Psychology 360: Personality Research Approach Motivation- Beyond Extraversion

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Outline

Descriptive versus casual models
    Descriptions of Introversion-Extravesion

New Tools

States and Traits

Theory comparison and development

References

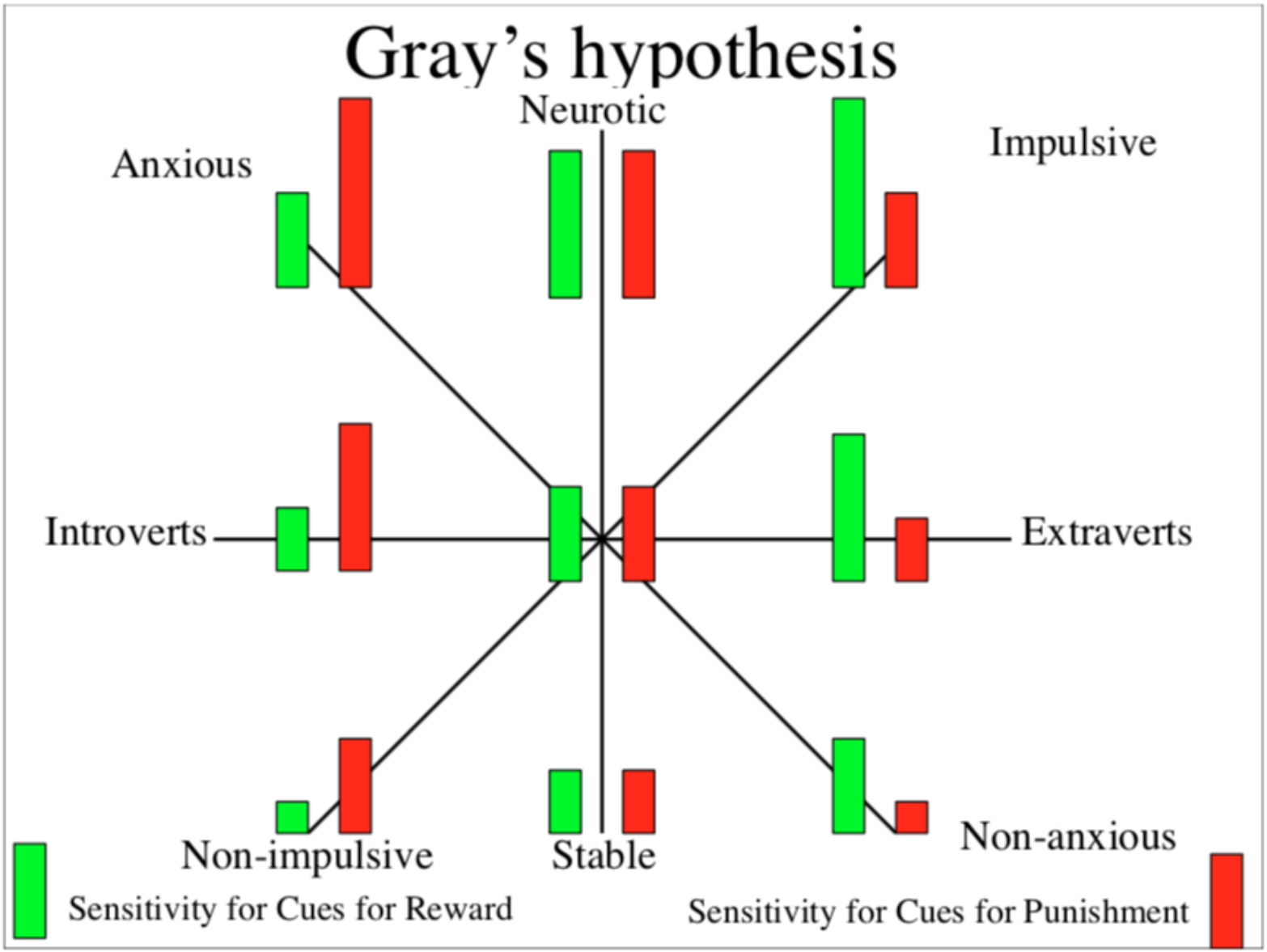
I/E

1. Simple descriptive basis
   - Self reports
   - Sociabile
   - Active
   - Impulsive
   - Spontaneous
2. Peer ratings
3. People who describe themselves as outgoing are more known to others.

Introversion/Extraversion as one dimension of affect/behavior space

1. As theory developed, the emphasis changed from Arousal to Positive Affect.
   - Basal differences in arousal could not explain diurnal rhythms
   - Why aren't Introverts extraverts at night?
2. Personality Trait description
   - Introversion/Extraversion
   - Neuroticism/Stability
3. Affective Space
   - Positive Affect
   - Negative Affect
4. Behavior
   - Approach
   - Avoidance

The Gray model



Personality and Emotions

The standard model

1. Dimensional model of personality
   Particularly Extraversion and Neuroticism
2. Dimensional model of emotions
   Positive Affect and Negative Affect
3. Dimensional congruence Extraversion and Positive Affectivity
   Neuroticism and Negative Affectivity

Dimensional analyses of personality

1. Descriptive
   Folk descriptive
   Natural language
2. Causal
   Biological mechanisms

Dimensional models of affect and emotion

1. “Primary” Emotions
   Fear
   Anger
   Joy
   Sadness
   Disgust
2. Secondary Emotions
   Shame
   guilt
3. Dimensional representations of primary emotions

Multiple Formulations of the measurement of Affect

1. Two dimensional models
   - Affective Valence and Arousal Russell (1980); Russell & Carroll (1999)
   - Positive and Negative Affect Watson, Clark & Tellegen (1988)
2. Multidimensional models
   - Pleasantness-unpleasantness, rest-activation, relaxation-attention Wundt (1904)
   - Energetic Arousal, Tense Arousal, and Hedonic Tone Matthews, Jones & Chamberlain (1990)
   - Hierarchical Models Tellegen, Watson & Clark (1999)

Measurng the dimensions of affect

1. Motivational state questionnaire (MSQ)
   - 70-72 items given as part of multiple studies on personality and cognitive performance Revelle & Anderson (1998)
   - Items taken from
     Thayer's Activation-Deactivation Adjective Checklist (ADACL)
     Watson and Clark Positive Affect Negative Affect Scale (PANAS)
     Larsen and Diener adjective circumplex
2. MSQ given before and after various mood manipulations
   Structural data is from before
3. Structural results based upon factor analyses of correlation matrix to best summarize data

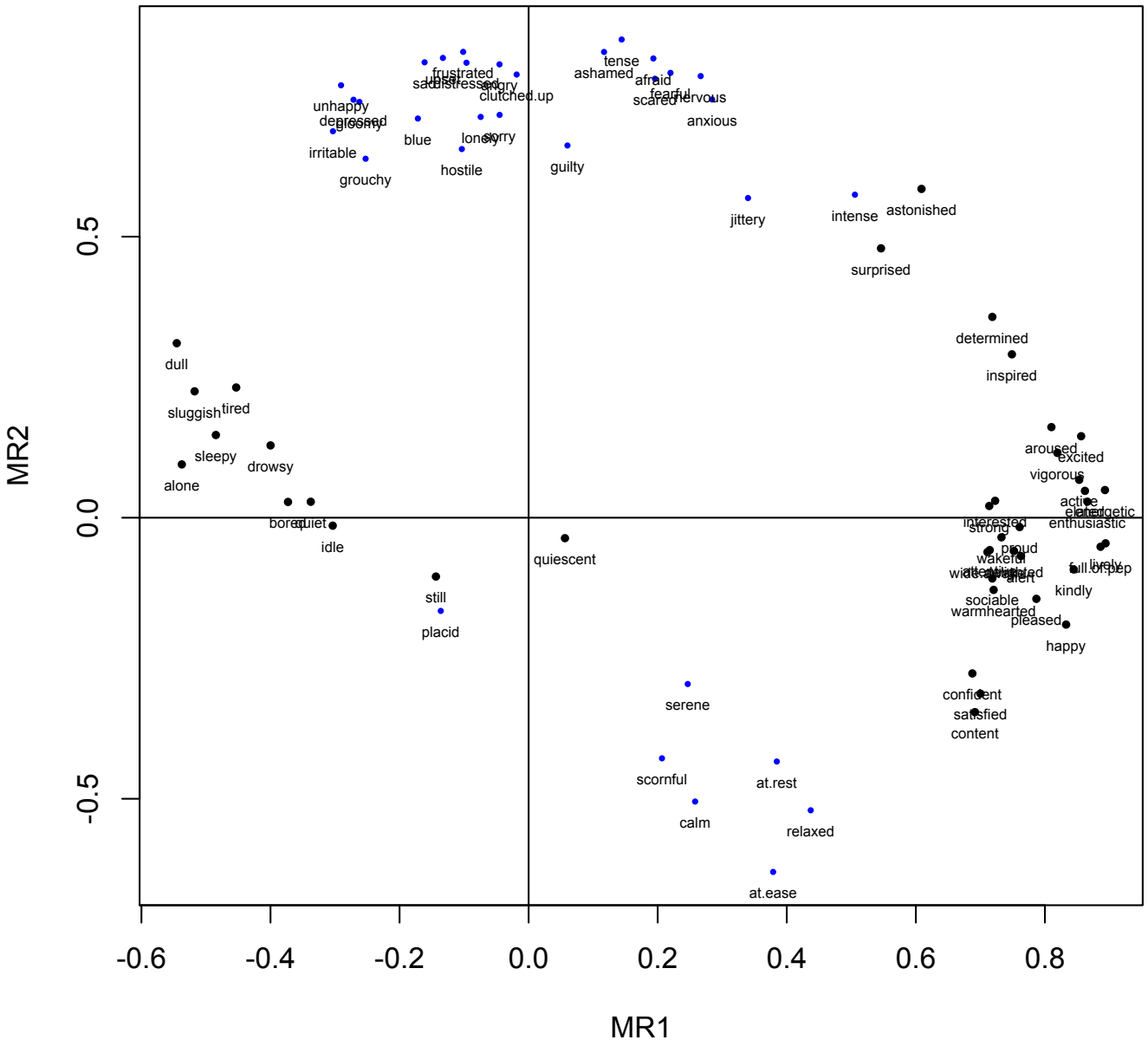
R code to produce the results

R code

```
f2 <- fa(msq[1:72],2)  #Ask for a two factor solution
#plot the factors with small text

fa.plot(f2,labels=colnames(msq[1:72]),cex=.5)
p2 <- polar(f2,sort=FALSE)  #convert to polar coordinates
#combine the loadings and the polar coordinates
f2p2 <- cbind(f2$loadings, p2)
f2p2 <- dfOrder(f2p2, 4]) #sort them by angle
df2Latex(f2p2)  #create the table
```

