

Single-case design



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Single-Case Design Introduction Scientists have attempted to understand complex human behaviour by following theoretical and/or practical approaches for many decades. For this reason, various types of research methods including experimental, theoretical and quasi-experimental designs have been developed. Along the history of scientific human studies, various research methods have been conceived and developed. For example, according to Tillman & Burns (2009), some scholars use rigorous research methods in order to minimise bias and errors in their research results, whereas others prefer using more flexible perspectives in this regard. In the context of this diversity, researchers should be cautious in selecting an appropriate research method. The Single case design method is considered a good example of human studies that has been so called because of the nature of human research and its use of individual samples i. e., only one or few numbers of participants. Gustav Fecner was the first scholar who has used Single case design in 1860 to develop the discipline of psychophysics. During the initial development of this design, Fecner conducted his research on only two participants (himself and his brother). According to Kerlinger and Lee (2000), Fecner is credited with inventing methods that are still used to measure sensory thresholds. According to Kerlinger and Lee (2000), I. P. Pavlov, through his use of this research design, did pioneering work on instrumental conditioning using dogs. Using single cases was the first step, which led to the development and expansion of this method. Single case design encompasses a set of characteristics that distinguishes it from others. For example, single-case design, or single participant experimental design, is defined as a strategy by which control in experiments over one or just few participants is achieved. That is why the method is sometimes referred to as <https://assignbuster.com/single-case-design/>

the N= 1 design (Barker, Pistrang, & Elliott, 2002). However, single design methods have had several terminologies over time, all of which share similar characteristics. Designs of single-case methods are commonly applied at schools, clinical settings, counselling, and research by observing the targeted behaviour before the experimental treatment. The observation is, then, used as a baseline measure to be compared against the behaviour after intervention. The participant is frequently used to evaluate the effects of behavioural interventions over time. Shaughnessy and Zechmeister (cited in Kerlinger and Lee, 2000) note that this mode of research is popular among those who conduct operant learning experiments or behaviour modification interventions. There is a need, here, to distinguish between Single-Case Design and Case Study design which are more common research methods in social science. The former focuses on an in-depth investigation of a single individual, group, or event in a descriptive or explanatory mode, whereas the latter is used to search causation in order to find underlying principles.

Brief Comparison between Single-Case Design and Group Studies

In order to gain deeper understanding of the difference between single-case design and group studies, Kachele, Schachter, & Toma (2009) compare the characteristics of both as shown in table 1.

| Single-Case Design | Group Design |
|---|---|
| Includes only one or a few cases | Includes multiple participants |
| Focuses on the individual rate | Focuses on the group average |
| Results cannot be generalised from just one individual to another similar individual. | Results can be generalised from the representative sample to a population |
| Examines individual variance and compares the subsequent results to the same | |

individual after interventions Examines rate of the representative sample and then disseminates the results into the community or compares it with another group Data analysis involves simple visual graphs Data analysis involves multiple statistical analysis Includes behaviour observations before and after the intervention Includes behaviour observations before or after the intervention

Types of Single-Case Design

1. Types Of Design That Uses Withdrawal Of Treatment

According to Kerlinger and Lee (2000), single-case design compares behaviours that occur before intervention and is measured over a long period of time so that they represent a stable baseline against behaviours that occur after intervention. The baseline or operant level is crucial for assessing changes in behaviour following intervention. Without effective establishment of a behavioural baseline before intervention, it would be difficult to carry out reliable assessment of behaviours resulting from intervention. Following are various variations in designs that use withdrawal of treatment:

2. ABA Design

According to Tingstrom (1996), ABA design includes three major steps: first, establishing a stable baseline (A), second, applying an experimental intervention to participant (B), and third, participant's response after they revert to the baseline position (A). The researcher determines whether the intervention has caused a significant change in participant's behaviour. The third step is crucial to know the response rate in case the participant has received no treatment and if the response change is due to the treatment intervention or something else. A typical example of the ABA design is its use in studying disabled students engaged in activities like reading using coloured overlays. Such an analysis can comprise three phases, the first one involving sessions without the inclusion of coloured overlays, the next one with coloured overlays and the

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last stage without them. Using this method, one can suggest whether students experience any improvement in reading words correctly when using coloured elements as a supplement. However, ABA design lacks a solution for the impact of intervention whose effects are not reversible. In addition, there are some ethical concerns about restoring the behaviour back to its original state in case intervention results in an undesirable behaviour (Tingstrom, 1996). Besides relying on specific information to select interventions in an effort to induce significant behaviour, the ABA approach is an evidence-driven philosophy. Moreover, ABA is designed around functional and applied goals. However, ABA should not be mistaken as a method that can be used to treat developmental disorders. It also does not contribute to increased dependence on others nor does it help in manipulating people (Tingstrom, 1996). In behaviour modification, experiments seldom return a participant to the baseline; therefore, it is inevitable to reintroduce the treatment by using the ABAB design. 3.

