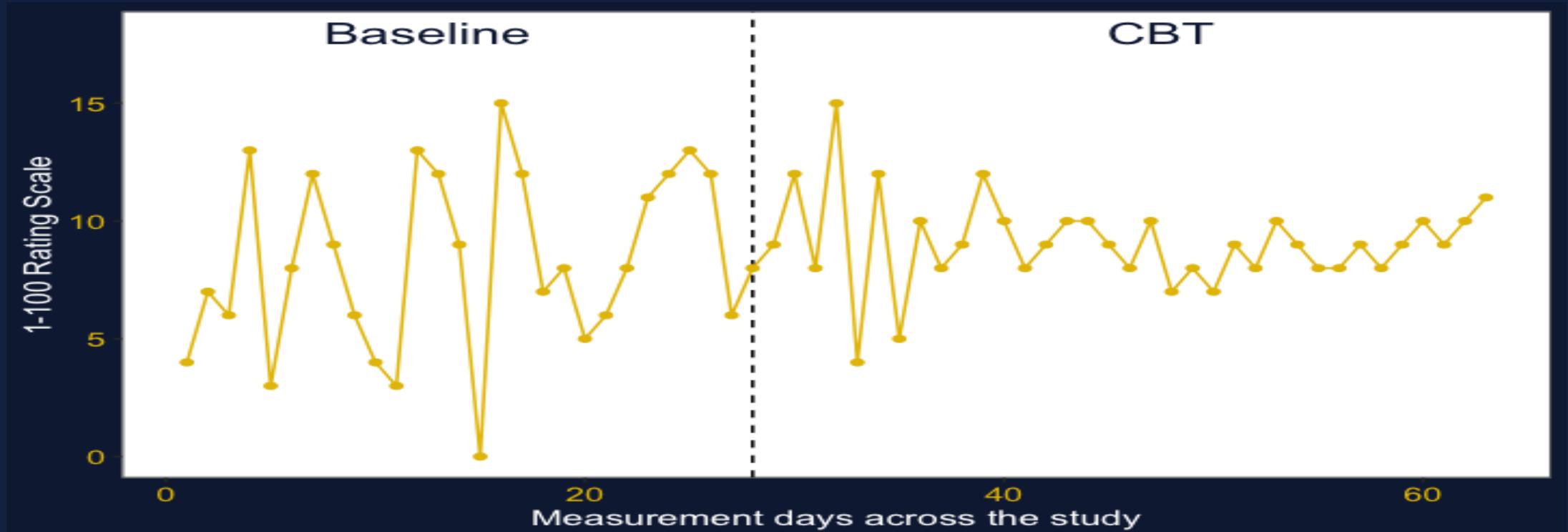




Planning for, conducting and reporting a single case experimental design

Clinical and Applied Psychology Unit

University of Sheffield





Steve Kellett

Clinical Psychologist

Sheffied Health & Social Care NHS
Foundation Trust



Mel Simmonds- Buckley

Researcher

University of Sheffield



Chris Gaskell

Clinical Psychologist

Salford Royal NHS Foundation Trust



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🧭 Navigating these slides

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Day 1

- Aims for the workshop
- Intro to SCEDs
- Why use SCEDs
- Types of SCEDs
- Measuring change
- Setting it up

Day 2

- Analysis
- Practice
- Resources



Note: all underlined white and red text are hyperlinks!



🧭 Navigating these slides

⌨️ Keyboard shortcuts - Press 'h'.

📍 Overview slides - Press 'o'.

✍️ Scribble on slides - Press 's'.

✉️ If you find any problems with these slides then e-mail [Chris](#).



Slides made using Xaringan and R
Markdown.



Aims of the workshop

- To become **familiar** with the requirements of the single-case experimental design.
- To appreciate the linkage between **practice-based evidence** and single case methodology.
- To **understand** the basic features of the available designs.
- To consider ways of making single case work more accessible to your client.
- To appreciate the **potential** of single case methodology.



Aims of the workshop

- To review the application of single-case methodology within clinical research and practice.
- To examine **practical difficulties** arising from the implementation of single case studies.
- To provide practical experience of design and analysis of single case studies.
- To provide a forum for you to discuss foreseen problems associated with single case design and to problem solve these with you.



