

Personality within individuals:
estimating individual differences in
endogenous and exogenous
affective responses

or

Measuring the dynamics of personality

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International Society for the Study of Individual Differences,
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<http://www.personality-project.org>

<http://pmc.psych.nwu.edu>

Measuring the dynamics of personality

- Personality is the coherent temporal pattern of Affect, Behavior, Cognition and Desire
- Focus today will be on dynamics of Affect within subjects and the feedback effect of Behavior upon current and subsequent affect.

Measuring the dynamics of personality

- We can recognize a person by his or her pattern of affect, behavior and cognition just as we recognize a musical tune that has a coherent pattern over time, even though played with different instruments in a different key, in a different tempo.
- Personality is the coherent temporal pattern of Affect, Behavior, Cognition and Desire.
- “Personality is a self-tunable system of the temporal patterning of the interplay between affect, motivation, cognition, and behavior.” (Ortony, Norman, & Revelle, in press, *Effective Functioning: A Three Level Model of Affect, Motivation, Cognition, and Behavior*. To appear in J. M. Fellous & M. A. Arbib (Eds.), *Who Needs Emotions? The Brain Meets the Machine*. New York: Oxford University Press.)

Measuring the dynamics of personality

- Structure of affect across individuals
- Structure of affect within individuals
- Sources of within subject variation

Measuring the dynamics of personality

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 - Positive Affect (PA) and Energetic Arousal (EA)
 - Negative Affect (NA) and Tense Arousal (TA)
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 - Large variation in correlation of PA and NA
 - Not due to artifact of sampling
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 - Endogenous rhythm of EA/PA
 - Exogenous “shocks” and NA/TA

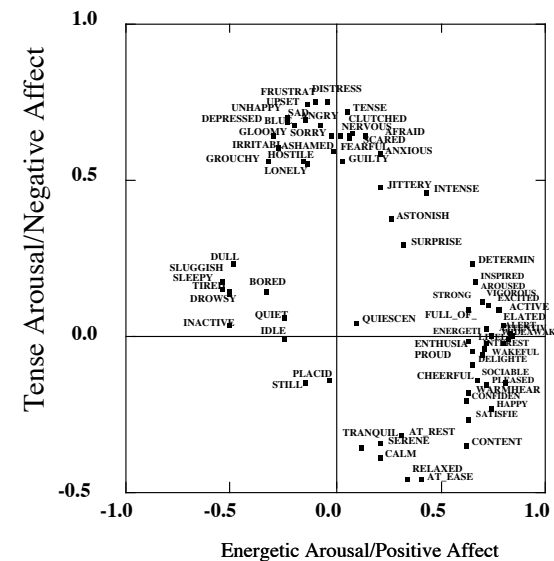
Multiple formulations of the measurement of affect

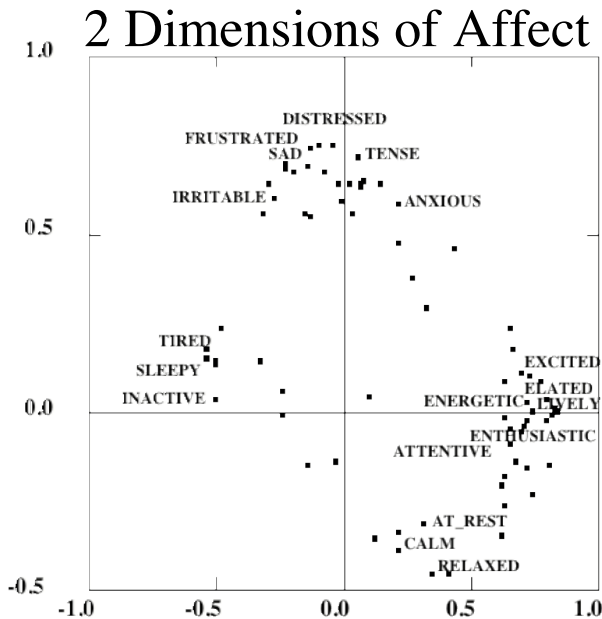
- Two dimensional models
 - Affective Valence and Arousal (Russell et al.)
 - Positive and Negative Affect (Tellegen, Watson & Clark)
 - Energetic and Tense Arousal (Thayer)
- Multidimensional models
 - Pleasantness-unpleasantness, rest-activation, relaxation-attention (Wundt)
 - Energetic Arousal, Tense Arousal, and Hedonic Tone (Matthews)
 - Hierarchical models (Watson and Tellegen)

Between subject structure of affect

- Motivational State Questionnaire (MSQ) administered to ≈ 3500 subjects (data collected over ≈ 10 years for many different experiments)
- Items from Thayer, Watson, Larsen & Diener
- 68-72 items administered at various times of day and under various conditions.
- 2, 3, 4, 5, and 6 factor solutions

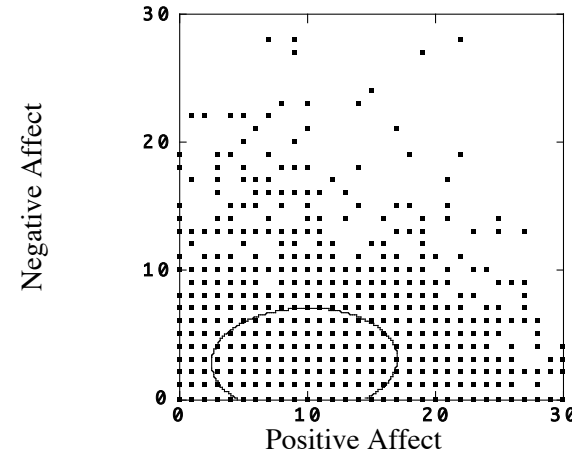
2 Dimensions of Affect





Positive x Negative Affect

$R = .04$ $N \approx 3,200$



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Studies of within subject affect

- Previously reported data from:
 - Rogers (diary study over two weeks)
 - Rafaeli (diary/PDA study over two weeks)
 - Demonstrated stable individual difference in synchrony/asynchrony of affect
- Current focus will be on dynamic patterning across time and over situations

