

# 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 differential psychologist:  
I study Personality and  
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

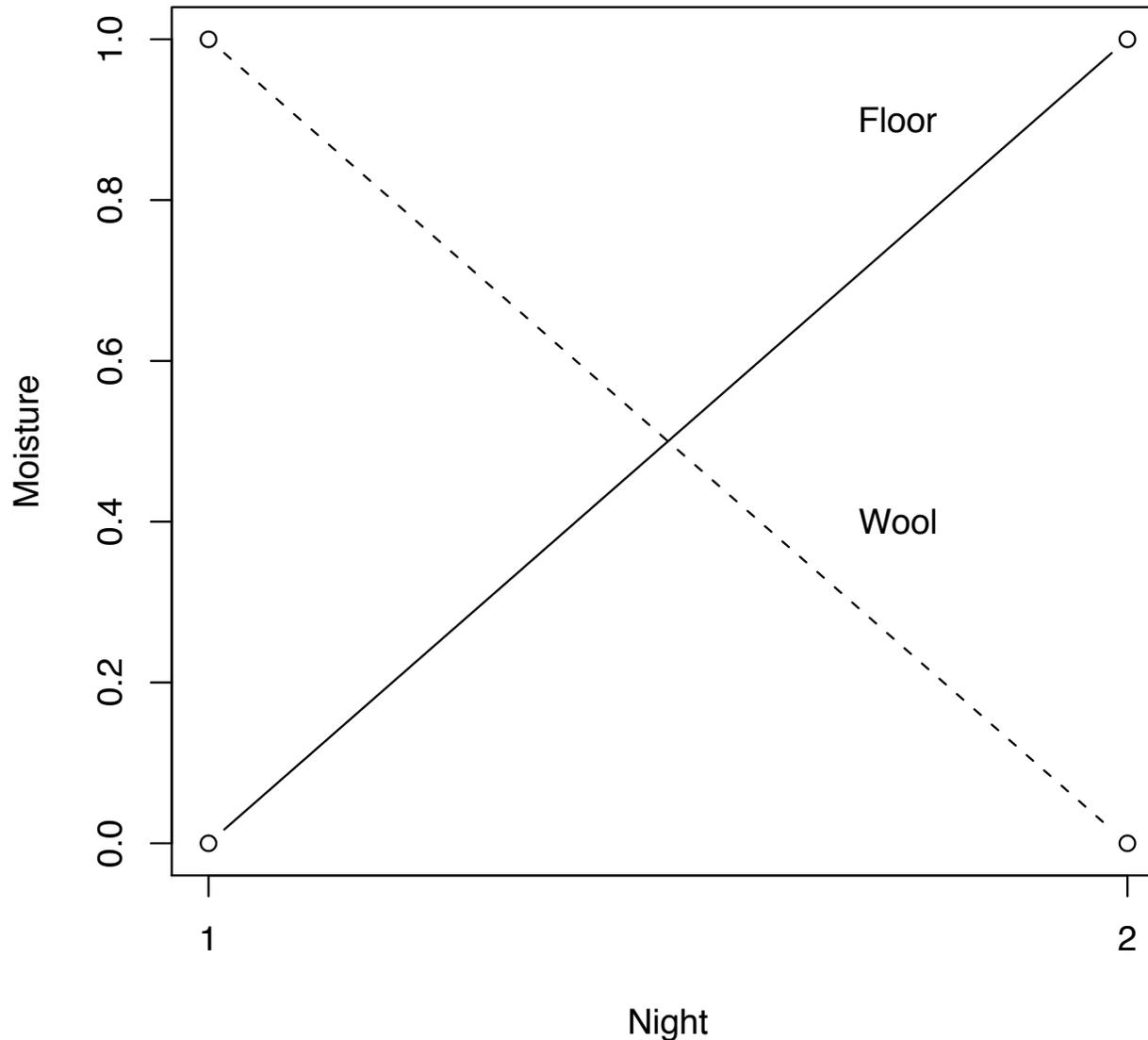
# Gideon, master methodologist

I. introduced the within subjects design

II. recognized the power of cross over interactions

III. was not afraid of asking hard questions

## Gideon's double dissociation test



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

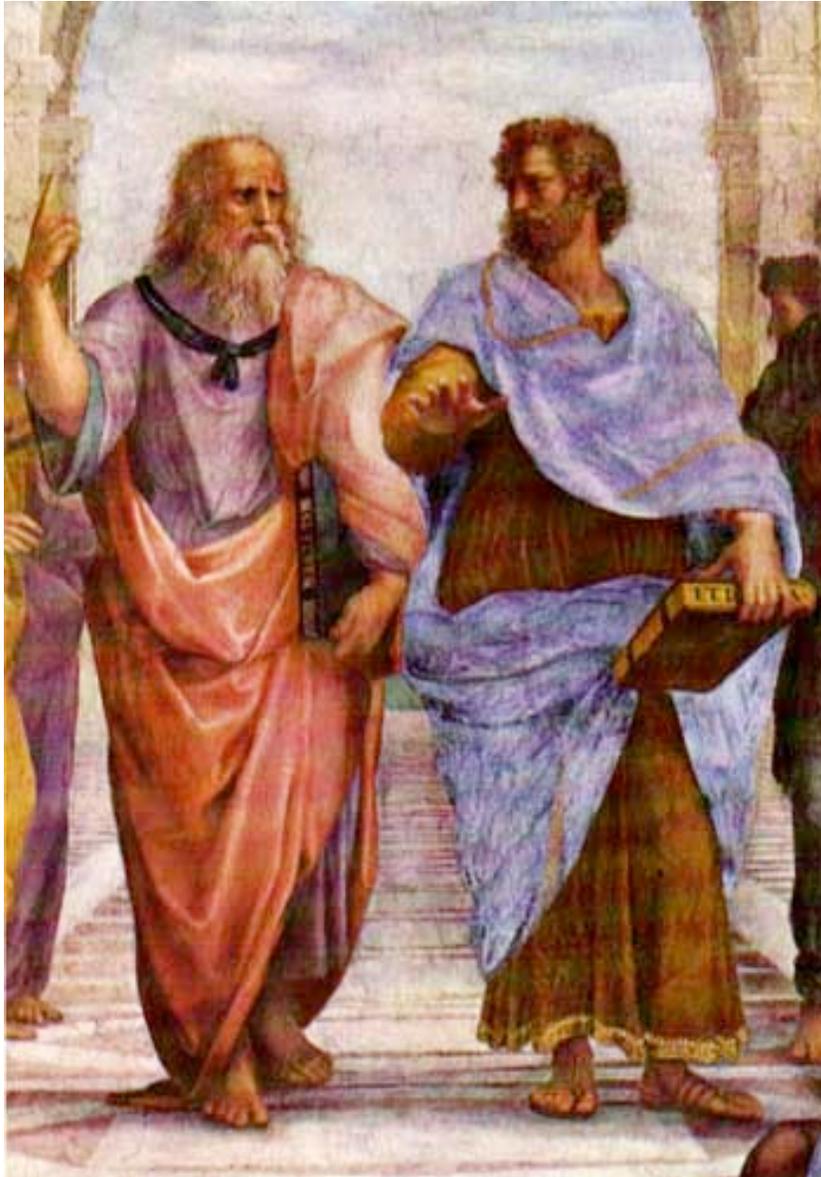
II. Solution: Sequential Affective and Cognitive Assessment

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 and the Giant 3: 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

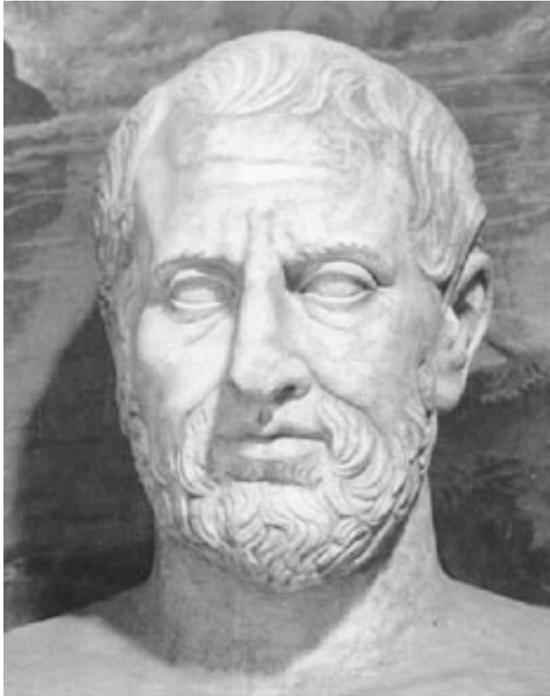
“... quick **intelligence, memory**, sagacity, **cleverness**, and similar qualities, do not often grow together, and that persons who possess them and are at the same time high-spirited and magnanimous are not so constituted by nature as to live orderly and in a peaceful and settled manner; they are 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

