Ad hoc vs. organised orchestration

A comparative analysis of technology-driven orchestration approaches

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Potential research collaboration

BRICS Multilateral Joint Call for Proposals 2017

Opening Date:
Friday, 3 June, 2016

Closing Date:
Friday, 2 September, 2016

BRICS Multilateral Joint Science and Technology Research Collaboration

2016 Call for Joint Project Proposals

EXTENDED APPLICANT'S SUBMISSION DEADLINE: 02 SEPTEMBER 2016

Background

On 18 March 2015, the BRICS Ministers of Science and Technology signed a Memorandum of Understanding (MoU) to establish a research and development collaborative programme between the BRICS countries. Following the signing of this MoU, the BRICS Group of Research Funding Parties held a meeting in July 2015 to discuss the BRICS Research and Innovation Initiatives and the establishment of the BRICS Working Group consisting of eight parties namely; National Council for Scientific and Technological Development (CNPq, Brazil), Foundation for Assistance to Small Innovative Enterprises (FASIE, Russia), Ministry of Education and Science (MON, Russia), Russian Foundation for Basic Research (RFBR, Russia), Department of Science and Technology (DST, India), Ministry of Science and Technology (MOST, China), National Natural Science Foundation of China (NSFC, China) and National Research Foundation (NRF, South Africa).

On 28 October 2015 the III BRICS Science, Technology and Innovation (STI) Ministerial Meeting signed the Moscow Declaration defining the guidelines for Research & Development cooperation among BRICS countries. In line with the objectives of the Moscow Declaration and the BRICS STI framework the NRF is pleased to announce the BRICS Multilateral Pilot call for 2016, and herewith invite all interested parties to submit their applications, by a date no later than that indicated.

Documents

BRICS Multilateral Call_SA _Guideline 2016 ›

BRICS STI Framework Programme 2016 ›

http://www.nrf.ac.za

Research goals

Supporting educators with technology-driven orchestration of learning activities in order to enable them become more effective in formal learning spaces.

Orchestration:

The real-time management of learning activities by educators.

Introduction (1)

Formal learning spaces are inherently complex ecosystems—actors, activities, constraints.

Introduction (2)

Formal learning spaces can be turned into effective learning environments by supporting educators with orchestration.

Technology-driven orchestration is flawed

Orchestration is *challenging* due to its multi-faceted nature

- Constraints such as time

Technology-driven orchestration is *ad hoc*—no standard way of orchestrating learning activities

- Analysis 1: Interviews
  - Expert review sessions with faculty teaching staff
- Analysis 2: Observations
  - Direct observations of lecture sessions
- Analysis 3: Archival records
  - UCT archived lecture recordings and screencasts

Streamlining technology-driven orchestration

We view orchestration as a function of the scale of learning activities—individual, group or class—with respect to time.

- Enactment of learning activities
- Sequencing of activities
- Learning activity management
- Centralised access to tools and services

Streamlined Orchestration.
Lighton Phiri, Christoph Meinel and Hussein Suleman.
Computers & Education 2016.

Comparative analysis study

How does organised orchestration compare with ad hoc orchestration in terms of effectiveness and User experience?

Comparative Analysis:

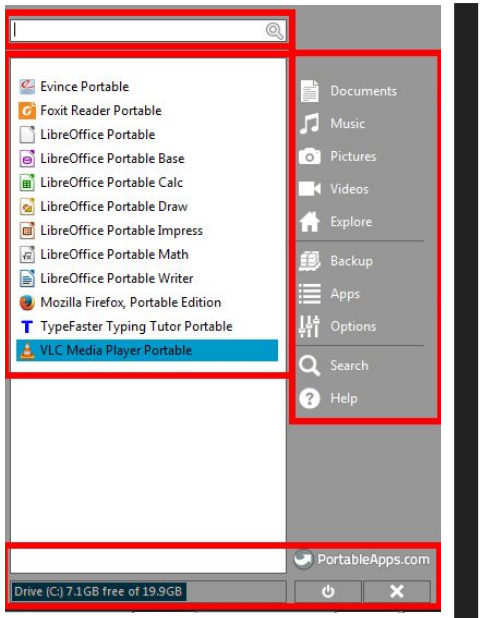
Ad hoc orchestration

vs.