Basic Method

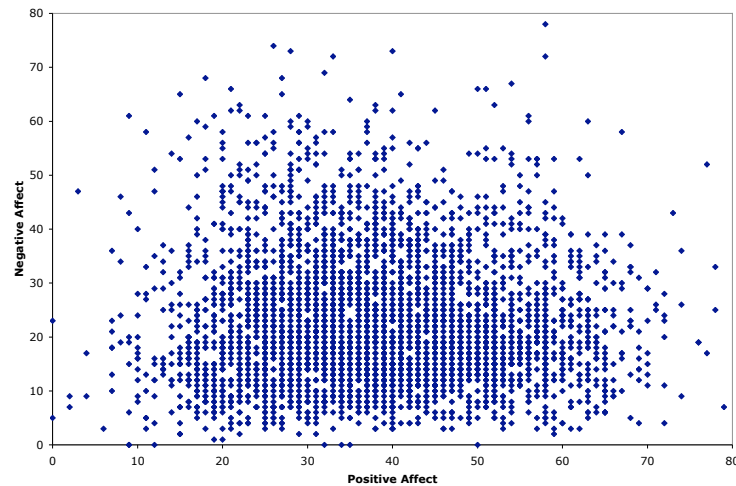
- Subjects: Northwestern undergraduates
- 8-16 affect items given every 3 hours during waking day for 1 week, 1-2 week delay, and then measured again for another week.
- Visual analog scales used by Rogers (N≈80)
- Visual analog scales and Personal Digital Assistants (Palm Pilots) used by Rafaeli (N≈80)
- Will present data from the PDA portion of Rafaeli's studies

Results: The correlation between positive and negative affect

- Between subjects (all data points) $r = -.04$
- Between subjects (aggregated within subjects) $r = -.14$
- Within subjects (all data points)
 - $-.5 < r < .7$ (observed $sd_r = .27$, expected = $.14$)
- Within subjects (aggregated by situations)
 - $-.8 < r < .9$ (observed $sd_r = .43$, expected = $.33$)

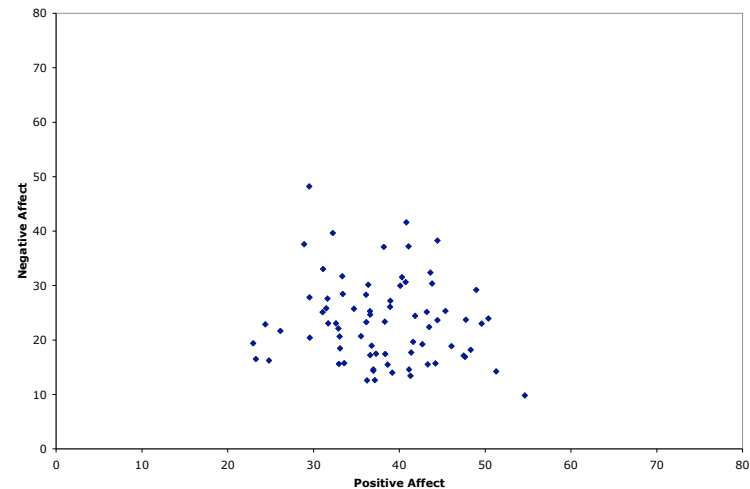
Positive and Negative Affect for all subjects over all observations $r = -.04$

Positive and Negative Affect (all observations)

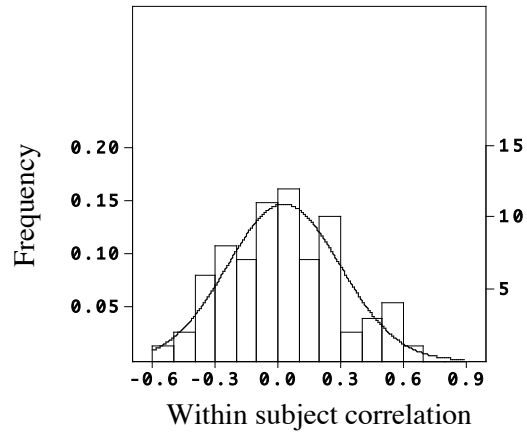


Mean Positive x Negative Affect Aggregated within subjects $r = -.14$

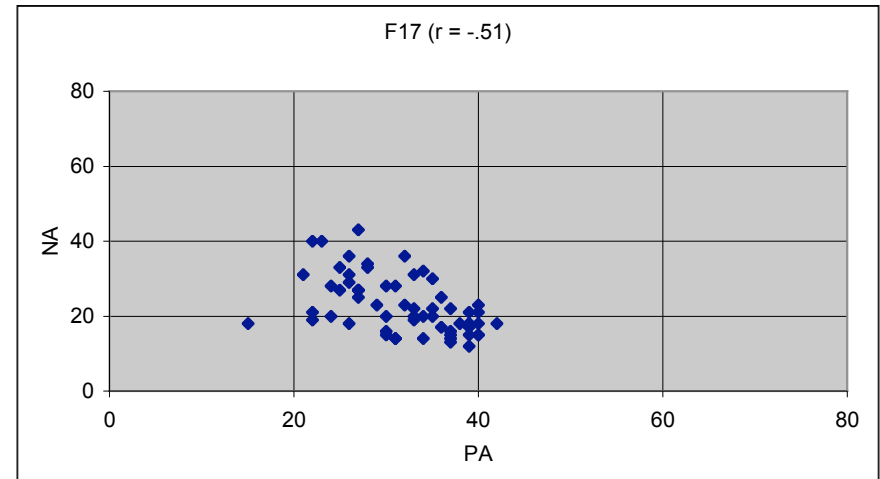
Positive and Negative Affect (subject averages)



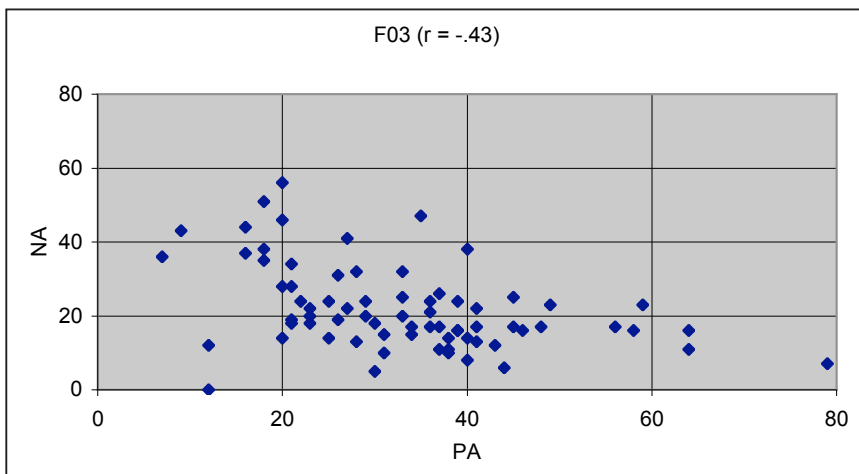
Large variation in within subject correlation of positive and negative affect ($sd_r = .27$, expected = .14)



