Personality and Individual Differences: the home for psychological generalists

William Revelle
Presidential Address to the International Society for the Study of Individual Differences, July, 2007
I am a personality psychologist:
I study Individual Differences
Personality and Differential Psychologists study The how and why of individual differences in

A) Affect  
B) Behavior  
C) Cognition  
D) Desire
Personality and Differential Psychologists integrate

A) social psychology
B) cognitive psychology
C) neuro-psychology
D) behavior genetics
E) methodology
Personality and Differential Psychology has applications in

I. Assessing leadership
II. Evaluating effectiveness
III. Testing Psychological Theory
Personality and Individual Differences

The study of personality and individual differences is the last refuge of the generalist in psychological theory and research.
Overview

I. Honorable history
II. Exciting Present
III. Promising future
Early Personality Research

I. Gideon
II. Plato
III. Theophrastus
IV. Hippocrates/Galen
V. Galton/Wundt/Heymans
Gideon, master methodologist

I. introduced the within subjects design

II. recognized the power of cross over interactions

III. was not afraid of asking hard questions
Gideon's tests for God are an early example of a double dissociation and probably the first published example of a cross over interaction. On the first night, the wool was wet but the floor was dry. On the second night, the floor was wet but the wool was dry (Judges 6:36-40)
Gideon and assessment

I. The problem: 32,000 volunteers were too many for purpose

II. Solution: Sequential Affective and Cognitive Assessment

A) 10,000 passed the affective test (step back if you are afraid)

B) 300 passed the cognitive assessment (lapping water like a dog showing battlefield skill)
Gideon’s assessment technique
Plato’s contribution to psychometrics and personality assessment
Plato’s contribution to psychometrics and assessment

I. True Score theory

II. The Allegory of the Cave and latent variable analysis

III. The Republic: leadership effectiveness: the role of intelligence, anxiety and impulsivity
Plato and latent variables:
The allegory of the cave

Suppose that there is a group of human beings who have lived their entire lives trapped in a subterranean chamber lit by a large fire behind them. Chained in place, these cave-dwellers can see nothing but shadows (of their own bodies and of other things) projected on a flat wall in front of them. Some of these people will be content to do no more than notice the play of light and shadow, while the more clever among them will become highly skilled observers of the patterns that most regularly occur. In both cases, however, they cannot truly comprehend what they see, since they are prevented from grasping its true source and nature. (Republic 514a)
Plato and leadership

... quick intelligence, memory, sagacity, cleverness, and similar qualities, do not often grow together, and that persons who possess them and are at the same time high-spirited and magnanimous are not so constituted by nature as to live orderly and in a peaceful and settled manner; they are driven any way by their impulses, and all solid principle goes out of them.

On the other hand, those steadfast natures which can better be depended upon, which in a battle are impregnable to fear and immovable, are equally immovable when there is anything to be learned; they are always in a torpid state, and are apt to yawn and go to sleep over any intellectual toil.

And yet we were saying that both qualities were necessary in those to whom the higher education is to be imparted, and who are to share in any office or command.

And will they be a class which is rarely found?

Then the aspirant must not only be tested in those labours and dangers and pleasures which we mentioned before, but there is another kind of probation which we did not mention--he must be exercised also in many kinds of knowledge, to see whether the soul will be able to endure the highest of all, or will faint under them, as in any other studies and exercises.
Tyrtamus of Lesbos (Theophrastus)
biological taxonomist and taxonomist of character
“Often before now have I applied my thoughts to the puzzling question -- one, probably, which will puzzle me for ever -- why it is that, while all Greece lies under the same sky and all the Greeks are educated alike, it has befallen us to have characters so variously constituted.”
Theophrastus, Chaucer and personality taxonomy

