Case study inference:
Four generalisation methods and how they may be integrated

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ABSTRACT

This study aims to describe how researchers may incorporate four different generalisation methods (working hypothesis, analytic generalisation, critical case and naturalistic generalisation) to aid them in properly generalising from case study results. It was found that critical cases can be used in combination with working hypothesis to determine the falsifiability of the hypotheses. Working hypothesis and analytic generalisation complement each other by making it possible for researchers to generalise to both theory and new hypotheses (i.e. both inductively and deductively). Lastly, naturalistic and analytic generalisation enables a double-ended generalisation, where both the reader and the scientist themself generalise to specific situations and over-all theory, respectively.

Keywords:
case study, analytic generalisation, critical case, naturalistic generalisation, working hypothesis

In the scientific world, discord regarding methodology is inevitable. Proponents of the qualitative and the quantitative methods respectively, expresses clear differences in opinion when the question of validity is put on the table. Arguments against quantitative research consider its superficiality, whereas assertions against qualitative research stems from a concern for reliability. However; when it comes to case studies, perhaps the most criticised element is generalisability (Firestone, 1993; Firestone & Herriott, 1983; Gerring, 2007; Hägg & Hedlund, 1979; Sharp, 1998; Tellis, 1997; Woodside, 2010).

A case study is the act of extensively studying something in particular, with the aim of amplifying one’s understanding of said thing (Ruddin, 2006). Case studies usually include a small sample of participants in a relatively small controlled environment (Tsang, 2014). Yet another description is presented by Simons (2015):

Case study is the study of the singular, the particular, the unique, whether that single case is a person, a project, an institution, a programme or a policy. (p. 175)
Yin (2013) considers case study generalisation as “an effort to generalize from a small number of cases to a larger population of cases” (p. 325). It is an attempt “…to learn from one [case] and understand many [cases]”, says Campbell (2003, p. 15). Ruddin (2006) comments that “[w]ithout generalization, we could not interact with our world in a coherent manner …” (p. 799). Robinson and Norris (2001) continues with saying that generalisation is part of our cognitive capabilities, and is therefore ineluctable.

Despite this, generalising case results to other contexts than the one studied, seems like a difficult task (Firestone, 1993). Results from a single case are considered by many as illegitimate for developing scientific theory. For instance, Mintzberg (2005) remarks, “If there is no generalizing beyond the data, no theory. No theory, no insight. And if no insight, why do research?” (p. 10). Qualitative intensive research is praised for its descriptive accuracy. Even though there are actions researchers can take to amplify the external validity and replicability of their case study, “[g]eneralizability is clearly not the strength of qualitative research”, as Firestone (1993, p. 16) so excellently explains it.

Many researchers are frightened by the thought of drawing conclusions from case studies, especially studies of single cases, due to the issues stated above. Kennedy (1979) acknowledges this, and states that the statistical research has its very own set of evaluation rules, which gives a clear and objective instruction of how the data should be interpreted. The author enunciates the significance in developing rules for how to pursue inferences for case studies, since the existing guidance are perceived as enigmatic compared to the statistical one (Kennedy, 1979).

It is because of this that studying and developing generalisation methods for case study inference is important. Not only will it generate more sophisticated and standardised practices closer to the statistical ones, it will also help researchers be more realistically confident in their case study findings. Investigating this subject will expectantly show how the strength and veracity of case studies can be conveyed to others, so that more find the results trustworthy.

The four approaches that will be presented following this introduction are working hypothesis, analytic generalisation, critical cases and naturalistic generalisation. The succeeding sections will attempt to answer how these may be integrated to build a framework of practices for researchers to use. This is accomplished through a literature review; therefore exclusively containing secondary sources. The literature describing the theoretical framework was found by searching in databases, such as Sage, Web of Science, Science Direct, Scopus, et cetera. The pursuit for relevant references was conducted using keywords such as, among others, generalise qualitative research and case study inference. The majority of the sources are scientific papers, published in a variety of journals. Once a paper was found useful for this study, a scan of the bibliography was made to possibly find other useful sources of information within.
My choice to assemble the study in this way stems from the nature of my purpose. The purpose is to examine the already established theoretical structure, which is formed by earlier conducted scientific research, together with analysing four different approaches which researchers can utilise in case study inference. The secondary sources are most readily accessible through databases, in the form of research papers and other literature reviews. Continuing the investigation via the bibliographies of papers that was found, is a good way of finding other sources (Jesson, Matheson & Lacey, 2011). This strategy is also motivated by not wanting to waste time and other resources in the process.

Following this introduction, the four different generalisation approaches will be presented, and ultimately an integral conclusion will be indicated, which will attempt to answer the question posed above.