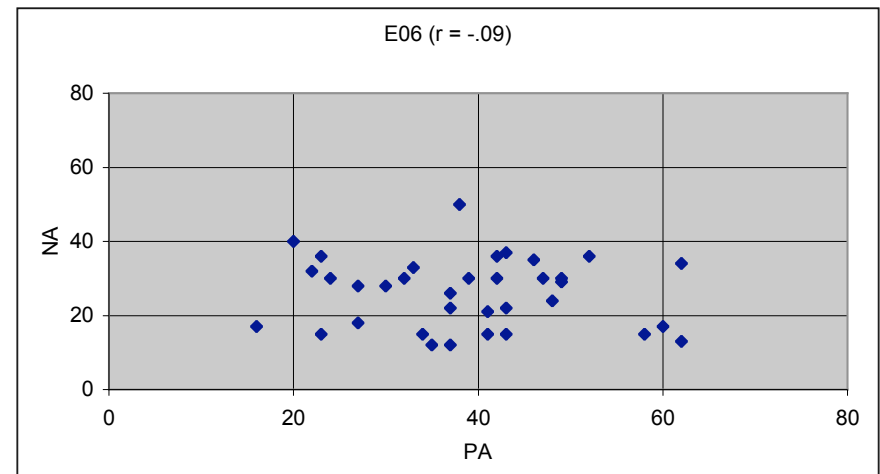
Positive and Negative Affect
(within subject correlation = $-.51$)



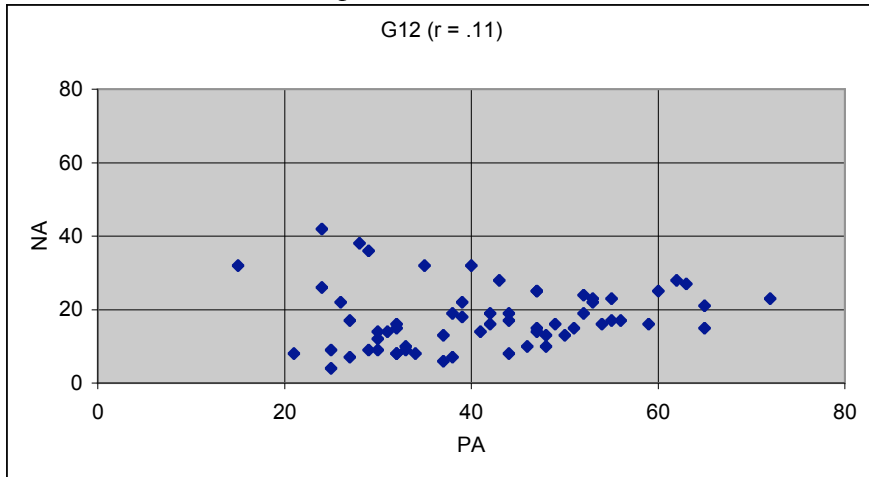
Positive and Negative Affect
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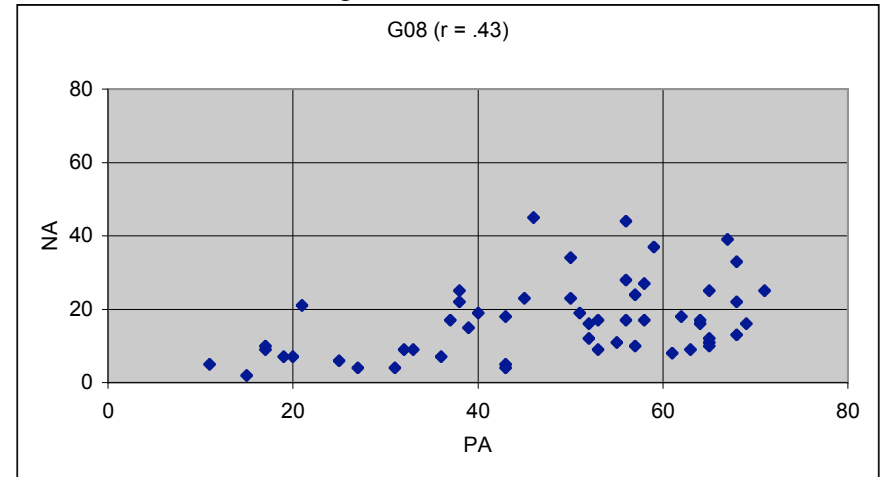
Positive and Negative Affect
(within subject correlation = $-.09$)



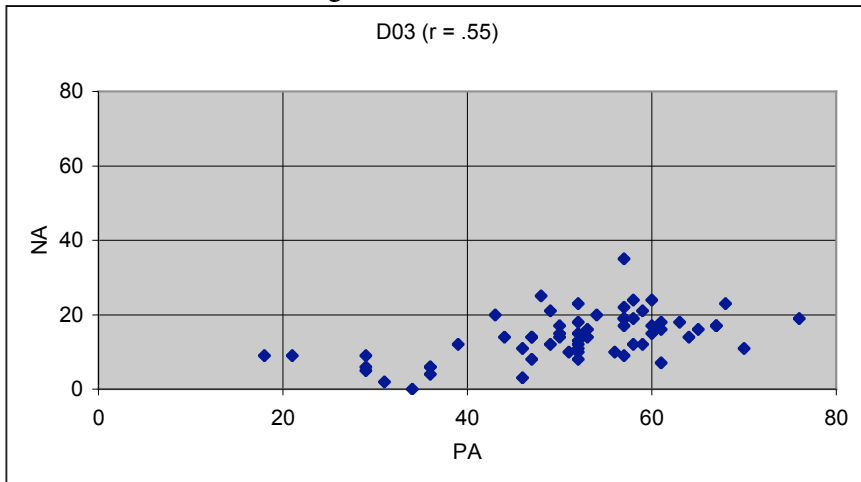
Positive and Negative Affect
(within subject correlation =.11)