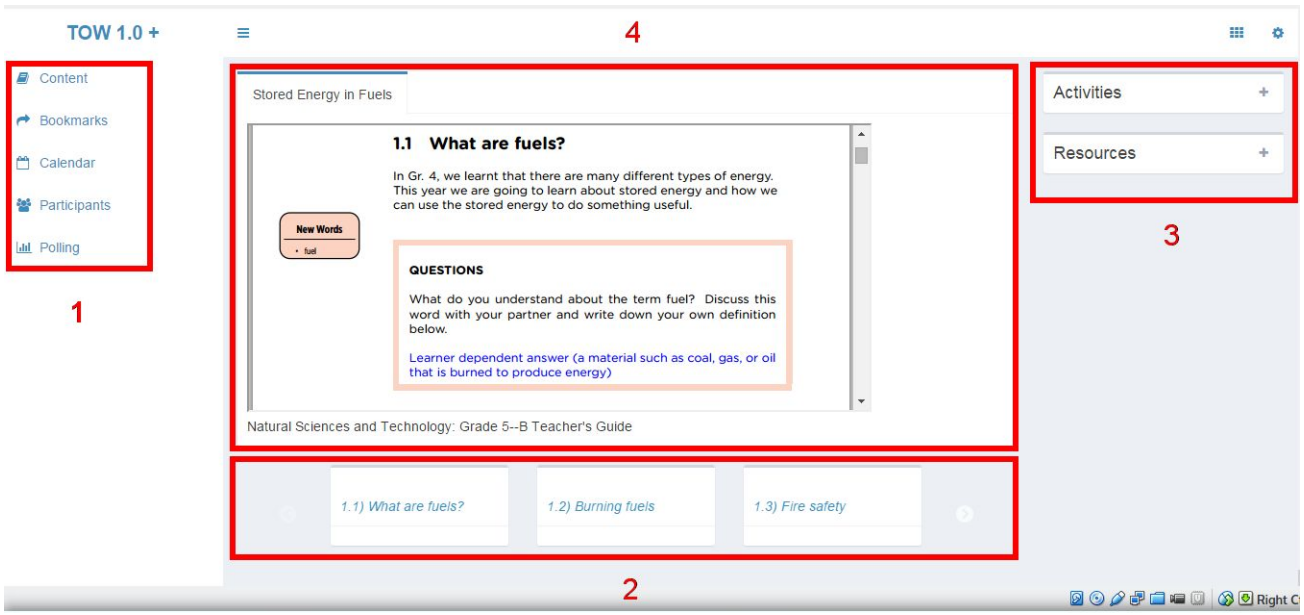
Organised orchestration

Ad hoc and organised orchestration techniques compared

- *PortableApps used to simulate ad hoc orchestration*
- *Workbench UI used to simulate organised orchestration*



PortableApps



Workbench UI

Evaluation aspects

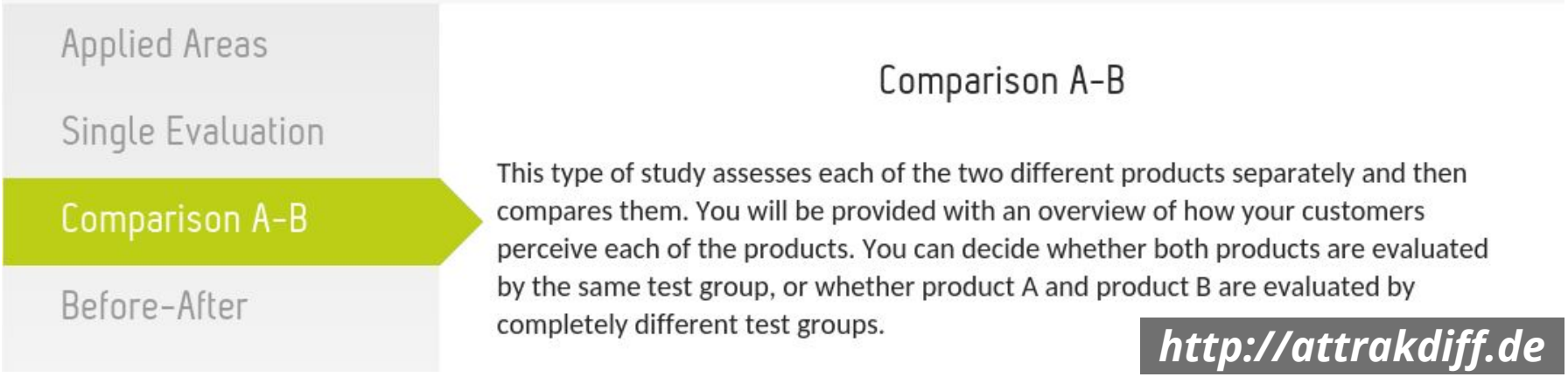
Effectiveness interpreted as follows:

- Learning activities orchestrated better, easier or faster
- Extent towards which orchestration goals were realised
- Participants’ level of comfort while orchestrating learning activities

User experience interpreted as participants' subjective views of orchestration technique's potential at meeting orchestration needs

Measurement instruments

AttrakDiff 2 used as primary measurement instrument



- Measures pragmatic quality (PQ), hedonic quality (HQ-I and HQ-S) and attractiveness quality (ATT) of interactive products
- Four dimensions associated with seven bipolar word-pairs—opposite adjectives

Evaluation metrics

How does effectiveness and user experience of organised orchestration compare with ad hoc orchestration?

- H1: Organised orchestration is more effective
- H2: Organised orchestration results in positive user experience

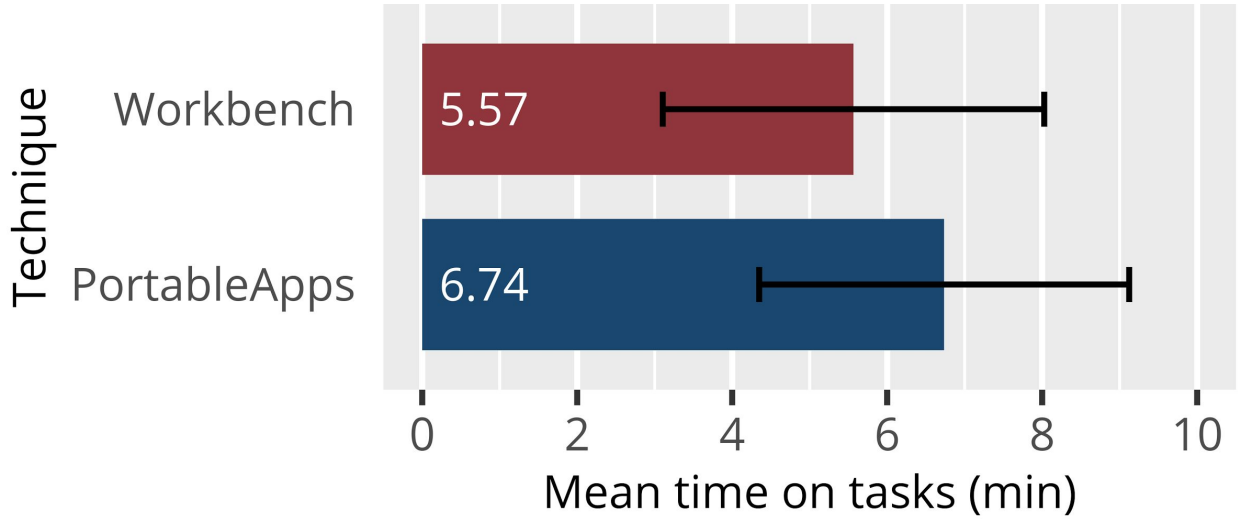
RQ	***AH***	***Factor***	***Variable***	***Scale***	***Description***
RQ1	*H1*	*Task speed*	T_t	*Min*	*Task time*
		Success	*PQ*	*[-3 – 3]*	*AttrakDiff 2*
		Comfort	*HQ-I*	*[-3 – 3]*	*AttrakDiff 2*
	H2	*UX*	*HQ-*;ATT*	*[-3 – 3]*	*AttrakDiff 2*

Study design

Within subject study design involving 61 participants from Cape Peninsula University of Technology recruited, with 55 of them completing all experimental tasks.