HOW THIS PAPER VIEWS THE RESEARCH PROCESS

This paper uses the concept of the research process presented in Svensson (2009), depicted in Figure 1. Svensson describes that the circle can go both the ways of clockwise and anti-clockwise, or in other words a deductive and inductive manner. Deductive research starts with an undeveloped hypothesis (idea), which is then tested by literature reviews and/or empirical data collection (support). Further on, the results are analysed (implication) and conclusions and possible generalisations are made (contributions). Then, a new hypothesis is created that erodes from the previous conclusions. Further, the process is commenced all over again. Vice versa applies to the inductive research, although in the opposite circular direction.

PRESENTATION OF THE FOUR METHODS

WORKING HYPOTHESES

The difference in purpose and end goal between case studies and quantitative studies is important to distinguish. To conduct case studies is to attempt the creation of hypotheses (Firestone, 1993; Ruddin, 2006; Woodside, 2010; Yin, 2012a) rather than quantitatively stating statistical facts. Cronbach (1975) identified the hypotheses as “working hypotheses” (p. 125), meaning that every case study result found will
contribute in accepting or denouncing the hypotheses, and possibly in building new ones.

Additionally, Tellis (1997) reports that a single case can be very useful in characterising an extreme case; that is, a case finding that takes the theory premises to an extreme level. The extreme case could be one which either confirms or denounces the underlying theory. This is a point that Yin (2012a, 2012b) continues to elaborate on. He says that the case findings may corroborate or completely reject the theoretical baseline, or it may create brand new hypothesis that commences the construction of new frameworks. This is also a case of a working hypothesis.

Hällström (2008) also acknowledges the concept, describing it as an “unfinished conceptualization of the uniqueness and generality of factors” (p. 326). These factors will be developed over time as the scientist travel through different cases and settings and discover supporting or contradicting premises.

**ANALYTIC GENERALISATION**

Authors such as Flyvbjerg (2006, 2001) and Ruddin (2006) defend the concept of qualitative generalising. Both deny the inability of cases to supply means for scientific development. The reasoning avers that case inference is all too often considered synonymous with statistical inference; the latter mainly used in quantitative research (Ruddin, 2006; Yin, 2012a). By drawing conclusions from individual cases “[w]e do not infer things ‘from’ a case study; we impose a construction, a pattern on meaning, ‘onto’ the case …” (p. 800, emphasis added).

While statistical findings are mainly generalised to populations (*statistical generalisation*), cases have a tendency to generalise to other circumstances and situations, with the help of in-depth analytic investigation (*analytical generalisation*, Yin, 2012a). As Yin says, case studies are not intended to generalise “from samples to universes” (p.18) as for instance qualitative surveys are. When one generalises analytically, one generalises to theory. Thorne et. al. (2009) describe the concept of *analytic generalisation* as follows:

> Findings drawn from interpretive description are not meant to reflect representativeness of the population; rather, when articulated in a manner that is authentic and credible to the reader, they can reflect valid descriptions of sufficient richness and depth that their products warrant a degree of generalizability in relation to a field of understanding. (p. 1385)

The claims made when generalising from cases cannot be considered as “proof” in a statistical sense. Rather, they build theoretical premises which function as a tool to make assertions about situations akin to the one studied (Yin, 2012a). The evidence that case study findings implies does not necessarily *prove* the theory, yet it must *support* the theory (Firestone, 1993). “The key is to build a proper case with analytic sophistication rather than creating something that can be easily replicated time and time again”, as Patton and Appelbaum (2003, p. 65) explains it. However, if further
case studies show resembling outcomes, they can be said to support the hypothesis and therefore be a part of constructing the theory (Yin, 2012a).

Tavoletti (2011) makes an interesting comparison between analytic generalisation in a case study and a laboratory experiment:

... [T]he chosen case study is not a random sample out of a population but a 'laboratory' that has been chosen intentionally, because of its accessibility and resources. Inside this 'laboratory' the suggested hypotheses have been tested. It is obvious that we cannot generalize from this 'laboratory', unless other researchers test the same hypotheses in different 'laboratories', but the proposed and empirically based analytical generalization is nonetheless a significant contribution and base for future research. (p. 25-26)

CRITICAL CASES

Furthermore, authors present the idea of a critical case (Flyvbjerg, 2006; Firestone, 1993), which shows researchers a way to more credibly generalise. Flyvbjerg describes the phenomenon such as:

“If it is valid for this case, it is valid for all (or many) cases.” In its negative form, the generalization would be, “If it is not valid for this case, then it is not valid for any (or only few) cases.” (p. 230)

A classic example of a critical case is the “black swan”, instated by Karl Popper in 1982. Even though Popper did not label his theory as such, it nevertheless holds the characteristics of a critical case. He firstly put forth the statement “There is a white swan”, which is the result of discovering a swan and observing its whiteness. If one were to inductively evolve the assessment, we get the inference “All swans are white”, which makes the original case observation a critical one. Yet, it is consequently falsifiable, since a single observation of a swan that is not white would make the statement deductively untrue. If one would observe the presence of a black swan, the observation would instantiate the existence of a mistake in the previously made assessment.

