Understanding the nature of adaptability and adaptive decision-making: Integrating self-report and performance-based assessment

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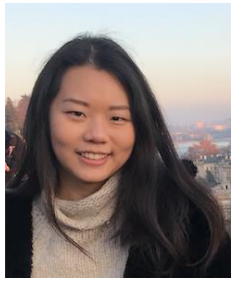

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"There is nothing permanent except change."

(Heraclitus, c. 500 BC)

"It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change."

(Charles Darwin)

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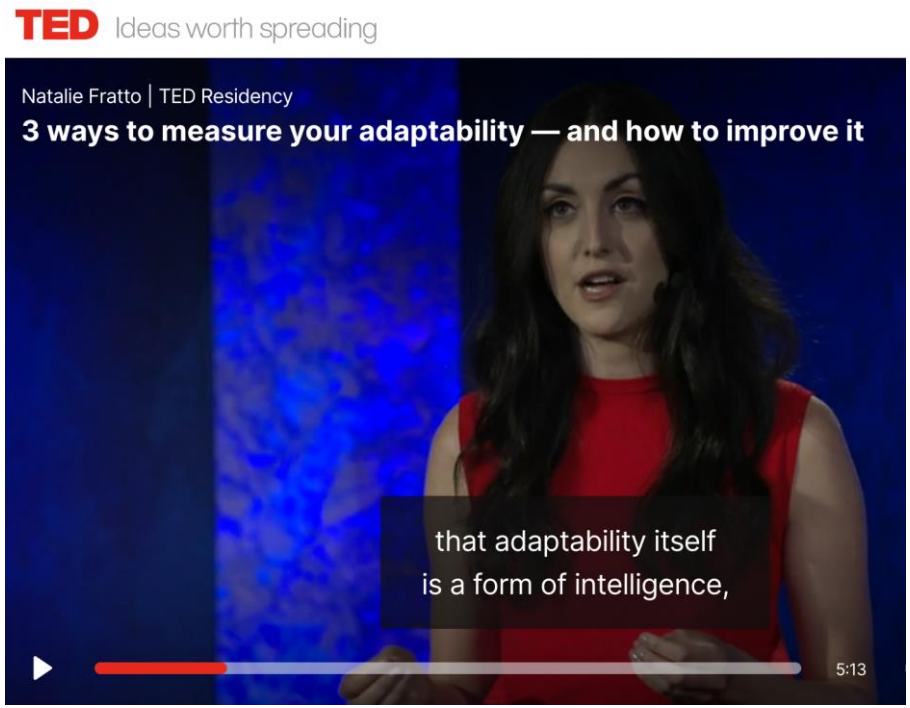

MANAGING UNCERTAINTY

Adaptability: The New Competitive Advantage

by Martin Reeves and Mike Deimler

From the July–August 2011 Issue

Adaptability

Human Sciences Impact for the Warfighter

Modern operations are characterised by volatile conditions, calling for a greater capacity to adapt to ambiguous or unexpected threats without a loss of functionality (Hyllengreen, 2017).

Adaptability: "capacity to constructively regulate cognitive, behavioural and affective functions in response to new, changing, and/or uncertain circumstances, conditions ar
2012, p. 59)

