# Synthetic Aperture Personality Assessment

William Revelle

Northwestern University

MPA 2006

# SAPA: Synthetic Aperture Personality Assessment

- What is it?
- Proof of concept (March-April, 2004: N ≈ 3,000)
  - correlating Big 5 with Right Wing Authoritarianism
- Large scale data set (March, 2004- March, 2006: N > 54,000)
  - item statistics on 120 International Personality Item Pool (IPIP) items
  - sex and age differences
- Extension to new domains (March 2006- :N ≈ 2,500)
  - Ability
  - Music Preferences

# Synthetic Aperture Measurement

- Synthetic Aperture Measurement is done in visual and radio astronomy by combining input from multiple, linked sites into one coherent image

- Classic example is radio astronomy at the Very Large Array (Socorro, New Mexico)

- Visual Astronomy uses similar techniques at Keck Observatory with "outriggers"

NRAO / AUI / NSF

# Very Long Array

# Very Long Array



NRAO / AUI / NSF

NRAO / AUI / NSF

# SAPA: Overview

- Develop item statistics and item-item covariances on large (N > 2000) item pools by randomly presenting small (N ≈ 60-80) subsets of items to different subjects taken from a very large (N > 56,000) and growing (≈100/day) subject population.

- Use open source and public domain software.

# SAPA: Synthetic Aperture Personality Assessment

- Not particular new or original, early work was done (and is still being done) at ETS on the SAT and GRE

- Techniques are now available for SAPA for all of us

# SAPA: Method

- Item Pool: International Personality Item Pool (Goldberg)
  - Particular emphasis upon marker sets of "Big 5"
- Subjects: recruited from visitors to the Personality Project (roughly 1-2000/day visitors) -> ≈ 100 day participants
- Methods: public domain applications
  - HTML, PHP, Apache, mySQL, R

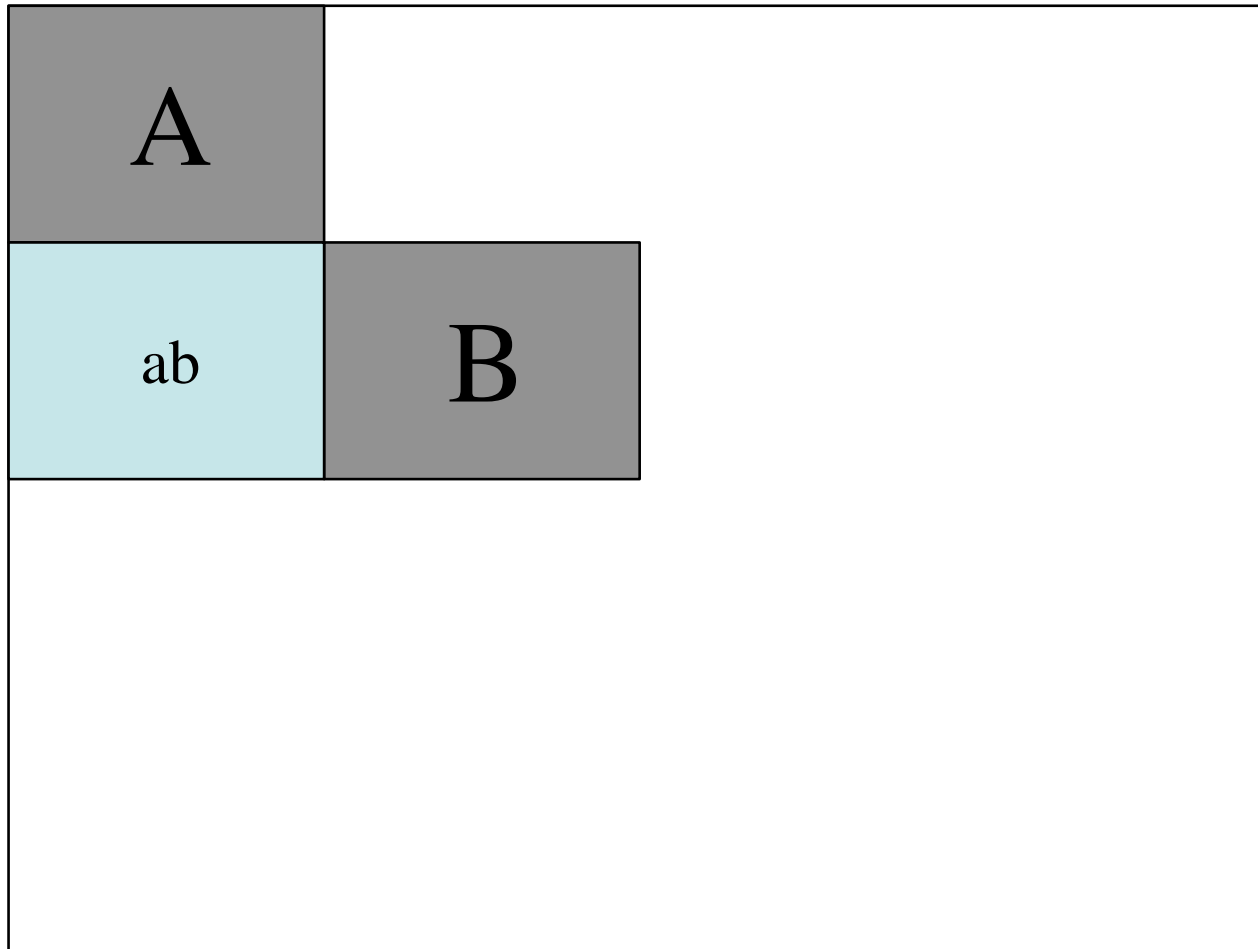# SAPA: basic concept

- Consider an item pool of P items divided into m sets e.g., P =120, m = 4 produces sets A, B, C, D of 30 items.

- Each subject (N >> 1000) is given 2 sets of items
  - E.g., (A+B, A+C, ... C+D)

- Sample size n for basic set is 2N/m,

- Sample size $n_{ij}$ for correlations between item subsets = 2N/(m*m-1)
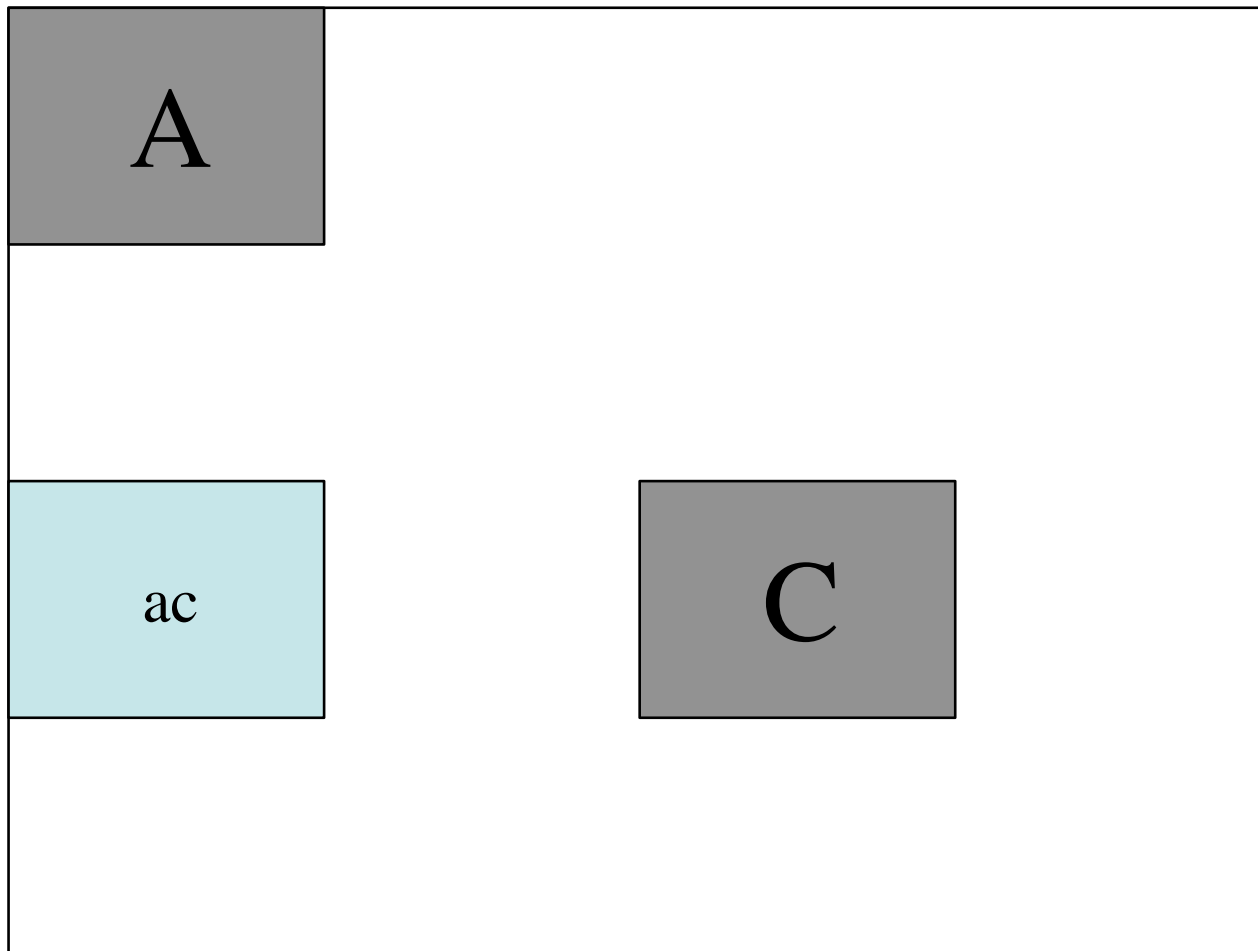
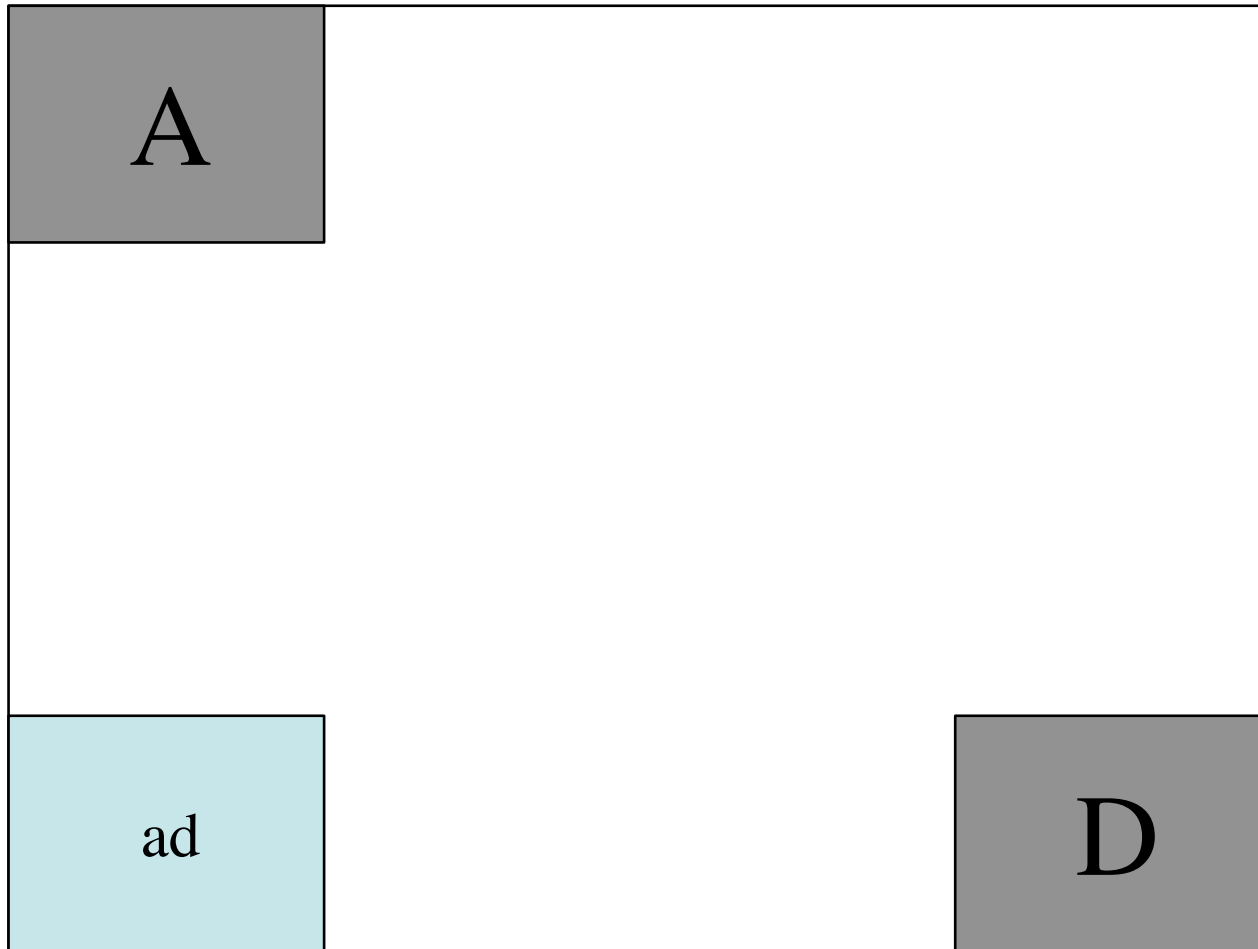# SAPA: conceptual demonstration