# Theophrastus: behavior genetics and taxonomic theory

“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

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

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

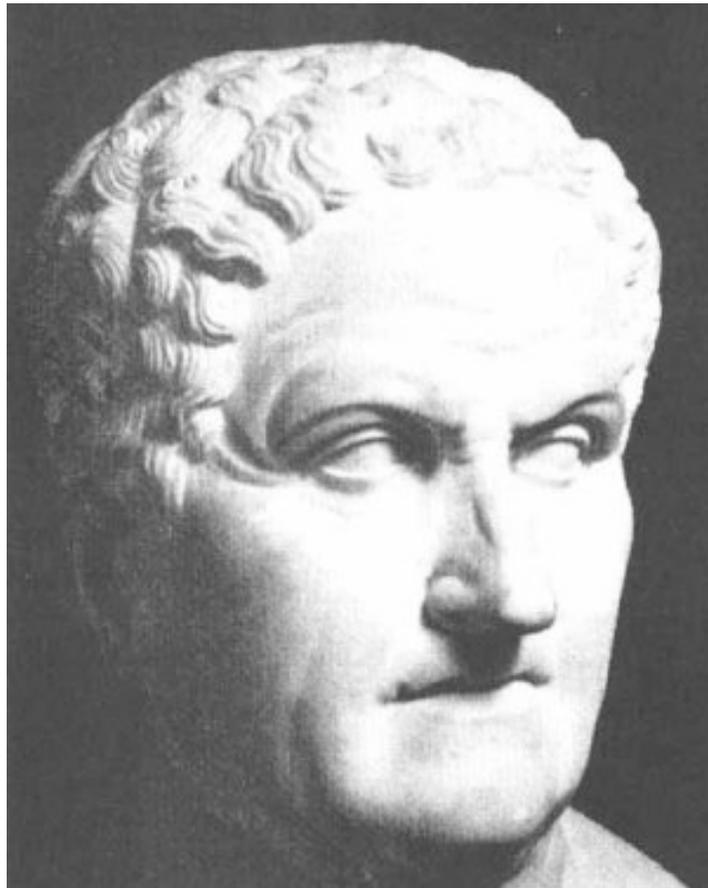
A) Reason and the brain

B) Emotion and the heart

C) Desire and the liver

## II. Hippocrates/Galen and theories of temperament

# Galen of Pergamum

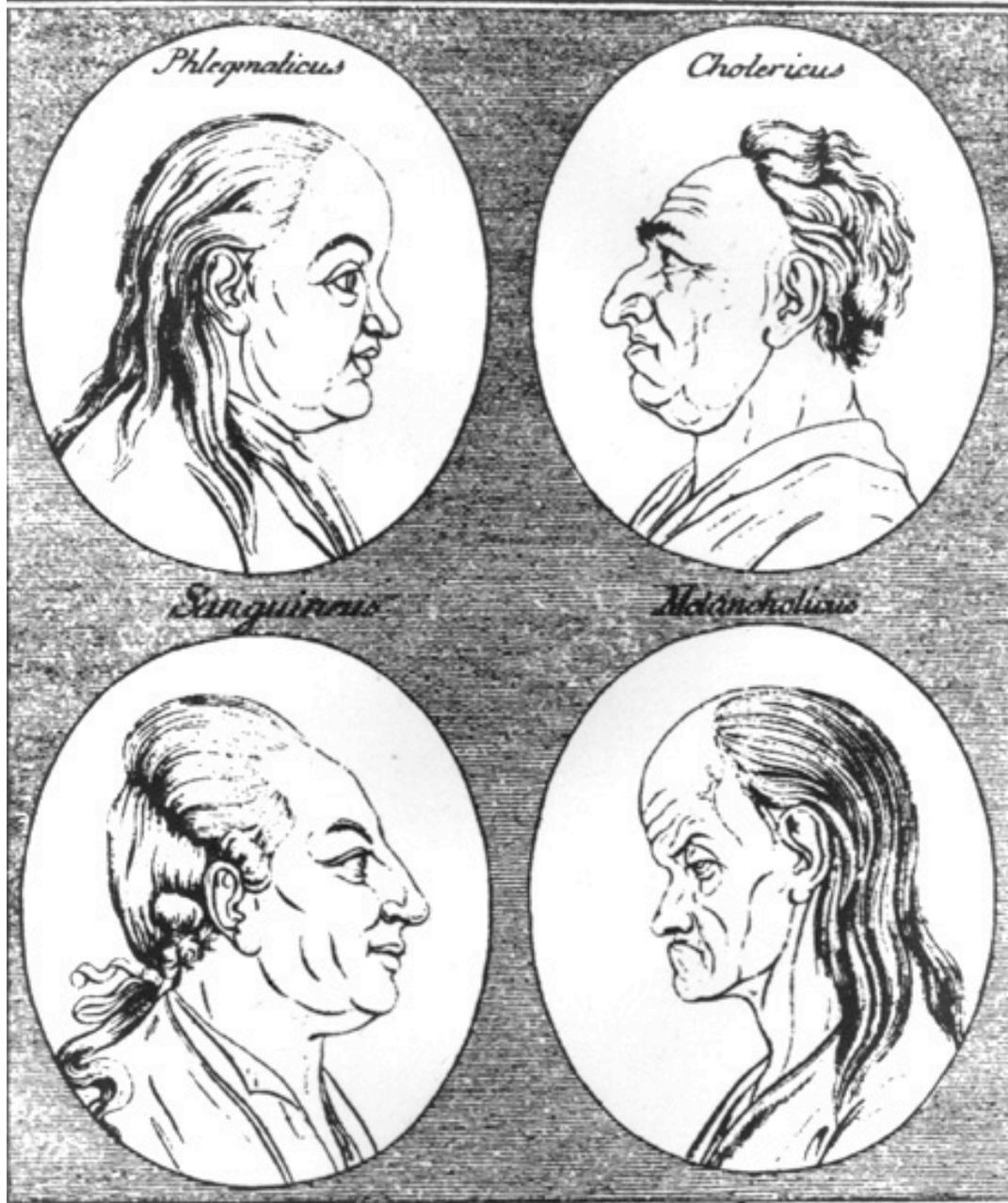


# 4 temperaments of Galen/Kant a recurring taxonomy

“element”	Physiological basis	Temperament
Fire	Yellow Bile	Choleric
Water	Phlegm	Phlegmatic
Air	Blood	Sanguine
Earth	Black Bile	Melancholic

