

The Economics and Psychology of Personality Traits: Extract

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Is It Conceptually Possible to Separate Cognitive Ability from Personality Traits?

- Many aspects of personality are a consequence of cognition, and cognition depends on personality. Nonetheless, one can separate those two aspects of human differences.

Is It Possible to Empirically Distinguish Cognitive from Personality Traits?

- Measures of economic preferences are influenced by numeracy and intelligence. IQ test scores are determined not only by intelligence, but also by factors such as motivation and anxiety.
- Moreover, over the life cycle, the development of cognitive ability is influenced by personality traits such as curiosity, ambition, and perseverance.

What is the Evidence on the Predictive Power of Cognitive and Personality Traits?

- Personality traits are important in explaining performance in specific tasks, although different personality traits are predictive in different tasks.
- The classical model of factor analysis, joined with the principle of comparative advantage, helps to organize the evidence in economics and psychology.

How Stable Are Personality Traits Across Situations and Across The Life Cycle? Are They More Sensitive than Cognitive Traits to Investment and Intervention?

- We present evidence that both cognitive and personality traits evolve over the lifecycle-but to different degrees and at different stages of the life cycle.
- Cognitive processing speed, for example, tends to rise sharply during childhood, peak in late adolescence, and then slowly decline.
- In contrast, some personality traits, such as conscientiousness, increase monotonically from childhood to late adulthood.
- We develop models in which traits are allocated differentially across tasks and activities.

Do the Findings from Psychology Suggest That Conventional Economic Theory Should Be Enriched? Can Conventional Models of Preferences in Economics Explain the Body of Evidence from Personality Psychology? Does Personality Psychology Merely Recast Well-Known Preference Parameters into Psychological Jargon, or is There Something New for Economists to Learn?

- Conventional economic theory is sufficiently elastic to accommodate many findings of psychology.
- However, our analysis suggests that certain traditional concepts used in economics should be modified and certain emphases redirected.
- Some findings from psychology cannot be rationalized by standard economic models and could fruitfully be incorporated into economic analysis.

- The evidence from personality psychology suggests a more radical reformulation of classical choice theory than is currently envisioned in behavioral economics which tinkers with conventional specifications of preferences.
- *More fundamentally, conventional economic preference parameters can be interpreted as consequences of these constraints.*
- For example, high rates of measured time preference may be produced by the inability of agents to delay gratification, interpreted as a constraint, or by the inability of agents to imagine the future.
- We develop a framework that introduces psychological variables as constraints into conventional economic choice models.

Definitions And A Basic Framework Of Measurement And Interpretation

- We distinguish between *cognitive ability* on the one hand and personality traits on the other.

How Are Cognitive and Noncognitive Attributes Measured?

Cognition	Stanford-Binet IQ Armed Forces Qualifying Test SAT/ACT Raven's Matrices
Personality	Big 5 HEXACO Big 3
Temperament	Children's Behavior Questionnaire Temperament and Character Inventory
Executive Function	Card Sorting Digit Span Visual Simon
Bias	Implicit Association Test Cognitive Reflection Task

Certain Traits Can Be Measured in Multiple Ways

Big 5 (personality)

- Openness
- Conscientiousness
- Extraversion
- Agreeableness
- Negative Emotionality

Big 3 (personality)

- 1 Neuroticism
- 2 Psychotism
- 3 Extraversion

HEXACO (personality)

- Honesty-Humility
- Emotionality
- eXtraversion
- Agreeableness
- Conscientiousness
- Openness to Experience

Certain Traits Can Be Measured in Multiple Ways

Children's Behavior Questionnaire (temperament)

- 1 Surgency
- 2 Negative Affectivity
- 3 Effortful Control

Temperament and Character Inventory (temperament)

- 1 Novelty Seeking
- 2 Harm Avoidance
- 3 Reward Dependence
- 4 Persistence

Other Preferences and Traits are Associated with Life Outcomes

Economic Preferences	Risk Aversion
	Ambiguity Aversion
	Time Preference
	Altruism
	Trust
	Positive Reciprocity
	Negative Reciprocity
	Cooperation
	Complexity
Personality Attributes	Creativity
	Grit
	Change

Measurement and Methodological Issues

- There are two general types of measurement schemes:
 - ① those that seek to measure or elicit conventional economic preference parameters, and
 - ② those that measure personality with self-reports or observer reports.
- Personality psychologists focus primarily on the latter.

- Personality psychologists marshal three types of evidence to establish the validity of their tests:
 - ① content-related,
 - ② construct-related, and
 - ③ criterion-related evidence.