Participants' levels of study ranged from second year to fourth year. In addition, participants had varying experience teaching and experience using computers

Results 1: Time on tasks



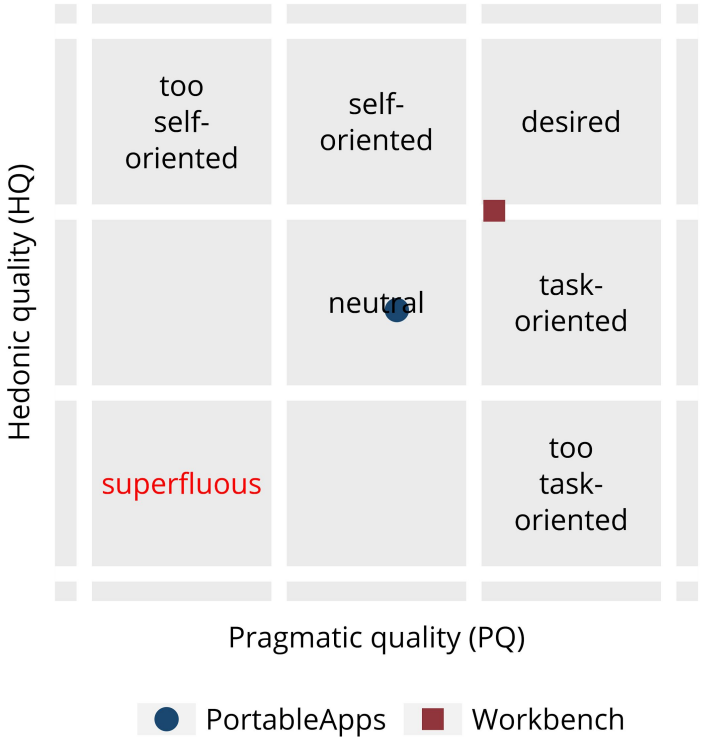
- On average, orchestration of learning activities was 21.0% faster using workbench

paired samples t-test; p-value < 0.05

Results 2: AttrakDiff 2 (1)

AttrakDiff 2
portfolio-presentation

- Both orchestration approaches fall within the same character region
- Workbench approach falls closer to desired character region

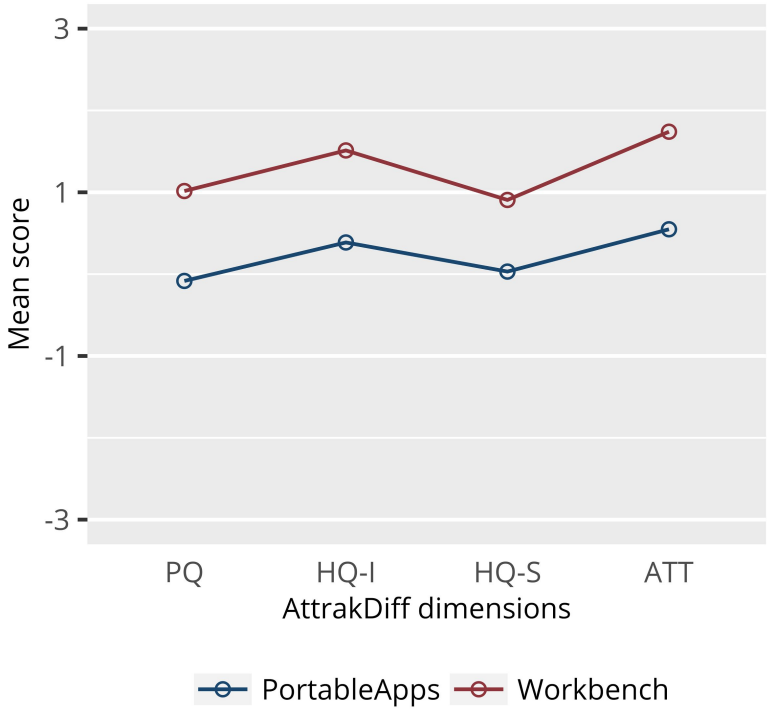


paired samples t-test; PQ: p-value < 0.001; HQ-I: p-value < 0.001; HQ-S: p-value < 0.001; ATT: p-value < 0.001

Results 2: AttrakDiff 2 (2)

