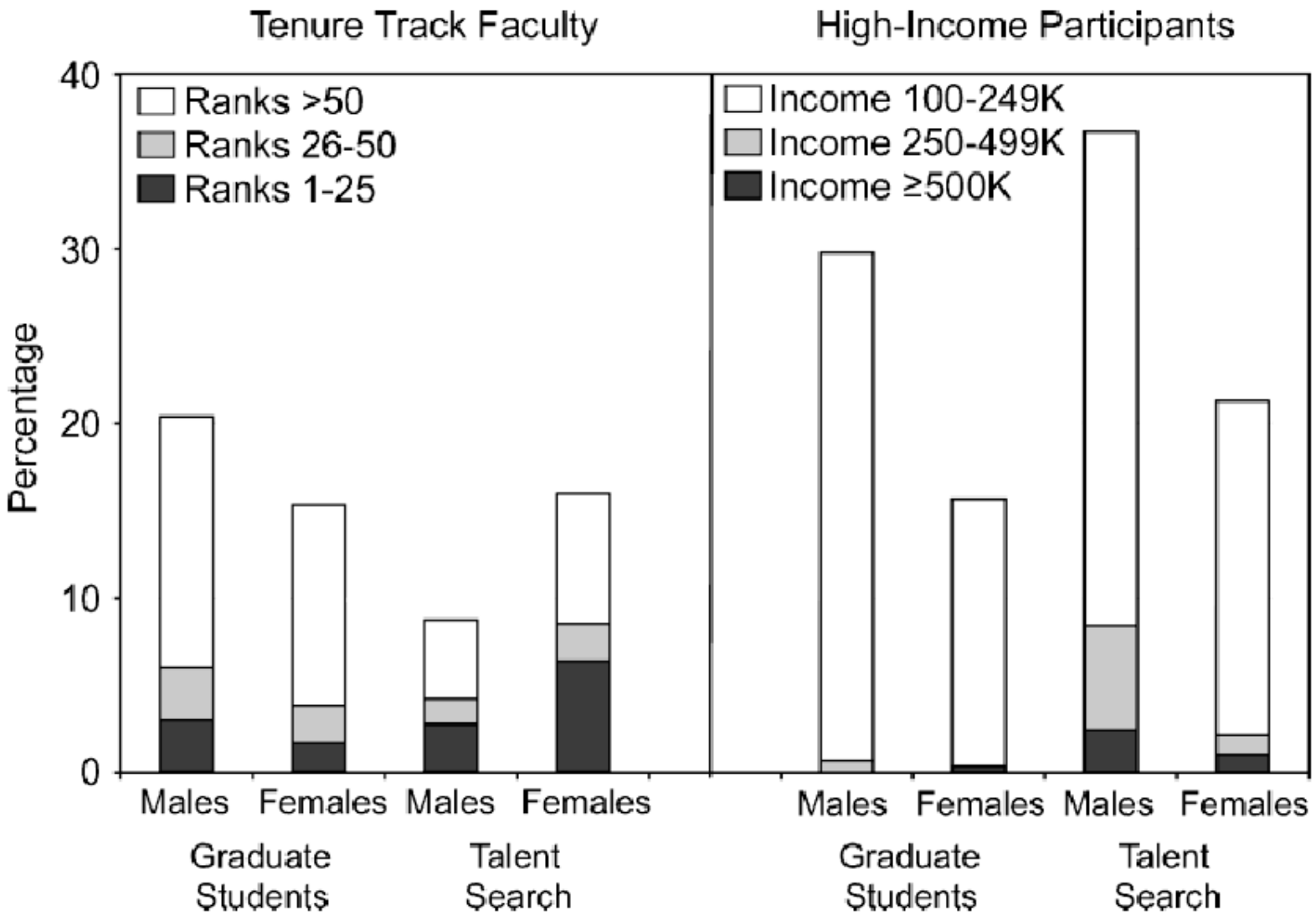




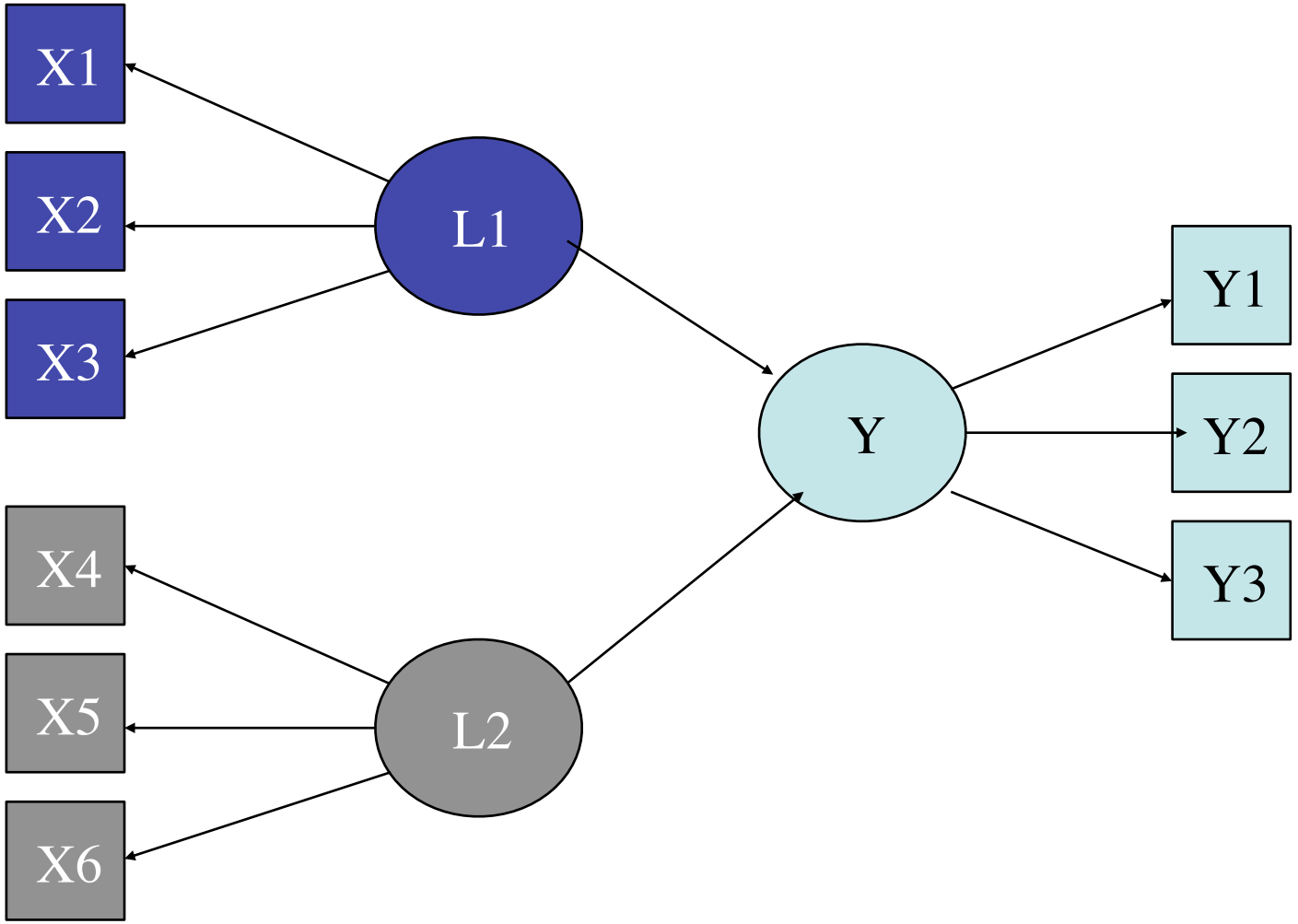


Validity continues even among top 1%

Validity over 25 years



Construct Validity: Convergent, Discriminant, Incremental



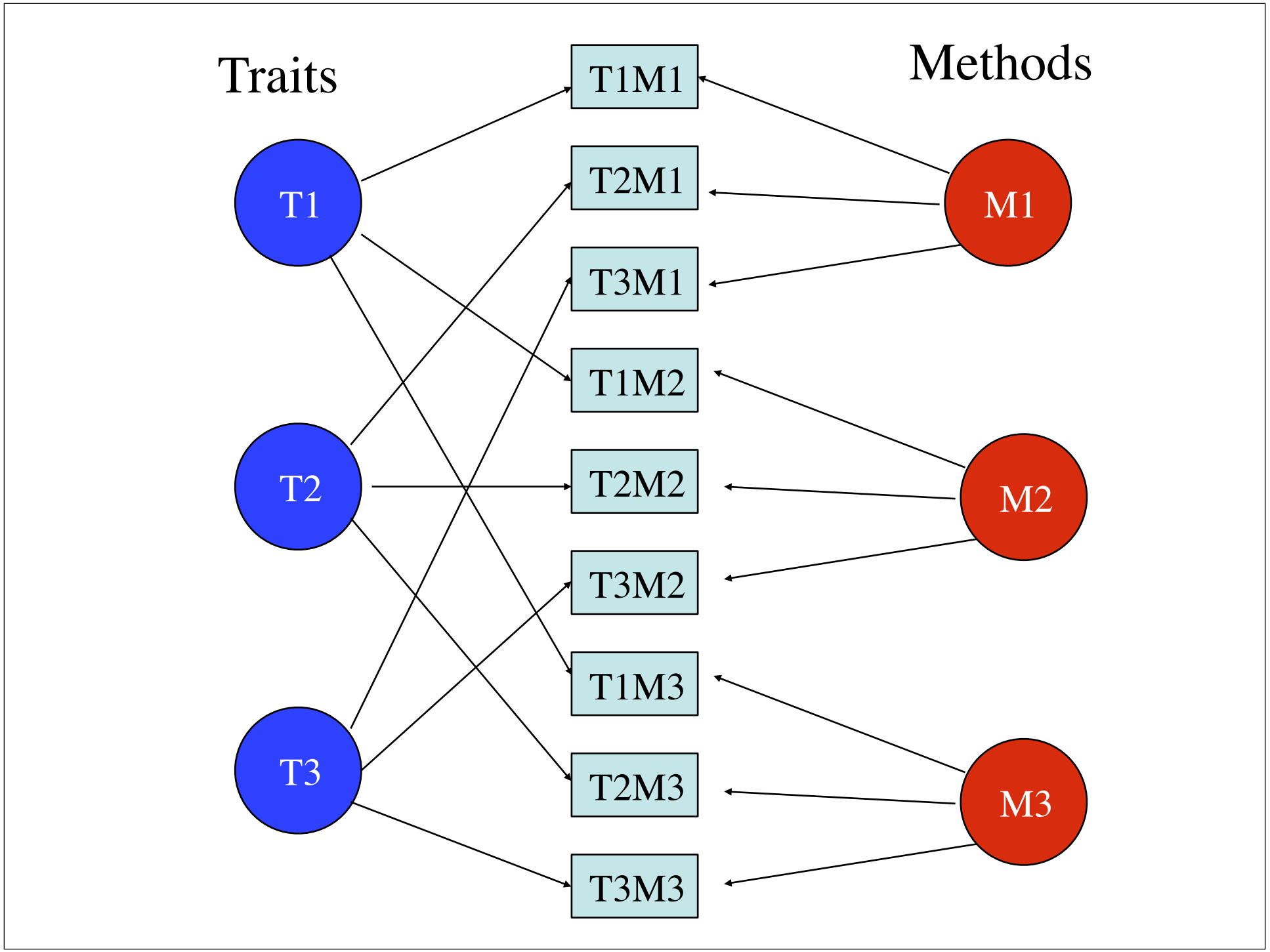
Multi-Trait, Multi-Method Matrix

	T1M1	T2M1	T3M1	T1M2	T2M2	T3M2	T1M3	T2M3	T3M3
T1M1	T1M1								
T2M1	M1	T2M1							
T3M1	M1	M1	T3M1						
T1M2	T1			T1M2					
T2M2		T2		M2	T2M2				
T3M2			T3	M2	M2	T3M2			
T1M3	T1			T1			T1M3		
T2M3		T2			T2		M3	T2M3	
T3M3			T3			T3	M3	M3	T3M3

Mono-Method, Mono trait = reliability

Hetero Method, Mono Trait = convergent validity

Hetero Method, Hetero Trait = discriminant validity


Traits
Methods
T1
T2
T3
T1M1
T2M1
T3M1
T1M2
T2M2
T3M2
T1M3
T2M3
T3M3
M1
M2
M3

Methods of Scale Construction

- Empirical
  - MMPI, Strong
- Rational
  - CPI
- Theoretical
  - NAch
- Homogeneous

  EPI, 16PF, NEO

Empirical Keying

- Ask items that discriminate known groups
  - People in general versus specific group
  - Choose items that are maximally independent and that have highest validities
- Example:
  - MMPI
  - Strong-Campbell
  - sex and ethnic differences in personality and music
- Problem:
  - What is the meaning of the scale?
  - Need to develop new scale for every new group

Sex differences at item level

Item	effect size
Get overwhelmed by emotions.	0.59
Sympathize with others' feelings.	0.45
Worry about things.	0.43
Feel others' emotions.	0.39
Get stressed out easily.	0.51
Have a soft heart.	0.38
Panic easily	0.50
Inquire about others' well-being.	0.41
Get upset by unpleasant thoughts that come into my mind.	0.38
Get upset easily.	0.37
Am indifferent to the feelings of others.	-0.33
Am not interested in other people's problems.	-0.33
Feel little concern for others.	-0.35
Am not easily bothered by things	-0.35
Love to help others.	0.34
Am not really interested in others.	-0.32
Think of others first.	0.30
Take offense easily.	0.29
Take time out for others.	0.33

Gender differences in music preferences

effect size	Item
0.9	Broadway Musicals (e.g. Rent, Cats, Phantom of the Opera)
0.68	Top 40/Pop Vocal Music (e.g. Kelly Clarkson, Madonna, The Black Eyed Peas)
0.65	Broadway, Movie and TV Soundtrack Music in General
0.59	Contemporary Rhythm and Blues (e. g. Whitney Houston, Usher, Alicia Keys)
0.59	Modern Country Music (e.g. Garth Brooks, Dixie Chicks, Tim McGraw)
0.37	Country Music in General
0.37	Movie Soundtracks (e.g. Starwars, Good Will Hunting, Garden State)
0.36	Top 40 Music/Pop in General
0.32	Pop Rock (e.g. Maroon 5, Counting Crows, John Mayer)
0.31	Modern Religious Music (e.g. 4Him, Casting Crowns)
0.3	Soul Rock (e.g. Stevie Wonder, Earth Wind and Fire)
-0.3	Acid Rock (e.g. Pink Floyd, The Doors, Jefferson Airplane)
-0.4	Heavy Metal (e.g. Metallica, Marilyn Manson, System of a Down)

Ethnic differences in music preferences

effect	Item
1.26	Acid Rock (e.g. Pink Floyd, The Doors, Jefferson Airplane)
1	Alternative (e.g. Pearl Jam, Incubus, Radiohead)
0.97	Electronic Music in General
0.91	Rock Music In General
0.87	Jam Bands (e.g. The Grateful Dead, Phish, String Cheese Incident)
0.87	Classic Rock (e.g. The Beatles, The Rolling Stones, Led Zeppelin)
0.85	Country Rock (e.g. The Allman Brothers, Lynyrd Skynyrd)
0.61	Electronic Dance Music (e.g. DJ Tiesto, Paul Van Dyk, Keoki)
0.59	Folk Music in General (e.g. Bob Dylan, Iron and Wine, Simon and Garfunkel)
0.57	Pop Rock (e.g. Maroon 5, Counting Crows, John Mayer)
0.56	Country Music in General
0.51	Bluegrass (e.g. Alison Krauss, Lester Flatt, Nickel Creek)
-0.56	Contemporary Rhythm and Blues (e. g. Whitney Houston, Usher, Alicia Keys)
-0.6	Blues in General (e.g. Ray Charles, Stevie Ray Vaughn, B.B. King)
-0.63	Instrumental Hip-Hop (e.g. DJ Hi-Tek, RJD2, Prefuse 73)
-0.64	Gospel Soul (e.g. Aretha Franklin, Solomon Burke)
-0.67	Soul in General (e.g. Otis Redding, Marvin Gaye)
-0.84	Religious Music in General
-1.04	Soul Rock (e.g. Stevie Wonder, Earth Wind and Fire)
-1.11	Rhythm and Blues in General
-1.43	Religious Gospel (e.g. Andre Crouch, Gospel Quartet)

Rational Keying

- Ask items with direct content relevance
- Example: California Psychological Inventory
- Problems
  - Not all items predict in obvious way
  - Need evidence for validity
  - Easy to fake

Theoretical Keying

- Ask items with theoretical relevance
- Example: Jackson Personality Research Form
- Problems:
  - Theoretical circularity
  - Need evidence for validity

Homogeneous Keying

- Select items to represent single domain
  - Exclude items based upon internal consistency
- Examples:
  - 16PF, EPI/EPQ, NEO
- Problems
  - Garbage In, Garbarge Out
  - Need evidence for validity

Methods of Homogeneous Keying

- Factor Analysis
- Principal Components Analysis
- Cluster Analysis

Scale Construction

Pragmatics: The Hase and Goldberg and Goldberg studies

Hase and Goldberg

- Differential validity of scale construction
  - Factor analytic
  - Empirical Group discrimination
  - Intuitive theoretical
  - Intuitive rational
  - Stylistic-psychometric
  - Random
- 200 University Freshman women
  - CPI items and 13 criteria

Hase and Goldberg: 13 Criteria

- Sorority Membership
- An experimental measure of conformity
- Peer ratings of
  - Dominance
  - Sociability
  - Responsibility
  - Psychological Mindedness
  - Femininity
- Peer ratings of how well known the person is
- Average number of dates per month
- College Grade Point Average
- College Achievement relative to ability
- College Major
- College Droput

Hase, H.D., and Goldberg, L. R. (1967) Comparative validity of different strategies of constructing personality inventory scales. Psychological Bulletin, 67 (4), 231-248.

Comparison of techniques

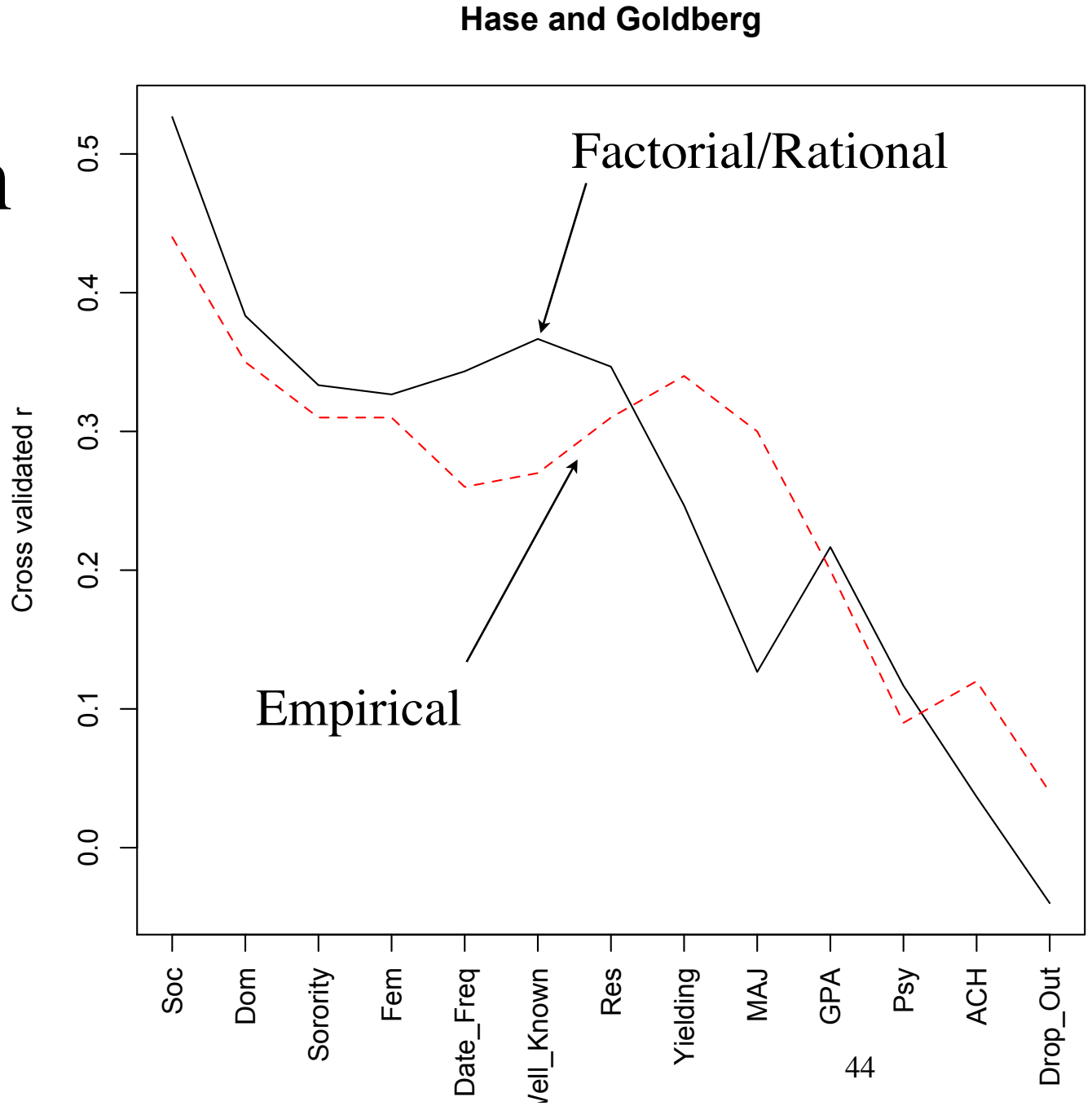
- Empirical
- Rational
- Theoretical
- Homogeneous
- Does it make a difference?
  - Hase and Goldberg: No
  - Goldberg, Yes.

Hase and Goldberg (means)

	var	n	mean	sd	median	trimmed	mad	min	max	range	se
Factor	1	13	0.25	0.18	0.27	0.25	0.13	-0.05	0.57	0.62	0.05
Theoretical	2	13	0.25	0.16	0.26	0.25	0.18	0.01	0.52	0.51	0.04
Rational	3	13	0.26	0.16	0.32	0.27	0.09	-0.08	0.49	0.57	0.04
Empirical	4	13	0.26	0.11	0.30	0.26	0.06	0.04	0.44	0.40	0.03
Stylistic	5	13	0.13	0.12	0.11	0.13	0.12	-0.07	0.35	0.42	0.03
Random	6	13	0.10	0.12	0.11	0.10	0.13	-0.08	0.30	0.38	0.03

Original Hase and Goldberg showed no difference between methods, except that stylistic and random were much worse.

