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Measurement and Assessment for Personnel Decisions:  
A comparison between human capability and cognitive ability

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Article #09-08-16

# Measurement and Assessment for Personnel Decisions:

A comparison between human capability and cognitive ability

Master's thesis project

Presented April 27<sup>th</sup>, 2009

To:

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# Overview

## General idea

- I looked at how human capability (a construct developed by EJ. and measured by a particular type of interview) could fit within the nomological net of other well studied and validated constructs in the I/O field such as CA and personality.

## Motivation

- Conduct a research project.
- Combine practice (previous job experience) with theory (master's experience)
- Compare practices in Argentina with practices in the U.S.
- Understand Elliot Jaques' (EJ) ideas from an I/O perspective.
- Share a different perspective with the rest of the program.
- Explore how EJ method can be improved.

# Outline

## 1. Literature review

- Most used and studied assessment methods for personnel decisions
- Elliot Jaques' theory main ideas and method of assessment

## 2. Present study

- Proposed hypotheses / rationale behind

## 3. Method

## 4. Results

## 5. Summary and conclusions

## 6. Limitations



# Literature Review

Different procedures have been developed to predict employee performance for personnel decisions.

Some of the most widely studied and used methods:

- Cognitive ability tests
  - Best predictor of task performance (Hunter & Hunter, 1984; Ree & Earles, 1992; Schmidt & Hunter, 1998; etc.)
  
- Personality inventories
  - Big Five factor model accepted as the most adequate measure of personality. (Salgado, 2005)
  - Best at predicting contextual performance (Motowildo, Borman & Schmit, 1997)
  
- Interviews
  - Best at predicting person-fit to the organization (Jako, 1991)
  - Remains the preferred method for most organizations (Zee, Bakker P. & Bakker A., 2002; Cortina et al.; 2008; APA, 2008).

# Cognitive Ability

General factor that involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly, learn from experience or generally think about information and ideas.

- Tends to remain stable over time.
- Becomes more important to job performance as the nature of work becomes increasingly complex and unpredictable.

(Gottfredson 1994, 1997)

- Standardized cognitive ability tests were shown to be one of the best predictors of task performance.
  - Validity coefficient .51 for middle job complexity.
  - .58 for professional and managerial jobs.

(Schmidt & Hunter, 1998)

- Main criticism: adverse effect (race - background).

# Personality

- The Big Five model emerged as an agreed taxonomy to assess personality (Digman, 1990; Goldberg, 1992; McCrae & Costa, 1987; Wiggins, 1996)
- According to the FFM, people can be described in terms of:  
I. Extraversion II. Agreeableness III. Conscientiousness IV. Em.Stab. V. Op. to Exp.
- Meta analyses have shown that personality measures predict job-relevant criteria
  - Personality constructs are among the best predictors of employee behavior w/ estimate validity of .40 (Ones, Viesvwaran & Dilchert, 2005)
  - Conscienti .20 and E. Stab .13 predict of job perf. (Hurtz & Donovan, 2000)
  - Agreeableness predicts interpersonal facilitation .17 (Hurtz & Donovan, 2000)
  - Extraversion  $r$  to job performance when job requires high social interaction (Barrick & Mount, 1991)
  - Extraversion and openness to experience  $r$  to training aptitude (Barrick & Mount, 1991)

# Interviews

- Validity varies according to level of structure (Huffcut & Arthur, 1994)
  - .20 unstructured interviews
  - .35 interviews with constraints limited to topic standardization
  - .56 structured interviews with pre-specification of questions
  - .57 structured interviews with fully structured questions and response format.
- Validity coefficient can also vary depending on the objective of the interview, (Jako, 1991)
  - When the purpose is to assess person-fit to the organization less structured interviews can be more valid than fully structured ones.
- Main criticism:
  - Many variables can interfere with the interview process. Interviewer can be affected by: errant information from the applicant, the situation, or from his/her personal biases (Jako, 1991).
  - Fully structured interviews are nothing more than verbal ability tests (Huffcut et al, 1994).

# Jaques' theory overview: main ideas

1. Requisite Organization
2. Levels of work
3. Levels of human capability
4. How Jaques proposes to measure HC

# Requisite Organization

Levels of Work



Time-Span

Human Capability



Time-Horizon

The different levels of task complexity mirror the different levels of human capability

# Levels of work - Strata

**Time-span of a role:** A measure of the level of work; the targeted completion time on the longest task in a role.

<i>Organizational layers</i>	<i>Time spans –strata- of the role</i>
Stratum IX and higher	100 + years
Stratum VIII	50 years to 100
Stratum VII	20 years to 50 years
Stratum VI	10 years to 20 years
Stratum V	5 years to 10 years
Stratum IV	2 years to 5 years
Stratum III	1 year to 2 years
Stratum II	3 months to 1 year
Stratum I	1 day to 3 months

# Human capability

HC: ability to handle complexity.

**Time Horizon:** a measure of the complexity of individual information processing and maximum problem solving capability at a given point.

## Three facets of HC:

**CAC:** level of capability a person is actually applying at a certain point in time in a specific job; involving experience, skills, knowledge and commitment to the job.

**CPC:** maximum level at which a person could currently work if he/she possessed the required skills, knowledge and motivation to perform that particular role (determined by CMP).

**FPC:** predicted level of potential capability a person will possess at some specific time in the future as a result of a maturational process.



# Assessing Human Capability

## **CAC: current applied capability**

- Can be determined by analyzing the current level of work: amount of complexity the person is actually handling in his/her present job.

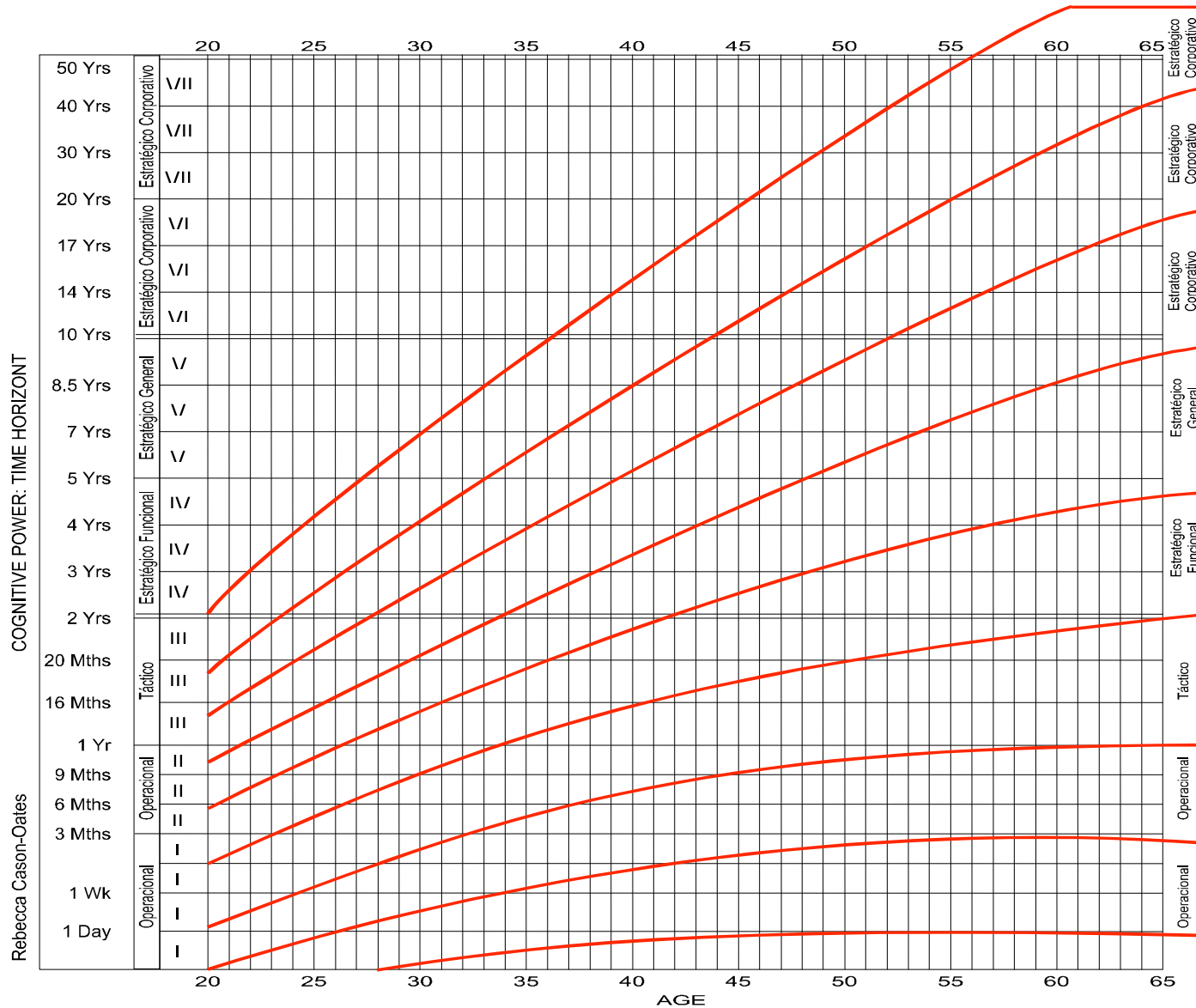
## **CPC: current potential capability**

- Can be assessed by listening to the logic people use when making arguments (observing the complexity of arguments -CMP).
- There are four qualitatively different types of argument.
- People that interweave several lines of argument at once, or argue from several perspectives, are said to operate on a higher stratum than someone who makes simpler assertions.

## **FPC: future potential capability**

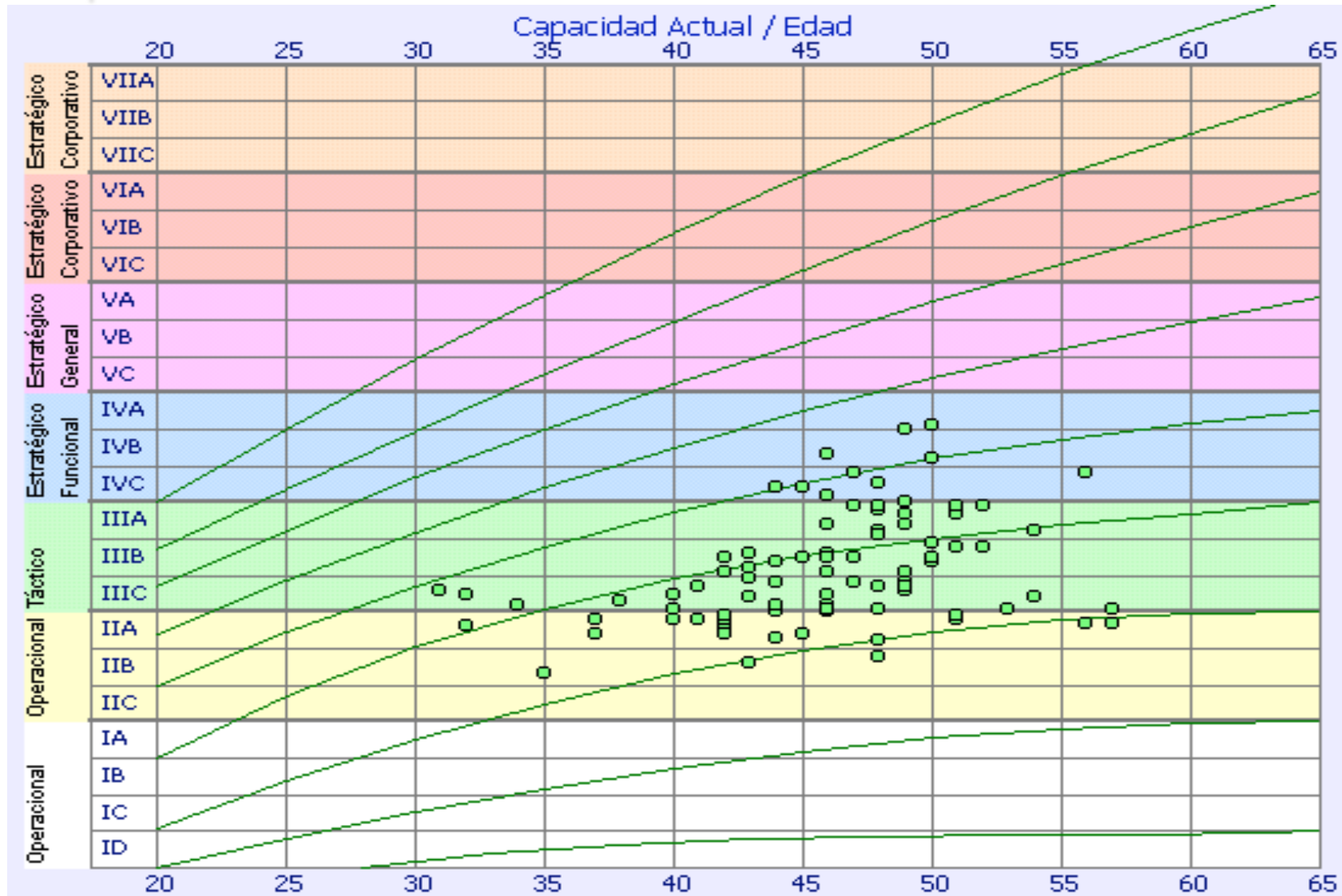
- People's capability increase in a predictable way over time.
- Once CPC is determined, the progression curves allow to identify FPC.

# Human Capability: progression curves



Adopted from Jaques & Cason, 1994

# Example of an organization's talent map measured by Jaques' method



Source: AMG Consulting Group (2009)

# Some of the organizations around the world that use Jaques' method

- Unilever
- Tesco
- Rio Tinto – CRA in Australia
- INCO – now CVRD-INCO
- Royal Dutch Shell
- Imperial Oil (EXXON in Canada)
- Algoma Steel
- Acindar Steel
- Inglis – Canada – now Whirlpool
- Whirlpool – China
- GE – talent pool development
- Northern Telecom
- Southern California Edison
- Novus International
- United Stationers
- National Health Service – UK
- Public Service Commission of Canada
- Health Canada – LCDC
- International Red Cross
- Passport Canada
- AFIP – Argentine tax agency
- BMO Financial Group – Canada
- CIBC - Canada
- Tembec Inc. – forest products
- Tata Motors
- US Army Research Institute
- US Army Medical Corp
- Vistage – TEC Groups – Lancaster Co.