NATURALISTIC GENERALISATION

The father of the concept of naturalistic generalisation is Stake (1978). His propounded definition can be outlined by experiential learning. Continuously, Melrose (2009) elaborates that “As readers recognize similarities in case study details and find descriptions that resonate with their own experiences; they consider whether their situations are similar enough to warrant generalizations.” (p. 1). In other words, naturalistic generalisation is when the “burden of generalisation” is put on the reader. The reader compares the case study findings to their former knowledge and understanding of reality and then determines whether or not the findings can be applied to their specific situation (Stake, 1995; Hällström, 2008; Lincoln & Guba, 2002).
Naturalistic generalisation has faced criticism, namely for deputing the reader to make generalisations instead of the researcher. This stands in contrast to typical scientific induction. Stake (2002) takes a defensive stance when he states:

…”[It] is a form of generalization too, not scientific induction but naturalistic generalization, arrived at by recognizing the similarities of objects and issues in and out of context and by sensing the natural covariations of happenings. To generalize this way is to be both intuitive and empirical, and not idiotic. (p. 22)

Stake (2002) later concludes that he urges researcher who wishes to use naturalistic generalisation to rigorously and accurately describe their case for the reader. By providing this so called “thick description” we pave the way for well-informed and sophisticated readers to make their own generalisations. This will, unlike traditional scientific inquiry, generate a broader picture which is more anchored in reality, Stake argues.

**ANALYSIS**

This paper will start the process of integrating the four generalisation methods by naming some similarities and differences between them. A significant analogy exists between working hypothesis and analytic generalisation, for instance the mechanism of inductive inference. However, a clear difference is what is constructed and developed using the case study findings. For working hypotheses, different cases aid in building already existing or new hypotheses; whereas in analytic generalisation, theory development is the end product of particular case findings.

When comparing analytic and naturalistic generalisation, the disparity is conspicuous. It is evident that naturalistic generalisation is built on the basis of individuals’ own vicarious experiences. Analytic generalisation, although not unmitigatedly scientific per definition, yet is still based on inference derived from logic performed by the researcher themself. With this said, a statement about integrating the approaches will be established in the following paragraphs.

A possible concern regarding the working hypothesis process is that it does not lead to any concrete conclusions. It could be considered a constant continuous process which remains unfinished, as Häggström (2008) adroitly stated. An (inevitably imperfect) hypothesis is created and tested through the implementation of many different case studies. If a case is found to contain attributes and factors that matches those of the original hypothesis, the original will be developed further to reflect the new findings. The new case finding will support the original hypothesis and will play a part in validating it. In contrast, a case with contradicting or differentiating attributes and factors will partly or completely refute it. It also plays a part in invalidating it, making it more difficult to rebuild again.
A parallel can be drawn to Karl Popper’s (1982) critical metaphorical case *The Black Swan*. The first statement “There is a white swan” symbolises the very first hypothesis that a researcher may instigate. Following that, evolving the statement through inductive inference, we get “All swans are white”. If we then were to discover a non-white swan, the evolved generalising statement would be deductively untrue, i.e. a non-white swan would not be able to be applied to the already existing theory. We would realise that the original premise contains flaws. The new discovery would invalidate the theory, yet it wouldn’t completely invalidate the original observation of a white swan. The working hypothesis would show its work if we were to change the statement to “There are swans that are white”, for instance. This statement is non-falsifiable, and is therefore a better depiction of reality than the all-covering generalisation. Consequently, the use of critical and extreme cases in the working hypothesis process is beneficial to the accuracy of our generalisations.

As previously stated, with analytic generalisation we generalise case study findings to theory (Yin, 2012a). The connection it has with working hypothesis can be noticed by looking at the research process demonstrated by Svensson (2009). Namely, in the deductive clockwise direction, new hypotheses can be derived from previously made research (i.e. established theory) that is an evolution of the original hypothesis. In the inductive anti-clockwise direction, a hypothesis can be used to make predictions about possible conclusions and after that test whether or not they are accurate. Ergo, theory and hypothesis are closely related. Consequently, analytic generalisation and working hypothesis are also connected.