# Multiple representations of the 4 temperaments



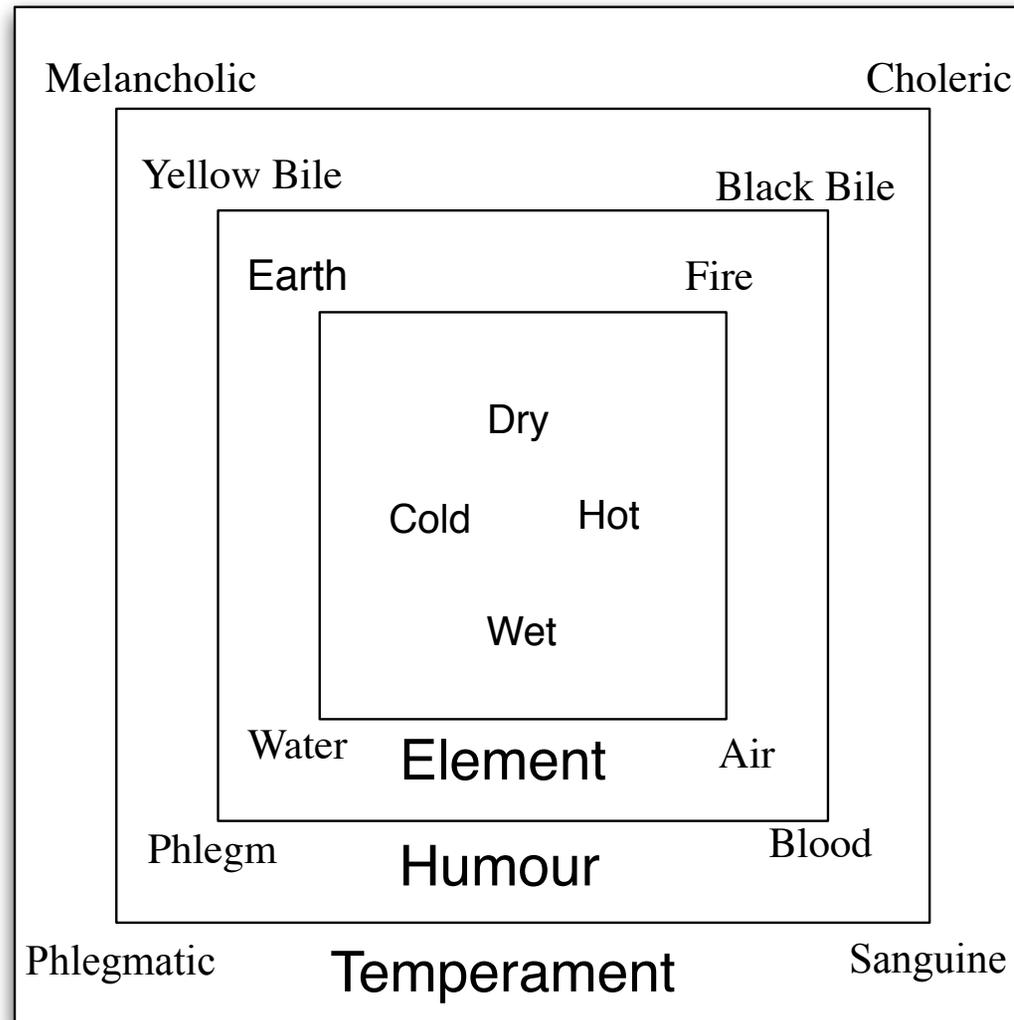




# Astrology and the four temperaments

Autumn

Summer

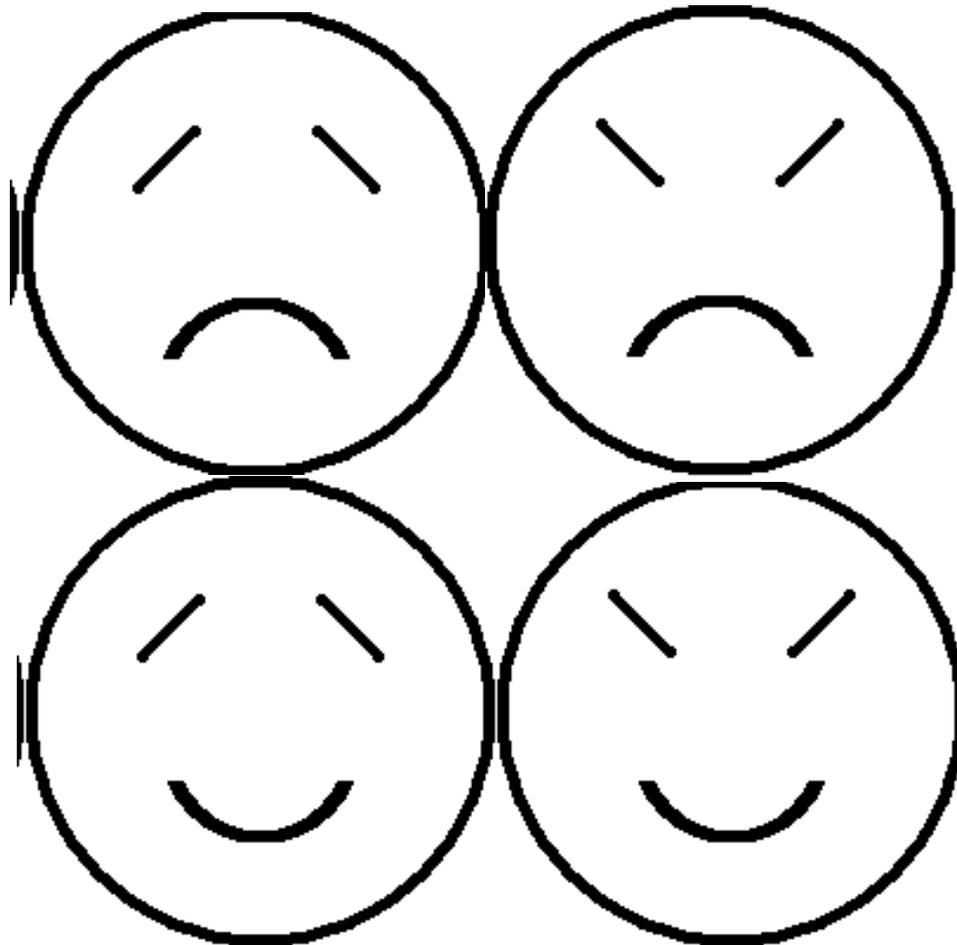


Winter

Spring

Season

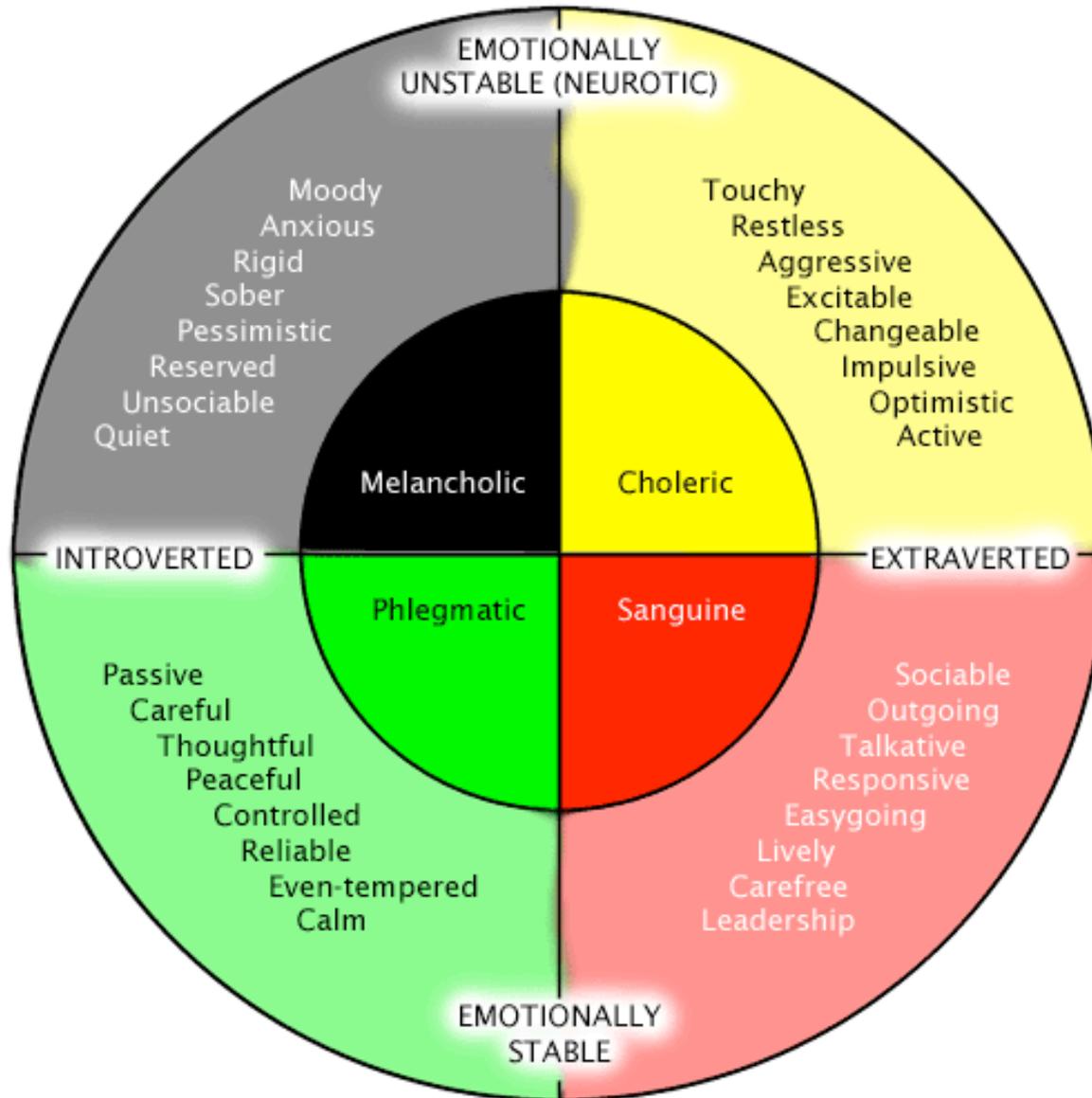
# Interest in the 4 temperaments continues today (c.f. wiki)



# Wundt's dimensional analysis

	Changeability	
Exciteability	Melancholic	Choleric
	Phlegmatic	Sanguine

# Eysenck's dimensional organization



Eysenck, H.J and Eysenck, M.W. *Personality and Individual Differences*.

Melancholic



Choleric

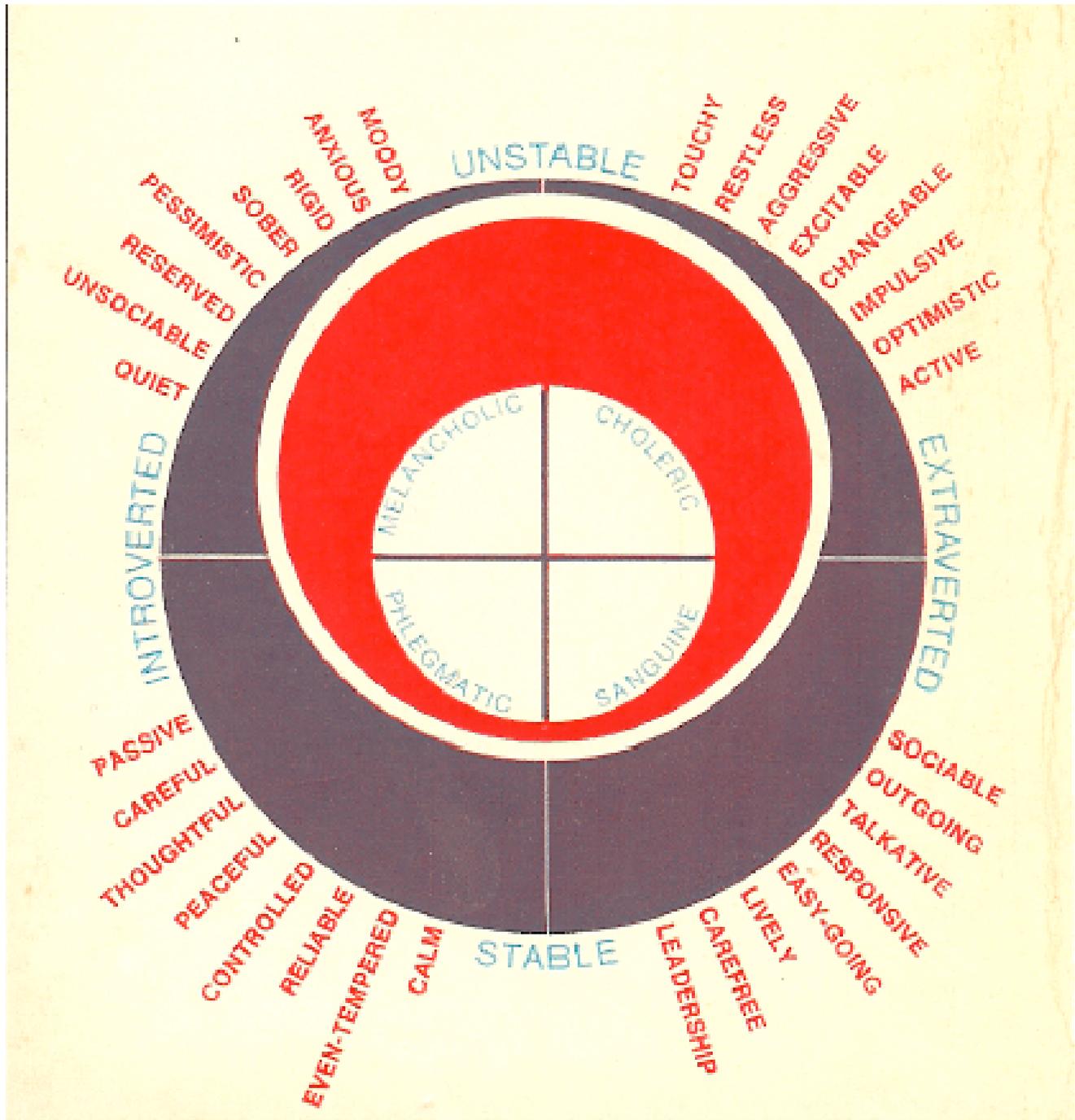


Phlegmatic



Sanguine





Individual differences come  
of age:

Measurement and experiments

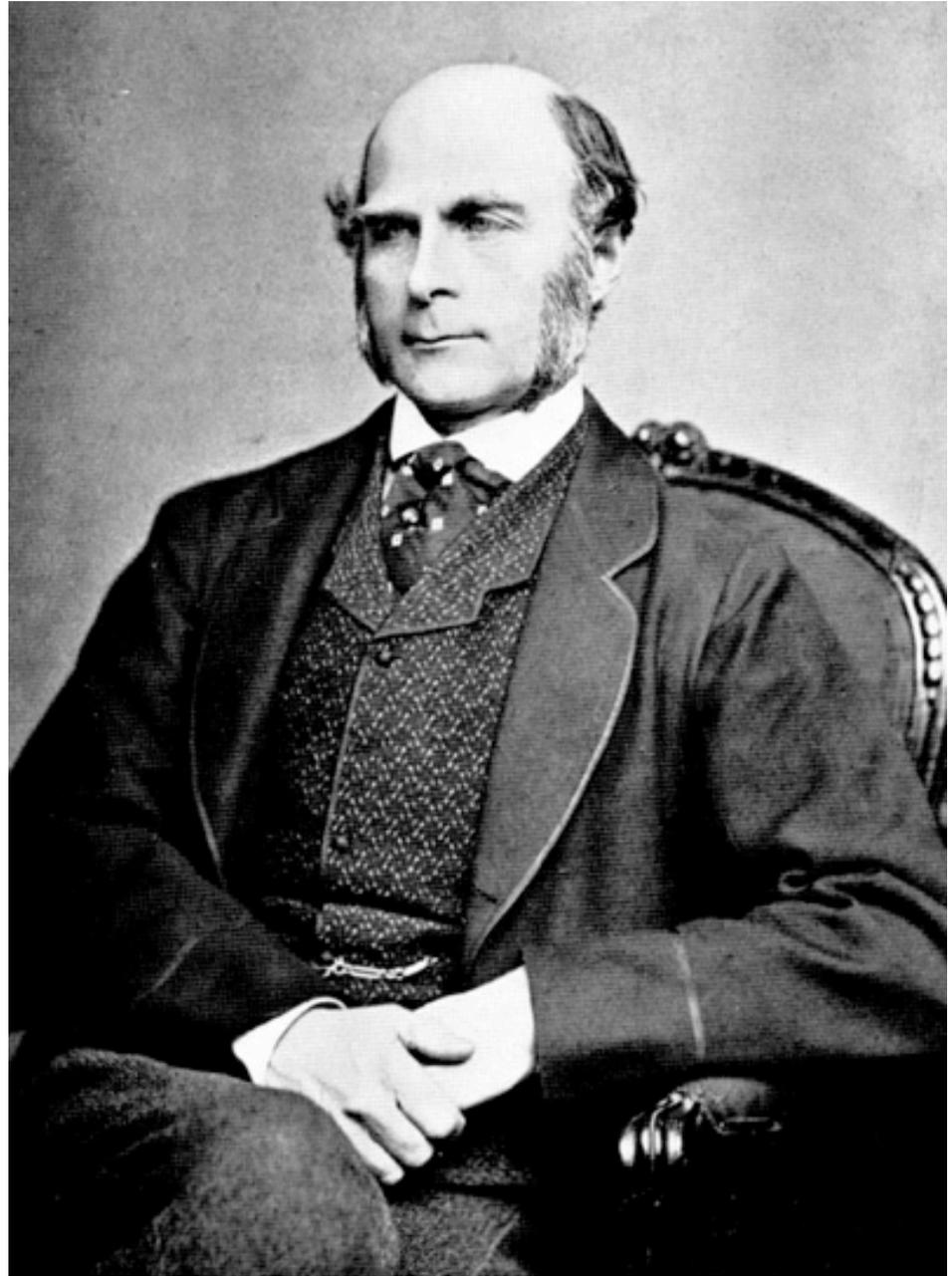
I. Francis Galton and regression

II. Wilhelm Wundt and experimental  
methods

# Francis Galton

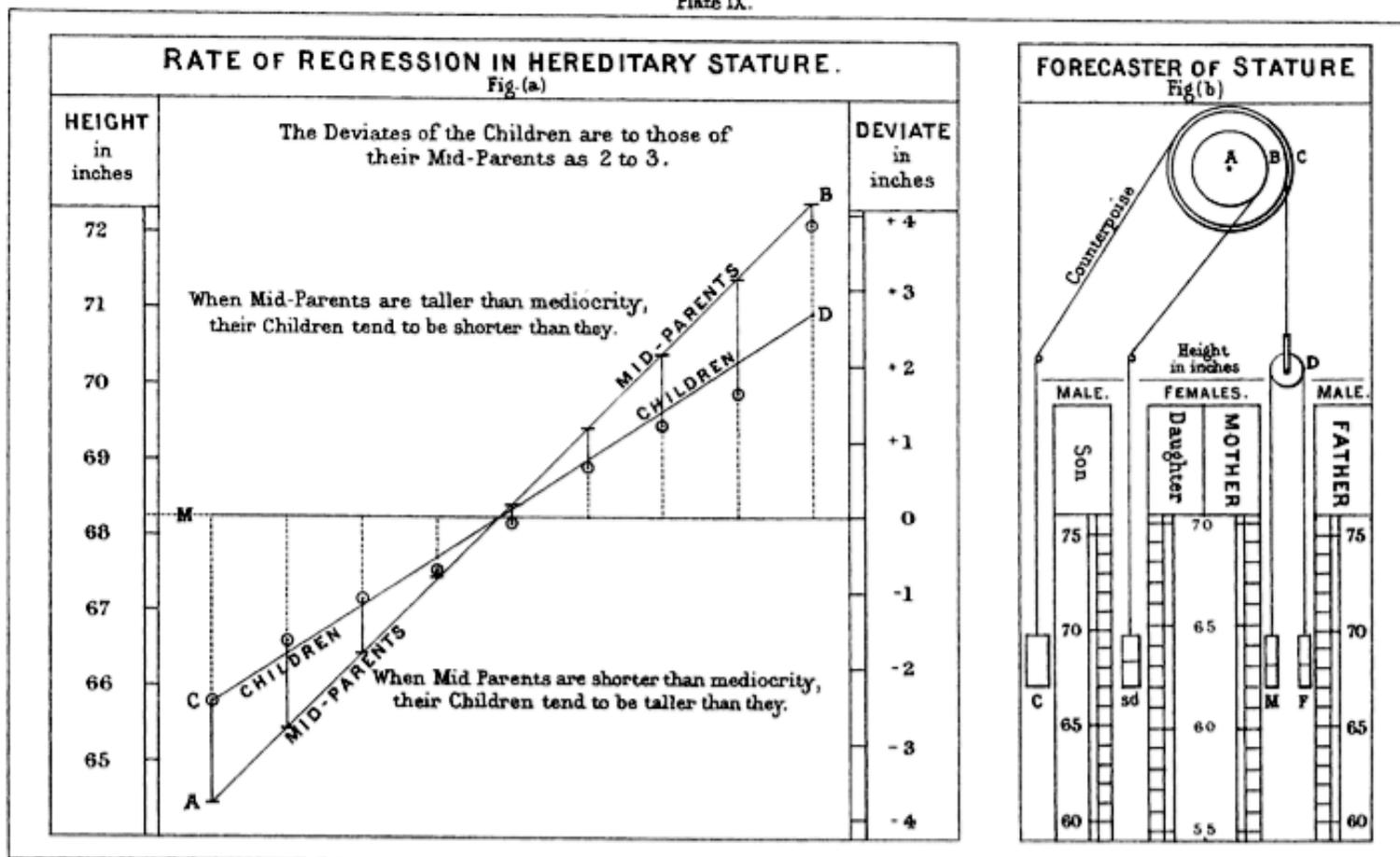
1822-1911

- Study of Hereditary Genius
- Regression
- Individual Differences



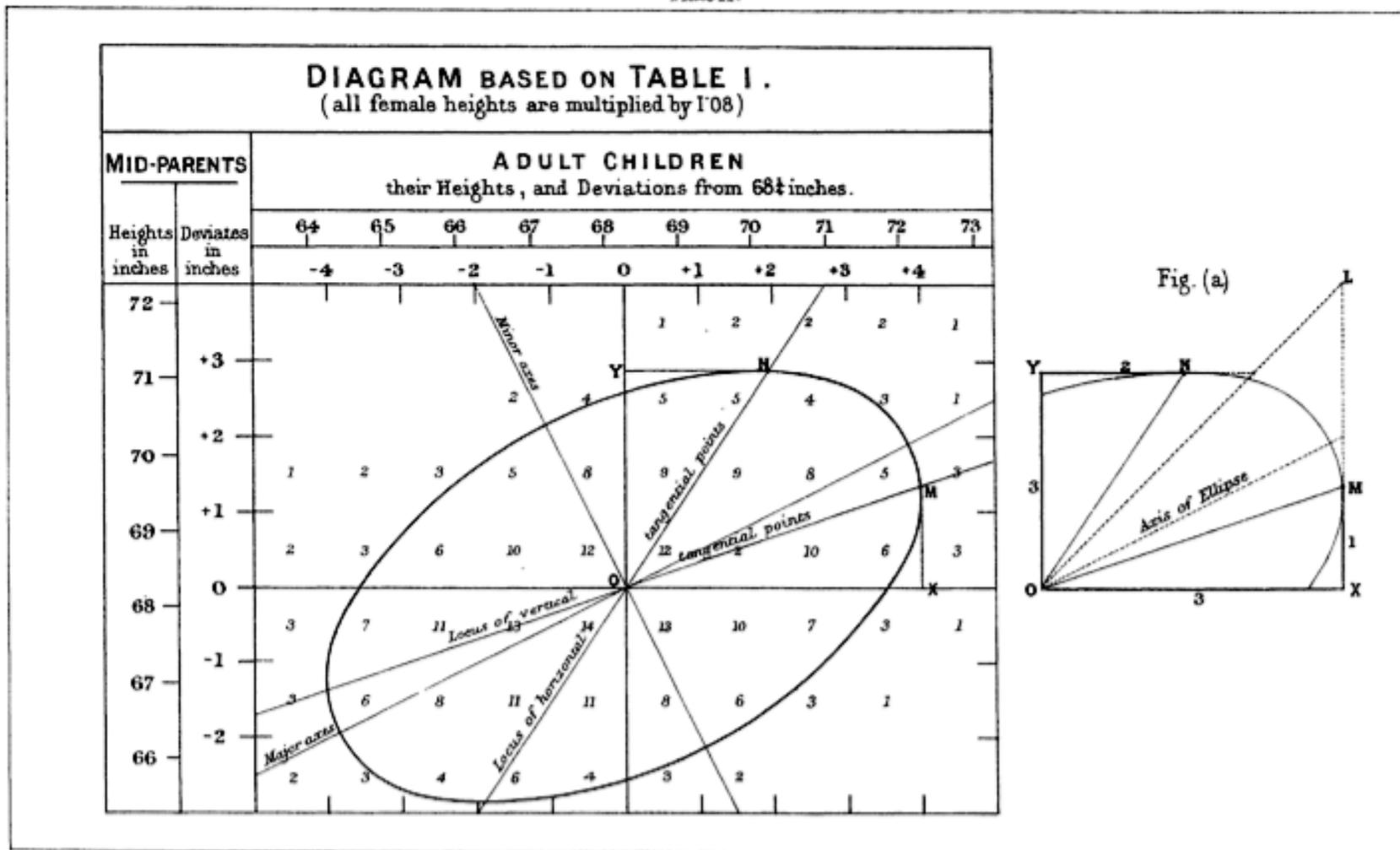
# Galton and Regression

Plate IX.



J.P. & W.R. Emble, Sc.