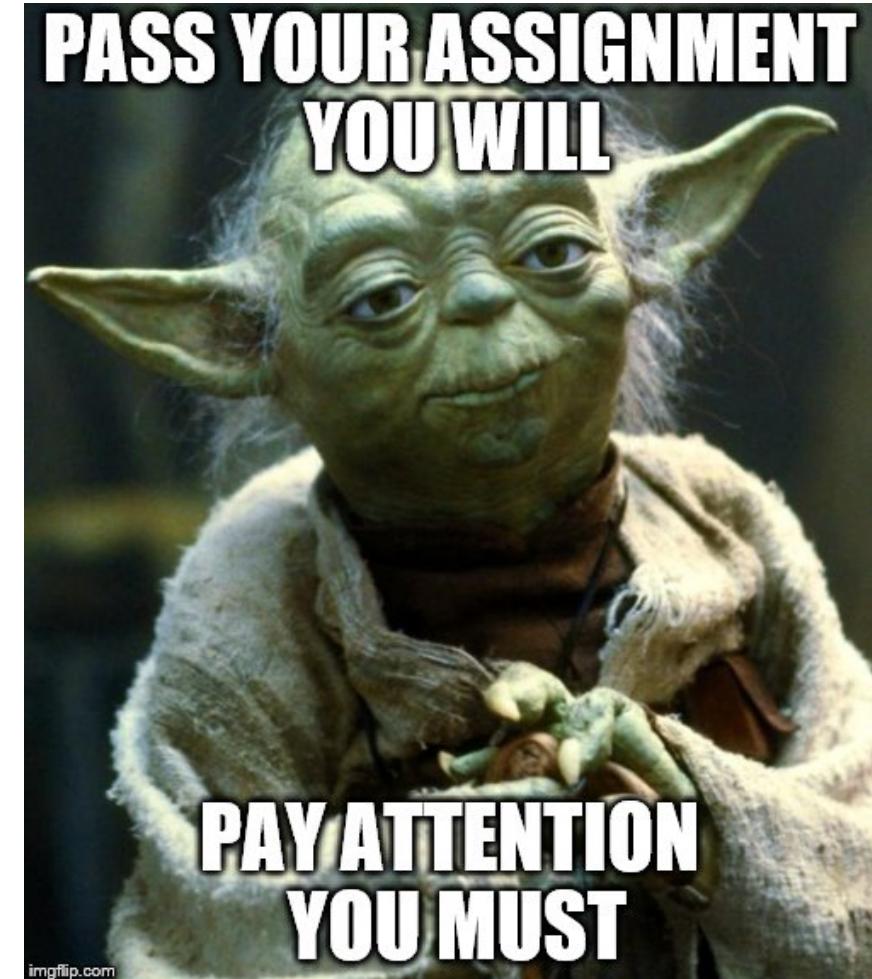
Hopes for the workshop

include...



A note on the assignment

- Conduct a SCED using delivery of the Unified Protocol.
 - Any SCED design is permissible (we will teach you all the methods).
 - Submit via Unidrive (not Turnitin).
 - Ethical approval for this in place
- Patient information and consent forms are on MUSE
 - Include signed consent form in appendix.





Introduction to SCED

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Brief history slide



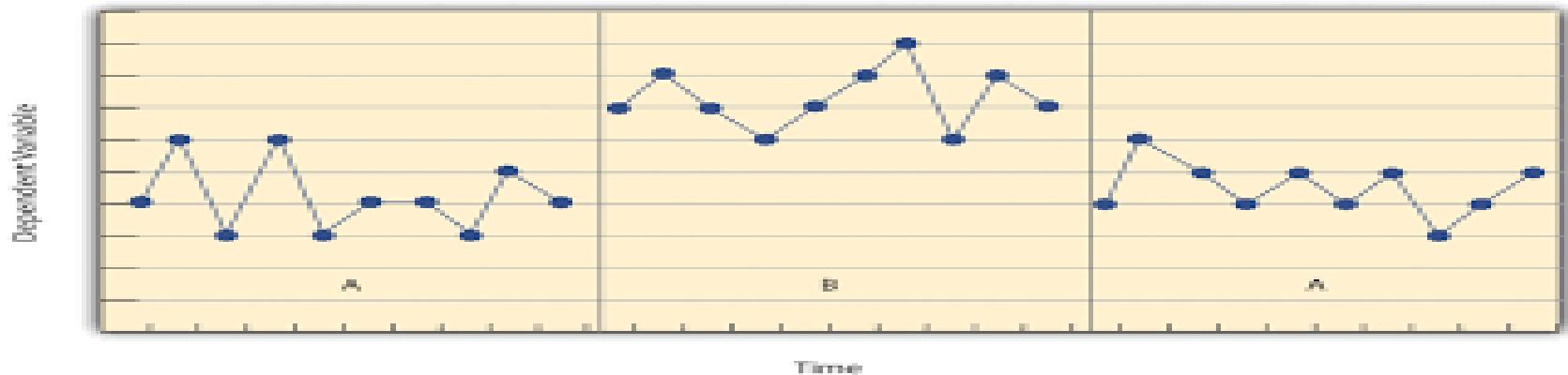
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Single case involves:

- Time-series measurement (quantifiable + over time).
- Baseline period.
- Experimental manipulation of an IV.
- Focus on within-subject variability.





What is a baseline?

- Repeated measurements before treatment is introduced.
- The ideal is long and stable baselines.

However:

- Not common
- Some disorders have inbuilt variability.
- Are neutral baselines are a fallacy?





Treatment

- Involves the introduction (and/or withdrawal) of the UP so that its effect on the idiographic measures can be assessed
 - The UP you deliver needs to be well specified
 - Take all of this – the design and the intervention to supervision.
 - Tape a treatment session and get your supervisor to rate your clinical competency with the CTS-R and you can report that in your method – that would add to the write up (but isn't a must do).



The focus?

- Your **individual** service user.
- **You**, the clinician.
- Why and what leads to change in this client?
- Within client change rather than across client change.



Why use SCMs?

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So why use SCMs?

💡 **Clinical research:** Testing clinical hypotheses and contributing to knowledge.

📝 **Practice philosophy:** Being a scientist practitioner.

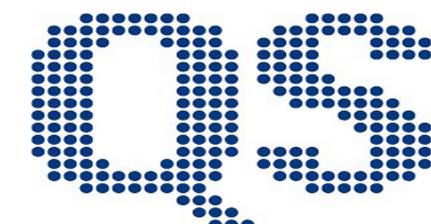
⚖️ **Accountability and evaluation:** Being an effective practitioner and auditing your work.

📖 **Education and training:** Learning SCED skills for the rest of your career



Status of SCED as a research tool?

- Highly accessible for clinicians.
- Growing popularity.
 - Single case texts/books regularly published.
 - No longer restricted to ABA.
 - Health user movements.
- Appropriate for novel or emerging areas.
 - e.g. CBT and panic/psychosis rooted in SCED evidence.
 - RCTs are not the only option.
- Rapidly developing field.
 - New analytical methods + designs.



Quantified Self



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Hour Glass Model



Clinical Practice

- Accountability and evaluation.
- Demonstrating treatment effectiveness.
- Monitoring progress (or deterioration).
- Training in single case methods makes more effective practitioners?
- Referral on following ineffective treatment – you will really know this.
- Inviting patient to be part of evaluation.