I. Theophrastus and the characters

II. Chaucer and the Canterbury Tales
Theophrastus meets Goldberg

<table>
<thead>
<tr>
<th>Extraversion</th>
<th>Agreeableness</th>
<th>Conscientious</th>
<th>Neuroticism</th>
<th>Openness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talkative</td>
<td>Sympathetic</td>
<td>Organized</td>
<td>Tense</td>
<td>Wide Interests</td>
</tr>
<tr>
<td>Assertive</td>
<td>Kind</td>
<td>Thorough</td>
<td>Anxious</td>
<td>Imaginative</td>
</tr>
<tr>
<td>Active</td>
<td>Appreciative</td>
<td>Planful</td>
<td>Nervous</td>
<td>Intelligent</td>
</tr>
<tr>
<td>Energetic</td>
<td>Affectionate</td>
<td>Efficient</td>
<td>Moody</td>
<td>Original</td>
</tr>
<tr>
<td>-Quiet</td>
<td>-Cold</td>
<td>-Careless</td>
<td>-Stable</td>
<td>-Commonplace</td>
</tr>
<tr>
<td>-Reserved</td>
<td>-Unfriendly</td>
<td>-Disorderly</td>
<td>-Calm</td>
<td>-Simple</td>
</tr>
<tr>
<td>Talker</td>
<td>Anxious to please</td>
<td>-Hostile</td>
<td>Coward</td>
<td>-Stupid</td>
</tr>
<tr>
<td>Chatty</td>
<td>Flatterer</td>
<td>-Shameless</td>
<td>Grumbler</td>
<td>-Superstitious</td>
</tr>
<tr>
<td>Boastful</td>
<td>-Unpleasant</td>
<td>-Distrustful</td>
<td>Mean</td>
<td>-Boor</td>
</tr>
<tr>
<td>Arrogant</td>
<td>-Outcast</td>
<td>-Avaricious</td>
<td>Unseasonable</td>
<td>-Gross</td>
</tr>
</tbody>
</table>

Goldberg, L. (1990); John, O. (1990); Theophrastus (372-287 BCE)
The biological basis of individual differences

I. Plato and the 3 domains of psychological research
   A) Reason and the brain
   B) Emotion and the heart
   C) Desire and the liver

II. Hippocrates/Galen and theories of temperament
Galen of Pergamum
4 temperaments of Galen/Kant
a recurring taxonomy

<table>
<thead>
<tr>
<th>“element”</th>
<th>Physiological basis</th>
<th>Temperament</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire</td>
<td>Yellow Bile</td>
<td>Choleric</td>
</tr>
<tr>
<td>Water</td>
<td>Phlegm</td>
<td>Phlegmatic</td>
</tr>
<tr>
<td>Air</td>
<td>Blood</td>
<td>Sanguine</td>
</tr>
<tr>
<td>Earth</td>
<td>Black Bile</td>
<td>Melancholic</td>
</tr>
</tbody>
</table>
Multiple representations of the 4 temperaments
Astrology and the four temperaments

- *Season*: Autumn, Summer, Winter, Spring
- *Temperament*: Sanguine, Phlegmatic, Melancholic, Choleric
- *Humour*: Yellow Bile, Black Bile
- *Element*: Earth, Fire, Water, Air
- *Heat*: Dry, Hot, Wet, Cold

These elements and temperaments correspond to the four seasons, creating a cyclical pattern in nature and human physiology.
Interest in the 4 temperaments continues today (c.f. wiki)
Wundt’s dimensional analysis

<table>
<thead>
<tr>
<th>Exciteability</th>
<th>Changeability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melancholic</td>
<td>Choleric</td>
</tr>
<tr>
<td>Phlegmatic</td>
<td>Sanguine</td>
</tr>
</tbody>
</table>
Eysenck’s dimensional organization

Melancholic

Choleric

Phlegmatic

Sanguine
Individual differences come of age:
Measurement and experiments

I. Francis Galton and regression
II. Wilhelm Wundt and experimental methods
Francis Galton
1822-1911
Galton and Regression
Galton and Regression
Wilhelm Wundt
1832-1920

- Basic Experimental Paradigm
- 3 factor theory of emotion
- Hedonic theory
Gerard Heymans (1857-1930)

- Empirically based research
- 3 dimensions of personality
Gerard Heymans (1857-1930)

- Empirically based research
  - 3000 (Dutch) doctors were asked to rate all members of a family on a large number of traits
  - ≈ 400 responded with ratings on 2,523 subjects
- Three dimensions
  - Emotionality or Emotional Instability
  - Activity or general drive
  - Dominance of primary or secondary functioning
## Heymns taxonomy
(from Eysenck, 1992)