AttrakDiff 2 dimension means

- PQ; HQ-I; HQ-S; ATT
  - Mean score higher for workbench on average
- Further analysis of dimension means done using word-pairs



paired samples t-test; PQ: p-value < 0.001; HQ-I: p-value < 0.001; HQ-S: p-value < 0.001; ATT: p-value < 0.001

Key study findings

- On average participants orchestrated learning activities faster using workbench
- Participants' perceived success at orchestrating learning activities greater using workbench

"Having to use approach 2 with my learners would take longer than doing the first one" —Group 1

"I liked it more than the first approach. This was really good and creative, easy to access your resources and activities" —Group 2

Key study findings (2)

- The influence of counterbalancing had a noticeable potential impact of approach complexity during transition

	Approach 1	***Approach 2***
Group 1	*Workbench: 5.84 (2.30)*	*PortableApps: 7.44 (2.24)*
Group 2	*PortableApps: 6.10 (2.38)*	*Workbench: 5.32 (1.05)*

- The influence of demographic differences resulted in minor variations from overall results.

Conclusion

Workbench approach potentially more effectiveness

- Learning activities orchestrated faster using workbench
- Perceived success more pronounced with workbench

Positive user experience for workbench approach

- Workbench had higher mean score for HQ-I and ATT dimensions

Future directions

- Case studies in authentic learning spaces
- Studies aimed at assessing the scripting and enactment of learning activities during presession management
- Reusable and sharable Orchestration OER packages

