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Brown, G. T. (2015). Benefits and challenges of mixed methods. In *LÜP International Workshop - Learning in Transition: Fostering Teacher Education*. Carl von Ossietzky University, Oldenburg, Germany.

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Benefits and Challenges of Mixing Methods

LÜP Graduate Program International Workshop, Carl von Ossietzky University, Oldenburg. June 1-4, 2015
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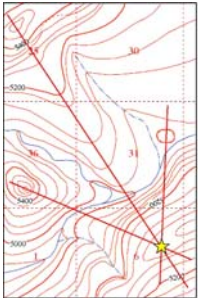



Method effects

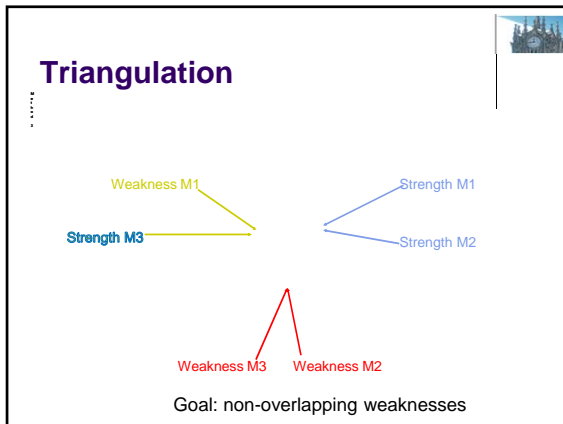


- How you collect and analyse data shapes and determines the results you get
- Every method is imperfect and so no method is immune to assumptions or imperfections
 - You're not perfect, likewise the method
- Results may be due to the method you use
 - Data may cluster because of how it is collected or interpreted not what it actually measures

Triangulation: Multiple & Mixed Methods



- I know where I am by relating to stuff I already know
 - Find location of unknown object by approaching it in different ways from known sites
- Metaphor for multiple and mixed methods research
 - Multiple approaches to examine common phenomenon



- ### Method Effects in Quantitative Research
- NOT new in Quantitative Research
 - Need to check or control for method effects by using multiple methods
 - Validation tools
 - Multi-trait, multi-method analysis
 - Multi-battery factor analysis
 - The common traits should stand out regardless of method used

Multi-Trait, Multi-Method Analysis

		Method 1		Method 2	
		Trait A	Trait B	Trait A	Trait B
Method 1	Trait A	(reliability)		If traits exist across methods then HeteroM+MonoT should be strong	
	Trait B	MonoM HeteroT	(reliability)		
Method 2	Trait A	HeteroM MonoT	HeteroM HeteroT	(reliability)	
	Trait B	HeteroM HeteroT	HeteroM MonoT	MonoM HeteroT	(reliability)

Campbell, D. T. & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin* 56, 81-105.

MTMM Analysis: Self-Rating, Teacher-Rating, & Ability

Measure	Monotrait Heteromethod			Heterotrait Monomethod			Heterotrait Heteromethod		
	1	2	3	1	2	3	1	2	3
1. SILSER									
2. Teacher Rating of Independence		.26	.22	.50		.73		.25	.21
3. ESA:IS Test Performance						na			

These are Average Correlations.
What Conclusions can you draw?

Brown, G. T. L. (2005). Student information literacy: Psychometric validation of a self-efficacy report. *Psychological Reports*, 96, 1044-1048.

Multi-Battery Factor Analysis

Scales	Joint Factor Analysis				Multi-battery Factor Analysis			
	I	II	III	IV	I	II	III	IV
18. Student Accountability	.66	.35	-.04	-.08	.19	.50	.01	.02
14. Describe	.63	-.44	-.15	.04	-.32	.35	-.04	.17
13. Valid	.56	-.41	.17	-.14	-.31	.35	.10	-.03
17. School Accountability	.56	-.13	.09	-.26	-.13	.43	.20	.00
20. Academic	.47	.05	-.20	-.24	.04	.48	.08	.28
7. Surface	.45	.09	-.12	-.10	-.01	.50	.04	-.00
21. Technological	.42	-.15	-.31	-.01	-.11	.35	-.07	.29
9. Internal	.40	.07	-.06	-.21	.02	.24	.13	.05
10. Bad	.13	.79	-.02	.01	.77	.11	.00	.01
11. Ignore	-.03	.72	-.02	-.09	.83	.04	.08	.28
16. Improve Learning	.39	.60	-.13	-.09	.43	.14	.11	.17
15. Improve Teaching	.38	.53	-.30	.08	.34	.18	-.03	.17
12. Inaccurate	-.11	.40	-.31	-.09	.49	.04	.08	.28
8. External	.20	.36	.13	.04	.23	.17	-.00	-.17
1. Nurturing	-.10	-.07	.67	-.20	.00	-.07	.07	.39
6. Deep	.02	-.05	.64	-.10	.00	-.02	.05	.37
22. Humanistic	.24	.05	.51	.16	.04	.15	-.12	.38
19. Social Reconstruction	.09	-.10	.39	-.35	-.05	.09	.16	.27
4. Social Reform	-.04	.03	-.02	.78	.06	.00	.72	.09
5. Development	-.06	-.11	-.29	.67	-.02	.04	.27	.29
3. Transmission	.20	.11	.09	.55	.03	.12	.59	-.09
	.36	.07	.09	.53	-.01	.46	.20	-.15