<table>
<thead>
<tr>
<th></th>
<th>Emotionality</th>
<th>Activity</th>
<th>P/S</th>
<th>Jung</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apathetic</td>
<td>-</td>
<td>-</td>
<td>S</td>
<td>Sensitive I</td>
</tr>
<tr>
<td>Amorphous</td>
<td>-</td>
<td>-</td>
<td>P</td>
<td>Intuitive I</td>
</tr>
<tr>
<td>Phlegmatic</td>
<td>-</td>
<td>+</td>
<td>S</td>
<td>Intuitive E</td>
</tr>
<tr>
<td>Sanguine</td>
<td>-</td>
<td>+</td>
<td>P</td>
<td>Sensitive E</td>
</tr>
<tr>
<td>Passionate</td>
<td>+</td>
<td>+</td>
<td>S</td>
<td>Thinking E</td>
</tr>
<tr>
<td>Choleric</td>
<td>+</td>
<td>+</td>
<td>P</td>
<td>Feeling E</td>
</tr>
<tr>
<td>Sentimental</td>
<td>+</td>
<td>-</td>
<td>S</td>
<td>Feeling I</td>
</tr>
<tr>
<td>Nervous</td>
<td>+</td>
<td>-</td>
<td>P</td>
<td>Thinking I</td>
</tr>
</tbody>
</table>
Mid - late 20th Century
Measurement and theory testing

I. John Atkinson
II. Donald Broadbent
III. Raymond Cattell
IV. Hans Eysenck
V. Jeffrey Gray
John Atkinson
1924-2003

I. Theory of Achievement Motivation
   A) Individual differences and general laws
   B) Theory testing through experimentation

II. Theory of the Dynamics of Action
   A) Inertial properties of motivations and desires
   B) Introduced the concept of personality traits as rates of change in psychological states
I. Cognitive experiments showed individual differences interacting with situational determinants of attention and performance

II. Experimental work on arousal theory inspired work by Eysenck and others
Raymond Cattell
1905 - 1998

Founding President:
Society for Multivariate Experimental Psychology

- Primarily multivariate, little "experimental"
Hans J. Eysenck
1916-1997
Founding President: International Society for the Study of Individual Differences
Cronbach, Eysenck and the two disciplines of scientific psychology

I. Cronbach (1957, 1975) and Eysenck (1966, 1983, 1997) argued for the unification of the two disciplines of experimental and correlational approaches

II. Is it possible?

III. Are we doing it?
Is it possible to do Experimental Personality?

I. Individuals cannot be assigned to personality conditions

II. Experimental designs test person x condition interactions

III. Can combine general laws with theories of individual differences
Few studies use experimental techniques or study IQ reported in our journals

<table>
<thead>
<tr>
<th>Journal</th>
<th>Total</th>
<th>Exper.</th>
<th>IQ</th>
<th>Exp%</th>
<th>IQ%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EJP</td>
<td>68</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>JoP</td>
<td>125</td>
<td>7</td>
<td>1</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>JPSP</td>
<td>280</td>
<td>26</td>
<td>3</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>JPSP-PID</td>
<td>92</td>
<td>26</td>
<td>3</td>
<td>28</td>
<td>3</td>
</tr>
<tr>
<td>JRP</td>
<td>102</td>
<td>16</td>
<td>1</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>PaID</td>
<td>586</td>
<td>73</td>
<td>47</td>
<td>12</td>
<td>8</td>
</tr>
</tbody>
</table>

The basic logic of a personality experiment

Observed paths (A-H) are estimates of latent paths (a-h) and are affected by reliability (r, s, t)
Testing Personality Theory with experimental methods

I. Eysenck’s theory of extraversion and arousal
   A) Preferences
   B) Performance

II. Gray’s theory of sensitivity to reward and punishment cues
Eysenck and Wundt curve
Eysenck + Hebb (1967)

- Level of Arousal function (non specific cortical bombardment)
- Level of "Cue Function" (or possibility thereof)
- Deep Sleep
- Increasing Interest, Alertness, Positive Emotion
- Point of awakening
- Introvert
- Optimal Level of Response and Learning
- Extravert
- Increasing Emotional Disturbance, anxiety
- Point of awakening