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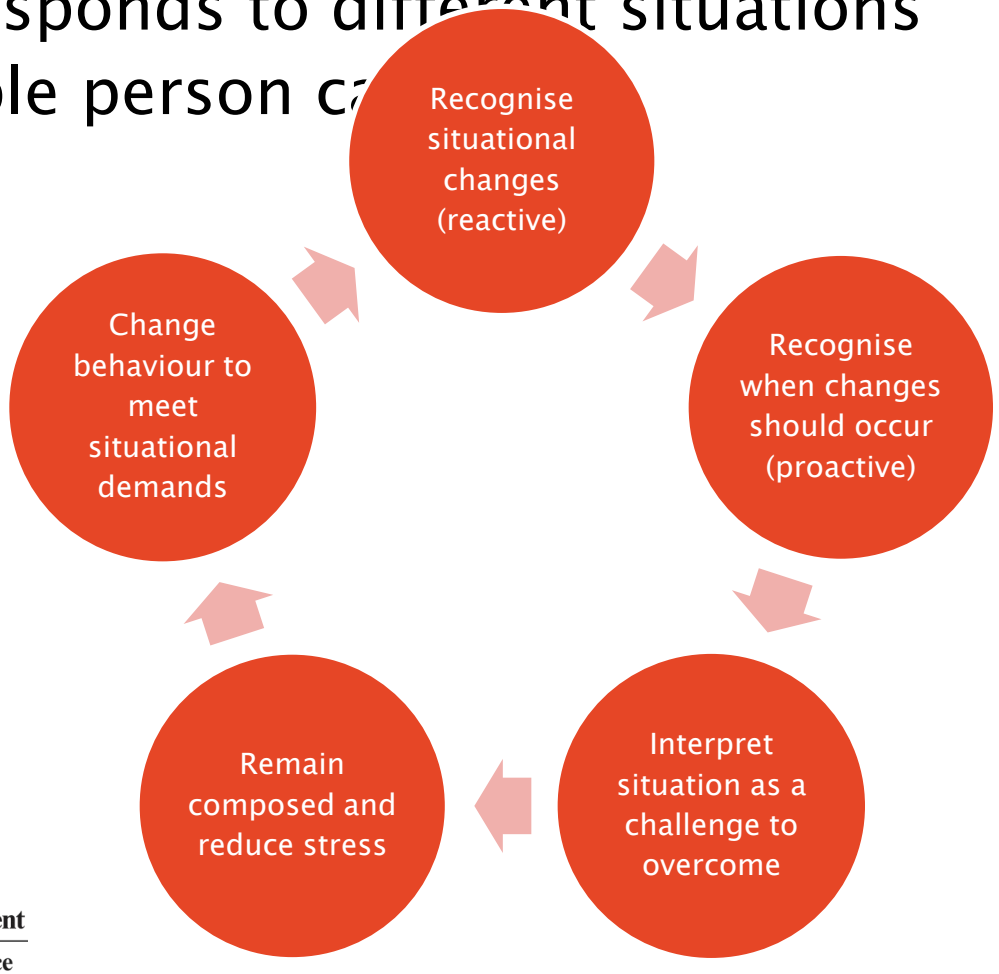
Individual Adaptability Theory (I-ADAPT)
Ployhart & Bliese (2006)

- Adaptability is a reasonably stable individual differences construct that influences how a person interprets and responds to different situations
- A highly adaptable person ca



Valid measurement

Methodological, and psychometric clarity is needed to progress the adaptability literature

Implications for real-world, high-stakes decisions

- Recruitment & selection
- Role-assignment
- Training & development

Human performance

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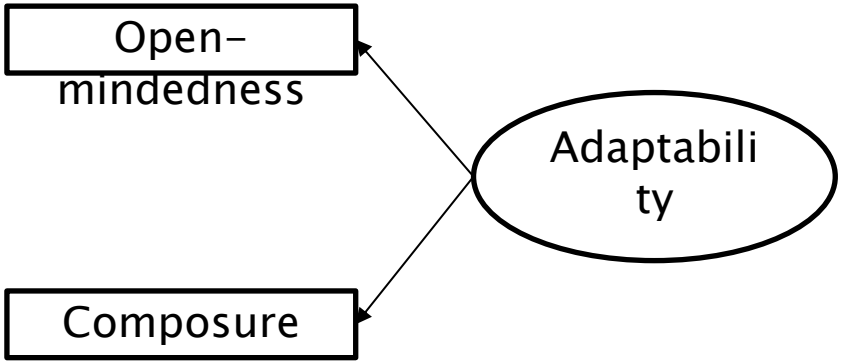
How is adaptability assessed? Measurement model 1