# Galton and Regression



# Wilhelm Wundt

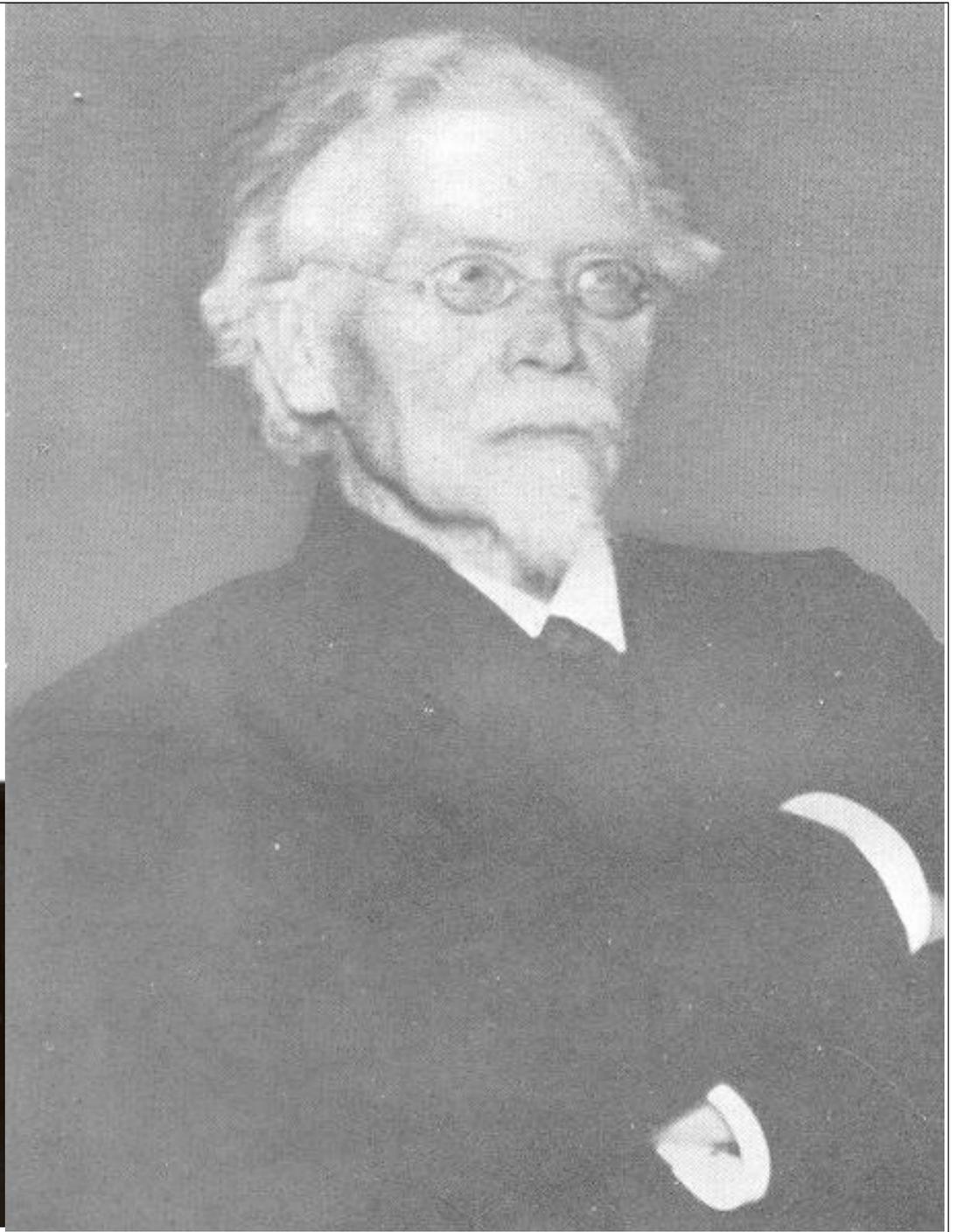
1832-1920

- 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
  - $\approx$  400 responded with ratings on 2,523 subjects
- Three dimensions
  - Emotionality or Emotional Instability
  - Activity or general drive
  - Dominance of primary or secondary functioning

# Heymans taxonomy

(from Eysenck, 1992)

	Emotionality	Activity	P/S	Jung
Apathetic	-	-	S	Sensitive I
Amorphous	-	-	P	Intuitive I
Phlegmatic	-	+	S	Intuitive E
Sanguine	-	+	P	Sensitive E
Passionate	+	+	S	Thinking E
Choleric	+	+	P	Feeling E
Sentimental	+	-	S	Feeling I
Nervous	+	-	P	Thinking I

# 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

# Donald E. Broadbent

1926-1993

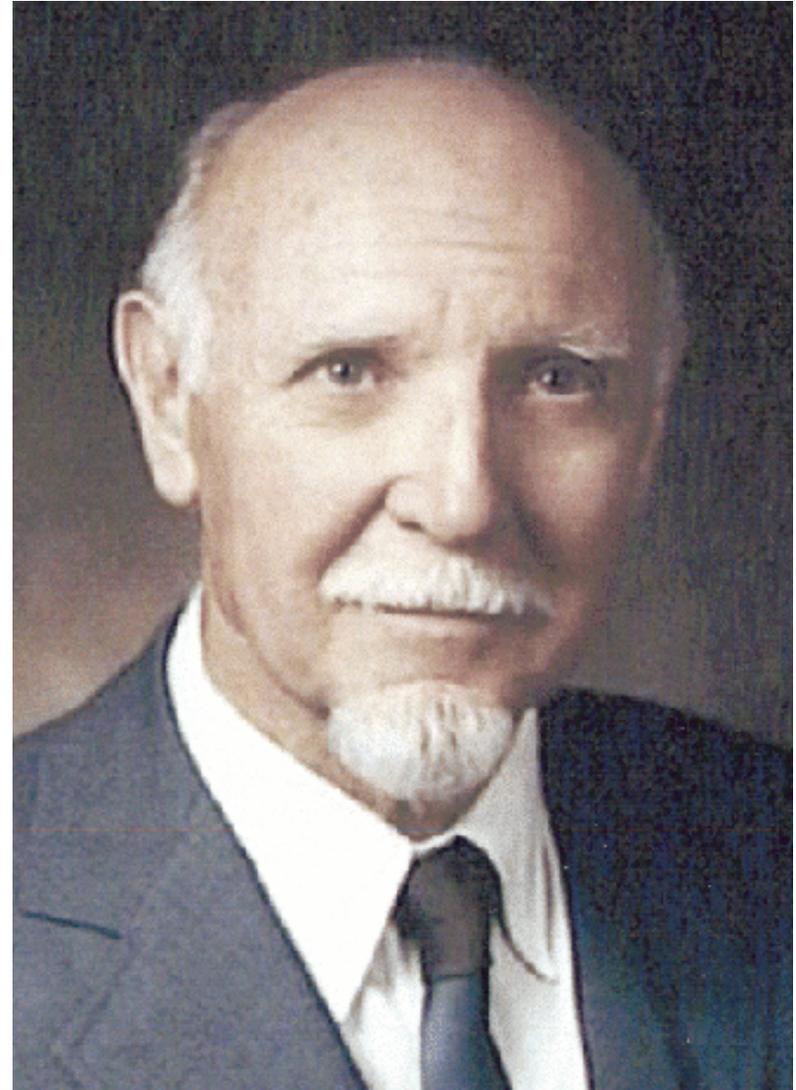
- I. Cognitive experiments showed individual differences interacting with situational determinants of attention and performance
- II. Experimental work on arousal theory inspired work by Eysenck and others

# Raymond Cattell

1905- 1998

Founding President:  
Society for Multivariate  
Experimental Psychology

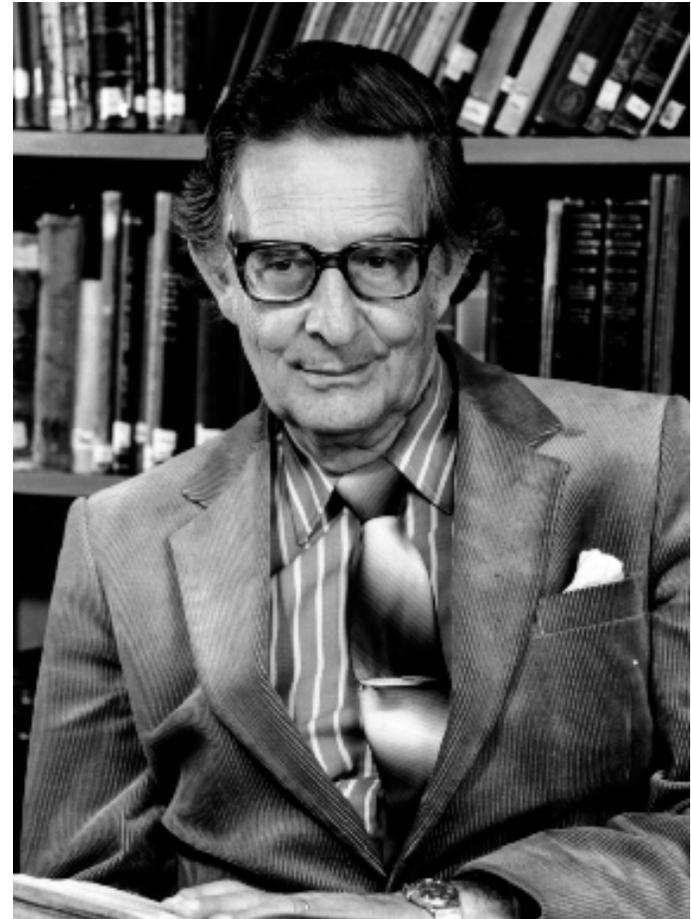
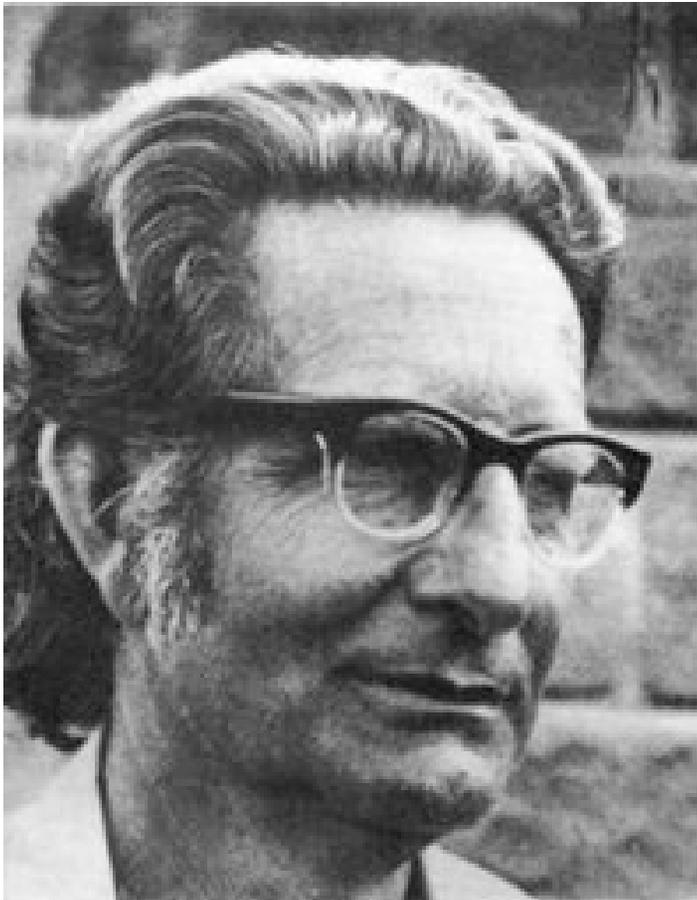
- Primarily  
multivariate, little  
“experimental”



# 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 can not be assigned to personality conditions
- II. Experimental designs test person x condition interactions
- III. Can combine general laws with theories of individual differences