2 dimensions of the Motivational State Questionnaire



Representative MSQ items arranged by angular location

Variable	PA	NA	θ	Vector length
wide.awake	0.74	0.00	0.21	0.74
alert	0.76	0.01	1.01	0.76
full.of.pep	0.84	0.03	1.77	0.84
lively	0.86	0.03	2.14	0.86
energetic	0.86	0.04	2.89	0.86
elated	0.73	0.04	3.03	0.73
active	0.82	0.06	3.96	0.82
anxious	0.28	0.56	63.02	0.63
nervous	0.21	0.62	71.01	0.66
afraid	0.12	0.62	78.90	0.63
fearful	0.11	0.61	79.79	0.62
sad	-0.08	0.66	97.15	0.67
lonely	-0.09	0.52	99.93	0.53
blue	-0.14	0.63	102.66	0.65
unhappy	-0.17	0.68	103.78	0.70
depressed	-0.18	0.66	105.31	0.68
tired	-0.53	0.14	165.32	0.54
sleepy	-0.50	0.13	165.78	0.52
drowsy	-0.50	0.12	166.68	0.51
calm	0.08	-0.40	281.25	0.41
serene	0.10	-0.33	287.11	0.34
relaxed	0.21	-0.44	295.22	0.49
at.ease	0.29	-0.45	302.64	0.54
at.rest	0.20	-0.31	302.84	0.37
content	0.54	-0.36	326.45	0.64
satisfied	0.58	-0.27	335.30	0.64
warmhearted	0.57	-0.18	342.37	0.60
happy	0.71	-0.23	342.42	0.75
attentive	0.72	-0.02	358.53	0.72
enthusiastic	0.80	-0.01	359.12	0.80

Personality and Emotions

Standard model

1. Dimensional model of personality
   Behavioral Activation/Approach $< - >$ Extraversion
   Behavioral Inhibition$< - >$Neuroticism
2. Dimensional model of Emotions
   Positive Affect
   Negative Affect
   Arousal?
3. Dimensional congruence
   Extraversion, Approach, and Positive Affectivity
   Neuroticism, Inhibition, and Negative Affectivity
4. Experimental Manipulations of mood between subjects
   - Movies, music, short vignettes

Science and instrumentation

1. Many of the leaps in science followed changes in instrumentation
2. Telescopes and theories of the universe
   Galileo /Newton
3. Ships allowed for larger sample frames
   Darwin/Wallace
4. Sonar showed variation in ocean sea floor
5. Satellite imaging of earth “removes” the water
   Radio Astronomy theories of big bang

Taking advantage of newer technologies in psychology

Much of science advances when the instruments change

1. computers
   reaction time
   Average evoked potentials
2. Imagining by combining multiple signals
   MRI/PET/CAT/MEG
3. Ambulatory assessment using PDA/cell phones
   computer programs to analyze complex data sets

Personality Measurement: snapshot or movie?

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

Personality and affect: within subject measurements

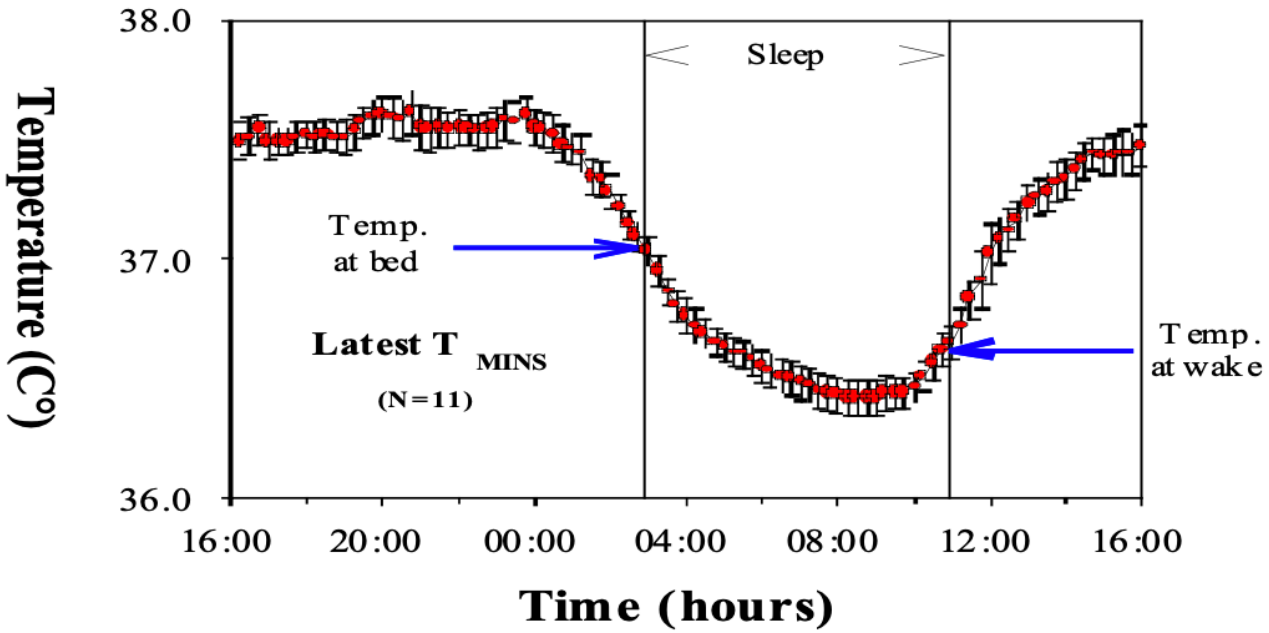
1. High frequency sampling: the example of body temperature
2. Low frequency sampling: daily diaries & Palm Pilot sampling of affect
3. Replacing Palm Pilots with cell phone
   - text messaging (Wilt, Funkhouser & Revelle, 2011)
   - smart phone questionnaires (Wilt, Bleidorn & Revelle, 2016a,b)

Within subject diary studies

Very high frequency (continuous) measurements

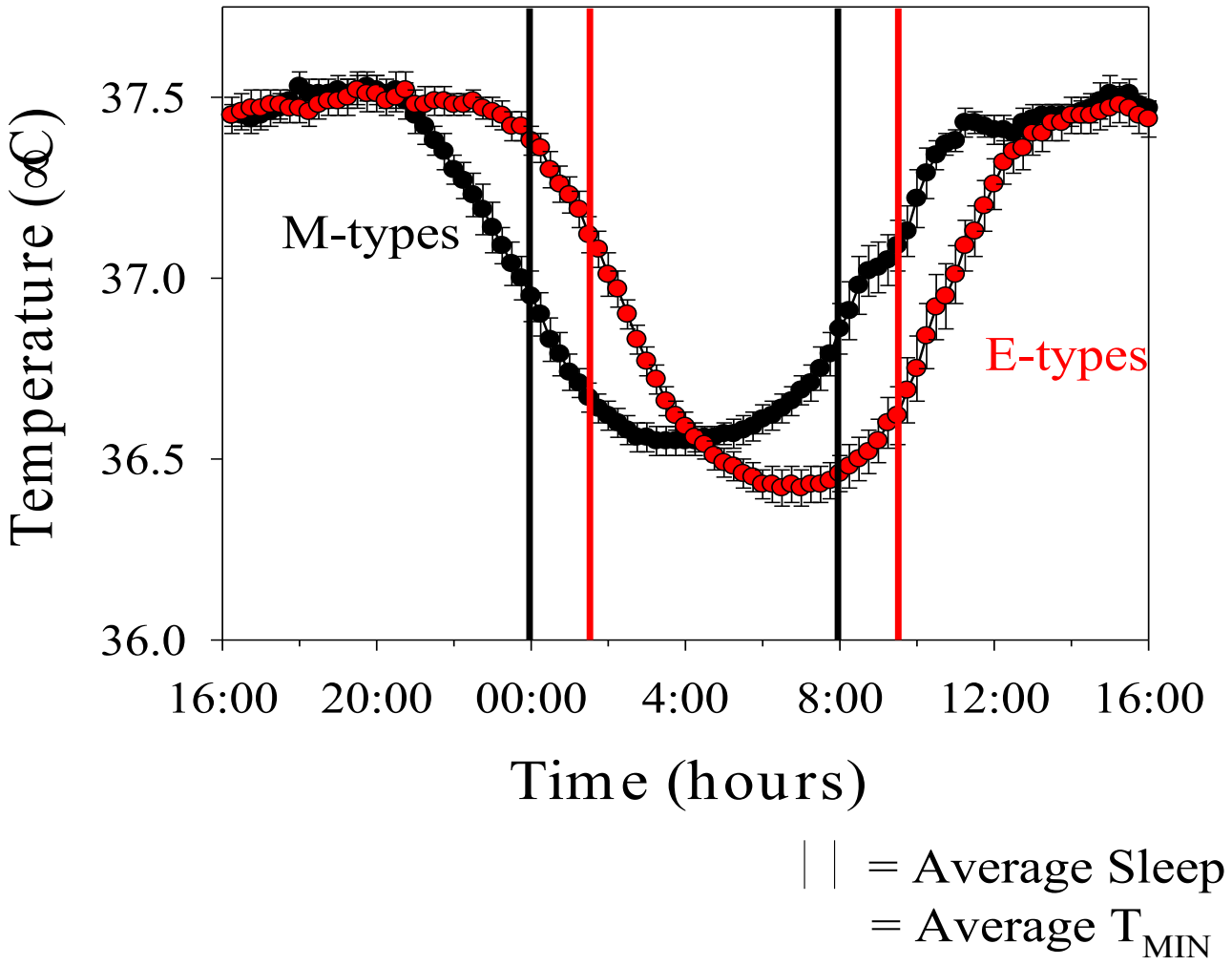
1. The big EAR Mehl, Pennebaker, Crow, Dabbs & Price (2001); Mehl & Pennebaker (2003); Mehl, Gosling & Pennebaker (2006); Mehl & Robbins (2012)
2. Physiological assays
   Cortisol (sampled multiple times per day)
   Body temperature
   - Core body temperature collected for $\approx$ 2 weeks
   - Data taken by aggregating subjects from multiple studies conducted by Eastman and Baehr on phase shifting by light and exercise

Body temperature over the day



Baehr, Revelle & Eastman (2000)

Individual differences in temperature over the day



Baehr et al. (2000)

Within subject diary studies-2

1. Measures
   Check lists
   Rating scales
2. High frequency sampling ¡–
   Multiple samples per day
   Low frequency sampling
   Once a day e.g., Fisher (2015) studies of mood
3. Sometimes at different times

High frequency measures of affect

1. Measures taken every 3 hours during waking day for 6-14 days
2. Paper and pencil mood ratings
   Short form of the MSQ
   Visual Analog Scale – Sampled every 3 hours
3. Portable computer (Palm) mood ratings (now cell phones)¡– –
   Short form of the MSQ
   Sampled every 3 hours