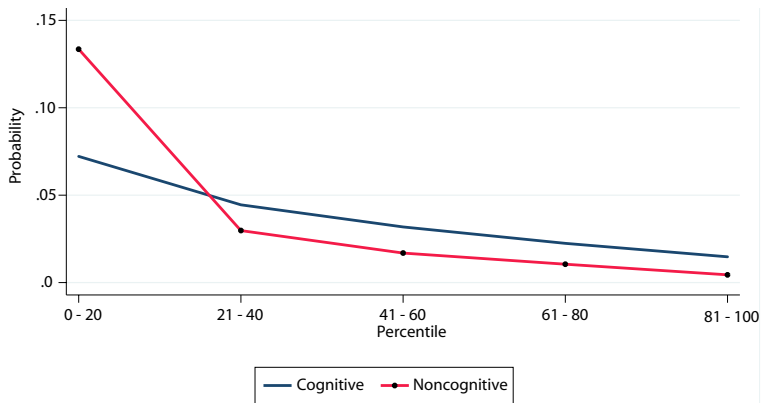
Convergent and Discriminant Validity

- “convergent” referring to the intercorrelations *within* a cluster and the “discriminant” referring to lack of correlation across clusters.

Evidence from the Literature

- Look at effects of both cognitive and noncognitive skills on many measures of social performance.

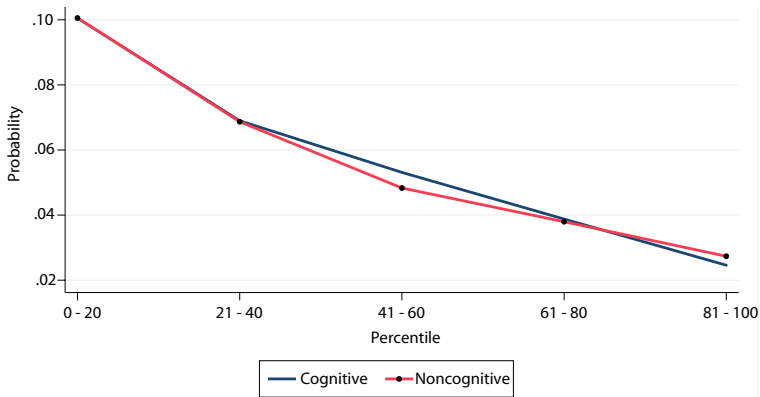
Figure 1: Ever been in jail by age 30, by ability (males)



Note: This figure plots the probability of a given behavior associated with moving up in one ability distribution for someone after integrating out the other distribution. For example, the lines with markers show the effect of increasing noncognitive ability after integrating the cognitive ability.

Source: Heckman, Stixrud, and Urzua (2006).

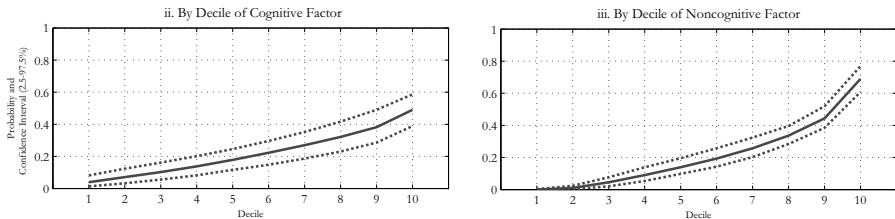
Figure 2: Probability of being single with children (females)



Note: This figure plots the probability of a given behavior associated with moving up in one ability distribution for someone after integrating out the other distribution. For example, the lines with markers show the effect of increasing noncognitive ability after integrating the cognitive ability.

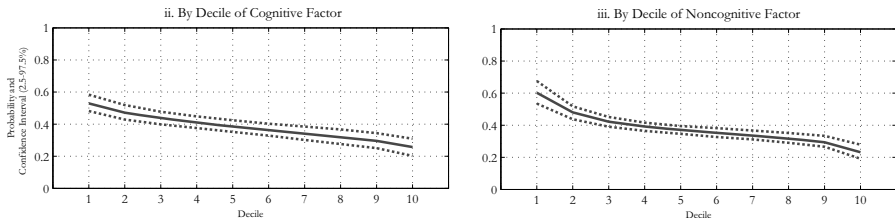
Source: Heckman, Stixrud, and Urzua (2006).

