

# Competency Modelling Revealed!

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## What We'll Be Covering

1. So methods are important after all
2. A (very) brief background on competency modelling
3. When competencies met assessment centres
4. The pros and cons of different approaches to competency modelling

## During this session I will cover:

- The pros and cons of the different approaches to competency measurement
- In turn, a set of guidelines for their appropriate and meaningful use

1. So methods are important after all

## The Multi-Method Issue

- The following beliefs seem to have arisen about measurement in I/O psychology
  - Methods are mere vehicles to measure competencies
  - Method effects are indications of error
  - We can combine methods to measure competencies

## 'Methods' vs 'Perspectives'

- Methods are not mere vehicles
  - They actually carry important information in and of themselves
  - Each method presents a unique perspective on the individual

## 'Methods' vs 'Perspectives'

- To average across these perspectives is maladaptive
  - Hides important information
  - Creates meaningless aggregates

2. A (very) brief background on competency modelling

## History

- McClelland (1973, p. 9)
  - We should assess “competencies that are more generally useful in clusters of life outcomes” (e.g., leadership, interpersonal skills)
  - As opposed to more specific tests (e.g., cognitive ability)

## History

- Picked up by consultants and mass-marketed
  - E.g., Boyatzis (1982), affiliated with Hay-McBer (now Hay Group)
- Ever since, welcomed by organisations internationally as a solution to many complex issues

## Definitions

- 'Competence' or 'competencies' have wide and varied meanings

## Definitions

- Some definitions are geographically specific
  - UK
    - Levels of competence, i.e., standards
  - USA
    - Inputs, i.e., knowledge, skills, abilities, and other characteristics

## Definitions

- Hoffman's (1999) useful differentiation
  - Competencies can assess:
    1. Observable performance
    2. Standards for performance
    3. Underlying attributes that lead to performance

## Definitions

- We will focus on the 'underlying attributes' component of this definition
  - Arises out of Boyatzis (1982) who conceptualised competencies as "an underlying characteristic of a person" (p. 21)
  - A very popular use of the competency term

# Measurement

- Several approaches to competency measurement available

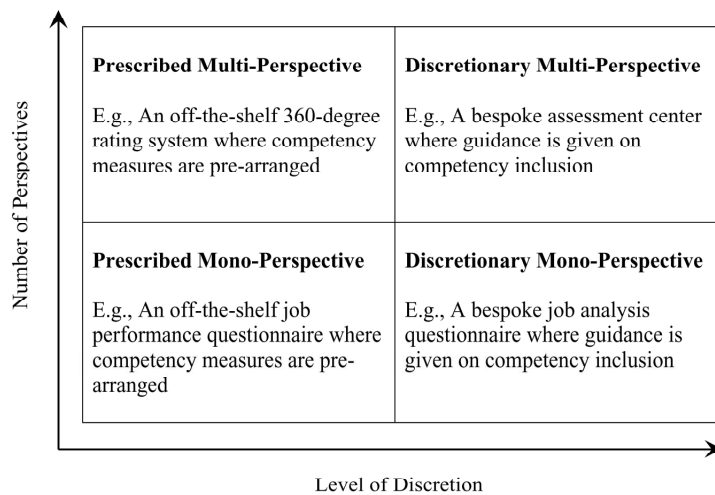


Figure 1. Level of discretion and number of perspectives in competency measurement.

## Schippmann et al. (2000)

- SIOP task-force on competencies
- Stated that the optimal way to measure competencies is to use:
  - “a variable combination and logically selected mix of multiple methods” (p. 716)

## AC Dimensions vs. Competencies

- Assessment centre (AC) dimensions are essentially a form of Boyatzis competency
  - (International Task Force on Assessment Center Guidelines, 2000, p. 330; Schippmann et al., 2000, p. 709)

## Competency Validation by AC

- ACs use multiple methods and represent an optimal platform for multi-perspective competency validation (see Schippman, et al., 2000)
  - However, only exercises are focused on in AC studies: Not multi methods