Boldness, resilience, flexibility

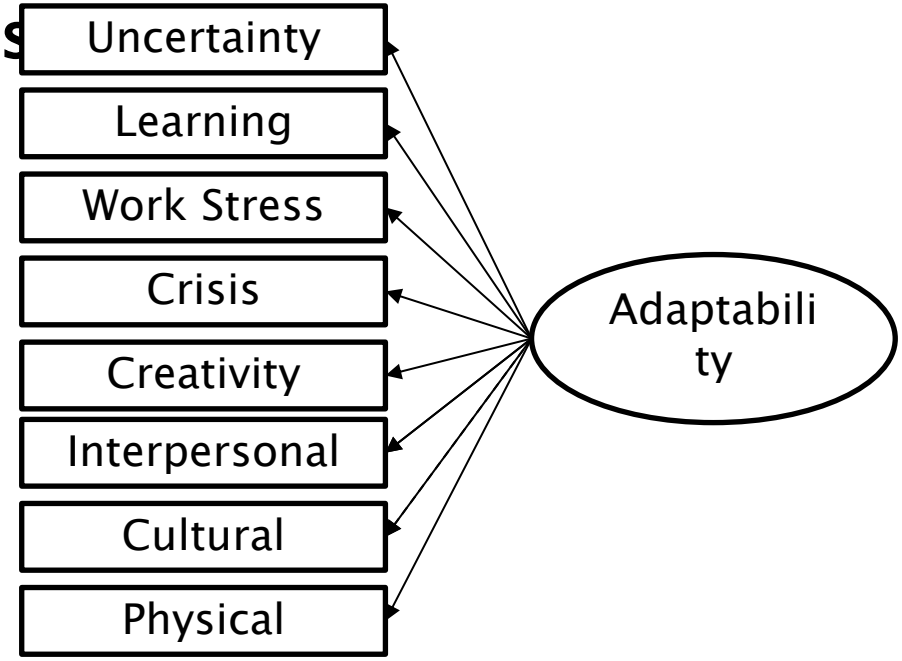
Adaptability as a personal attribute

'Subjective' self-report scales



2-dimension model (Martin et al., 2012)

Item: *"When uncertainty arises, I am able to minimise frustration or irritation so I can deal with it best" (composure)*