Figure 3: Probability of being a 4-year college graduate by age 30 (males)



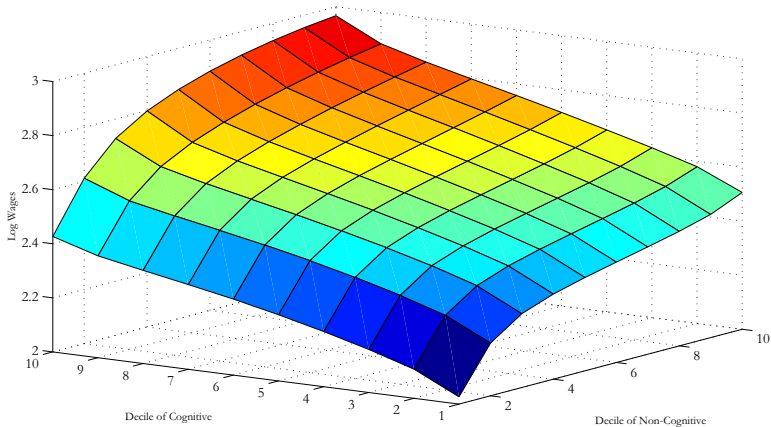
Notes: The data are simulated from the estimates of the model and our NLSY79 sample. We use the standard convention that higher deciles are associated with higher values of the variable. The confidence intervals are computed using bootstrapping (200 draws).

Figure 4: Probability of daily smoking by age 18 (males)



Notes: The data are simulated from the estimates of the model and our NLSY79 sample. We use the standard convention that higher deciles are associated with higher values of the variable. The confidence intervals are computed using bootstrapping (200 draws).

Figure 5: Mean log wages by age 30 (males)

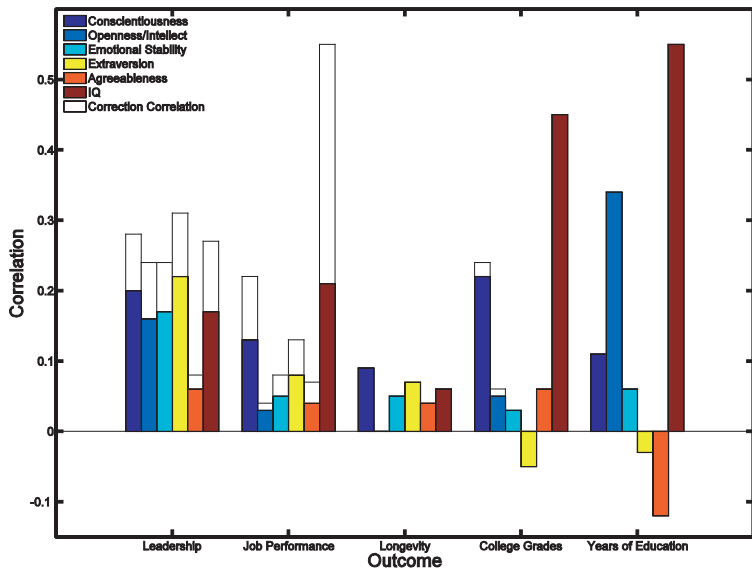


Predictive Power of Personality Traits

- The importance of personality traits can be inferred from the failure of cognitive measures to predict certain outcomes. Heckman and Rubinstein (2001) use evidence from the General Education Development (GED).

- Figure 3 summarizes correlations for the predictive validity of IQ and Big Five personality factors on leadership ratings, job performance, longevity, college grades, and years of education.

- IQ surpasses any single Big Five personality factor in the prediction of the two academic outcomes, college grades ($r = .45$) and years of education ($r = .55$).



- Contemporary psychologists suggest that self-control, perseverance, and other aspects of conscientiousness as the major personality contributors to success in school and in life.

- As Heckman, Stixrud, and Urzua (2006) and Judge and Hurst (2007) show that among participants in the NLSY 1979 cohort, positive self-evaluations measured in young adulthood (with self-report questions of self-esteem, locus of control, and related traits) predict income in mid-life and, further, enhance the benefits of family socioeconomic status, and academic achievement on mid-life income.

Changing Preference Parameters and Psychological Variables

- If they change, to what extent do environments and investments influence the developmental trajectories of personality traits?