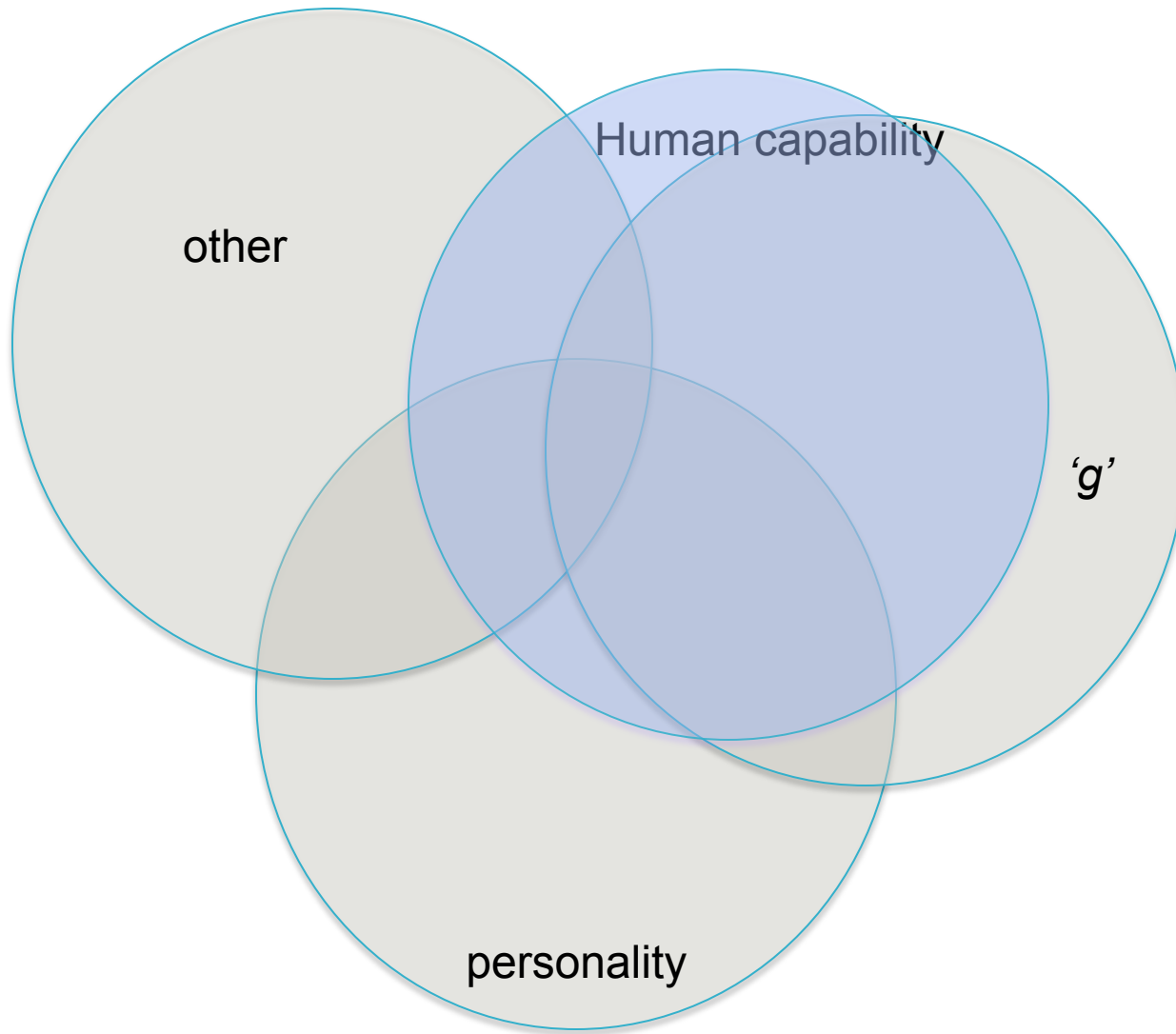
Source: Global Organization Society

# Present Study

# What is HC?



# What is HC? – first intuitions



# Purpose of the study

- **Primary purpose:** Examine the possible relationship between Jaques' conceptualizations of HC (as determined by interviews) and measures of CA as determined by CA tests.
- **Secondary purpose:** Determine whether personality factors as assessed by the Big Five Factor Model are related to measures of HC.
- **Additionally:** Examine background variables that might be influencing the assessment of HC.



# Proposed Hypotheses

- H1: Measures of human capability as described by Jaques will be positively correlated with cognitive ability.
  
- H2: Measures of Current Potential Capability (CPC) will have the highest correlation with CA compared to other facets of HC (FPC).
  
- H3: Personality factors will influence HC interview ratings.

# Rationale for hypothesis 1

HC will be related to CA

Interviews in general tend to assess cognitive ability

- Cortina, Goldstein, Davison & Gilliland (2000)
- Salgado & Moscoso, (2002)
- Walters, Miller & Ree (1993)

Jaques' definition of HC has many aspects in common with the definition of CA .

Jaques' method of assessment seems to be particularly focused on measuring mental complexity.

# Rationale for hypothesis 2

CPC will be more closely related to CA than FPC

- CPC is defined as a function of complexity of mental process. It is said to increase over time as part of a maturational process.
- FPC is defined as the predicted level of potential capability a person will possess at some specific time in the future as a result of the maturation of that person's level of complexity of mental processing over time.
- CA is said to remain relatively stable over time.

(Schmidt, Hunter, Outbridge and Goff, 1988)

# Rationale for hypothesis 3

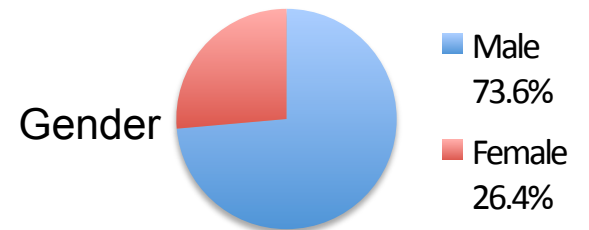
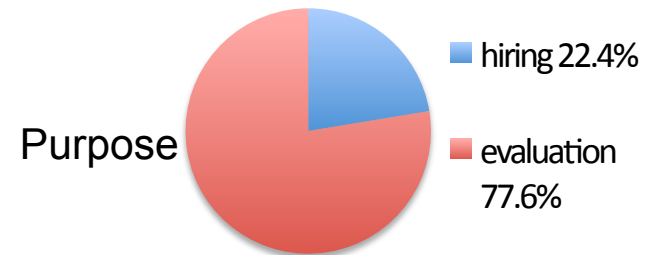
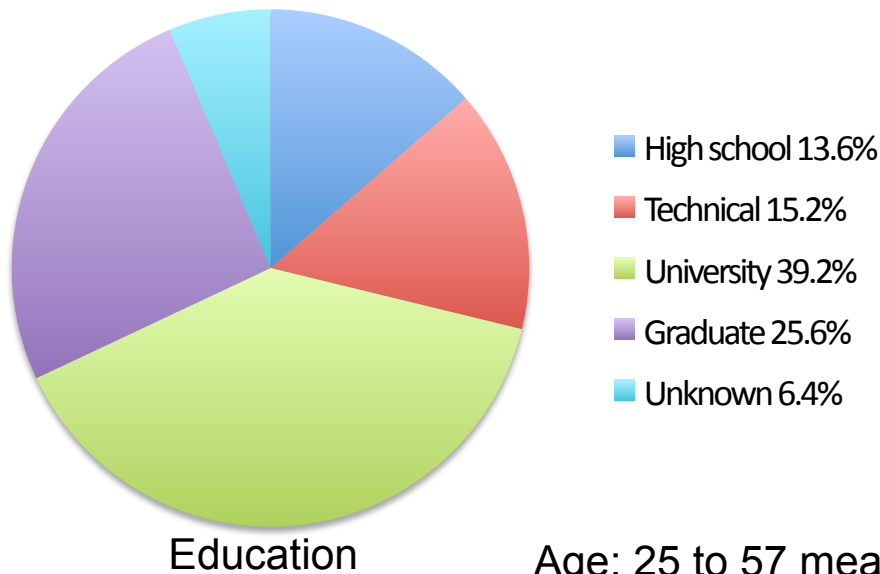
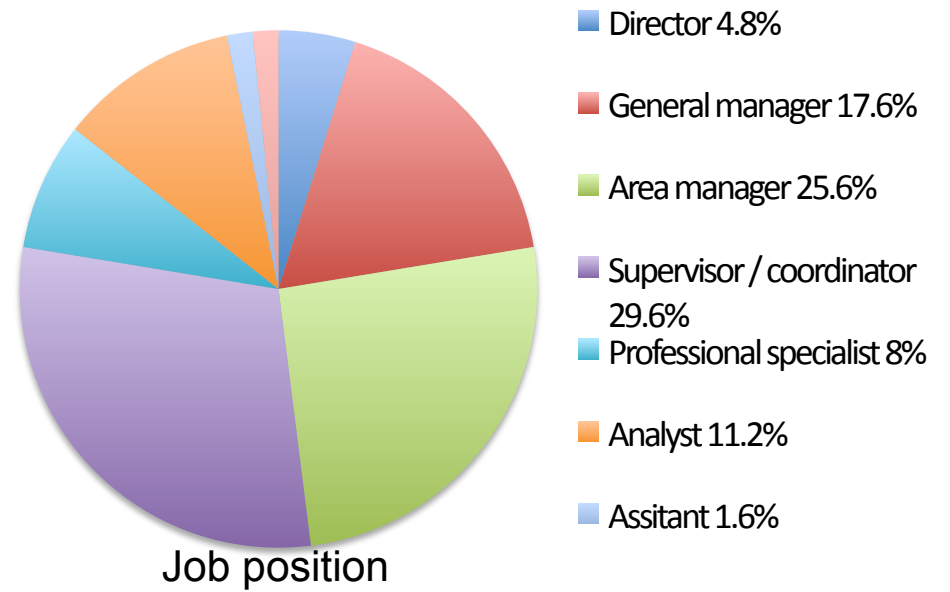
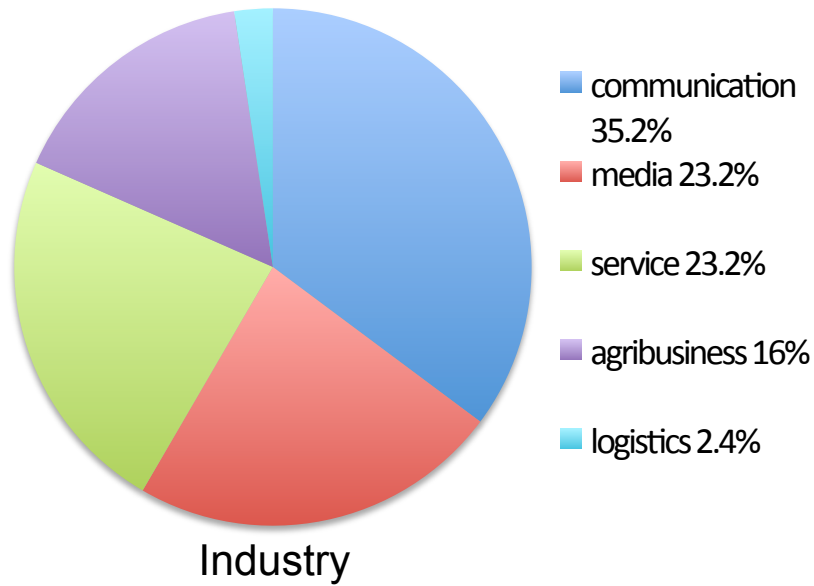
Personality factors will influence the assessment of HC

**Even when not intended to, interviewers capture personality factors.**

- Barrick, Patton & Haugland, (2000)
- Cortina, Goldstein, Payne, Davison & Gilliland (2000)

# Method

# Sample composition N=125 (employees)



Age: 25 to 57 mean = 35.7/ Sd. = 6.76

# Variables and measures

DV

Human capability

- CPC
- AS
- FPC
- FS

Semi-structured interview based on E.J method

Cognitive ability

- Actual score
- Score age c.

WPT

IVs

Personality factors

- Extraversion
- Agreeableness
- Conscientious.
- Emot. Stabil.
- Openness Exp.

IPIP-16PF

Background charact.

- Industry
- Job Position
- Education
- Gender
- Age
- Purpose
- Rater

Survey pre/during i.