Traditional measures

1. Mean level
   Energetic arousal
   Tense arousal
   Positive affect
   Negative affect
2. Variability
3. Correlation across measures (Synchrony) Rogers & Revelle (1998); Rafaeli, Rogers & Revelle (2007)
   Mixed emotions

Phasic measures of affect

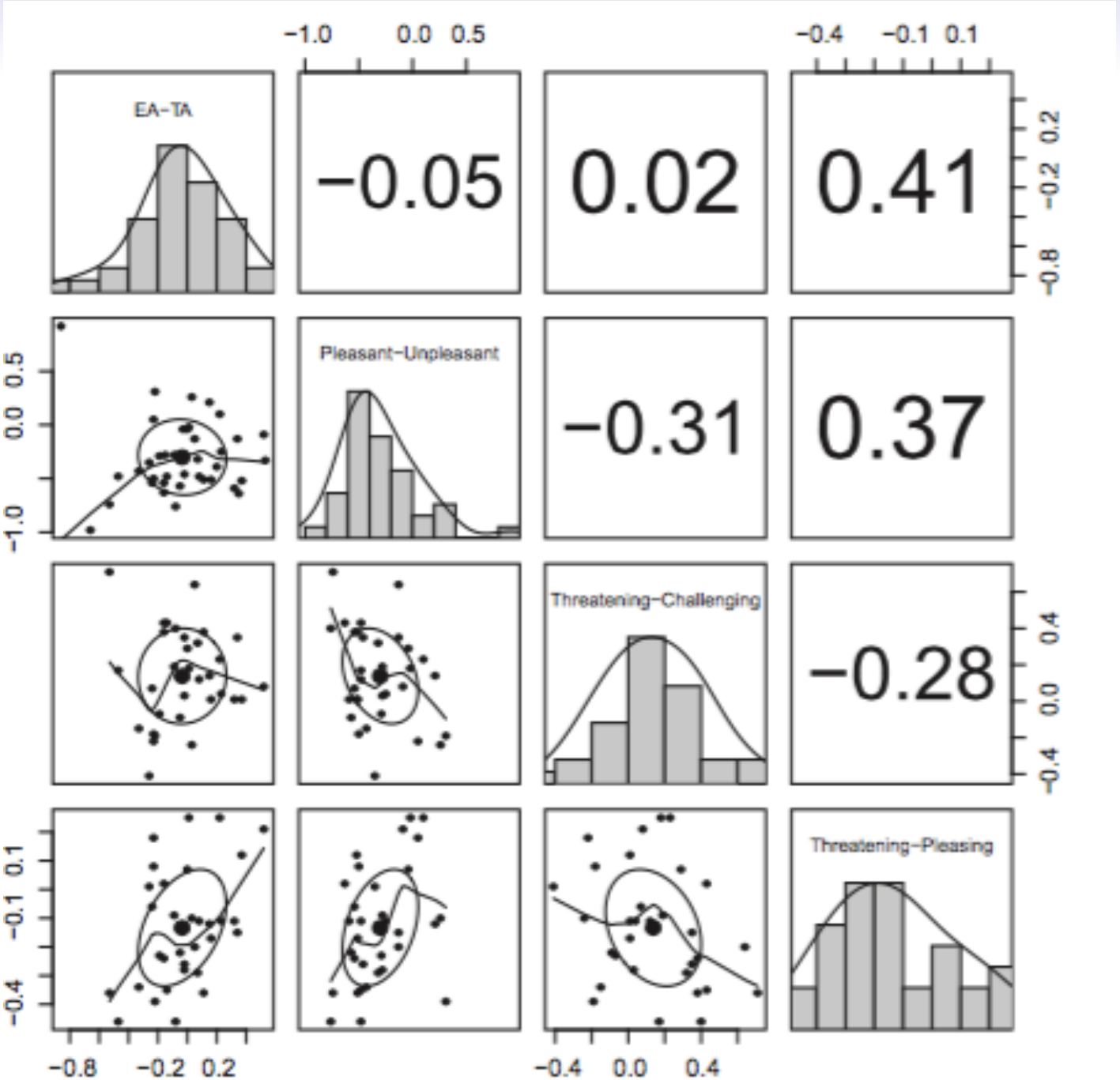
1. Fit 24 hour cosine to data
   Iterative fit for best fitting cosine
   Permutation test of significance of fit
2. Measure
   Fit (coherence)
   Amplitude
   Phase

Affective rhythms and cognitive performance-1

1. Design:High frequency diary study of affect combined with a low frequency study of reaction time
2. Subjects: 28 NU undergraduate volunteers
3. Method:
   1 week diary study 5 times a day
   Simple reaction time once a day at 5 different times using a Mac program at home
4. Low negative correlations of RT with concurrent measures of Energetic Arousal
5. Stronger negative correlations of RT with Cosine fitted Energetic Arousal
   $=>$Diurnal variation in RT may be fitted by immediate and patterns of arousal

Affective synchrony and personality

1. Cell phone: text messaging study
   The Dynamic Relationships of Affective Synchrony to Perceptions of Situations Wilt et al. (2011)
2. Measure energetic arousal and tension within subjects across days
3. Find the within subject correlation of EA and TA
4. Correlate this correlation with how people view the situation


EA−TA
−0.05
0.02
0.41
Pleasant−Unpleasant
−0.31
0.37
Threatening−Challenging
−0.28
Threatening−Pleasing
−1.0 0.0 0.5
−0.4 −0.1 0.1
−0.8 −0.2 0.2
−0.4 0.0 0.4

State Extraversion and State PA

1. A number of studies by Will Fleeson and his colleagues have examined the distribution of behaviors and affect
2. Fleeson (2001); Fleeson, Malanos & Achille (2002); Fleeson (2007)
3. The claim is that it is the distribution of current states that we need to examine (Fleeson, 2001).
4. Acting extraverted leads to positive affect.
5. Larsen & Ketelaar (1989) examined sensitivity to positive and negative mood inductions.

But perhaps not sensitivity to reward much as cues for reward

1. The “Larsen Effect” of extraversion, reward and positive affect is a now you see it, now you don’t effect.
2. Luke Smillie and his colleagues examined the conditions of the relationship (Smillie, Cooper, Wilt & Revelle, 2012; Smillie, Geaney, Wilt, Cooper & Revelle, 2013)
3. Extraversion relates to positive affect when doing something leads to reward.

Predicting individual differences in performance under stress

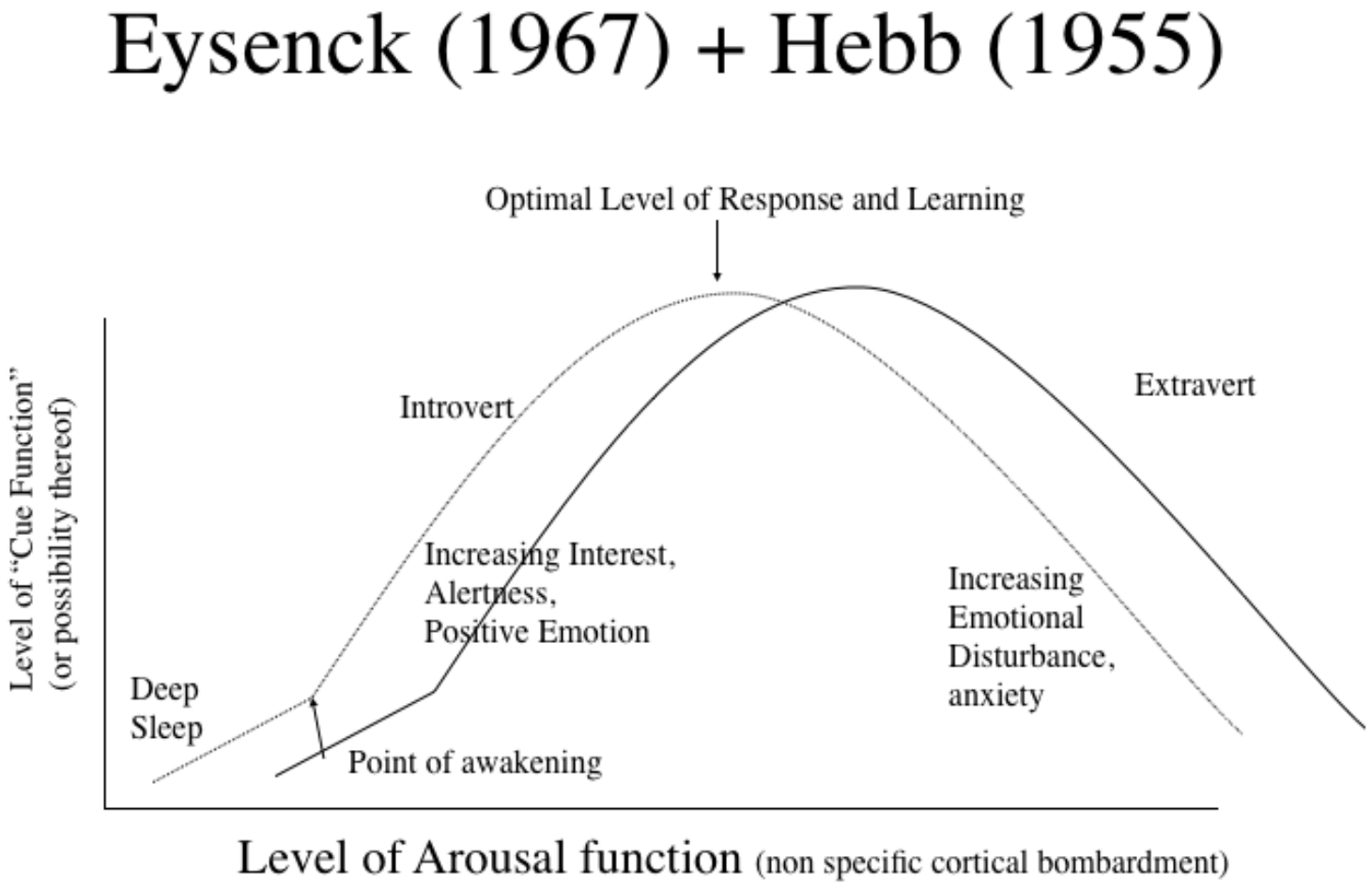


Figure: From Eysenck (1967)

Confirmation experiment $\neq$ theory testing: The example of caffeine by extraversion

1. Basic hypothesis
   - Introverts are more aroused than extraverts Eysenck (1967)
   - Caffeine or time stress will increase arousal
   - Performance is a curvilinear function of arousal (Yerkes & Dodson, 1908; Hebb, 1955; Easterbrook, 1959; Broadbent, 1971)
2. Revelle, Amaral & Turriff (1976)
   - I-E measured with Eysenck Personality Inventory
   - caffeine given as placebo or 200 mg in capsule
   - Performance on practice Graduate Record Exams (GRE), reported in standardized scores
3. Predictions
   - Introverts $>$ extraverts in relaxed condition
   - Introverts $<$ extraverts with time pressure and caffeine