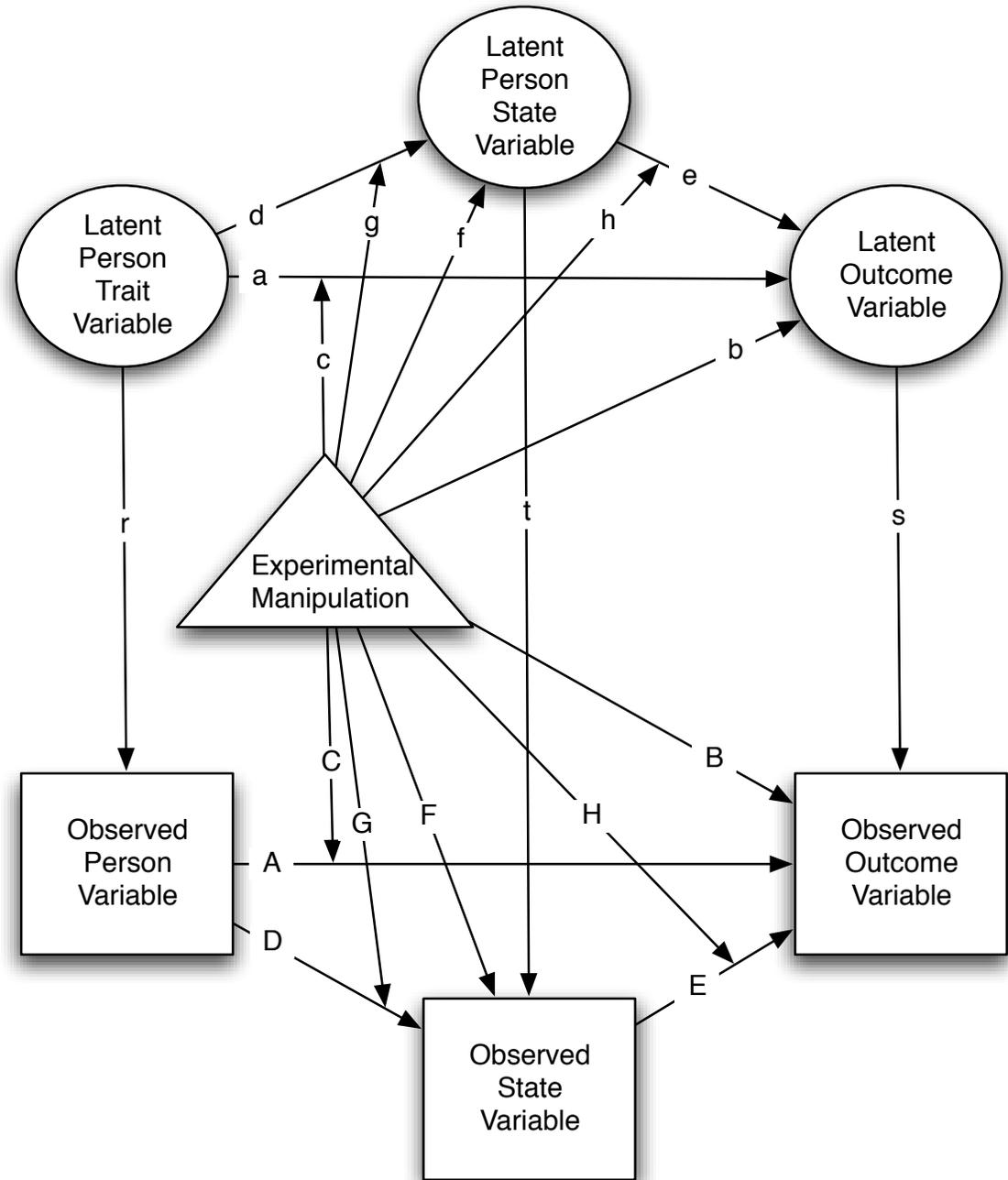
# Few studies with experimental techniques or that study IQ are reported in our journals

Journal	Total	Exper.	IQ	Exp%	IQ%
EJP	68	0	2	0	3
JoP	125	7	1	6	1
JPSP	280	26	3	9	1
PaID	586	73	47	12	8
JRP	102	16	1	16	1
JPSP-PID	92	26	3	28	3

Revelle, W. and Oehlberg, K. (in press) Integrating experimental and observational personality research: the contribution of Hans Eysenck , Journal of Personality.

# 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

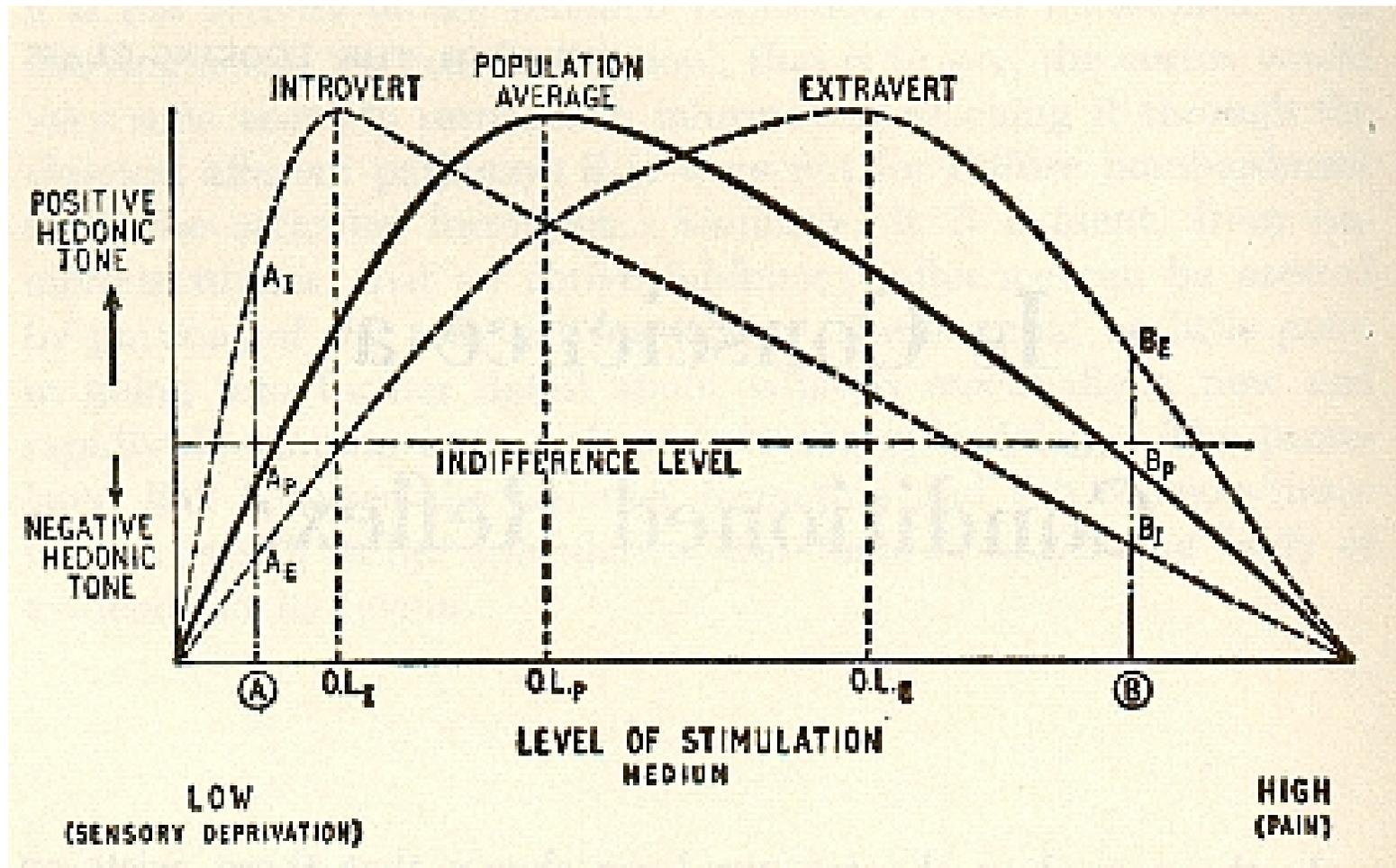
## I. Eysenck's theory of extraversion and arousal

A) Preferences

B) Performance

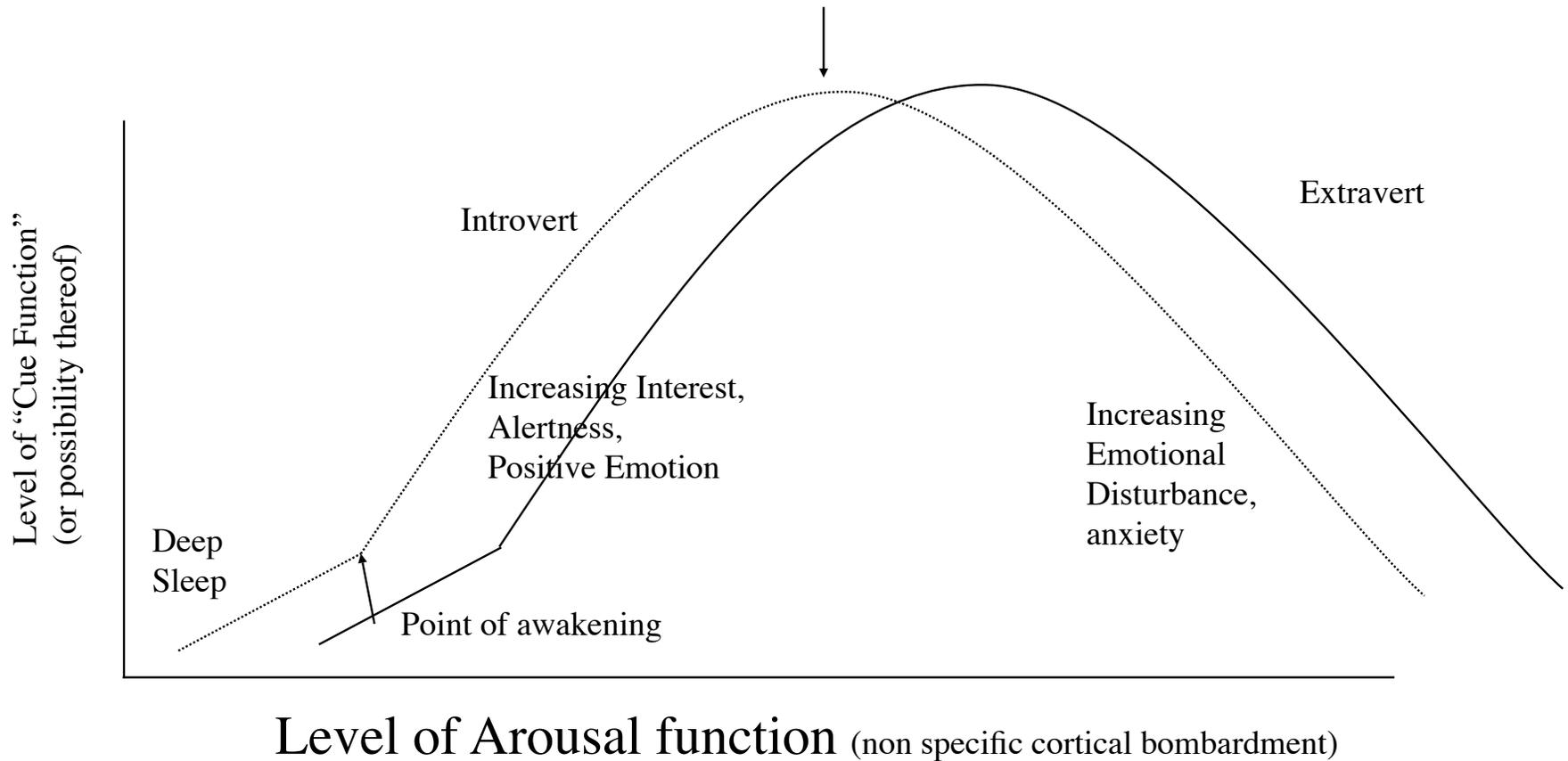
## II. Gray's theory of sensitivity to reward and punishment cues