# Procedure

- Data was collected by a consulting firm in Argentina as part of their standard assessment procedures which includes:
- An individual 2.5 hr. Semi-structured interview w/ a psychologist
  1. Questions assessing values and competencies (predetermined questions – vary across clients).
  2. Projective test (Rorschach ink bolt test).
  3. Standardized topic to assess complexity of mental process
    - What do you think about the legalization of drugs?
- Standardized tests (additionally for purpose of this study)
  - Wonderlic Personnel test (12 minutes)
  - 16PF-IPIP inventory (no time limit)



# Interview Coding

<i>Category of mental processing</i>	<i>Time spans – strata- of the role</i>	<i>Individual's capability Time-horizons</i>		<i>Score</i>
Conceptual serial	Stratum VII	20 years to 50 years	a. high: 40 years +	21
			b. medium: 30 years	20
			c. low: 20 years	19
Conceptual cumulative	Stratum VI	10 years to 20 years	a. high: 17 years +	18
			b. medium: 14 years	17
			c. low: 10 years	16
Conceptual declarative	Stratum V	5 years to 10 years	a. high: 8.5 years +	15
			b. medium: 7 years	14
			c. low: 5 years	13
Symbolic parallel	Stratum IV	2 years to 5 years	a. high: 4 years +	12
			b. medium: 3 years	11
			c. low: 2 years	10
Symbolic serial	Stratum III	1 year to 2 years	a. high: 20 months +	9
			b. medium: 16 months	8
			c. low: 1 year	7
Symbolic cumulative	Stratum II	3 months to 1 year	a. high: 9 months +	6
			b. medium: 6 months	5
			c. low: 4 months	4
Symbolic declarative	Stratum I	1 day to 3 months	a. high: 3 months +	3
			b. medium: 2 months	2
			c. low: 1 day	1

# Personality inventory

<i>Big Five</i>	<i>16-PF Scales</i>
I. Extraversion	<ul style="list-style-type: none"><li>• Friendliness</li><li>• Reserve-R</li><li>• Assertiveness</li><li>• Gregariousness</li><li>• Introversion-R</li></ul>
II. Agreeableness	<ul style="list-style-type: none"><li>• Warmth</li><li>• Sensitivity</li></ul>
III. Conscientiousness	<ul style="list-style-type: none"><li>• Orderliness</li><li>• Dutifulness</li></ul>
IV. Emotional Stability	<ul style="list-style-type: none"><li>• Emotional stability</li><li>• Anxiety-R</li><li>• Emotionality-R</li><li>• Distrust-R</li></ul>
V. Openness to Experience	<ul style="list-style-type: none"><li>• Intellect</li><li>• Imagination</li><li>• Complexity</li></ul>

# Data analysis

## 1. Hypotheses 1 and 2

- Correlation: HC – CA

## 2. Hypothesis 3

- Reliability: 16PF-Scales / Big 5 Factors
- Factor analysis / Parallel analysis: Big 5 Factors
- Correlation: HC – Big 5 / 16PF
- Regression: Step 1: CA / Step 2: Big 5

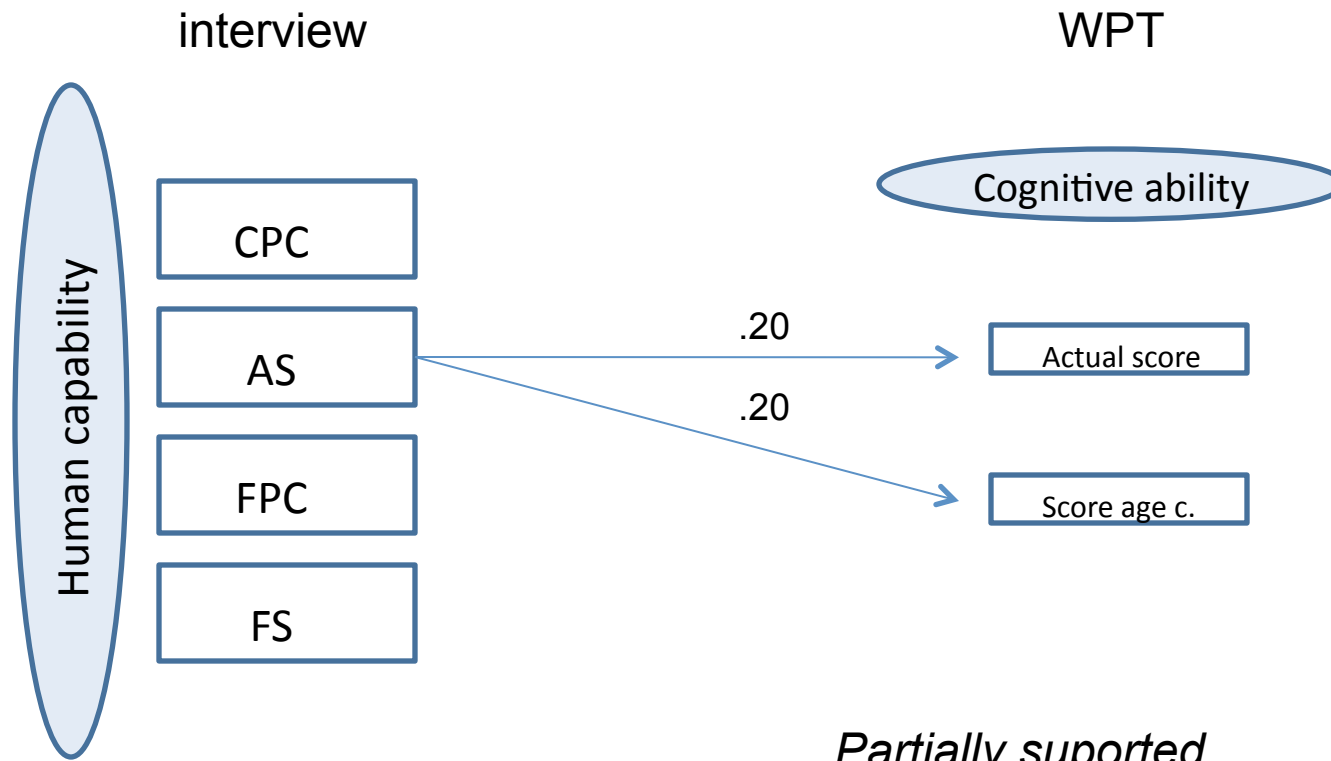
## 3. Background characteristics

- Correlation: HC – education, gender, age, purpose.
- One way ANOVA: HC - Industry, Job position, rater.

# Results

# Results: Hypotheses 1 and 2

*Correlations between Human Capability and Cognitive Ability*



# Descriptive Statistics and Correlations

## *Human Capability and Cognitive ability*

Measure	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1.HC- CPC	6.46	1.004	(-)					
2.HC- FPC	9.34	1.756	.41**	(-)				
3.HC-AS	2.43	0.497	.82**	.40**	(-)			
4.HC-FS	3.37	0.642	.36**	.88**	.34**	(-)		
5.WPT-AS	22.27	5.396	.12	.13	.20*	.00	(-)	
6.WPT-AC	23.46	5.551	.14	.03	.20*	-.07	.97**	(-)

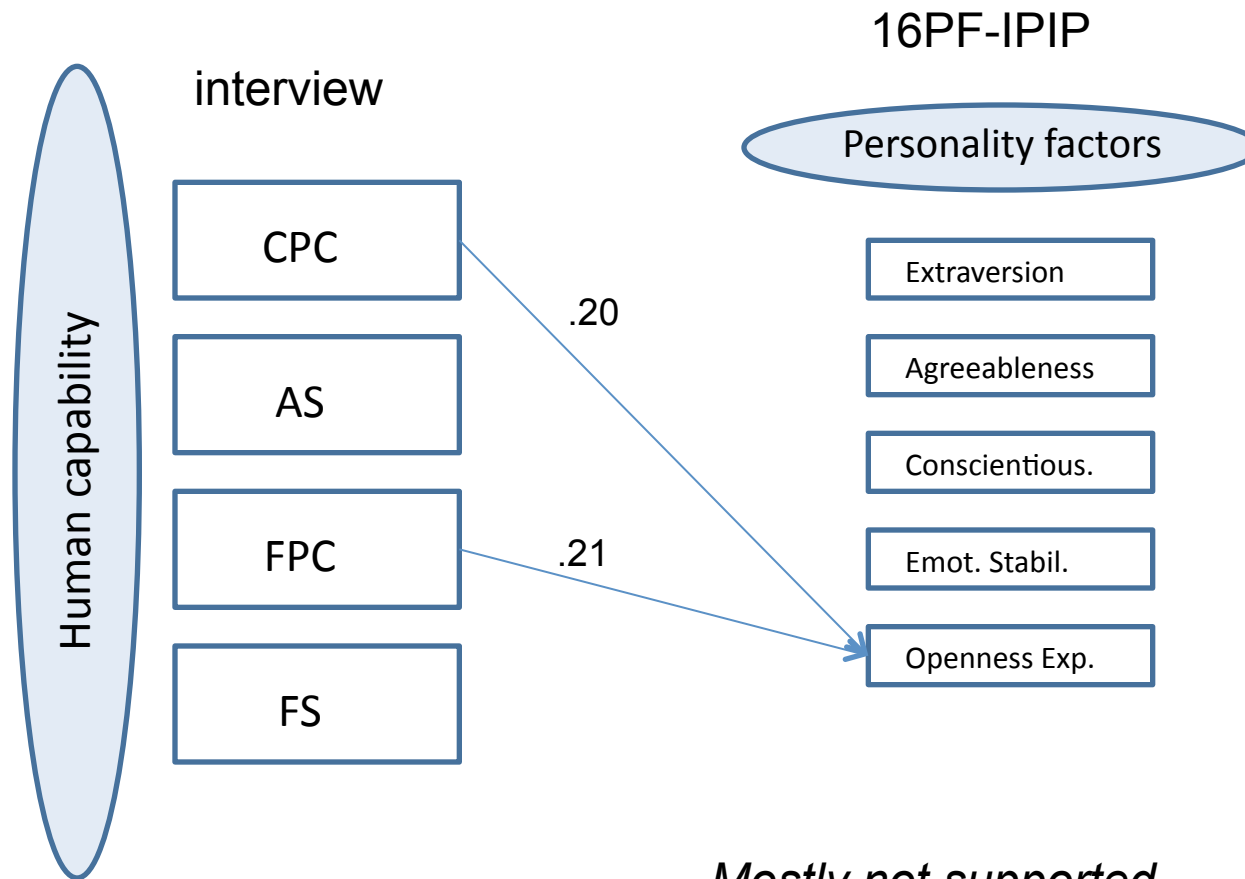
*N*=125

\*\*Correlation is significant at the 0.01 level (2-tailed)

\*Correlation is significant at the 0.05 level (2-tailed)

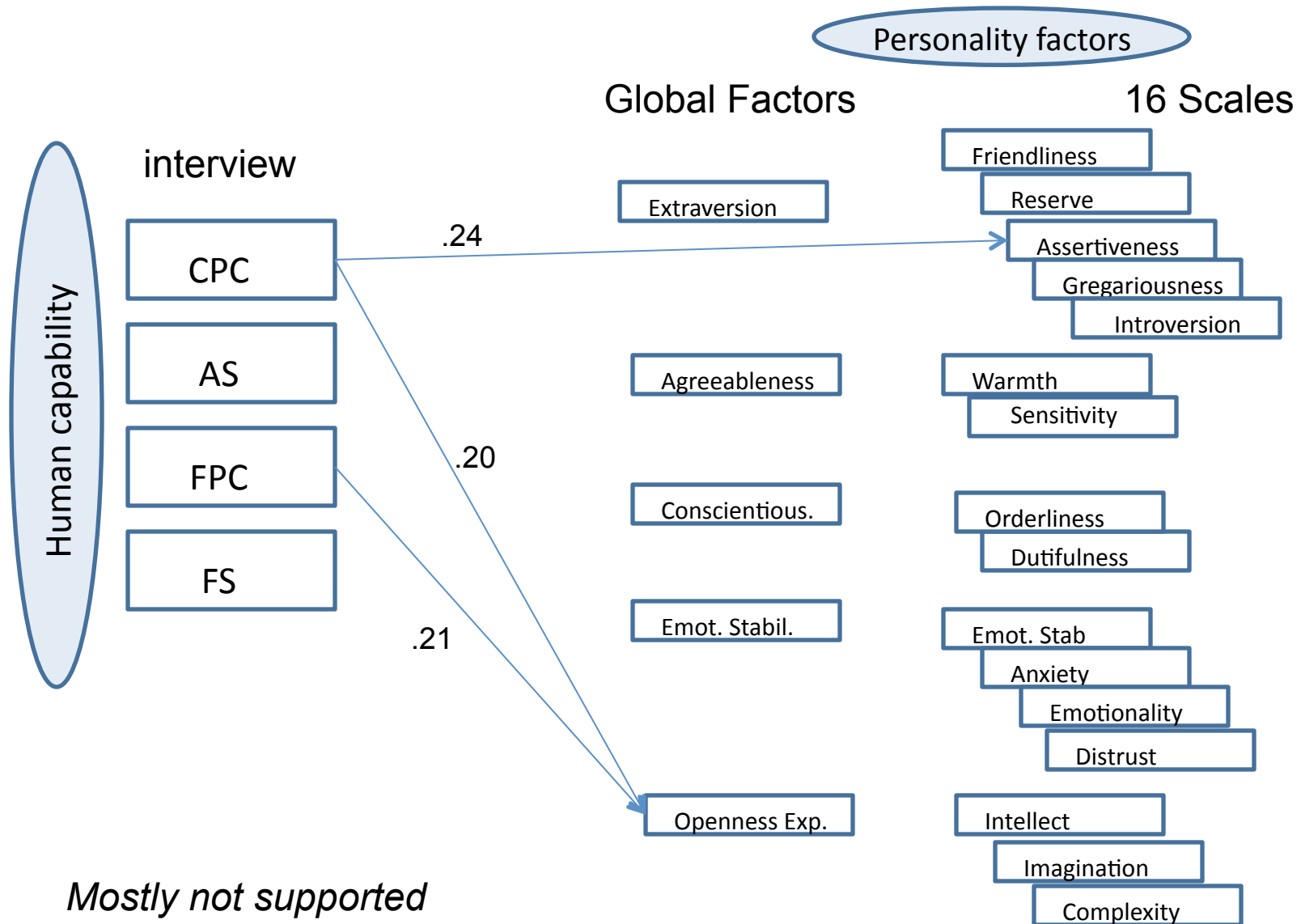
# Results: Hypothesis 3

*Correlations between Human Capability and the Big 5*



# Results: Hypothesis 3

*Correlations between Human Capability and the 16PF*





# Descriptive Statistics and Correlations

## *Human Capability, Cognitive ability and Personality (Big 5)*

Measure	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11
1.HC- CPC	6.46	1.004	(-)										
2.HC- FPC	9.34	1.756	.41**	(-)									
3.HC-AS	2.43	0.497	.82**	.40**	(-)								
4.HC-FS	3.37	0.642	.36**	.88**	.34**	(-)							
5.WPT-AS	22.27	5.396	.12	.13	.20*	.00	(-)						
6.WPT-AC	23.46	5.551	.14	.03	.20*	-.07	.97**	(-)					
7.BF1-Ex.	3.4223	0.33	.18	.10	.11	.01	-.09	-.06	(.72)				
8.BF2-Ag.	3.7546	0.34854	.06	.06	.00	.01	.01	.04	.51**	(.36)			
9.BF3-Es.	3.916	0.40076	-.02	-.01	-.09	-.02	-.19	-.18	.24*	.25*	(.66)		
10.BF4-Co.	3.7435	0.29813	.03	-.04	.01	-.14	-.04	-.05	.42**	.38**	.33**	(.63)	
11.BF5-Oe.	3.4778	0.29543	.20*	.21*	.13	.17	.08	.09	.46**	.53**	.03	.12	(.52)

*Note.* Total  $N=125$  /  $N=94$  for Big 5. Scale score correlations are given below the diagonal. Internal reliabilities (coefficient alphas) are given in the parentheses along the diagonal. \*\*.Correlation is significant at the 0.01 level (2-tailed). \*.Correlation is significant at the 0.05 level (2-tailed)