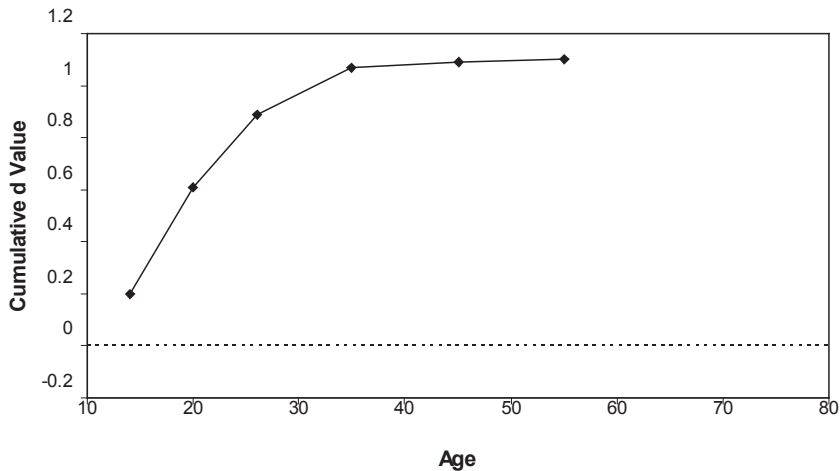
- The malleability of personality can be defined and measured in several ways: Mean-level change refers to change over time in absolute levels of a trait and is measured by changes in scores over time.
- Rank-order change, in contrast, refers to changes in the ordinal ranking of a trait in a population and is measured by test-retest rank correlations.
- Cognitive abilities exhibit dramatic mean-level change from early childhood through adolescence, but, over the same period, strong rank-order stability.

- A second useful dichotomy contrasts normative change, defined as changes that are typical of the average individual in a given population, and caused either by biological programming (ontogenic) or by predictable changes in social roles (sociogenic), and non-normative change, encompassing both intentional change, caused by deliberate, self-directed efforts, deliberately chosen changes in social roles and atypical life events (trauma, for example).