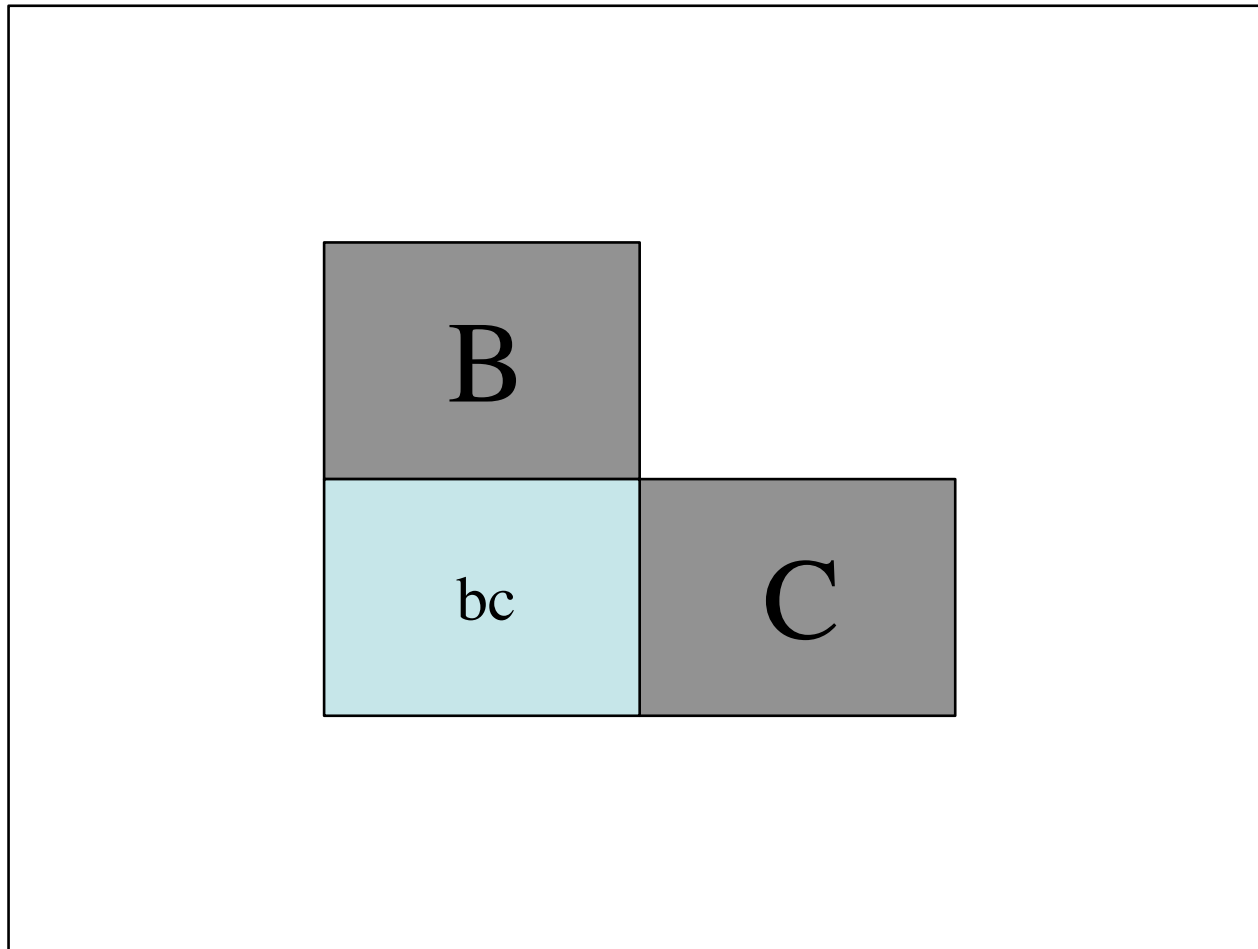# Basic Model
## a subject sees

# Basic Model
## a subject sees

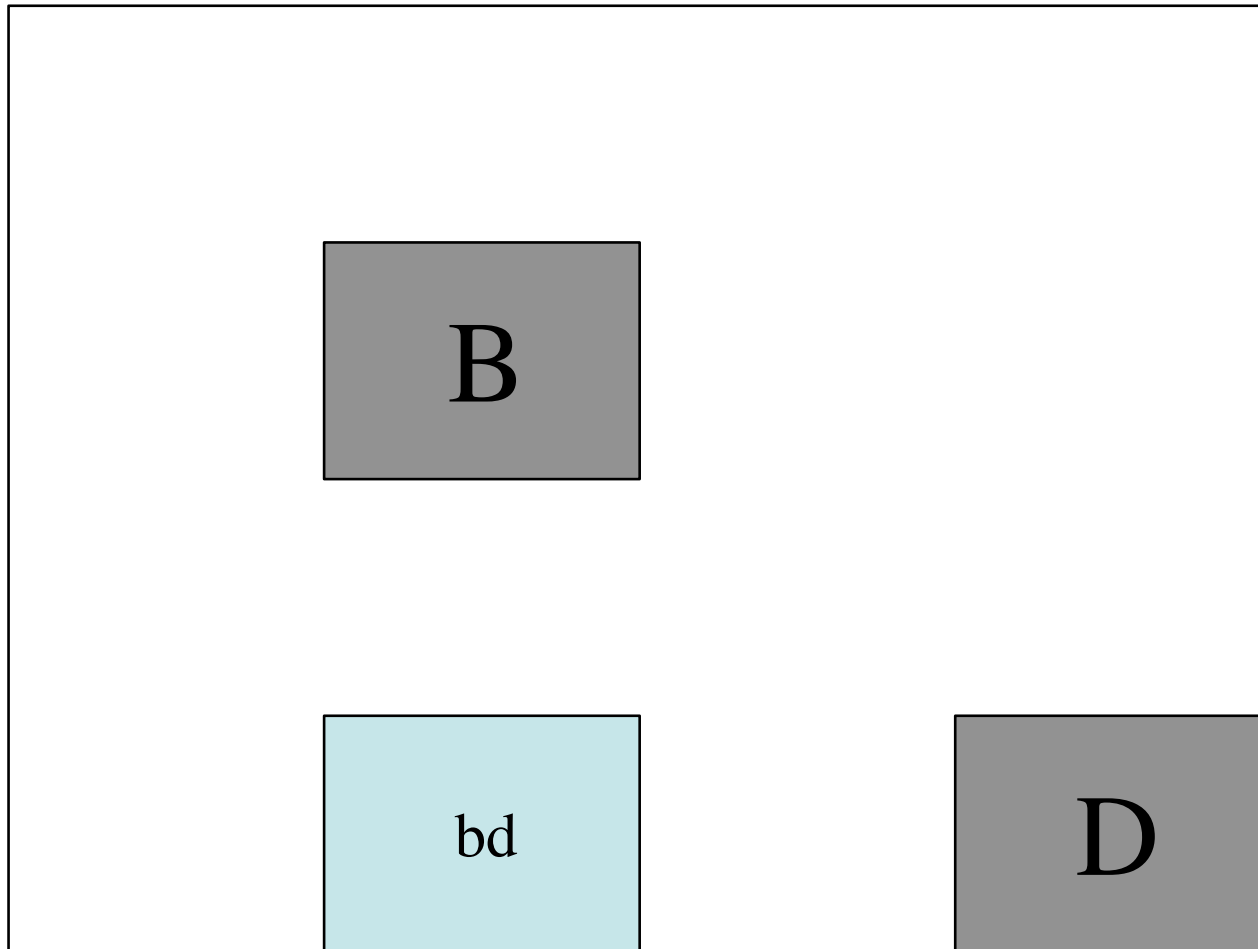# Basic Model
## a subject sees

# Basic Model
## a subject sees

# Basic Model
## a subject sees

B

bd

D

# Basic Model
# a subject sees
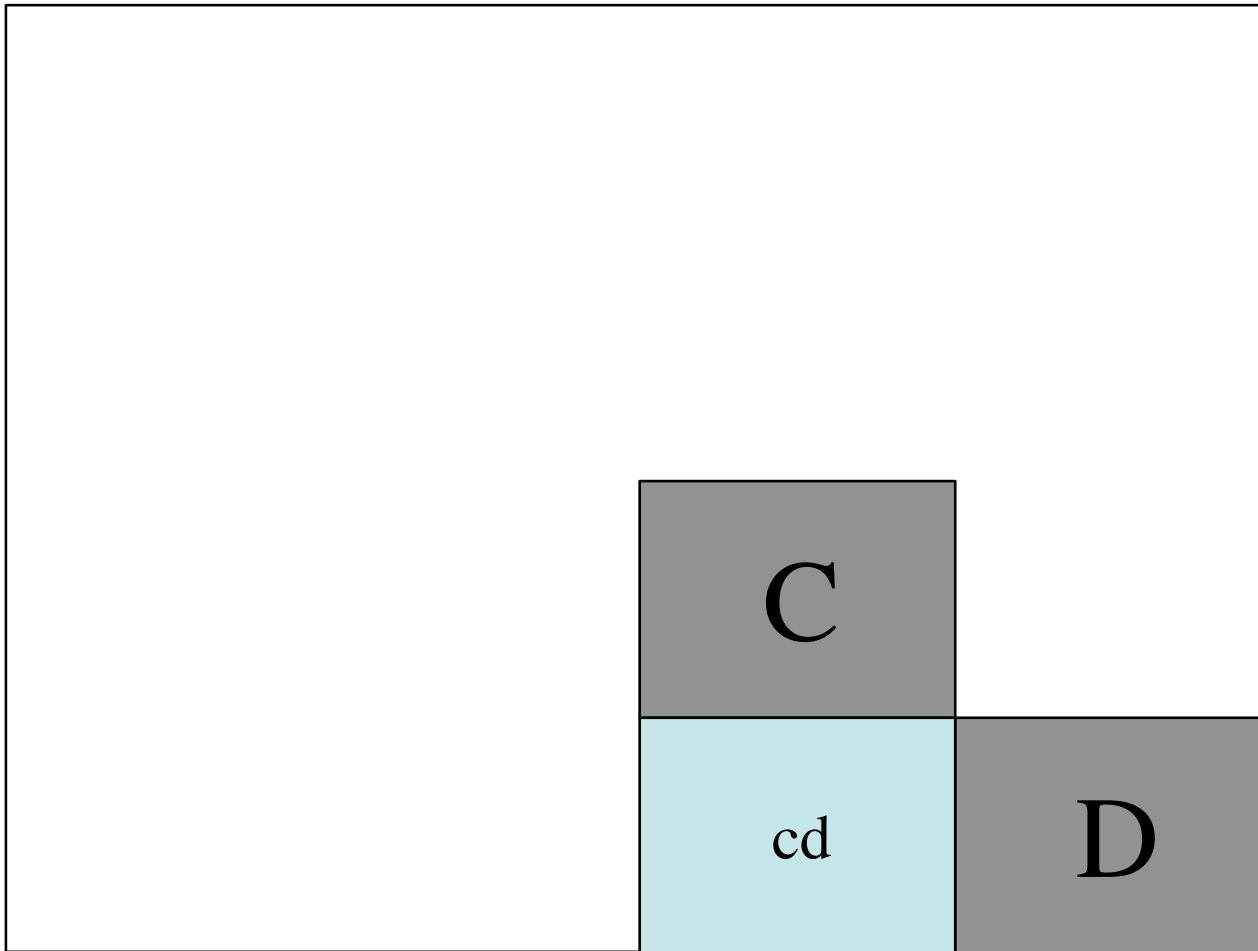
# Basic Model
# experimenter collects

# Variances and covariances can be formed synthetically



| A | | | |
|---|---|---|---|
| ab | B | | |
| ac | bc | C | |
| ad | bd | cd | D |

# SAPA: Users perspective

- Recruited from visitors to personality-project.org
- Basic demographic data
- 50 questions selected from Big 5 scales of IPIP
- 10 additional questions from IPIP  are interlaced with the 50
- Personality feedback (adapted from John Johnson

# Subject Recruitment -

## The Personality Project--Overview

**The Personality Project**
- **What's New?**
- **"Big 5" personality test**

**Recommended Readings**
- Overviews
- Personality Taxonomies
  - Descriptive Taxonomies
  - Theoretical Taxonomies
  - Intelligence

  Assessment and Applications
  - Psychometrics
  - Statistics

  Personality theory
  - Biological approaches
  - Behavior genetics
  - Psychoanalytic theory
  - Evolutionary Psychology
  - Other

**Academic Webpages**
- Scientific Journals
- Research Labs
- Homepages of researchers
- Course Syllabi .
- Online research projects

**Non academic Webpages**

That people differ from each other is obvious. How and why they differ is less clear and is an important part of the study of personality. Personality psychology addresses the questions of shared human nature, dimensions of individual differences and unique patterns of individuals.