8-dimension model (Pulakos et al., 200

Item: *"I think clearly in times of urgenc*

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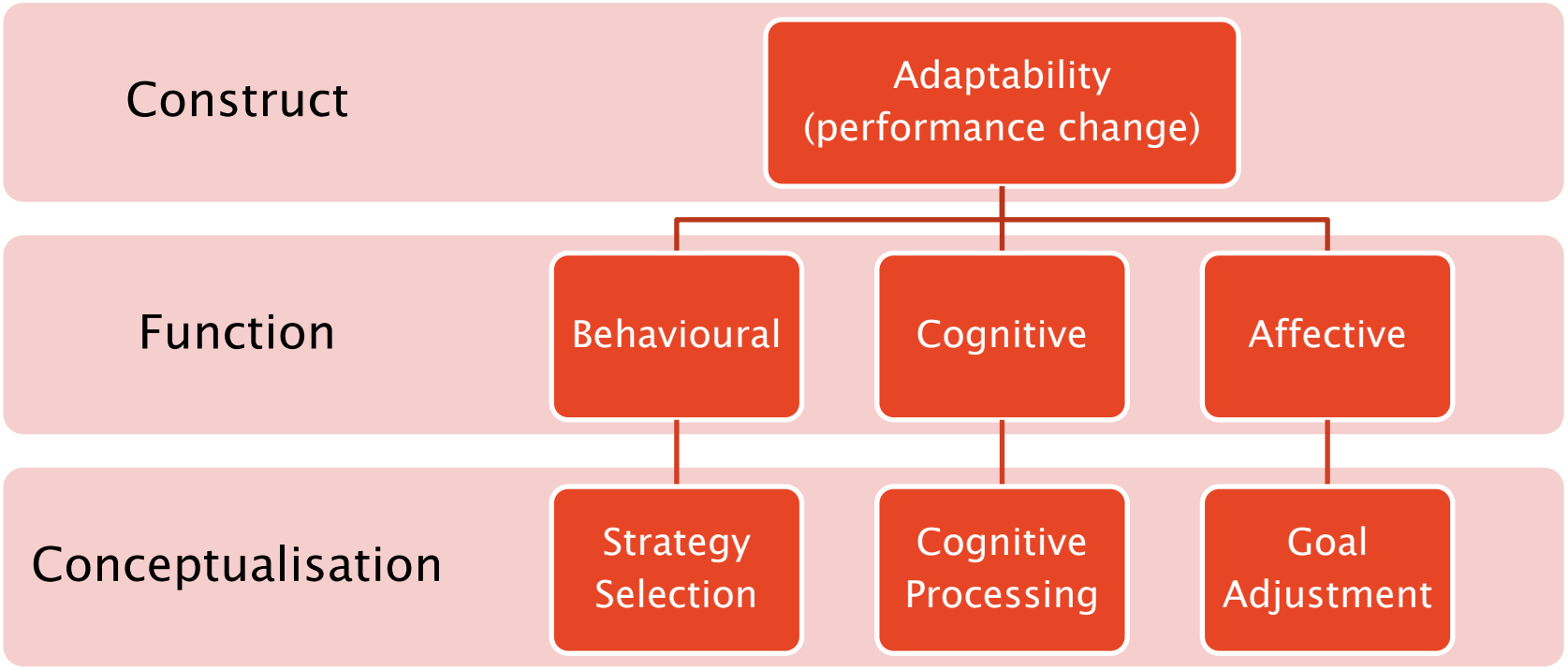
How is adaptability assessed? Measurement model 2

Adaptability as a performance change construct

'Objective' performance-based tasks



Martin et al., 2012; Ployhart & Bliese, 20

How is adaptability assessed? Two measurement models

There is a need to integrate and synthesize this expanding literature.

Lack of systematic comparison between these two methods.

Do they measure the same construct, different constructs, or separate manifestations of the same adaptability construct?

Aims

In two studies we aimed to:

1. Examine and extend existing adaptability frameworks, develop an integrated framework of adaptability
2. Develop a parsimonious taxonomy of adaptable performance, captured via multiple performance-based decision making tasks
3. Compare and cross-validate the two measurement models of adaptability with each other and with personality and cognitive ability indices

Study 2 was intended as a replication and extension of Study 1

Method: Sample

Study 1: 118 first-year undergraduate students from the University of Sydney

Study 2: 126 first-year undergraduate students from the University of Sydney

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Method: Study 1

- Self-report adaptability scales
  - Adaptability Scale: open-mindedness, composure
  - Individual Adaptability Scale: tolerance for uncertainty, learning efficacy, creative problem-solving
  - Boldness Scale
  - Resilience Scale
  - Change Resistance/Inflexibility Scale: routine-seeking, short-term focus, cognitive rigidity, stress reaction

- Performance-based tasks
  - See next slide

- Personality and intelligence
  - [illegible] (Big 5)

Example items

"I am able to revise the way I think about a new situation to help me through it"

"I am able to make effective decisions without all

relevant information"

"I function well in new situations even when unprepared"

"Can deal with whatever comes"

"I'll take a routine day over a day full of unexpected events any time"