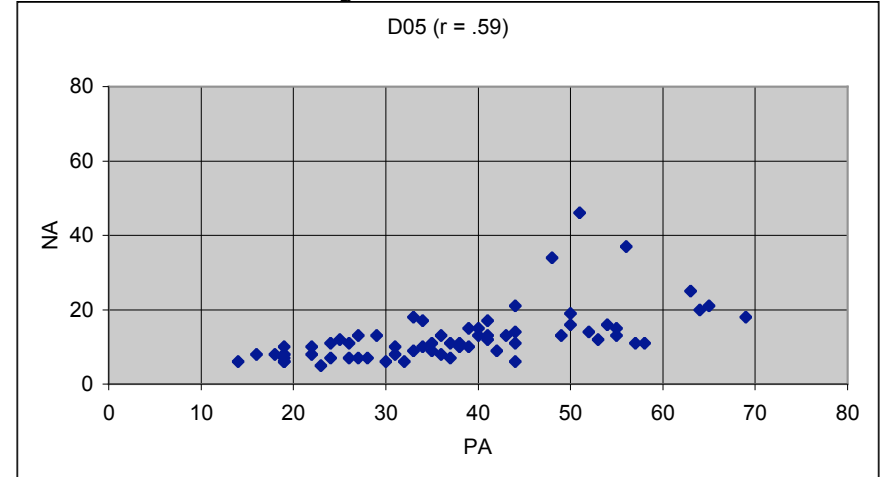
Positive and Negative Affect
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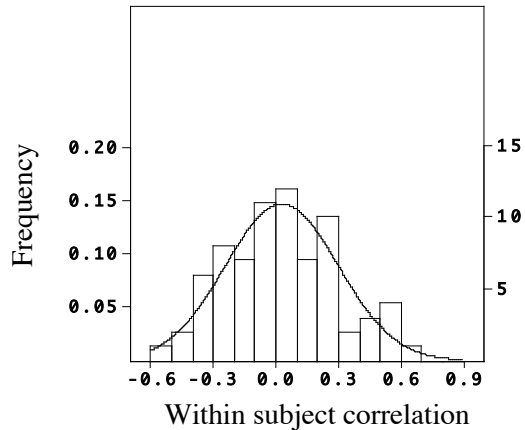
Positive and Negative Affect
(within subject correlation =.55)



Positive and Negative Affect
(within subject correlation =.59)



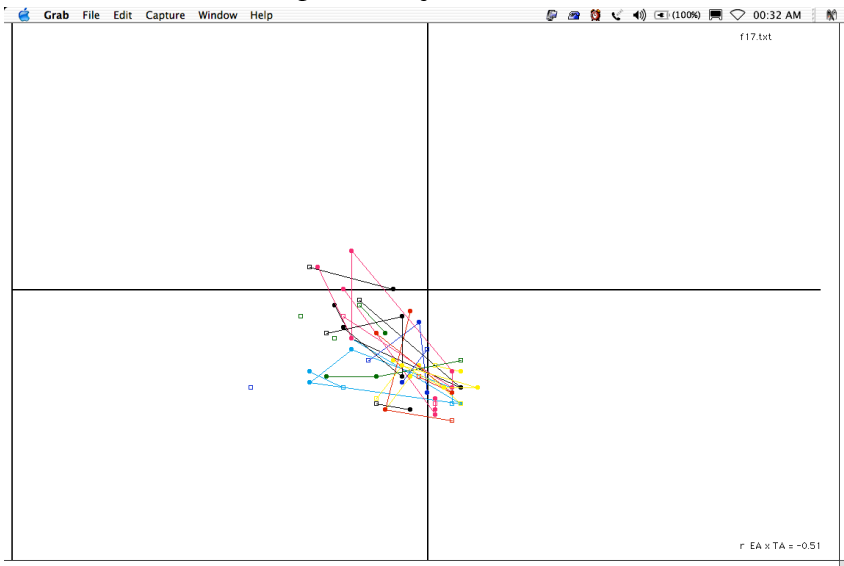
Large variation in within subject correlation of positive and negative affect ($sd_r = .27$, expected = .14)



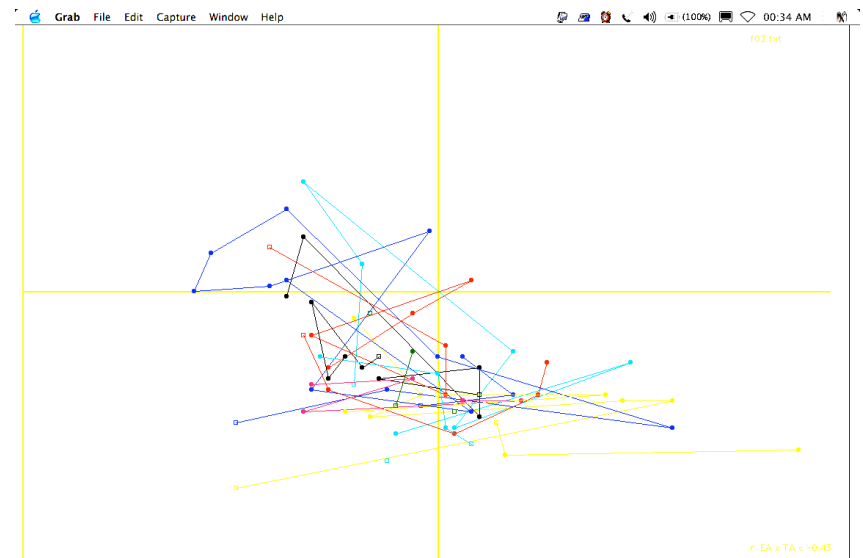
Measuring the dynamics of personality

- Measurements taken every 3 hours during waking day
- We can observe within subject change in positive and negative affect over a day, replicated each day
- Note that while people differ in their pattern, within each person, the pattern is consistent

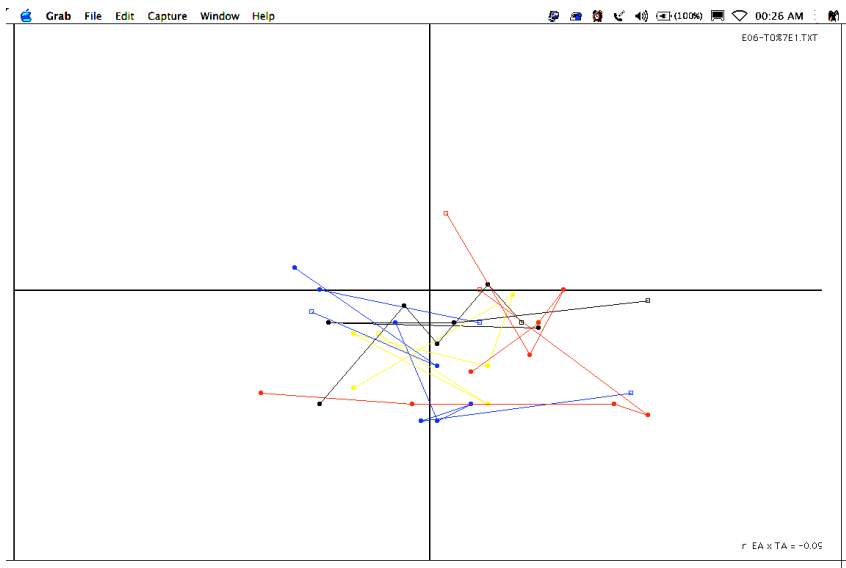
Within subject dynamics ($r = -.51$)