But, prediction depends upon criteria



Advantages and disadvantages

- Empirical
  - Harder to fake
  - Harder to interpret
  - Requires new scale validation for every criterion
- Rational/Homogeneous
  - More transparent
  - Homogeneity of measure suggests single construct

3 stages of scale construction: I: Design

1. Review theory of attribute to be measured
    1. Convergent measures
    2. Discriminant measures
2. Write items based upon theory
    1. items drawn from different facets of theory
    2. items balanced for response styles
3. Screen items for readability, bias, understandability
4. Include "hyperplane stuff"
    1. possible related constructs
    2. theoretically important alternatives
5. Define target population
    1. Who is to be measured
    2. Consider issues of homogeneity/heterogeneity

3 stages of scale construction: II: Data

1. Administer items and record responses
    1. (1) Monitor for serious, engaged test taking
    2. (2) Double check for data entry errors
2. Examine the distribution and search for outliers
    1. data entry errors
    2. uncooperative subjects
3. Form proximity (correlation) matrix
4. Extract optimal number of factors or clusters
    1. statistically (chi square and maximum likelihood)
    2. psychometrically (maximize alpha, beta, VSS)
    3. for interpretation (to maximize understanding)

3 stages of scale construction: III: Application

1. Form scales based upon these factors/ clusters
    1. score salient items
    2. drop non salients
2. Purify scales -- item analysis
    1. high correlation with scale
    2. low correlations with other scales
    3. low correlations with measures of response styles
    4. moderate levels of endorsement
3. Validate against other measures of same and different constructs
    1. Assess reliability (internal consistency &stability)
    2. Demonstrate convergent, discriminant and incremental validity

Scale Construction: An example

- 4 sets of items were constructed to represent 4 psychological domains
  - Sociability, Impulsivity, Need Achievement, Anxiety
- Surveys were given to friends of experimenters who also peer rated their friends

Scale Construction: Example (2)

- Items were entered into a spreadsheet and checked for incorrect entries
  - Missing values were replaced with a missing value code (NA)
- Basic item statistics were examined
- Scales were constructed based upon original scoring keys -- item whole correlations allowed for some trimming of items
- Alphas were calculated for each scale

Scales were also constructed using a hierarchical cluster algorithm for items (ICLUST)

- 1) Find similarity (correlation) matrix
- 2) Combine most similar pair of items to form a new variable (cluster)
- 3) Find similarity of this cluster to all other items/clusters
- 4) Repeat steps 2 and 3 until some criterion (e.g., alpha or beta) fails to increase

Item Analysis
What items load on scales?
Scale 1: Alpha = .90

0.81	0.31	0.11	-0.24	I would call myself a sociable person
0.81	0.36	-0.01	-0.22	At a part, I like to mingle and meet as many new people as I can
0.77	0.4	-0.1	-0.29	Other people consider me a social butterfly
0.76	0.23	0.12	-0.23	I am a people person
0.74	0.37	-0.06	-0.35	In a group of people, I am likely to initiate conversations
0.72	0.34	-0.05	-0.13	I am a terrific conversationalist
0.7	0.35	-0.08	-0.3	I enjoy talking to strangers
0.7	0.36	-0.08	-0.33	I can easily let myself go and enjoy a lively party
0.69	0.3	0.09	-0.22	I think of of myself as very lively.
0.64	0.24	-0.03	-0.26	I can always think of something to say
-0.64	-0.28	0.23	0.44	I feel uncomfortable in large groups
-0.58	-0.22	0.18	0.54	I generally become anxious when I meet new people
0.5	0.25	0.11	-0.04	I would rather attend a party than study

Scale 2: alpha = .64

0.3	0.66	-0.05	0.09	I often act without thinking.
0.24	0.62	-0.19	-0.14	I often say things before thinking about how they'll make others feel.
-0.42	-0.54	0.11	0.2	I spend a lot of time thinking about what I want to say before I say it.
0.1	0.53	0.06	0.22	I have trouble concentrating on things for a long period of time.
0.11	0.52	-0.04	-0.19	I don't like to stick to a strict schedule.
0.23	0.5	-0.01	-0.13	When I want something, I'll stop what I'm doing to get it.
0.14	0.5	-0.23	0.14	I spend my paycheck right after I receive it.
0.09	0.5	0.12	0.26	I am easily distracted.
-0.13	-0.48	-0.15	-0.2	I am not easily distracted from tasks.
0.38	0.47	0	0.07	I often interrupt others when I have something I want to say.
-0.02	-0.47	0.3	0.16	I prefer to have a regular schedule.
0.37	0.44	0.18	-0.3	I enjoy the unexpected.

Scale 3: Alpha = .79

0.02	-0.09	0.8	0.17	It is important for me to do well.
0.05	-0.1	0.71	0.13	I set high standards for myself.
0.02	0.1	-0.71	-0.3	It does not bother me when others think that I'm a failure
-0.04	-0.06	0.68	0.23	I judge myself by the way I perform.
0.07	0.08	0.67	0.15	Success after a lot of hard work is rewarding.
0.01	-0.01	0.66	0.42	I am upset when I do poorly.
-0.17	-0.27	0.63	0.46	When attempting a task, I often think about the consequences of failure.
0.22	0.04	0.62	0.33	Being recognized for doing something well is important to me.
-0.1	-0.06	0.61	0.27	I would rather pull an “all-nighter” than feel unprepared for an exam.
-0.04	-0.18	0.58	0.43	I prefer tasks I know I will succeed at.
-0.22	-0.31	0.57	0.22	I often find myself planning for the future.
0.02	-0.27	0.57	-0.03	I do everything to the absolute best of my ability.
0.03	-0.32	0.53	-0.07	I feel that I must complete a task once I begin.
-0.27	-0.44	0.52	0.17	I think about the consequences of my actions.
-0.03	-0.3	0.49	-0.02	I often do more than is required on a task.
0.18	0.05	0.49	-0.06	I tend to do better in tasks that will be evaluated.
-0.12	0	0.47	0.51	I find it hard to recover when someone criticizes me
-0.17	-0.2	0.44	0.61	I worry about things that have already happened
0.06	0.28	-0.43	-0.07	I rarely do work beyond the minimum.

Scale 4: alpha = .67

0.27	0.09	-0.29	-0.7	I am nearly always relaxed
-0.24	-0.19	0.34	0.69	I often worry about things that others find trivial
-0.2	-0.16	0.37	0.64	I often feel stressed
-0.32	-0.11	0.4	0.6	A number of upcoming events currently have me feeling stressed
-0.11	-0.36	0.25	0.55	Change stresses me
-0.11	-0.04	0.03	0.53	I often can't go to sleep at night because I've got a lot on my mind
-0.06	0.04	0.14	0.52	Sometimes I feel like things are out of my control
-0.19	0.07	0.42	0.51	When doing a task, I often think about the consequences of failing
0.28	0.2	-0.32	-0.48	I don't worry about things I can't control
-0.13	-0.05	0.26	0.44	I have a pessimistic attitude regarding my abilities
-0.32	-0.18	0.06	0.44	I assume the worst going into a situation
-0.17	-0.35	0.4	0.42	It takes me a while to make a decision.
-0.31	0	-0.31	0.39	I am nervous right now

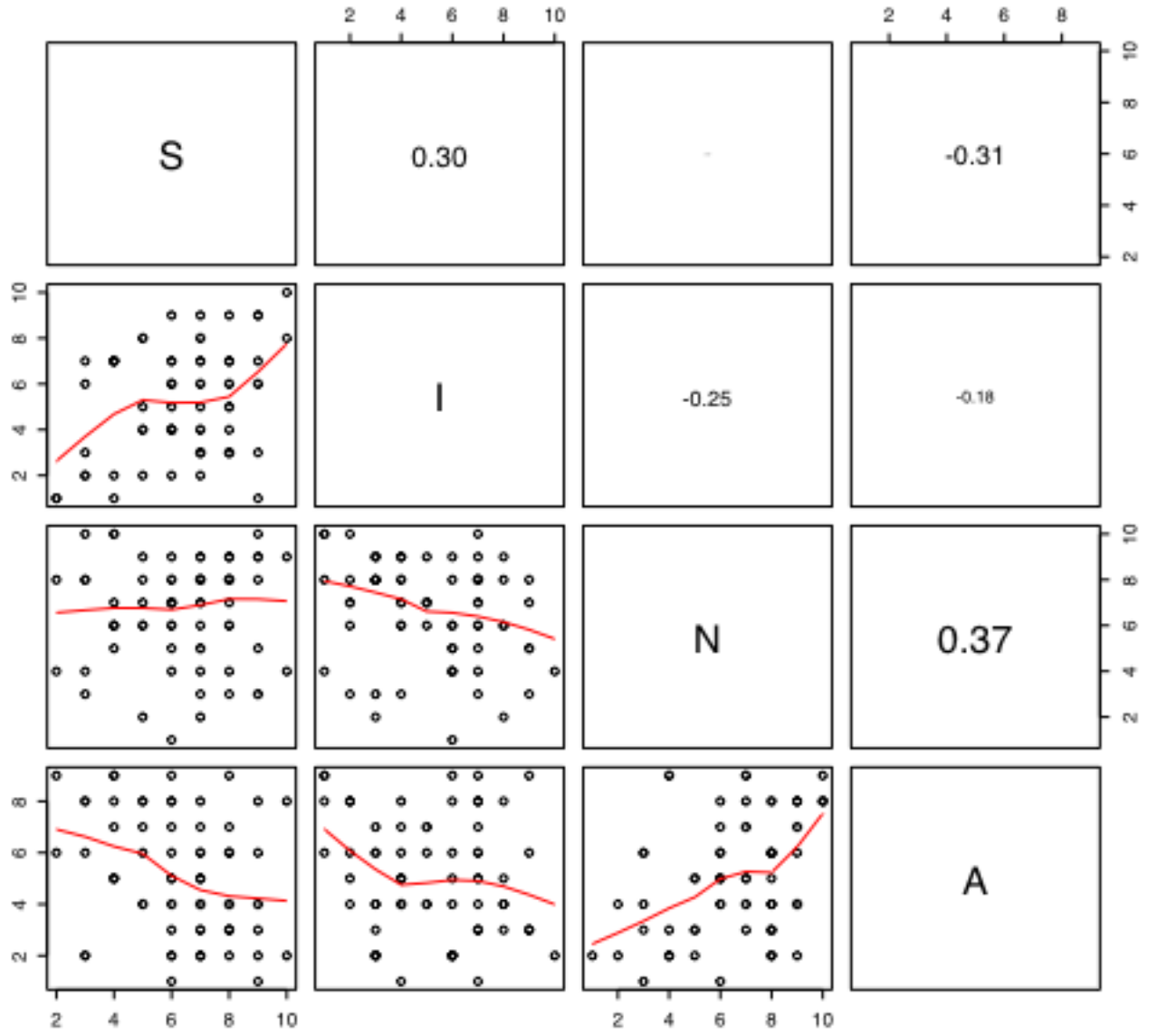
Structure of Class Scales (alphas on diagonal)

	Soc	Imp	Nach	Anx
Soc	**0.90**	0.46	0.00	-0.33
Imp	0.46	**0.64**	-0.16	-0.15
Nach	0.00	-0.16	**0.79**	0.33
Anx	-0.33	-0.15	0.33	**0.67**

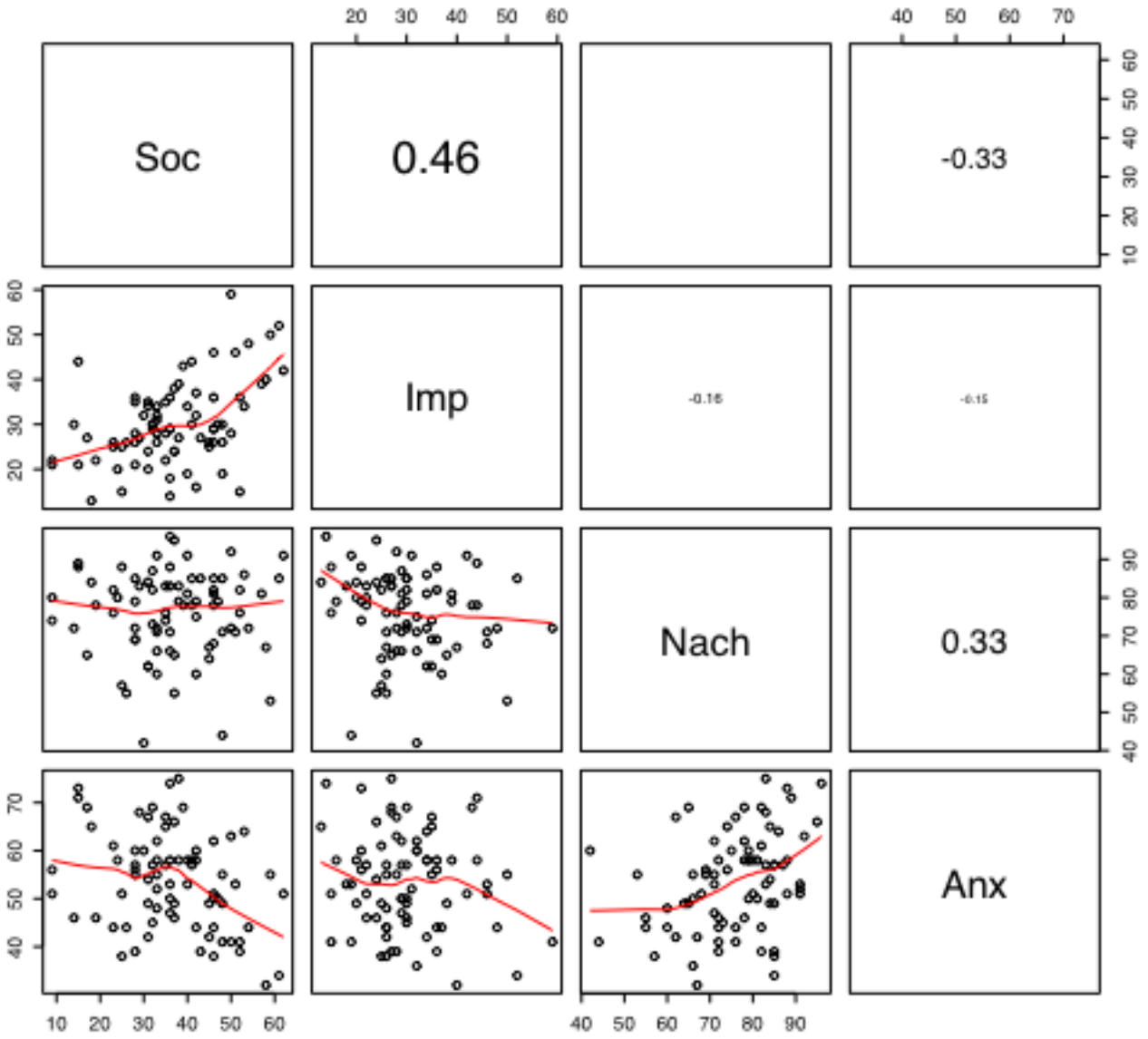
Structure of Self Report Scales Class scales vs. Big 5 scales (alphas on diagonal)

	Soc	Imp	Nach	Anx	Extra	Con	Open	Stab	Agree
Soc	**0.90**	0.46	0.00	-0.33	0.72	-0.05	0.20	0.23	0.54
Imp	0.46	**0.64**	-0.16	-0.15	0.24	-0.43	0.00	-0.04	0.22
Nach	0.00	-0.16	**0.79**	0.33	0.21	0.58	0.48	-0.26	0.26
Anx	-0.33	-0.15	0.33	**0.67**	-0.28	0.15	-0.05	-0.64	-0.04
Extra	**0.72**	0.24	0.21	-0.28	**0.79**	0.15	0.47	0.26	0.64
Con	-0.05	**-0.43**	**0.58**	0.15	0.15	**0.81**	0.45	-0.01	0.25
Open	0.20	0.00	**0.48**	-0.05	*0.47*	0.45	**0.70**	0.04	0.44
Stab	0.23	-0.04	-0.26	**-0.64**	0.26	-0.01	0.04	**0.82**	0.15
Agree	0.54	0.22	0.26	-0.04	*0.64*	0.25	0.44	0.15	**0.60**

Scatter Plot Matrix of Peer Ratings



Scatter Plot Matrix of Self Report



How do we validate scales? Multi-Method-Multi Trait Matrix

- Structure of scales and structure of peer ratings do not imply validity for either
- We need to compare
  - Mono Trait - Mono Method (reliability)
  - Mono Trait - Hetero Method (convergent)
  - Hetero Trait - Mono Method (discriminant)
  - Hetero Trait Hetero Method (discriminant)

MultiTrait-Multi Method

	Self report with class items				Self report Big 5 items					Peer ratings			
	Soc	Imp	Nach	Anx	Extra	Con	Open	Stab	Agree	S	I	N	A
Soc	**0.90**	0.46	0.00	-0.33	0.72	-0.05	0.20	0.23	0.54	0.59	0.28	-0.21	-0.47
Imp	0.46	**0.64**	-0.16	-0.15	0.24	-0.43	0.00	-0.04	0.22	0.25	0.40	-0.32	-0.25
Nach	0.00	-0.16	**0.79**	0.33	0.21	0.58	0.48	-0.26	0.26	-0.02	-0.19	0.39	0.17
Anx	-0.33	-0.15	0.33	**0.67**	-0.28	0.15	-0.05	-0.64	-0.04	-0.12	-0.02	0.11	0.30
Extra	**0.72**	0.24	0.21	-0.28	**0.79**	0.15	0.47	0.26	0.64	0.44	0.03	0.06	-0.41
Con	-0.05	**-0.43**	**0.58**	0.15	0.15	**0.81**	0.45	-0.01	0.25	0.05	-0.17	0.50	0.22
Open	0.20	0.00	**0.48**	-0.05	*0.47*	0.45	**0.70**	0.04	0.44	0.17	-0.10	0.26	0.06
Stab	0.23	-0.04	-0.26	**-0.64**	0.26	-0.01	0.04	**0.82**	0.15	0.10	-0.09	-0.13	-0.25
Agree	0.54	0.22	0.26	-0.04	*0.64*	0.25	0.44	0.15	**0.60**	0.38	0.04	0.05	-0.19
S	**0.59**	0.25	-0.02	-0.12	**0.44**	0.05	0.17	0.10	0.38	1.00	0.30	0.04	-0.31
I	0.28	**0.40**	-0.19	-0.02	0.03	-0.17	-0.10	-0.09	0.04	0.30	1.00	-0.25	-0.18
N	-0.21	-0.32	**0.39**	0.11	0.06	**0.50**	0.26	-0.13	0.05	0.04	-0.25	1.00	0.37
A	*-0.47*	-0.25	0.17	**0.30**	*-0.41*	0.22	0.06	**-0.25**	-0.19	-0.31	-0.18	0.37	1.00

A multi-Trait, Multi-Method Matrix (alphas on the diagonal)

PRQ-07- Anxiety: alpha .86

q42	47	Even trivial proble	1	0.65	0.21	-0.11	-0.03	-0.28
Anxiety	2	Anxiety	1	0.62	0.08	-0.07	0.06	-0.23
q6	11	I dont handle stress	1	0.60	0.33	-0.19	0.04	-0.33
q50	55	Even in non stressf	1	0.58	0.40	-0.05	0.02	-0.16
q2	7	I get nervous very e	1	0.55	0.22	-0.23	0.06	-0.38
q18	23	I rarely feel tense	1	-0.54	0.01	-0.13	-0.08	0.19
q34	39	I have a hard time f	1	0.51	0.26	0.21	-0.08	-0.19
q26	31	I often feel anxious	1	0.50	0.24	0.19	0.18	-0.16
q10	15	I am easily bothered	1	0.48	0.18	-0.04	0.07	-0.13
q22	27	I feel stressed when	1	0.47	0.26	0.18	-0.17	-0.20
q30	35	I often feel tense,	1	0.47	0.07	-0.07	0.23	-0.18
q62	67	A small unpleasant	1	0.46	0.28	0.16	-0.02	-0.16
q66	71	I worry about what	1	0.44	0.25	-0.04	0.12	-0.04
q54	59	I feel tension in m	1	0.42	-0.27	0.08	0.12	-0.12
q70	75	I bounce back quick	1	-0.41	-0.26	0.37	0.15	0.39

Achievement: alpha .87

q81	86	I believe that if so	3	0.08	-0.06	0.70	-0.03	0.26
q33	38	I find myself needi	3	0.06	0.17	0.65	-0.01	0.25
q17	22	I have high standar	3	0.11	0.16	0.64	-0.23	0.13
q41	46	I always make sure	3	0.02	-0.06	0.58	-0.15	0.19
q4	9	I am thoughtful and	3	-0.09	0.00	0.57	-0.44	0.06
q25	30	If I fail, I keep t	3	-0.09	0.23	0.57	-0.08	0.30
q1	6	I love to seek out	3	-0.04	-0.08	0.56	-0.05	0.39
q77	82	I always see projec	3	0.16	0.09	0.55	-0.19	0.13
q13	18	I like to go the ex	3	0.09	0.01	0.54	-0.26	0.20
q49	54	The joy of success	3	0.03	0.05	0.54	-0.01	0.25
q61	66	I experience great	3	-0.01	0.00	0.54	-0.16	0.12
q60	65	I stay on task unti	3	0.12	0.07	0.53	-0.28	0.13
q45	50	I prefer challengin	3	-0.10	0.08	0.50	-0.06	0.15
q73	78	I set long term and	3	0.15	-0.07	0.46	-0.09	-0.01
q78	83	I tend to back away	3	0.20	0.16	-0.45	0.27	-0.05
q57	62	I always reach the	3	-0.10	0.14	0.44	-0.18	0.27

Impulsivity: alpha = .87

q24	29	I often change my p	4	0.09	-0.34	0.08	0.62	0.33
q52	57	I often get sidetra	4	0.21	-0.32	-0.16	0.61	0.18
q8	13	I say things that I	4	0.10	-0.14	-0.12	0.59	0.21
q28	33	I dislike planning	4	0.13	-0.14	-0.18	0.56	0.08
q40	45	I act on sudden urg	4	0.02	-0.30	0.07	0.55	0.24
q44	49	I often regret deci	4	0.28	-0.10	-0.14	0.55	0.26
q84	89	I am an impulsive pe	4	-0.07	-0.18	0.07	0.55	0.36
q69	74	I tend to procrasti	4	-0.03	0.03	-0.32	0.53	0.18
Impulsivity	4	Impulsivity	4	0.08	0.04	-0.24	0.51	0.24
q32	37	I indulge in my des	4	0.13	0.05	0.16	0.50	0.25
q76	81	I sometimes look ba	4	0.11	-0.11	0.07	0.46	0.31
q20	25	I plan my activitie	4	0.17	0.24	0.27	-0.44	-0.14
q68	73	I always think befo	4	-0.03	0.17	0.25	-0.44	-0.23
q55	60	Ill spend time talk	4	0.21	0.02	-0.09	0.43	0.26
q80	85	I often say the fir	4	-0.12	0.01	-0.13	0.42	0.40