Being a Scientific Practitioner



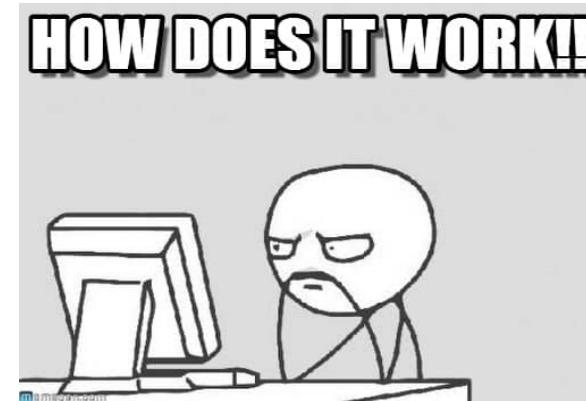


Scientific Practitioner

Most useful contribution of SCED?

Ability to answer questions that are **clinically relevant variants** on those of evidence-based practice.

"Does this evidence-based treatment work for this particular client, who differs in some way from the sample characteristics of the evidence base?"





What's the advantage of SCED?

- Low cost
- Low infrastructure
- Small 'turning circle'
- Easily adaptable + flexible
- Collaborative (if done right)

Available for all clinicians to use!.





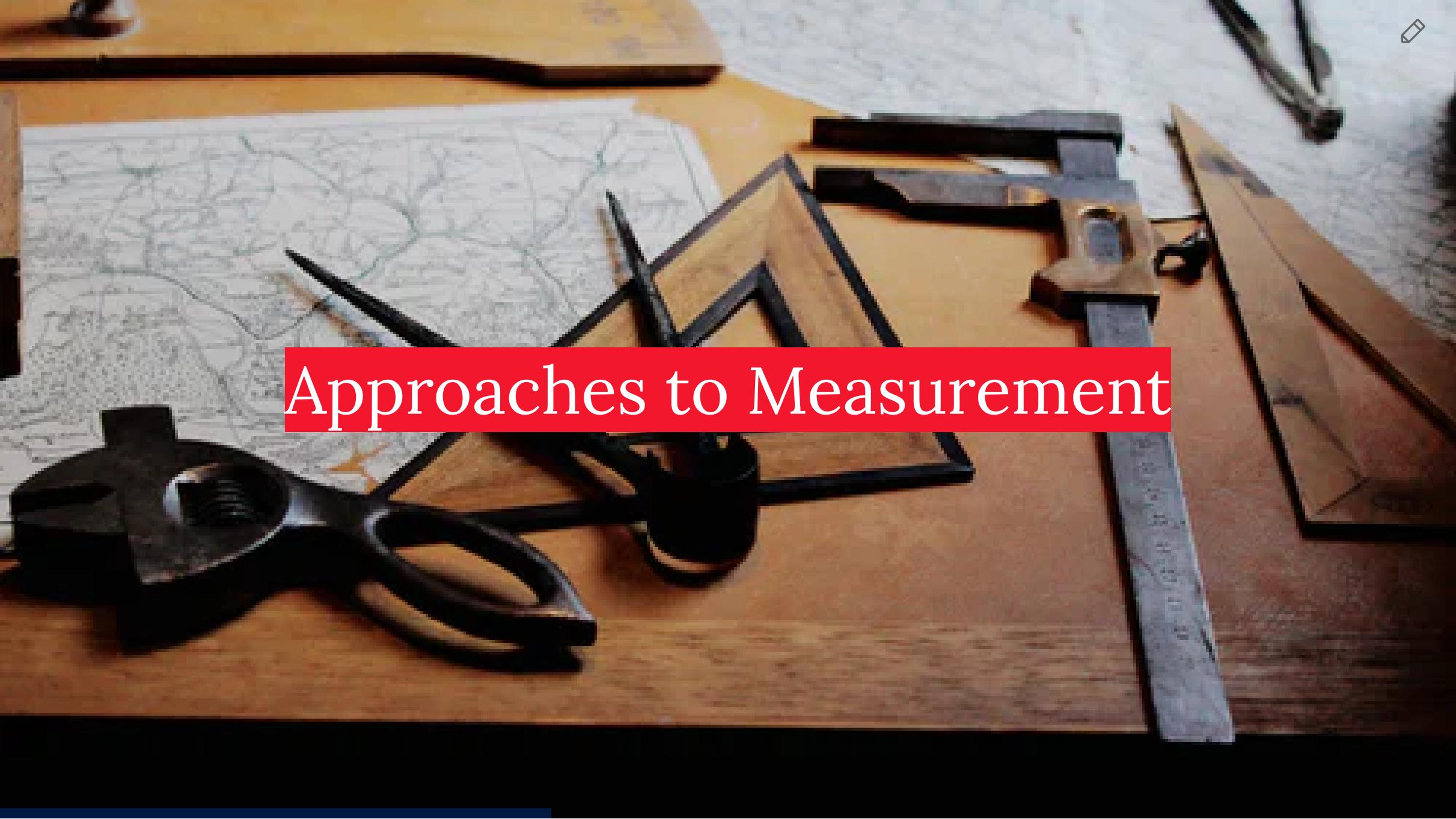
Why don't clinicians use it?

- Lack of confidence
- Lack of knowledge
- Can be messy in practice.
 - The ideal described in the classic texts on the design seems a far cry from what is possible in the real world.
- Perception that it is too much for the recipient to handle.
 - [Theory of Spun Glass](#) (Meehl, 1973)



Approaches to Measurement

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A photograph of a light-colored wooden desk. On the desk, there is a detailed topographical map of a coastal area. Next to it is a black compass rose. A clear plastic protractor is positioned over the map. A metal ruler lies horizontally across the desk. In the foreground, a black electronic calculator is placed next to the ruler. The background shows more of the desk surface and some papers.

Approaches to Measurement



Nomothetic Measures

Traditional questionnaire approaches used in services.

Idiographic Measures

Unique measures applied in an individualised manner.

Qualitative Approaches

Qualitative approaches to assessment (e.g. interviews).

- Attempts to generalise people.
- Uses objective knowledge.
- Based on data that is categorical or numerical.

- Focuses on recognition of uniqueness.
- Uses subjective experience.
- Based on study of uniqueness at an individual level.