DATA-5 inventories; 22 scales
 Problem: Factor IV mixes inventory and trait
 Same Method (circled in red)
 Same Trait (circled in red)

Brown, Gavin T L (2007). An introduction to multi-battery factor analysis: Overcoming method artefacts. *Practical Assessment Research & Evaluation*, 12(7). Available online: <http://tinyurl.com/2bt7fl>

Advantages of Particular Methods

- Surveys describe what is at large sample level.
- Interviews describe why and how it is at small scale level.
- Observations allow for rich descriptions and resulting grounded theory to emerge.
- Experiments allow for controlled testing of theories
- Statistical tests of significance allow us to eliminate chance in understanding relationships between variables.

Strengths & Weaknesses of Qualitative & Quantitative Methods

Method	Population	Occurrence	Timing	Format	Ethics	Setting
Fieldwork	Small	Natural	Now	Verbal & Non	Constrained	Realistic
Survey	Census	Natural	Now	Verbal	Non-Constrained	Artificial
Experiments	Small	Controlled	Now	Verbal & Non	Constrained	Artificial
Non-reactive	Small	Natural	Past	Verbal & Non	Non-Constrained	Realistic

Choose the best compromise.

To think about

- Is your problem or interest...
 - Quantities or qualities
 - Take place in a naturally occurring or artificial setting
 - Focused on meanings or behaviours
 - Amenable to an inductive or deductive approach
 - Generalised to cultural contexts or universe of all populations
- If both then need mixing methods design
- If problem contains both then need both

Mixing Methods

- More than using multiple methods
 - Multiple methods within quantitative reduces error and increases validity
- Mixing methods means using both qualitative and quantitative appropriately mixed depending on multi-faceted nature of problem
- Can be done within 'scientific' paradigm
 - but many critics of 'positivism' argue for purist 'interpretive' philosophies of knowledge and research---problem, indeed

Mixing Methods Rationale

- When you want to ask a question that has rarely been asked or has been asked with questionable results.
- When you want the strength of multiple methods for triangulation.
- When some, and only some, of your variables are easily quantifiable at this stage of inquiry.

Mixing Methods Research

- Mixing methods moderates the competition between methodological paradigms
- Simply adding a second method to a study does not make it good research
- What makes good research is having a rationale for mixing methods and a rigorous implementation technique
 - How will you get Method x to speak to the results of Method y, especially if one is Quant and the other Qual?

Philosophic Basis

- Pragmatism—cf. Charles Sanders Peirce
 - Reject dualisms
 - Natural, social, & psychological worlds important
 - Endorses fallibilism: theory is tentative
 - Instrumental evaluation of theories—must be workable, predictable, applicable
 - Pluralist and eclectic in terms of method & theory
 - Empirical, experiential, experimental—real world
 - Action preferred to philosophizing
 - Practical orientation—interested in effective practice

Pragmatism
http://en.wikipedia.org/wiki/Pragmatism#Further_reading

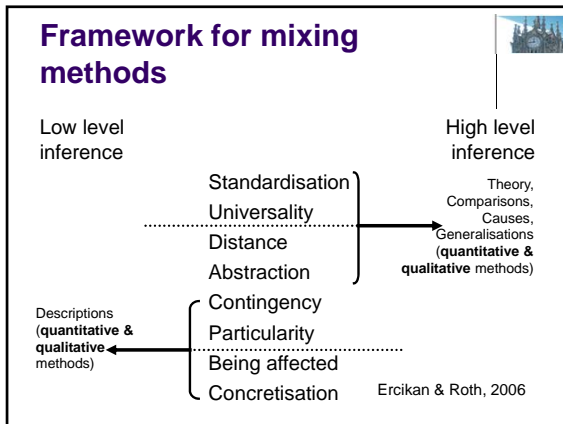
- *Pragmatists*: connection with practical consequences or real effects as vital components of both [meaning](#) and [truth](#).
- emphasis on the importance of practical effects in connection with theoretical ideas as they impact on the human way of life in general and the life of inquiry in particular
- Doubt requires justification
 - (confrontation with some specific recalcitrant matter of [fact](#) which unsettles our belief in some specific [proposition](#)).
 - Not just "I disagree with your approach or philosophy or theory"
- Inquiry is then the rationally self-controlled process of attempting to return to a settled state of belief about the matter.
- beliefs are [dispositions](#) which qualify as true or false depending on how helpful a disposition proves in accomplishing the believer's goals
 - But beyond relativism