Sociability alpha=.92

q35	40	I have a large soci	5	-0.27	-0.07	0.19	0.31	0.79
q83	88	I am a very sociable	5	-0.25	-0.04	0.38	0.17	0.79
q11	16	I tend to avoid soc	5	0.30	-0.11	-0.23	-0.22	-0.70
q23	28	I make friends easi	5	-0.25	0.05	0.27	0.28	0.69
q51	56	People are more lik	5	0.19	0.13	-0.20	-0.25	-0.67
q19	24	I am good at mainta	5	-0.15	-0.04	0.28	0.11	0.65
q67	72	I am always willing	5	-0.10	-0.17	0.20	0.34	0.63
q39	44	Id rather spend tim	5	-0.05	0.06	0.15	0.25	0.62
q43	48	I am happier when I	5	-0.06	0.03	0.45	0.30	0.60
q3	8	I like to meet new	5	-0.12	0.21	0.25	0.14	0.59
q31	36	I tend to talk a lo	5	-0.33	-0.38	0.19	0.17	0.59
Sociability	3	Sociability	5	-0.19	-0.02	-0.17	0.32	0.56
q16	21	I tend to make deci	5	-0.15	-0.14	0.19	0.41	0.54
q59	64	I prefer large crow	5	-0.18	0.01	-0.08	0.24	0.52

PRQ-07:
More reliable, greater validity except for Nach

	PNach	PAnx	PSoc	PImp	Nach	Anx	Soc	Imp
PNach	1.00	0.21	-0.08	-0.30	0.20	0.10	0.00	-0.31
PAnx	0.21	1.00	-0.10	-0.03	-0.01	0.66	-0.22	0.06
PSoc	-0.08	-0.10	1.00	0.29	-0.16	-0.18	0.60	0.37
PImp	-0.30	-0.03	0.29	1.00	-0.25	0.16	0.22	0.53
Nach	0.18	-0.01	-0.14	-0.23	0.84	0.08	0.28	-0.23
Anx	0.09	0.60	-0.16	0.15	0.07	0.82	-0.25	0.09
Soc	0.00	-0.21	0.57	0.21	0.24	-0.22	0.89	0.44
Imp	-0.29	0.05	0.35	0.50	-0.19	0.08	0.39	0.87

Personality-Music-IQ

alphas on diagonal, unattenuated above

	A	*C*	*E*	*O*	*N*	*P*	*R*	*H*	*FC*	*g*	*math*	*matrix*	*iq?*
A	***0.90***	0.35	0.44	0.27	-0.09	0.46	0.08	0.35	0.17	0.08	0.07	-0.03	0.16
C	0.31	***0.89***	0.21	0.11	-0.16	0.23	-0.15	0.13	0.03	0.00	0.02	-0.06	0.04
E	0.39	0.19	***0.91***	0.27	-0.27	0.30	0.12	0.27	0.13	-0.11	-0.09	-0.13	-0.06
O	0.24	0.09	0.24	***0.86***	-0.07	-0.01	0.27	0.07	0.42	0.36	0.36	0.16	0.36
N	-0.09	-0.14	-0.24	-0.06	***0.92***	-0.01	0.03	-0.13	-0.12	-0.04	-0.06	-0.04	0.00
Pop	**0.39**	**0.20**	**0.26**	-0.01	-0.01	***0.82***	0.21	0.43	0.38	0.01	-0.02	0.01	0.04
Rock	0.06	-0.12	0.10	**0.22**	0.02	0.17	***0.76***	0.18	0.38	0.13	0.15	0.04	0.13
HipHop	**0.28**	0.10	**0.22**	0.06	-0.11	0.34	0.14	***0.75***	0.48	-0.07	-0.07	-0.01	-0.09
Folk.clas	0.14	0.02	0.11	**0.34**	-0.10	0.31	0.29	0.37	***0.78***	0.25	0.28	0.21	0.12
g	0.08	0.00	-0.10	**0.32**	-0.04	0.01	0.11	-0.06	0.21	***0.89***	1.05	0.76	0.97
math	0.06	0.02	-0.07	**0.30**	-0.05	-0.02	0.11	-0.06	0.22	0.88	***0.80***	0.47	0.81
iq.matrix	-0.03	-0.05	-0.11	0.14	-0.04	0.01	0.03	-0.01	0.17	0.67	0.38	***0.85***	0.32
iq3	0.14	0.03	-0.05	**0.30**	0.00	0.03	0.10	-0.07	0.10	0.81	0.64	0.26	***0.79***

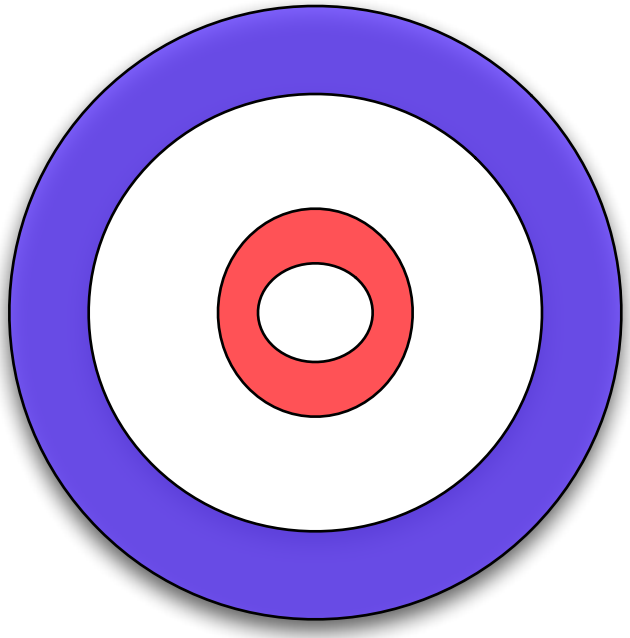
Personality-Music Regression models

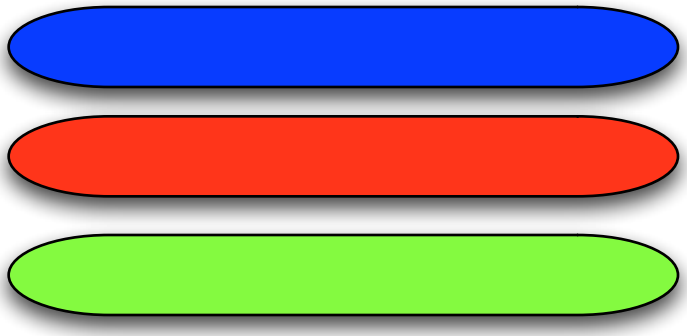
	Pop	Rock	HipHop	Folk.classic
Agreeable	0.34	0.04	0.24	0.07
Conscientious	0.08	-0.16	0.00	-0.04
Extraversion	0.16	0.08	0.12	-0.01
Open	-0.13	0.21	-0.03	0.33
Neuroticism	0.06	0.03	-0.06	-0.08
R2	0.19	0.08	0.10	0.13

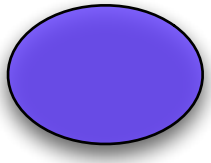
Personality + Demographics = Music

	Pop	Rock	HipHop	Folk.classic
Agreeable	**0.28**	0.09	**0.21**	0.06
Conscientious	0.06	-0.13	-0.02	-0.06
Extraversion	0.15	0.07	0.12	0.02
Open	-0.10	**0.18**	0.01	**0.30**
Neuroticism	0.02	0.05	-0.06	-0.07
sex	**0.19**	-0.09	0.04	-0.01
bw	0.00	**0.29**	-0.28	0.00
age	0.07	-0.09	-0.02	**0.23**
$R2	**0.23**	**0.17**	**0.18**	**0.18**

What is a cluster?



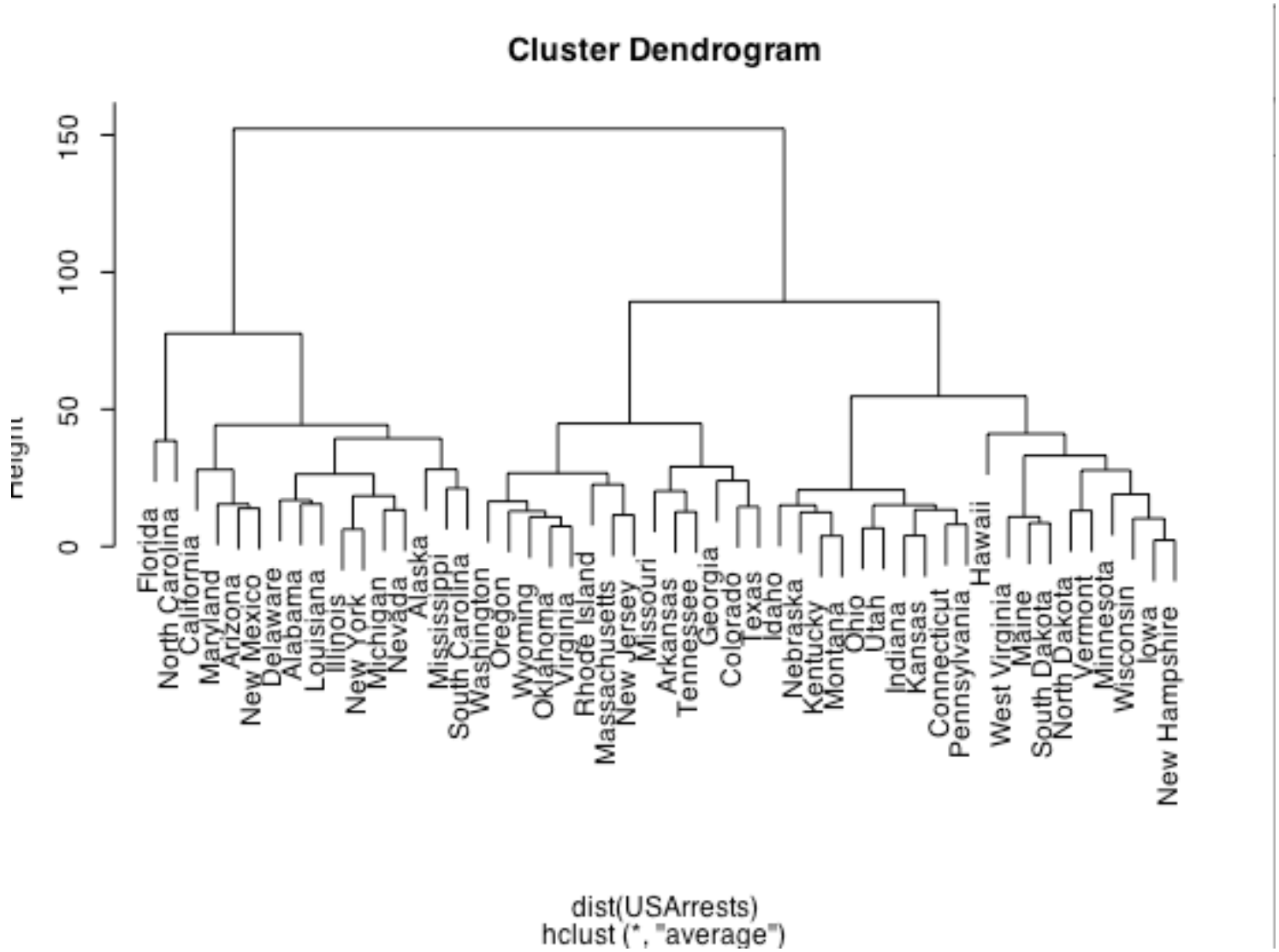




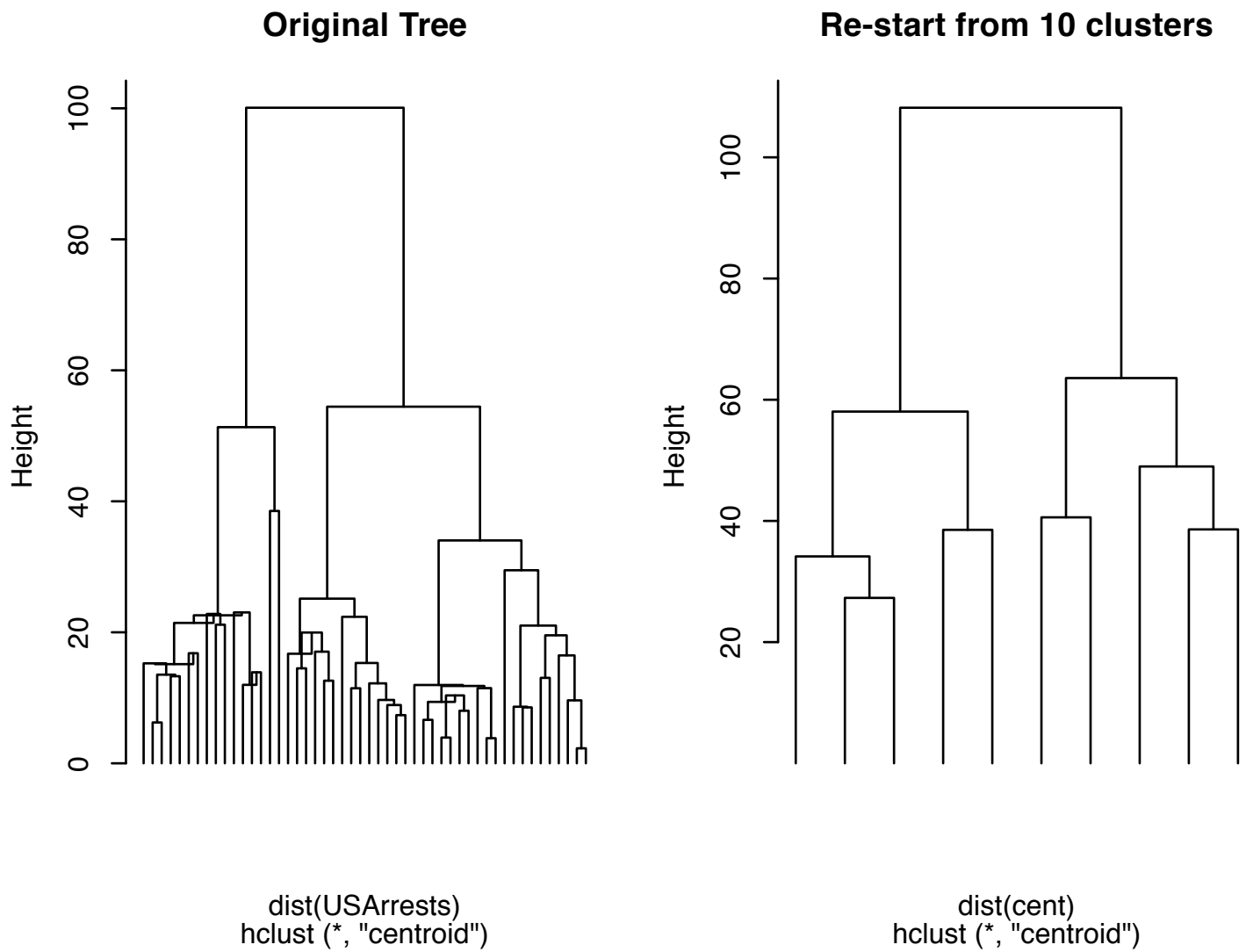
Clustering rules

- Distance:
  - Nearest neighbor
  - Farthest neighbor
  - Centroid distance
- Methods
  - Hierarchical
    - Agglomerative
    - Divisive
  - non-hierarchical

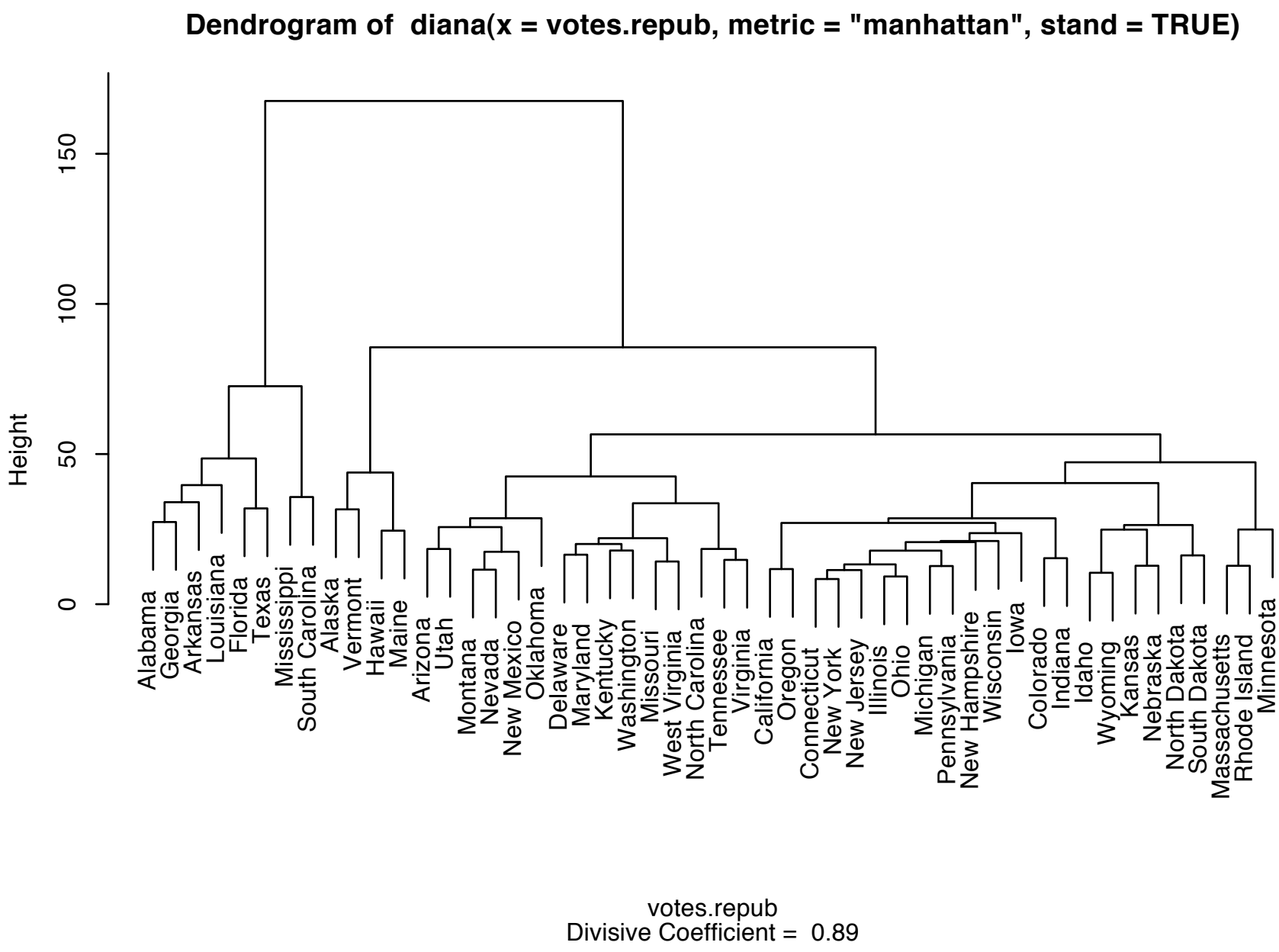
Hierarchical Clustering



More clustering



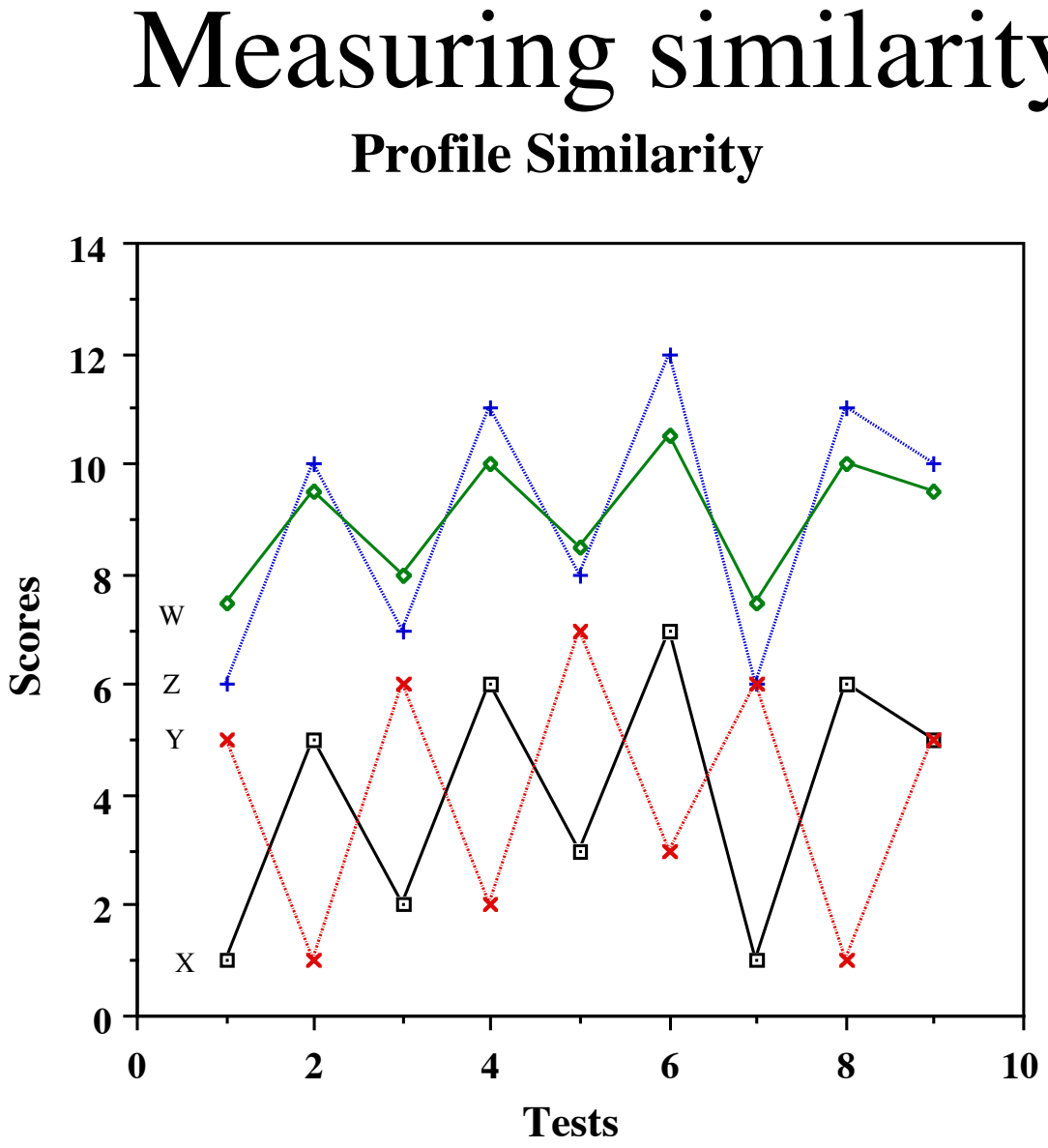
Clusters of voting behavior



Clustering Issues

- Cluster Objects/people
  - similarities or distances?
    - what distance metric
  - can objects be reversed? (not usually)
- Cluster items (unusual, but see ICLUST)
  - items can be reversed (-happy)
  - results are similar to factor analysis
- Stopping rules for cluster
  - number of cluster problem

Measuring similarity



Similarity and distance

Questions:

Given a set of scores on multiple tests (a subject profile), how should we measure the similarity between different profiles? What does it mean to have a similar profile?

What metric to use?