Caffeine and time stress on complex performance

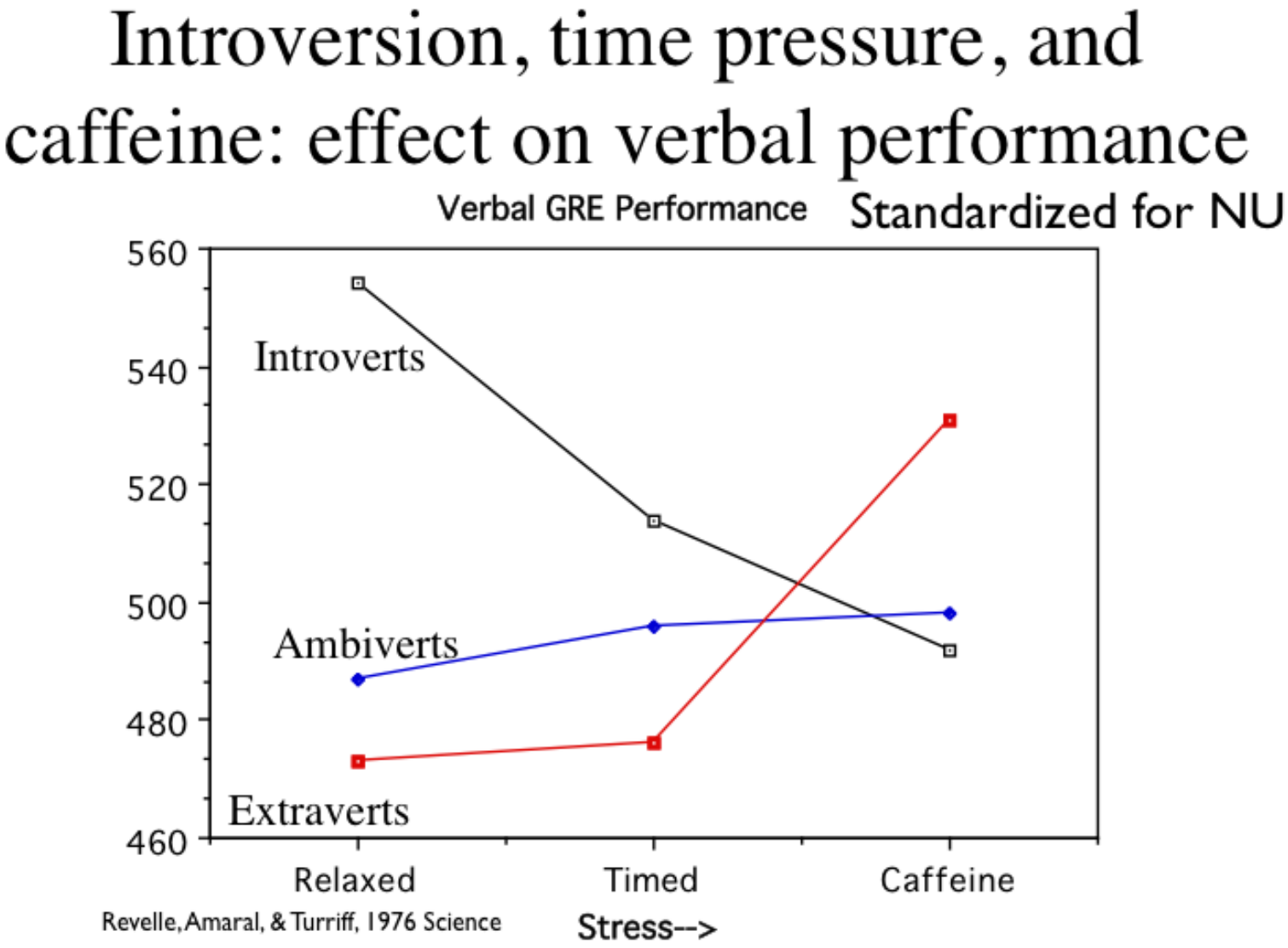


Figure: Revelle et al. (1976)

Failures to replicate lead to theory improvement: The discovery of the imp/soc distinction

Failures to replicate can lead to better science for they show the limits of an effect.

1. Kirby Gilliland (1976) failed to replicate the Revelle et al. (1976) effect
   - A better study, caffeine was dosed by body weight and had 3 levels of caffeine
   - Used the Eysenck Personality Questionnaire (EPQ) instead of Eysenck Personality Inventory (EPI)
   - Failed to find the same results
2. Did replicate the results when using the EPI (Gilliland, 1980)
3. What was the difference?

Gilliland's dissertation results did not replicate Revelle et al. (1976)

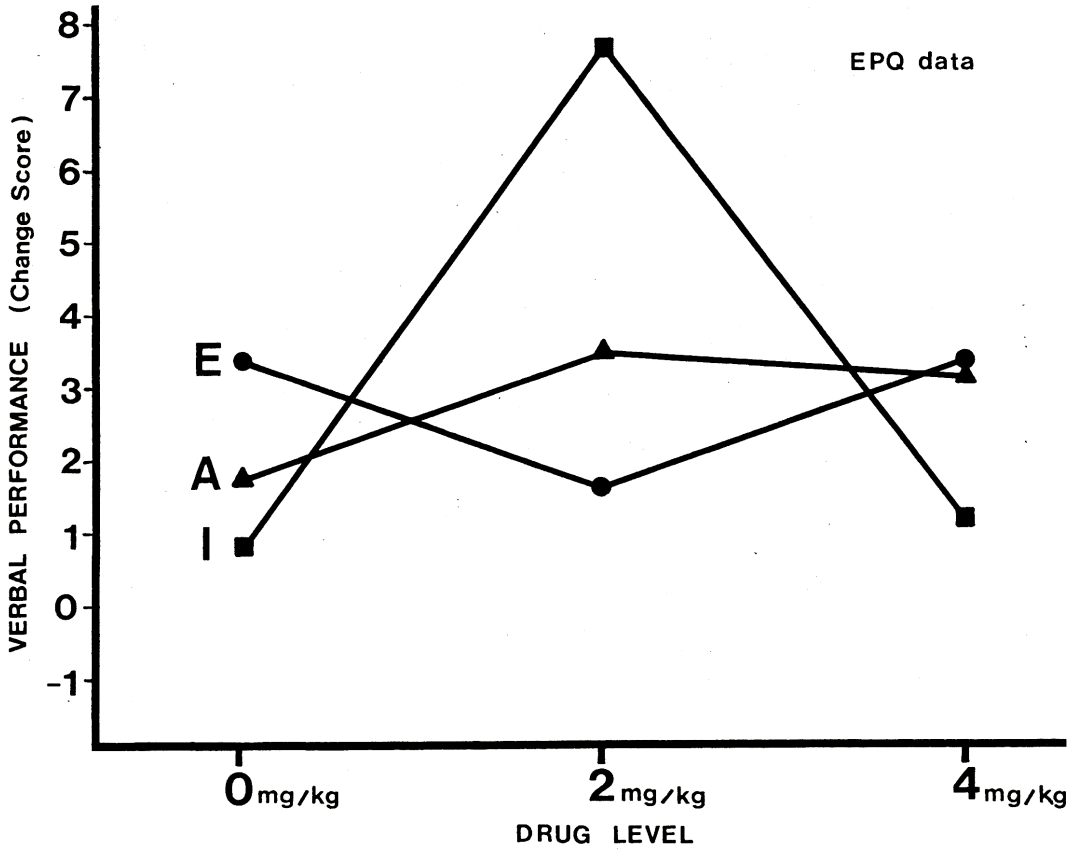


Figure 8. EPQ based group means for change in number of items correctly answered on GRE practice tests.

26

Figure: From Gilliland (1976)

Gilliland (1980) replicated (Revelle et al., 1976) when using EPI.

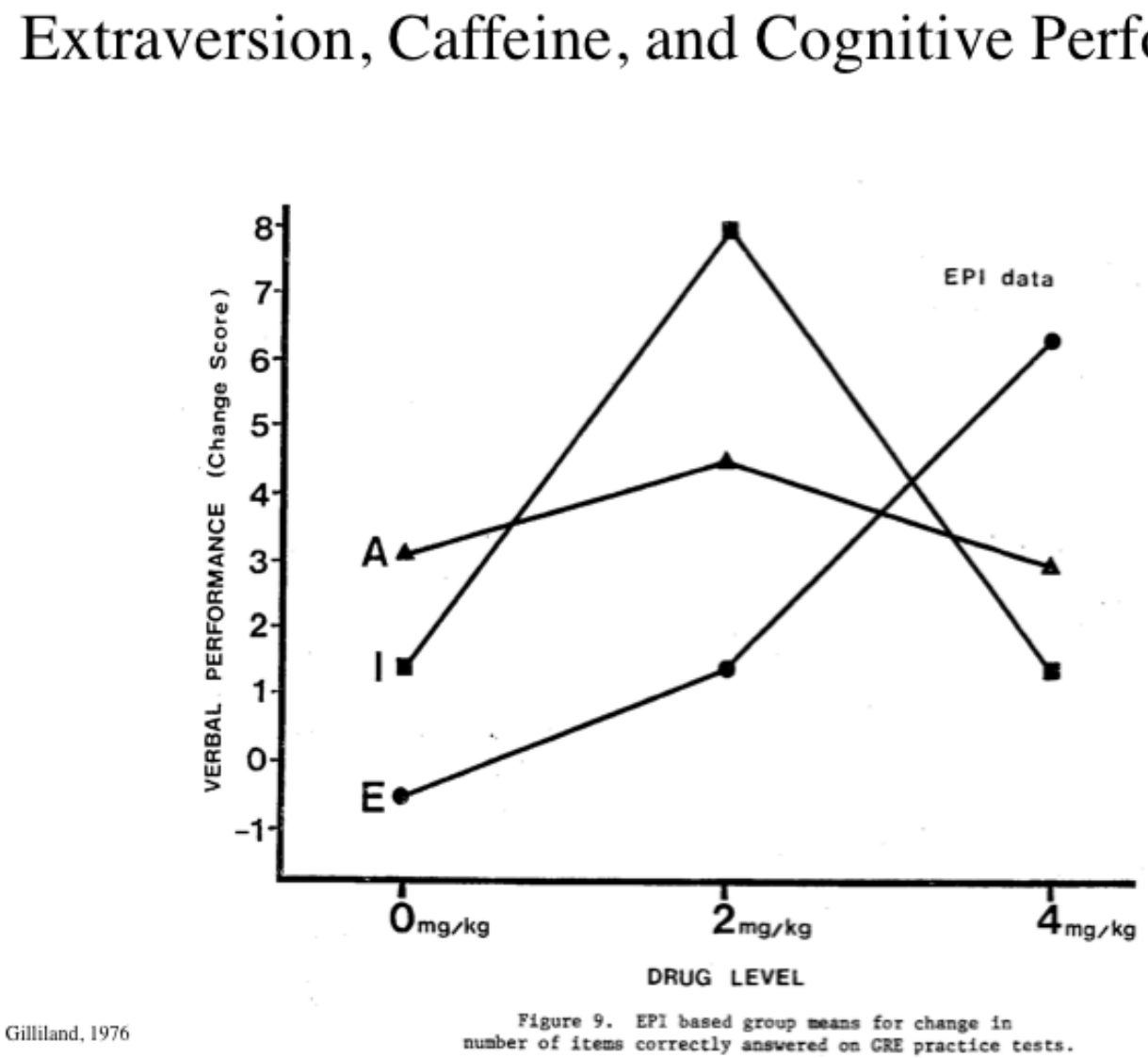


Figure: From Gilliland, K. (1980). The interactive effect of introversion-extraversion with caffeine induced arousal on verbal performance. Journal of Research in Personality, 14(4), 482–492.