## Major Criticism

- Insufficient empirical evidence for competencies (e.g., Heinsman et al., 2007; Lievens, Sanchez, & de Corte, 2004)
  - Certainly the case for multi-perspective approaches
  - There is some evidence for mono-perspective competencies (e.g., Bartram, 2005)

## What is needed

1. A study on the 'optimal' multi-perspective approach to competency assessment
2. This study would need to:
  - Assess a recognised and established competency model
  - Use a truly multi-perspective approach

3. When competencies met  
assessment centres

## Study Characteristics

- Developmental AC
- 18 Competencies from Lominger
- 229 Manager-level participants
- A truly multi-perspective approach to measurement
  - Personality-based
  - Cognitive abilities
  - Exercise performance

## Subject-to-variable ratios

- Statistical tests only work when there are sufficient numbers of participants relative to variables
- We are interested in the components that made up the competency measures so subject-to-variable ratios become an issue

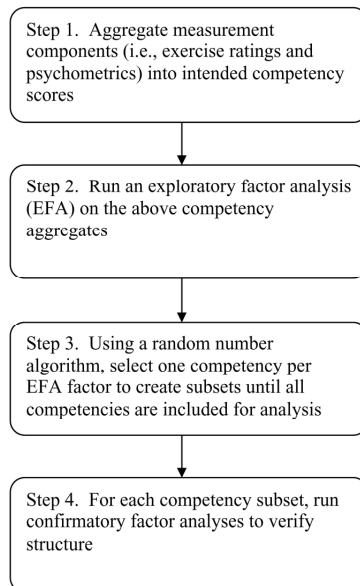
## How Competencies were Measured

### Multimethod Competency Configuration

#	Lominger Competency Title	Configuration	n(i)
1	Business acumen	fm; b; ar1; vr1; x1b1; x2b1; x3b1	7
2	Developing direct reports	ue; fl; fa; x4b1	4
3	Informing	ue; fq2; ff; x1b3; x4b2	5
4	Managing and measuring work	fg; ff; x1b6; x4b5	4
5	Listening	fn; fe; x1b7; x2b3; x3b5; x4b6	6
6	Confronting direct reports	fl; md; fn; fo; x4b3	5
7	Drive for results	fq4; spicomp; nr1; x1b4; x2b4; x3b7	6
8	Customer focus	spias; fh; in; ree; x1b5; x2b5; x3b6	7
9	Managing others	me; ue; ce; ff; x2b2; x3b2; x4b4	7
10	Open minded	fq1; x2b6; x3b8	3
11	People smart	fa; me; x3b4; x4b7	4
12	Conflict manager	ue; fe; fn; x4b9	4
13	Cool transactor	md; fc; x4b10	3
14	Agile communicator	vr1; x1b2; x2b10; ex3b10	4
15	Visioning	fq1; x1b10; x2b7; x3b9	4
16	Critical thinking	fl; fa; ue; x4b8	4
17	Solution finder	fm; b; ar1; x1b9; ex2b9; x3b3	6
18	Inspires others	me; ff; fh; x1b8; x2b8	5

Note: n(i) = number of components that made up a given competency. 1. Personality based measures. From the *15FQ+*, fm = concrete vs. abstract; b = intellectance; fa = distant aloof vs. empathic; fc = feeling vs. emotionally stable; fe = accommodating vs. dominant; ff = serious vs. enthusiastic; fg = expedient vs. conscientious; fh = retiring vs. socially bold; fl = trusting vs. suspicious; fn = concrete vs. abstract; fo = direct vs. restrained; fo = self-assured vs. apprehensive; fq1 = conventional vs. radical; fq2 = group vs. self-sufficient; fq4 = composed vs. tense driven. From the *Sales Preference Indicator* (spi), spicomp = competitive; spias = adaptive selling; in = integrated networks. From the *Genos Emotional Intelligence* scales, ue = understanding emotions of others; me = managing emotions; ce = controlling emotions; ree = recognising and expressing emotions; md = making decisions. 2. Ability-based methods. From the *Psychtec Graduate Reasoning Test* suite, ar1 = abstract reasoning; vr1 = verbal reasoning; nr1 = numerical reasoning. 3. Performance-based methods. x# = simulation exercises 1 through 4; b# = denotes behavioral checklist items on each simulation exercise.