Minkowski Distances = $\sqrt[r]{\sum (X_i - Y_i)^r}$

r=1 city block metric ==> all distances equally important (no diagonals)

r=2 Euclidean metric ==> diagonals are shorter than sums

r>2 non-Euclidean ==> emphasizes biggest differences

r=∞ non-Euclidean ==> distance = biggest difference

Consider different metrics

A						B
	C					
				D		

	X	Y
A	1	7
B	7	7
C	2	4
D	5	1

Min

	A	B	C	D
A				
B	0			
C	1	3		
D	4	2	3	

Euclidean

	A	B	C	D
A				
B	6			
C	3.2	5.8		
D	7.2	6.3	4.2	

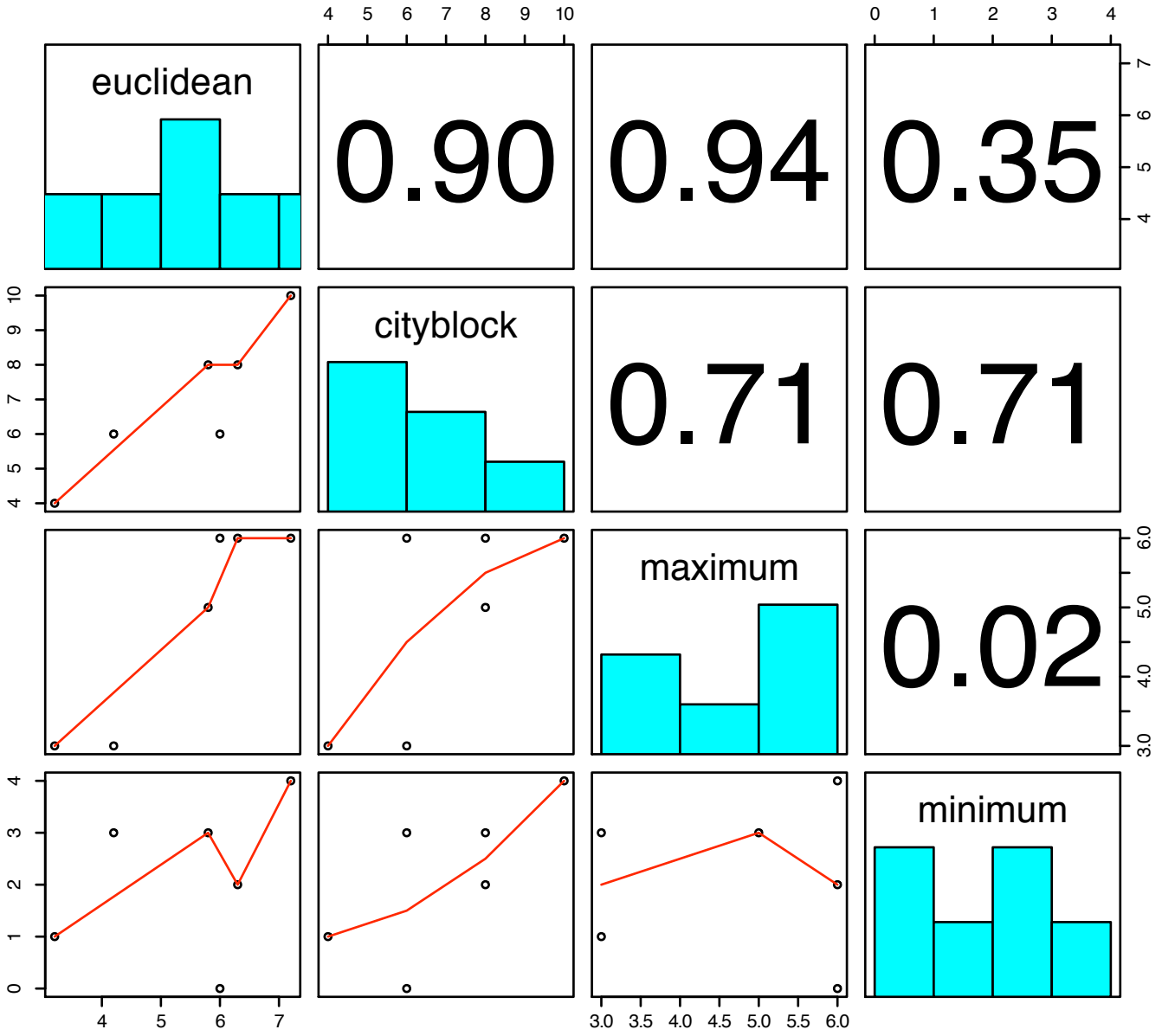
City block

	A	B	C	D
A				
B	6			
C	4	8		
D	10	8	6	

Max

	A	B	C	D
A				
B	6			
C	3	5		
D	6	6	3	

A comparison of metrics



Similarity and correlation

$$D = \sqrt{\sum(X_i - Y_i)^2}$$

let M_X= mean X M_y=mean Y $L = M_X - M_y$

$x = X - M_X$ $y = Y - M_y$

$$D = \sqrt{\sum(X_i - Y_i)^2} = \sqrt{\sum\{(X_i - M_X) - (Y_i - M_y) + L\}^2}$$

$$D = \sqrt{\sum(x - y + L)^2} \Rightarrow D = \sqrt{Var_X + Var_y - 2Cov_{xy} + L^2}$$

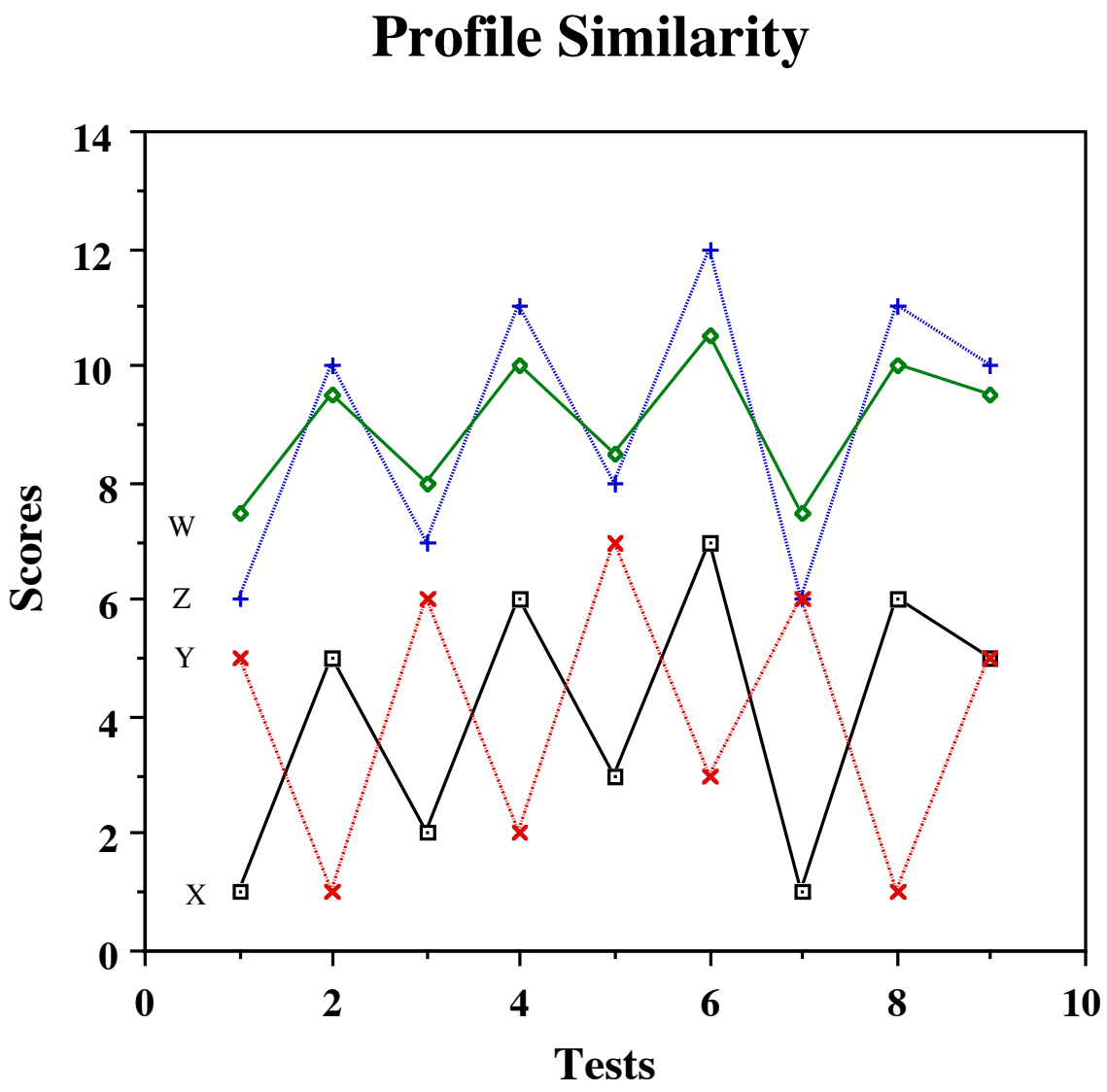
Distance is a function of differences of Level, Scatter, and Pattern

Level ==>	**differences of means**	$L^2 = (M_X - M_y)^2$
Scatter ==>	**Variances**	$Var_X + Var_y$
Pattern ==>	**Covariance**	$2Cov_{xy}$

If variables are standardized (means set to zero and variances to 1) then distance is a function of the correlation between the two profiles.

$$D^2 = 2(1 - r_{xy})$$

Similarity



City blocks vs. Euclid

```
MATRIX  OF  CITY  BLOCK  DISTANCES
                X              Y              Z              W
    X           0.000
    Y           3.778          0.000
    Z           5.000          5.000          0.000
    W           5.000          5.000          1.000
0.000
(W  and  Z  are  most  similar,  followed  by  X  and  Y)

  MATRIX  OF  NORMALIZED  EUCLIDEAN  DISTANCES

                X              Y              Z              W

   X            0.000
   Y            4.028          0.000
   Z            5.000          6.420          0.000
   W            5.115          5.855          1.080
0.000
(W  and  Z  are  most  similar,  followed  by  X  and  Y)
```

Covariance and Correlation

COVARIANCE MATRIX

	X	Y	Z	W
X	5.250			
Y	-3.875	5.250		
Z	5.250	-3.875	5.250	
W	2.625	-1.938	2.625	1.313

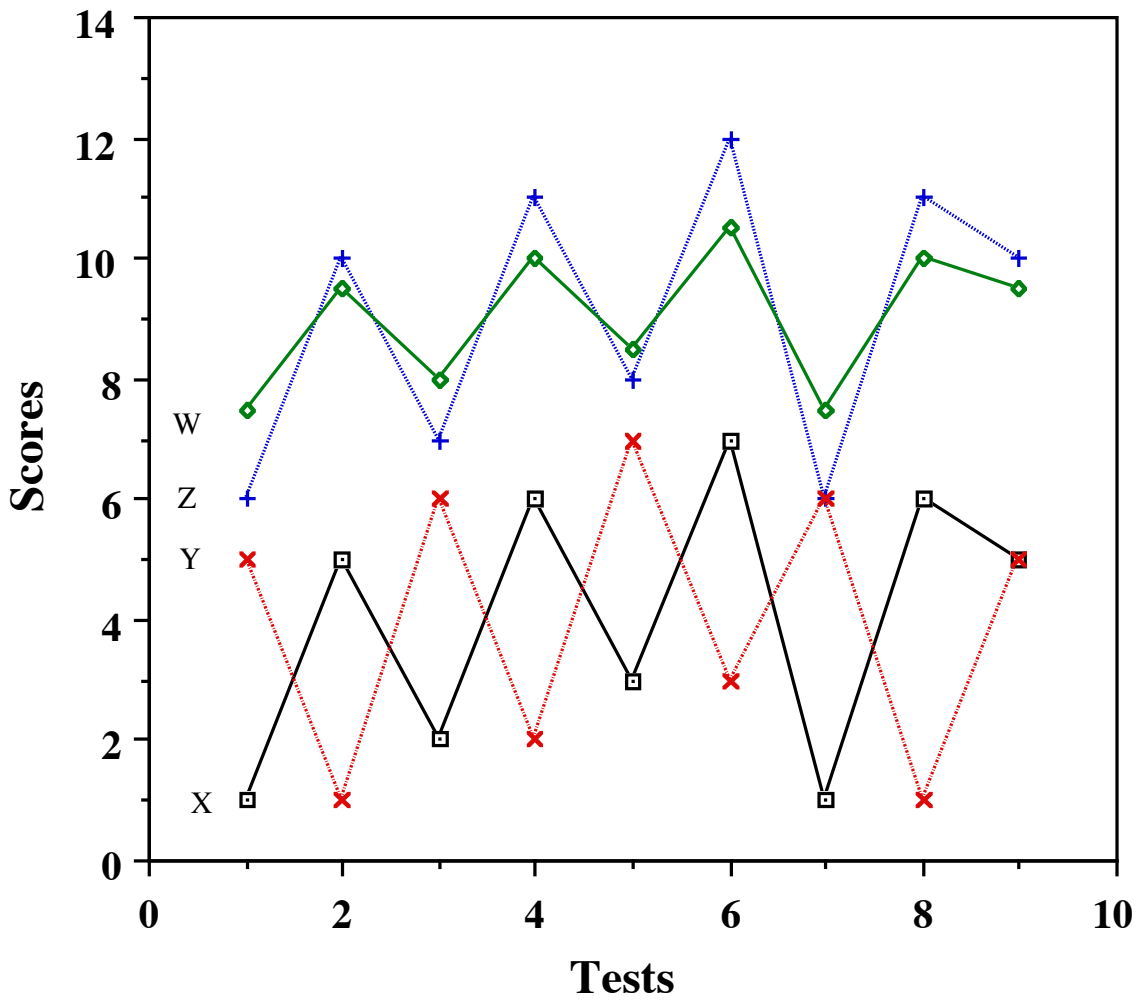
(X and W are most similar, X is negatively related to Y)

PEARSON CORRELATION MATRIX

	X	Y	Z	W
X	1.000			
Y	-0.738	1.000		
Z	1.000	-0.738	1.000	
W	1.000	-0.738	1.000	1.000

(X is identical to W and Z, negatively related to Y)

Similarity of Profiles: Level, scatter, pattern



Sources of Data

- Self Report
  - Direct subjective
    - empirical scales: MMPI/Strong-Campbell
    - factorial scales: EPI/16PF/NEOPI-R
    - rational scales: PRF
  - Indirect/projective (access to subconscious?)
    - TAT
    - Rorschach
  - Indirect/objective
    - Cattell objective test battery
    - Implicit Attitudes Test (RT measures)
    - Emotional "Stroop"
  - Indirect/other
    a) Kelly Construct Repetory Grid
    a) Carroll INDSCAL

George Kelly and the theory of Personal Constructs

- Man as scientist:
  - "each man contemplates in his own personal way the stream of events upon which he finds himself so swiftly borne"
  - "Man looks at his world through transparent patterns or templates which he creates and then attempts to fit over the realities of which the world is composed. The fit is not always very good. Yet without such patterns the world appears to be such an undifferentiated homogeneity that man is unable to make any sense out of it. Even a poor fit is more helpful to him than nothing at all.

George Kelly and the theory of Personal Constructs

- Fundamental postulate:
  - "A person's processes are psychological channelized by the ways in which he anticipates events."
- Measurement:
  - The role construct repertory test (REP test).
- Analysis:
  - What are the fundamental constructs with which one views the world? This can be the entire set of constructs elicited by the REP test, or some clustering or grouping of these constructs.

Kelly Rep Test

self	O		O				
lover	O						
mother		O					
father				O			
sib	O						
teacher			O				
Best friend		O		O			
Boss			O				
coworker		O		O			
construct							

REP test: complications

- Completely idiosyncratic. There is no concern with any fundamental dimensions. However, it is possible to apply same group space and still detect individual construct dimensions
- But consider a similar model: individuals as having unique distortions of shared space. The INDSCAL and ALSCAL algorithms are available to solve for joint and individual spaces.

Multidimensional Scaling

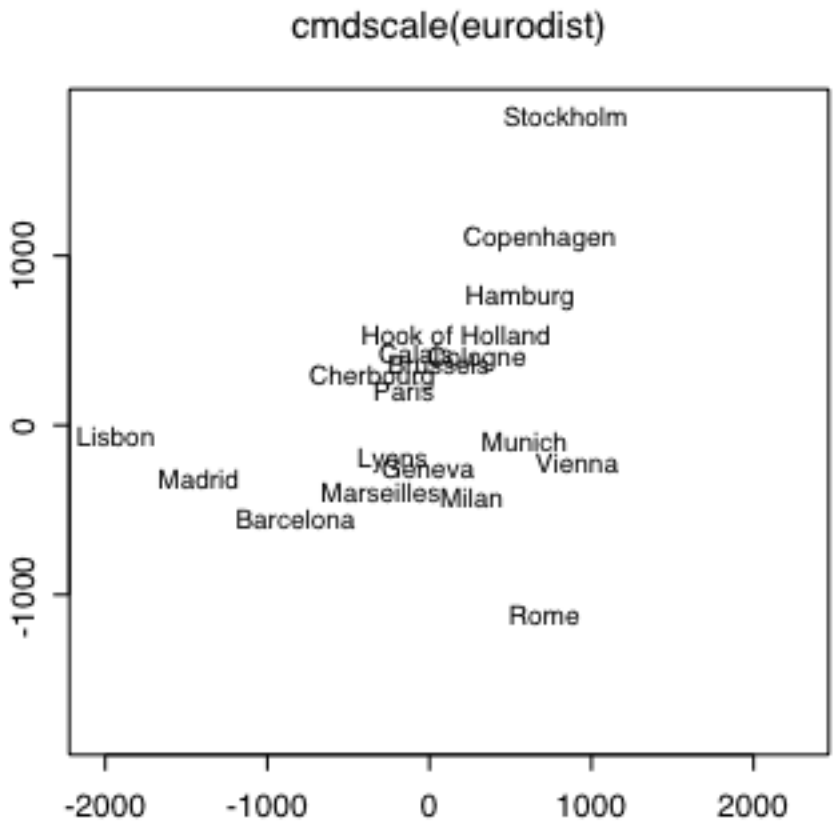
- Application of metric or non-metric scaling
- Metric scaling:
  - Find dimensional representation of observed distances (e.g., latitude and longitude)
  - Strong assumption of data and metric
- Non-metric scaling
  - Scaling to minimize a criterion insensitive to ordinal transformations

Distances between cities

	Athen	Barcelona	Brussels	Calais	Cherburg	Cologne	Copenhage	Geneva	Gilbralter	Hamburg
Barcelona	3313									
Brussels	2963	1318								
Calais	3175	1326	204							
Cherbourg	3339	1294	583	460						
Cologne	2762	1498	206	409	785					
Copenhagen	3276	2218	966	1136	1545	760				
Geneva	2610	803	677	747	853	1662	1418			
Gibralta	4485	1172	2256	2224	2047	2436	3196	1975		
Hamburg	2977	2018	597	714	1115	460	460	1118	2897	
Hook of Holkan	3030	1490	172	330	731	269	269	895	2428	550

What is the best representation of these distances in a two dimensional space?

Scaling of European Cities

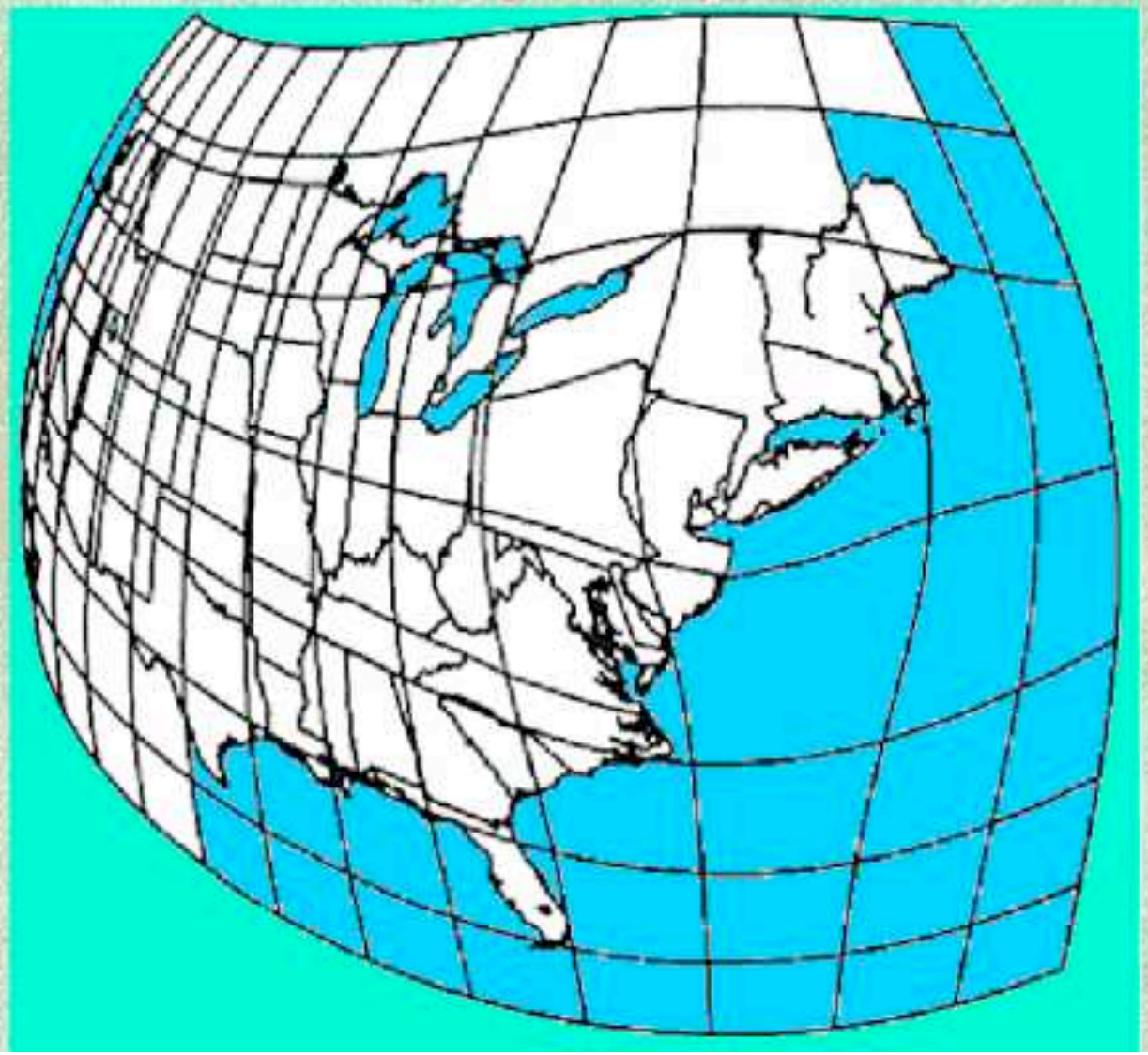


Individual Differences in MDS INDSCAL

- Consider individual differences in MDS
  - Each individual applies a unique weighting to the MDS dimensions
- Solve for Group space as well as individual weights to be applied to the group space