- like ideographics, focuses on subjective judgement and experience.
- Traditional methods: interviews, focus groups, soft outcomes.

Adapted from



Ideographic or nomothetic?

SCED seeks to balance focus on nomothetic and idiographic approaches to measurement.

A funnel approach from nomothetic to idiographic target measures

“Different but complementary approaches to accumulating a broader base of evidence... So, when asked by clinical trainees, what two outcome measures I would recommend, my response invariably is: one nomothetic and one idiographic”.

— Barkham, 2016

Nomothetic and ideographic has long tradition within psychotherapy Sheffield University (e.g., Barkham, Stiles, & Shapiro, 1993).

[Barkham commentary \(2017\)](#)



Time series measurement

- Frequent measurement of idiographic outcome measures that are key to the maintenance of the clinical problem
- In essence, you then ask to what extent the observed variation in the idiographic measures is consistent with change occurring?
- The repeated idiographic measures provide data on the variation across time in these outcome. With this information the search can begin for the causes of that variation



Choosing nomothetic measures

- These are the psychometrics that are off the shelf and you use them at pre and post intervention
 - Do them at the end of follow-up if you have that in your design
 - Do them at the end of each phase if you are doing more than a A/B
 - Try to match one the nomothetic measure to the presenting problem
 - You need to use the CORE-OM at least.



Choosing a generalisation measure

- Whilst the intervention should influence the target of the intervention, an important issue is whether the intervention generalises to other aspects of the client's life.
 - These measures are good test of the external validity of your work.
 - You take these measures (e.g. quality of life) occasionally and often in tandem with the nomothetic outcomes measures.



- Qualitative approaches can also be profitably applied to the single-case design. The collection of rich, detailed qualitative information throughout the course of treatment can prove useful in helping to rule out alternative hypotheses



Setting up ideos





Practicalities

- Usually single case designs rely either on direct staff/parent/carer observations OR self-monitoring using self-report diaries.

Designing idiographic measures: tips

- Designed collaboratively
- In the client's language
- Can be a piece of cognition, behaviour , affect or interpersonal process (or a variety of these; topographical variation)
- Anchored and scaled effectively – in the clients own words
- High frequency occurrences are best
- Intensity measures
- Frequency measures
- When to complete?
- What time period do they cover?



BASELINE REQUIREMENTS

What are the minimum requirements for a baseline? Number of observations? 14 DAYS Stability? Sidman suggests collecting data until a stable baseline is achieved. Stability is defined 5% variability around mean value. Remember. Your baseline measures should continue throughout your intervention and be repeated at follow up. When does the baseline start and end? In the UP, the baseline (A) would end once you have the formulation in place. Start of module 1 is start of treatment (B). The UP formulation goes in the appendix of the piece of coursework.



So, why is baseline stability an issue?

- A worsening baseline: sudden, dramatic worsening of symptoms may represent a temporary change that would dissipate regardless of any intervention
 - An improving baseline: problematic, because any subsequent improvement during the intervention phase may have occurred whether or not the intervention was introduced

Baseline-practical issues

- Suitable baseline: the assessment phase
 - Identify a small number of target variables during the assessment and then generate a brief rating scale, which the client would complete daily over time

STABLE BASELINES

Baseline should be stable (mean level) with low variability. Problems arise if baselines display: (i) Linear trends: (ii) Higher order trends (iii) High variability Presence of (i), (ii), or



Consider having a control idiographic measure

- These are an idiographic measure, not expected to change due to the intervention
 - If there is change in the target idiographic measures and not the control is shows the intervention working.
 - Stability also shows its not spontaneous recovery



How to engage clients

- Not a must do aspect of your work
- Good rationale
- Have a relaxed attitude
- Display interest in their plight
- Be flexible
- This is an aspect of your normal practice
- Encourage reflectivity
- Keeping an eye on progress
- Promise feedback

.



Modelling and role play

- Lets decide as a group what the client will be presenting with and in what context
 - What the demonstration and then we can critique it
 - Then you will get to practice in 2s – you both have a go.



Different designs

Designs

A-B

A-B-FU

A-B-A-B

A-B-A-C

Various SCED designs

Endless number of possible combinations.

What do the letters mean?

- A = Baseline
- B = Intervention
- A2/W = Withdraw treatment
- C = Second, alternate treatment.
- FU = Follow up.

The choice of design determines the internal and external validity of your single-case study.

Important to be aware of what is feasible and ethical.