Research in personality ranges from analyses of genetic codes and studies of biological systems to the study of sexual, social, ethnic, and cultural bases of thought, feelings, and behavior. Personality research includes studies of cognitive abilities, interpersonal styles, and emotional reactivity. Methods range from laboratory experiments to longitudinal field studies and include data reduction techniques such as factor analysis and principal components analysis, as well as structural modeling and multi-level modeling procedures. Measurement issues of most importance are those of reliability and stability of individual differences.

Research in individual differences addresses three broad questions: 1) developing an adequate descriptive taxonomy of how people differ; 2) applying differences in one situation to predict differences in other situations; and 3) testing theoretical explanations of the structure and dynamics of individual differences.

These pages are meant to guide those interested in personality theory and research to the current personality research literature. Although some of the readings are available on-line, all should be available from most university libraries. Abstracts of many recent articles are available by using search engines such as Medline.

# Introductory page

**Internet Personality Inventory Survey**

The following is an internet-based study of personality. Many of us have a good idea what it means to be extraverted or agreeable at an intuitive level, but we are interested in what form those descriptions take at the most basic level. One theory on this subject argues that there are five basic dimensions of personality -- Extraversion, Emotional Stability, Agreeableness, Conscientiousness, and Openness to Experience.

This study has two purposes. One is to find out more about these five dimensions of personality. Another is to take part in and further the use of the internet as a collaborative and data collection tool. To that end, our test is composed of freely available items from the International Personality Item Pool, and the descriptions we use for each trait were borrowed and adapted from work done by John Johnson.

When you take this test, you will receive a report summarizing your standing in the Big-5 dimensions. This report is generated dynamically and is different for everybody taking the test. If you want to learn more about the Big-5 model and want to know where you might stand in that model, you should take this test.

After completing the test, you are invited to leave feedback regarding your impressions of the test and the reports it generates.

In addition to helping you find out your "Big 5" score, we are also interested in relating those broad personality traits to experimental measures of musical preference and cognitive ability. We include a few items about musical preferences and a few cognitive ability items that we are developing.

Before taking the test you must proceed to the [consent form](#).

# Consent form

Northwestern University
Department of Psychology
Consent Form
Project Title: An Internet Study of the Basic Dimensions of Personality
Principal Investigator: William Revelle

## Introduction/Purpose:

You are being asked to participate in a research study of the basic dimensions of personality. The purpose of this study is to examine the correlational structure of items similar to those used in many personality inventories. In addition, by allowing the public to participate in this web based inventory we hope to increase public knowledge about science based models of personality. This inventory will compare your answers to those of others and give you an estimate of your level on each of five broad personality domains ("the big 5"). These domains represent normal differences in personality that are probably known by your friends and colleagues. This inventory will not reveal any secret information about you, nor will it assess any serious psychological problems. The report is designed to be objective, not necessarily pleasing or flattering. Because we are using a limited number of items, sampled from a broad domain of items, your scores will be sensitive errors of measurement and will not necessarily agree with measures of the same traits using other items. If people who know you well disagree with the results of this inventory, then the inventory results are probably wrong. If you answer the items carelessly or intentionally try to distort the results, then the results will be incorrect.

For more information about personality theory and research, please consult the pages of the personality-project. Other online tests are discussed there, as well as links to reviews of current literature in personality assessment.

•••

# Demographics

**Please Enter Your Demographic Data**

These data are necessary because they will be used to calculate your score so as to give you the best results. No information will be collected that would identify you.

Please enter your gender.

[ Indicate Your Gender ▼ ]

Please indicate your level of formal education.

[ Indicate Your Level of Education ▼ ]

Please enter your age [ ]

Please select your country of origin.

[ Indicate Your Country ▼ ]

On the following pages, there are phrases describing people's behaviors. Please use the rating scale below to describe how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex, and roughly your same age. So that you can describe yourself in an honest manner, your responses are anonymous. Please read each statement carefully, and then click the bubble that corresponds to the number on the scale.

| 1. | Am the life of the party. | Very Inaccurate ○ | Moderately Inaccurate ○ | Slightly Inaccurate ○ | Slightly Accurate ○ | Moderately Accurate ○ | Very Accurate ○ |
|----|---------------------------|-------------------|-------------------------|-----------------------|---------------------|-----------------------|-----------------|
| 2. | Insult people. | Very Inaccurate ○ | Moderately Inaccurate ○ | Slightly Inaccurate ○ | Slightly Accurate ○ | Moderately Accurate ○ | Very Accurate ○ |
| 3. | Am always prepared. | Very Inaccurate ○ | Moderately Inaccurate ○ | Slightly Inaccurate ○ | Slightly Accurate ○ | Moderately Accurate ○ | Very Accurate ○ |
| 4. | Get stressed out easily. | Very Inaccurate ○ | Moderately Inaccurate ○ | Slightly Inaccurate ○ | Slightly Accurate ○ | Moderately Accurate ○ | Very Accurate ○ |
| 5. | Have a rich vocabulary. | Very Inaccurate ○ | Moderately Inaccurate ○ | Slightly Inaccurate ○ | Slightly Accurate ○ | Moderately Accurate ○ | Very Accurate ○ |
| 6. | Get back at others. | Very Inaccurate ○ | Moderately Inaccurate ○ | Slightly Inaccurate ○ | Slightly Accurate ○ | Moderately Accurate ○ | Very Accurate ○ |

# Feedback based upon 5 scales

## Personality Profile

What follows is the results of your survey responses. The results here are grouped into five categories: extraversion, agreeableness, conscientiousness, emotional stability, and openness. These categories represent the way that most people talk about personality and so they may reflect cultural or social biases.

While many or all of these categories may look like words you typically use (even ones that often are accompanied with a value judgment) it is important to understand that these five factors are really labels used by psychologists to describe differences between people.

This is not a psycho-analysis; the results presented here were created directly from your responses to the items. For that reason, it is unlikely that there should be a mis-match between our descriptions and how you or others view themselves. However, there is always room for error, and we would like to see your feedback on our inventory and descriptions. Feedback can be left here.

The descriptions used here are borrowed from John Johnson, who hosts a page of descriptions . If you would like to learn more about the model of personality presented here, you can find an overview and a short biblography on the personality project website. We also discuss how to estimate the realibility of these results and show the distributions of scores from the first 3,000 people who have taken the survey.
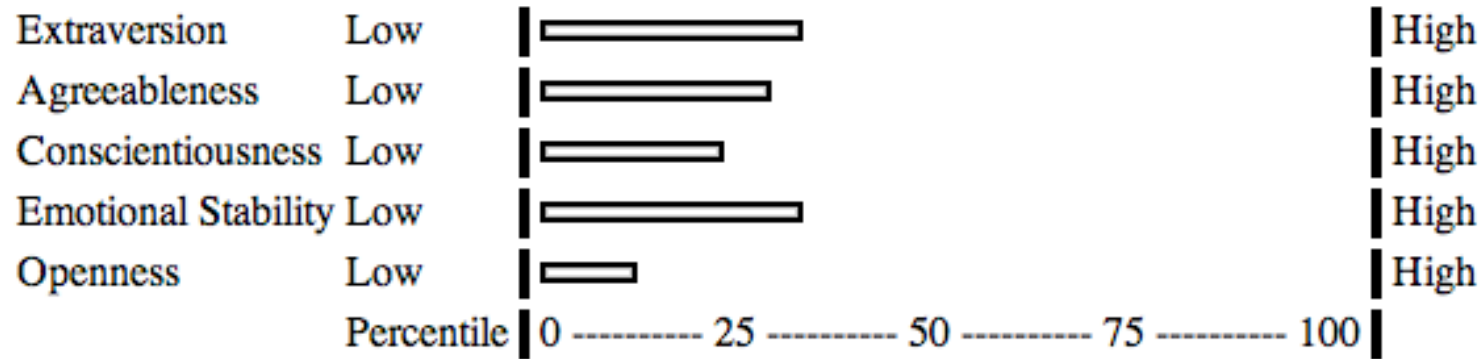
# Feedback (continued)

**SHARE YOUR SCORE!**

Copy the URL or hyperlink below to share your score with others, or use it to visit your score later.

Your score URL:

```
http://test.personality-project.org/survey/yourscores.php?
G=1&Y=123&A=3.5&O=3.5&E=3.5&S=3.5&C=3.5
```

Hyperlink to your score:

```
<a href='http://test.personality-project.org/survey/yourscores.php?
G=1&Y=123&A=3.5&O=3.5&E=3.5&S=3.5&C=3.5'>Check out my
personality profile!</a>
```

| | | | |
|---|---|---|---|
| Extraversion | Low | | High |
| Agreeableness | Low | | High |
| Conscientiousness | Low | | High |
| Emotional Stability | Low | | High |
| Openness | Low | | High |
| Percentile | 0 ---------- 25 ---------- 50 ---------- 75 ---------- 100 | | |

# Extraversion Report

Extraversion is marked by pronounced engagement with the external world. Extraverts enjoy being with people, are full of energy, and often experience positive emotions. They tend to be enthusiastic, action-oriented, individuals who are likely to say "Yes!" or "Let's go!" to opportunities for excitement. In groups they like to talk, assert themselves, and draw attention to themselves.

Introverts lack the exuberance, energy, and activity levels of extraverts. They tend to be quiet, low-key, deliberate, and disengaged from the social world. Their lack of social involvement should not be interpreted as shyness or depression; the introvert simply needs less stimulation than an extravert and prefers to be alone. The independence and reserve of the introvert is sometimes mistaken as unfriendliness or arrogance. In reality, an introvert who scores high on the agreeableness dimension will not seek others out but will be quite pleasant when approached.

| Score at a Glance | |
| --- | --- |
| Total Score | 31 |
| Avg Response | 3.5 |

Your average score on extraversion was 3.5, which is considered low. It is in approximately the 31st percentile for males over the age of 21.

Your score on Extraversion is low, indicating you are introverted, reserved, and quiet. You enjoy solitude and solitary activities. Your socializing tends to be restricted to a few close friends.

# Original proof of concept Big 5 and Right Wing Authoritarianism

- Honors thesis of Greg Laun, 2004
- First 2,500 cases were given 50 Big 5 items + 10 Right Wing Authoritarianism items for a combined pool of 100 Big 5 and 20 RWA
- Results parallel previous results with more conventional sampling techniques
- 3-4 weeks of operation

# Right Wing Authoritarianism

Our country desperately needs a mighty leader who will do what has to be done to destroy the radical new ways and sinfulness that are ruining us.

Gays and lesbians are just as healthy and moral as anybody else.

Our country will be great if we honor the ways of our forefathers, do what the authorities tell us to do, and get rid of the 'rotten apples' who are ruining everything.

Atheists and others who have rebelled against the established religions are no doubt every bit as good and virtuous as those who attend church regularly.

The *real* keys to the 'good life' are obedience, discipline, and sticking to the straight and narrow.

A lot of our rules regarding modesty and sexual behavior are just customs which are not necessarily any better or holier than those which other people follow.

There are many radical, immoral people in our country today, who are trying to ruin it for their godless purposes, whom the authorities should put out of action.

It is always better to trust the judgment of the proper authorities in government and religion than to listen to the noisy rabble-rousers in our society who are trying to create doubt in people's minds.

There is absolutely nothing wrong with nudist camps.

There is no 'ONE right way' to live life; everybody has to create their *own* way.