A New Yorker's View

Square root azimuthal projection, with obvious distortion



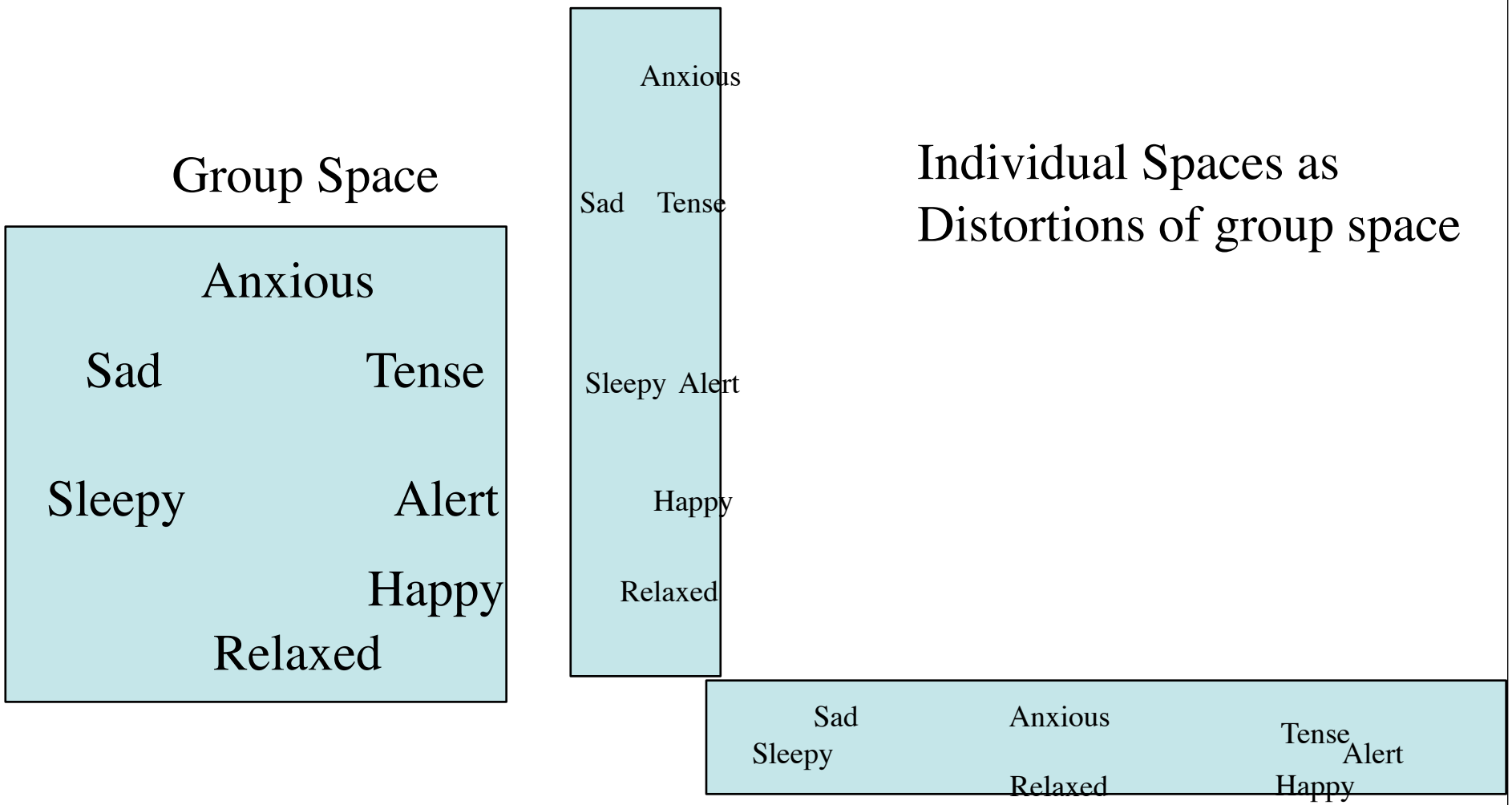

THE
NEW YORKER
PACIFIC OCEAN
HUDSON RIVER
10TH AVE
9TH AVE

THE GERMAN HEALTH CARE SYSTEM

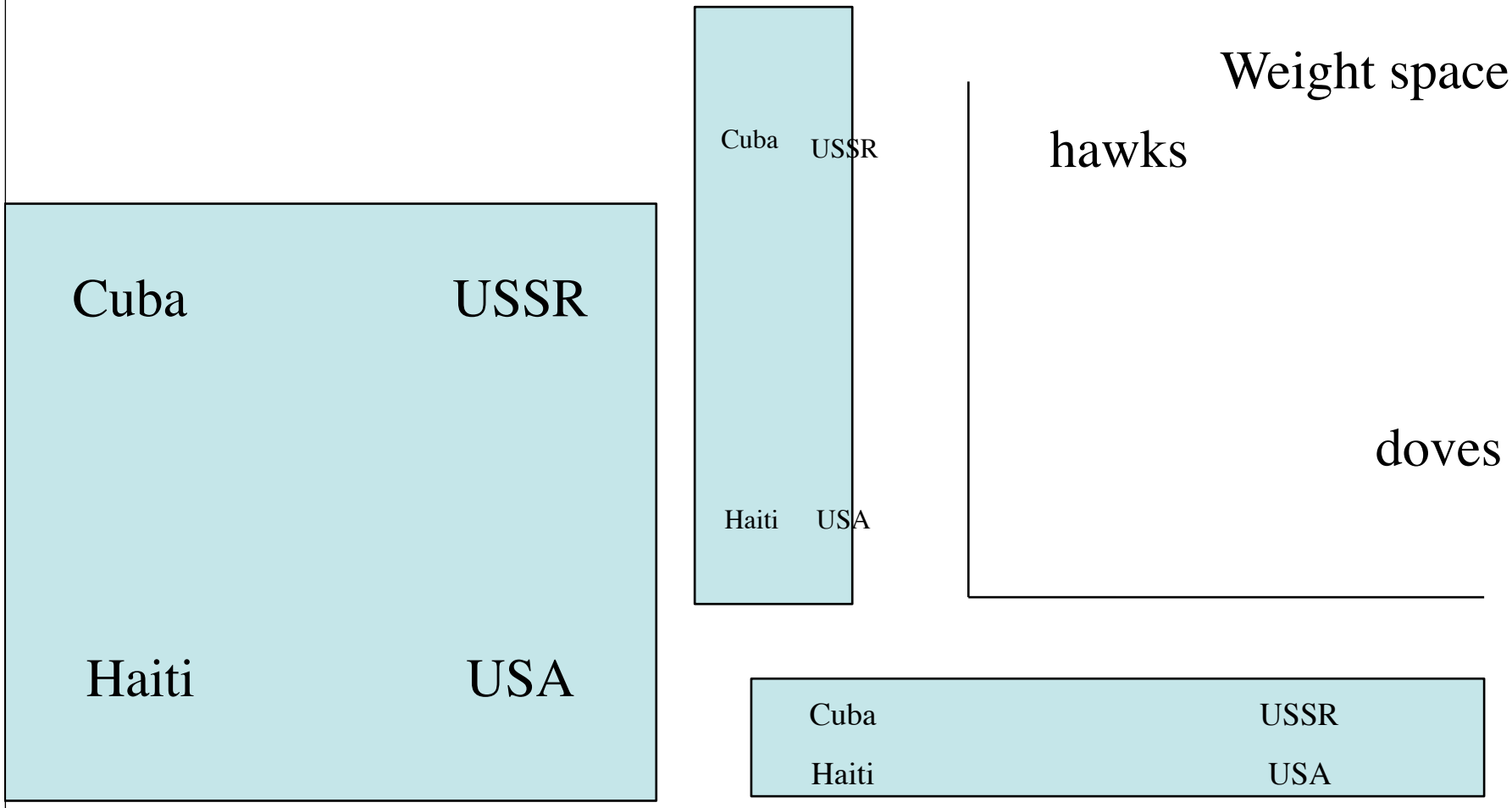
INDSCAL

- Consider a set of points X_i with a corresponding set of distances in K dimensional space:
  - $D_{ij} = (\sum (x_{ik} - x_{jk})^2)^{.5} \quad (k=1 \ldots K)$
- Consider individuals 1 .. n who differ in the relative importance (weight) they place on the dimensions $w_{k.}$
- Then, the distances for individual$_l$ are
  - $D_{ijl} = (\sum \{w_{lk} * (x_{ik} - x_{jk})\}^2)^{.5} \quad (k=1 \ldots K)$

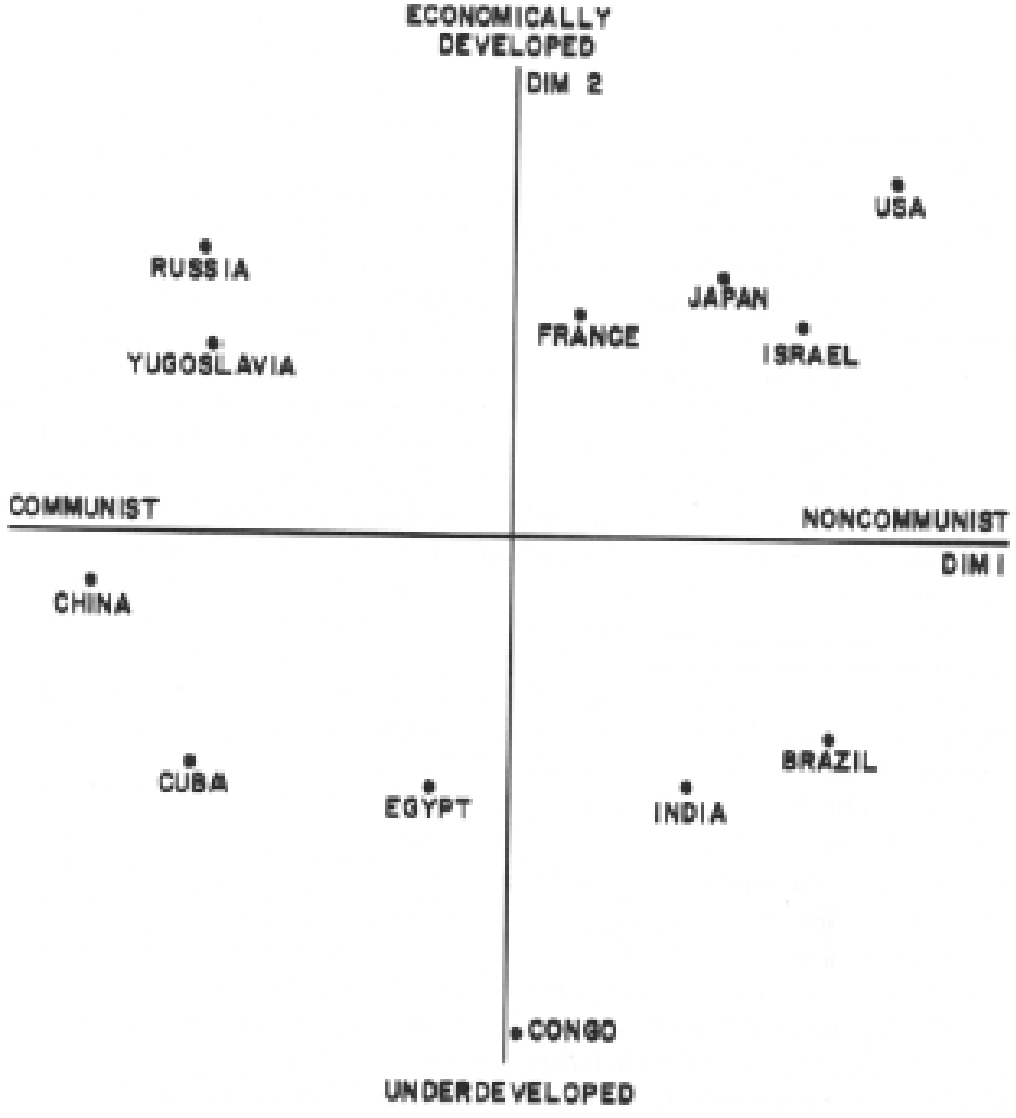
Carroll IndScal model
Individual Differences in MDS



Representation of Countries and attitudes towards Vietnam



INDSCAL- Wish data of countries



from J.D. Carroll and M. Wish, 2002

Weight space - Wish data

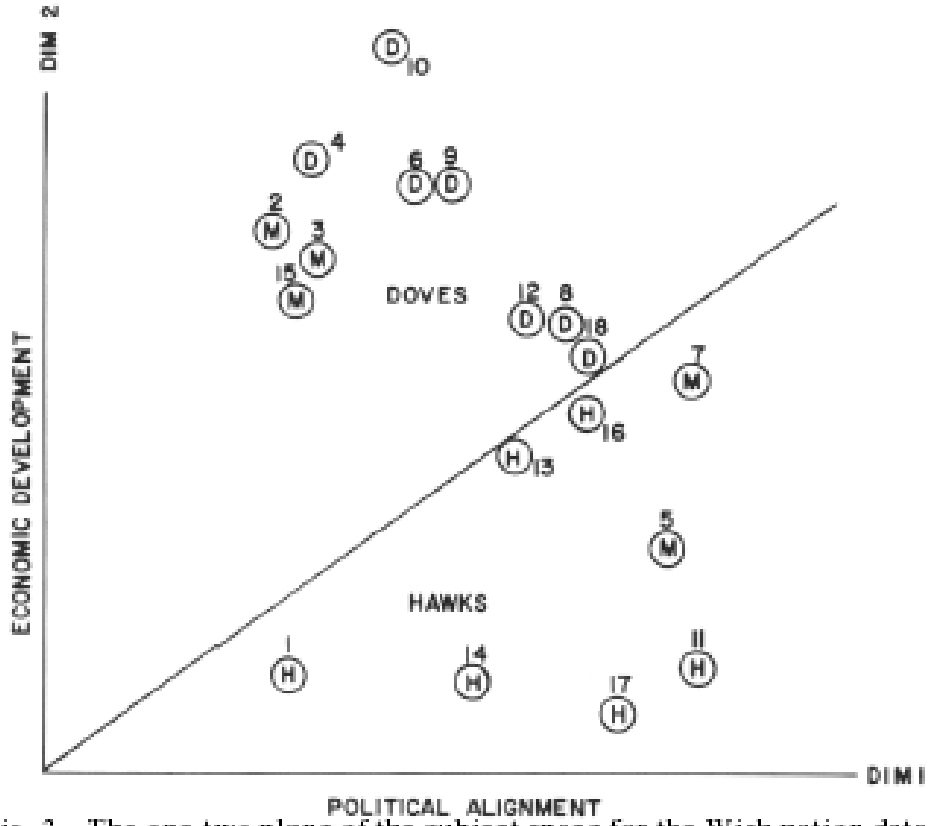


Fig. 3. The one-two plane of the subject space for the Wish nation data. *D, H* and M stand for "dove," "hawk," and "moderate" (as determined by subjects' self-report) vis-a-vis attitudes on Vietnam War. Forty-five-degree line divides "doves" from "hawks," with "moderates" on both sides.

Sources of Data

- Structured interviews (e.g., SCID)
- Other ratings
  - Peer ratings
  - supervisory ratings
  - subordinate ratings
- archival/unobtrusive measures
  - unobtrusive measures
  - historical record
    - GPA
    - Publications
    - Citations
  - Neuropsychological
    a) neurometrics
    b) "lie detection"

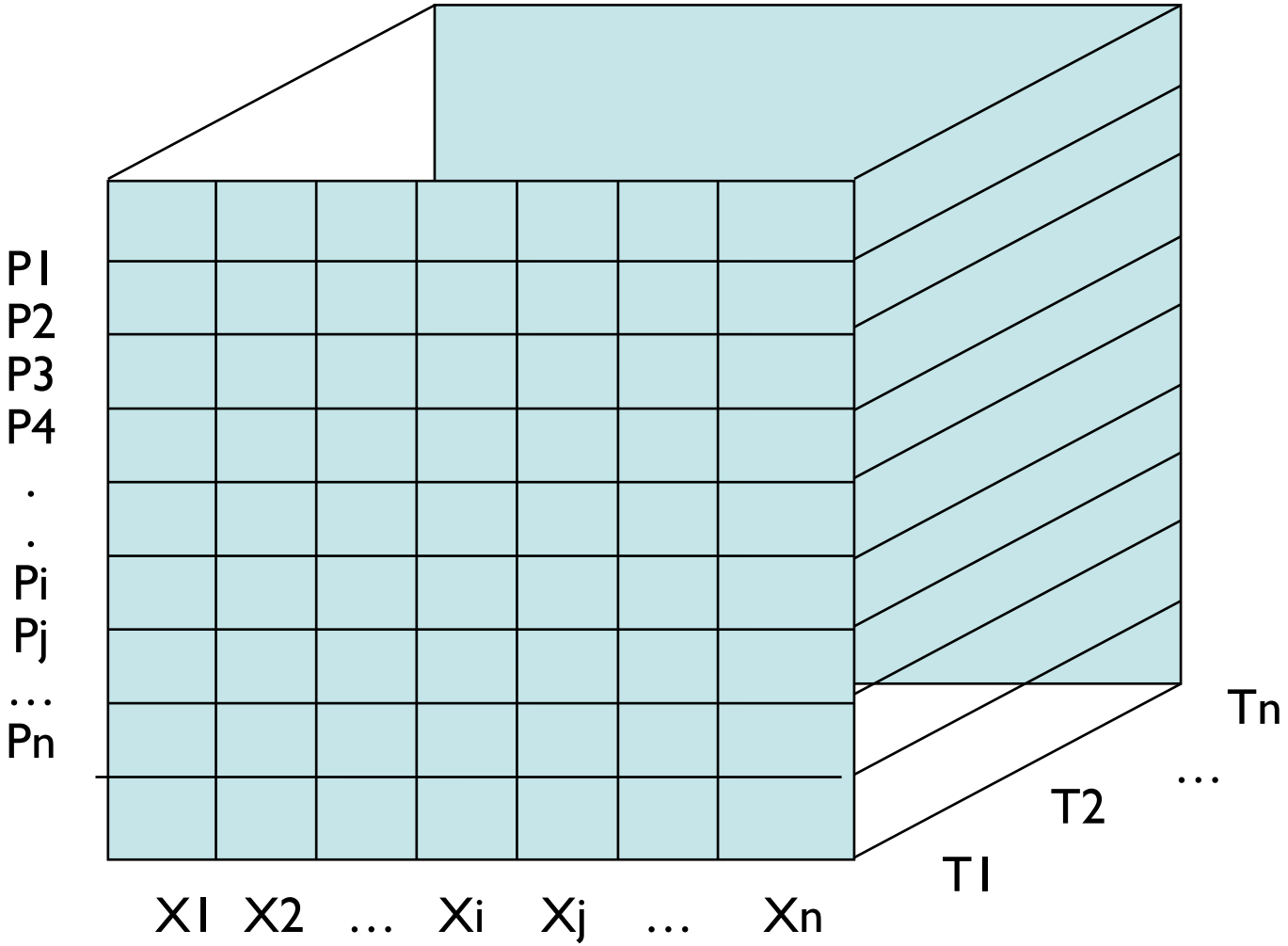
Sources of Data

- Performance tests
  - OSS stress tests
  - New faculty job talks
  - Clinical graduate applicant interviews
  - Internships
  - Probationary Periods
- Web based instrumentation
  - self report
  - indirect (IAT)

The data box

Multiple ways of assessment

The data box: measurement across time, situations, items, and people



Cattell's data box

Integrating People, Variables, and Occasions

- Person x Variables
  - Variables over People, fixed Occasion (R)
  - People over Variables, fixed Occasion (Q)
- Person x Occasions
  - Occasions over People, fixed Variable (S)
  - People over Occasions, fixed Variable (T)
- Variables x Occasions
  - Variables over Occasions, fixed People (O)
  - Occasions over Variables, fixed People (P)

Cattell, R.B (1978) The scientific use of factor analysis. p 323

Traditional measures

- Individuals across items
  - correlations of items taken over people to identify dimensions of items which are in turn used to describe dimensions of individual differences
    - Ability
    - Non-cognitive measures of individual differences
      - stable: trait
      - unstable: state
- INDSCAL type comparisons of differences in structure of items across people
- 3 Mode Factor Analysis

Other ways of measurement

- Example of measurement of the structure of mood
  - between subjects
  - within subjects

Introversion/Extraversion as one dimension of affect/behavior space

- Personality trait description
  - Introversion/Extraversion
  - Neuroticism Stability
- Affective Space
  - Positive Affect
  - Negative Affect
- Behavior
  - Activation and Approach
  - Inhibition and Avoidance

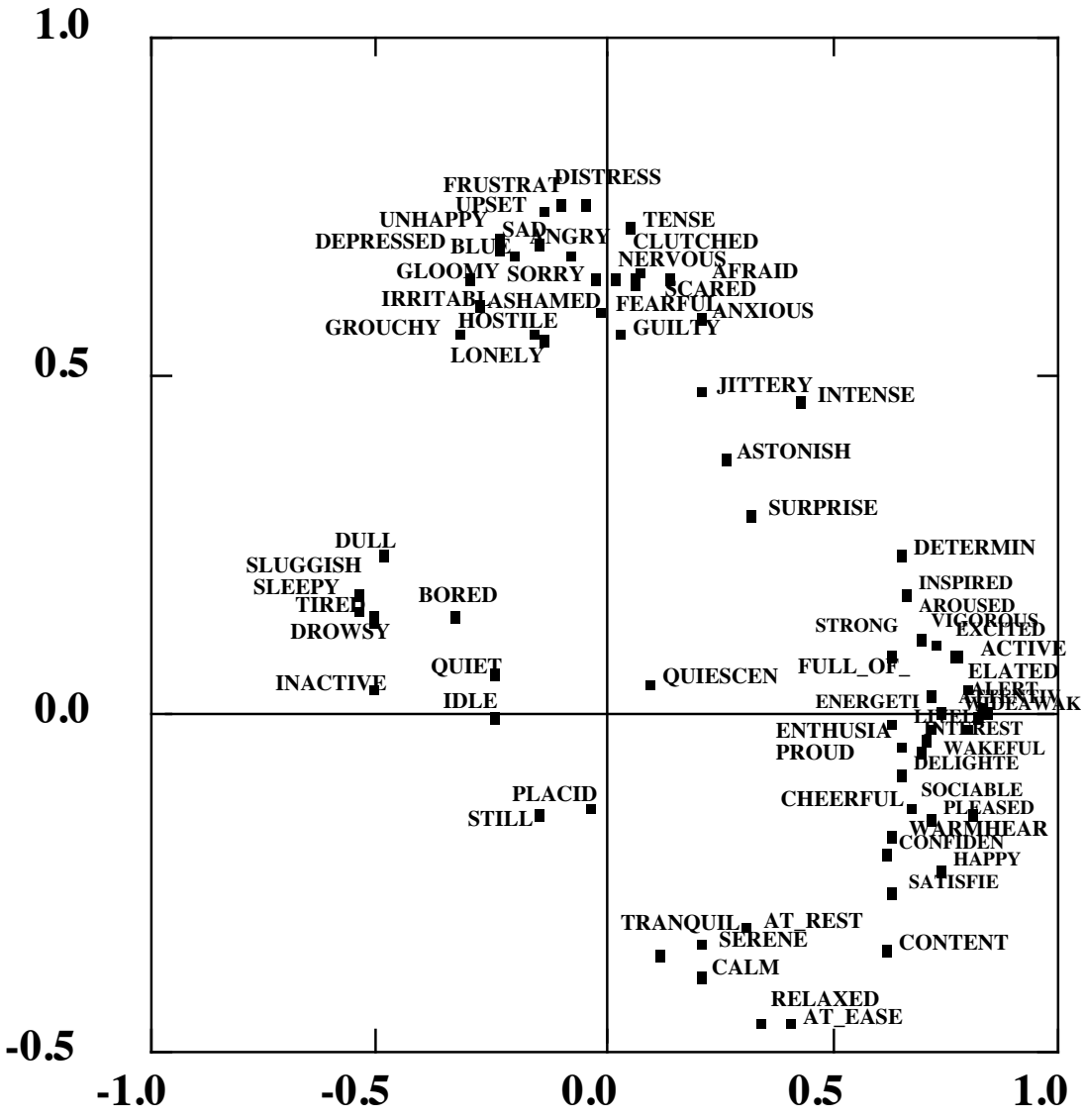
Personality and Emotions

- Standard model
  - Dimensional model of personality
    - Particularly Extraversion and Neuroticism
  - Dimensional model of emotions
    - Positive Affect and Negative Affect
  - Dimensional congruence
    - Extraversion and Positive Affectivity
    - Neuroticism and Negative Affectivity