Repeating Treatment Design ABAB In certain cases, the examiner performing a single case study may not wish to finish the experiment in the control condition. Such instances are particularly true in cases where the target's behaviour improves as a result of the experiment and indicates a flaw in the ABA approach. This discrepancy is avoided by including a treatment phase after the stages under the ABA approach, which is collectively known as the ABAB design. Thus, this design begins with a control condition, proceeds to an experimental condition and then concludes with another set of control and experimental conditions. An example figure of the ABAB design is shown below: Figure 1: ABAB design (or Withdrawal/Reversal Design), (McMillan, 2004) 4. Design Using Multiple Baselines There is another type of single-case

design which uses more than one baseline. Many different baselines are established before treatment. This type of single-case design is called a multiple baseline study: across participants, behaviours, and environments (Kazdin, 2003) as shown in Figure 2. Figure 2: Multiple baseline design, (Kazdin, 2003). To examine the effectiveness of a treatment, it is suitable to use the multiple baseline approach (Tillman & Burns, 2009). In multiple-baseline across-behaviour design, an intervention is introduced many times to treat a single behaviour, where each baseline represents a different behaviour. For example, in cases of child autism, baseline 1 can be banging the head against wall, baseline 2 may be a constant talk of different tones with noises added, and baseline 3 can be hitting others. The main goal of using three baselines is to see if the behavioural change coincides with the treatment; for example, behaviour 1 may change while behaviour 2 remains constant or stable. After a period of time, the same treatment is applied to the second behaviour (baseline 2), and each following behaviour is exposed to the same treatment procedure. The main point is that when responses to certain behaviour are independent from responses to others, the treatment can be effective. If the responses are correlated, interpretation will be more difficult (Creswel, 1998). Through the across-participant design, the researcher applies the same treatment to the same behaviour of different individuals in the same environment, though baseline varies according to individual participants. For instance, Tingstrom, et al., (1997) used multiple baselines across participants. In this study the compliance training package was a treatment based intervention which used physical touch, verbal praise (time in), and a coercive procedure (time out) in order to increase the rate of student compliance with teachers' instructions. The behaviour of interest

was compliance to teachers' instruction and the environment was the classroom. All of the three participants (students A, B, and C) had noncompliance behaviours, articulation and language disorder. Following were the intervention phases in this study: baseline, time in only and compliant time in with time out to follow up. B and C remained at baseline while time-in-only was implemented with A. At a time Student A showed a change, the time-in-only was implemented with Student B, and Student C remained at baseline. At the same time the Student B showed a change in compliance, the time-in-only was implemented with Student C. Results of the study support the effectiveness of the combined time in with time out intervention in raising compliance. Regarding the multiple baseline design - across environments, the same treatment is given for different participants. Every baseline represents a different participant and environment. In this design, treatment and behaviour can be same with three different patients (Creswel, 1998). According to Kazdin (2003), single-case design has many problems. Some of these disadvantages are more apparent specifically in discussing the types of single-case design. For example, the external validity of single case design remains one of its most apparent problems. It is believed that it is difficult to generalize the results of one study based on one case to another population. Another disadvantage of sing case design is repetitive treatment with one participant, which raises a question on whether the treatment intervention can be equally effective for participants who have not had exposure to the previous treatment. Moreover, single-case design is considered more sensitive to aberrations on part of the experimenter and the participant than other methods. However, single case design can be effective only when the researcher avoids bias and when the participant is

cooperative. Using Single-Case Design also has several advantages. For example, it is very valuable with small numbers of participants, it recognizes clinical changes, it is flexible with a variety of conditions, it provides data that are based on practice, and focuses on specific behaviours of individual patient.

Conclusion This paper discusses and differentiates between several Single-Case Design methods in terms of historical development, application environments and characteristics. The report has also shed light on major drawbacks of using single design in contrast to the many advantages it offers. It is believed that single case design is an effective method to study individual cases, and related treatment interventions. However, the validity of this method and lack of experimental objectivity may be a subject of criticism over time. Therefore, further research on human studies is required to constantly improve Single-Case Design. The preceding chapters also offer some insights into various features of single-case design, the parameters that can be used to ascertain its quality and the standards that help determine whether intervention as an evidence is validated. Single-case design also provides an effective methodology that can benefit people with disabilities. As such, any policy that encourages the use and development of evidence-driven techniques in areas like education should use single-case design as the preferred methodology.

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