Our country will be destroyed someday if we do not smash the perversions eating away at our moral fiber and traditional beliefs.
31

# RWA and the Big 5

|  | Con | Agree | N (-) | Open | Ext |
|---|---|---|---|---|---|
| Con | | | | | |
| Agree | .21 | | | | |
| N (-) | .17 | .13 | | | |
| Open | .07 | .17 | .12 | | |
| Ext | .12 | .43 | .28 | .23 | |
| RWA | .23 | .03 | .00 | -.33 | .00 |

# First two years of operation

- N ≈ 54,480

- remove duplicated and near duplicated records
  - Some visitors were clearly trying out the system and change one or two items and then resubmit
  - Duplication measure as count of duplicate blocks of 20 items

- removed age < 10 or age > 100
- N = 51,410

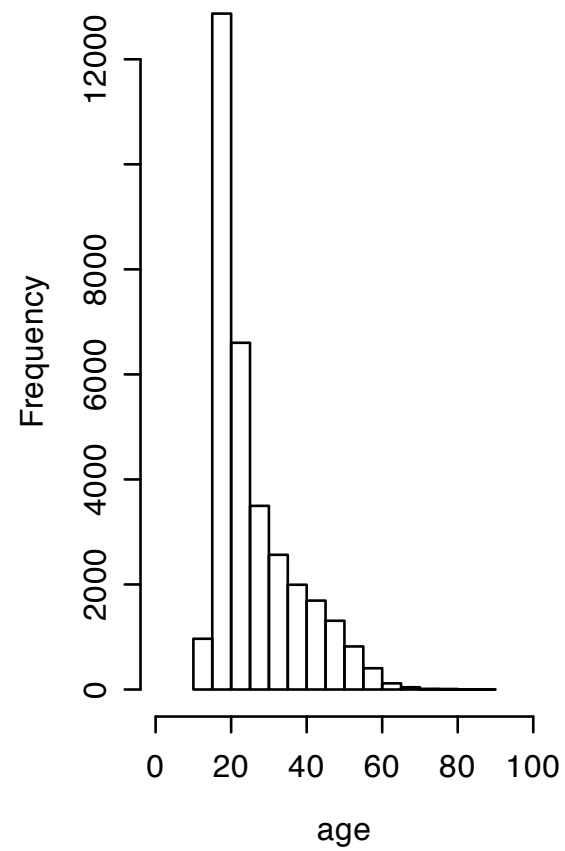# Distribution of near duplicates
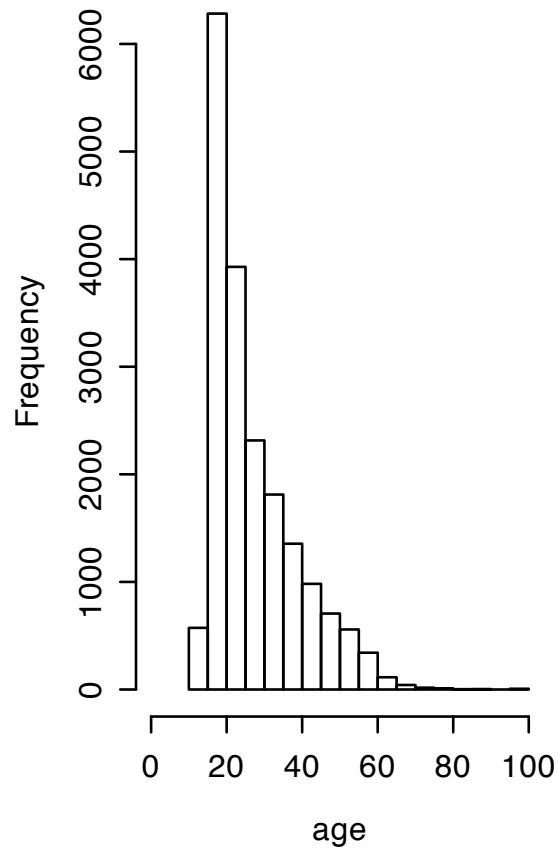


less stringent
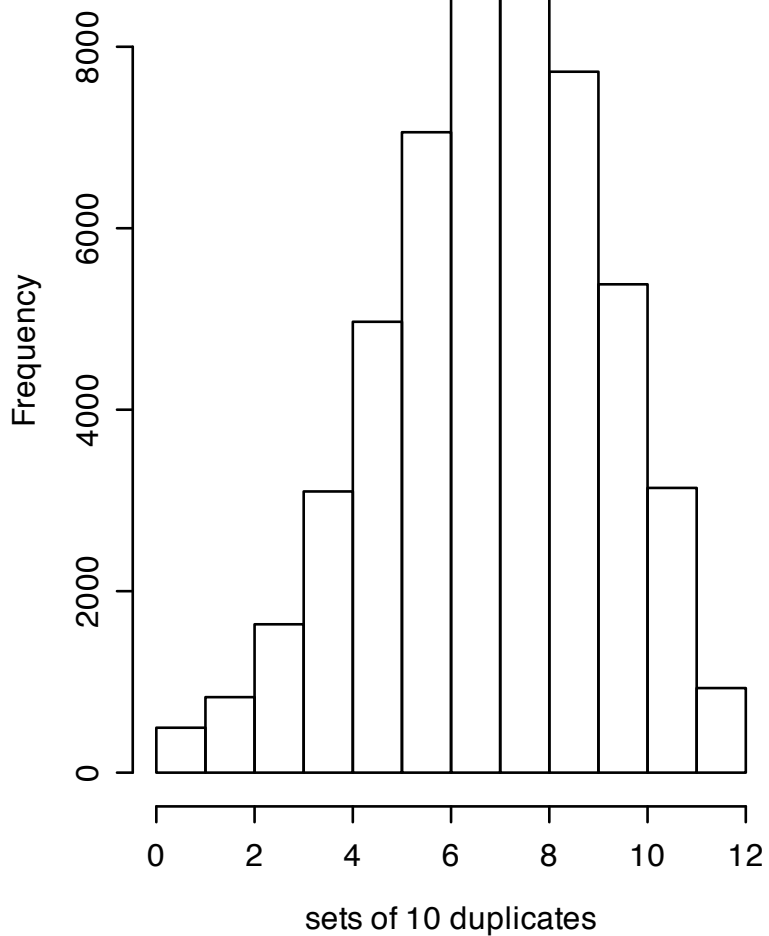
very stringent
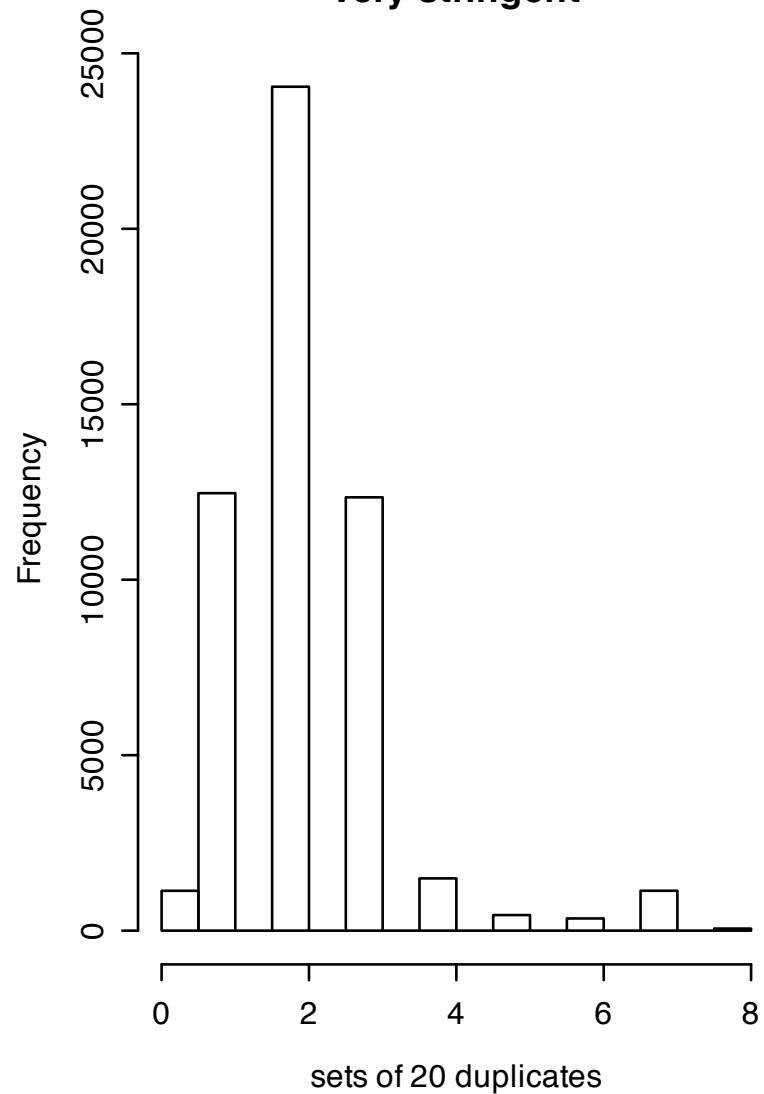
# Basic demographics

|  | Male | Female |
| --- | --- | --- |
| Min | 11 | 11 |
| 25% | 19 | 18 |
| Med | 23 | 22 |
| 75% | 34 | 32 |
| Max | 99 | 90 |
| Mean | 27.59 | 26.38 |
| N | 19,051 | 32,907 |

# Age by gender

# Countries > .5% of sample represent 90% of total

| | | | | |
|---|---|---|---|---|
| USA | 36,071 | 36,071 | 70% | 70% |
| Canada | 3,115 | 39,186 | 6% | 76% |
| UK | 2,260 | 41,446 | 4% | 81% |
| Australia | 1,616 | 43,062 | 3% | 84% |
| India | 796 | 43,858 | 2% | 85% |
| Philippines | 526 | 44,384 | 1% | 86% |
| Malaysia | 357 | 44,741 | 1% | 87% |
| Singapore | 323 | 45,064 | 1% | 88% |
| Germany | 284 | 45,348 | 1% | 88% |
| China | 283 | 45,631 | 1% | 89% |
| Norway | 270 | 45,901 | 1% | 89% |
| Ireland | 269 | 46,170 | 1% | 90% |
| Hong Kong | 235 | 46,405 | 0% | 90% |
| New Zealand | 210 | 46,615 | 0% | 91% |
| Netherlands | 204 | 46,819 | 0% | 91% |
| Mexico | 203 | 47,022 | 0% | 91% |

# Items given (so far)

- 160 from IPIP
  - 100 IPIP: Big 5
  - 60  IPIP: NEO +
- 20 Right Wing Authoritarian
- Item response form:
- 1  - 6
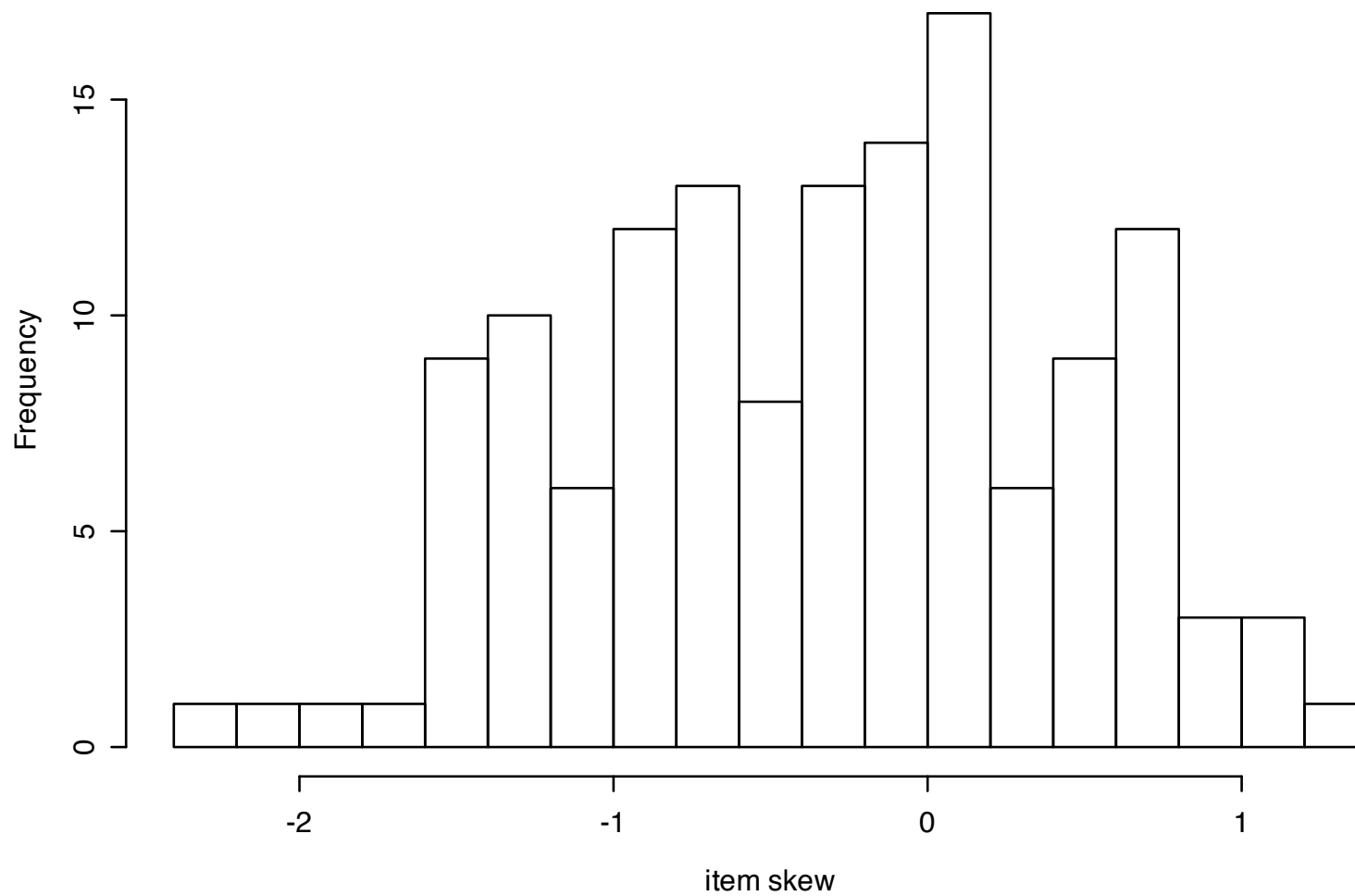- Scores are reported as item averages