Level of Arousal function (non specific cortical bombardment)
Experiments test limits of generality

I. If a personality dimension interacts with a manipulation, then we are able to define the limits of the individual difference

II. Interactions allow us to exclude alternative hypotheses
Introversion and
cognitive performance

I. Introverts do better on exams in relaxed conditions than extraverts.

II. Is this because they are smarter?

III. No, because experimentally we can show this effect reverses under time stress and caffeine
Introversion, time pressure, and caffeine: effect on verbal performance

Verbal GRE Performance
Standardized for NU

Introverts
Ambiverts
Extraverts

Relaxed | Timed | Caffeine

Revelle, Amaral, & Turriff, 1976 Science
Does this support Eysenck’s hypothesis?

I. Yes, but further studies limit this effect and show an interaction with time of day

II. This interaction tests and finds the limit of the overall trait effect
Impulsivity, Caffeine, and Time of Day: the effect on complex cognitive performance

Revelle, Humphreys, Simon and Gilliland, JEP:G, 1980
Impulsivity, Caffeine, and Time of Day: the effect on complex cognitive performance

Revelle, Humphreys, Simon and Gilliland, JEP:G, 1980
Extraversion vs. Impulsivity

• Caffeine effects were systematic, but not for extraversion, but rather for impulsivity
• Systematic interaction with time of day
• Implications
  – Performance does vary as function of personality and arousal, but depends upon time of day
  – Personality dimension of relevance was impulsivity
• Experimental studies allowed us to limit the generalization of the personality trait
The field of personality and individual differences is strong

I. After a long dry period, personality is becoming an active endeavor again in the US.

II. Europeans (and others) continued the tradition of theory and research in individual differences
Differential Psychology is more than “personality”

I. Intelligence
II. Sex
III. Age
IV. Ethnicity
V. Culture
Intelligence and mortality

I. Ian Deary: IQ, SES and mortality
II. Linda Gottfredson: Life as an IQ test
III. Is “Health Literacy” more than IQ?
Genetics of Individual Differences

I. Major Behavior Genetic studies (e.g. GOSAT) are being conducted.

II. Specific target gene analyses are being replicated across labs.

III. Gene x Gene and Gene x Environment interactions are being replicated and becoming more common.
Individual differences in Cognitive-Neuro functioning

I. Richard Haier and PET scanning

II. Aljoscha Neubauer and MRI/EEG imagining of cognitive functioning -- individual differences in brain activation

III. Neuro-endocrinology
New technologies lead to new methodologies: The example of the Web

I. Public domain materials: IPIP
II. Web based assessment: SAPA
III. Public domain software: R
International Personality Item Pool: a collaboratory

I. Lew Goldberg’s http://ipip.ori.org provides > 2000 items used in personality inventories organized by scale

II. Item statistics and correlations with various criteria available from Lew Goldberg
Synthetic Aperture Personality Assessment (SAPA)

I. Takes advantage of web for subject recruitment (currently > 70,000)

II. Gives each participant a small subsample (50+) of IPIP + ? items

III. Builds up item statistics across (>300 ) items for > 70,000 subjects
SAPA uses open source code

I. Written in HTML/PHP and uses MySQL for data storage

II. Analyzed using the open source statistics package R.
SAPA allows detailed analysis of multiple domains

I. Structure of personality items and relationship to new constructs

II. IQ estimates

III. Sex differences

IV. Ethnic differences
SAPA measures

I. Demographics: age, sex, education, country

II. Base measures: “Big 5” CANOE

III. IQ items, validated with (self reported) SAT/ACT
   A) “homegrown” IQ items
   B) self reported SAT/ACT/SATv/SATq

IV. Other constructs
Synthetic Aperture Personality Assessment: other constructs examined

I. Music preferences
II. Trust/Trustworthiness
III. Right Wing Authoritarianism
IV. Promotion and Prevention Focus
V. Verbal versus quantitative reasoning
Items with largest correlation with gender