# Descriptive Statistics and Correlations

## *Human Capability, Cognitive ability and Personality (16PF)*

Measure	M	SD	7	8	9	10	11	12	13	14
1.HC- CPC	6.46	1.004	.08	.14	.06	.24*	.03	.10	.18	.03
2.HC- FPC	9.34	1.756	.07	.11	-.08	.03	.04	-.06	.08	.03
3.HC-AS	2.43	0.497	.04	.10	.01	.12	-.06	-.10	0.14	-.03
4.HC-FS	3.37	0.642	.03	.07	-.15	.00	-.07	-.10	-.01	-.01
5.WPT-AS	22.27	5.396	-.11	.09	-.08	-.13	.07	.06	-.11	.08
6.WPT-AC	23.46	5.551	-.08	.13	-.04	-.10	.05	.09	-.08	.11
7. W	3.9999	.35782	(.74)							
8. I	3.8696	.35575	.40**	(.68)						
9.ES	3.9314	.44745	.35**	.57**	(.80)					
10.A	3.8333	.35428	.42**	.59**	.60**	(.60)				
11.G	3.224	.46326	.34**	.27**	.14	.28**	(.66)			
12.D	4.0598	.41101	.00	.13	.19	.16	.06	(.68)		
13.F	3.6958	.46277	.54**	.38**	.45**	.50**	.43**	.08	(.79)	
14.S	3.5093	.5192	.24*	.13	.22*	.10	.13	.22*	.38**	(.72)
15.D	2.1449	.41733	-.17	.22*	-.02	.11	-.04	-.07	.01	.04
16.I	3.0343	.46859	.26*	.07	-.20*	-.01	.10	-.29**	.27**	.16
17.R	2.6619	.65114	-.31**	-.17	-.28**	-.39**	-.29**	.04	-.56**	-.31**
18.A	2.609	.48159	-.29**	-.32**	-.63**	-.44**	-.10	-.09	-.37**	-.21*
19.C	3.5296	.4117	.45**	.53**	.42**	.44**	.24*	.02	.39**	.48**
20.I	2.9799	.41123	-.33**	-.19	-.29**	-.34**	-.14	-.05	-.34**	-.11
21.O	3.7722	.51253	.21*	.26*	.30**	.42**	.14	.50**	.35**	.2
22.E	2.2035	.38187	-.29**	.13	-.29**	-.17	-.12	-.33**	-.27**	-.25*

# Descriptive Statistics and Correlations

*Human Capability, Cognitive ability and Personality (16PF) Cont.*

Measure	M	SD	15	16	17	18	19	20	21	22
1.HC- CPC	6.46	1.004	-.02	.13	-.16	-.01	.18	-.03	.04	-.05
2.HC- FPC	9.34	1.756	-.08	.16	-.14	.12	.19	-.02	.04	-.05
3.HC-AS	2.43	.497	-.06	.13	-.12	.05	.05	-.06	-.06	.02
4.HC-FS	3.37	.642	-.01	.14	-.06	.19	.15	-.04	.05	.04
5.WPT-AS	22.27	5.396	-.12	.05	.04	.12	.03	.12	-.35**	.02
6.WPT-AC	23.46	5.551	-.05	.03	.02	.09	.06	.11	-.34**	.04
15.D	2.1449	.41733	(.78)							
16.I	3.0343	.46859	.13	(.70)						
17.R	2.6619	.65114	-.03	-.22	(.88)					
18.A	2.609	.48159	.12	.28**	.25*	(.70)				
19.C	3.5296	.4117	.12	.24*	-.34**	-.27**	(.62)			
20.I	2.9799	.41123	.11	.21*	.31**	.33**	-.20	(.69)		
21.O	3.7722	.51253	.01	-.15	-.15	-.28**	.20	-.13	(.79)	
22.E	2.2035	.38187	.37**	.08	.09	.34**	-.17	.19	-.30**	(.61)

# Hierarchical Regression

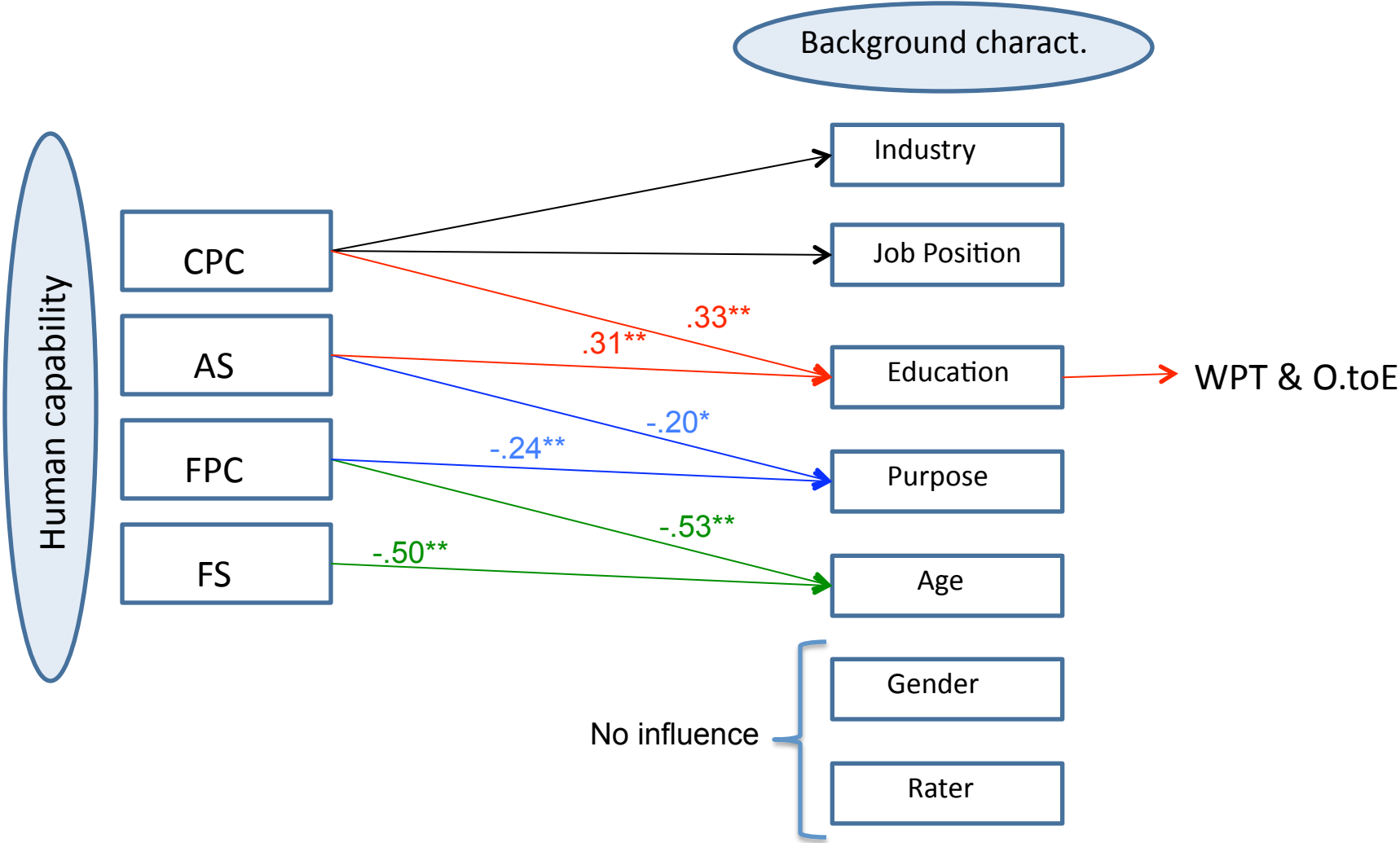
Model	Unstandardized Coefficients		Standardized coefficients		
	B	Std. Error	$\beta$	<i>t</i>	Sig.
Step 1					
(Constant)	5.969	.441		13.524	.000
WPT Actual Score	.022	.019	.119	1.153	.252
Step 2					
(Constant)	3.52	1.88		1.873	.064
WPT Actual Score	.022	.02	.118	1.111	.269
Extraversion	.533	.403	.175	1.322	.19
Agreeableness	-.335	.392	-.116	-.854	.395
Conscientiousness	-.044	.283	-.017	-.154	.878
Emotional Stability	-.019	.407	-.006	-.046	.963
Openness to Experience	.612	.439	.180	1.395	.167

Total N=94

Dependent variable: current potential capability (CPC)

Step 1  $R^2 = .002$  for Step 2;  $\Delta R^2 = .062$ ;  $p = .336$

# Background characteristics



Purpose: 1= evaluation / 2 = hiring

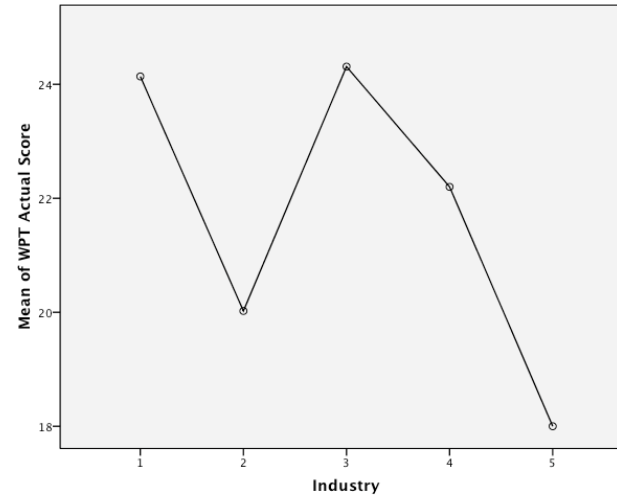
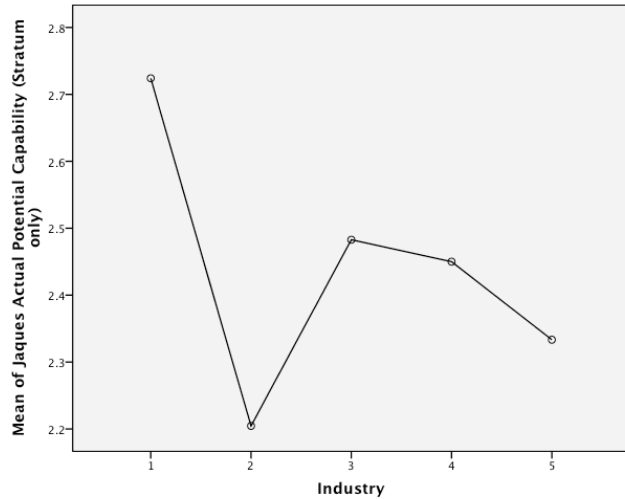
# Descriptive Statistics and Correlations

## *Human Capability, Cognitive ability and Demographic characteristics*

Measure	M	SD	12	13	14	15
1.HC- CPC	6.46	1.004	-.07	.33**	-.13	.21
2.HC- FPC	9.34	1.756	-.06	.18	-.24**	-.53**
3.HC-AS	2.43	.497	-.02	.31**	-.20*	.16
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10..BF4-Co.	3.7435	.29813	.03	-.04	.17	.03
11.BF5-Oe.	3.4778	.29543	.14	.22*	.14	-.01
12 gender	-	-	(-)			
13 education	-	-	-.05	(-)		
14 purpose	-	-	.06	-.25	(-)	
15 age	35.7	6.761	.12	-.09	.18*	(-)

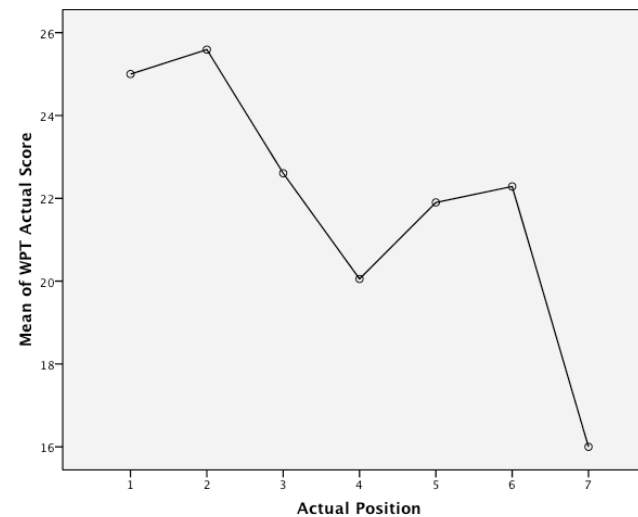
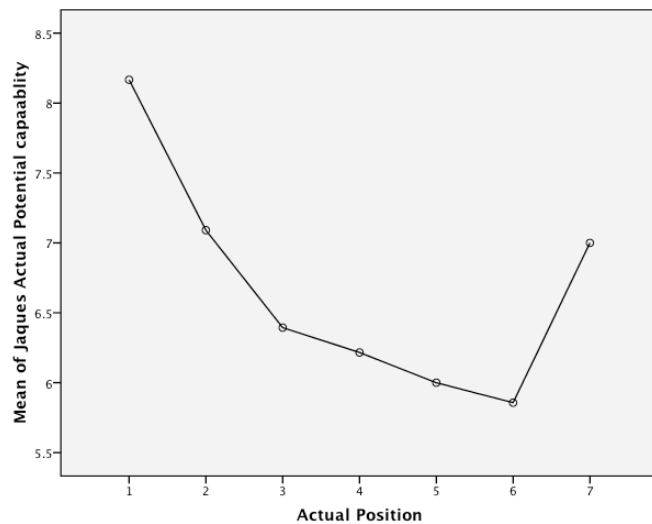
# One way ANOVA