Using psychometrics to explain experimental results: Rocklin & Revelle (1981)

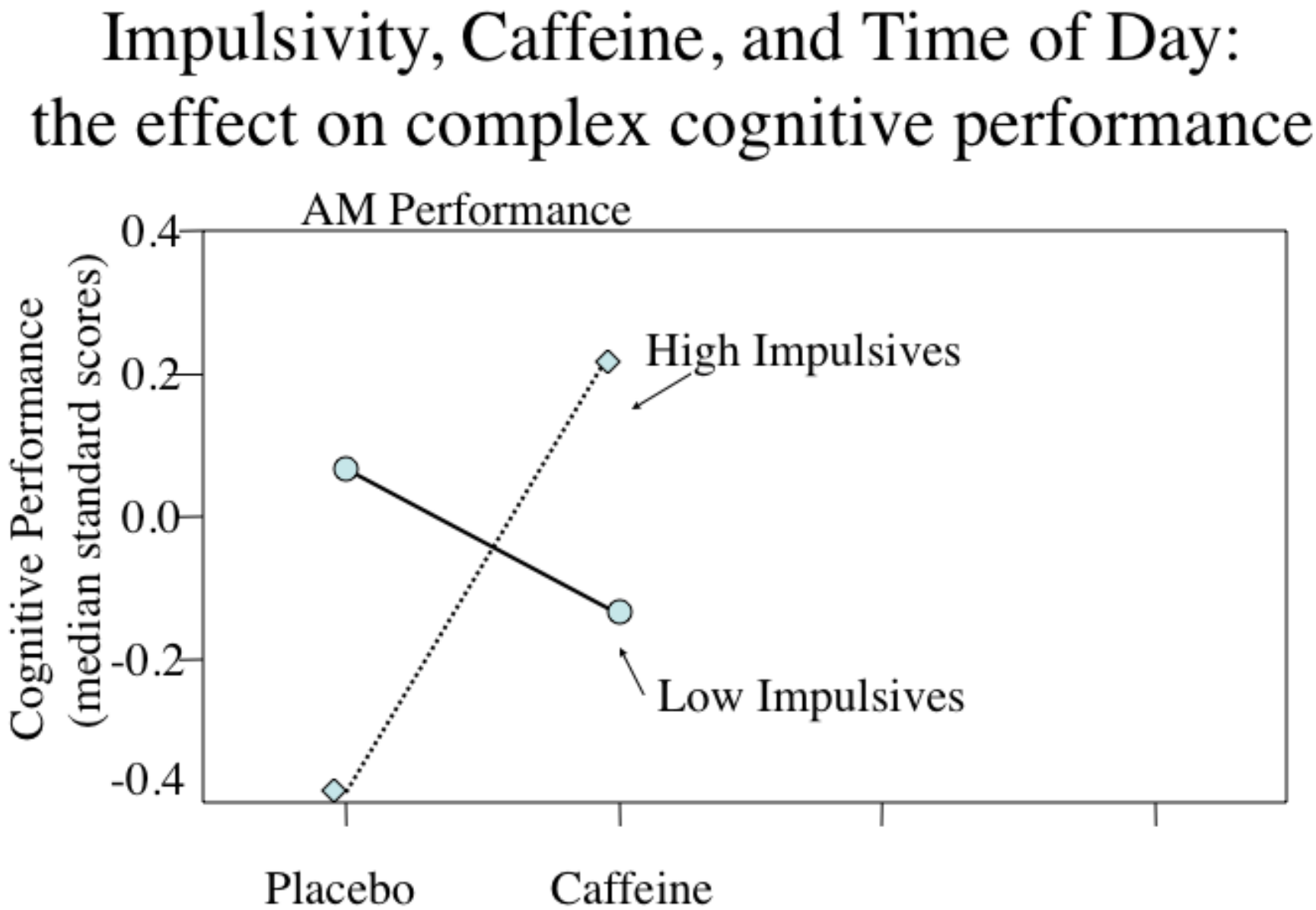
1. Eysenck Personality Inventory
   - Extraversion
   - Neuroticism
2. The new and improved Eysenck Personality Questionnaire
   - Extraversion
   - Neuroticism
   - Psychoticism
3. Cross form correlations were high for E (.74) and N (.83)
4. Structure was completely different for the two Extraversion scales
   - Number of factors determined by the Very Simple Structure criterion (Revelle & Rocklin, 1979)
   - 2 primary factors of EPI E (sociability and impulsivity)
   - one factor for EPQ E
5. This led to a small cottage industry of replications using EPI instead of EPQ (e.g., Campbell, 1983; Campbell & Heller, 1987).

Theory testing and rejecting by finding limiting cases

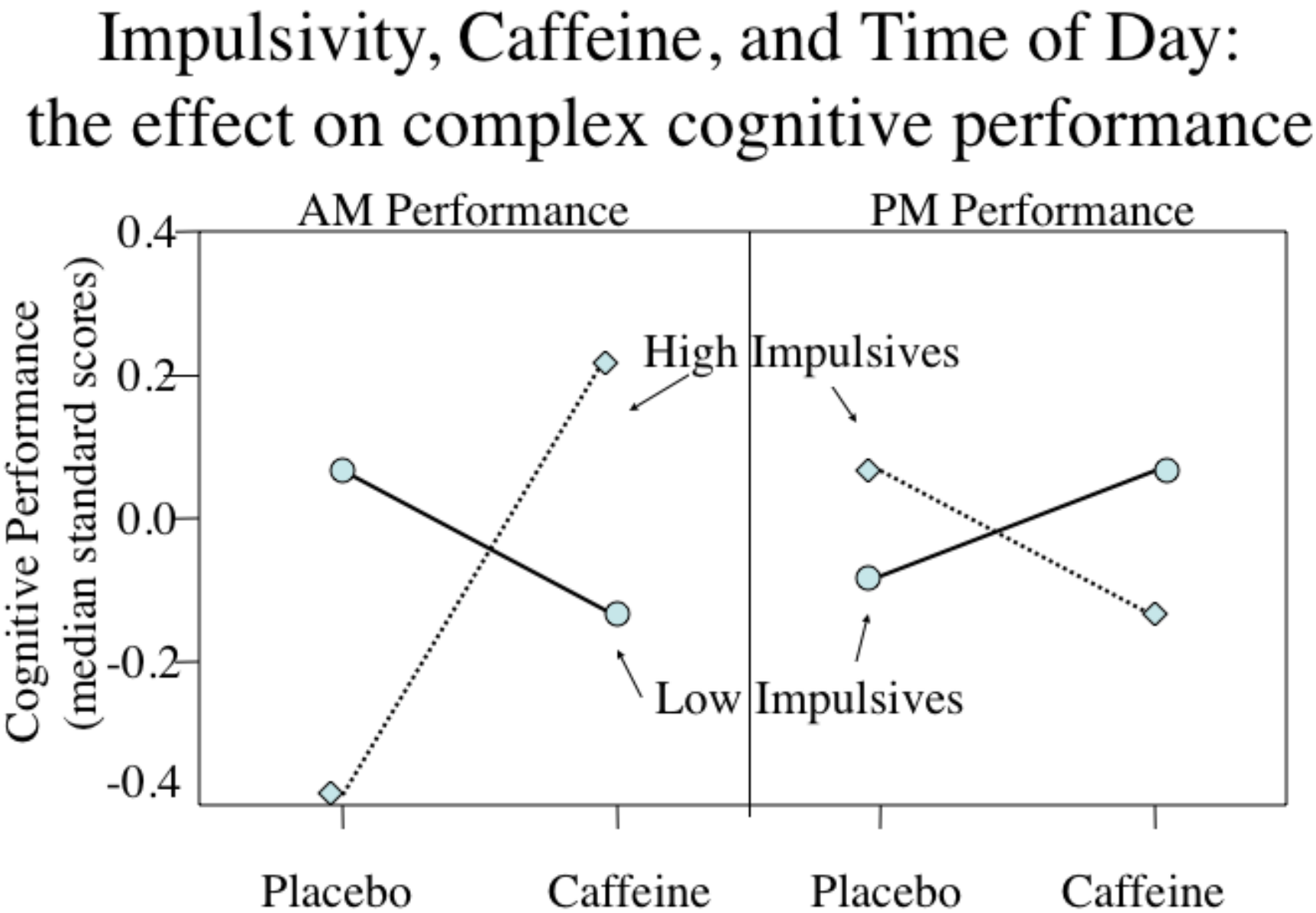
1. Over three years, we could replicate the Revelle et al. (1976) study about half the time.
   - We tested many different explanations, none worked.
   - Had varied time of day because we thought everyone would be more aroused later in the day. That is we hypothesized
     - $E < I$
     - $am < pm$
     - $placebo < caffeine$
2. Eventually we found a consistent interaction of Imp x drug x Time if we assumed an inverted U relationship of arousal and performance and
   - $E_{am} < I_{am}$
   - $I_{pm} < E_{pm}$
   - $placebo < caffeine$

Revelle, W., Humphreys, M. S., Simon, L., & Gilliland, K. (1980). Interactive effect of personality, time of day, and caffeine: A test of the arousal model. Journal of Experimental Psychology General, 109(1), 1–31.

