A reflection on using mind maps as a tool for grounded theory analysis

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Introduction

Qualitative data analysis can be a daunting task, especially for novice researchers, and there is no one way to approach this as research topics and approaches are multiple and diverse. Over recent decades, qualitative data analysis software (QDAS) such as NVivo or Leximancer have been developed to support researchers with this task. However, different software tools provide different functionalities and, at times, may limit empirical material/data analysis or can be difficult to learn in the first place. Further, utilising grounded theory with its different coding phases can add another challenge for novice researchers. This paper presents a reflection by a novice researcher on exploring different tools for qualitative empirical material analysis and using a mind mapping software to refine concepts and codes within a grounded theory research project. As such, this paper provides an illustration of the use of mind maps rather than reporting on the research findings. First, the paper provides a brief background on novice qualitative researchers, QDAS, mind maps, and a study background to contextualise the reflection. For the reflection, a first-person voice has been chosen, which represents the first author's account of her experiences during her PhD project on travellers' climate change perceptions. This was completed with guidance by her supervisor and co-author of this paper. By sharing this research experience, it is hoped to provide other (novice) researchers with insights into how to creatively approach research challenges and how mind maps can be used in new ways as a research tool.

Novice qualitative researcher

The PhD journey is not just concerned with pursuing and completing a research project, but is also part of the process of 'becoming' a researcher. As such, 'doing' a PhD is a lived experience that involves successes and failures (Jennings et al., 2010). It is also a journey of growth: starting as a novice, becoming an apprentice, and, hopefully, achieving mastery. For a novice researcher, engaging with grounded theory can be a daunting task, which starts with deciding which grounded theory approach to follow (Jennings et al., 2010) and learning how to conduct open, axial, and theoretical coding as part of a constant comparative analysis process (Corbin & Strauss, 2008). One of the main challenges that novice qualitative researchers face is how to make sense of their empirical material. With the researcher being the main 'research instrument' (Lincoln & Guba, 1985), this instrument may require re-calibration throughout the research process (Peredaryenko & Krauss, 2013). Reflexivity, generally associated with the researcher's social situatedness, plays an important role within emergent qualitative research designs and "permeates every aspect of the research process" (Hertz, 1996, p. 5). The qualitative researcher has to critically reflect on the research design process throughout the research and modify it if needed (Hammersley & Atkinson, 1983). As such, reflexivity informs decision-making during the empirical material analysis within grounded theory research and related processes (Jennings et al., 2010). Furthermore, a researcher has to be critical and reflective about his or her explorations, the tools employed and their usefulness for the research purpose and, where necessary, change or introduce other tools (Hine, 2005). In doing so, a researcher takes a more pragmatic position as the lived experience of the research process provides challenges, which require an iterative problem-solving strategy (Strübing, 2007). The reflection in this paper represents such lived experience and provides an account of changes

made throughout the research and interpretation process that was supported by qualitative empirical material/data analysis software.

Qualitative data analysis software

Since the 1980s, through the rise of information and communication technology, a range of QDAS has emerged and, over time, such QDAS products have become more sophisticated (Wolski, 2018). Recent developments include the inclusion of non-textual material, automated analyses, and visualisations, which, however, depends on the specific software product. An increase in functionality can enable the researcher to explore the empirical material in different ways; albeit, this can make it more challenging to learn the software in the first place (John & Johnson, 2000). New functionalities have not just been developed due to advances in information technology, but also due to new kinds of qualitative empirical material like videos, reviews and other online content. In general, the internet and personal computer have helped with the spread and wider adoption of QDAS within the qualitative research community (Wolski, 2018).

However, the use of QDAS has also been criticised as functionality may limit or even direct empirical material analysis and interpretations (John & Johnson, 2000). Researchers therefore are required to be reflexive about the impact QDAS can have on their research. With the qualitative researcher being the key research instrument, decisions regarding the research design, data collection and analysis have to consider the potential influence QDAS can have. Researchers therefore need to be wary about which tools to use and how, and this includes considering aborting the use of a specific software if it limits the research and its interpretation/analysis.