## Industry



1. call center
2. mobile phone
3. media
4. agribusiness
5. transportation

## Job Position

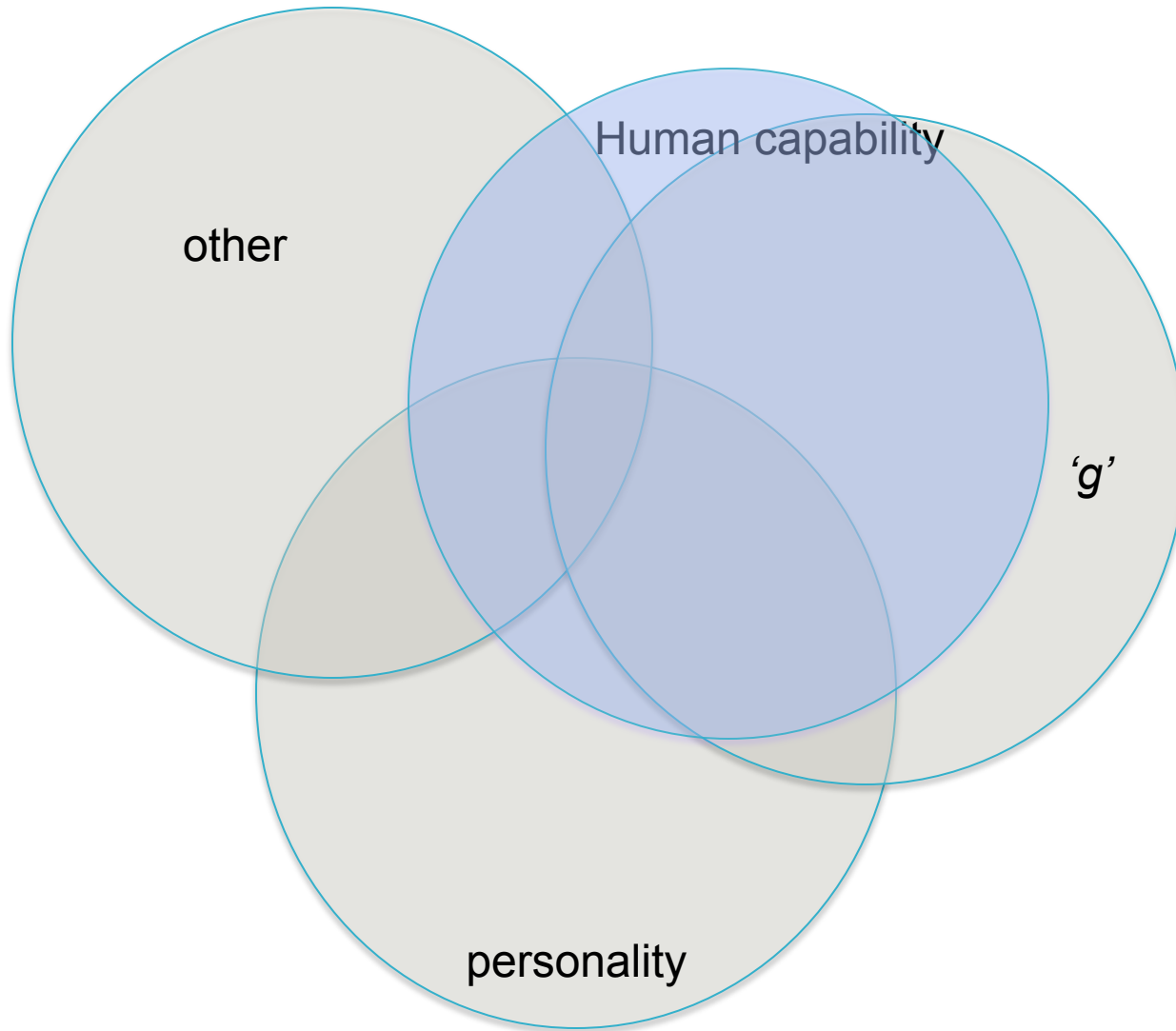


1. Director
2. General Manager
3. Area Manager
4. Supervisor / leader
5. Professional specialist/ expert
6. Analyst
7. Assistant
8. Other

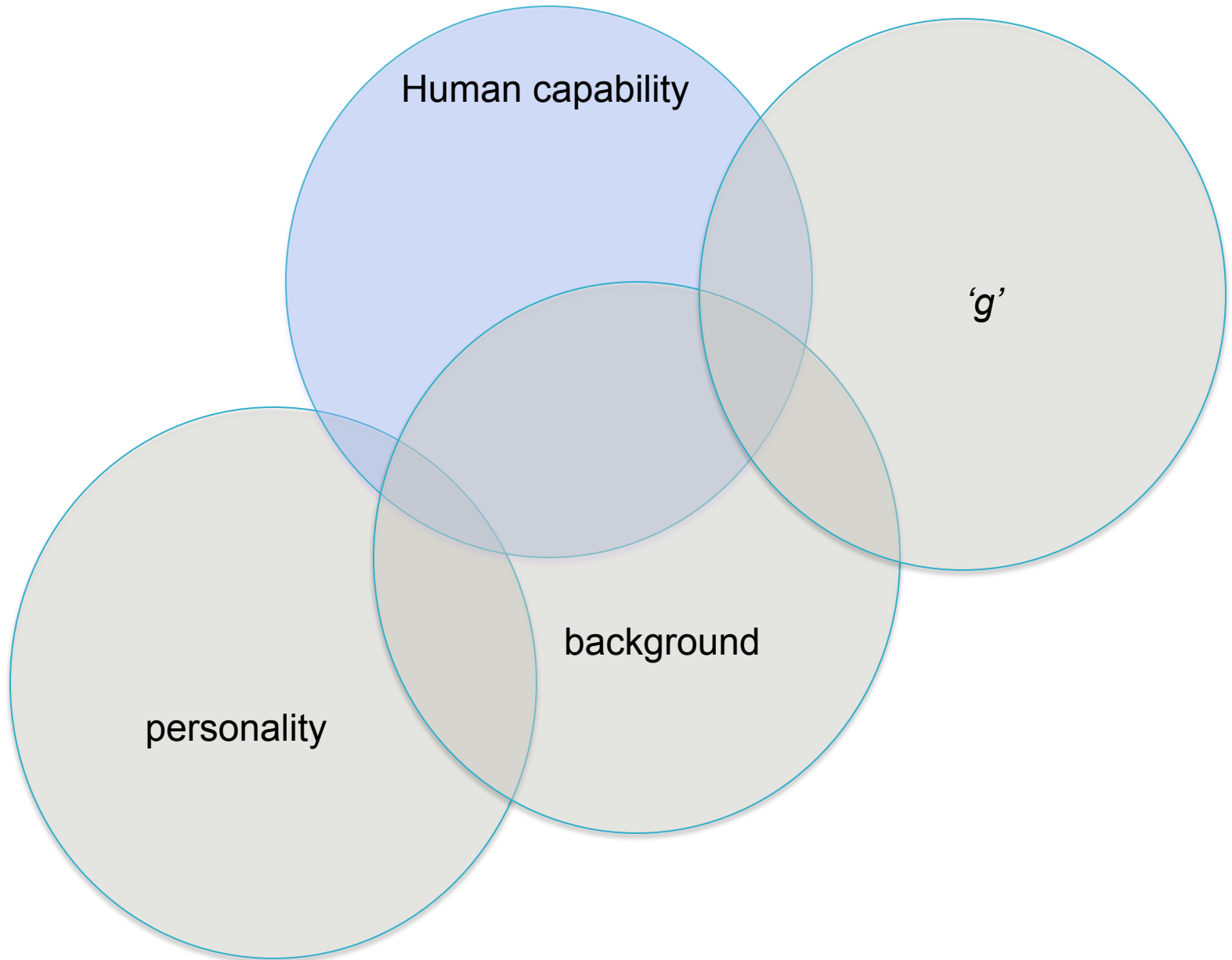
# Summary and Conclusions



# Expected relationships



# Observed relationships



# Summary – hypotheses 1 and 2

## Hypothesis 1: Partially supported

Possible explanations:

- All interviews measure CA to some extent.
- HC and CA are somewhat related to each other.
  - (Prinsloo study CPP – CA similar results)

## Hypothesis 2: Partially supported

Possible explanations:

- FPC is a measure of experience.

# Summary – hypothesis 3

Hypothesis 3: Mostly not supported by this study

Possible explanations:

- HC is not related to personality
  - Support Jaques' premises.
  - Other studies (found later) had similar results: CPP – MBTI (Heerden, 2005; Nzama, De Beer & Visser, 2008).
- HC is related to personality but the measured used to assess personality was not adequate:
  - 16IPIP scales: low reliability, weak factor structure.
  - Cultural and translation issues involved.
  - Factors such as O to E and assertiveness do in fact influence the assessment of HC. However, it is hard to tell if they are in fact part of the construct of HC or if they are being captured by raters as unintended byproducts.
- HC and personality were mostly not related because:
  - Self vs. others' perceptions of personality.

# What Jaques' interview might be measuring?

Overall, Jaques' idea of HC seems to be a measure of something else, different than CA and personality.

What is it?

- Cognitive complexity? (tendency to describe the environment multidimensionally)
- Previous experience / job knowledge?
- Person-fit?
- A construct itself?

# Implications

- One more step towards integrating Jaques' theory into the I/O field.
- Support for Jaques ' premises that HC is different from CA and personality.
- Cognitive ability might be a good complement to HC for making personnel decisions.

# Suggestions for future research

- Clarification of Jaques' definitions
- Test of reliability and validity of Jaques' assessment method.
- Replicate study with a better measure of personality.
- Understanding the implications of using different methods in different cultures.

# Limitations

- Issues with the personality scales (reliability, FA)
- Cultural issues
- Sample size
- Time



Questions / Feedback

# Feedback

1. Things to change / improve / delete?
2. Things I should have done differently?
3. What else can I do with this data?
4. Summary of results to consulting firm
  - What should I recommend?
  - Where should I focus?

# Appendix

# Hierarchical Regression

Model	Unstandardized Coefficients		Standardized coefficients		
	B	Std. Error	$\beta$	<i>t</i>	Sig.
Step 1					
(Constant)	2.164	.200		10.821	.000
WPT Actual Score	.007	.009	.083	.8	.426
Step 2					
(Constant)	1.778	.89		1.997	.049
WPT Actual Score	.006	.009	.071	.66	.511
Extraversion	.202	.191	.142	1.053	.295
Agreeableness	-.149	.186	-.111	-.803	.424
Conscientiousness	-.099	.134	-.085	-.736	.464
Emotional Stability	.007	.193	.004	.034	.973
Openness to Experience	.185	.208	.117	.888	.377

Total N=94

Dependent Variable: Current potential capability (AS - Stratum only)

Step 1  $R^2 = .007$  for Step 2;  $\Delta R^2 = .037$   $p = .648$

# Complexity of Mental Process (CMP)

<i>Type of mental process</i>	<i>Internal logical process – structure of the argument</i>
Parallel	Serial process A if and only if serial process B Several serial arguments are linked together.
Serial	If A then B; if B then C. Argument based on an “if-then” structure.
Cumulative	A and B and C –therefore D. Argument by adding a number connected points.
Declarative	A or B or C –therefore D. Argument by making simple unconnected points.

Each of these four types of mental processes can be found on each of the four following categories:

Universal	world of universal ideas. Used by those that can handle problems of entire societies.
Conceptual	The use of conceptual ideas.
Symbolic	minimum order required to manage daily work in an org. Can understand abstract ideas.
Concrete	characteristic of children. Ideas refer to concrete objects.

<i>Individual's capability Time-horizons -CMP</i>	<i>Time span –Strata- of the role</i>		
Conceptual serial	Stratum VII	20 years to 50 years	a. high: 40 years + b. medium: 30 years c. low: 20 years
Conceptual cumulative	Stratum VI	10 years to 20 years	a. high: 17 years + b. medium: 14 years c. low: 10 years
Conceptual declarative	Stratum V	5 years to 10 years	a. high: 8.5 years + b. medium: 7 years c. low: 5 years
Symbolic parallel	Stratum IV	2 years to 5 years	a. high: 4 years + b. medium: 3 years c. low: 2 years
Symbolic serial	Stratum III	1 year to 2 years	a. high: 20 months + b. medium: 16 months c. low: 1 year
Symbolic cumulative	Stratum II	3 months to 1 year	a. high: 9 months + b. medium: 6 months c. low: 4 months
Symbolic declarative	Stratum I	1 day to 3 months	a. high: 3 months + b. medium: 2 months c. low: 1 day

# Issues with the Big5 - Reliability

		Original items		Item deleted	After deleting items to increase reliability			
		# of items	alpha		# of items	alpha	Mean	SD
<b>BF1</b>					<b>45</b>	<b>.723</b>	<b>3.4223</b>	<b>.33000</b>
<b>Extraversion</b>								
	7) Friendliness	10	.774	144	9	.788	33.2088	4.20982
	11) Reserve-R	10	.877	6	9	.883	23.9574	5.86023
	4) Assertiveness	10	.527	50	9	.596	34.5000	3.18852
	5) Gregariousness	10	.630	58	9	.664	29.1087	4.16278
	14) Introversion-R	10	.642	95	9	.685	26.8191	3.70110
<b>BF2</b>					<b>18</b>	<b>.364</b>	<b>3.7546</b>	<b>.34854</b>
<b>Agreeableness</b>								
	1) Warmth	10	.743	-	10	.743	40.1196	3.52025
	8) Sensitivity	10	.676	105, 54	8	.718	28.0745	4.15361
<b>BF3</b>					<b>17</b>	<b>.656</b>	<b>3.9160</b>	<b>.40076</b>
<b>Conscientiousness</b>								
	15) Orderliness	10	.770	79	9	.784	33.9032	4.61582
	6) Dutifulness	10	.578	20, 59	8	.675	32.4787	3.28806
<b>BF4</b>					<b>34</b>	<b>.628</b>	<b>3.7435</b>	<b>.29813</b>
<b>Emotional Stability</b>								
	3) Emotional Stabil.	10	.763	49	9	.8	35.3763	4.04839
	12) Anxiety-R	10	.667	71, 23	8	.695	20.8723	3.85276
	16) Emotionality-R	10	.611	112, 3	8	.610	17.6277	3.054994
	9) Distrust-R	10	.712	80, 156	8	.778	17.1720	3.35450
<b>BF5</b>					<b>30</b>	<b>.515</b>	<b>3.4778</b>	<b>.29543</b>
<b>Openness to Exp.</b>								
	2) Intellect	13	.655	76	12	.677	16.713	4.08812
	10) Imagination	10	.561	68	9	.698	27.3085	4.21729
	13) Complexity	10	.608	64	9	.615	31.7660	3.70534