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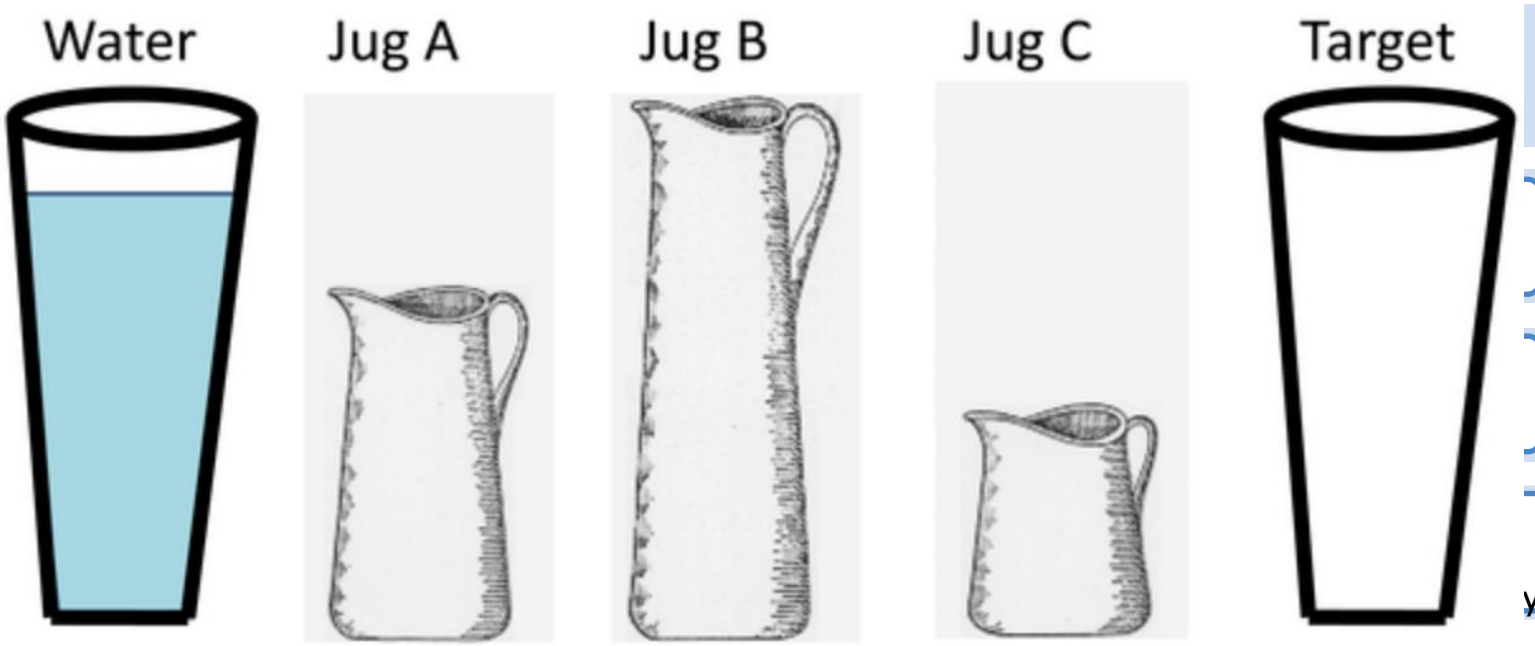
Taxonomy of adaptable performance

(based on Martin et al., 2012; Ployhart & Bliese, 2006)



A bat and a ball cost $1.10 in tot
How much does the ball cost?

Unbelievable

No addictive things are inexpensive.
Some cigarettes are inexpensive.
Therefore, some cigarettes are not addictive.

prev

Method: Study 2

- As in Study 1
- Expanded battery and nomological network:
  - Executive Functions (working memory, switching)
  - Raven's Advanced Progressive Matrices (Gf)
  - On-Task Confidence