<table>
<thead>
<tr>
<th>Correlation</th>
<th>Item Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.28</td>
<td>(Like) Broadway Musicals (e.g. Rent, Cats, Phantom of the</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>0.27</td>
<td>Get overwhelmed by emotions.</td>
</tr>
<tr>
<td>0.26</td>
<td>Get stressed out easily.</td>
</tr>
<tr>
<td>0.25</td>
<td>(Like) Broadway, Movie and TV Soundtrack Music in General</td>
</tr>
<tr>
<td>0.24</td>
<td>Am concerned about others.</td>
</tr>
<tr>
<td>0.23</td>
<td>Sympathize with others' feelings.</td>
</tr>
<tr>
<td>0.22</td>
<td>(Like) Top 40/Pop Vocal Music (e.g. Kelly Clarkson, Madonna,</td>
</tr>
<tr>
<td>0.22</td>
<td>Panic easily.</td>
</tr>
<tr>
<td>0.22</td>
<td>Worry about things.</td>
</tr>
<tr>
<td>0.2</td>
<td>Feel others' emotions.</td>
</tr>
<tr>
<td>0.2</td>
<td>Inquire about others' well-being.</td>
</tr>
<tr>
<td>-0.2</td>
<td>Believe that I am better than others.</td>
</tr>
<tr>
<td>-0.17</td>
<td>Am not easily bothered by things.</td>
</tr>
<tr>
<td>-0.17</td>
<td>Feel little concern for others.</td>
</tr>
</tbody>
</table>
Non-IQ items predict g

<table>
<thead>
<tr>
<th>Value</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.26</td>
<td>(Like) Opera (e.g. Verdi, Wagner, Puccini)</td>
</tr>
<tr>
<td>0.26</td>
<td>Am quick to understand things.</td>
</tr>
<tr>
<td>0.25</td>
<td>Have a rich vocabulary.</td>
</tr>
<tr>
<td>-0.25</td>
<td>Have difficulty understanding abstract ideas.</td>
</tr>
<tr>
<td>0.24</td>
<td>(Like) Big Band/Swing (e.g. Glenn Miller, Duke Ellington)</td>
</tr>
<tr>
<td>-0.24</td>
<td>Am not interested in theoretical discussions.</td>
</tr>
<tr>
<td>0.24</td>
<td>Believe that I am better than others.</td>
</tr>
<tr>
<td>0.23</td>
<td>Love to read challenging material.</td>
</tr>
<tr>
<td>0.23</td>
<td>Believe in the importance of art.</td>
</tr>
<tr>
<td>0.22</td>
<td>Can handle a lot of information.</td>
</tr>
<tr>
<td>0.22</td>
<td>(Dislike) Gospel Style Country (e.g. Del Way, Carroll Roberson,</td>
</tr>
<tr>
<td>-0.22</td>
<td>Avoid philosophical discussions.</td>
</tr>
<tr>
<td>-0.22</td>
<td>Try to avoid complex people.</td>
</tr>
<tr>
<td>0.22</td>
<td>(Like) Modern Electronic Music (e.g. Jean-Michel Jarre,</td>
</tr>
<tr>
<td>0.21</td>
<td>Use difficult words.</td>
</tr>
<tr>
<td>0.2</td>
<td>Tend to vote for liberal political candidates.</td>
</tr>
</tbody>
</table>
Relating cognitive and non-cognitive personality