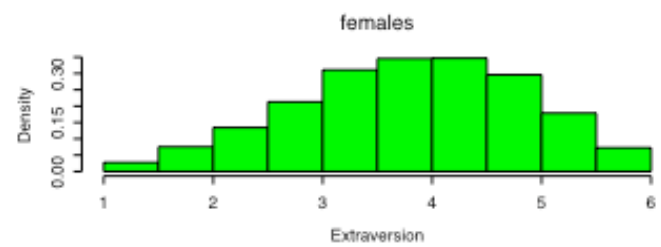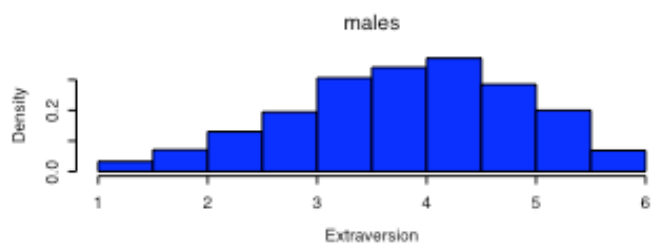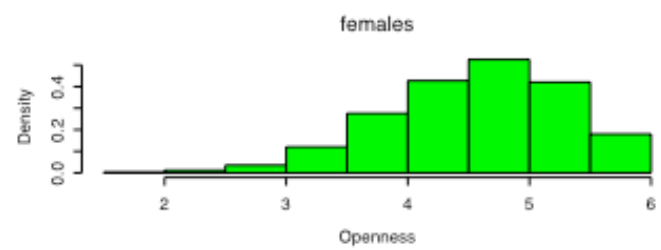# Item Means

**histogram of item means**
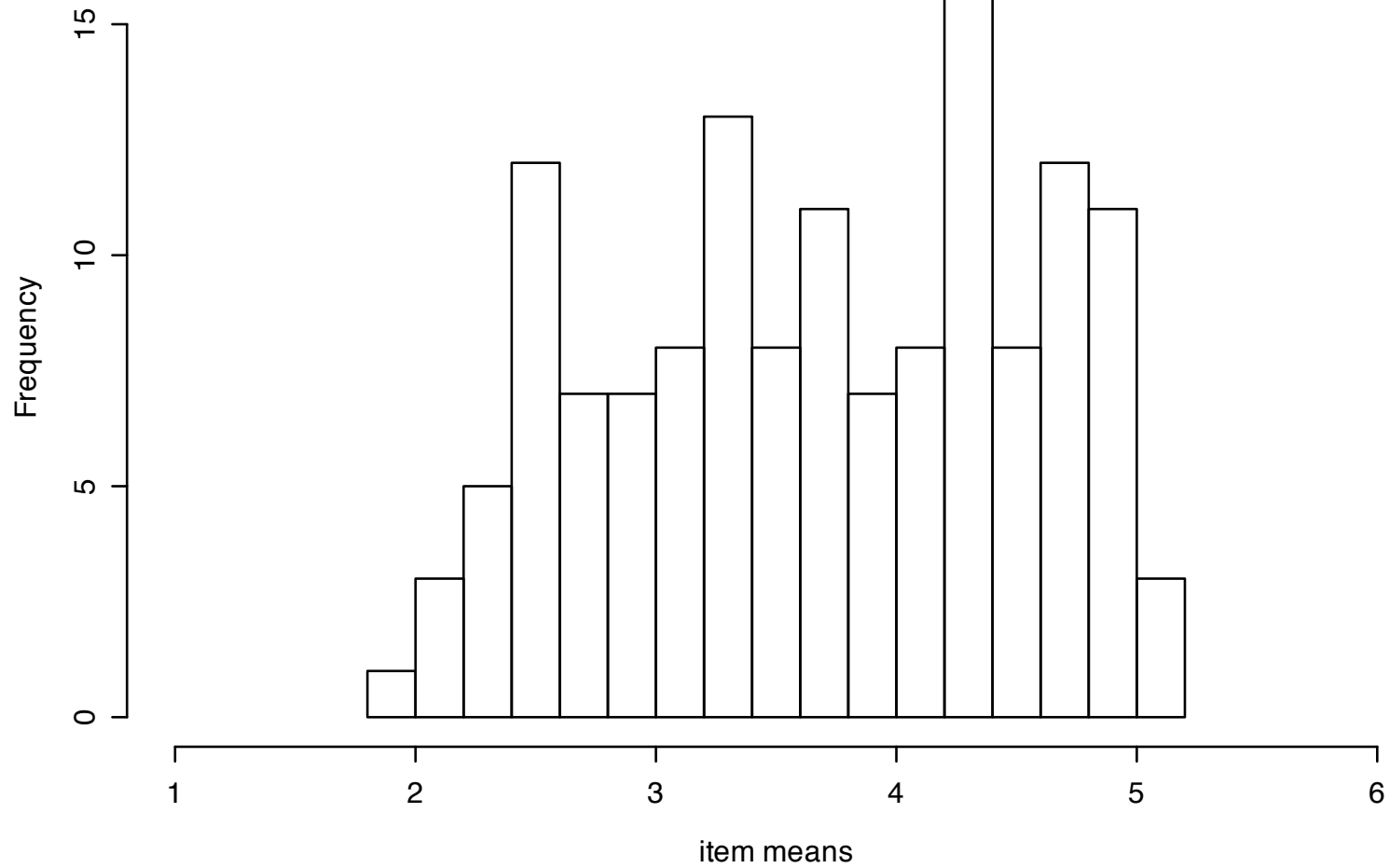
# Item Skew

**histogram of item skew**

Frequency

item skew

# 5 item Big 5 scales - first 12,000 Ss

| Scale | Mean | S.D. | Average skew | Average Alpha | Average alternate form |
|-------|------|------|--------------|---------------|------------------------|
| C | 4.04 | 1.00 | -.24 | .58 | .73 |
| A | 4.65 | .84 | -.77 | .55 | .67 |
| N (-) | 3.58 | 1.09 | -.00 | .61 | .73 |
| O | 4.60 | .81 | -.55 | .51 | .62 |
| E | 3.86 | 1.08 | -.26 | .62 | .78 |
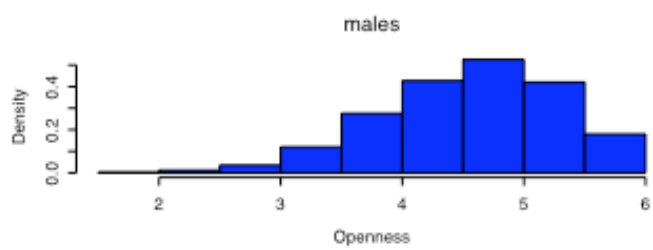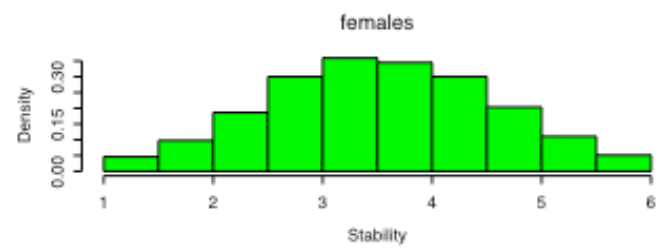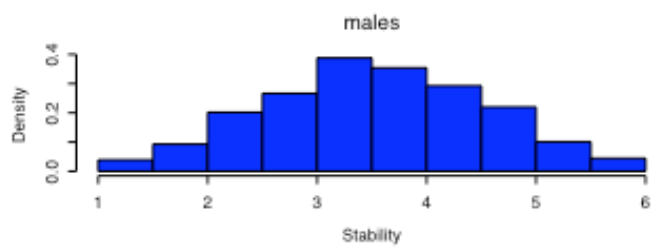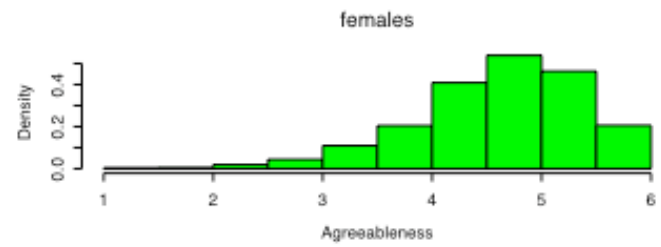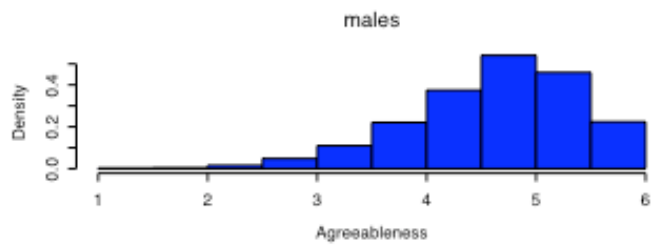
# Sex differences at item level

| 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 |

# Scree of 120 SAPA items



scree plot
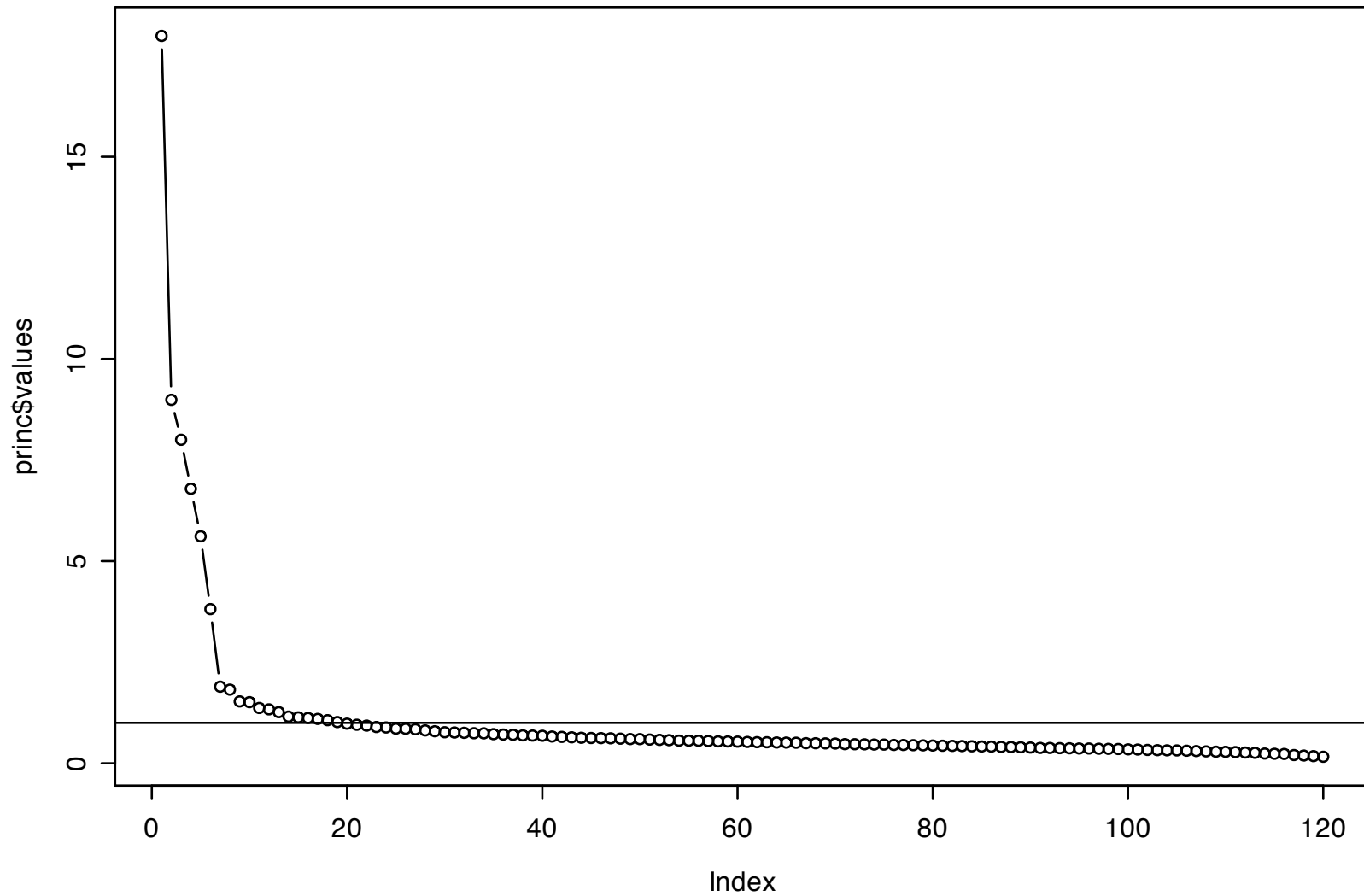
# Correlating the Big 5

Raw correlations below the diagonal, reliabilities on the diagonal, unattenuated above the diagonal

|  | agreeableness | Conscientious | Extraversion | Openness | Neuroticism |
|---|---|---|---|---|---|
| agreeableness | *0.89* | 0.31 | 0.47 | 0.25 | -0.21 |
| Conscientious | 0.28 | *0.92* | 0.22 | 0.16 | -0.26 |
| Extraversion | 0.43 | 0.2 | *0.94* | 0.24 | -0.34 |
| Openness | 0.22 | 0.14 | 0.21 | *0.83* | -0.16 |
| Neuroticism | -0.19 | -0.24 | -0.32 | -0.14 | *0.93* |