## Analytic Strategy



## Step 1. EFA of Intended Competency Aggregates

### *Exploratory Factor Analysis of Competency Aggregates*

Competency	Factor			$h^2$
	1	2	3	
BA	.92			.80
SF	.91			.81
VIS	.88			.75
OM	.77			.55
ACOM	.74			.68
DFR	.73			.62
CF	.72			.63
IO	.70			.70
MO	.53	.44		.75
CM		.89		.73
DDR		.76		.74
CT		.74		.50
CTNK		.73		.61
CDR		.56		.47
LIS		.52		.39
PS	.31	.50		.50
MMW			.78	.78
INF			.59	.73
SS	8.00	6.99	3.43	
Cum. %	51.42	61.26	65.20	

Step 2. Randomly select subgroups from the EFA; One competency per factor

## Step 4. Run CFAs on Measurement Components I: Competency Aggregates

*Confirmatory Factor Analysis Goodness-of-Fit Statistics for Competencies*

Model	Competencies	AS?	df	$\chi^2$	SRMR	RMSEA	TLI	CFI
1	OM, CM, INF	No	51	199.7	.114	.135	.386	.543
2	SF, CTK, MMW	No	74	203.1	.083	.091	.623	.694
3	VIS, CT, MMW	No	41	132.2	.082	.102	.626	.721
4	IO, CDR, INF	No	74	410.6	.123	.146	.392	.506
5	BA, PS, MMW	No	87	303.7	.094	.108	.493	.580
6	CF, DDR, INF	No	87	384.2	.133	.127	.413	.513
7	DFR, LIS, INF	No	116	371.0	.095	.102	.539	.607
8	ACOM, DDR, MMW	No	51	173.9	.095	.106	.686	.757
9	MO, CTK, INF	No	62	496.9	.170	.181	.356	.488

*Note.* AS = Admissible solution, denoting whether estimates were within acceptable limits (standardized loadings < |1.00|, non-negative unique variances); SRMR = standardized root mean square residual; RMSEA = root mean squared error of approximation; TLI = Tucker-Lewis index; CFI = comparative fit index; OM = open minded; CM = conflict manager; INF = informing; SF = solution finder; CTK = critical thinking; MMW = managing and measuring work; VIS = visioning; CT = cool transactor; IO = inspires others; CDR = confronting direct reports; BA = business acumen; PS = people smart; CF = customer focus; DDR = developing direct reports; DFR = drive for results; LIS = listening; ACOM = agile communicator; MO = managing others. Other competency combinations that did not include INF and MMW resulted in similar outcomes. Repeats of measurement sources were deleted from subsequent analyses to avoid concerns around multicollinearity.

Not looking good for competencies... ☹️

OK, let's use the same data, but structure it in another way...

## Step 4. Run CFAs on Measurement Components II: Original Methods

*Confirmatory Factor Analysis Goodness-of-Fit Statistics for Method Combinations*