# Rationale for deleting items

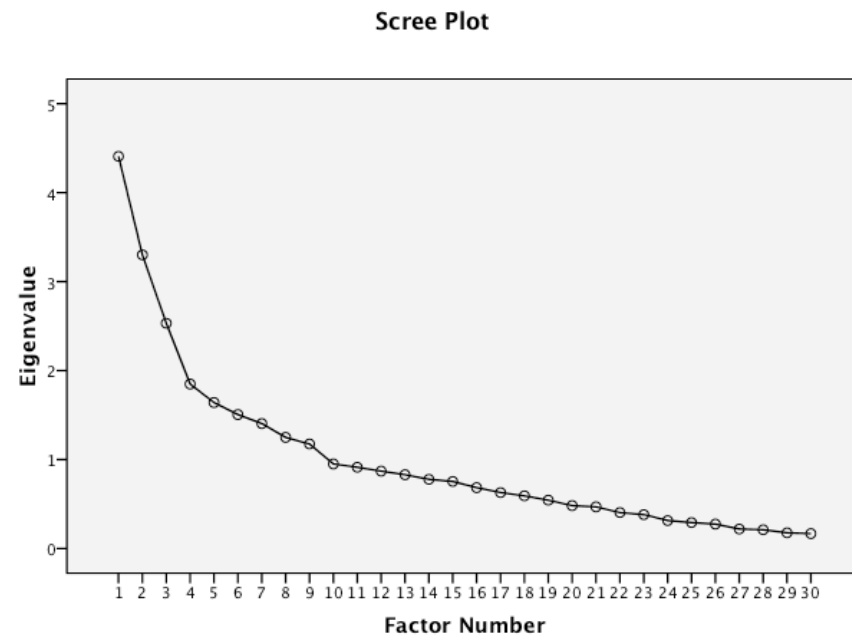
Items deleted			
	English version	Spanish translation	Rationale
<b>scale Extraversion</b>			
7	144. Don't mind being the center of attention	No me importa ser el centro de la atención de los demás	Low correlation.
11	6. Show my feelings	Siento deseos de hablar de mi mismo	Translation. Low correlation.
4	50. Never challenge things.	Casi nunca critico a los demás	Translation. Low correlation.
5	58. Act wild and crazy.	Frecuentemente actúo de manera impulsiva	Low correlation.
14	95. Can't do without the company of others.	No puedo hacer nada sin la compañía de los demás	Translation. Low correlation.
<b>Agreeableness</b>			
8	105. Don't like action movies	No me gustan las películas de acción	Low correlation. Do not understand relation of item with scale.
8	54. Cry during movies	Lloro frecuentemente durante las películas.	Cultural. Low correlation.
<b>Conscientiousness</b>			
15	79. Put off unpleasant tasks	Postergo last tareas desagradables	Low correlation.
6	20. Believe in one true religion.	Creo en una única religion verdadera	Cultural. Low correlation.
6	59. Likes to stand during the national anthem	Me gusta ponerme de pie durante el himno nacional.	Cultural. Low correlation.
<b>Emotional Stability</b>			
3	49. Am relaxed most of the time.	Estoy tranquilo la mayor parte del tiempo	Low correlation.
12	23. Am not easily bothered by things.	No me altero con facilidad	Low correlation.
12	71. Don't worry about things that have already happened.	No me preocupan las cosas que ya han ocurrido	Low correlation.
16	3. Have a good word for everyone.	Siempre tengo una palabra de aliento para todos	Translation. Low correlation. Could be assessing friendliness instead of emotionality
16	112. Judge people by their appearance.	La apariencia de los demás es muy importante para mi	Translation. Low correlation.
9	156. Am aware of others	Soy precavido con los demás	Low correlation.
9	80. Find it hard to forgive others	Me resulta difícil perdonar a los demás.	Low correlation.
<b>Openness to Experience</b>			
2	76. Consider myself an average person	Me considero una persona común	Translation. Low correlation.
10	68. Love to daydream	Adoro soñar despierto	Low correlation. Translation.
13	64. Prefer variety to routine	Me gusta mas la variedad que la rutina.	Low correlation.



# Factor analysis - Openness to Experience

Factor	Initial Eigenvalues			Total
	Total	% of Variance	Cumulative %	
1	4.409	14.695	14.695	1.685
2	3.301	11.004	25.699	3.246
3	2.532	8.441	34.14	2.7
4	1.849	6.162	40.302	2.231
5	1.641	5.47	45.772	1.181
6	1.506	5.02	50.792	0.982
7	1.405	4.683	55.475	0.997
8	1.249	4.164	59.639	0.918
9	1.175	3.917	63.556	0.772
10	0.951	3.17	66.726	
11	0.914	3.046	69.772	
12	0.87	2.9	72.671	
13	0.83	2.766	75.437	
14	0.778	2.592	78.029	
15	0.754	2.513	80.542	
16	0.684	2.281	82.823	
17	0.629	2.098	84.921	
18	0.592	1.973	86.893	
19	0.543	1.812	88.705	
20	0.482	1.607	90.312	
21	0.468	1.561	91.872	
22	0.404	1.346	93.219	
23	0.381	1.269	94.488	
24	0.314	1.048	95.535	
25	0.292	0.973	96.508	
26	0.274	0.915	97.423	
27	0.219	0.73	98.152	
28	0.211	0.702	98.855	
29	0.176	0.587	99.442	
30	0.167	0.558	100	

Extraction Method: Maximum Likelihood.



# Factor analysis - Openness to Experience

Pattern Matrix<sup>a</sup>

	Factor								
	1	2	3	4	5	6	7	8	9
BF39	.192	-.031	-.007	.190	.109	.296	-.071	-.352	.007
BF78	-.019	.173	.122	-.120	.029	-.123	.644	-.127	-.212
BF87	.087	.235	.114	.140	-.117	.085	.390	-.123	-.130
BF83	.072	.147	.175	.130	-.025	.547	-.115	-.046	-.080
BF19r	1.024	-.084	-.095	-.138	-.040	.048	-.058	-.098	.099
BF45r	.116	.417	.038	.082	-.109	.130	.103	-.233	.187
BF102r	.122	-.072	.220	.134	-.385	-.051	.056	-.100	.028
BF52r	.095	-.035	.046	.036	-.022	.075	.038	-.618	.025
BF107r	.053	.049	-.143	.196	-.301	-.071	.098	-.041	.286
BF138	-.016	-.148	-.098	.412	-.033	.327	.323	.248	.101
BF32	-.074	.044	.297	.203	.047	.526	.017	-.119	.124
BF44	-.068	.952	.004	.060	.122	.054	.011	.100	.037
BF43	-.043	.562	-.132	-.091	-.008	-.058	.129	.026	.059
BF81	-.125	-.031	-.031	.148	-.053	.174	.592	.123	.068
BF135	.319	.109	.102	.145	.047	.110	.395	.319	-.049
BF113	-.102	.401	.027	-.246	-.555	.182	.006	.000	.186
BF37	.119	.338	.009	.015	-.210	.123	.287	.056	-.077
BF141r	.020	.068	.056	-.086	-.039	-.071	.396	-.081	.107
BF55r	.049	.010	-.133	-.037	-.015	.467	.048	-.002	-.123
BF33r	-.040	.116	-.050	.587	.074	.253	-.005	-.066	-.142
BF145r	-.017	-.047	-.026	.683	-.105	-.109	-.060	-.056	.043
BF127	-.053	.048	.088	-.129	.660	.150	-.063	-.101	.177
BF162	.248	.016	.440	-.065	.088	.114	.085	-.031	.102
BF75	-.095	-.071	.709	-.086	-.001	.027	.235	-.357	.038
BF38	.115	.140	.109	-.081	.078	-.126	-.123	.035	.656
BF34	.051	.079	.502	-.069	-.078	.124	-.132	.391	.156
BF91	-.090	-.034	.156	.208	.439	-.061	.225	-.231	.367
BF61r	-.145	-.359	-.162	-.234	.106	.409	.231	-.002	.235
BF140r	.057	-.073	.675	.010	.117	-.162	.105	.014	-.038
BF109r	.267	-.070	.175	.056	.439	-.185	-.001	.019	-.012

Extraction Method: Maximum Likelihood.  
 Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 53 iterations.

# Factor analysis - Extraversion

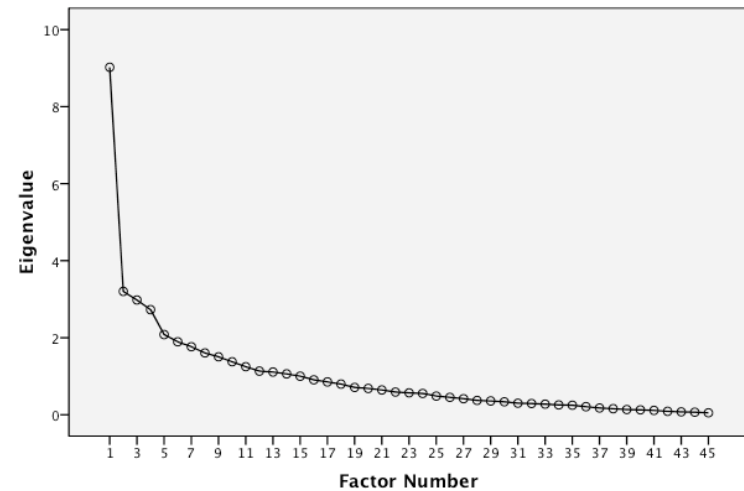
Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	9.020	20.045	20.045	2.964	6.587	6.587	2.764
2	3.203	7.117	27.162	1.427	3.172	9.759	2.395
3	2.981	6.624	33.786	5.811	12.912	22.671	3.542
4	2.729	6.064	39.850	1.117	2.482	25.153	4.232
5	2.082	4.627	44.477	3.000	6.666	31.819	2.623
6	1.894	4.209	48.686	2.536	5.636	37.455	5.406
7	1.767	3.926	52.612	2.136	4.747	42.202	2.836
8	1.604	3.566	56.177	1.545	3.434	45.637	2.220
9	1.505	3.344	59.521	1.345	2.989	48.626	2.709
10	1.375	3.056	62.577	1.473	3.274	51.900	2.494
11	1.247	2.772	65.348	1.285	2.857	54.757	2.869
12	1.133	2.518	67.866	1.039	2.309	57.065	1.695
13	1.110	2.467	70.333	1.008	2.241	59.306	1.636
14	1.061	2.358	72.691	.880	1.955	61.260	1.744
15	1.001	2.224	74.914	.664	1.476	62.736	1.055
16	.907	2.015	76.929				
17	.852	1.893	78.822				
18	.796	1.769	80.592				
19	.710	1.577	82.169				
20	.684	1.520	83.689				
21	.643	1.430	85.118				
22	.589	1.309	86.427				
23	.570	1.266	87.694				
24	.553	1.230	88.924				
25	.486	1.079	90.003				
26	.451	1.003	91.006				
27	.417	.928	91.933				
28	.372	.826	92.760				
29	.358	.796	93.555				
30	.336	.748	94.303				
31	.300	.667	94.970				
32	.292	.649	95.619				
33	.275	.610	96.230				
34	.255	.566	96.795				
35	.247	.549	97.345				
36	.209	.464	97.808				
37	.175	.390	98.198				
38	.157	.348	98.546				
39	.135	.301	98.847				
40	.127	.283	99.129				
41	.112	.249	99.378				
42	.089	.198	99.576				
43	.075	.166	99.743				
44	.066	.147	99.889				
45	.050	.111	100.000				

Extraction Method: Maximum Likelihood.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Scree Plot



# Factor analysis - Extraversion

Pattern Matrix<sup>a</sup>

	Factor														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BF137	-.011	.106	.167	.046	-.055	-.116	.536	.034	-.078	.072	-.040	-.103	.057	-.072	.209
BF131	-.058	-.014	.083	.223	.019	.092	.135	-.078	-.049	.777	-.092	-.019	-.021	-.031	.029
BF15	.171	.029	.090	.927	.052	-.069	.037	-.020	.027	.056	-.014	-.116	-.034	-.118	.021
BF153	-.171	.106	.274	.247	.182	-.028	-.078	-.108	-.017	.165	.058	.064	-.125	.119	.024
BF26r	.065	.008	.156	.342	.033	-.098	.161	-.080	-.176	-.056	.218	-.166	-.030	-.063	.273
BF88r	.001	.019	.046	.081	-.062	-.018	.481	-.040	.040	.085	.338	.008	.007	.000	.401
BF72r	.038	.043	.342	.113	.055	-.137	-.016	.194	.120	.101	.295	-.124	-.133	-.035	.089
BF7r	-.025	.121	.339	-.150	.061	-.058	.006	.073	-.102	.571	.119	.148	.077	-.101	.104
BF143r	.098	.059	-.004	.050	.122	.076	-.028	.036	-.160	-.020	.526	-.034	-.104	.061	.017
BF163	-.016	.016	-.102	-.099	.091	.768	.033	-.030	.062	-.056	-.064	.068	-.035	-.024	-.025
BF42	.142	-.053	.086	-.116	-.139	.376	-.070	.202	.300	-.392	-.037	.195	.162	.162	.211
BF132	-.064	.016	-.922	-.051	.041	.146	-.058	-.023	.105	-.103	.100	-.030	.106	.052	.057
BF99	.008	-.020	-.056	-.009	-.077	.868	-.044	.024	-.044	.003	.085	.129	-.045	.007	-.041
BF4	.091	.150	-.057	-.047	-.002	.353	.084	.059	-.152	-.021	-.529	-.042	-.193	.138	.033
BF56r	.126	.030	-.139	-.172	-.129	.459	-.021	-.266	-.118	-.003	.082	-.049	-.153	-.221	-.210
BF85r	.067	-.014	-.090	-.025	-.059	.774	-.032	-.068	.094	.059	-.095	-.064	.066	-.048	.077
BF36r	-.140	.184	-.156	-.027	-.100	.427	.035	-.028	-.006	-.009	-.325	-.064	-.105	-.126	.397
BF120r	-.068	-.065	.030	-.085	-.075	.845	-.134	-.032	.100	.020	.005	-.014	-.015	.026	.024
BF139	.031	.027	.031	-.007	-.013	.131	.574	.129	-.268	.098	.030	.179	-.016	.115	.068
BF14	-.019	-.117	-.071	.014	.075	-.121	.864	.015	.078	-.009	-.181	-.117	-.030	.004	-.224
BF161	.055	-.037	-.214	.055	-.107	-.295	-.040	.174	-.380	.089	.079	-.028	-.126	.003	.074
BF147	-.025	.018	.009	.031	.088	-.012	.055	.879	.016	-.057	-.048	-.125	-.057	-.092	-.022
BF67	-.076	.034	-.142	.398	-.016	-.055	-.020	.155	-.134	.068	-.043	.232	.019	.031	-.095
BF65	-.017	.112	-.012	.006	-.222	-.132	.033	.191	.256	.329	.038	.062	-.222	.219	-.041
BF157r	-.145	-.036	.096	.034	-.006	-.086	.110	.165	-.083	-.071	.315	-.127	-.224	.214	.163
BF108r	-.193	.063	.030	.145	.085	-.071	-.007	-.135	.112	-.008	.033	-.064	-.266	.271	-.016
BF47r	.029	-.081	.079	-.001	.049	.136	.000	.063	-.023	.002	-.027	.008	-.801	.022	.029
BF150	-.095	.108	.130	.371	.147	.033	.072	.108	-.143	-.041	.273	.037	.148	.172	.017
BF5	-.041	.219	.077	.113	.066	.052	.112	-.014	-.034	-.059	-.036	-.078	.142	.085	-.249
BF92	.030	.078	-.043	.106	.960	-.072	-.060	.065	-.048	-.037	-.058	.002	.018	-.007	.072
BF100	.083	1.042	-.020	.030	.032	-.046	-.033	.020	.002	-.029	-.083	.045	.051	-.122	.030
BF128	-.108	-.125	.275	-.015	.352	.194	-.057	.210	-.125	.345	-.008	-.210	.258	.235	-.021
BF48r	-.010	-.068	.011	-.097	.644	-.126	.134	.022	.172	.075	.156	.098	-.219	-.062	-.151
BF82r	-.114	.558	-.006	-.090	-.045	.024	-.122	-.037	.023	.128	.139	-.386	.042	.300	-.025
BF30r	-.034	.024	-.077	-.040	.182	.034	.255	.025	.035	-.180	.198	.160	.008	.384	-.055
BF10r	.248	.046	.040	-.053	.099	.060	.063	-.017	.166	.198	.087	-.014	.138	.204	-.123
BF1	.414	-.111	-.215	.066	.179	.173	.011	-.136	.095	.059	.011	-.072	.111	-.014	.086
BF106	.002	-.071	.067	-.003	.052	.101	-.065	-.163	.118	.041	.023	.718	-.006	.065	.022
BF31	1.034	.031	.034	.048	-.045	.002	.014	.037	.067	-.023	.146	.027	-.023	.054	-.035
BF146	.157	-.181	.039	.035	-.019	.107	-.009	-.032	-.071	.014	-.328	-.006	.293	.213	.068
BF11	.182	-.045	-.130	-.108	.094	-.050	-.071	-.089	-.039	.248	-.162	.080	.058	.125	.217
BF122	.488	-.086	.076	-.016	.018	-.153	-.074	-.173	-.159	-.150	-.165	.040	-.040	.018	.061
BF86	.292	-.023	-.032	-.087	-.013	-.097	.025	-.033	-.131	.070	-.165	.131	-.011	.654	-.022
BF62r	-.044	.046	-.209	-.160	-.037	.008	-.027	-.108	.707	.000	-.011	.150	.002	.021	.028
BF152r	.080	-.071	-.058	-.071	.053	.070	-.133	.095	.689	-.062	-.070	.041	-.054	-.070	-.015