Theory testing by rejection: The example of time of day x caffeine



Theory testing by rejection: The example of time of day x caffeine

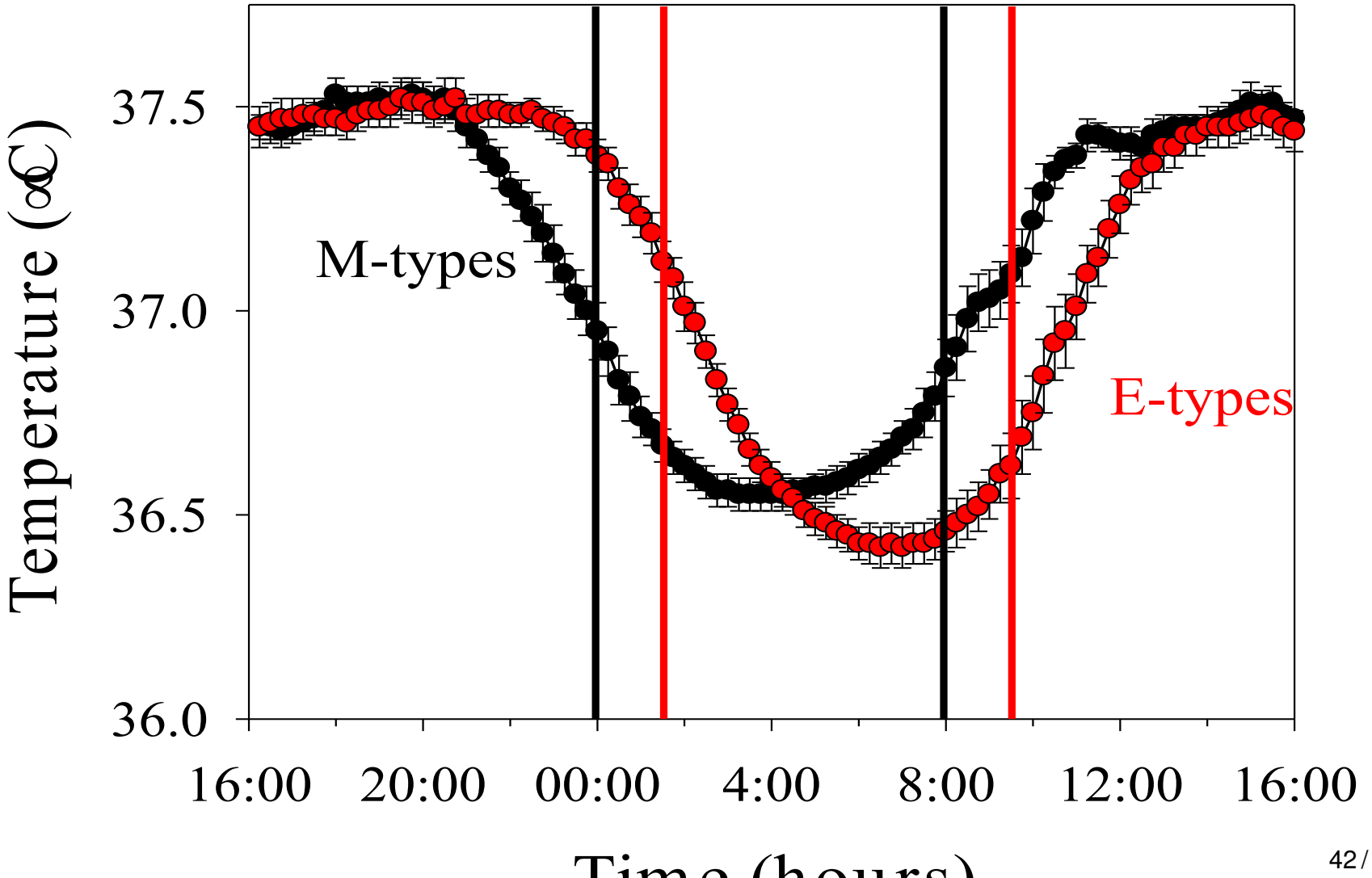


Using experimental data for correlational analysis: body temperature and personality

1. Charmane Eastman had examined core body temperature over two weeks to study the effects of shift work.
   - Multiple, small experimental studies
   - Each study had included measures (MMPI-2) that could be interpreted as impulsivity.
   - Each study included measures of morningness-eveningness.
2. Erin Baehr synthesized these studies to examine individual differences in body temperature.
   - We also measured average bed time and average rise time for all subjects.
   - Acrophase of Body Temperature differed more than differences in behavior (biology meets society)
3. Although we plot the data in terms of Morningness/Eveningness, somewhat weaker results were true for impulsivity (Baehr et al., 2000).

Baehr, E. K., Revelle, W., & Eastman, C. I. (2000). Individual differences in the phase and amplitude of the human circadian temperature rhythm: with an emphasis on morningness-eveningness. Journal of Sleep Research, 9(2), 117–127.

Biology meets society – time of day and morningness/eveningness



Theory development by integrating multiple alternative theories

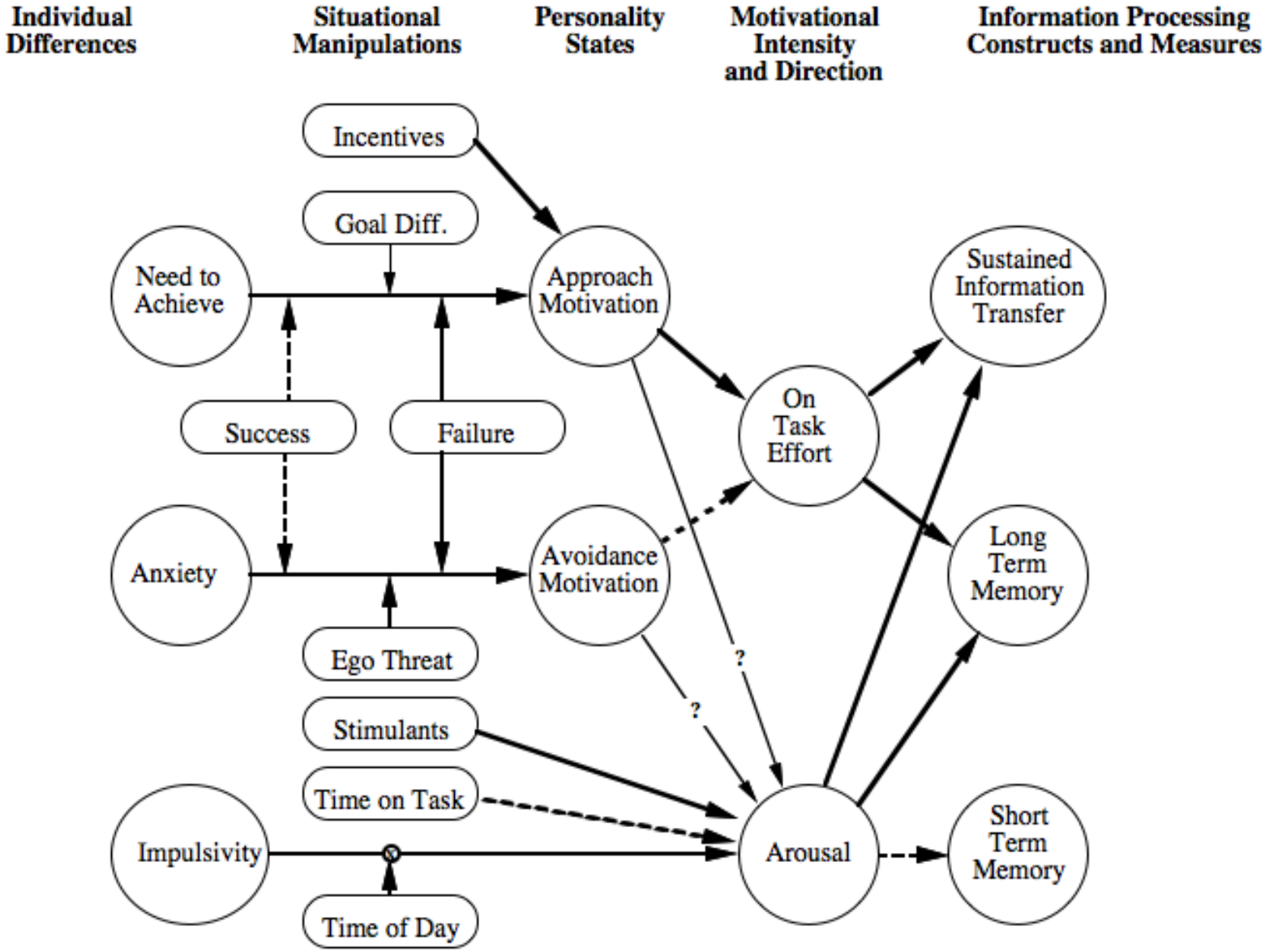
Multiple theories about personality and efficient performance

1. H.J. Eysenck (1967) and arousal theory
   - Introverts more aroused than Extraverts
   - Arousal has an inverted U relationship to performance
2. J.W. Atkinson (1957, 1974) and achievement motivation theory
   - High need achievement and low test anxiety lead to high motivation (Atkinson, 1957)
   - Motivation has inverted U relationship to performance (Atkinson, 1974)
   - Motivation has inertial properties (Atkinson & Birch, 1970; Revelle & Michaels, 1976; Revelle, 1986)
3. Theories of anxiety and cognitive performance
   - Anxiety and task difficulty (Spence, Farber & McFann, 1956)
   - Anxiety and working memory (Eysenck & Mathews, 1987; Eysenck, Derakshan, Santos & Calvo, 2007; Eysenck, 2000)
   - Anxiety and resource allocation (Wine, 1971)
4. Easterbrook (1959) and the Yerkes & Dodson (1908) "law"

Integrating multiple theories of performance: Humphreys & Revelle (1984)