Different designs

Designs

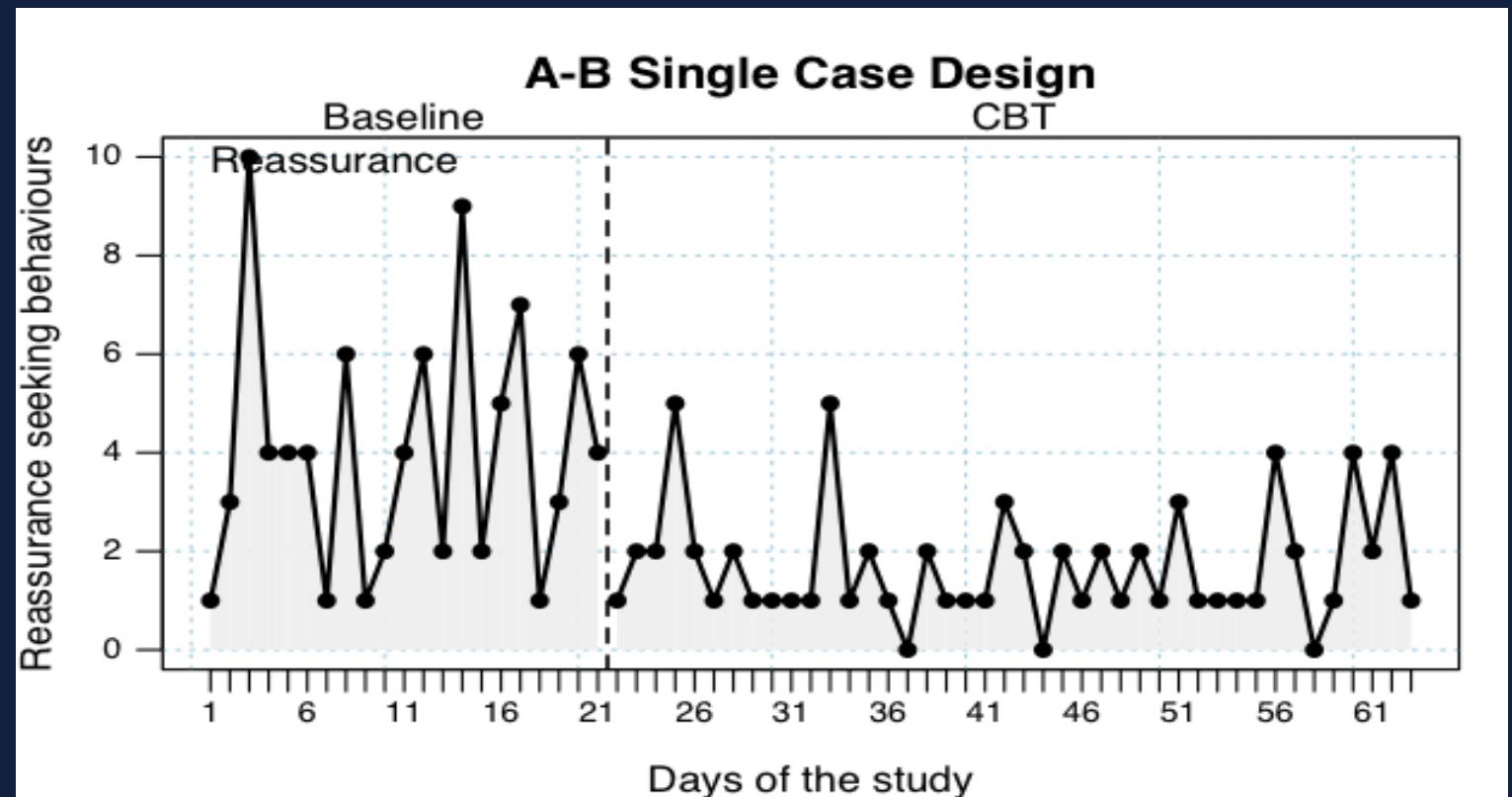
A-B

A-B-FU

A-B-A-B

A-B-A-C

- Most accessible.
- Low validity.
- Empirical case study.
- Another point.
- Another point,



Different designs

Designs

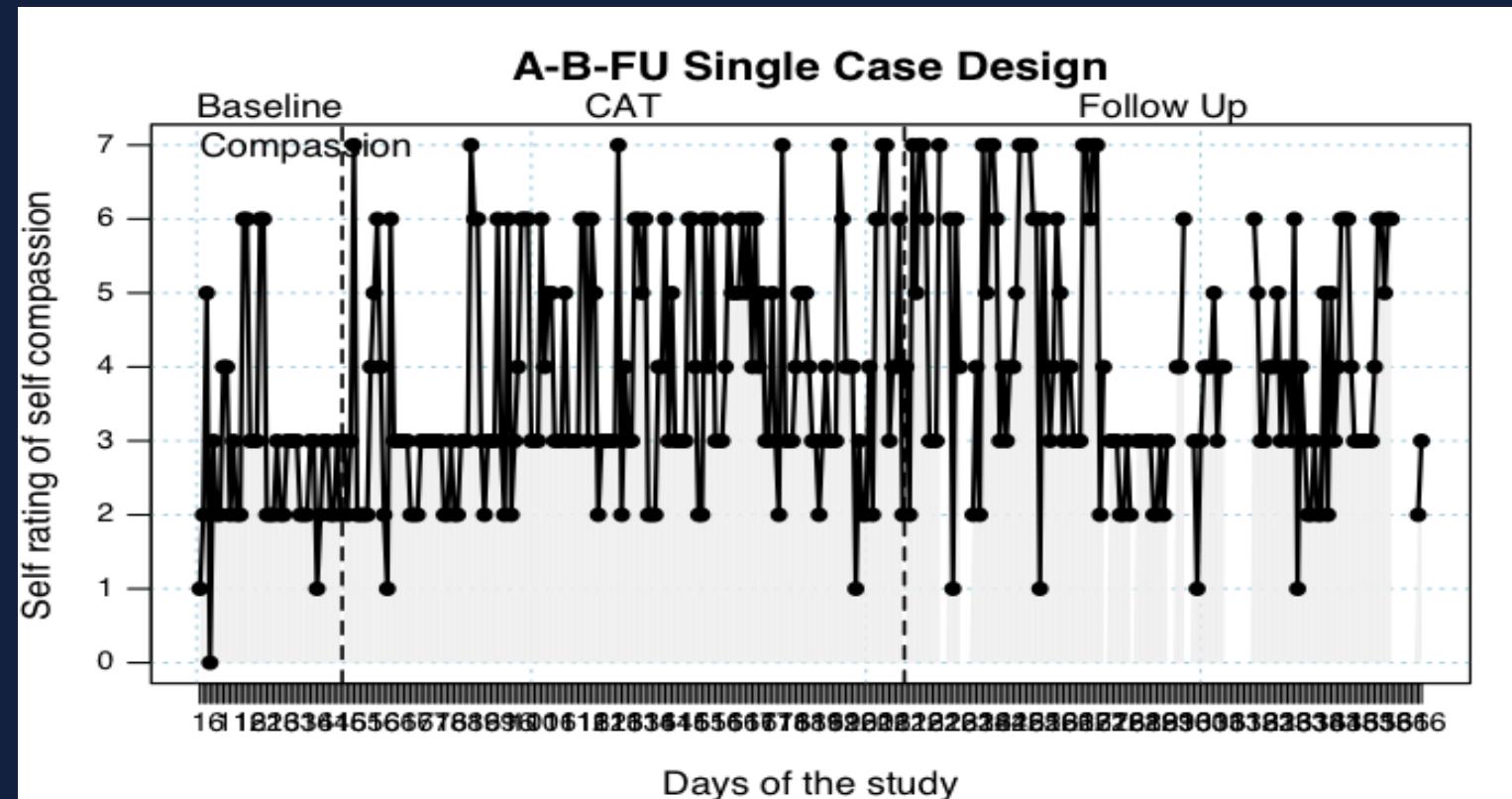
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Different designs