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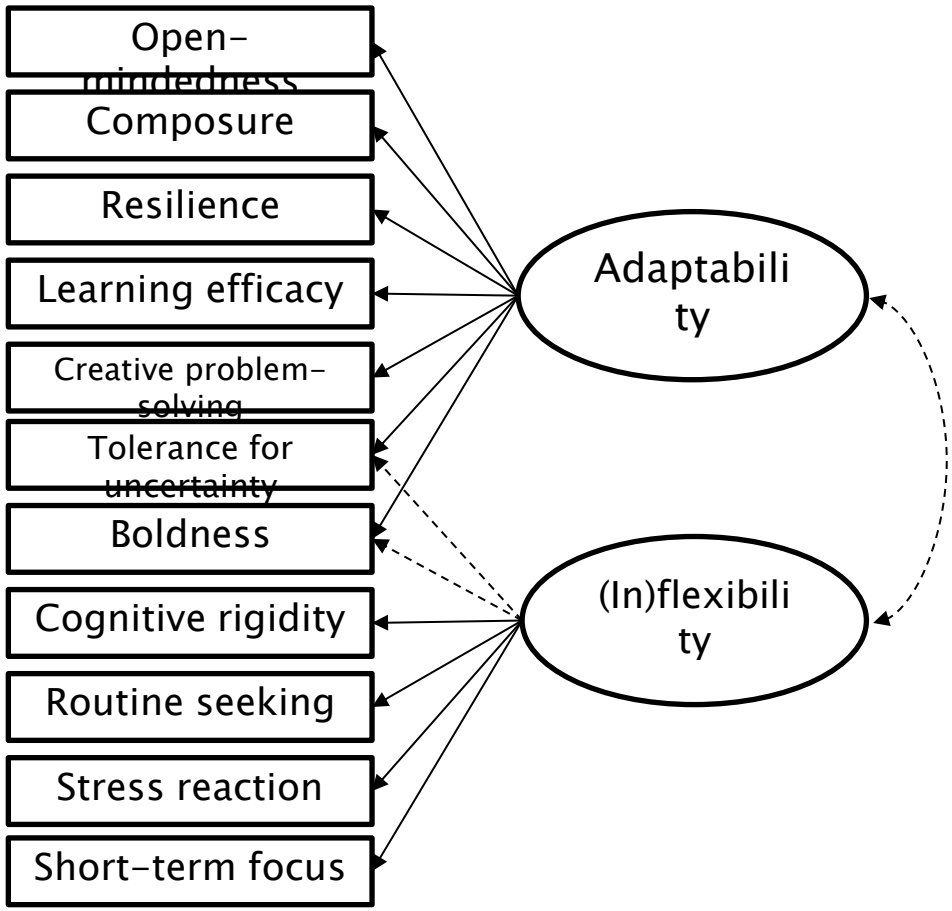
Results: Aim 1
(integrating and extending adaptability models using self-reports)

Study 1: Broad, latent adaptability and (in)flexibility factors (Exploratory Factor Analysis) $r = -.65$

Study 2: Factorial structure replicated (Confirmatory Factor Analysis) $r = -.60$



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CFA Fit Statistics

Model	χ^2	df	χ^2/df	GFI	TLI	CFI	RMSEA (90% CI)	AIC
Two-factor model	63.67	38	1.68	.92	.92	.95	.07 (.04-.10)	119.67

Results: Aim 2
(capturing adaptable performance via multiple markers)

Study 1 and Study 2:
Only accuracy metrics converged in an EFA

Suggests task-specifi

Study 1 EFA

Task	Loading	Communality
Water Jar accuracy	**.31**	.13
Water Jar strategy	.16	.26
Cognitive Reflection accuracy	**.53**	.59
Syllogistic Reasoning accuracy	**.80**	.46
Unsolvable Anagrams time	.02	.07
Unsolvable Anagrams accuracy	**.39**	.43

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Results: Aim 3

(comparing and cross-validating measurement models)

Lack of convergence between self-report and performance-based metrics

Self-reported adaptability related to personality and confidence (but not cognitive abilities)