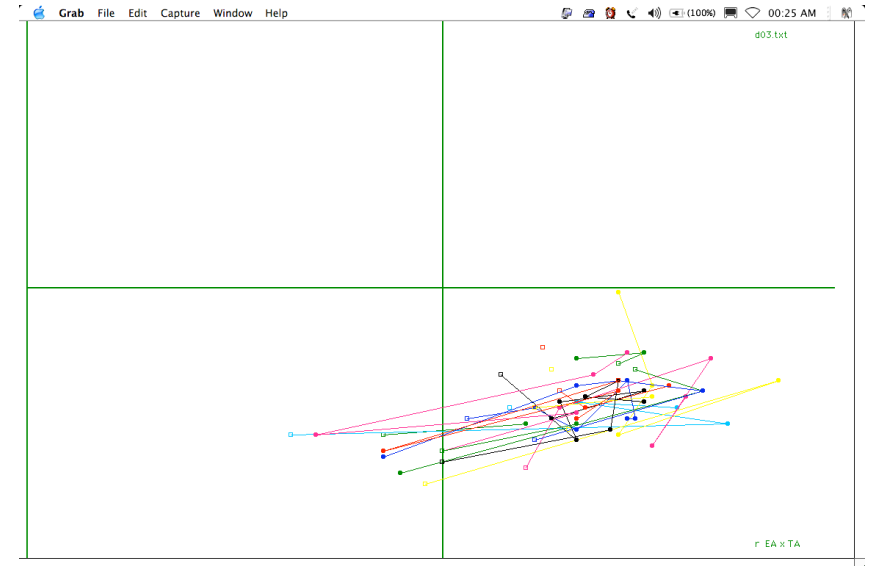
Within subject dynamics ($r = -.43$)



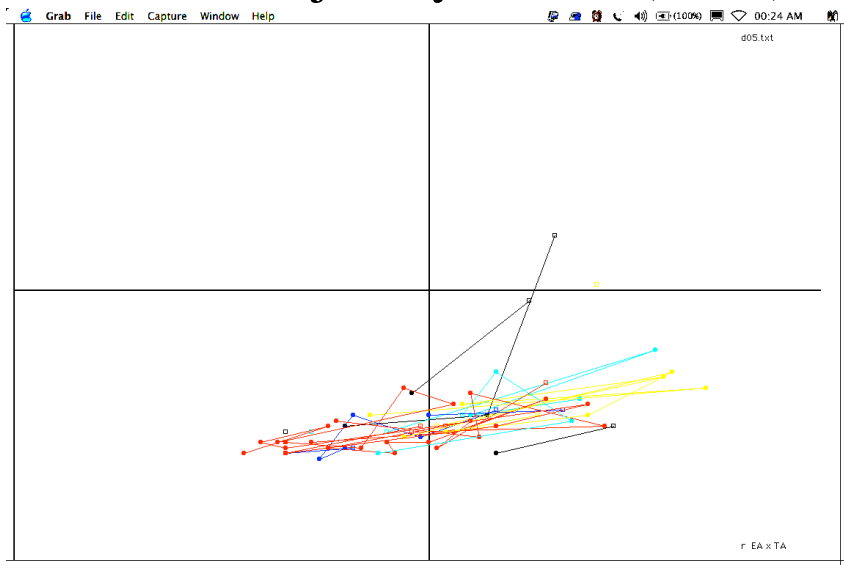
Within subject dynamics ($r = -.05$)



Within subject dynamics ($r = .55$)



Within subject dynamics ($r = .59$)



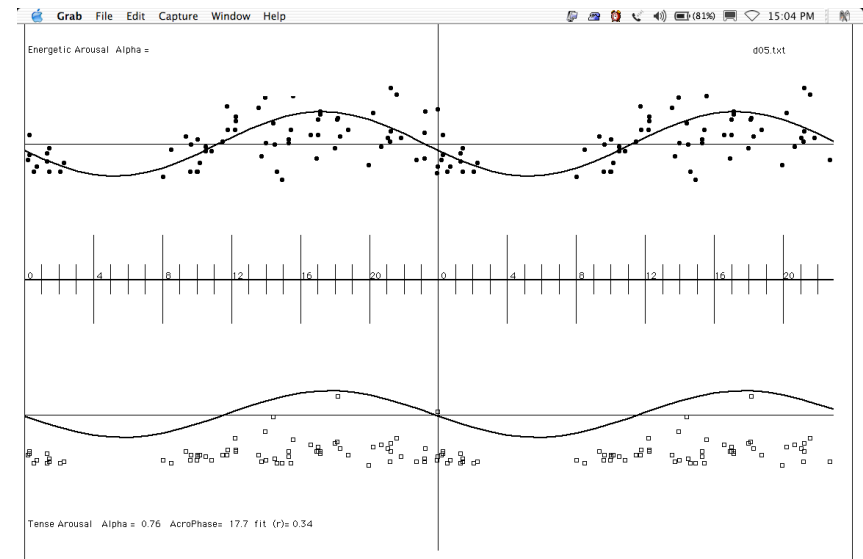
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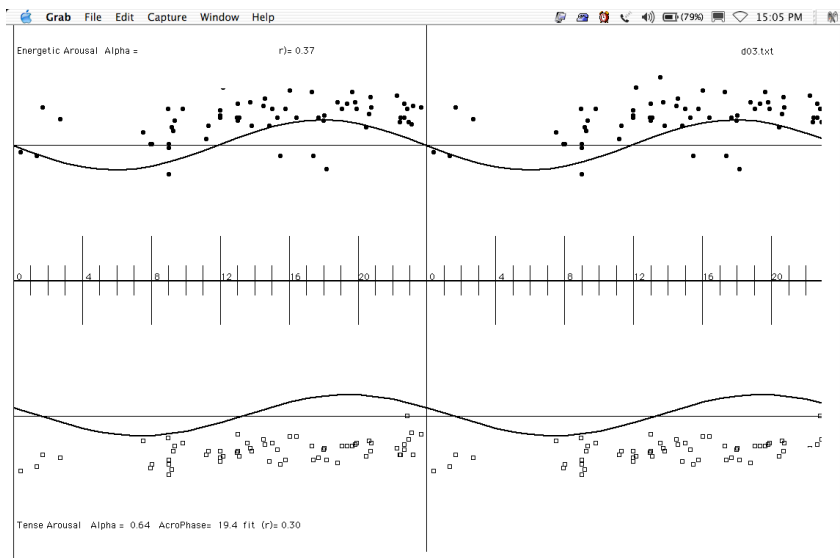
Endogenous rhythms of affect