Measuring the dimensions of affect

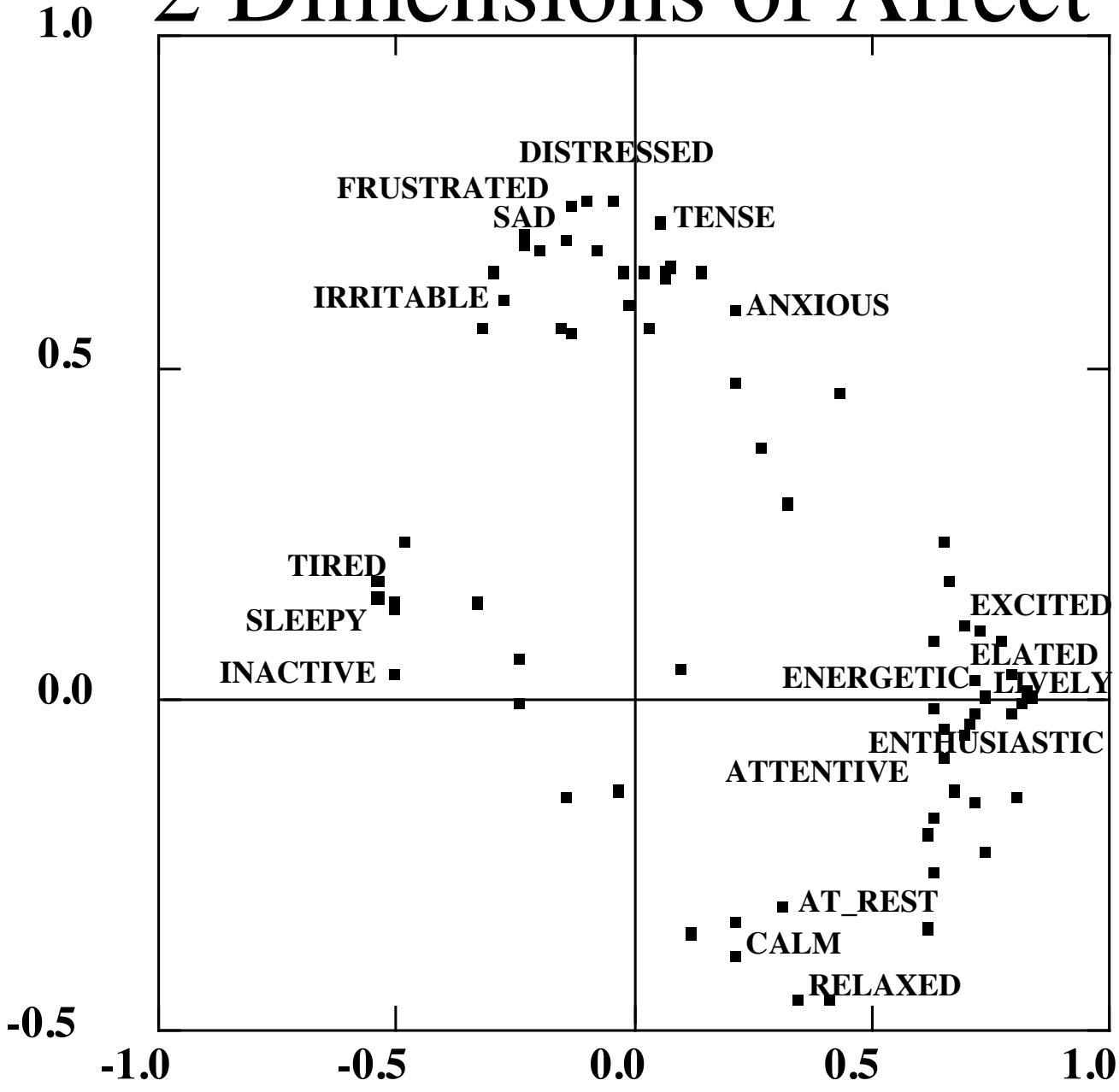
- Motivational state questionnaire (MSQ)
  - 70-72 items given as part of multiple studies on personality and cognitive performance
  - Items taken from
    - Thayer's Activation-Deactivation Adjective Checklist (ADACL)
    - Watson and Clark Positive Affect Negative Affect Scale (PANAS)
    - Larsen and Diener adjective circumplex
  - MSQ given before and after various mood manipulations
    - Structural data is from before
- Structural results based upon factor analyses of correlation matrix to best summarize data

2 Dimensions of Affect



Energetic Arousal/Positive Affect

2 Dimensions of Affect



Representative MSQ items (arranged by angular location)

Item	EA-PA	TA-NA	Angle
energetic	**0.8**	0.0	1
elated	**0.7**	0.0	2
excited	**0.8**	0.1	6
anxious	0.2	**0.6**	70
tense	0.1	**0.7**	85
distressed	0.0	**0.8**	93
frustrated	-0.1	**0.8**	98
sad	-0.1	**0.7**	101
irritable	-0.3	**0.6**	114
sleepy	**-0.5**	0.1	164
tired	**-0.5**	0.2	164
inactive	**-0.5**	0.0	177
calm	0.2	**-0.4**	298
relaxed	0.4	**-0.5**	307
at ease	0.4	**-0.5**	312
attentive	**0.7**	0.0	357
enthusiastic	**0.8**	0.0	358
lively	**0.9**	0.0	360

Personality and Emotions

- Standard model
  - Dimensional model of Personality
    - Behavioral Activation/Approach <-> Extraversion
    - Behavioral Inhibition <-> Neuroticism
  - Dimensional model of Emotions
    - Positive Affect
    - Negative Affect
    - Arousal?
  - Dimensional congruence
    - Extraversion, Approach, and Positive Affectivity
    - Neuroticism, Inhibition, and Negative Affectivity

Personality measurement: snapshot or movie?

- Cross sectional measurement of a person is similar to a photograph-- a snapshot of a person at an instant.
- Appropriate measurement requires the integration of affect, behavior, and cognition across time.

Personality and affect: within subject measurements

- High frequency sampling: the example of body temperature

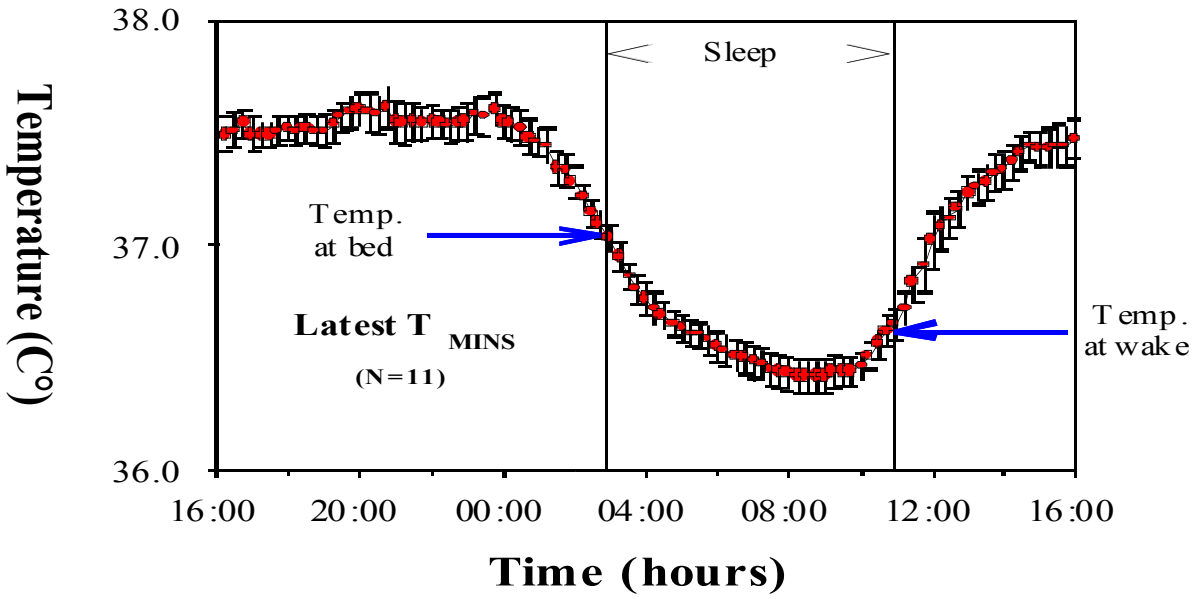
- Low frequency sampling: palm pilot sampling of affect

Within subject diary studies-1

- Very High Frequency (continuous) measurements
  - Physiological assays
    - Cortisol
    - Body temperature <--
      - Core body temperature collected for ≈ 2 weeks
      - Data taken by aggregating subjects from multiple studies conducted by Eastman and Baehr on phase shifting by light and exercise

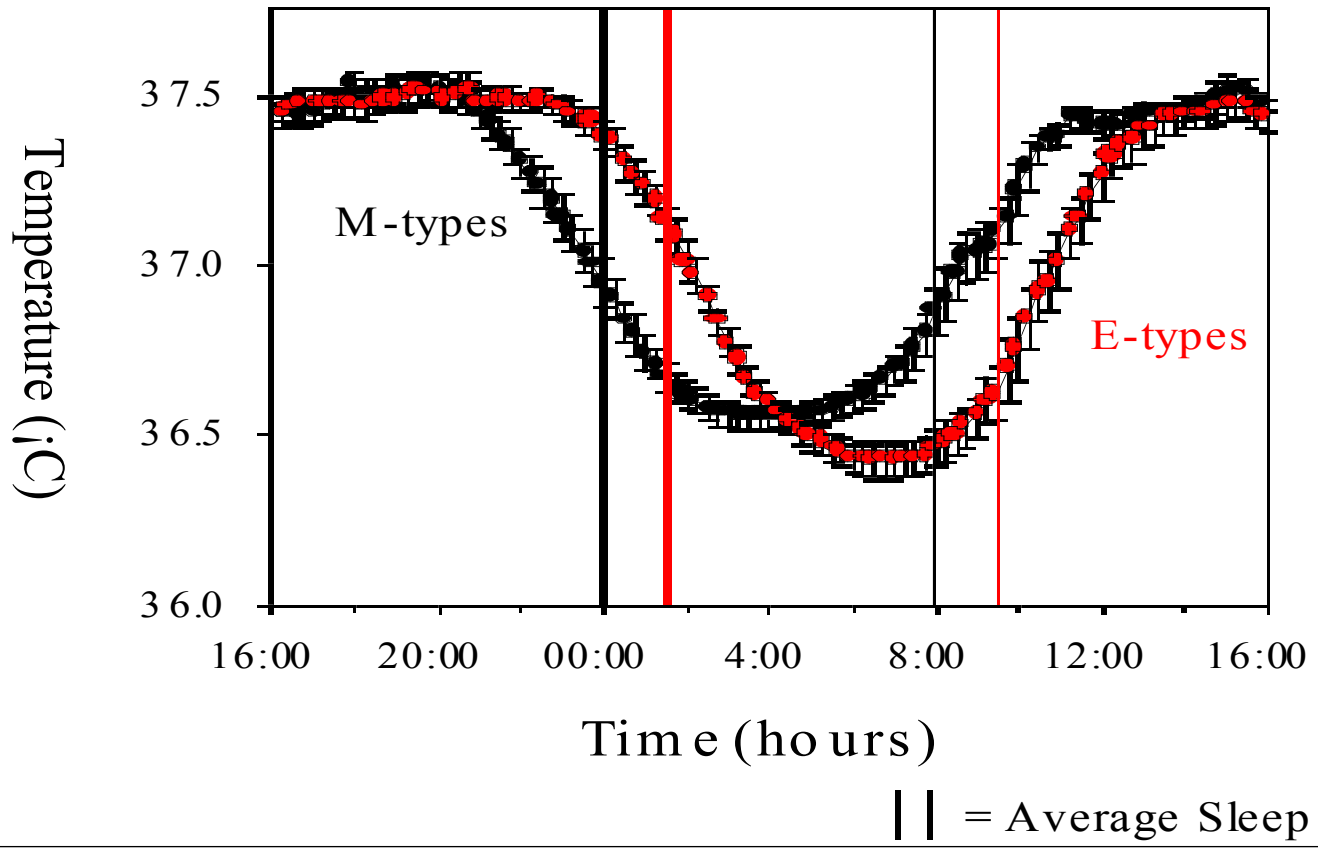
Body Temperature as f(time of day)

(Baehr, Revelle & Eastman, 2000)



Morningness/Eveningness and BT

(Baehr, Revelle and Eastman, 2000)



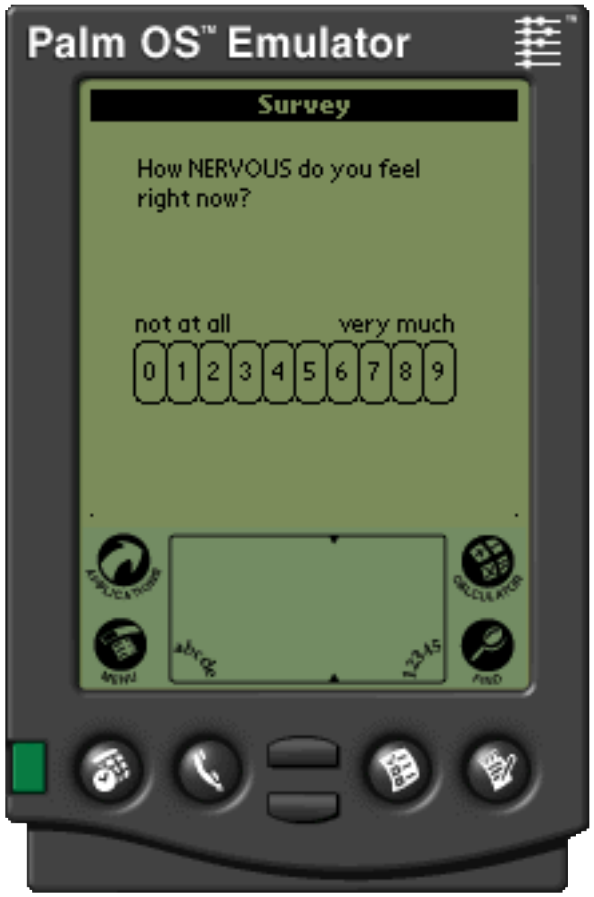
Within subject diary studies-2

- Measures
  - Check lists
  - Rating scales
- High frequency sampling <--
  - Multiple samples per day
- Low frequency sampling
  - Once a day
  - Sometimes at different times

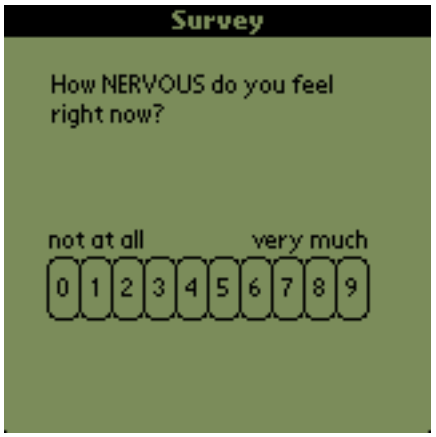
High frequency measures of affect

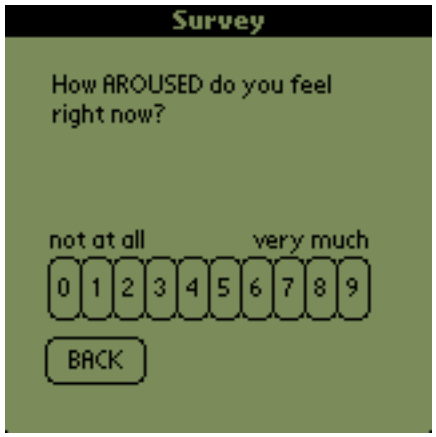
- Measures taken every 3 hours during waking day for 6-14 days
- Paper and pencil mood ratings
  - Short form of the MSQ -- Visual Analog Scale
  - Sampled every 3 hours
- Portable computer (Palm) mood ratings <--
  - Short form of the MSQ
  - Sampled every 3 hours

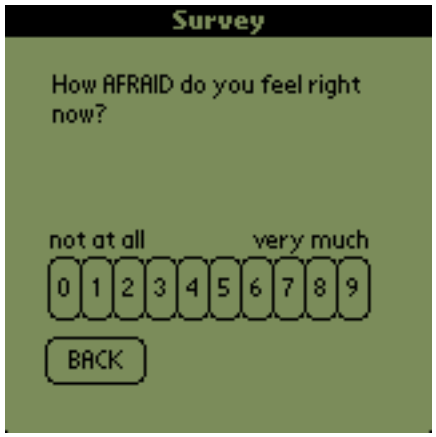
Palm Affect Survey

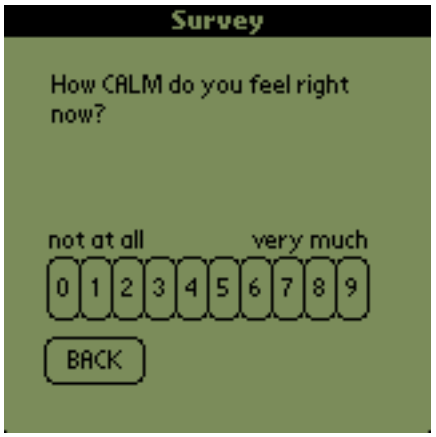


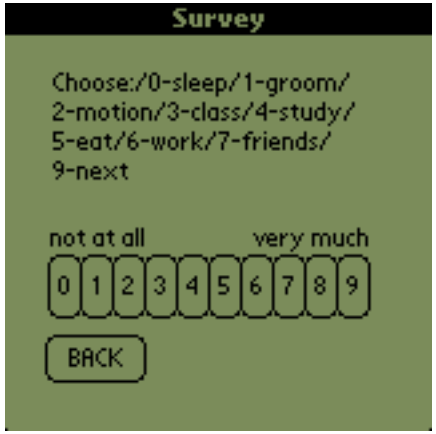
Palm affect and activity survey

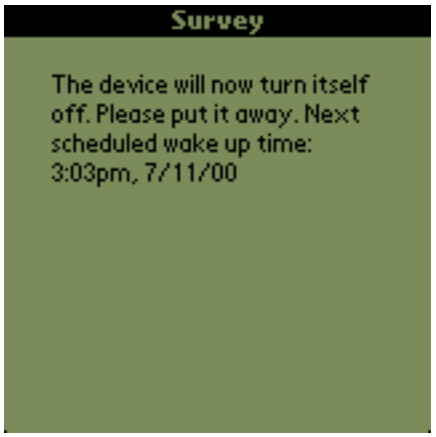












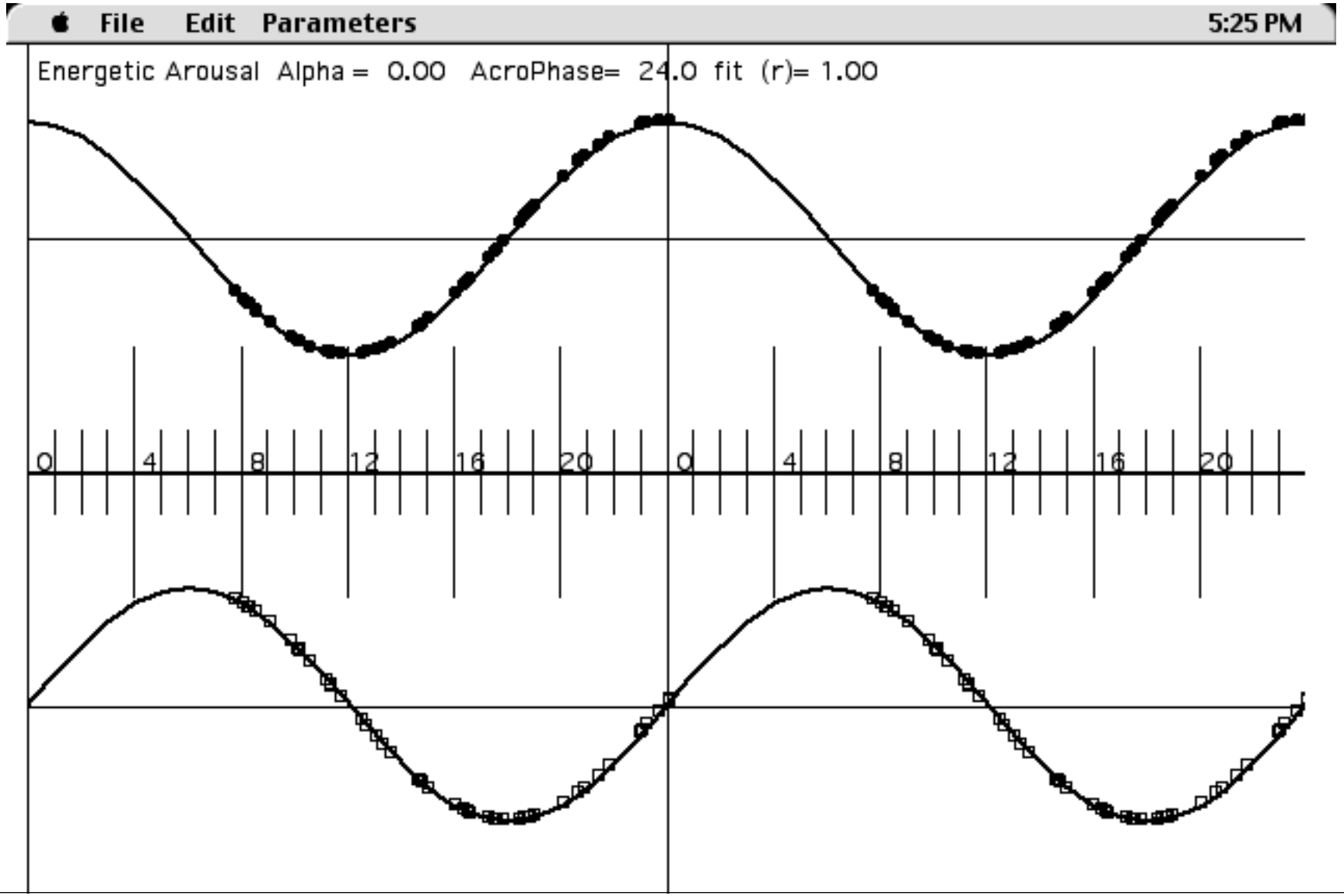
Traditional measures

- Mean level
  - Energetic arousal
  - Tense arousal
  - Positive affect
  - Negative affect
- Variability
- Correlation across measures (Synchrony)