Model	Method Factors and their Components			AS?	df	$\chi^2$	SRMR	RMSEA	TLI	CFI
	Personality-Based	Performance	Ability							
1	fq1; ue; fe; fn; fq2; ff	x2b6; x3b8; x4b9; x1b3; x4b2	n/a	Yes	43	84.3	.064	.067	.848	.881
2	fm; b; fl; fa; ue; fg; ff	x1b9; x2b9; x3b3; x4b8; x1b6; x4b5	ar1	Yes	75	174.0	.073	.079	.715	.765
3	fq1; md; fc; fg; ff	x1b10; x2b7; x3b9; x4b10; x1b6; x4b5	n/a	Yes	43	99.8	.065	.079	.778	.827
4	me; ff; fh; fl; md; fn; fo; ue; fq2	x1b8; x2b8; x4b3; x1b3; x4b2	n/a	Yes	76	215.2	.070	.093	.755	.796
5	fm; b; fa; me; fg; ff	x1b1; x2b2; x3b1; x3b4; x4b7; x1b6; x4b5	ar1; vr1	Yes	87	239.1	.084	.091	.644	.705
6	spias; fh; in; ree; ue; fl; fa; fq2; ff	x1b5; x2b5; x3b6; x4b1; x1b3; x4b2	n/a	Yes	89	171.4	.065	.066	.841	.865
7	fq4; spicomp; fn; fe; ue; fq2; ff	x1b4; x2b4; x3b7; x1b7; x2b3; x3b5; x4b6; x1b3; x4b2	nr1	Yes	117	298.0	.080	.085	.676	.721
8	ue; fl; fa; fg; ff	x1b2; x2b10; x3b10; x4b1; x1b6; x4b5	vr1	Yes	52	155.2	.070	.097	.741	.796
9	me; ue; ce; ff; fl; fa; fq2	x2b2; x3b2; x4b4; x4b8; x1b3; x4b2	n/a	Yes	64	177.6	.095	.091	.837	.866

*Note.* AS = Admissible solution, denoting whether estimates were within acceptable limits (standardized loadings <|1.00|, non-negative unique variances); SRMR = standardized root mean square residual; RMSEA = root mean squared error of approximation; TLI = Tucker-Lewis index; CFI = comparative fit index; OM = open minded; CM = conflict manager; INF = informing; SF = solution finder; CTK = critical thinking; MMW = managing and measuring work; VIS = visioning; CT = cool transactor; IO = inspires others; CDR = confronting direct reports; BA = business acumen; PS = people smart; CF = customer focus; DDR = developing direct reports; DFR = drive for results; LIS = listening; ACOM = agile communicator; MO = managing others. Intended competencies were composed of the following combinations. OM = fq1 + ex2b6 + ex3b8. CM = ue + fe + fn + ex4b9. INF = ue + fq2 + ff + ex1b3 + ex4b2. Repeats of measurement sources were deleted from subsequent analyses to avoid concerns around multicollinearity. The single manifest ar1 had its error variance estimated from the coefficient alpha reported in the manufacturer's technical manual (.84) and the sample-specific variance (see Hayduk, 1987). Personality-based subscales indicated by fq1; ue; fe; fn; fq2; ff; fm; b; fl; fa; fg; md; fc; me; fh; fo; spias; in; ree; ce; fq4; spicomp; x# = simulation exercise; b# = behavioural item; mental ability tests indicated by ar1; vr1; nr1.

## Conclusions

- In a multi-method approach to competency measurement
  1. Competency aggregates failed to manifest
  2. Data resembled original methods, not competencies

4. The pros and cons of different approaches to competency modelling

Single-Perspective Approaches

## Single-Perspective Approaches: Issues

- Provide a view that is not as comprehensive as multi-perspectives
- However, there is some evidence that meaningful constructs can emerge when a single method is used
  - E.g., A questionnaire (see Bartram, 2005)

## Single-Perspective Approaches: Advice

- Organisations need to make an effort to validate their competency model using data analytic techniques
  - E.g., The Warehouse currently validating their competency questionnaire for performance management using:
    - EFA
    - CFA
    - Concurrent validation

## Multi-Perspective Approaches

## Multi-Perspective Approaches

- This study:
  - Adds to a growing body of literature on the problems of aggregating across methods or sources generally
    - 360-degree approaches (Mount, et al., 1998)
    - Assessment centre dimensions (Lance, et al., 2004)

## Multi-Perspective Approaches

- With multi-perspective approaches, it tends to be that:
  - You get out what you put in
  - You are unlikely to obtain meaningful competency aggregates

## Multi-perspective approaches: Issues

- Provides a rich assessment from multiple perspectives
- However is unlikely to return meaningful competency aggregates

## Multi-method approaches: Advice

- Stick with scores on the original methods (or sources)
- Averaging across them will probably hide what is *really* being assessed
  - E.g., stay with the original assessments of personality, ability, and exercise performance and don't aggregate into competencies

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