Extraction Method: Maximum Likelihood.  
 Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 25 iterations.

# Parallel Analysis

Extrv.

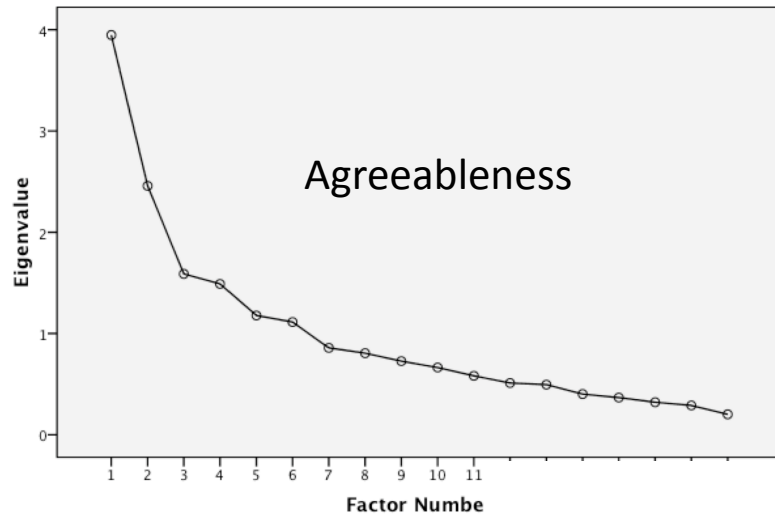
Run MATRIX procedure:			
Specifications for this Run:			
Ncases	94		
Nvars	45		
Ndatsets	1000		
Percent	95		
Random Data Eigenvalues			
	Root	Means	Prcntyle
	1.00000000	2.65153552	2.85218304
	2.00000000	2.44755379	2.58946342
	3.00000000	2.29670088	2.41729692
	4.00000000	2.16881303	2.27816359
	5.00000000	2.05434984	2.14666591
	6.00000000	1.95314823	2.04338467
	7.00000000	1.85830385	1.93633628
	8.00000000	1.77114890	1.85009862
	9.00000000	1.68743643	1.76154488
	10.00000000	1.60804962	1.6754974
	11.00000000	1.53430938	1.6013894
	12.00000000	1.46336607	1.5293462
	13.00000000	1.39602266	1.4573073
	14.00000000	1.32997118	1.3897078
	15.00000000	1.26688919	1.3249646
	16.00000000	1.20736635	1.2627308
	17.00000000	1.15223247	1.2052682
	18.00000000	1.09577261	1.1496752
	19.00000000	1.04275687	1.0953703
	20.00000000	.99019682	1.04075536
	21.00000000	.93984622	.99056724
	22.00000000	.89032853	.93780540
	23.00000000	.84444031	.89069356
	24.00000000	.79971555	.84431808
	25.00000000	.75674499	.80360560
	26.00000000	.71381172	.75463520
	27.00000000	.67267622	.71572524

O. To Exp.

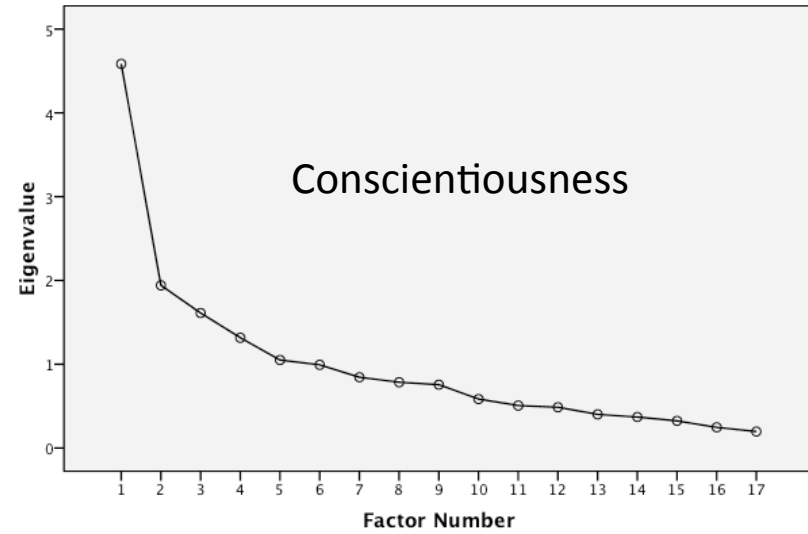
Run MATRIX procedure:			
Specifications for this Run:			
Ncases	94		
Nvars	30		
Ndatsets	1000		
Percent	95		
Random Data Eigenvalues			
	Root	Means	Prcntyle
	1.00000000	2.24630343	2.42250308
	2.00000000	2.05279397	2.18036347
	3.00000000	1.90556697	2.01452471
	4.00000000	1.78330691	1.88002201
	5.00000000	1.67706995	1.76473441
	6.00000000	1.57798221	1.65954594
	7.00000000	1.48878384	1.56438601
	8.00000000	1.40436197	1.47766688
	9.00000000	1.32467334	1.39253801
	10.00000000	1.25148159	1.3190459
	11.00000000	1.18020793	1.2420486
	12.00000000	1.11402873	1.1711108
	13.00000000	1.04948111	1.1073964
	14.00000000	.98774695	1.04302692
	15.00000000	.92988572	.97983222
	16.00000000	.87325259	.92589384
	17.00000000	.81797593	.86891121
	18.00000000	.76421606	.81144197
	19.00000000	.71383824	.76448284
	20.00000000	.66453708	.71074480
	21.00000000	.61641763	.66099889
	22.00000000	.57013291	.61706604
	23.00000000	.52504104	.56912714
	24.00000000	.48084301	.52782393
	25.00000000	.43879862	.48063618
	26.00000000	.39753022	.43969282
	27.00000000	.35692214	.39954440

# Factor analysis – Scree Plots

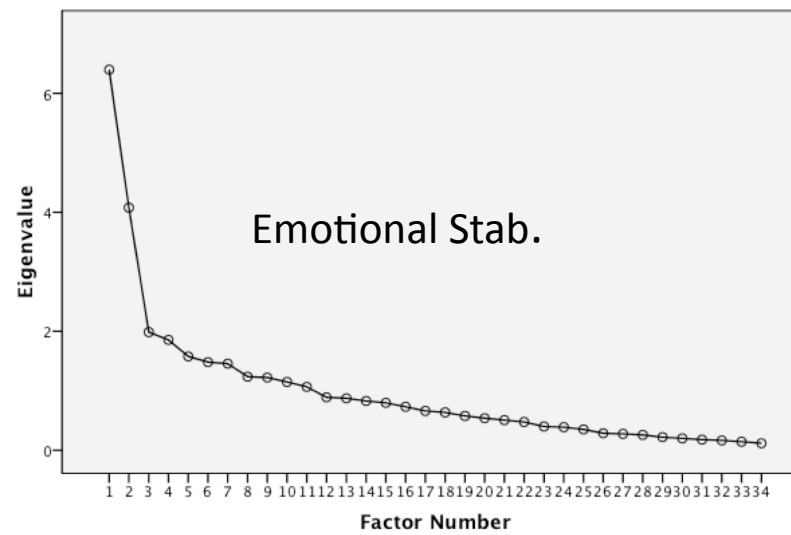
Scree Plot



Scree Plot



Scree



----- Original Message -----  
Subject: Re: Question regarding the 16PF IPIP questionnaire  
From: "John A. Johnson" <[j5j@psu.edu](mailto:j5j@psu.edu)>  
Date: Sat, February 28, 2009 5:59 pm  
To: "cecilia cortina" <[ac168535@albany.edu](mailto:ac168535@albany.edu)>  
-----

Hi, Ana,

I do not have any direct familiarity with clustering the IPIP 16PF scales into the five factors, but the list you provide seems completely reasonable. Scales built from those subscales really ought to be reliable.

This suggests to me two possibilities: (1) Your research participants did not pay close attention and respond properly to the the questionnaire, of (2) Mistakes were made in the process of entering or analyzing your data.

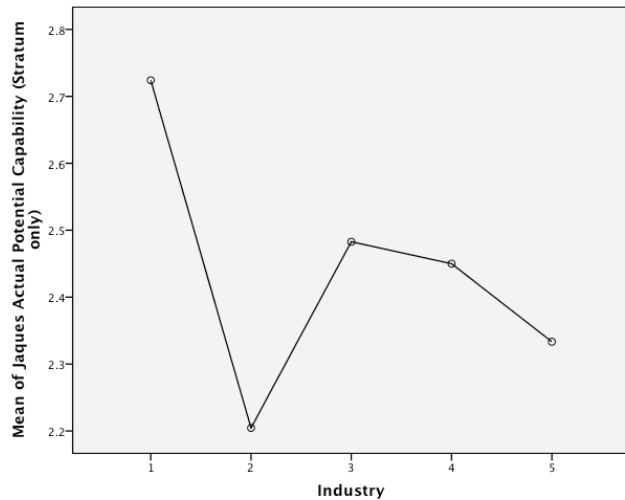
I doubt that your participants would have been uncooperative, so I will bet that the problem is somewhere in the data entry and/or analysis. Did you try running reliability analyses on the individual subscales to see if they are reasonably reliable? Also, did you try computing a simple matrix of correlations among the subscales within each factor? If you haven't, try those analyses. If they do not come out properly, I would check to see that the data were entered correctly. Please let me know what you find.

Best wishes,

John A. Johnson

# One way ANOVA

HC (AS) and Industry



1. call center
2. mobile phone
3. media
4. agribusiness
5. transportation

## Multiple Comparisons

Jaques Actual Potential Capability (Stratum only)  
Bonferroni

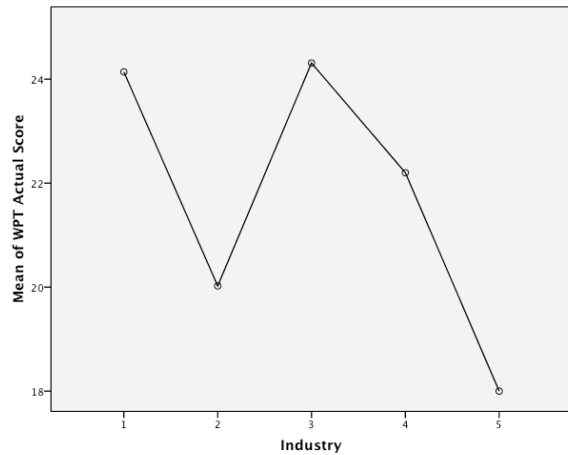
(I) Industry	(J) Industry	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	.520*	.111	.000	.20	.84
	3	.241	.122	.498	-.11	.59
	4	.274	.135	.442	-.11	.66
	5	.391	.281	1.000	-.41	1.20
2	1	-.520*	.111	.000	-.84	-.20
	3	-.278	.111	.135	-.60	.04
	4	-.245	.125	.520	-.60	.11
	5	-.129	.277	1.000	-.92	.66
3	1	-.241	.122	.498	-.59	.11
	2	.278	.111	.135	-.04	.60
	4	.033	.135	1.000	-.35	.42
	5	.149	.281	1.000	-.65	.95
4	1	-.274	.135	.442	-.66	.11
	2	.245	.125	.520	-.11	.60
	3	-.033	.135	1.000	-.42	.35
	5	.117	.287	1.000	-.70	.94
5	1	-.391	.281	1.000	-1.20	.41
	2	.129	.277	1.000	-.66	.92
	3	-.149	.281	1.000	-.95	.65
	4	-.117	.287	1.000	-.94	.70

\*. The mean difference is significant at the 0.05 level.