	Self-report metrics		Performance-based metrics					
	F1: Adaptability	F2: (In) flexibility	WJT strategy	WJT accuracy	CRT accuracy	SRT accuracy	UAT time	UAT accuracy
F1: Adaptability	–	-.60**	-.03	.09	.03	.10	.06	.17
F2: (In)flexibility	–	–	-.10	-.19	-.08	-.04	-.01	-.12
Extraversion	.20*	-.31**	.10	-.09	-.17	-.10	.02	-.15
Agreeableness	.16	-.12	.19*	-.10	-.03	-.02	.22*	.06
Conscientiousness	.26**	.04	-.10	-.10	-.06	-.02	.00	.04
Neuroticism	-.49**	.32**	.09	-.16	-.07	-.07	-.10	-.08
Intellect	.22*	-.24*	.17	.05	.13	.20*	.08	.04
EAT (Gf/Gc)	.10	-.10	.00	.21*	.44**	.52**	.28**	.05
RAPM (Gf)	.05	-.10	.14	.42**	.64**	.39**	.28**	-.03
Switching								
Repeat errors	-.03	-.11	-.06	-.20*	-.23*	-.37**	-.02	-.09
Switch errors	-.17*	-.05	.05	-.22*	-.19*	-.32**	-.05	.04
Working memory								
Accuracy	.24**	-.08	-.10	.19*	.33**	.22*	.14	.19*
Confidence	.32**	-.06	-.06	.25*	.55**	.28*	.15	.15

Implications and Future Directions

- Integrative framework of adaptability based on previous models was empirically supported and replicated

- Novel taxonomy categorising performance adaptability is adaptable itself – inform future research designs and task selection

- Divergence between self-report and performance-based assessment suggests they measure two separate manifestations of a singular construct

Implications and Future Directions

– Dissociation partly due to a "common method artefact"?

Intercorrelations amplified by shared methods and reduced across different ones – questionnaires versus performance tasks

– Self-report measures = global evaluations

Performance-based tasks = specific in-the-moment responses

Implications and Future Directions

- Dissociation needs to be addressed through validation against real-world outcome criteria, to compare relative predictive validity.

- Combining performance measures with self-report markers enables a broad selection necessary in capturing the complex nature of adaptability.

- End-users would benefit from specifying what dimensions of adaptability are central to their contexts.

Take-home message

Researchers need to be aware of the different measurement models in assessing adaptability.

As they likely measure different aspects and levels (global/specific) of adaptability, researchers should specify where their approach lies.

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Questions?

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Supplementary materials: Means and reliabilities

Study 1

Variable	M	SD	α
Self-Report Measures			
Adaptability Scale			
Open-mindedness	32.28	4.67	.85
Composure	13.50	4.01	.85
Individual Adaptability Scale			
Learning efficacy	32.86	5.50	.86
Tolerance for uncertainty	28.47	5.70	.85
Creative problem-solving	17.09	3.16	.72
Resilience Scale	25.00	6.62	.88
Boldness Scale	47.31	8.72	.87
Resistance to Change Scale			
Routine seeking	15.82	4.56	.77
Stress reaction	14.81	3.76	.72
Short-term focus	14.30	4.13	.80
Cognitive rigidity	12.92	3.66	.68
Performance-Based Tasks			
Water Jar Task			
Strategy changes	3.20	1.70	.82
Accuracy	85.93	14.51	.55
Cognitive Reflection Test (accuracy)	51.09	32.05	.77
Syllogistic Reasoning Task (accuracy)	60.49	25.19	.66
Unsolvable Anagrams Task			
Time spent on set A (seconds)	130.14	83.26	n/a
Accuracy on sets B & C	48.52	28.31	.76