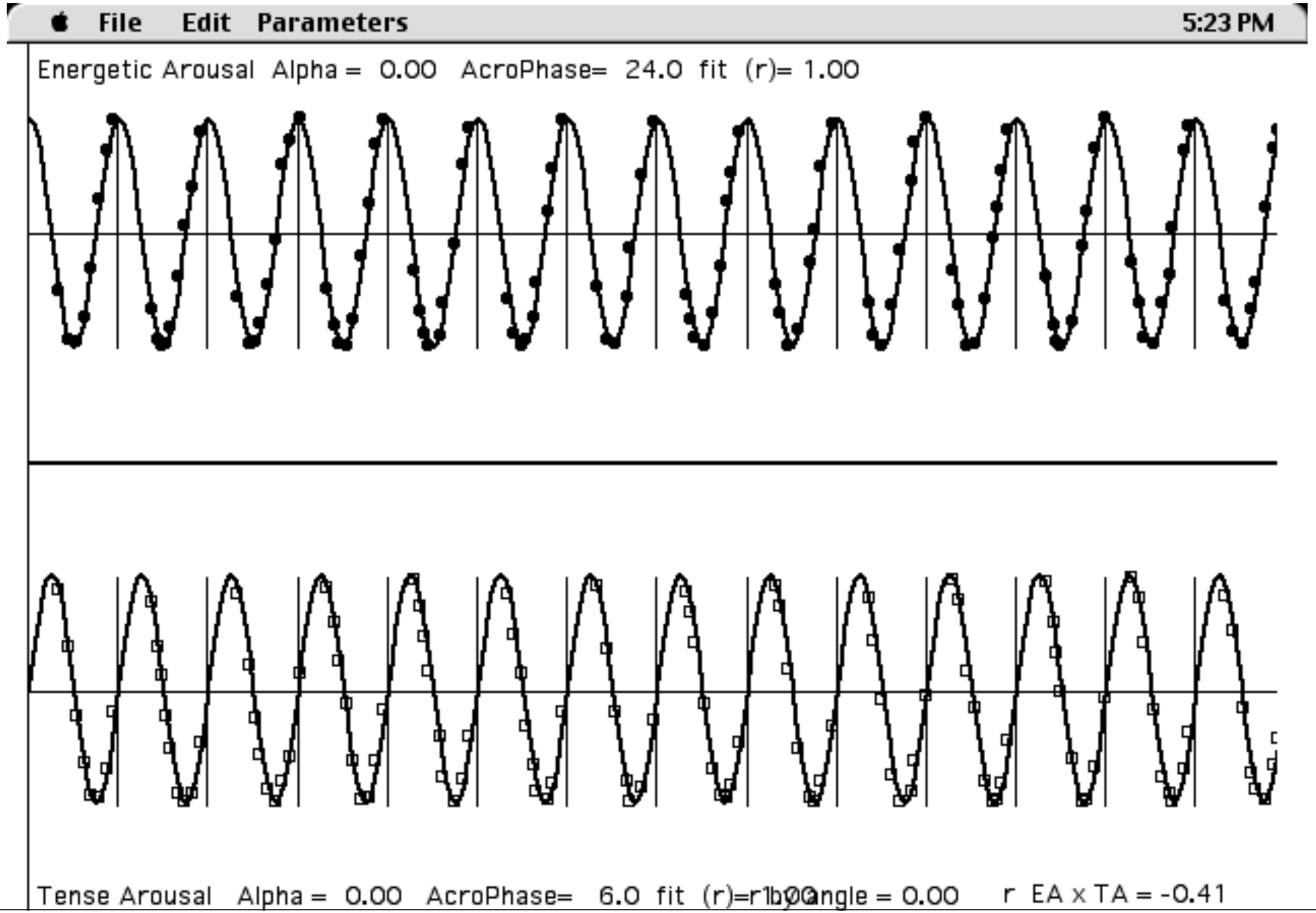
Phasic measures of affect

- Fit 24 hour cosine to data
  - Iterative fit for best fitting cosine
  - Permutation test of significance of fit
- Measure
  - Fit (coherence)
  - Amplitude
  - Phase

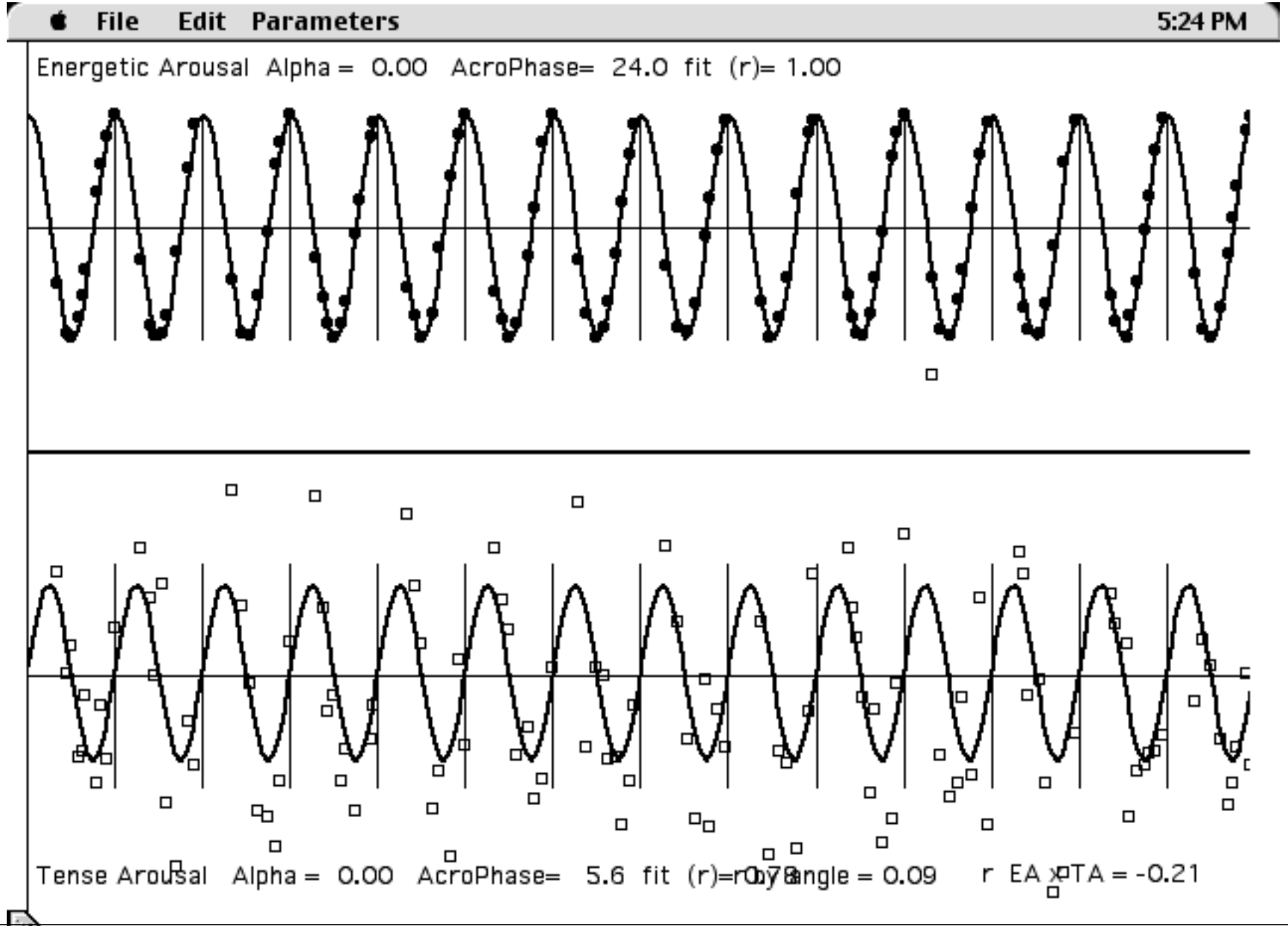
Affective rhythms can differ in phase (simulation - double plotted to show rhythm)



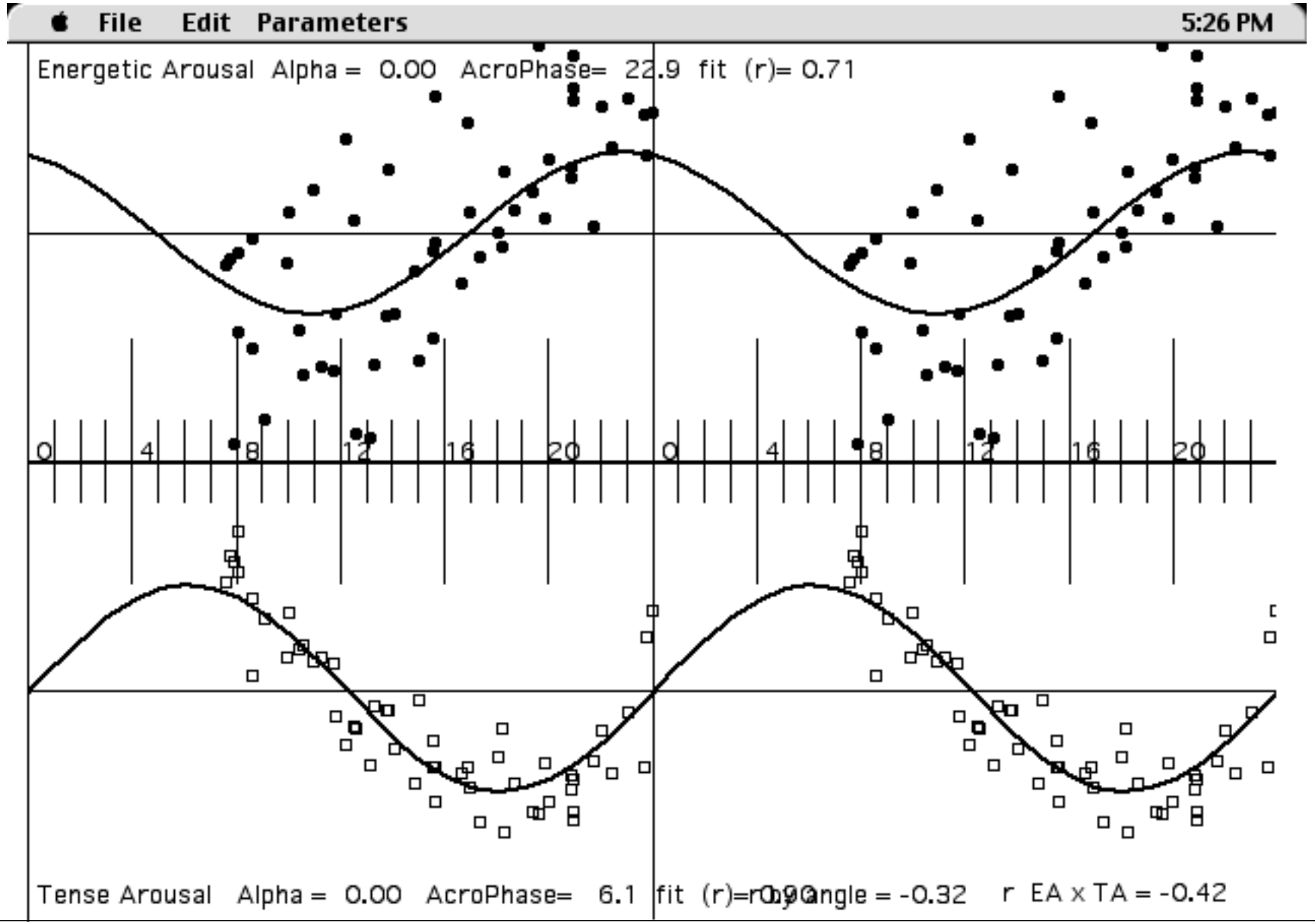
Phase differences of simulated daily data

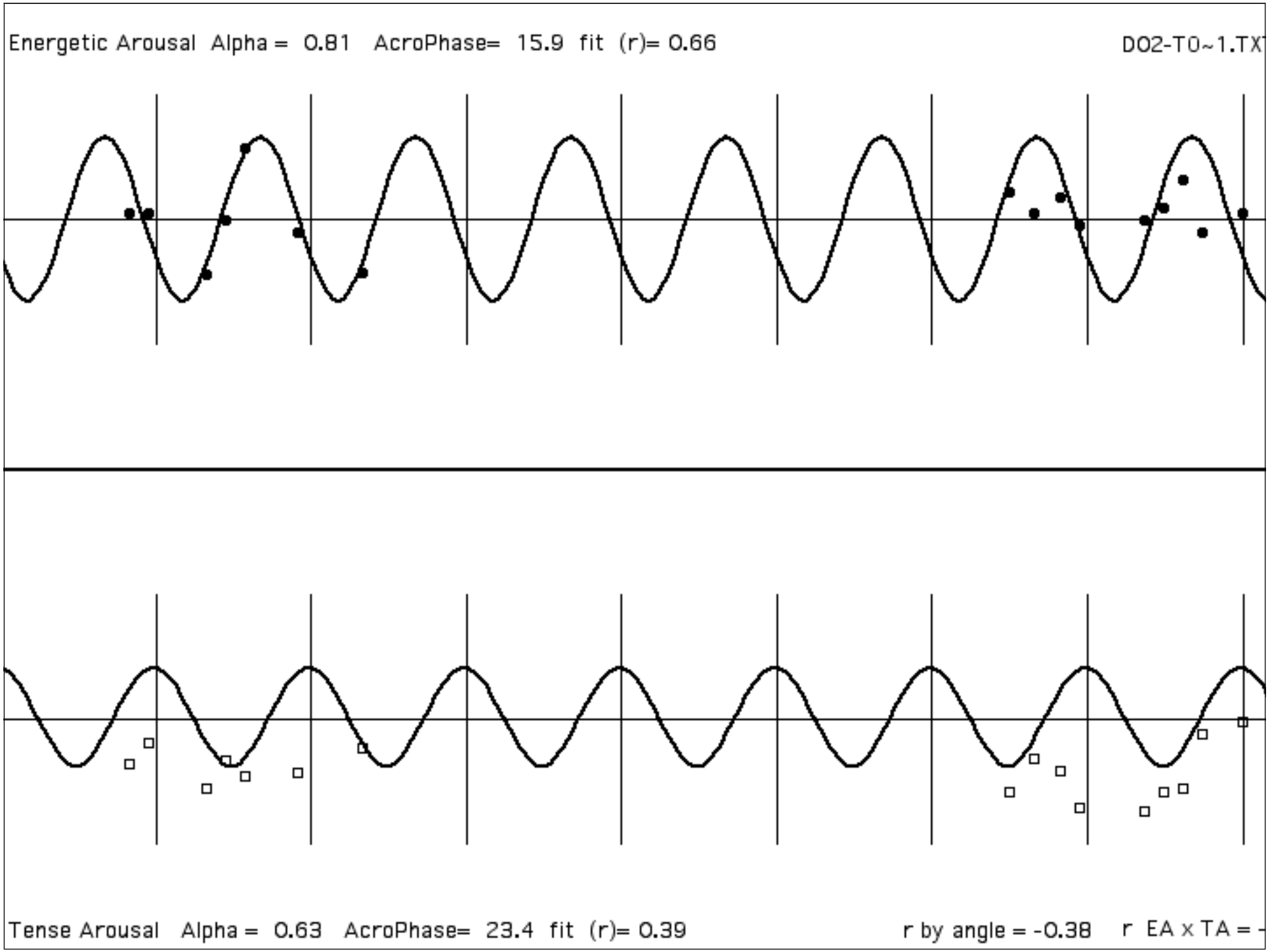


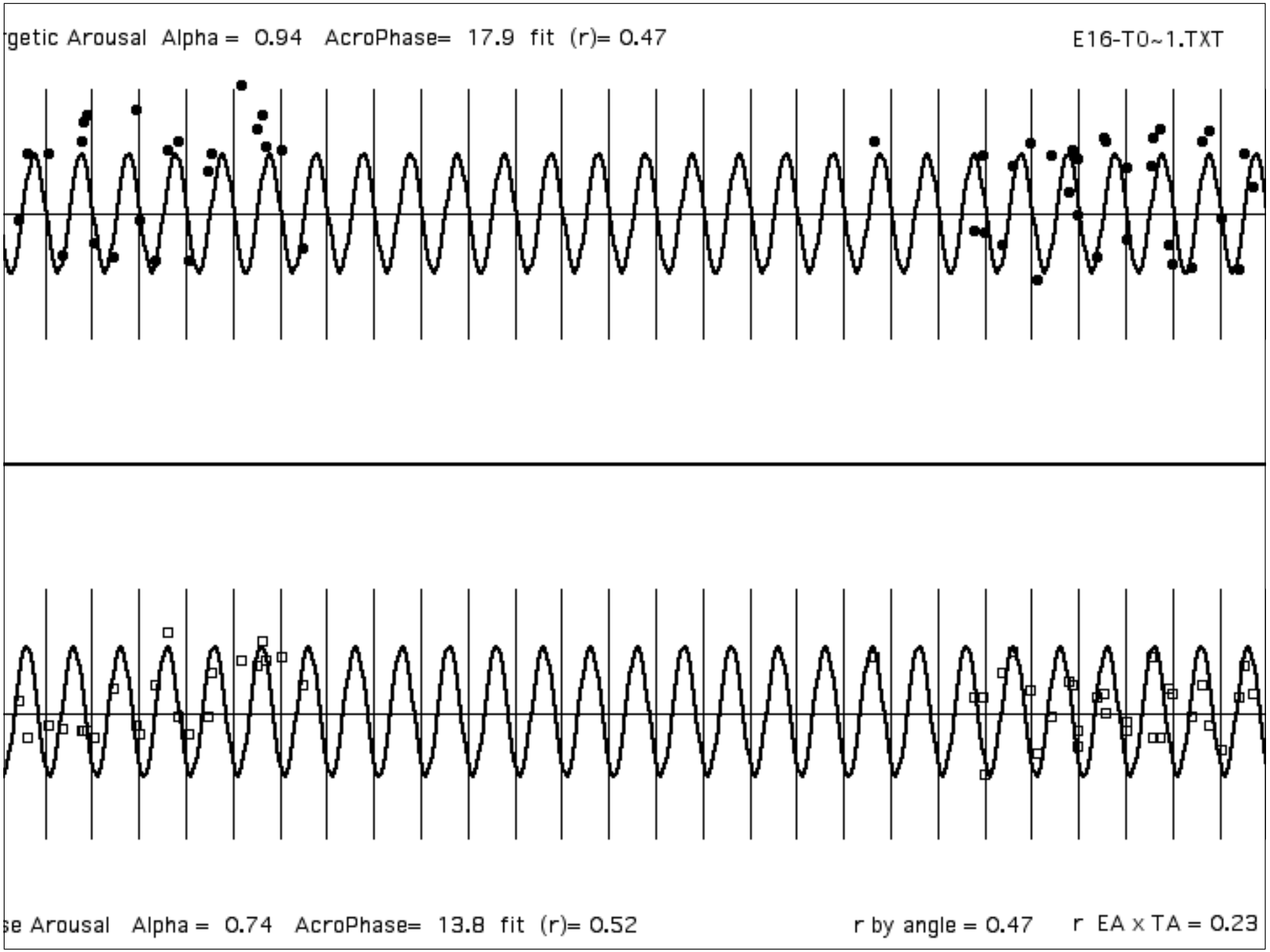
Differences in coherence (fit) simulated daily data