When using the method of working hypothesis, researchers are (not unexpectedly) constantly concentrated around the concept of hypotheses. One can easily ask oneself the question: if scientists merely continue to develop their hypotheses and research questions, do they ever reach closing results? Do they ever arrive at conclusions, or are they stuck in a constant never-ending circle? Are they ever able to apply any concrete knowledge to universes? I argue that integrating analytic generalisation will soothe these concerns. By combining the utilisation of constantly evolving your hypotheses and the notion of presenting a rigorous case description for generalising to theory, researchers will find a valuable balance between the inductive and deductive process. To combine the generalisation to hypothesis and theory is to create a prosperous inclusive method, which could be likened with an abductive approach.

Despite the evident differences between naturalistic and analytic generalisation, a linkage between them is accessible. Analytic generalisation is well executed if it is composed of sophisticated, credible and authentic inference, as we have learned from Patton and Appelbaum (2003) and Thorne et. al. (2009). We can also recall from Stake (2002) that naturalistic generalisation is possible and justified only if researchers provide a rigorous and accurate “thick description” of the case for the reader to interpret. If we formulate our inferences authentically, credibly, rigorously and
accurately, the reader may then use their experience and naturalistic mind to draw their own conclusions and generalisations from the present findings.

In practice, this would entail a process where the author encourages the reader to search for further reasoning and thought pattern. This course of action could be expressed in an advocative section of the conclusion, where the author turns to the reader and invites them to mentally analyse and compare the findings to their own experiences. This section should conclude in telling the reader to apply the current case study findings to their own situation, if they find them applicable (Stake, 1995; Hällström, 2008; Lincoln & Guba, 2002). Alternatively, it could occur through a public statement in conjunction with the publication of the paper. The burden of generalisation is put on both the reader and the author once the author turns to the reader (as accounted for above), but also when the author engages in analytical reasoning and draws conclusions from an analytic generalisation process when writing the paper. This double-ended examination of the results will aid in generating a broad and more accurate picture of reality, derived from even a single case. This way, generalisations can be made to universal theory and to specific individual situations and settings. The integration of these two generalisation approaches is advantageous, since it makes the findings more applicable and pervasive.

Lastly, case studies can be compared to scientific experiments, where a procedure is performed to affirm, support or reject a hypothesis. Tavoletti (2011) tells us that creating generalised inference from hypothesis testing is a difficult task if not other case studies are conducted in different settings. This could be compared with laboratory experiments, where phenomena are tested multiple times to find out whether or not the hypothesised factors are indeed the common denominator in many different settings. Additionally, by a parable, one could say that each case study conducted could be equated and compared to an experiment. Each found confirming case study helps in building the theory; just as each experiment test done on a phenomenon in a laboratory which finds confirming results further the establishment of the main theoretical framework.

**CONCLUSION**

This paper has demonstrated how an integration of four generalisation models can be achieved. Firstly, a description was provided of how critical cases can be used in the working hypothesis process. Although every regular case serves as one part of the puzzle, the critical case has a particular ability to determine the falsifiability of the hypothesis. It can play a decisive role in evolving the working hypothesis on every step of the way. Therefore, utilising the working hypothesis process when investigating a critical or extreme case paves the way for a well-executed case study generalisation.
Continuously, harmony between the inductive and deductive process can be attained by also infusing analytic generalisation. By continually progressing and developing the instated hypothesis whilst additionally generalising analytically to theory, the researcher encompasses an extensive area of generalising and arrive at an abductive methodology. Consolidating the two will assist with eschewing getting caught in an endless spiral of evolving hypotheses without arriving at conclusions. It will alleviate the painting of a broad and proper portrait of reality, as well as embody an inclusive umbrella of applicable generalisations.

Lastly, this study concludes that a combination of naturalistic generalisation and all the preceding methods will conceivably result in a double-ended generalisation which will eventuate in more extensive answers, which can be applied to both general theory and to distinctive circumstances. This is achieved by meticulously describing case studies and communicating to the reader the importance of them assessing the results themself, making their own naturalistic generalisations and lastly applying it to their own reality.

Considering that this study has purely investigated the integration of four different generalisation models, an encouraging suggestion is made to further investigate this subject, possibly finding new combinations of the aforementioned methods or even bringing additional methods to the table. A different interesting approach to the problem would be to see if these findings are applicable to all different kinds of cases, or if different generalisation methods work variously on different types of cases. Perhaps this article will prompt other researchers to examine that area further. As a finishing concluding thought, I am hopeful this study has entailed positive consequences for those searching for better generalisation methods in cases study inference. The popularity of the case study as the choice of method in science, as well as the research regarding the methodology itself, has risen in recent times. Thus knowledge on the area will expectedly expand and spread in subsequent times.

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