# Eysenck and Wundt curve



# Eysenck (1967) + Hebb (1954) + Yerkes/Dodson (1908)

Optimal Level of Response and Learning



# Experiments test limits of generality

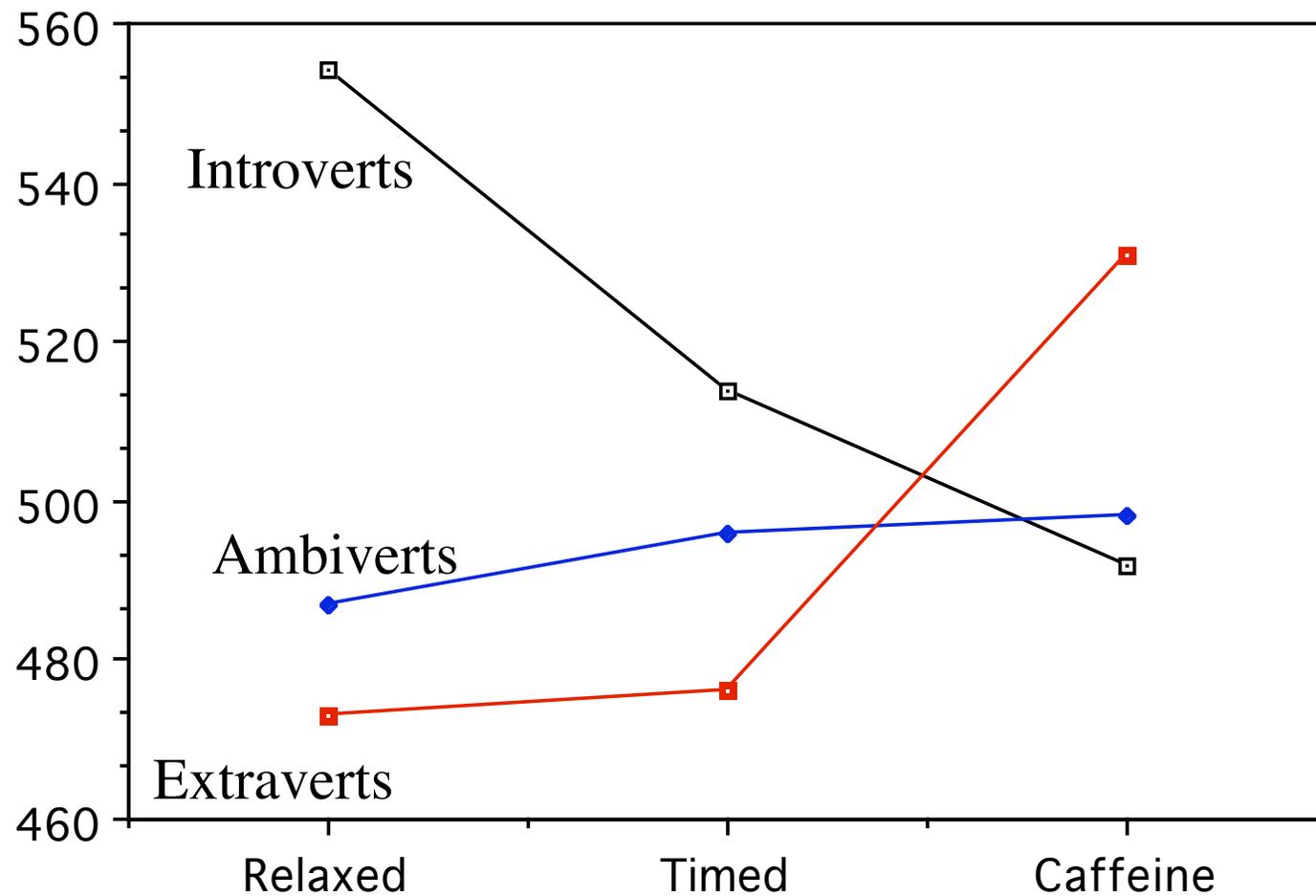
- I. If a personality dimension interacts with a manipulation, then we are able to define the limits of the individual difference
- II. Interactions allow us to exclude alternative hypotheses

# 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



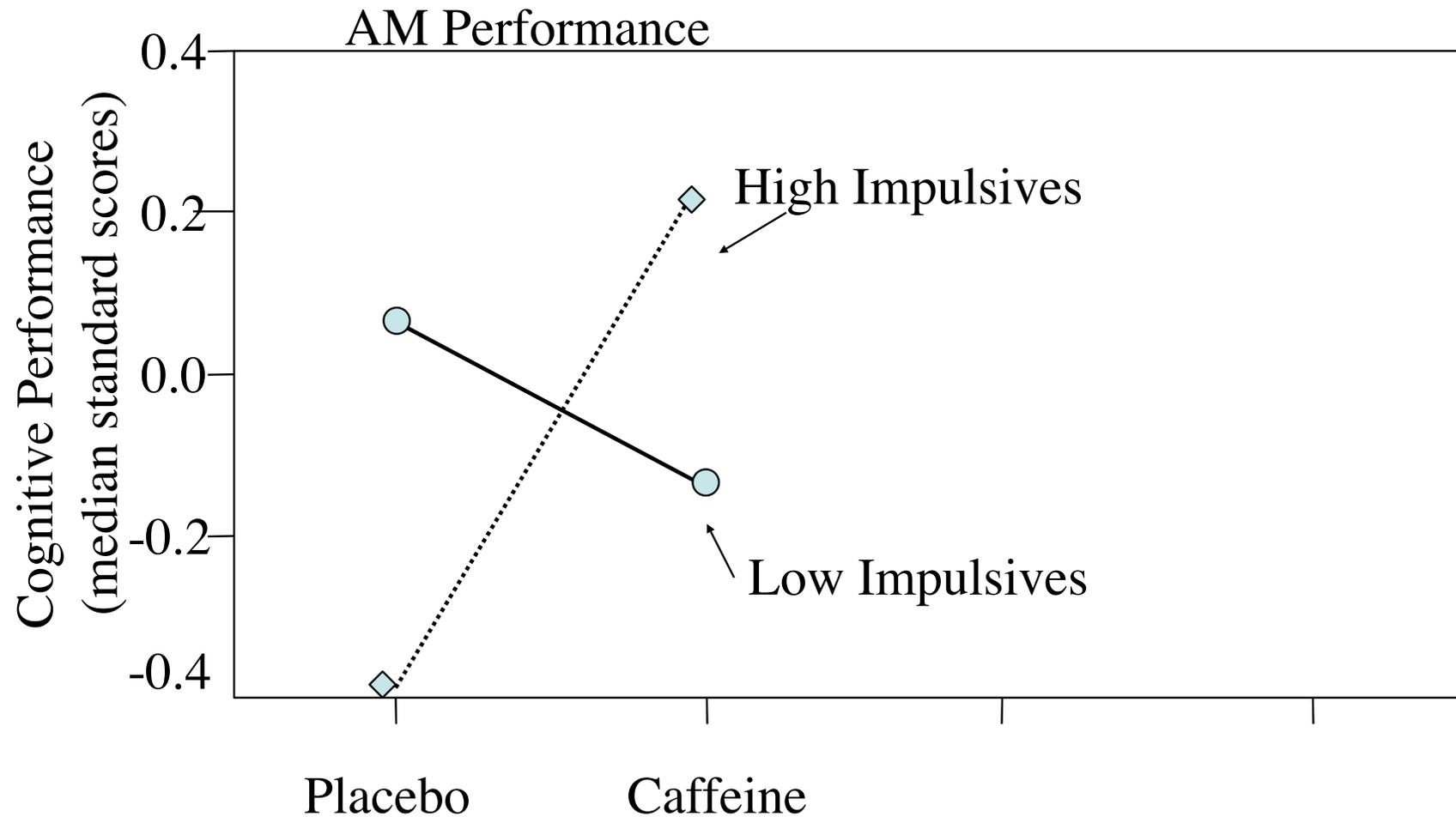
Revelle, Amaral, & Turriff, 1976 Science