<table>
<thead>
<tr>
<th></th>
<th>C</th>
<th>A</th>
<th>N</th>
<th>O</th>
<th>E</th>
<th>ACT</th>
<th>SAT</th>
<th>SAT</th>
<th>g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consc</td>
<td>0.92</td>
<td>0.27</td>
<td>-0.17</td>
<td>0.11</td>
<td>0.15</td>
<td>-0.02</td>
<td>-0.08</td>
<td>-0.02</td>
<td>0.01</td>
</tr>
<tr>
<td>Agree</td>
<td>0.25</td>
<td>0.90</td>
<td>-0.20</td>
<td>0.22</td>
<td>0.44</td>
<td>-0.07</td>
<td>-0.07</td>
<td>-0.12</td>
<td>0.02</td>
</tr>
<tr>
<td>Neurot</td>
<td>-0.16</td>
<td>-0.18</td>
<td>0.93</td>
<td>-0.16</td>
<td>-0.31</td>
<td>-0.03</td>
<td>-0.02</td>
<td>-0.09</td>
<td>-0.11</td>
</tr>
<tr>
<td>Open</td>
<td>0.1</td>
<td>0.20</td>
<td>-0.14</td>
<td>0.87</td>
<td>0.33</td>
<td><strong>0.35</strong></td>
<td><strong>0.39</strong></td>
<td><strong>0.25</strong></td>
<td><strong>0.33</strong></td>
</tr>
<tr>
<td>Extrav</td>
<td>0.14</td>
<td>0.40</td>
<td>-0.28</td>
<td>0.30</td>
<td>0.93</td>
<td>-0.03</td>
<td>-0.06</td>
<td>-0.07</td>
<td>-0.08</td>
</tr>
<tr>
<td>ACT</td>
<td>-0.02</td>
<td>-0.07</td>
<td>-0.03</td>
<td><strong>0.32</strong></td>
<td>-0.03</td>
<td><strong>1.00</strong></td>
<td>0.56</td>
<td>0.59</td>
<td>0.50</td>
</tr>
<tr>
<td>SATV</td>
<td>-0.08</td>
<td>-0.07</td>
<td>-0.02</td>
<td><strong>0.37</strong></td>
<td>-0.06</td>
<td>0.56</td>
<td><strong>1.00</strong></td>
<td>0.59</td>
<td>0.33</td>
</tr>
<tr>
<td>SATQ</td>
<td>-0.01</td>
<td>-0.11</td>
<td>-0.09</td>
<td><strong>0.24</strong></td>
<td>-0.07</td>
<td>0.59</td>
<td>0.59</td>
<td><strong>1.00</strong></td>
<td>0.43</td>
</tr>
<tr>
<td>g</td>
<td>0.01</td>
<td>0.01</td>
<td>-0.09</td>
<td><strong>0.28</strong></td>
<td>-0.07</td>
<td>0.45</td>
<td>0.30</td>
<td>0.39</td>
<td><strong>0.81</strong></td>
</tr>
</tbody>
</table>

alpha reliabilities on diagonal, disattenuated correlations above diagonal
Predicting Aptitude Tests
Openness and Verbal

<table>
<thead>
<tr>
<th></th>
<th>SAT</th>
<th>ACT</th>
<th>SATV</th>
<th>SATQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>β Open</td>
<td>0.19</td>
<td>0.21</td>
<td>0.31</td>
<td>0.14</td>
</tr>
<tr>
<td>β g</td>
<td>0.33</td>
<td>0.39</td>
<td>0.21</td>
<td>0.35</td>
</tr>
<tr>
<td>R</td>
<td>0.42</td>
<td>0.49</td>
<td>0.42</td>
<td>0.41</td>
</tr>
<tr>
<td>R²</td>
<td>0.18</td>
<td>0.24</td>
<td>0.18</td>
<td>0.17</td>
</tr>
</tbody>
</table>
Open Source and Public Domain Software

I. Open source software allows us to share statistical algorithms across the web. An example is R.

II. R has been developed over the past 12 years by statisticians around the world and has become a standard for statistical computing.
R: Statistics for all of us

I. R packages are available for free for all computer platforms

A) Factor analysis, cluster analysis, IRT, Multilevel modeling, structural equations, Multidimensional Scaling, etc.

B) What is not yet available can be created easily
Differential Psychology in the future

I. New technologies for measurement
   A) ambulatory assessment of psychophysiology
   B) time intensive data collection

II. New statistical procedures
   A) multilevel analysis
   B) dynamic modeling

III. Revised theories
An example of theory revision: Reinforcement Sensitivity Theory

I. J. A. Gray (1972, 2002)

II. Philip Corr, Alan Pickering, Luke Smilie
Promising Developments

I. Handbook of Personality Research (Robbins, Fraley & Krueger, 2007)

II. Roadmap for new methodologies in behavioral science (NIH)