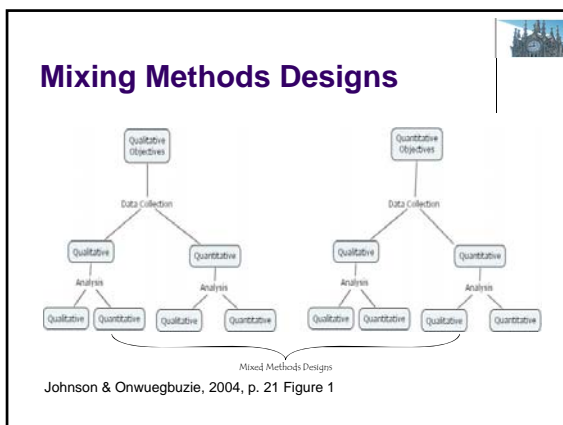
Intended Advantages of Mixing Methods

- Reduce bias in the study.
- Help to understand complex issues.
- Addresses the *objectivity-subjectivity* continuum.
- Allows researcher to move back and forth between paradigms to fully understand situation.

Disadvantages of Mixing Methods

- Conflict of paradigms - purist perspective.
- Can you really work and write using two contrasting paradigms and be close to the truth?
- Works well if you work in a team - one qualitatively grounded, one quantitatively grounded.
- But results from one method may not align with another method





Mixed Method Design Options: Status & Timing

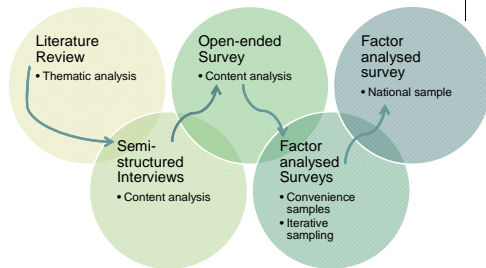
	Concurrent [6]	Sequential
Equal Status	QUAL + QUAN	QUAL → QUAN QUAN → QUAL
Dominant Status	QUAL + quan	QUAL → quan qual → QUAN
	QUAN + qual	QUAN → qual quan → QUAL

Johnson & Onwuegbuzie, 2004, p22, Figure 2

Mixing Data Collection

- Sequential building on prior study
 - Using qualitative approaches to confirm or further explore existing quantitative data.
 - Survey or test to interview or focus group
 - Using qualitative methods to develop and refine quantitative measures.
 - Interviews/focus groups to fixed form surveys
 - Using quantitative methods to test the generalisability of a particular finding
 - Interview results to large-scale survey

Example of Mixing Methods Research



Brown G. T. L. (2002). *Teachers' Conceptions of Assessment*. Unpublished doctoral dissertation. University of Auckland.

When methods don't align

- Questionnaire and interviews—how simple

Articles	Subject of study	Participants	Study design	Agreement
<i>Correlational analysis: Krippel</i>				
Bergman et al. (2004)	Personal medical history about former illnesses and their age at diagnosis	7,841 male and female residents of Potsdam	Baseline face-to-face computer guided interview, then, approximately 2 years later, a follow-up self-administered questionnaire.	$r = .83-.88$ for diseases like diabetes, cancer, etc.; $r = .68-.77$ for gout, hypertension, etc.; $r = .39-.59$ for rheumatism, IBS, stomach ulcers, etc.
Rasmussen et al. (1991)*	Migraine headaches	713 Danish adults	Questionnaire administered, followed by a clinical semi-structured interview and an examination by a medical	$r = .24, .30, .43$ for different types of headaches
Holm (1982)*	Religious beliefs	122 Swedish speaking Finnish adults	An open interview, questionnaire, and two tests administered to participants in alternating order.	Range $r = .08-.32$
Burrows et al. (2004)	Social desirability in health assessment	261 American Gulf War Veterans	Questionnaire administered, then, 2 weeks later, they took part in a computer assisted telephone interview.	Interview identified more symptoms ($n = 51$); questionnaire identified more severe symptoms ($n = 86$).

Concluding thoughts

- Method effects result from instrument design, participant responses, and analytical processes and can cause data to say different things.
- Differences should be considered not so much as confirmatory or divergent, but rather as complementary
- Analyse data separately using methods suitable to each
- Then compare results to see if any common messages resonate from both methods

To finish

- “triangulation attempts to confirm inferences made from the findings of several research methods and approaches. However, triangulation is less a method than a troublesome metaphor”. (Smith, 2006, p. 465)

• Smith, M. L. (2006). Multiple methodology in education research. In J. L. Green, G. Camilli, & P. B. Elmore (Eds.), *Handbook of complementary methods in education research* (pp. 457-475). Mahwah, NJ: LEA.

Your mission should you choose to accept it ...

- Not Impossible, but possible
- Think, plan, collect, think, adjust, think, focus
 - What do we want to know?
 - What do we already know?
 - What is a good way to get at what we want?
 - What did we find?
 - What does this tell us in light of what we already know?
 - What should we do next?

References

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