Designs

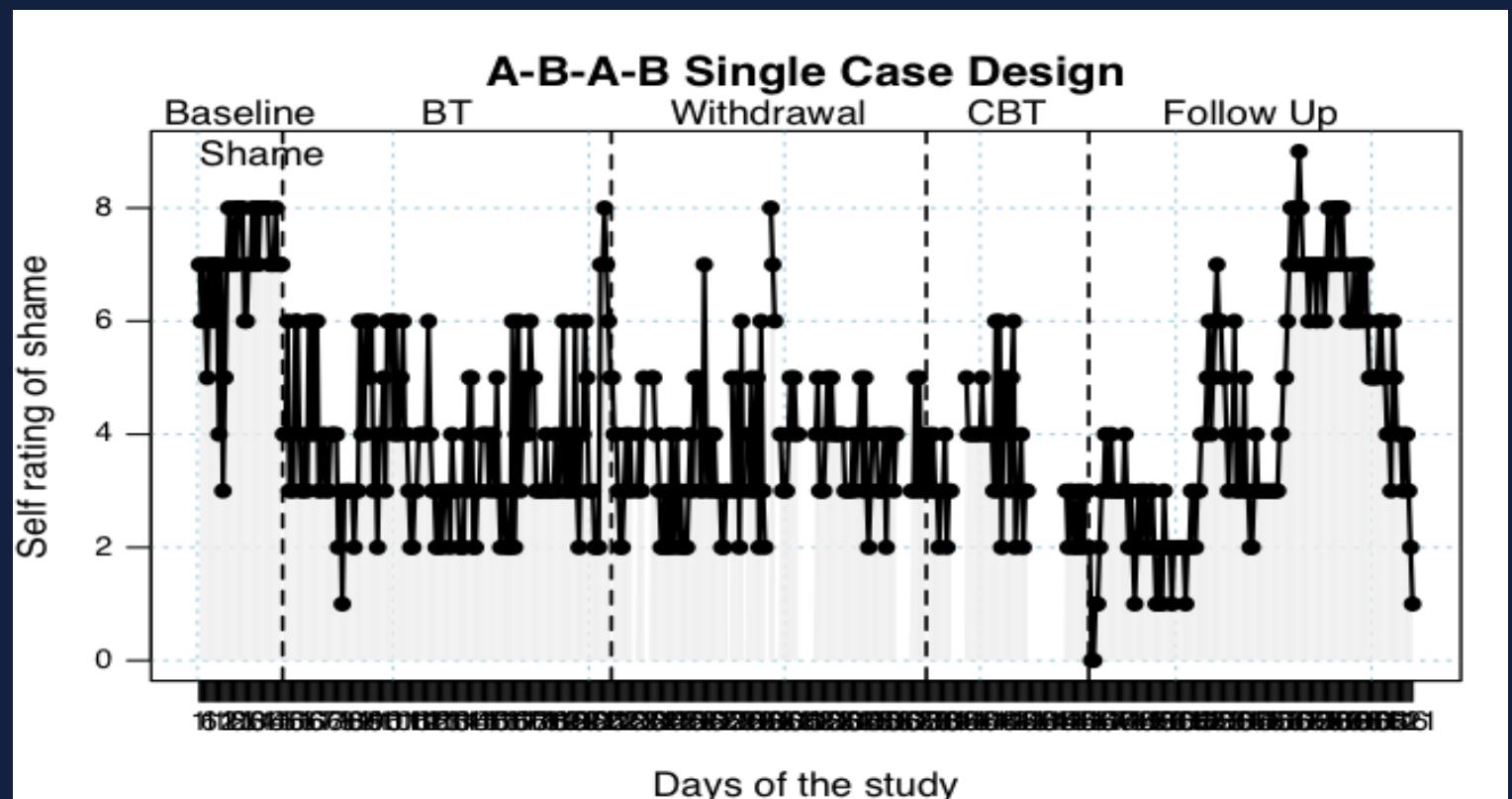
A-B

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Different designs

Designs

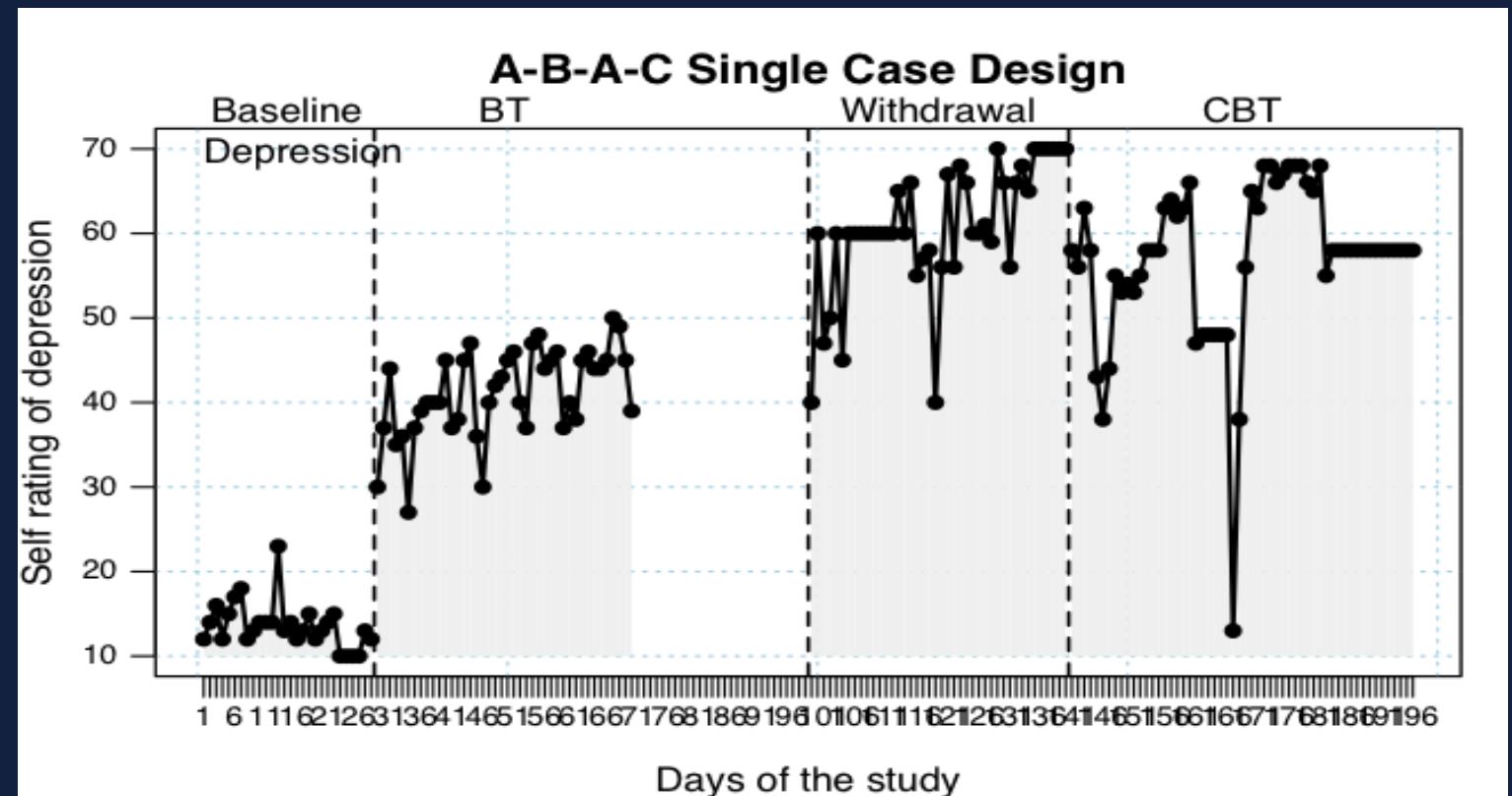
A-B

A-B-FU

A-B-A-B

A-B-A-C

- Another point.
- Another point.
- Another point.
- Another point.





Withdrawl designs and Ethics

Ask - am I being ethical and so are reversals or withdrawals appropriate? Important to know the methodological features before you start (see the later planning slide)

Problems with withdrawal designs

Non-reversible treatments: therapeutic instructions (e.g. self-control / management strategies) CAP/client expectations/interactions; long-acting pharmacological interventions; altered environments; altered staff attitudes. Carry-over effects between the phases. Ethical / clinical problems: Prior agreement with client / staff needed, Client consent and general ethical issues Ethics of accountability and evaluation Relatively brief withdrawal phase and rapid re-instatement of treatment Problem of client's expectations and adherence to withdrawal Treatment holidays?



Threats to validity

1. History (extraneous concurrent events)
2. Maturation (spontaneous recovery)
3. Testing (reactivity and the mere measurement effect)
4. Instrumentation (reliability)
5. Multiple intervention problems (can a psychotherapy be withdrawn)?
6. Instability



Mini interventions

- Borkovec and Castonguay (2006) point out, the use of mini-interventions in which circumscribed components of treatment are actively manipulated is an underused research strategy, but one that offers the opportunity to increase our knowledge of basic change mechanisms in psychological treatments.
 - Separate out the modules on the time series graphs and test for an effect.
 - Submit the excel sheets as part of the submission showing each module and the scores on the idiographic measures during the phases



Planning your design

+what to consider; write a plan and take it to supervision

- The type of design
 - The number of sessions in each phase and module
 - How the phases will be sequenced with the modules
 - Frequency of the idiographic measures