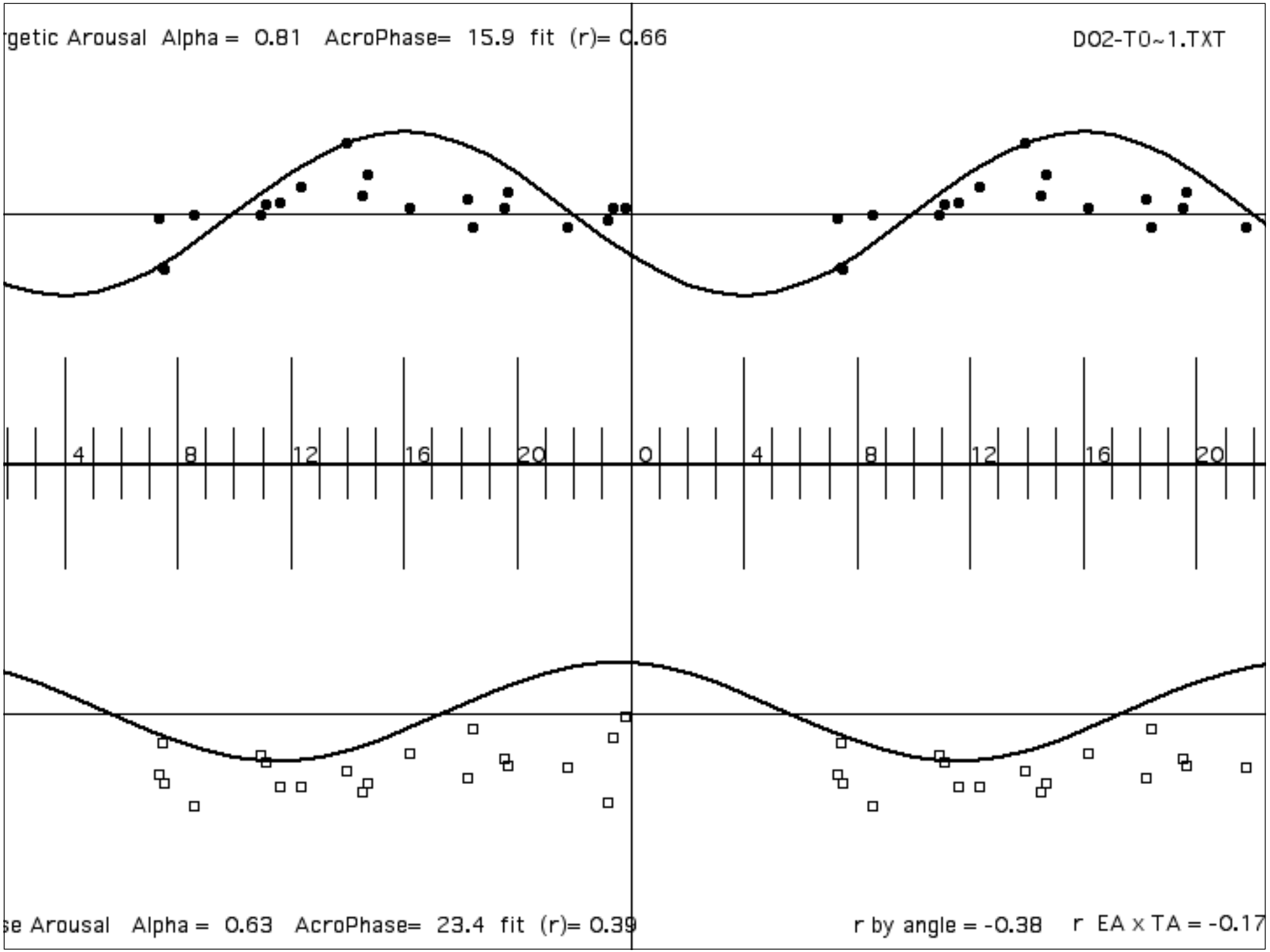


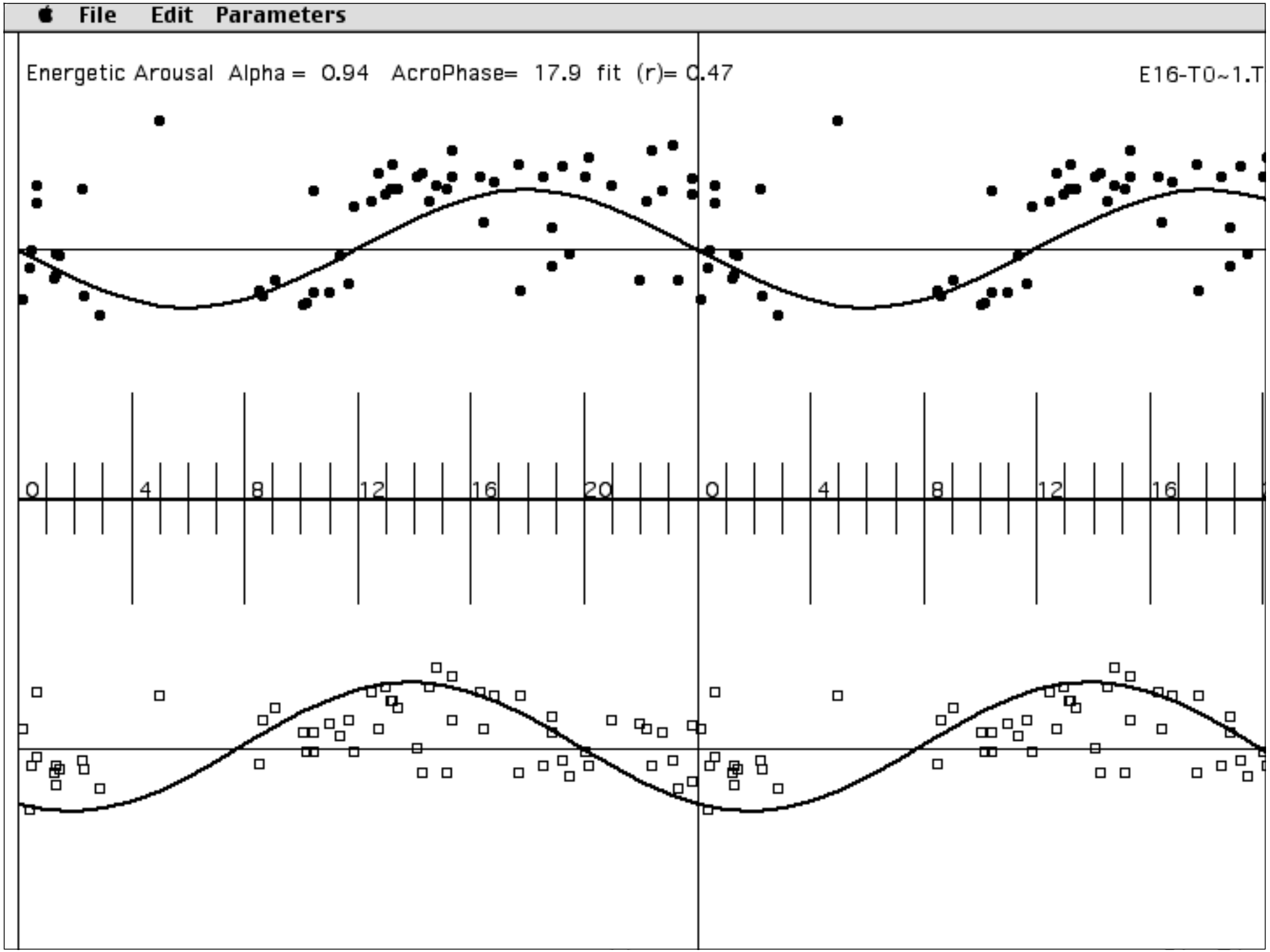
Phase and Coherence differences (simulated data -- double plotted)




Energetic Arousal Alpha = 0.81 AcroPhase= 15.9 fit (r)= 0.66
DO2-T0~1.TX
Tense Arousal Alpha = 0.63 AcroPhase= 23.4 fit (r)= 0.39
r by angle = -0.38 r EA x TA = -


rgetic Arousal Alpha = 0.94 AcroPhase= 17.9 fit (r)= 0.47
E16-T0~1.TXT
se Arousal Alpha = 0.74 AcroPhase= 13.8 fit (r)= 0.52
r by angle = 0.47
r EA x TA = 0.23


rgetic Arousal Alpha = 0.81 AcroPhase= 15.9 fit (r)= 0.66
DO2-T0~1.TXT
4
8
12
16
20
0
4
8
12
16
20
se Arousal Alpha = 0.63 AcroPhase= 23.4 fit (r)= 0.39
r by angle = -0.38
r EA x TA = -0.17


File Edit Parameters
Energetic Arousal Alpha = 0.94 AcroPhase= 17.9 fit (r)= 0.47
E16-T0~1.T
0
4
8
12
16
20
0
4
8
12
16

Multi-level analysis of patterns of affect across time-1: Method

- Within subject estimates of basic parameters
  - Level
  - Scatter (variability)
  - Phase
  - Coherence (fit)
- Between subject measures of reliability
  - Week 1/Gap/Week 2

Multi-level analyses of affect-2: 1-2 week Test-Retest Reliability

	VAS-1	VAS-2	Palm
Energetic Arousal	.67	.81	.82
Tense Arousal	.68	.57	.81
Fit EA	.55	.41	.07
Fit TA	.61	.25	.17
Phase EA	.69	.36	.58
Phase TA	.39	.25	.36
EA -TA Synchrony	.63	.48	.35

Affective rhythms and cognitive performance-1

- Design:High frequency diary study of affect combined with a low frequency study of reaction time
- Subjects: 28 NU undergraduate voluneteers
- Method:
  - 1 week diary study 5 times a day
  - Simple reaction time once a day at 5 different times using a Mac program at home

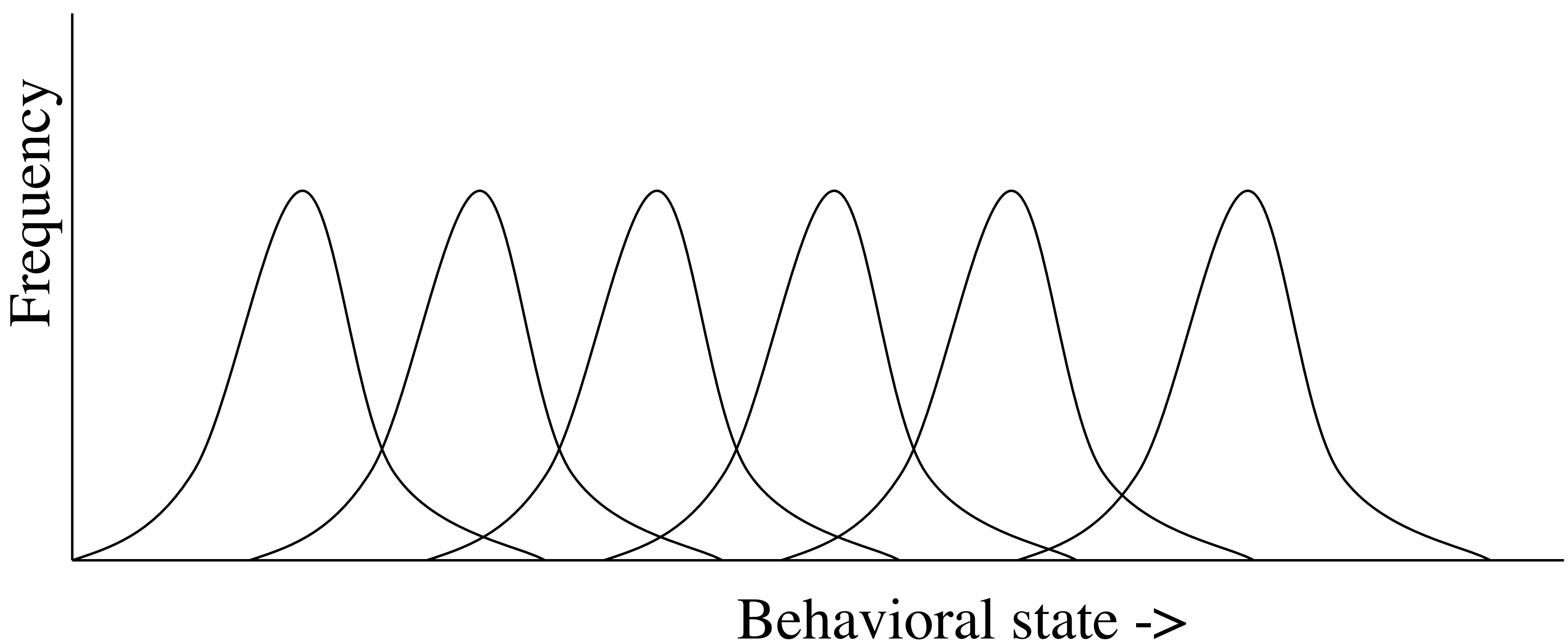
Affective rhythms and cognitive performance-2

- Low negative correlations of RT with concurrent measures of Energetic Arousal
- Stronger negative correlations of RT with Cosine fitted Energetic Arousal
- => Diurnal variation in RT may be fitted by immediate and patterns of arousal

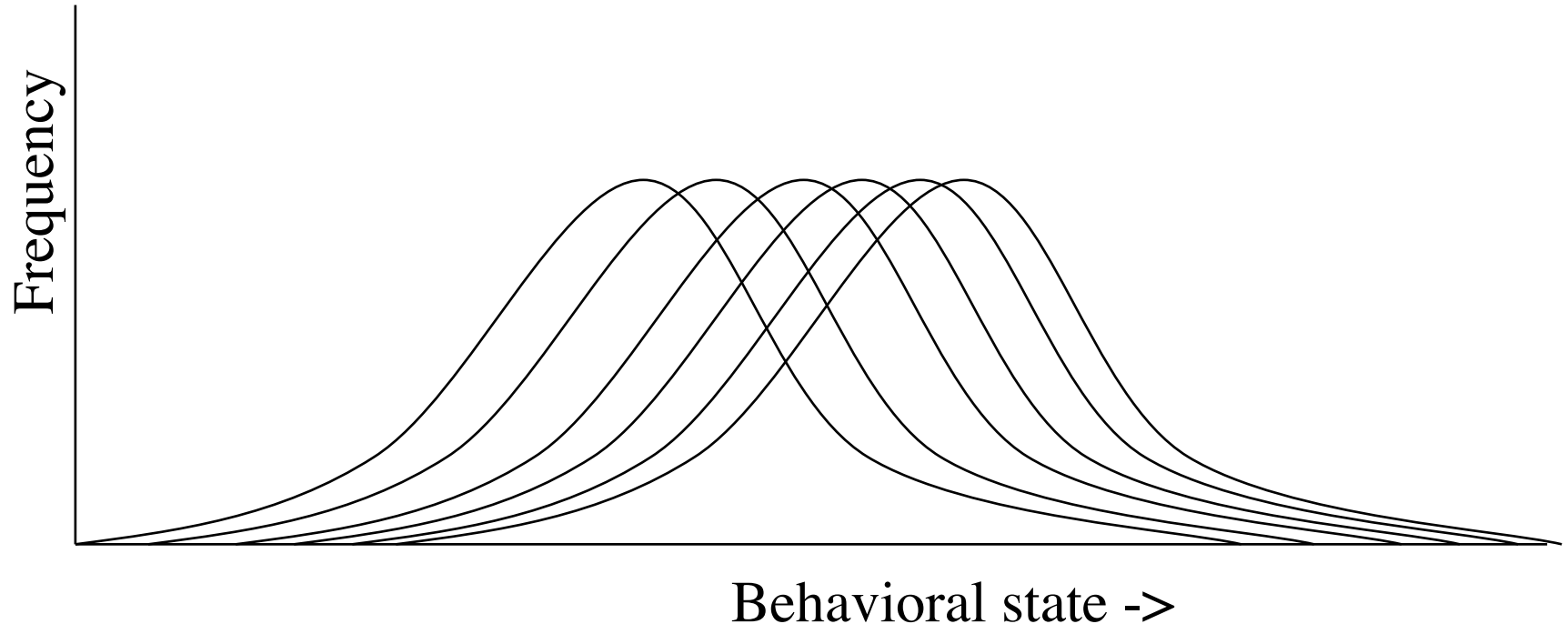
Behavioral variation over time

- William Fleeson and studies of personality variability over time
- Personality traits and personality states
- Traits as aggregated states

Behavioral Variability: Model 1:



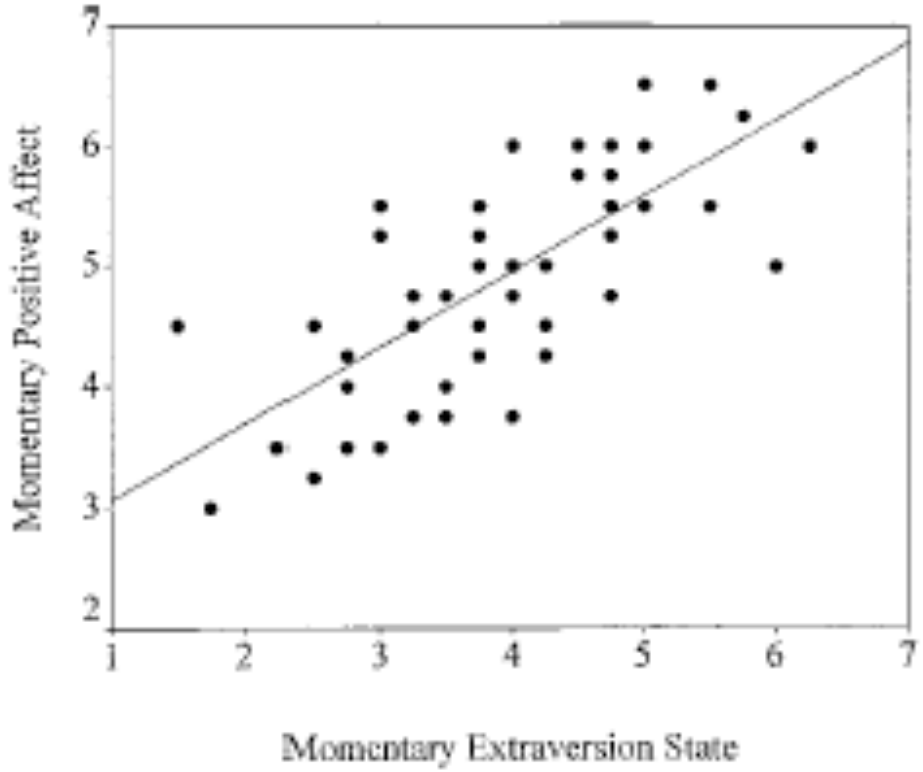
Behavioral Variability:



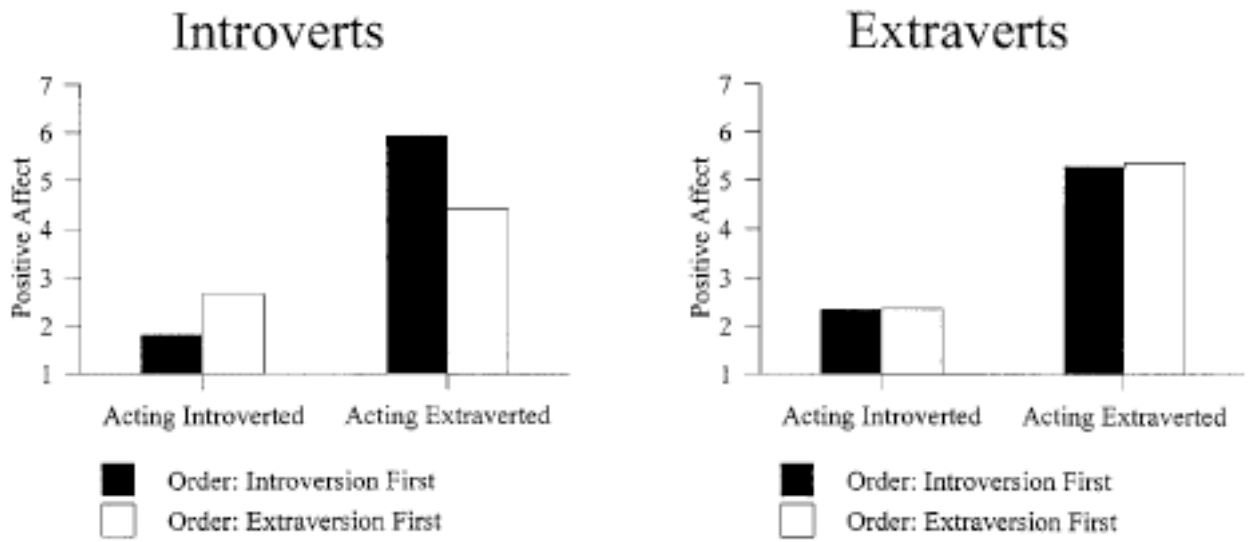
Stability of trait means and variances

- Fleeson examined within and between day levels of behaviors and affects
- Low correlations of single measurement with other single measurements
- High correlations of means over multiple days with similar means over different days
- High correlations of variability over multiple days with similar estimates over different days

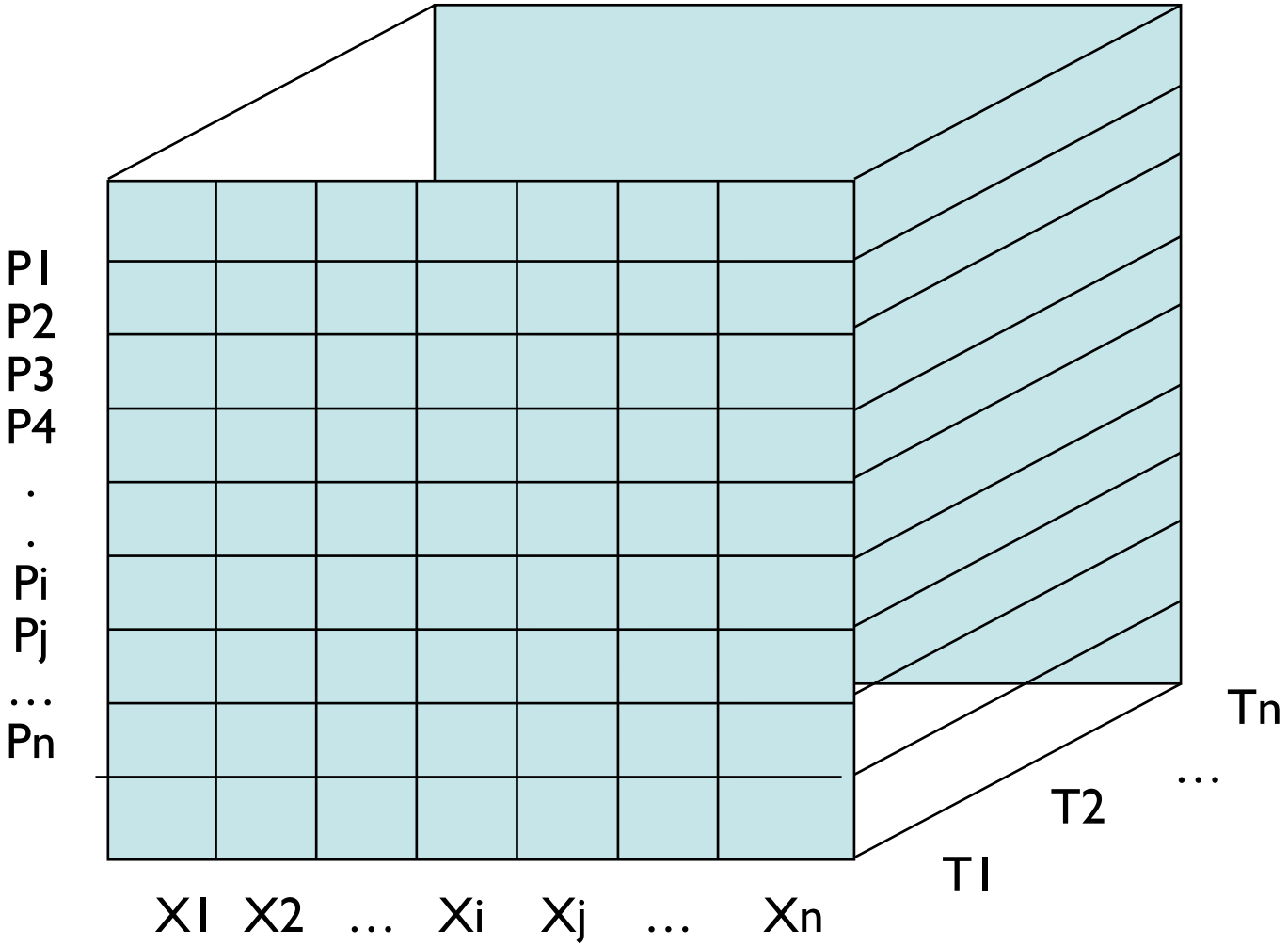
Extraversion and Affect



Positive Affect and acting Extraverted



The data box: measurement across time, situations, items, and people



Cattell's data box

Integrating People, Variables, and Occasions

- Person x Variables
  - Variables over People, fixed Occasion (R)
  - People over Variables, fixed Occasion (Q)
- Person x Occasions
  - Occasions over People, fixed Variable (T)
  - People over Occasions, fixed Variable (S)
- Variables x Occasions
  - Variables over Occasions, fixed People (P)
  - Occasions over Variables, fixed People (O)

Cattell, R.B. (1966), Handbook of Multivariate Experimental Psychology. p 69-70.
but see Cattell, R.B (1978) The scientific use of factor analysis. p 323 where P is swapped with O and T with S.

Traditional measures

- Individuals across items
  - correlations of items taken over people to identify dimensions of items which are in turn used to describe dimensions of individual differences
    - Ability
    - Non-cognitive measures of individual differences
      - stable: trait
      - unstable: state
- INDSCAL type comparisons of differences in structure of items across people
- 3 Mode Factor Analysis