N= 51,410

# Extensions to new domains

- Honors thesis of Melissa Liebert
- Personality and music preferences
  – extension of work of Peter Rentfrow and Sam Gosling
- Personality and ability
  – development of web based, public domain ability test

# Web management

A program to provide survey information for the synthetic aperture personality study

Option 1 dumps the ipip to the screen
Note that we need to fix up this item list to produce all the items we are currently giving.
Option 2 lists the item numbers used in each subtest
Option 3 provides a count of subjects
Option 4 dumps the data to a special file (permission required)
" This option should be fixed to just add incremental subjects"
Option 5 shows the feedback we have received
Option 6 information available to the system
Option 7 List of items currently used in the studies
Option 8 List of all items available
Option 9 List the music responses
Option 10 List the iq responses

# Basic stats

Survey.info as of Tuesday 02nd of May 2006 10:44:05 AM
2293 subjects in ipip_repsonses

2255 subjects in music_responses;

709 subjects in iq_responses with SAT scores

519 subjects in iq_responses with ACT scores

202 subjects in iq_responses with ACT and SAT scores

# Data retrieval

participant_number, RID, no_code, study_number, country, gender, race, education, major, age, SAT, ACT, iq_1, iq_2, iq_3, iq_4, iq_5, iq_6, iq_7, iq_8, iq_9, iq_10, iq_11, iq_12, iq_13, iq_14, iq_15, iq_16, iq_17, iq_18, iq_19, iq_20, iq_21, iq_22, iq_23, iq_24, iq_25, iq_26, iq_27, iq_28, iq_29, iq_30, iq_31, iq_32, iq_33, iq_34, iq_35, iq_36, iq_37, iq_38, iq_39, iq_40, iq_41, iq_42, iq_43, iq_44, iq_45, iq_46, iq_47, iq_48, iq_49, iq_50, iq_51, iq_52, iq_53, iq_54, iq_55, iq_56
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# Basic data cleaning

- Drop duplicate records

- Drop testing trials

- Drop bad data (bug)

| Total N | 2255 |
|---------|------|
| no dups | 2117 |
| not bad | 2112 |
| Clean   | 2102 |

# Country of origin

| USA | 1555 |
|---|---|
| Canada | 138 |
| UK | 59 |
| Australia | 36 |
| India | 23 |
| Germany | 21 |
| China | 15 |
| Singapore | 15 |
| Mexico | 10 |
| Greece | 9 |

# Basic demographics: Age

|       | Male  | Female |
|-------|-------|--------|
| Min   | 12    | 14     |
| 25%   | 18    | 18     |
| Med   | 21    | 21     |
| 75    | 27    | 29     |
| Max   | 85    | 70     |
| Mean  | 24.25 | 25.09  |
| N     | 787   | 1314   |

# Basic demographics: Education

| | Male | Female |
|---|---|---|
| <12 years | 133 | 177 |
| High School | 94 | 88 |
| some college | 70 | 98 |
| at college | 326 | 675 |
| college grad | 73 | 137 |
| grad/prof | 91 | 139 |
| N | 787 | 1314 |

# Music Preferences

- Listed 60 music genres
  - 14 from STOMP (Rentfrow and Gosling, JPSP, 2003)
  - additional items from Little & Zuckerman, (PAID,1986)
- sampled 12 genres/subject
- Examined
  - Gender differences
  - Ethnic differences
  - Factor structure
  - Personality correlates

# Music genres

Now we will ask a few questions about your musical preferences. Please use the rating scale below to describe how accurately each statement describes you. So that you can describe yourself in an honest manner, your responses are anonymous. Please read each statement carefully, and then click the bubble that corresponds to the number on the scale.

| | | Unaware of Genre | Strongly Dislike | Moderately Dislike | Somewhat Dislike | Somewhat Like | Moderately Like | Strongly Like |
|---|---|---|---|---|---|---|---|---|
| 61. | Heavy Metal (e.g. Metallica, Marilyn Manson, System of a Down); | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 62. | Indie Rock (e.g. Death Cab for Cutie, Broken Social Scene, The Shins); | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| 63. | Contemporary (e.g. Ives, Copland, Bernstein); | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

# 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) |

# 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) |

# Factor structure of music preferences

- 3-5 factors
  - problem of sex and ethnic differences leading to large factors associated with between group variance rather than clear structure within groups (Simpson's paradox)
- 3 factors for all subjects
- 5 factors provides clear solution within groups

# 5 factor structure? Sample items

| | | | | | |
|---|---|---|---|---|---|
| Blues in General (e.g. Ray Charles, Stevie Ray Vaughn, B.B. King) | -0.84 | | | | |
| Soul in General (e.g. Otis Redding, Marvin Gaye) | -0.77 | | | | |
| Latin American Music | 0.69 | | | | |
| Top 40/Pop Vocal Music (e.g. Kelly Clarkson, Madonna, The Black Eyed Peas) | | -0.67 | | | |
| Broadway, Movie and TV Soundtrack Music in General | | -0.62 | | | |
| Jazz Music in General | | 0.6 | | | |
| Easy Listening Vocal (e.g. Frank Sinatra, Tony Bennett, Barbra Streisand) | | 0.58 | | | |
| Alternative Hip-Hop (e.g. Atmosphere, Jurassic 5, Aesop Rock) | | | 0.67 | | |
| Funk in General (e.g. James Brown, George Clinton and the Parliament-Funkadelic, Kool and the Gang) | | | 0.57 | | |
| Country Music in General | | | -0.51 | | |
| Punk Rock (e.g. The Clash, Green Day, Rancid) | | | | 0.62 | |
| Folk Music in General (e.g. Bob Dylan, Iron and Wine, Simon and Garfunkel) | | | | -0.57 | |
| Acid Rock (e.g. Pink Floyd, The Doors, Jefferson Airplane) | | | | 0.51 | |
| Bluegrass (e.g. Alison Krauss, Lester Flatt, Nickel Creek) | | | | | -0.57 |
| Hip-Hop in General (e.g. The Beastie Boys, The Roots) | | | | | 0.54 |

# Online ability assessment

- Created 56 items
  - matrix like reasoning
  - number series
  - letter series
  - logic
  - vocabulary
  - basic math
  - general knowledge
- sampled 14 items/subject
- for subjects from US, asked for SAT/ACT

# Ability items

Now we will ask a few reasoning and knowledge questions. This part is experimental. We hope to use this section to develop some norms that we will then be able to report to future visitors. We greatly appreciate your participation. Remember, your responses are anonymous. Please read each statement carefully, and then click the bubble that corresponds to the best answer. After these questions, we will give you the report on your Big 5 scores.

| 73. | What number is one fifth of one fourth of one ninth of 900? | 2 ○ | 3 ○ | 4 ○ | 5 ○ | 6 ○ | 7 ○ |
|---|---|---|---|---|---|---|---|
| 74. | If you rearrange the letters COBILOCR you will have the name of a: | Planet ○ | Fruit ○ | River ○ | Animal ○ | Vegetable ○ | Country ○ |
| 75. | Please mark the word that does not match the other words: | Buenos Aires ○ | Melbourne ○ | Seattle ○ | Cairo ○ | Morocco ○ | Milan ○ |
| 76. | If some pineapples are oranges and all apples are oranges, then some | TRUE ○ | FALSE ○ | Neither ○ | ○ | ○ | ○ |

Please indicate which is the best answer to complete the figure.
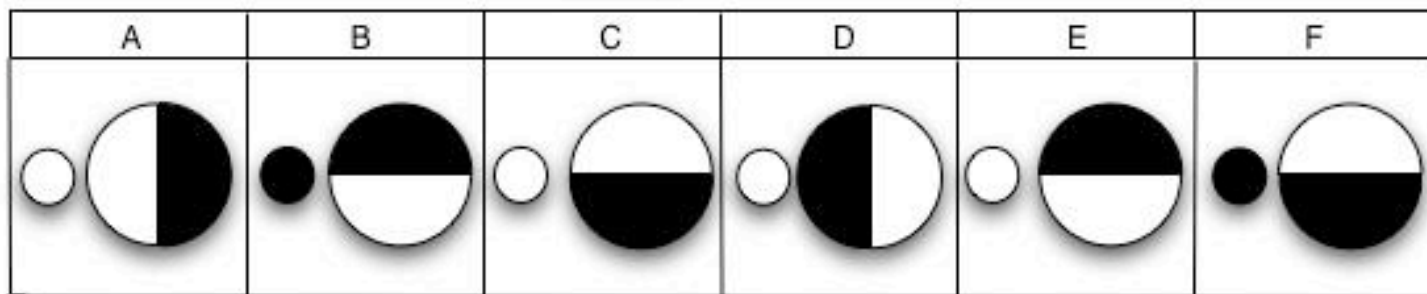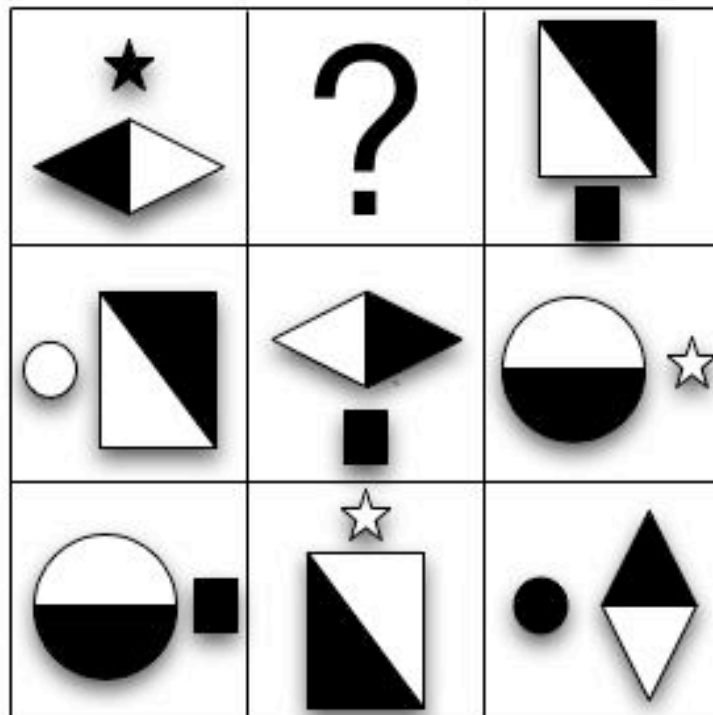