 - Frequency of the nomothetic and generalisation measures
 - Frequency, duration, place and time of sessions
 - Baseline fidelity (be able to describe in full detail)
 - Treatment fidelity (how to keep everything the same bar starting treatment).



STAGES TO SCED

IDENTIFY QUESTION AND HYPOTHESIS. SELECT APPROPRIATE DESIGN AND MEASURES. IDENTIFY MATERIALS AND RESOURCES. COLLECT DATA/ SUPERVISE STUDY. ANALYSIS. INTERPRETATION. COMMUNICATION. These stages may need to be considered collectively and not in isolation. For example. The level of communication of findings may determine the level of analysis adopted.

‘



IDENTIFY CLINICAL QUESTIONS AND HYPOTHESES

Have you a clear UP formulation in place? Have you got the books!? Is the treatment compatible with the therapy as described in the treatment manual? State the hypotheses clearly! State any therapeutic predictions clearly!



IDENTIFY MEASURES

What measures are required to assess therapeutic aims and goals? Ensure measures are suitable for SCED. In practice this usually means observational measures such as time sampling and staff checklists on in-patient wards; daily diaries of symptoms, functioning, problem resolution; regular use of short psychometric questionnaires etc. Ensure rating scales are unambiguously worded and are anchored and well described.

‘



IDENTIFY MEASURES

Ensure that diaries are well laid out and well presented. Scraps of paper do not value people and are seldom completed! Try to use a page a day to record ratings - avoid weekly sheets. Consider using a combination of measures targeted at both symptoms and functioning . Consider several sources of measurements: client and partner/carer, child and parent, Consider adding a follow ups phase; A/B-FU design

‘



MATERIALS AND RESOURCES

Ensure measures are acceptable/appropriate for client, or staff or carer or partner. Plan for study to fit into clinical practice: baseline collected across sessions 1-2, intervention starts session 3, 16 sessions of therapy contracted, follow ups at 6 weeks and 6 months? Ensure adequate resources - staff properly briefed, supervisor aware of coursework (especially to them), new staff on wards are briefed.