Supplementary materials: EFA and correlations

Study 1

Variable	2	3	4	5	6	7	8	9	10	11	Factor 1	Factor 2	h^2
1 Open-mindedness	.47**	.64**	.60**	.62**	.68**	.57**	-.49**	-.39**	-.49**	-.12	.89	.10	.66
2 Composure	1	.68**	.40**	.27**	.57**	.58**	-.46**	-.42**	-.44**	-.03	.55	-.15	.44
3 Resilience		1	.50**	.49**	.71**	.73**	-.58**	-.47**	-.50**	-.09	.80	-.05	.70
4 Learning efficacy			1	.49**	.50**	.49**	-.36**	-.33**	-.39**	-.02	.72	.10	.43
5 Creative problem-solving				1	.53**	.41**	-.45**	-.24**	-.33**	-.10	.81	.22	.45
6 Tolerance for uncertainty					1	.72**	-.66**	-.65**	-.69**	-.12	.54	-.41	.79
7 Boldness						1	-.62**	-.57**	-.64**	-.09	.50	-.38	.67
8 Routine seeking							1	.63**	.64**	.26**	-.20	.63	.62
9 Stress reaction								1	.71**	.20**	.17	.97	.72
10 Short-term focus									1	.15	.00	.85	.72
11 Cognitive rigidity										1	.10	.28	.05

The two extracted factors explained 56.73% of the common variance.

Supplementary materials: Correlations study 1

	Self-report measures			Performance-based measures				
	F1: Adaptability	F2: (In) flexibility	WJT strategy	WJT accuracy	CRT accuracy	SRT accuracy	UAT time	UAT accuracy
F1: Adaptability	-	-.65**	.19*	-.05	-.02	.04	.09	.01
F2: (In)flexibility	-	-	-.11	-.04	-.09	-.05	-.04	-.01
Extraversion	.49**	-.43**	.09	-.14	-.13	-.01	.06	.00
Agreeableness	.32**	-.08	-.01	-.13	.01	.11	-.09	.03
Conscientiousness	.19*	.06	.06	.01	-.03	-.02	-.06	.01
Neuroticism	-.43**	.40**	.07	.09	-.06	-.00	-.18	.03
Intellect	.31**	-.19*	.26**	-.03	-.05	.17	.14	-.09
Intelligence	.20*	-.19*	.09	.05	.46**	.43**	.02	.31**

Supplementary materials: Means and reliabilities

Study 2

Variable	M	SD	α
Self-Report Measures Adaptability Scale			
Open-mindedness	30.98	4.99	.87
Composure	14.09	3.39	.77
Individual Adaptability Scale			
Learning efficacy	33.08	4.26	.78
Tolerance for uncertainty	29.82	3.93	.71
Creative problem-solving	16.96	2.78	.68
Resilience Scale	25.94	5.61	.83
Boldness Scale	49.37	6.61	.79
Resistance to Change Scale			
Routine seeking	13.99	3.27	.64
Stress reaction	14.03	3.31	.71
Short-term focus	12.01	3.49	.75
Cognitive rigidity	12.83	3.59	.79
Performance-Based Measures			
Water Jar Task			
Strategy changes	2.45	1.83	.83
Accuracy	80.08	21.41	.74
Cognitive Reflection Test (accuracy)	42.63	32.68	.80
Syllogistic Reasoning Task (accuracy)	58.83	25.84	.68
Unsolvable Anagrams Task			
Time spent on set A (seconds)	140.05	87.58	n/a
Accuracy on sets B & C	45.34	29.48	.80

Supplementary materials: Correlations study 2

Variable	2	3	4	5	6	7	8	9	10	11
1 Open-mindedness	.54**	.60**	46**	.41**	.33**	.41**	-.20*	-.28*	-.13	.09
2 Composure	1	.66**	.27**	.41**	.44**	.51**	-.27**	-.22*	-.25**	.12
3 Resilience		1	.40**	.42**	.47**	.61**	-.30**	-.34**	-.33**	.16
4 Learning efficacy			1	.46**	.21*	.21*	-.16	.01	-.14	.13
5 Creative problem-solving				1	.42**	.46**	-.32**	-.13	-.18*	.15
6 Tolerance for uncertainty					1	.54**	-.45**	-.32**	-.51**	.05
7 Boldness						1	-.48**	-.39**	-.38**	.19*
8 Routine seeking							1	.45**	.45**	.16
9 Stress reaction								1	.52**	-.01
10 Short-term focus									1	.09
11 Cognitive rigidity										1

Supplementary materials: Final CFA model