| A | B | C | D | E | F |
|---|---|---|---|---|---|

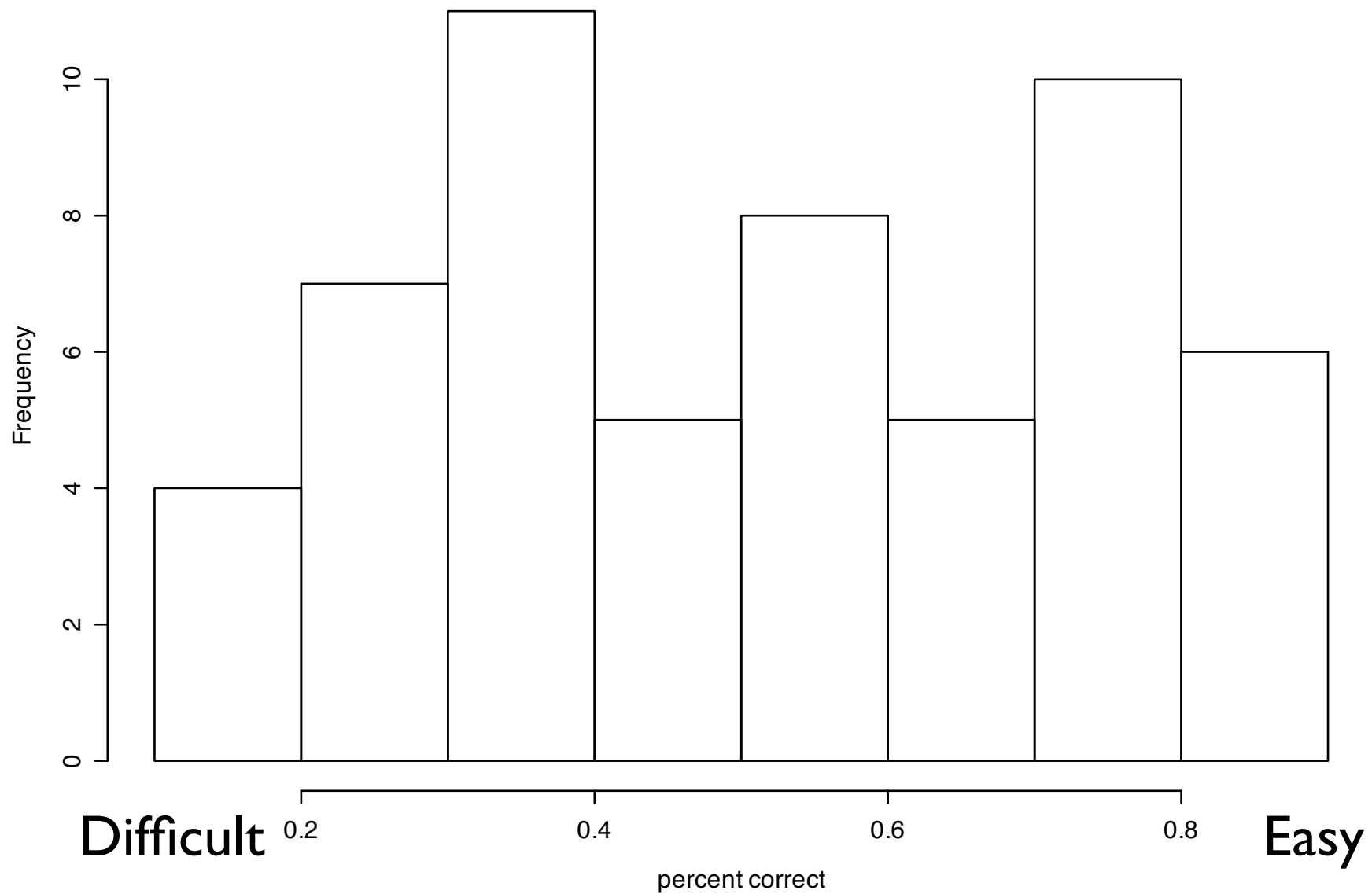| 78. | A | B | C | D | E | F |
|-----|---|---|---|---|---|---|
|     | ○ | ○ | ○ | ○ | ○ | ○ |

# Systematic sampling of items

- Items were grouped into 8 sets of 7 items representing consistent mixtures of item content.

- Two sets were given to each subject.

- Thus, items within sets would appear to 1/4 of subjects.

- Items between sets would appear to 1/16 of subjects

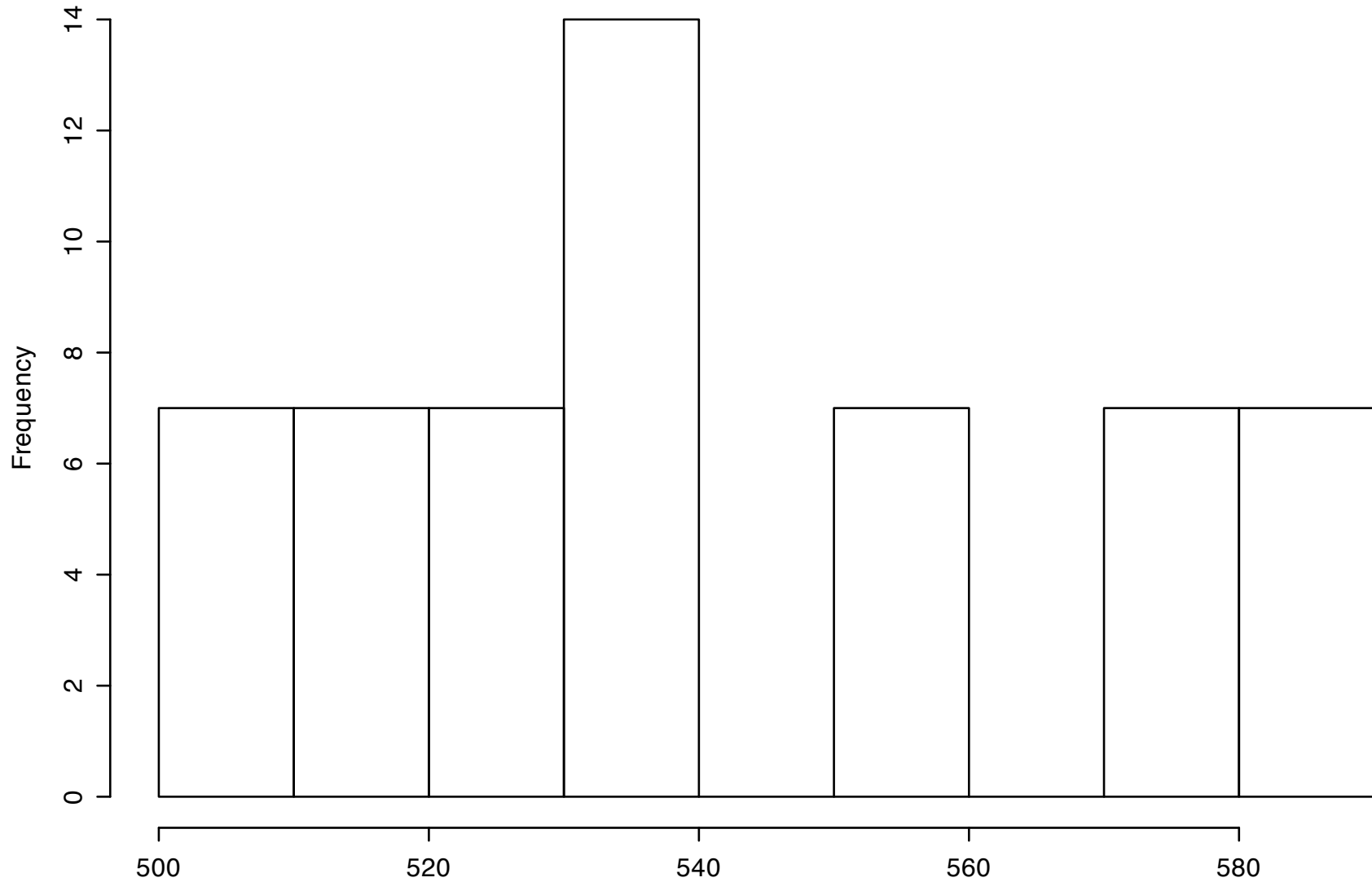- Alternative is complete random sampling or 1/8 probability of all pairs.

63

# Item difficulties
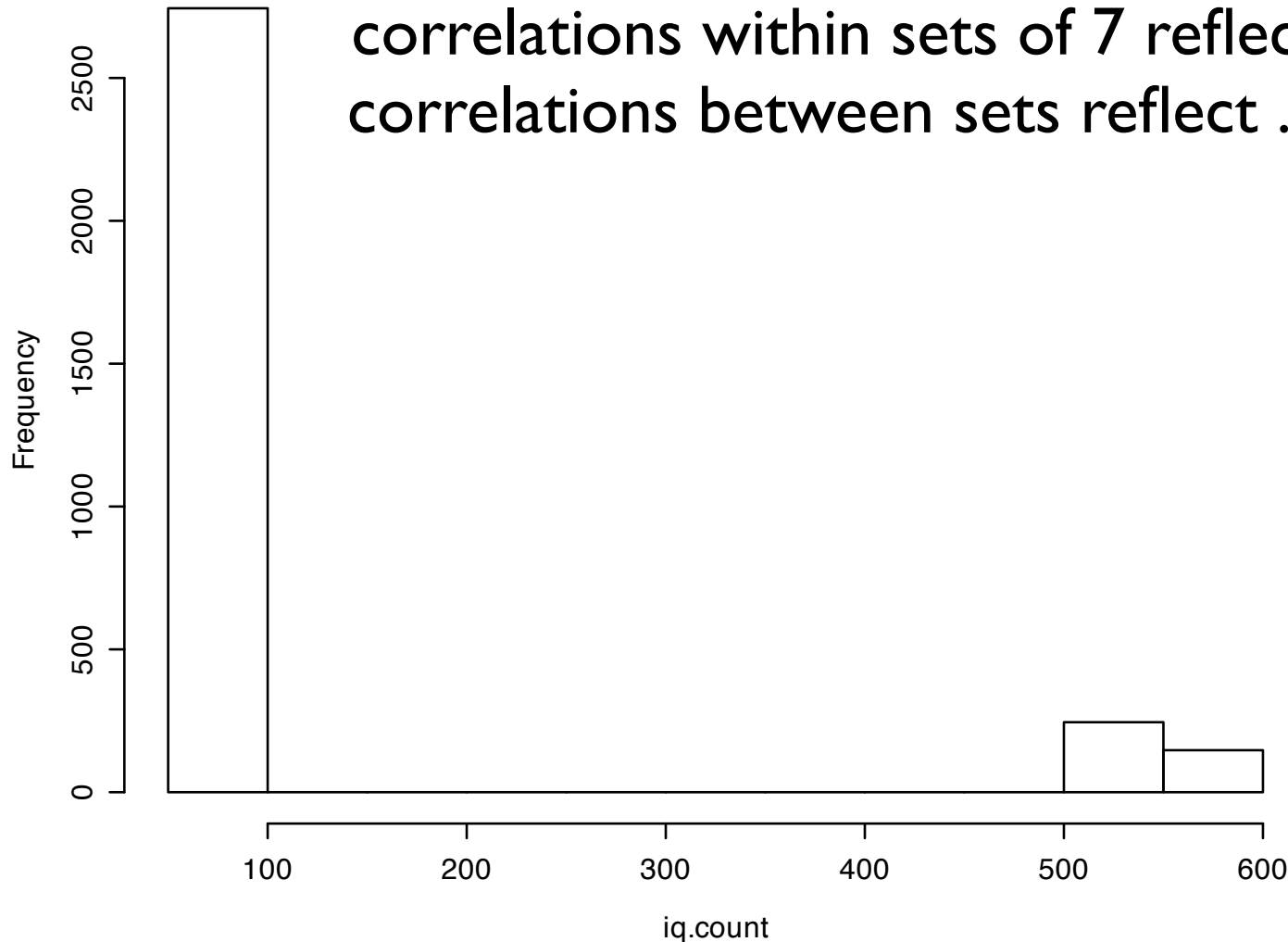
**Histogram of item difficulties**



Difficult | Easy

percent correct

# Item sample size

**sample sizes at item level**

# Sample sizes of item pairs

**Histogram of iq.count**

correlations within sets of 7 reflect .25 of total
correlations between sets reflect .0625 of total

Frequency

2500

2000

1500

1000

500

0

100    200    300    400    500    600
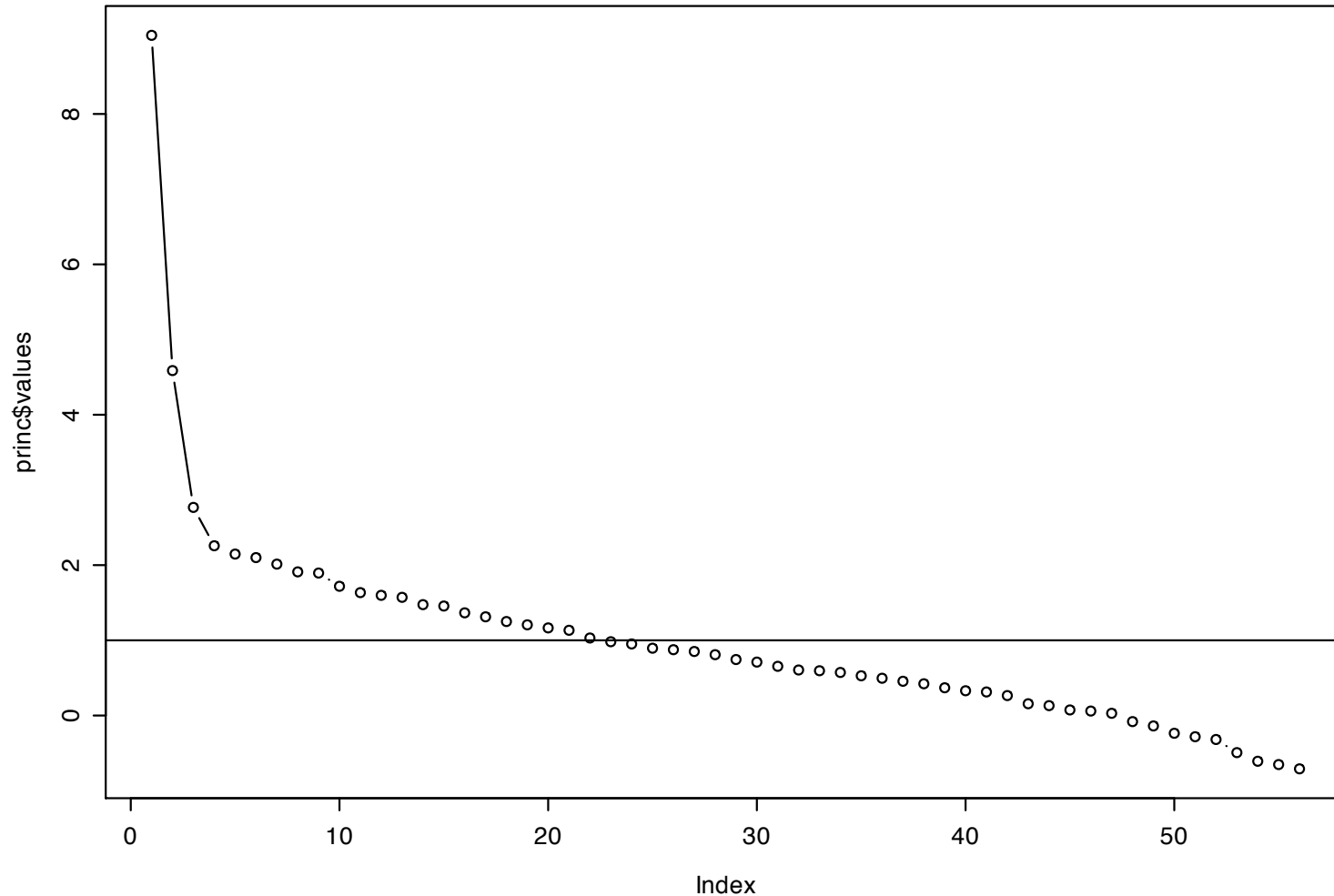
iq.count