‘



MATERIALS AND RESOURCES

If staff are collecting the data do they understand the design rationale and do they need any training? Data is being recorded and stored reliably (i.e. it is being written down in a retrievable manner, it is not missing and is confidential). If appropriate, staff should receive ongoing feedback about progress of the case (i.e. regular review meetings) and this be reported in the method. What are the consequences of diverting resources to this project in relation to other ongoing clinical work? Is it feasible in the setting your working in?



INTERPRETATION

What are the main changes or effects? How do they correspond to predictions? Are they valid given the design? What alternative explanations (i.e. threats to validity) are there? Are the effects reliable or clinical significant? Are they noticeable to therapist, client or others? Are they generalizable or clinically replicable? If effects are clinically nonsignificant - what explanations exist?

‘



COMMUNICATION AND DISSEMINATION

Share the findings with the client or the staff or both. Thank client and staff.

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Course work specific information

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What can you submit?

- The design of the submission needs to either be quasi-experimental or a SCED. The design of quasi-single case experiments is A/B .
 - It is advantageous but not necessary to have a follow-up phase (i.e. an A/B-FU design) in which the idiographic measures continue to be collected and the nomothetic measure(s) are collected at the final follow-up.
 - CAPs are also encouraged to consider completing a true SCED in which a cross-over design is used (e.g. A/B/C where B is the UP and C is CAT) or where there is a treatment removal component (i.e. ABA, or ABAB).
 - All designs need to be agreed in clinical supervision, and treatment withdrawal particularly considered due to the associated ethical issues.



How to do a good piece of coursework

The structure is (4,000 words): Title Introduction, aims and hypotheses Methods Results
Discussion References Appendices (not in the word count)

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Reporting standards for SCED

- Look in the resource pack and its there! (SCRIBE guidelines)
 - This will help you write inclusively.
 - Read this before planning a case too!



What goes in the introduction?

- Concise summary of relevant background literature about the UP and how it relates to the case.
 - Consider and refer to relevant NICE guidance if available.
 - Provide focus of present case study briefly mentioning rationale and approach and end with specification of hypotheses according to design.



How to write the methods

- Outline of rationale and design of SCED, brief and confidential description of client (presenting problem/diagnosis/previous service usage/current medication), service, supervision, and your details.
 - Describe the idiographic measures and the data collection methods (e.g. observational schedules, self-monitoring diaries completed by the client) and the analysis strategy being used and naming the package being used.
 - List and provide evidence of the psychometric properties of nomothetic measures used and the analysis strategy being taken (e.g. RCSC).
 - A three-column treatment adherence table should be provided detailing the session number, UP module, clinical content of that session.
 - Report any competency checks done by your supervisor.



Session	Phase of study and module	Content
Session 1	A: Baseline	Assessment of current functioning
Session 2	A: Baseline	Assessment of developmental history and formulation produced
Session 3	B: Module 1; motivation enhancement	Balance sheet and goals
Session 4	B: Module 2; understanding emotions	Completed 3 system analysis and agreed homework
Sessions 5 and 6	B: Module 3; emotion awareness	Completed and analysed two ARCs and agreed homework



What goes in the results?

- Present the idiographic results first in the form of time series graphs for each measure that show each of the phases of the study. Days not sessions on the horizontal axis and scores on the vertical axis.
 - A baseline median trend line should be fitted and also trend lines fitted for each phase.
 - Baseline phases should be assessed for trend using both visual analysis and statistical analysis (e.g. Tau). When significant baseline trend arises, statistical analyses which adjust for baseline trend should be employed (e.g. Tau-U). Individual study phases should also be assessed for serial dependency (autocorrelation).
 - Present a table of means (SD) for each idiographic measure for each phase of the study.



What goes in the results?

- Idiographic outcome measures should be assessed for between phase change using a minimum of three nonoverlap tests (e.g. PND, PEM, PAND, NAP, IRD). These findings should be reported in a table and interpreted using the established guidelines.
 - The scores on nomothetic measure(s) should be presented in a table for each time point.
 - This table also contains reliable and clinical change analysis and also the relevant clinical and community norms on that measure.
 - If there is a sessional nomothetic outcome measure then that should be graphed at each session.



What goes in the results?

- Additional or supplementary data and graphs can be appended to the report after the reference section.
 - When statistical analyses are reported, ensure sufficient details (t values, d.f., means and SDs of groups, etc.) for their interpretation are provided.
- Graphs within the body of the text should be of a high standard of presentation and clearly labelled.



What goes in the discussion?

- The findings should be discussed in relation to the original hypotheses.
 - Please ensure that you relate the results obtained to the design employed.
 - Consider the generalisability of the intervention effect.
 - A critical review of the methods, design and analysis employed should be presented.
 - Please comment on any relevant organisational and ethical issues surrounding this clinical study. The clinical significance of the study should also be addressed.



What goes in the appendices?

- UP formulation
 - Examples of the idiographic data collection tools (e.g. observational schedules by staff or patient daily diaries) should be placed in the appendices and care should be taken to ensure that they are anonymous. Redact personal information.
 - As the UP is a modularised approach, the CAP trainees should also submit an excel sheet in which the idiographic measures are clearly labelled in terms of dates of completion by the service user and the progression through the UP modules.
 - The signed consent form



CONCLUSIONS

SCED can be used in a wide variety of situations and these range across service users and settings. CAPs as a scientist-practitioners – a good place to be. Integrate the methods into your practice – don't be anxious. Always start with the baseline - the design can evolve and be flexible Remember to remember your client - your job is to help them and not manipulate variables and phases Play around with the methodology

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How to analyse and interpret SCED data?

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Recap from Day 1

- Introduced rationale and applications of SCED
 - Aware of different types of SCED design
 - How to design and implement measures