Stress-->

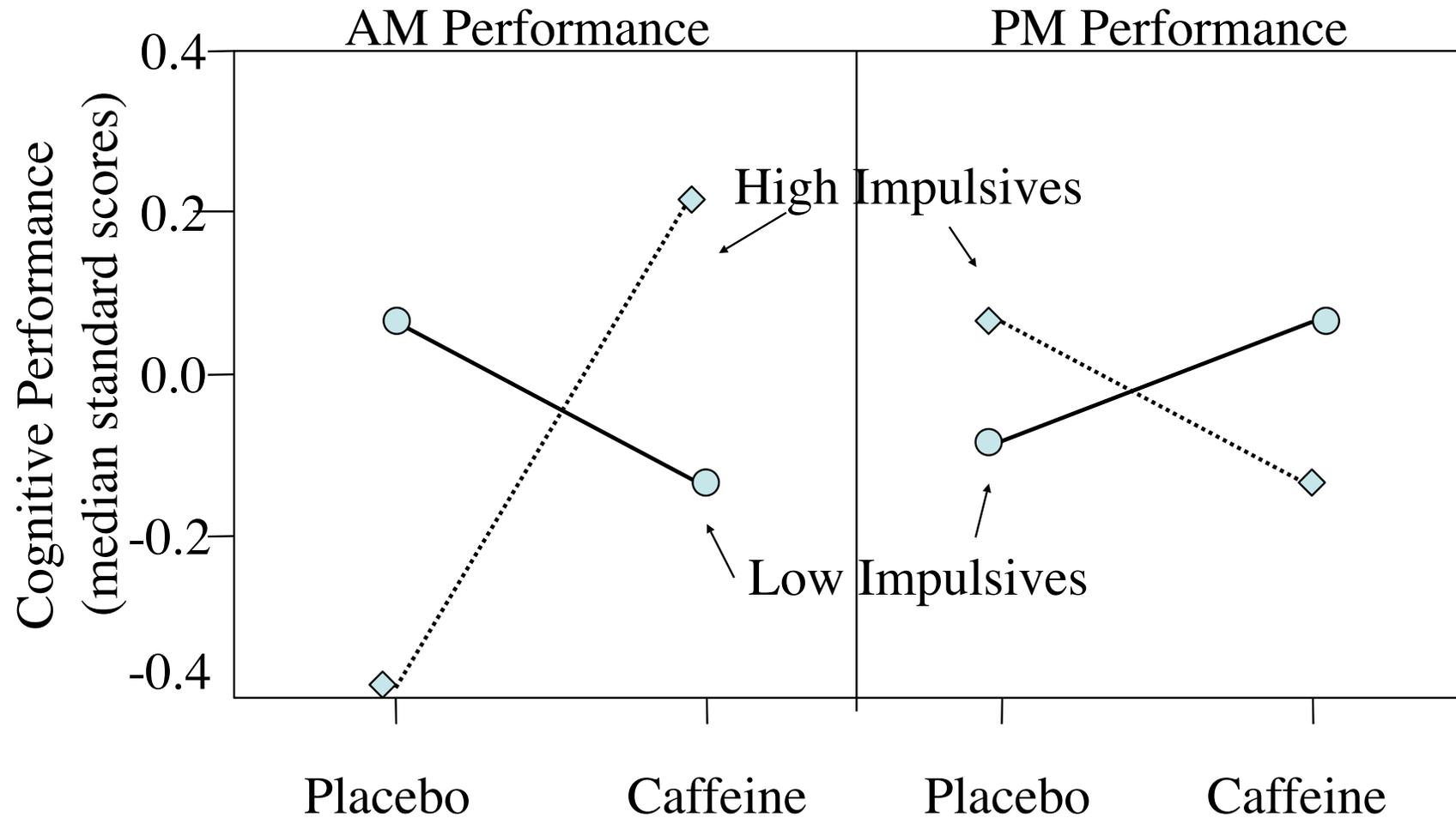
# Does this support Eysenck's hypothesis?

- 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



# Impulsivity, Caffeine, and Time of Day: the effect on complex cognitive performance



# Extraversion vs. Impulsivity

- Caffeine effects are 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) continue 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

# ISSID

The purpose of the Society is to foster research on **individual differences in temperament, intelligence, attitudes and abilities**. The Society aims to investigate the major dimensions of individual differences **in the context of experimental, physiological, pharmacological, clinical, medical, genetic, statistical and social psychology** and to **seek the determinants, causes and concomitants** of individual differences with concepts derived from those disciplines. To promote this purpose, the Society produces scientific papers and organizes scientific meetings to discuss and exchange information and ideas relevant to the measurement, structure, dynamics and biological bases of individual differences.

# 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 candidate 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 (e.g. C. deYoung)

# 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 (>400 ) 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/SAT<sub>v</sub>/SAT<sub>q</sub>

IV. Other constructs

# 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](#).

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 <input type="radio"/>	Moderately Inaccurate <input type="radio"/>	Slightly Inaccurate <input type="radio"/>	Slightly Accurate <input type="radio"/>	Moderately Accurate <input type="radio"/>	Very Accurate <input type="radio"/>
2.	Insult people.	Very Inaccurate <input type="radio"/>	Moderately Inaccurate <input type="radio"/>	Slightly Inaccurate <input type="radio"/>	Slightly Accurate <input type="radio"/>	Moderately Accurate <input type="radio"/>	Very Accurate <input type="radio"/>
3.	Am always prepared.	Very Inaccurate <input type="radio"/>	Moderately Inaccurate <input type="radio"/>	Slightly Inaccurate <input type="radio"/>	Slightly Accurate <input type="radio"/>	Moderately Accurate <input type="radio"/>	Very Accurate <input type="radio"/>
4.	Get stressed out easily.	Very Inaccurate <input type="radio"/>	Moderately Inaccurate <input type="radio"/>	Slightly Inaccurate <input type="radio"/>	Slightly Accurate <input type="radio"/>	Moderately Accurate <input type="radio"/>	Very Accurate <input type="radio"/>
5.	Have a rich vocabulary.	Very Inaccurate <input type="radio"/>	Moderately Inaccurate <input type="radio"/>	Slightly Inaccurate <input type="radio"/>	Slightly Accurate <input type="radio"/>	Moderately Accurate <input type="radio"/>	Very Accurate <input type="radio"/>
6.	Get back at others.	Very Inaccurate <input type="radio"/>	Moderately Inaccurate <input type="radio"/>	Slightly Inaccurate <input type="radio"/>	Slightly Accurate <input type="radio"/>	Moderately Accurate <input type="radio"/>	Very Accurate <input type="radio"/>

# Online ability assessment

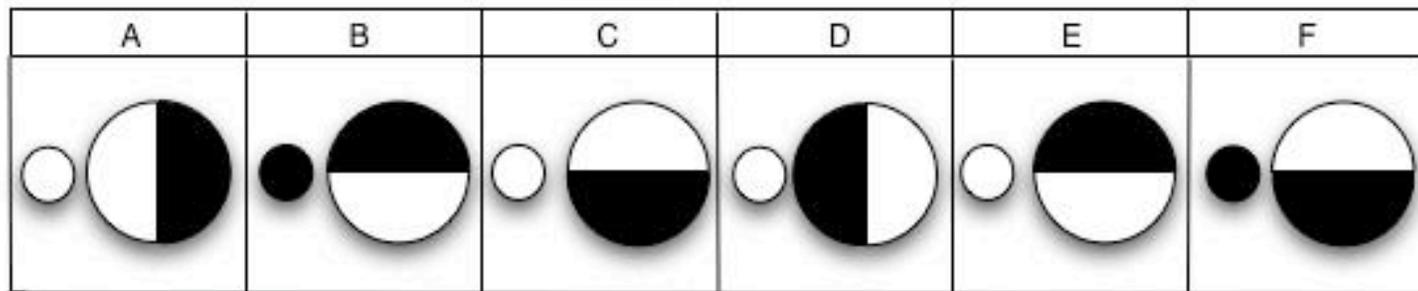
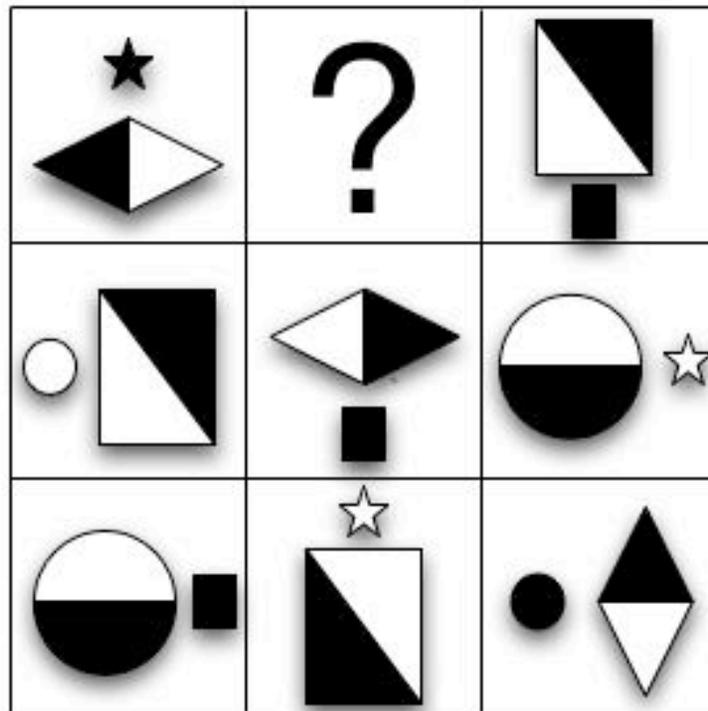
- Created 56 items
  - matrix like reasoning
  - number series
  - letter series
  - logic
  - vocabulary
  - basic math
  - general knowledge
- sampled 14 items/subject
- for subjects from US, asked for SAT/ACT
  - now asking for SAT V and SAT Q to examine sex differences

# 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 <input type="radio"/>	3 <input type="radio"/>	4 <input type="radio"/>	5 <input type="radio"/>	6 <input type="radio"/>	7 <input type="radio"/>
74.	If you rearrange the letters COBILOCR you will have the name of a:	Planet <input type="radio"/>	Fruit <input type="radio"/>	River <input type="radio"/>	Animal <input type="radio"/>	Vegetable <input type="radio"/>	Country <input type="radio"/>
75.	Please mark the word that does not match the other words:	Buenos Aires <input type="radio"/>	Melbourne <input type="radio"/>	Seattle <input type="radio"/>	Cairo <input type="radio"/>	Morocco <input type="radio"/>	Milan <input type="radio"/>
76.	If some pineapples are oranges and all apples are oranges, then some	TRUE <input type="radio"/>	FALSE <input type="radio"/>	Neither <input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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



78.

A



B



C



D



E



F



# 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

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

# Non-IQ items predict g

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

# Relating cognitive and non-cognitive personality

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

alpha reliabilities on diagonal, disattenuated correlations above diagonal

# Predicting Aptitude Tests

## Openness and Reasoning

	SAT	ACT	SATV	SATQ
$\beta$ Open	0.19	0.21	<b>0.31</b>	0.14
$\beta$ g	0.33	0.39	0.21	<b>0.35</b>
R	0.42	0.49	0.42	0.41
R <sup>2</sup>	0.18	0.24	0.18	0.17

# Gender, Education and Age

	gender	education	age
Conscientious	0.14	<b>0.20</b>	<b>0.21</b>
Agreeable	<b>0.25</b>	0.11	0.12
Neuroticism	<b>0.21</b>	-0.04	-0.10
Open	-0.11	0.17	0.12
Extraversion	0.06	0.00	0.00
gender	1.00	0.07	0.03
education	0.07	1.00	<b>0.44</b>
age	0.03	<b>0.44</b>	1.00
SAT	-0.08	0.03	-0.03
ACT	-0.02	0.16	0.12
SATV	0.02	0.09	0.04
SATQ	-0.13	0.06	0.00
g	-0.07	<b>0.29</b>	0.15
genderscale	<b>0.54</b>	0.04	0.01

# 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 (10-20 x faster development time)

# 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. Multiple “Handbooks” of Personality and Personality Research (e.g., Robbins, Fraley & Krueger, 2007)

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