Mind maps

Tony Buzan is seen as the father of modern mind mapping (Buzan & Buzan, 1996) with mind maps commonly used as a tool for brainstorming and visualisations. The academic literature predominantly discusses the use of mind maps and other forms of maps (for example concept maps) as a tool for visualisation and communication of research frameworks or findings. However, recent discussions explore mind maps also as a tool for empirical material collection and analysis (Wheeldon & Åhlberg, 2012). For example, as a data collection tool, a mind map can help participants to better frame experiences (Wheeldon & Faubert, 2009) or can enable co-creation in action research (Wengel, McIntosh, & Cockburn-Wootten, 2019); as a tool for empirical material analysis, mind maps can help the researcher to visualise empirical material and emerging themes during the interpretation process (Fotis, 2015). The use of mind maps as a tool for empirical material analysis has not been discussed widely, although it may provide new possibilities for some researchers. During empirical material analysis, it can enable the qualitative researcher to ‘see’ empirical material and emerging concepts in a different way, and as such enables crystallisation (Guba & Lincoln, 2005). The following reflection provides one account and illustration of how mind maps have helped a novice researcher with her grounded theory analysis in such a way.

Study background

The aim of the research was to gain a deeper understanding of travellers' climate change perceptions and influences on their travel behaviours. Travellers are main actors in tourism and contribute to climate change through their travel activities (Patterson et al., 2006). Until now, travellers' participation in the climate change context has mostly been viewed as an adaptation resulting in changed travel patterns (Mather, Viner, & Todd, 2005). In order to understand such adaptation behaviour, however, we first need to understand what travellers' perceptions are with regards to climate change and travelling (Gössling et al., 2012). Moreover, we need to understand how individuals' self-identity and social embeddedness shape their perceptions or are shaped and changed through their perceptions. To achieve this, the research focused on travellers' voices within the co-construction and re-construction of climate change meanings.

The research applied a postmodern constructivist paradigm and a grounded theory approach in particular (Charmaz, 2006). Representing a holistic-inductive research framework, empirical material was collected from two online sources. In a preliminary study, existing online discussions within the Lonely Planet Thorn Tree forum were interpreted and provided initial insights. For the main study, a research website, the Climate Change Research Lounge, was developed and participants based on the Australian Lifestyle Survey (ALS) were invited to provide their reflections. The online environment was chosen as a research setting because travellers use online spaces for their meaning-, sense-, and decision-making processes with regards to travelling and climate change. These two studies generated different types of empirical material in the form of existing discussions threads and guided online reflections. For the purpose of this paper, the focus is on the interpretation processes of both studies rather than providing detailed insights into the interpretations. In particular, the following text reflects on the strategies and tools used for coding and the grounded theory interpretations.

Reflection

Looking back on the research process and my reflections, I must admit, I underestimated the effort and time it would take to develop my research website and to recruit and engage participants as initially planned. I constantly had to reassess the amount of time available for website development and actually collecting empirical material and my interpretations. This combined with the given time frame for the completion of a PhD placed pressure on the process and required decisions that focussed on generating sufficient empirical material rather than 'experimenting' further with online engagements. Throughout the research, I had to reflect on the research design, tools used, and decisions made as part of the coding process. Overall, I had the opportunity to grow as a researcher and feel that at the end, I mastered at least a few things.

Lonely Planet interpretation process

The Lonely Planet study enabled me to gain initial insights into the climate change issues that were relevant to discussion participants. Immersing myself within the Thorn Tree discussions that were related to climate change, I also gained a better understanding of differences in such discussions. Some of these discussions addressed climate change in the context of weather and 'best time to travel'; discussions that were more general mentioned climate change only briefly, and other discussions were specifically initiated to discuss climate change issues. Immersing myself in the discussions, therefore, supported the purposeful selection of relevant discussion threads for my grounded theory interpretation. In order to interpret the discussions, I retrieved the threads through a 'copy and paste' process from the website and generated a word document

for each of the selected 31 discussion threads. I decided to code the discussions manually by printing them and noting emerging themes next to the posts. Re-reading the themes I generated, I started grouping them into categories for further interpretation. To ensure rigour, I discussed the emergent themes with my supervisor who had been given a series of the discussion threads. My supervisor also interpreted the threads and we compared codings and interpretations. This co-interpretation ensured that my interpretations had a 'goodness of fit' and were not forced. The six main themes that emerged from this process were travellers' positions on climate change, social institutions, role of information, travellers' reflexivity, travellers' personal and social agency, as well as meaning- and sense-making processes. The main categories I developed referred to participants' position on climate change, grouping them into Believers, Non-believers, and Undecideds. These categories represent Lonely Planet participants' stance on human-induced climate change; however, as the categorisation was based on my interpretations, I acknowledge that discussion participants might not have agreed with such 'labels'. The first insights and interpretations of these discussions also influenced how I further approached my research. Such an approach resonates with the emergent nature of qualitative research and particularly with grounded theory. In particular, the first insights and interpretations influenced the development of the open-ended questions for the online reflections, to ensure these reflections included participants' perceptions of climate change and connectivity to travel decision-making.