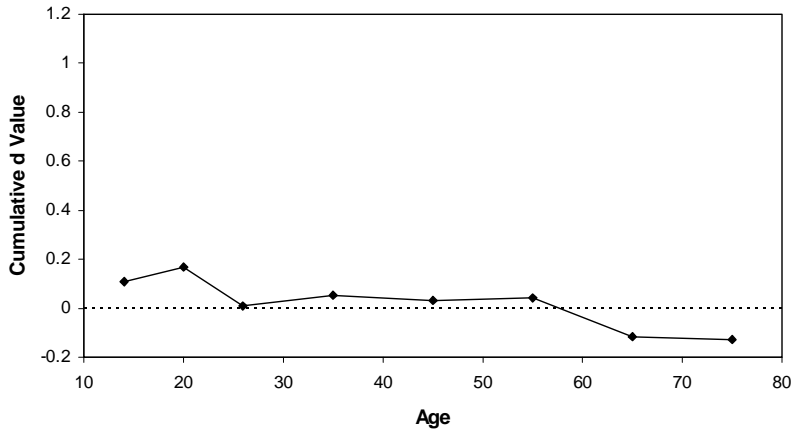
Mean Level Changes

- People typically become more socially dominant

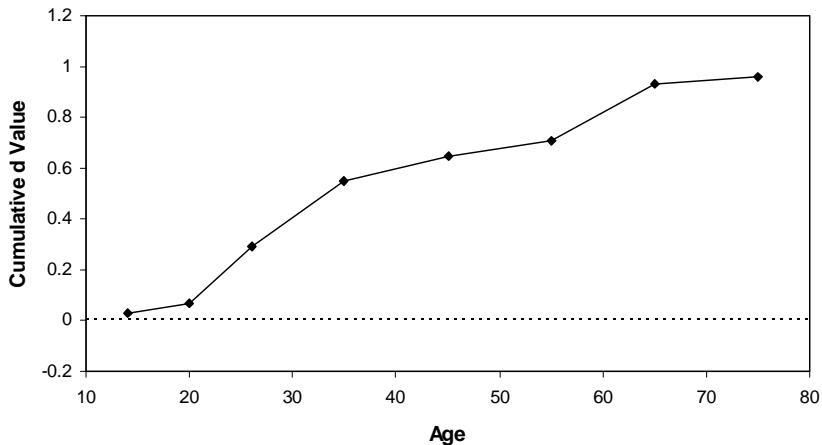
Social Dominance



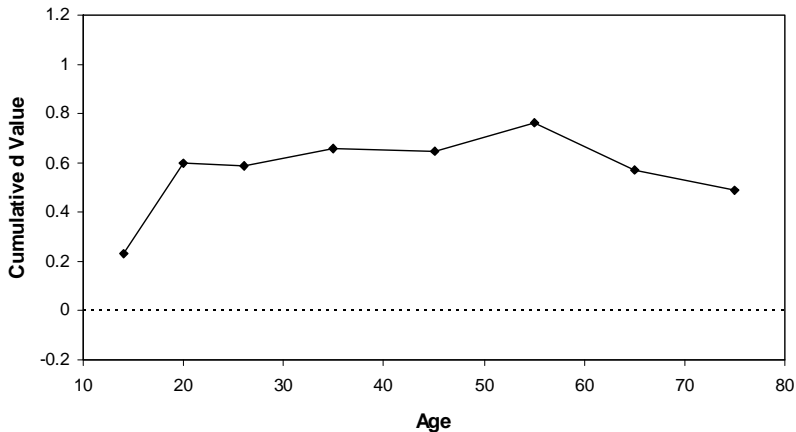
Social Vitality



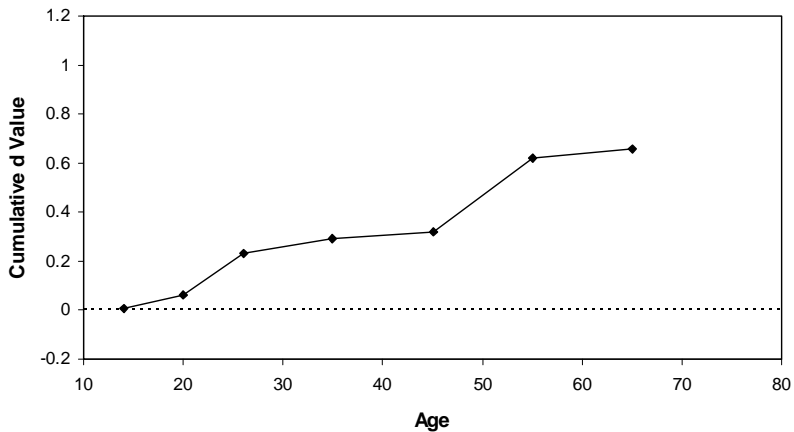
Conscientiousness



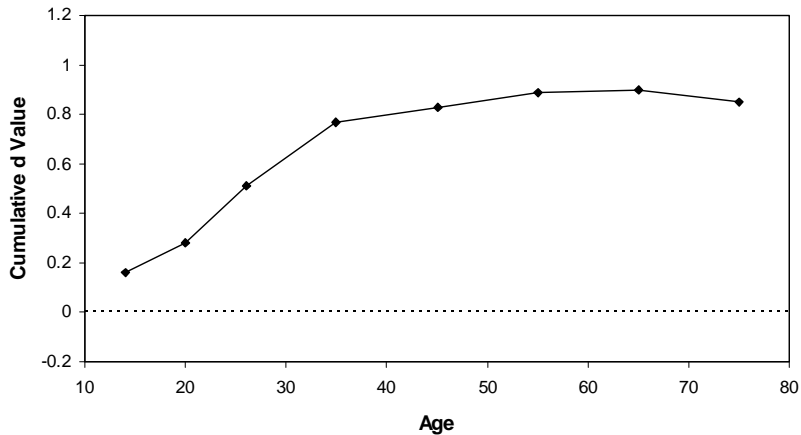
Openness to Experience



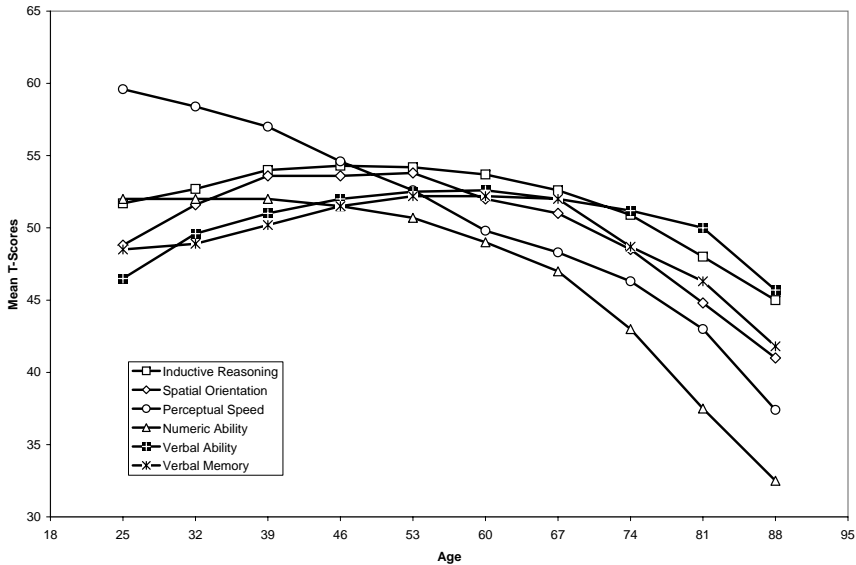
Agreeableness

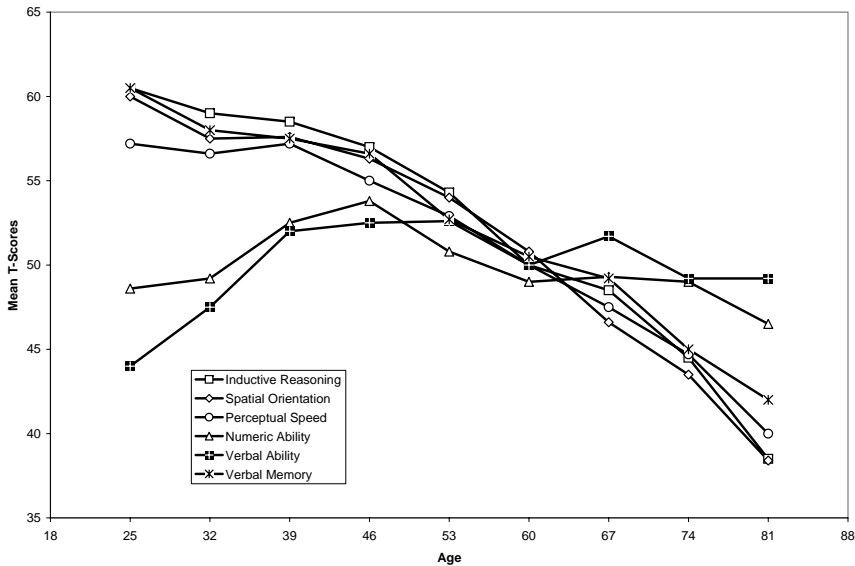


Emotional Stability