# One way ANOVA

## WPT and Industry



1. call center
2. mobile phone
3. media
4. agribusiness
5. transportation

### Multiple Comparisons

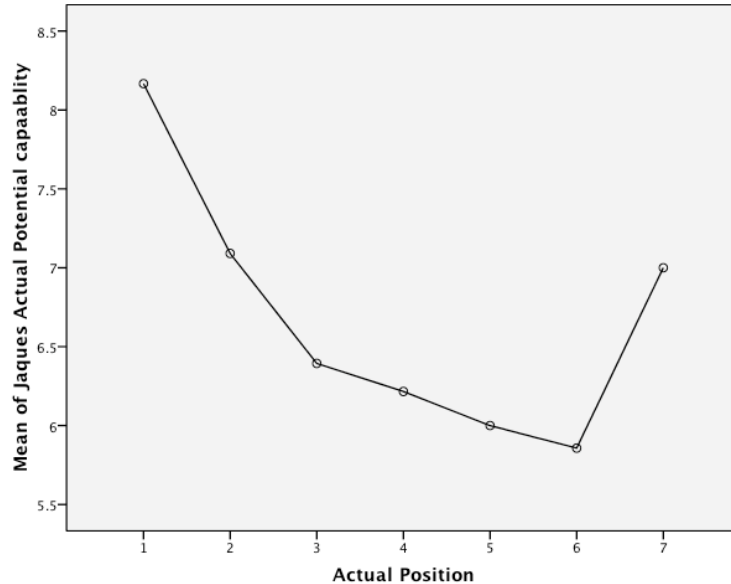
WPT Actual Score  
Bonferroni

(I) Industry	(J) Industry	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	4.115*	1.218	.010	.63	7.60
	3	-.172	1.337	1.000	-4.00	3.65
	4	1.938	1.480	1.000	-2.30	6.17
	5	6.138	3.088	.492	-2.69	14.97
2	1	-4.115*	1.218	.010	-7.60	-.63
	3	-4.288*	1.218	.006	-7.77	-.80
	4	-2.177	1.373	1.000	-6.10	1.75
	5	2.023	3.039	1.000	-6.67	10.71
3	1	.172	1.337	1.000	-3.65	4.00
	2	4.288*	1.218	.006	.80	7.77
	4	2.110	1.480	1.000	-2.12	6.34
	5	6.310	3.088	.432	-2.52	15.14
4	1	-1.938	1.480	1.000	-6.17	2.30
	2	2.177	1.373	1.000	-1.75	6.10
	3	-2.110	1.480	1.000	-6.34	2.12
	5	4.200	3.153	1.000	-4.82	13.22
5	1	-6.138	3.088	.492	-14.97	2.69
	2	-2.023	3.039	1.000	-10.71	6.67
	3	-6.310	3.088	.432	-15.14	2.52
	4	-4.200	3.153	1.000	-13.22	4.82

\*. The mean difference is significant at the 0.05 level.

# One way ANOVA

*CPC and Job position*



1. Director
2. General Manager
3. Area Manager
4. Supervisor / leader
5. Professional specialist/ expert
6. Analyst
7. Assistant
8. Other

## Multiple Comparisons

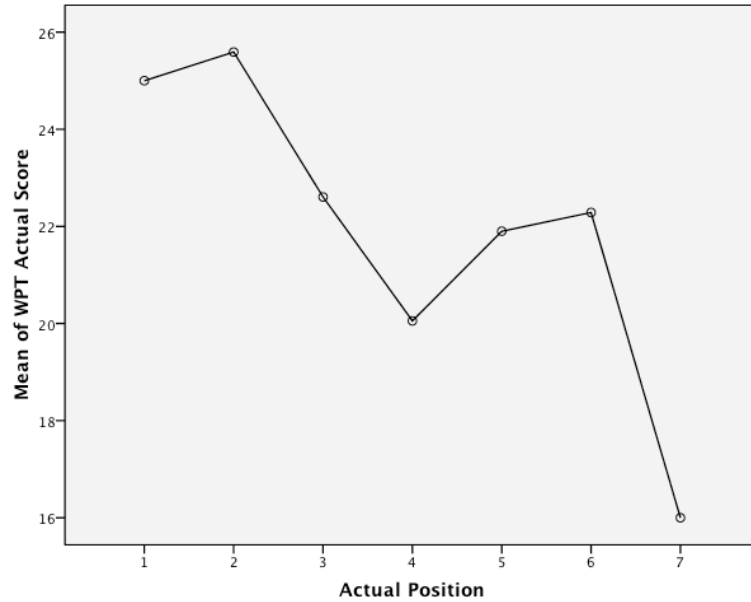
Jaques Actual Potential capability  
Bonferroni

(I) Actual Po...	(J) Actual Po...	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	1.076	.401	.174	-.17	2.32
	3	1.773*	.386	.000	.57	2.97
	4	1.950*	.383	.000	.76	3.14
	5	2.167*	.449	.000	.77	3.56
	6	2.310*	.424	.000	.99	3.63
	7	1.167	.710	1.000	-1.04	3.37
2	1	-1.076	.401	.174	-2.32	.17
	3	.697	.239	.091	-.05	1.44
	4	.875*	.234	.006	.15	1.60
	5	1.091*	.332	.028	.06	2.12
	6	1.234*	.297	.001	.31	2.16
	7	.091	.642	1.000	-1.90	2.09
3	1	-1.773*	.386	.000	-2.97	-.57
	2	-.697	.239	.091	-1.44	.05
	4	.178	.208	1.000	-.47	.82
	5	.394	.314	1.000	-.58	1.37
	6	.537	.277	1.000	-.32	1.40
	7	-.606	.633	1.000	-2.57	1.36
4	1	-1.950*	.383	.000	-3.14	-.76
	2	-.875*	.234	.006	-1.60	-.15
	3	-.178	.208	1.000	-.82	.47
	5	.216	.310	1.000	-.75	1.18
	6	.359	.273	1.000	-.49	1.21
	7	-.784	.631	1.000	-2.74	1.18
5	1	-2.167*	.449	.000	-3.56	-.77
	2	-1.091*	.332	.028	-2.12	-.06
	3	-.394	.314	1.000	-1.37	.58
	4	-.216	.310	1.000	-1.18	.75
	6	.143	.360	1.000	-.98	1.26
	7	-1.000	.674	1.000	-3.09	1.09
6	1	-2.310*	.424	.000	-3.63	-.99
	2	-1.234*	.297	.001	-2.16	-.31
	3	-.537	.277	1.000	-1.40	.32
	4	-.359	.273	1.000	-1.21	.49
	5	-.143	.360	1.000	-1.26	.98
	7	-1.143	.658	1.000	-3.18	.90
7	1	-1.167	.710	1.000	-3.37	1.04
	2	-.091	.642	1.000	-2.09	1.90
	3	.606	.633	1.000	-1.36	2.57
	4	.784	.631	1.000	-1.18	2.74
	5	1.000	.674	1.000	-1.09	3.09
	6	1.143	.658	1.000	-.90	3.18

\*. The mean difference is significant at the 0.05 level.

# One way ANOVA

*WPT and Job position*



1. Director
2. General Manager
3. Area Manager
4. Supervisor / leader
5. Professional specialist/ expert
6. Analyst
7. Assistant
8. Other

## Multiple Comparisons

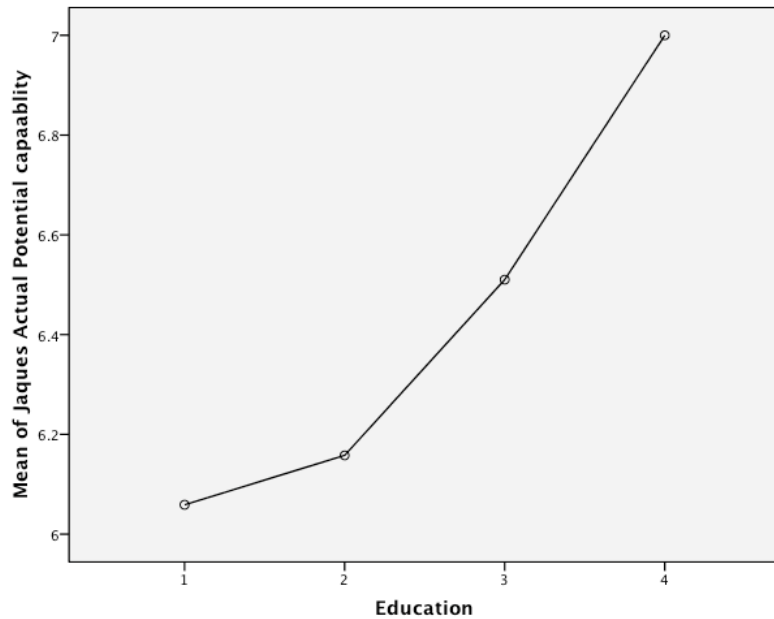
WPT Actual Score  
Bonferroni

(I) Actual Position	(J) Actual Position	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-.591	2.353	1.000	-7.90	6.72
	3	2.394	2.267	1.000	-4.65	9.43
	4	4.946	2.248	.625	-2.04	11.93
	5	3.100	2.638	1.000	-5.09	11.29
	6	2.714	2.492	1.000	-5.03	10.46
	7	9.000	4.171	.693	-3.95	21.95
2	1	.591	2.353	1.000	-6.72	7.90
	3	2.985	1.406	.753	-1.38	7.35
	4	5.537*	1.375	.002	1.27	9.81
	5	3.691	1.948	1.000	-2.36	9.74
	6	3.305	1.746	1.000	-2.12	8.73
	7	9.591	3.773	.259	-2.13	21.31
3	1	-2.394	2.267	1.000	-9.43	4.65
	2	-2.985	1.406	.753	-7.35	1.38
	4	2.552	1.223	.821	-1.25	6.35
	5	.706	1.844	1.000	-5.02	6.43
	6	.320	1.629	1.000	-4.74	5.38
	7	6.606	3.720	1.000	-4.95	18.16
4	1	-4.946	2.248	.625	-11.93	2.04
	2	-5.537*	1.375	.002	-9.81	-1.27
	3	-2.552	1.223	.821	-6.35	1.25
	5	-1.846	1.821	1.000	-7.50	3.81
	6	-2.232	1.603	1.000	-7.21	2.75
	7	4.054	3.708	1.000	-7.46	15.57
5	1	-3.100	2.638	1.000	-11.29	5.09
	2	-3.691	1.948	1.000	-9.74	2.36
	3	-.706	1.844	1.000	-6.43	5.02
	4	1.846	1.821	1.000	-3.81	7.50
	6	-.386	2.115	1.000	-6.95	6.18
	7	5.900	3.957	1.000	-6.39	18.19
6	1	-2.714	2.492	1.000	-10.46	5.03
	2	-3.305	1.746	1.000	-8.73	2.12
	3	-.320	1.629	1.000	-5.38	4.74
	4	2.232	1.603	1.000	-2.75	7.21
	5	.386	2.115	1.000	-6.18	6.95
	7	6.286	3.861	1.000	-5.71	18.28
7	1	-9.000	4.171	.693	-21.95	3.95
	2	-9.591	3.773	.259	-21.31	2.13
	3	-6.606	3.720	1.000	-18.16	4.95
	4	-4.054	3.708	1.000	-15.57	7.46
	5	-5.900	3.957	1.000	-18.19	6.39
	6	-6.286	3.861	1.000	-18.28	5.71

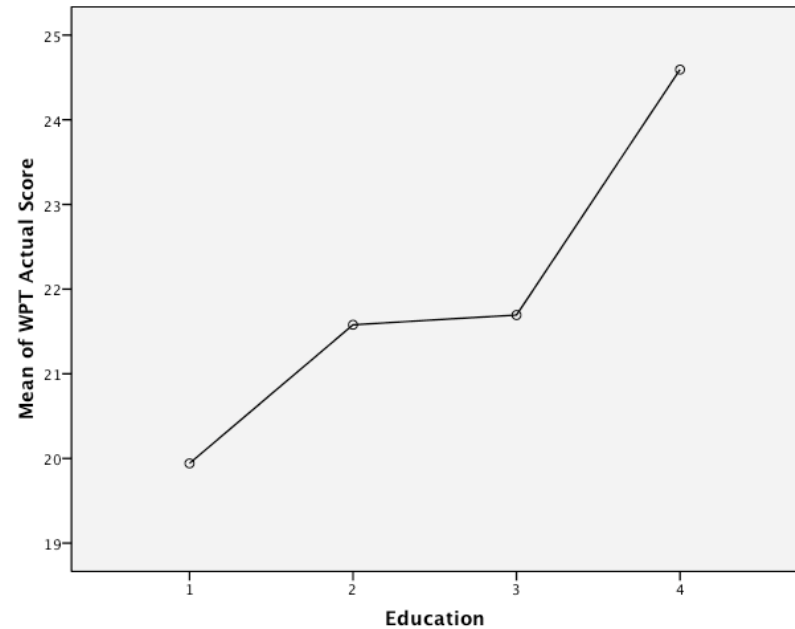
\*. The mean difference is significant at the 0.05 level.

# One way ANOVA - means

CPC - Education



WPT- Education



1. High school
2. Technical / incomplete university
3. university degree
4. master's degree

# Some of the organizations around the world that used Jaques' method

- Atento
- Grupo Brescia Perú
- Grupo Clarín Argentina
- Grupo Danone
- Molinos Rio de la Planta
- Carrefour Argentina/México
- Refinor – Argentina
- Cargill Crop Protección
- Novartis – Argentina
- Sociedad Portuaria de Cartagena
- Banex / Superville
- Banco Bisel – BERSA -Banco del Suquía – Argentina/Uruguay
- Banco República / Banco de Mendoza / Banco Social
- Servicio Exterior de la Nación (República Argentina)
- Repsol YPF – Argentina, Spain
- Pecom Energía -Argentina, Perú, Venezuela, Bolivia, Ecuador-
- Petrobras Unidad Argentina
- Petrobras Internacional Brasil – Bolivia – Colombia
- Movicom - Bell South – Argentina
- Telefónica Argentina
- Refinor – Argentina
- Siemens - Países Andinos y Argentina
- General Motors - Países Andinos
- Knoll - Países Andinos
- Banco de Comercio Exterior
- Banco Central de la República Argentina
- Banco de la Pampa / Banco Dorrego

Source: AMG Consulting Group



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Promoting among potential users of the methods, appreciation of the variety of uses and benefits of science-based management, and access to resources.

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