Bibliography

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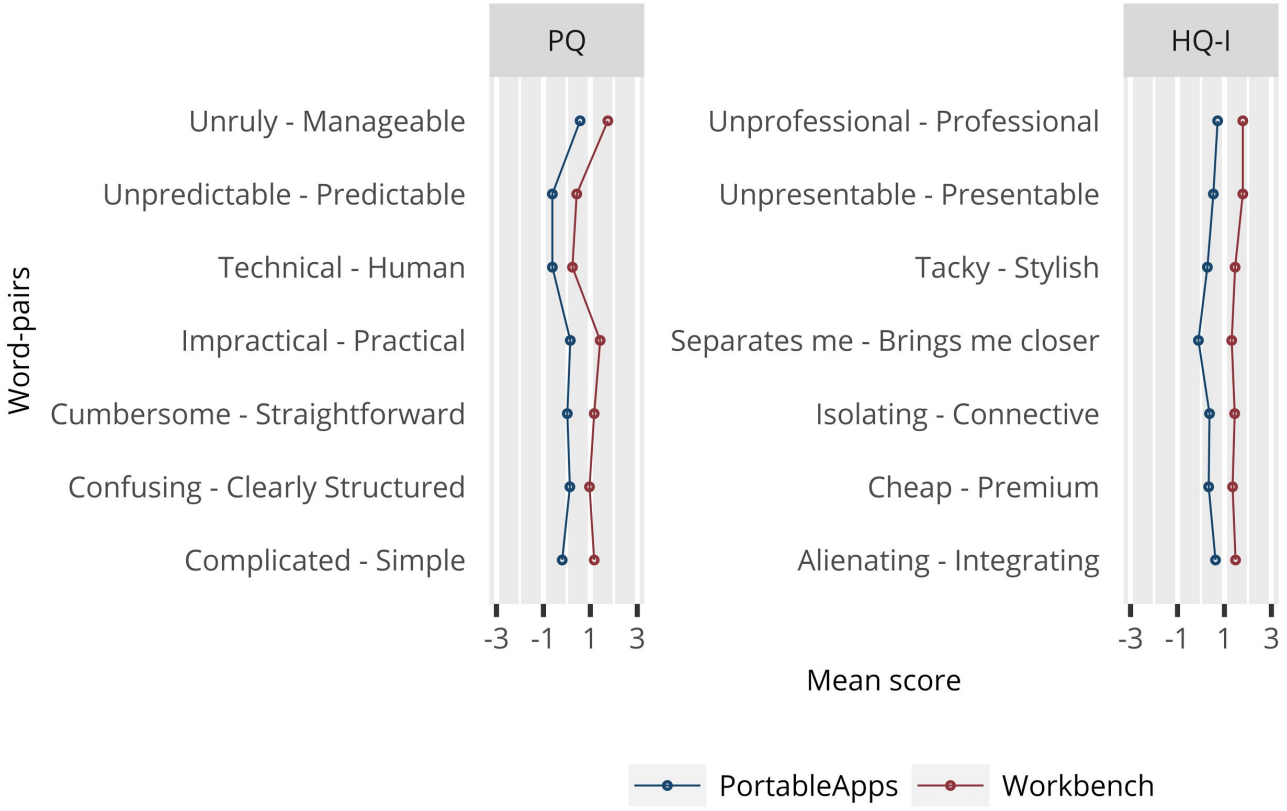
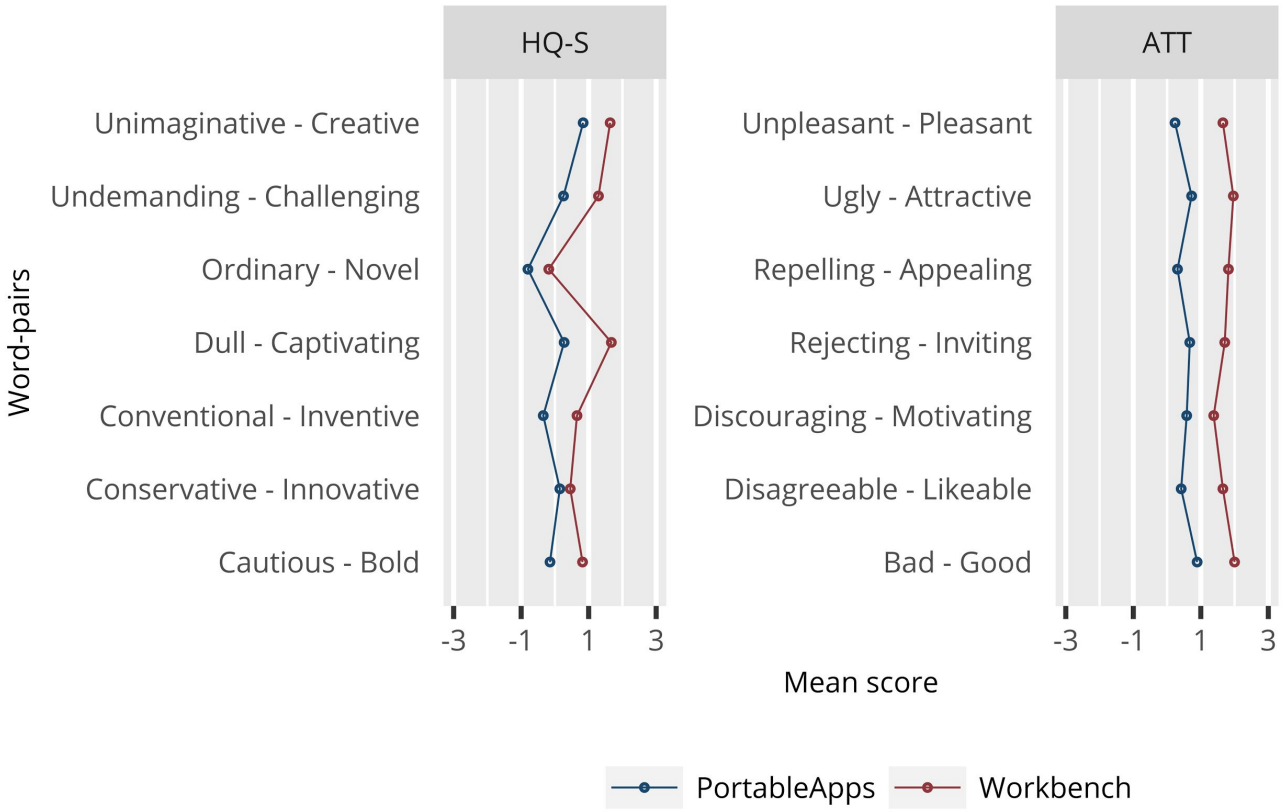
AttrakDiff 2 word-pairs (1)



PQ and HQ-I word-pair means

AttrakDiff 2 word-pairs (2)



HQ-S and ATT word-pair means