- Possible to fit each person's daily data with cosine of time of day to estimate any diurnal pattern.
- Positive affect and energetic arousal show strong diurnal rhythm
- Negative affect and tense arousal show very weak diurnal rhythm

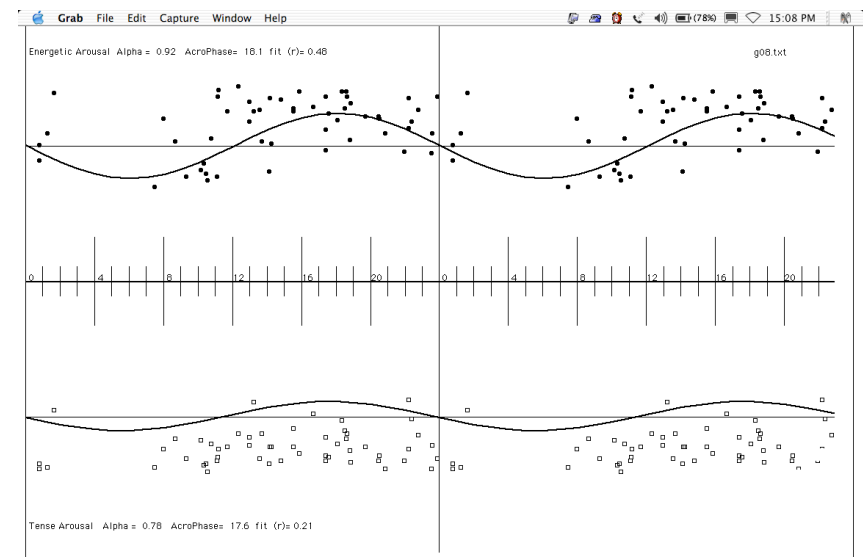
Fitting affect within subjects



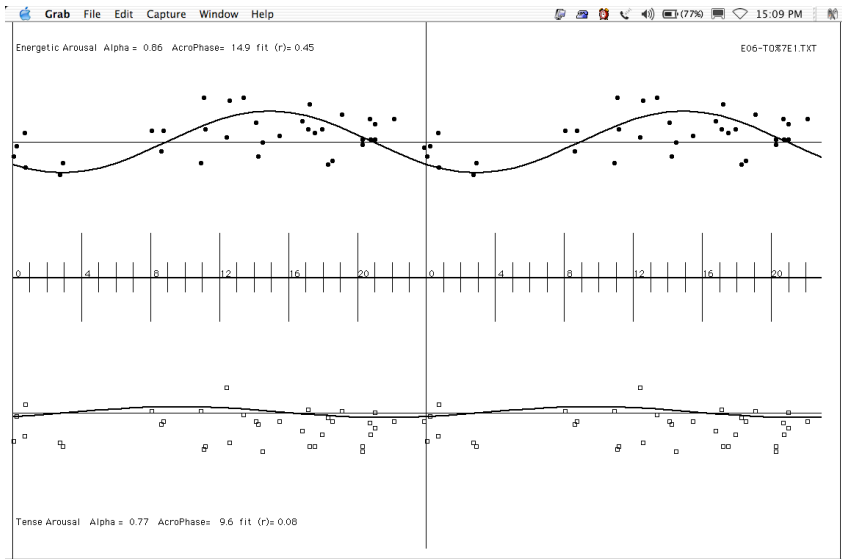
Fitting affect within subjects



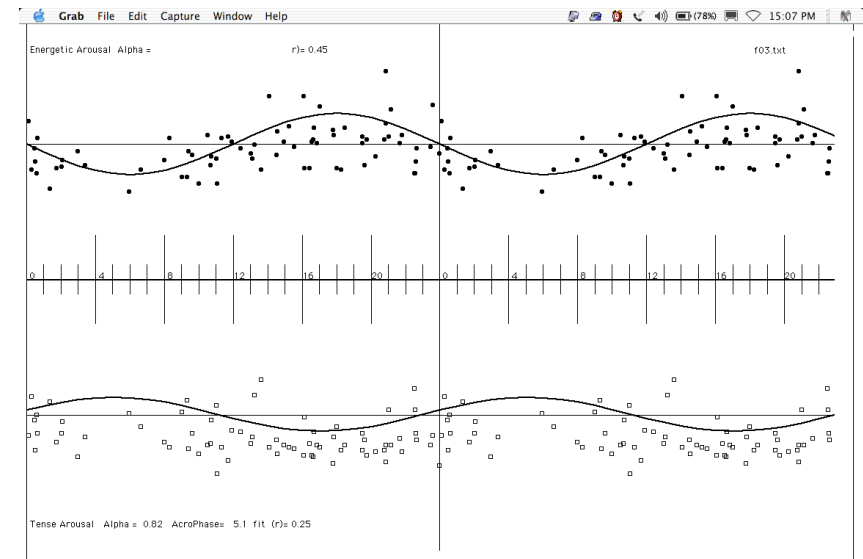
Fitting affect within subjects



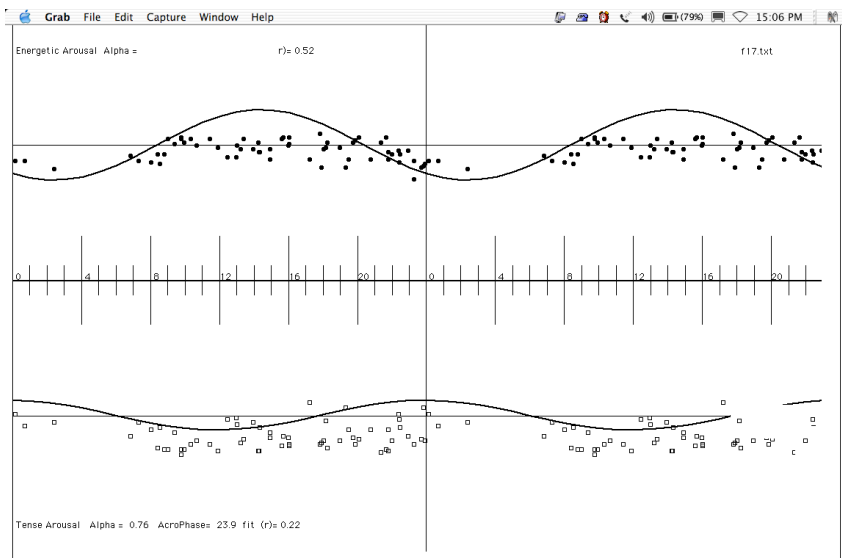
Fitting affect within subjects



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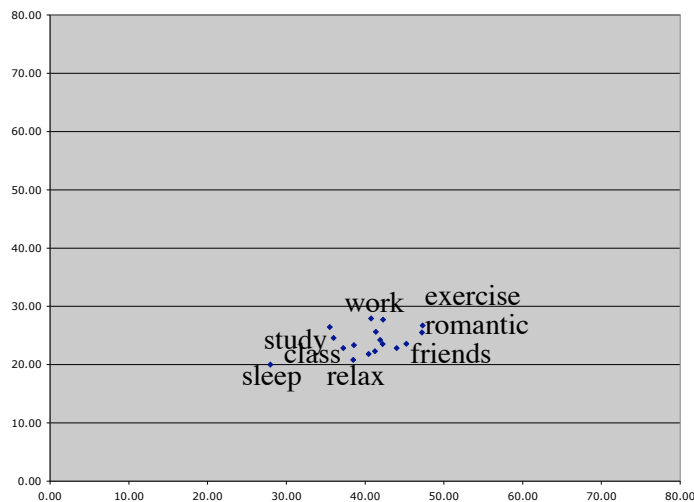
Affect varies by situation