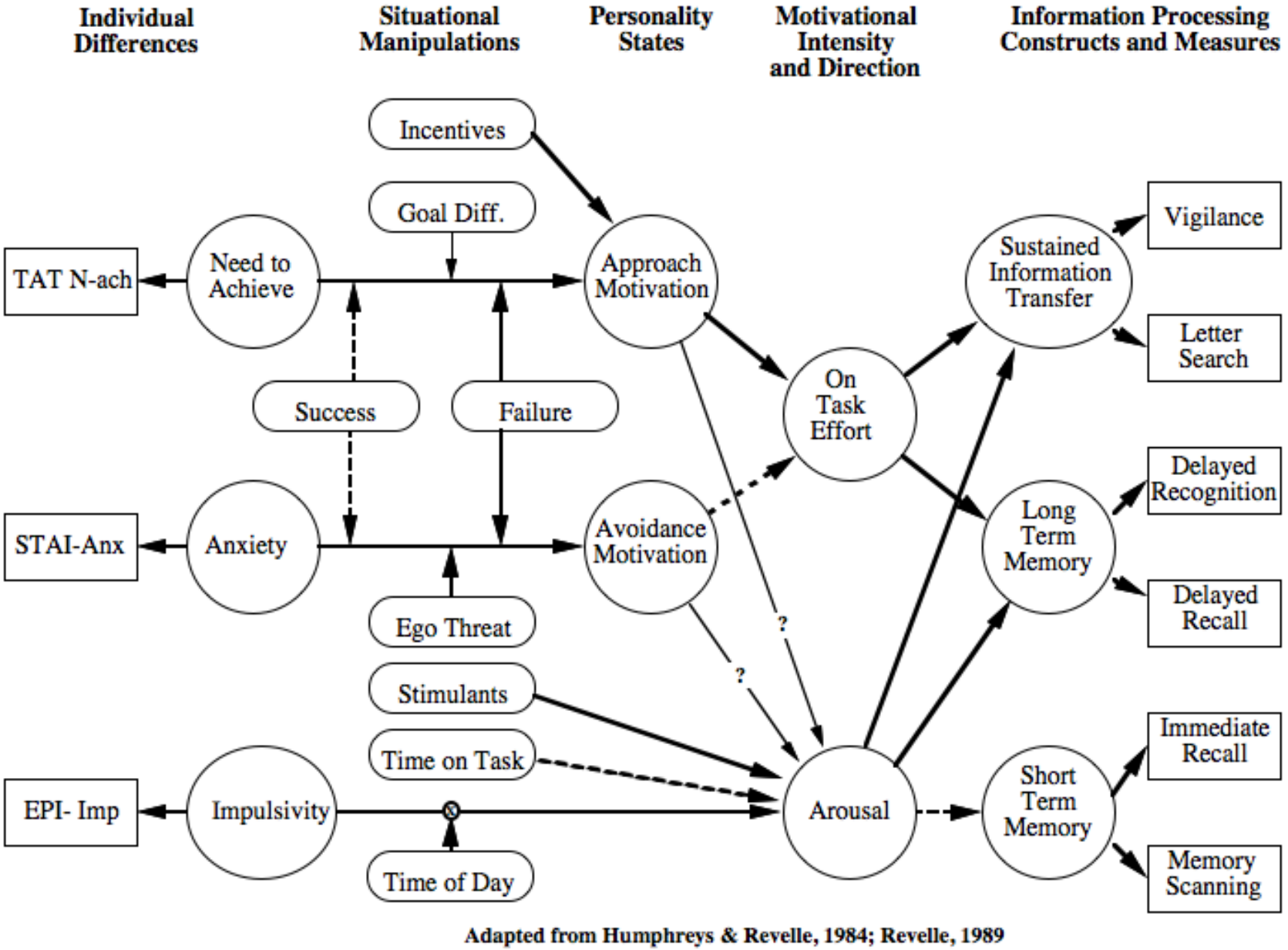
1. Multiple dimensions of personality relating to efficient cognitive performance
   - Introversion/Extraversion – Impulsivity
   - Anxiety (not just neuroticism)
   - Achievement motivation
2. Decomposing motivation
   - Arousal
   - Effort
3. Decomposing Performance
   - Attention tasks
   - Short term (working) memory tasks
   - Complex tasks that reflect some mixture of attention and memory

A "simple" model of personality and performance



Adapted from Humphreys & Revelle, 1984; Revelle, 1989

Personality, Motivation, and Cognitive Performance



Adapted from Humphreys & Revelle, 1984; Revelle, 1989

Theory testing by critical comparisons

1. Theories differ in breadth and depth
   - Many theories are silent for some phenomenon
   - Some sets of theories are mutually compatible, but with different range

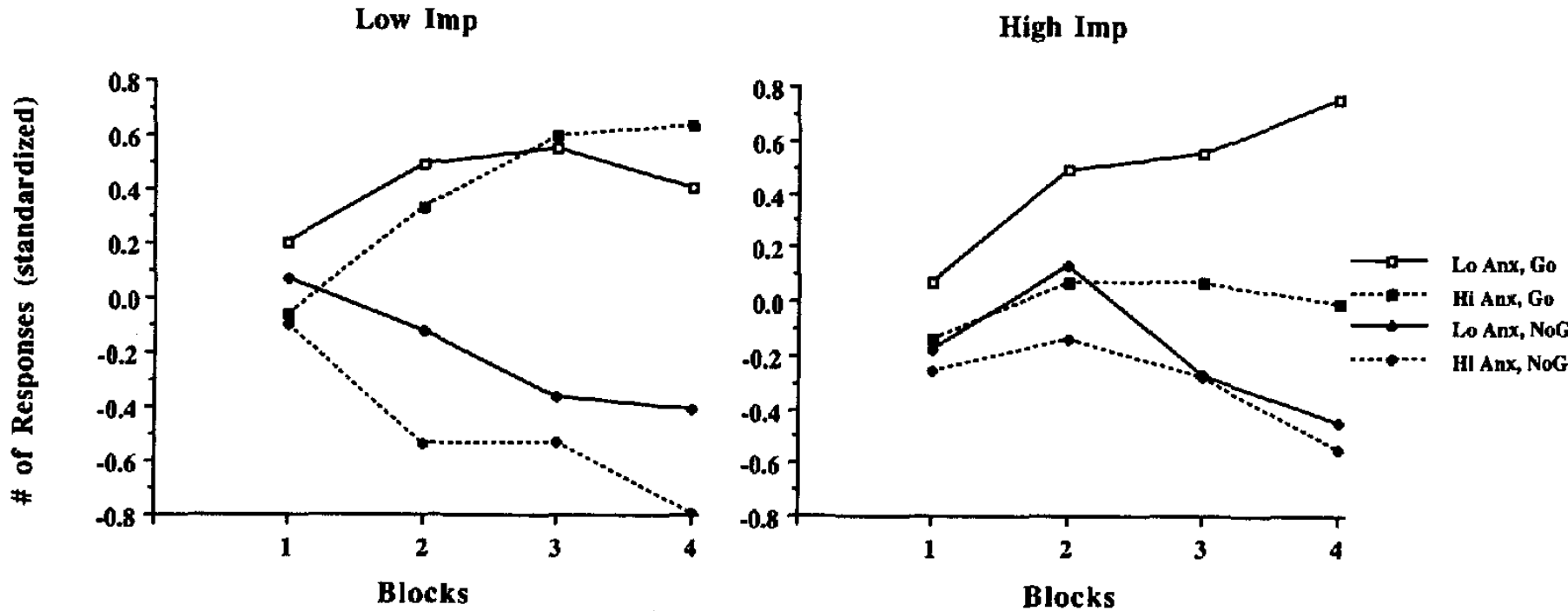
Phenomenon	Theory 1	Theory 2	Theory 3	Theory 4
A	+	+	+	+
B	+	+		+
C	+		+	+
D		+	+	
E	+	-	0	
F	0	+		

2. We test alternative theories by looking for where they make different predictions.
3. It is not enough to disconfirm a theory, we must show better alternatives.

Testing four models of conditioning: Zinbarg & Revelle (1989)

1. Drive Theory (Hull, 1943; Spence, 1964)
   - Anxiety and performance (Spence et al., 1956) but see Weiner & Schneider (1971)
2. Eysenck (1967); Eysenck & Eysenck (1985) specify the variables that affect conditioning:
   - Partial reinforcement
   - weak conditioned stimuli
   - discrimination learning
3. Impulsivity and cues for reward, anxiety and cues for punishment Gray (1981)
4. Extravert's focus on reward blinds them to punishment Newman, Widom & Nathan (1985); Patterson, Kosson & Newman (1987)

Zinbarg & Revelle (1989) used a go-nogo discrimination task



Reliable anxiety x impulsivity x Cue type interactions across four studies. Results not directly supportive of any of the four theories but suggested a revision of the Gray model. From Zinbarg, R. E. & Revelle, W. (1989). Personality and conditioning: A test of four models. Journal of Personality and Social Psychology, 57(2), 301-314.

Tests of competing theories of anxiety and information processing
Leon & Revelle (1985)

How does anxiety affect performance?

1. Anxiety interacts with task difficulty Spence et al. (1956)
   - But see Weiner & Schneider (1971)
2. Anxiety limits working memory capacity Eysenck & Mathews (1987); Eysenck et al. (2007); Eysenck (2000)
3. Anxiety narrows the breadth of attention Easterbrook (1959)
4. Anxiety leads to off task thoughts Wine (1971)

Leon, M. R. & Revelle, W. (1985). Effects of anxiety on analogical reasoning: A test of three theoretical models. Journal of Personality and Social Psychology, 49(5), 1302-1315.

Geometric analogies differing in memory load (transformations) and complexity (number of elements)

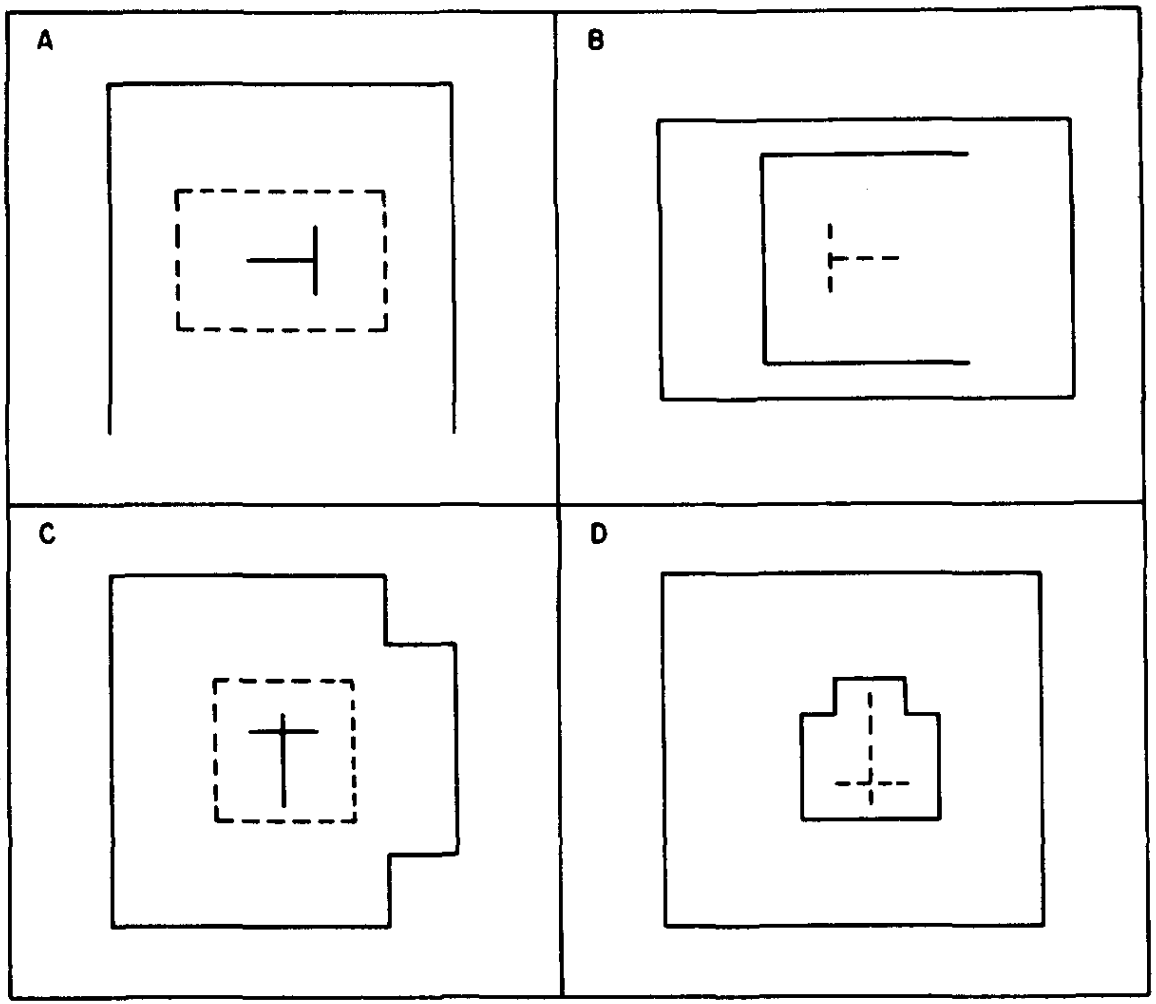


Figure 1. Sample 3-element two-transformation analogy problem.