- Figure 4b shows mean-level changes in cognitive skills using a longitudinal analysis, and the bottom panel of Figure 4b shows mean-level changes using a cross-sectional analysis.





Rank-Order Change in Cognitive and Personality Skills

- Figure 5a shows graphs of rank order stability of personality by age.
- Figure 5b shows rank order stability of IQ over broad age ranges.

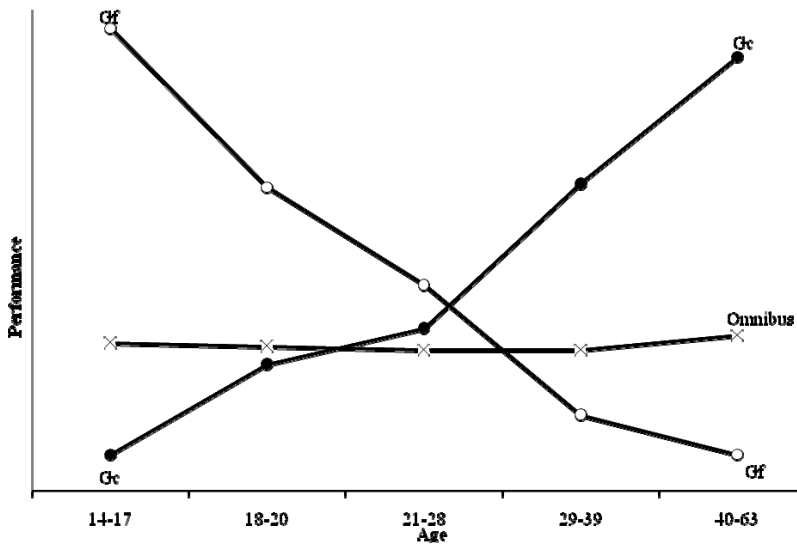
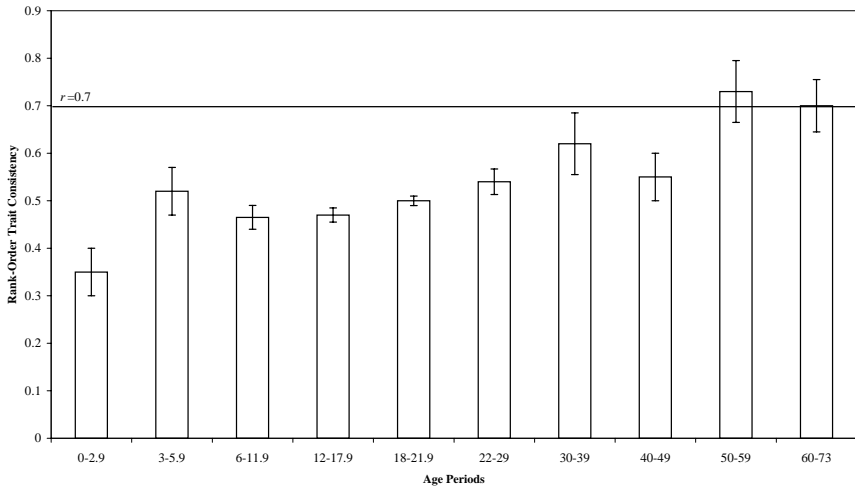
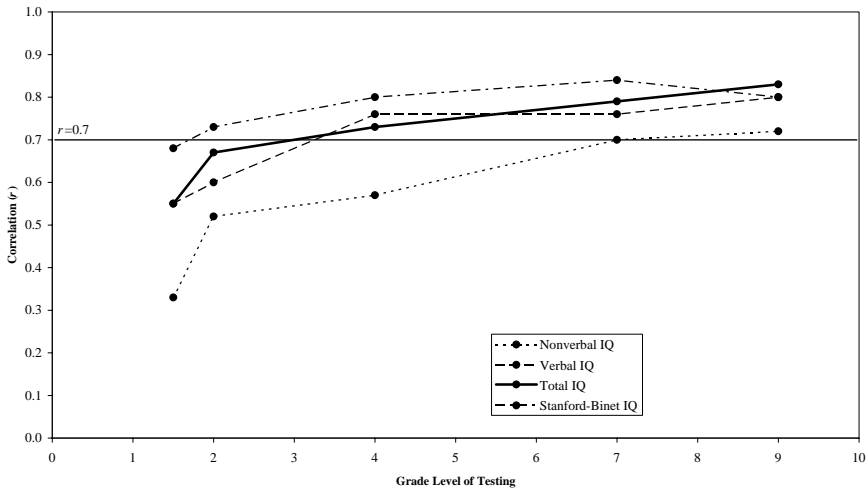