- A small effect of situation on affect, but a much larger individual difference in experience of affect by situation
- Is the affect a function of the situation, or is the situation a function of prior affect?
- Individuals differ in their choice of situation, as well as the affect they experience in the situation

Individual affect depends upon person in the situation

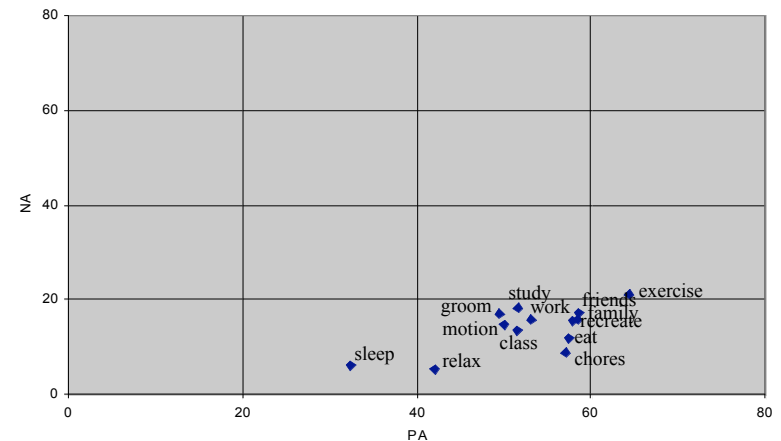
- Situations were defined using Dan Ozer's categorization of typical student activities
- Aggregate the affect ratings by situations to examine the effect of situation on individuals.
- Note the variation between subject in the effect of situations