Memory load, stress and anxiety Leon & Revelle (1985)

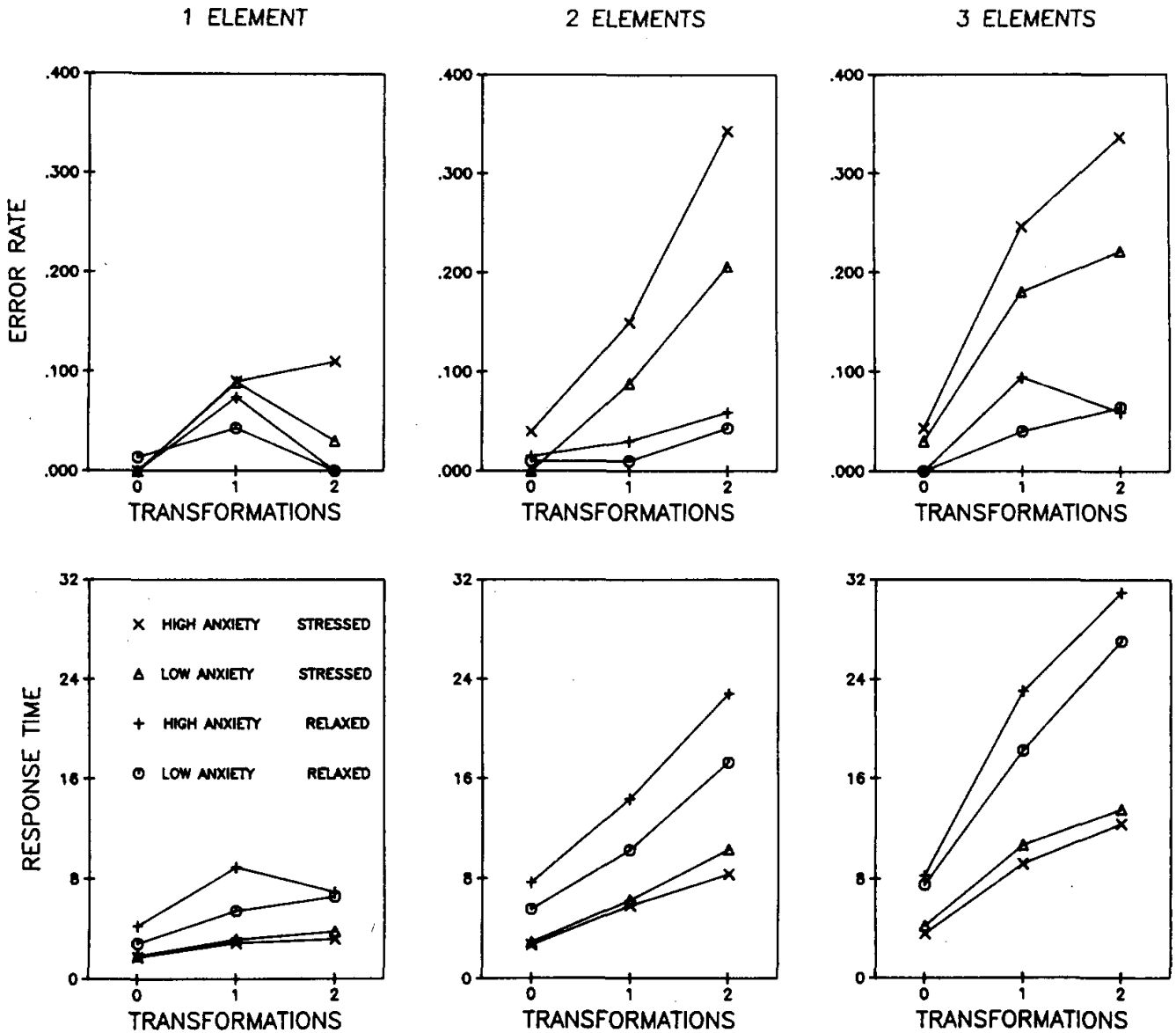


Figure 3. Error rates and response times for true analogies. (Error rates are calculated for all true analogies. Response times are calculated for true analogies that were solved correctly.)

Integrating cognitive theory with personality theory: Impulsivity, arousal and breadth of processing

1. Strong theories make testable predictions and theory develops by testing these predictions. Who is better able to test one's theories than oneself?

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2. Anderson & Revelle (1994) examined sustained performance on a recognition memory task to test the hypothesis that high trait impulsives were consistently faster to suffer from a decay in arousal than low trait impulsives.
3. We examined this effect at two times of day and unexpectedly found a time of day by impulsivity interaction.

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3. We examined this effect at two times of day and unexpectedly found a time of day by impulsivity interaction.
4. But science advances by disconfirmation as well:

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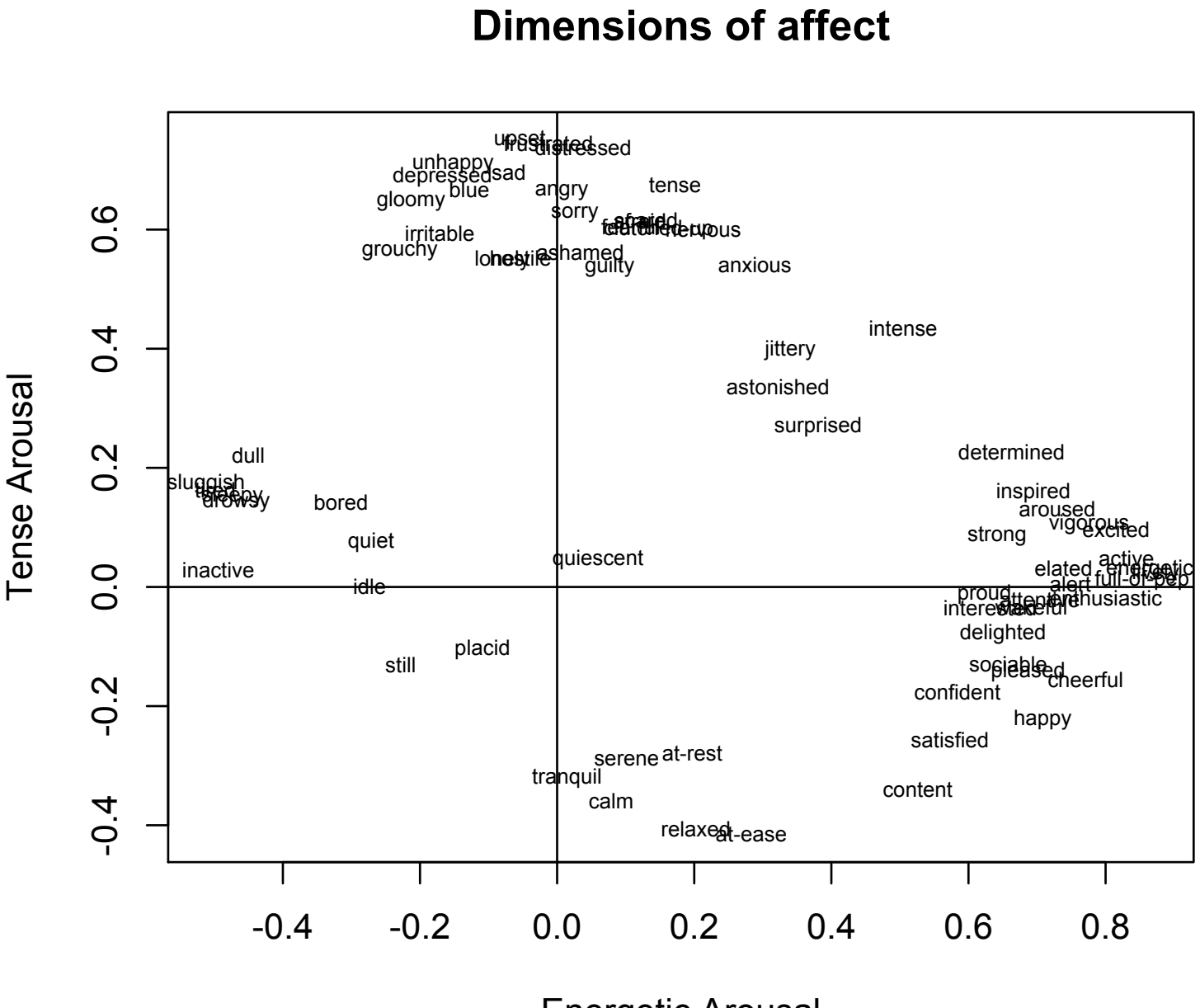
2. Anderson & Revelle (1994) examined sustained performance on a recognition memory task to test the hypothesis that high trait impulsives were consistently faster to suffer from a decay in arousal than low trait impulsives.
3. We examined this effect at two times of day and unexpectedly found a time of day by impulsivity interaction.
4. But science advances by disconfirmation as well:
   - "Two particular models deserve attention here. First, these data obviously contradict our own previous arguments (e.g., Revelle et al., 1987; Revelle & Anderson, 1992) that impulsivity is linked to stable differences in rate of change in arousal states." (Anderson & Revelle, 1994)

Integrating experimental and correlational data: Aggregating data across experimental studies for psychometric analysis

1. For about 10 years, we collected mood and arousal data as part of every experimental study we did.
   - Typical design was a mood pretest
   - Some arousal or motivation manipulation (e.g., caffeine, time stress, movies)
   - Then some post test
2. Motivational State Questionnaire (MSQ) was formed from items taken from Thayer's AD-ACL Thayer (1978), the PANAS (Watson et al., 1988) and various circumplex measures of emotion (Larsen & Diener, 1992)
3. Factor structure of the 72 items for 3896 subjects and their correlations with basic personality scales from the EPI is reported by Rafaeli & Revelle (2006)
4. The actual data are available as the `msq` data set in the *psych* package (Revelle, 2022) in R.

Dimensions of the Motivational State Questionnaire



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