Figure 4c





Incorporating Personality and Cognitive Ability into Conventional Economic Models: A Simple Framework for Organizing the Evidence

- How should one incorporate psychological traits into conventional economic models?
- One could think of them as public goods.
- This is the approach implicitly adopted by most personality psychologists.
- One could also think of psychological traits as excludable private goods.
- More of a trait used in one activity means less of the trait available for use in other activities.

- In addition, one might augment, complement or override the supply of a trait to any activity by supplying more time, or energy, to the activity in which the trait is used.
- On the other hand, “energy,” e , which can be vector valued, may be used to moderate the manifestation of the trait (for example, energy may be spent controlling anger in a given activity).
- Individuals differ in their endowment vector of the trait \bar{f} .
- Thus there may be a time constraint as in Becker (1965) or more generally there may be energy constraints (constraints on effort capacity).

A Simple One-period Model

- Assume that there are J activities with outputs Z_j , $j = 1, \dots, J + 1$.
- We add one activity to account for market earnings. Z_j is produced by combining tasks, T_j , defined in section II, with purchased market goods, X_j .

- We augment the task functions defined by equation (??) to include levels of energy, and time, in vector e^j

$$T_j = h_j(f^j, e^j) \text{ for } j = 1, \dots, J + 1 \quad (1)$$

f^j is to be distinguished from f_j , the j^{th} component of vector f .

- Parallel notation for e^j .
- For a fixed input of psychological traits, higher levels of e^j may raise the output of the task.
- Thus if $e^j = 0$, the trait f^j may be switched off. However, if some traits have negative productivity in some tasks more energy may be allocated to those tasks to offset the negative trait.

- Output in activity Z_j is

$$Z_j = \varphi_j(T_j, X_j) \text{ for } j = 1, \dots, J + 1 \quad (2)$$

- The outputs in activity j depend on the task output T_j and the goods input X_j .
- Agents have preferences over Z_j and e_j .
- The effort expended in an activity may have psychic costs or benefits.
- There may be psychic costs in using e_j to suppress the expression of a trait.

- Preferences may also depend on f as well as other variables which we keep implicit.
- The utility function is

$$U = U(Z_1, \dots, Z_j, e^1, \dots, e^{J+1}, f) \quad (3)$$

- Income is return on asset flow Y plus labor earnings which we denote $Z_{J+1} = \varphi_{J+1}(T_{J+1}, X_{J+1})$.

$$\sum_{j=1}^{J+1} P_j X_j = Y + Z_{J+1} \quad (4)$$

- Z_{J+1} is a hedonic earnings function which prices out traits and energy in the market.

- It is possible to distinguish two different cases for f .
- For psychological traits, we can distinguish the case where f is a public good, $f^j = \bar{f}$ for all $j = 1, \dots, J + 1$.
- When it is a private good, $\sum_{j=1}^{J+1} f^j = \bar{f}$
- People are not stuck with their personality in all activities.