A small effect of situations on positive and negative affect



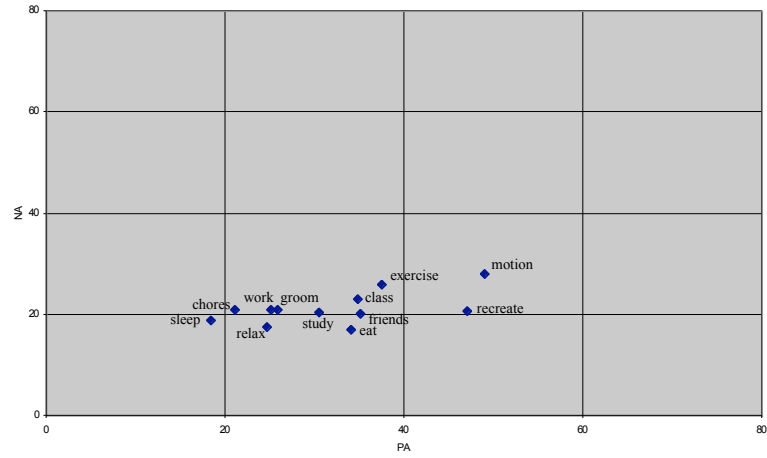
$$r = .695$$

D03 Across Activities



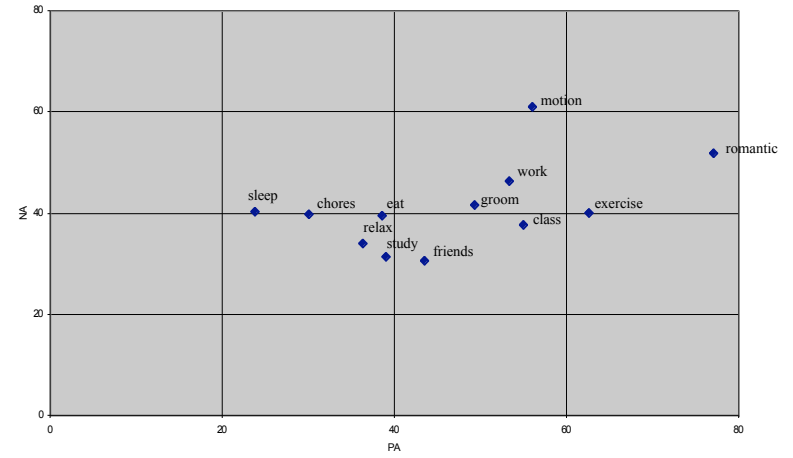
$r = .571$

D18 Across Activities



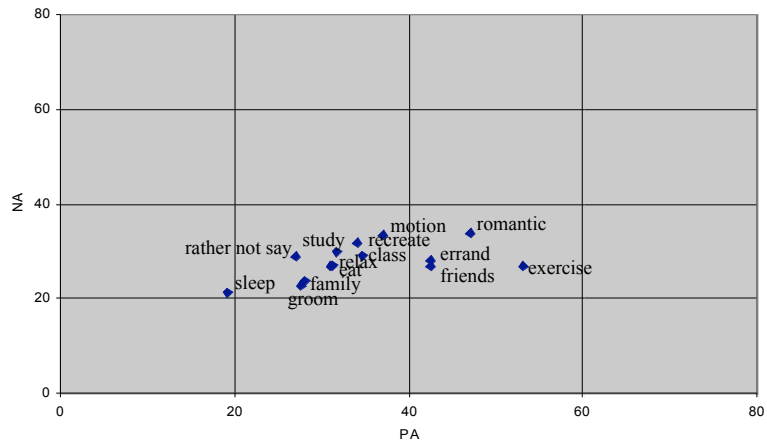
$r = .530$

E16 Across Activities



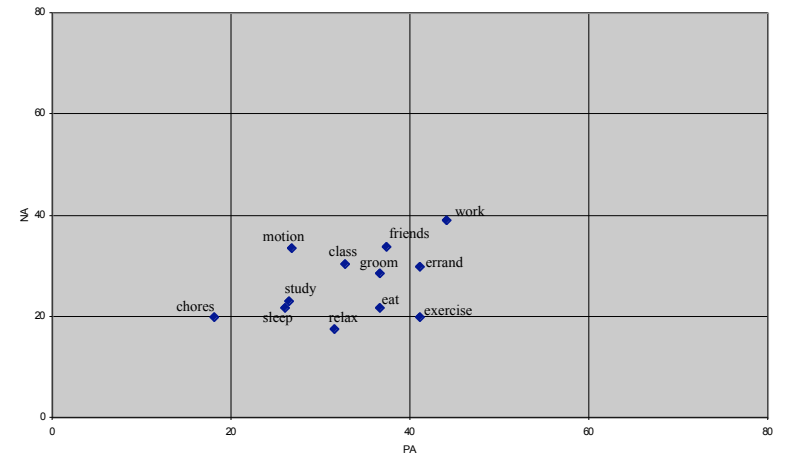
$r = .505$

D11 Across Activities



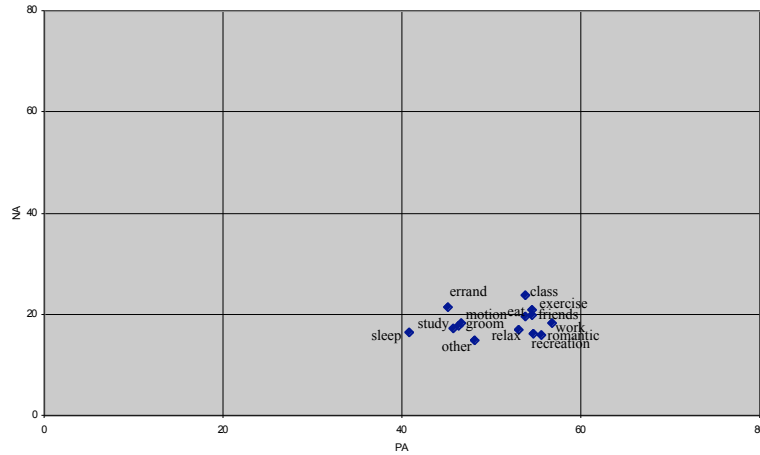
$r = .441$

D19 Across Activities



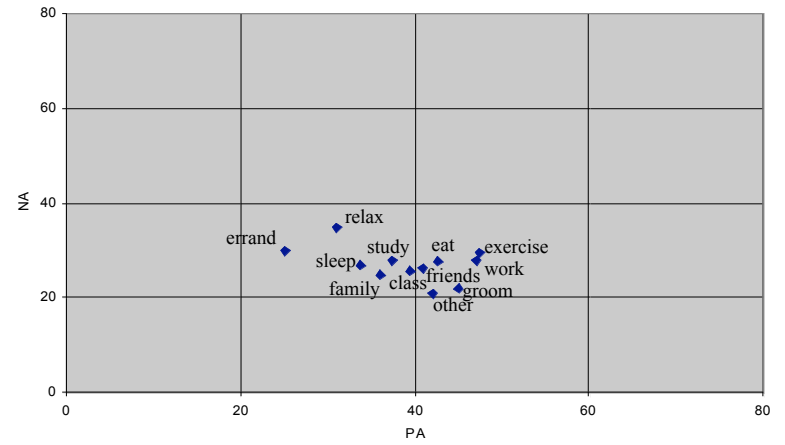
$$r = .191$$

D20 Across Activities



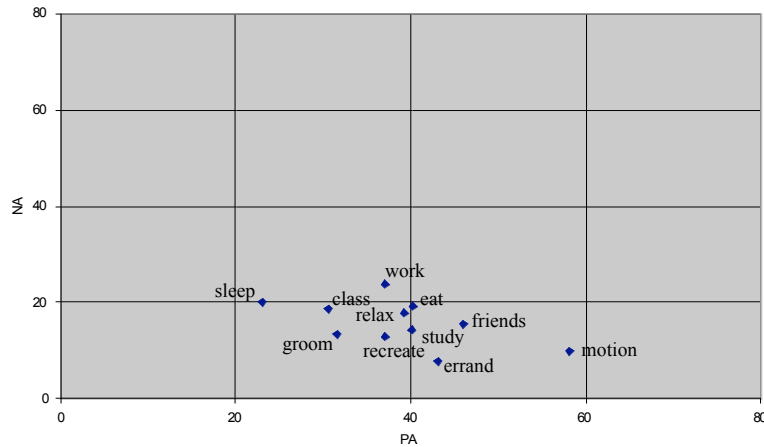
$$r = -.433$$

E19 Across Activities



$$r = -.539$$

D01 Across Activities



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Measuring the dynamics of personality

If personality reflects stability in the changing pattern of Affect, Behavior, and Cognition across time, then we need to focus on measuring Affect, Behavior, and Cognition within subjects across short and long temporal intervals.

With the ability to use new data collection techniques (e.g. PDAs) and new analytic techniques (e.g., HLM) we can measure the dynamics of personality within individuals as well as between individuals.