54  57  61  66  69  72  74  75  76  78  80  81  82  83  84  86  89  91  93  96 508 515 521 534 539 555 579 589
98  98  98  98 294  98  98 196 294  98 196  98  98  98  98  98 294  98  98  98  49  49  49  49  49  49  49  49

# Scree suggests 3-4 factors

**Scree of IQ items**



Note that the matrix is improper

# Factor Structure

- 3 factors, oblique rotation
- Schmid Leiman transformation to produce hierarchical factor structure of g loadings and loadings on residualized group factors
  - g
    - Math/reasoning
    - Spatial/matrices
    - Verbal/general knowledge
  - McDonald's Omega = .44 (general factor saturation)
  - Cronbach's Alpha = .88   (common factors)

Self reported SAT x ACT
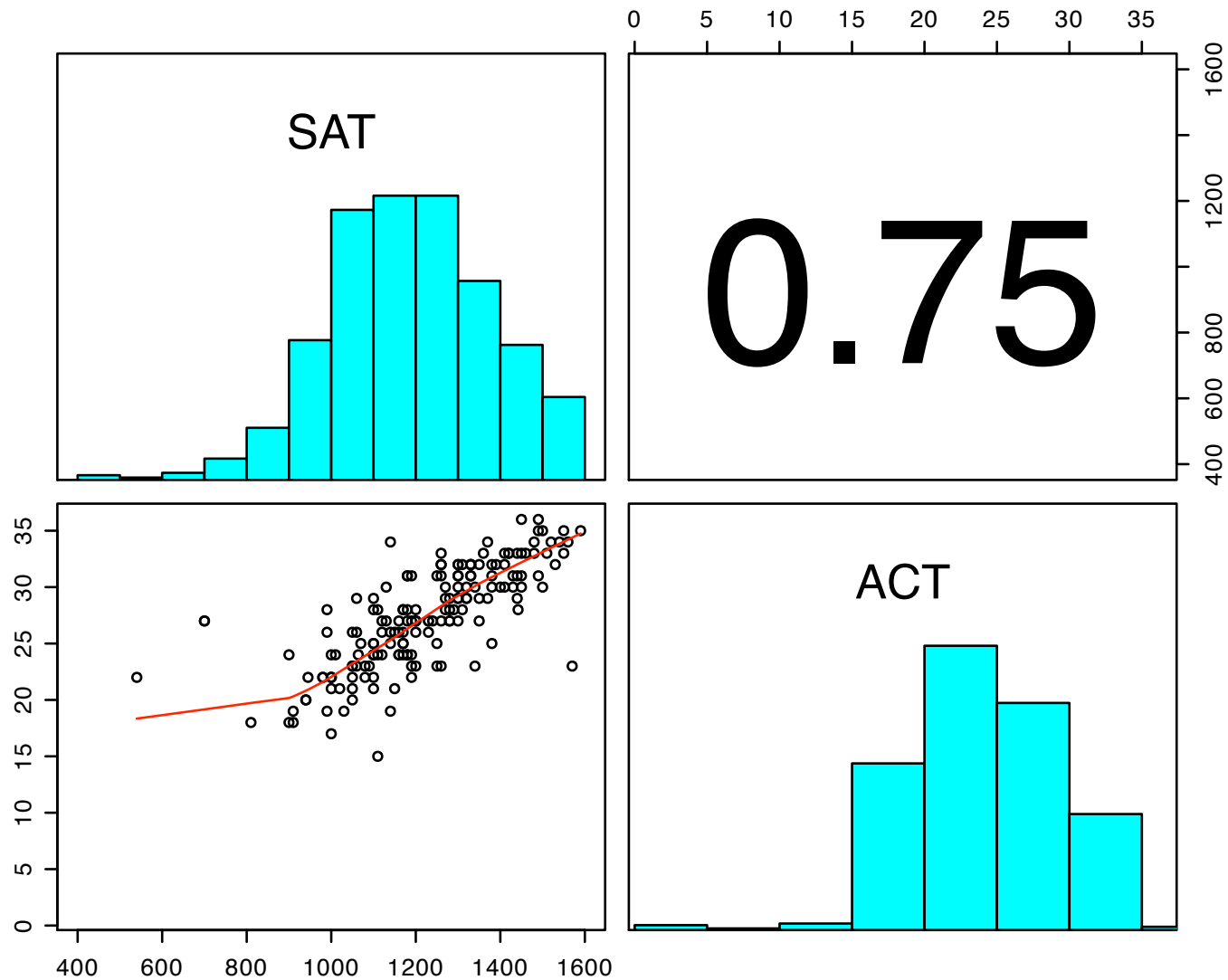
# Item cluster correlations with SAT/ACT

|      | SAT  | ACT  | g    | F1   | F2   | F3   |
|------|------|------|------|------|------|------|
| SAT  | 1.0  |      |      |      |      |      |
| ACT  | .75  | 1.0  |      |      |      |      |
| g    | .35  | .34  | .87  |      |      |      |
| F1   | .35  | .35  | .94* | .84  |      |      |
| F2   | .25  | .25  | .42* | .33  | .83  |      |
| F3   | .17  | .16  | .73* | .55  | .24  | .73  |

*partial item overlap

# Future directions

- Rapid item prototyping
- How does item x relate to standard set?
- How does scale Y relate to scale Z

# Improving items from IPIP

- Base set of 100 items
  - 20 from each to measure CANOE/OCEAN
  - each person gets 5 sets of 10
  - each 10 item scale made up of 2 (sampled from 4) groups of 5 items
- 71 Exploratory items
  - each person gets 10 randomly chosen from 71

# Big 5 and Motivation Orientation

- 11 items from Dan Molden said to measure
  - Prevention Focus
  - Promotion focus
- What are the basic item statistics
- How do they related to the Big 5?

# IPIP Big 5 with Motivational Focus

Raw correlations below the diagonal, reliabilities on the diagonal, unattenuated above the diagonal

|  | Agreeable | Conscientious | Extraversion | Open | Neuroticism | Promotion | Prevention |
|---|---|---|---|---|---|---|---|
| Agreeable | *0.89* | 0.35 | 0.45 | 0.26 | -0.11 | 0.51 | 0.19 |
| Conscientious | 0.31 | *0.89* | 0.22 | 0.11 | -0.16 | 0.62 | 0.35 |
| Extraversion | 0.40 | 0.20 | *0.91* | 0.26 | -0.27 | 0.63 | -0.08 |
| Open | 0.23 | 0.09 | 0.23 | *0.86* | -0.06 | 0.58 | -0.14 |
| Neuroticism | -0.10 | -0.15 | -0.25 | -0.05 | *0.92* | -0.61 | -0.16 |
| Promotion | 0.40 | 0.48 | 0.50 | 0.44 | -0.48 | *0.68* | 0.23 |
| Prevention | 0.15 | 0.29 | -0.06 | -0.11 | -0.13 | 0.16 | *0.74* |

# Questions and challenges

- Validity of item responses compared to non web surveys
  - Intentional faking
  - Duplicate responding
- Generalizability of subject pool
  - Age
  - Gender
  - Nationality
- See Linda Skitka and Edward Sargis (2006): The internet as psychological laboratory. Annual Review of Psychology, 57: 529-555.
- See also websm.org  for links to websurvey information

# Very Long Base Line Arrays

- Images from multiple, independent observatories may be synthesized into one image.

- Currently, the VBLA collects data from sites ranging from Mona Kea to New Mexico, to the Virgin Islands, to New Hampshire

# The Very Long Base Line Array
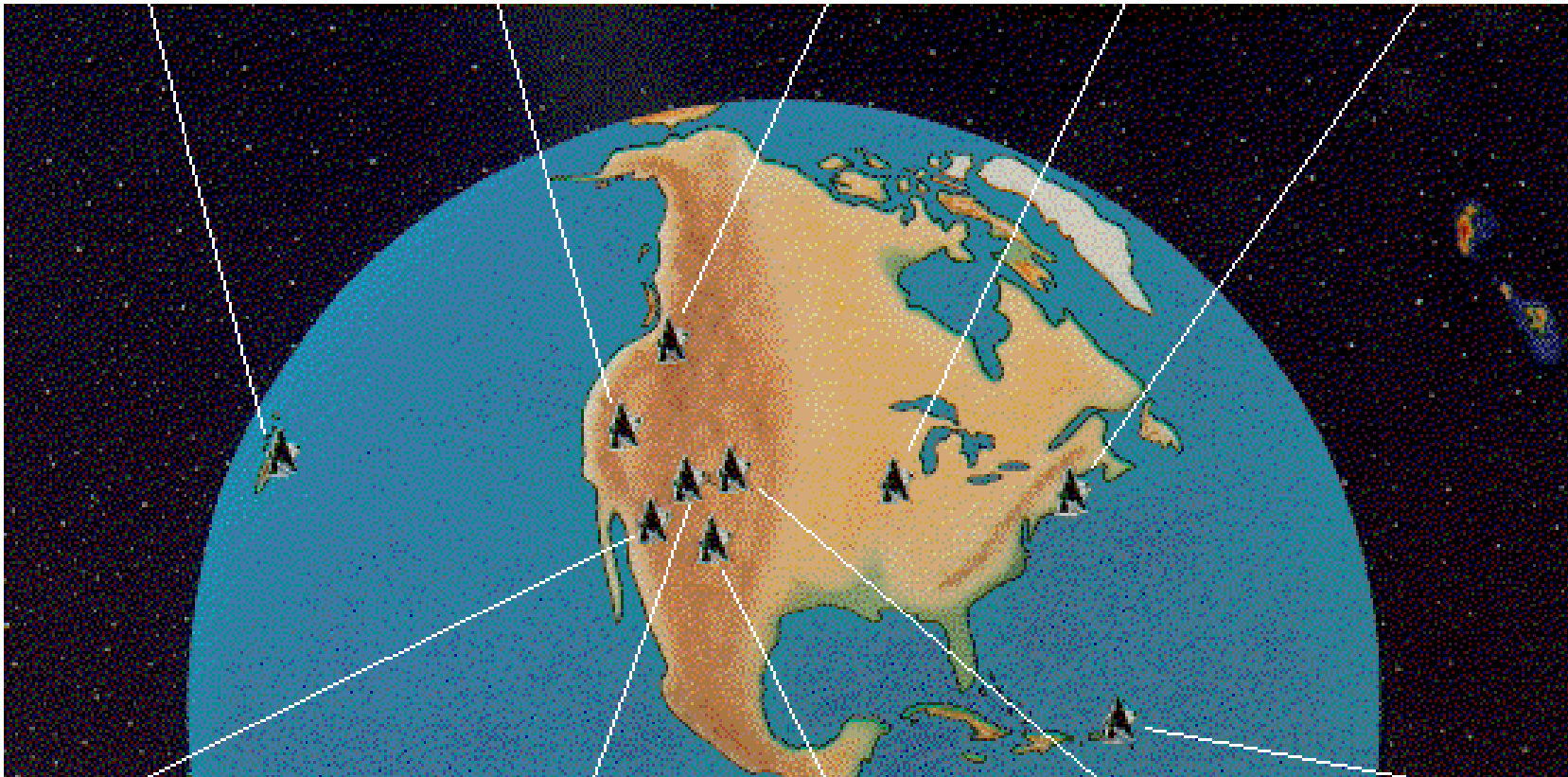
# A proposal to generalize SAPA to become Very Large Assessment

- Shared item pool: IPIP and extensions
  - ipip.ori.org  (2,000+ personality items
  - ability.personality-project.org (?)
- Pooled item scores -- available through web
  - E.g., test.personality-project.org/survey/ survey.info
- Statistical analyses to be web available
  - item means, descriptive stats
  - IRT parameters?

# A Very Long Base Line Personality Test?