- For simplicity, we consider the pure private goods case and the pure public goods case. Assume that e is private.

$$e \quad \text{Private} \quad \frac{f}{\text{Public case I} \quad \text{Private case II}}$$

- In case I, the additional constraint operating on the consumer beyond the budget constraint (4) is

$$f^j = \bar{f}, \quad \sum_{j=1}^{J+1} e^j = \bar{e}, \quad \text{for all } j = 1, \dots, J + 1. \quad (5)$$

- In case II, the operative constraints are

$$\sum_{j=1}^{J+1} f^j = \bar{f}, \quad \sum_{j=1}^{J+1} e^j = \bar{e} \quad (6)$$

Case I: Traits as Public Goods

- In case I, different bundles of \bar{f} across persons create comparative advantages for agents in different tasks and thus produce comparative advantages in different activities.
- Case I is a version of Michael's (1973) model of environmental variables in a household production framework.

- For analytical simplicity, suppose that Z_j and T_j , $j = 1, \dots, J + 1$, display constant returns to scale in non-public inputs.

- In terms of the technologies (1), when f is a public good, we assume constant returns to scale in e^j but that $f^j = \bar{j}$ is a fixed, environmental variable.
- Different levels of \bar{f} produce different productivities in different tasks.
- Feeding \bar{f} into the activity functions (2), which are also assumed to be constant returns to scale, we can analyze the agent' problem of allocating effort among tasks and goods among activities using the analysis of Michael (1973).
- Financial and energy resources are not changed by \bar{f} except for its effect on Z_{J+1} .
- Holding energy and money resources fixed, changes in \bar{f} produce reallocations across budget categories.

Several Cases

- Consider an increase in conscientiousness.
- This will likely increase earnings (via Z_{J+1}), and will enhance productivity in some tasks intensive in conscientiousness and activities based on those tasks more than other tasks and activities.
- The increased income will support more of all activities.
- The differential shift in productivity across tasks and activities will reduce the prices of activities that are more intensive in the use of conscientiousness.
- If the demands for those activities are price elastic compared to the demands for the less conscientiousness-intensive activities, the demand for the inputs used in those activities will increase.
- If the demands are relatively inelastic, the demands will decrease because of the greater productivity for the inputs.

- If a trait reduces productivity, the chain of logic just presented runs in reverse.
- With increases in, for example, neuroticism, shadow prices of activities intensive in that trait will increase.
- Labor earnings will tend to decrease.
- In the price-elastic case, consumers will tend to substitute away from activities intensive in the trait and the demand for inputs will decrease.
- In the inelastic case, input demands will increase as agents substitute goods and energy inputs into the activities that are inelastically demanded.

- The same level of the traits is found in all activities, but in general, energy or time will be allocated differentially among activities.
- A person who allocates more energy or time to a task will manifest more of the trait.
- If inputs are complementary, at the same scale of output more of the task will be demanded.
- Unless one controls for these inputs, one may fail to capture the uniformity of traits across tasks and activities.
- In all of these cases, purchase patterns of market goods will provide information on endowments and allocation of energy and traits.

Case II: Traits as Private Goods

- The case when traits are private goods produces the possibility of different levels of traits being used in different tasks and activities.
- Responses of activity levels to changes in rewards across activities will be more price-elastic when traits can be allocated across activities than when traits are fixed.
- Equiproportionate expansions in (\bar{f}, \bar{e}) differentially expand the consumption possibility set for activities intensive in (f, e) and reduce their shadow prices, producing substitution effects in task production and activity consumption that promote consumption in activities intensive in the traits.

- The public goods case imposes more constraints on the system than the private goods case.
- Compared to the case of public goods for traits, agents will reduce their allocation of the trait from activities where their productivity is negative and will spend less effort (e) in overriding the effects of negative traits in productivity.
- The trait will be shifted into less costly activities and less energy will be spent controlling it.

- The evidence summarized in sections IV and V of this lecture would seem to favor case II, since different levels of traits are often found in different activities.
- However, since most of the estimates reviewed in this paper do not adjust for the inputs that affect the manifestation of the traits, one must be cautious in reaching this conclusion.
- Such adjustments are indicated by the theory but are not yet standard in economics or psychology.

- The roles of time and energy in amplifying or reducing the effects of the traits in activities needs to be systematically explored to make the theory empirically operational as are the effects of traits on the purchase of related goods (for example, shy people may seek to live in secluded areas, houses with high walls and seek jobs with little human contact).
- In the private goods specification of the model (case II), the motivation for the supply of traits to different activities depends on preferences (utility rewards U), on productivity in Z_j , and in productivity in the tasks T_j . In this framework, it is possible to formalize many of the currently disparate concepts of personality psychology.
- It would be very informative to estimate both versions of the model and to test between them.