Research Lounge interpretation process

I concentrated my empirical material collection via the Research Lounge on a webform, guiding participants' online reflections, as the initially employed tools (email, blog, and forum) did not generate sufficient empirical material. The open-ended reflections were stored in an online database and downloadable as an Excel file. For the interpretation of the reflections, I used different types of software products at different stages of the interpretation process. For an initial exploration and later cross-interpretation of the reflections, I utilised Excel as it allowed me to use sorting and filter functionalities that supported the exploration and interpretation. The initial exploration was followed by the grounded theory interpretation process based on open, axial, and theoretical coding (Charmaz, 2006; Corbin & Strauss, 2008). I decided to employ NVivo for the open and axial coding phases as it provided specific coding functionalities that support qualitative interpretations. For the theoretical coding, I used MindManager, a mind mapping program, as it enabled me to visualise my interpretations, which supported the theorising process. I moved through different phases of the interpretations process that are represented by initial exploration and the grounded theory interpretation process.

In my first phase of exploration, I placed and read participants' reflections in an Excel spreadsheet in order to get a 'feeling' for the quality of the reflections and to see how general insights compared to the Lonely Planet study. Similar to the existing Thorn Tree discussions, the online reflections also contained statements relating to participants' position on climate change. This reaffirmed the authenticity of the main categories of Believers, Non-believers, and Undecideds and I applied this categorisation also for the Research Lounge participants. I added the appropriate category to the reflections of each participant to identify them as Believer, Non-believer, or Undecided, again, acknowledging that participants themselves might not have agreed with such labels. Utilising the Excel spreadsheet structure and filter function enabled me to explore participants' demographics with regards to the categories and the later developed behaviour groups. Furthermore, I added a general pseudonym for each

participant, consisting of a serial number, and if available gender and age (for example, '118 Female 27' or '035 Male'). I used these pseudonyms in my memos and during the interpretation process. These pseudonyms were also used throughout my thesis when presenting my Research Lounge participants' voices in the respective chapters.

For the following grounded theory interpretation process, as previously stated, I employed NVivo and MindManager. To conduct the open and axial coding of the Research Lounge reflections I had to import the reflections into NVivo. In order to do so, I had to generate a Word document for each participant or reflection, utilising Microsoft Word's mail merge function that generated the documents based on the empirical material in the Excel file. Each Word file was named according to the participant's pseudonym, that also allowed an easy linking between NVivo coding and the Excel file. I started my open coding by reading a set of responses per open-ended question and developing some initial codes. I also provided the same set of responses to my supervisor in order to see if these or similar codes were identified. Discussions of both coding results guided the further refinement and development of the codes. Throughout the research, I kept a coding memo in which I reflected on the initial coding structure as well as all changes within this structure. Such changes reflect the axial coding of the Research Lounge reflections, as axial coding is based on sorting, synthesising, and organising the developed themes and concepts (Charmaz, 2006; Clarke, 2005).

In my interpretation process of the online reflections, I began with open coding the first 50 reflections. After coding these reflections, I conducted axial coding, before continuing with coding another set of 40 reflections. Within grounded theory interpretation, codes or themes, concepts, and categories are constantly compared against each other in order to reinterpret empirical material and reconstruct categories (Jennings & Junek, 2007). This continued axial coding process was used to compare the established codes and concepts, leading to further axial coding, redefining and reorganising codes. Although I developed a large number of codes and concepts, I still felt unable to 'see' my grounded theory emerging. In a next phase, I therefore decided to follow a crystallisation approach by looking at my empirical material and the themes from a different angle (Guba & Lincoln, 2005) and utilising a visual approach. For this approach, I used the mind mapping program MindManager. With the mind maps, I created visual representations of the emerged themes and concepts that enabled me to 'see' my theory emerging. An example of such a map is shown in Figure 1, which visualises the coding of Research Lounge Undecideds' relationships with nature. Some of the Research Lounge Believers' mind maps covered several pages in a print out, as Believers were the largest group within the Research Lounge participants.

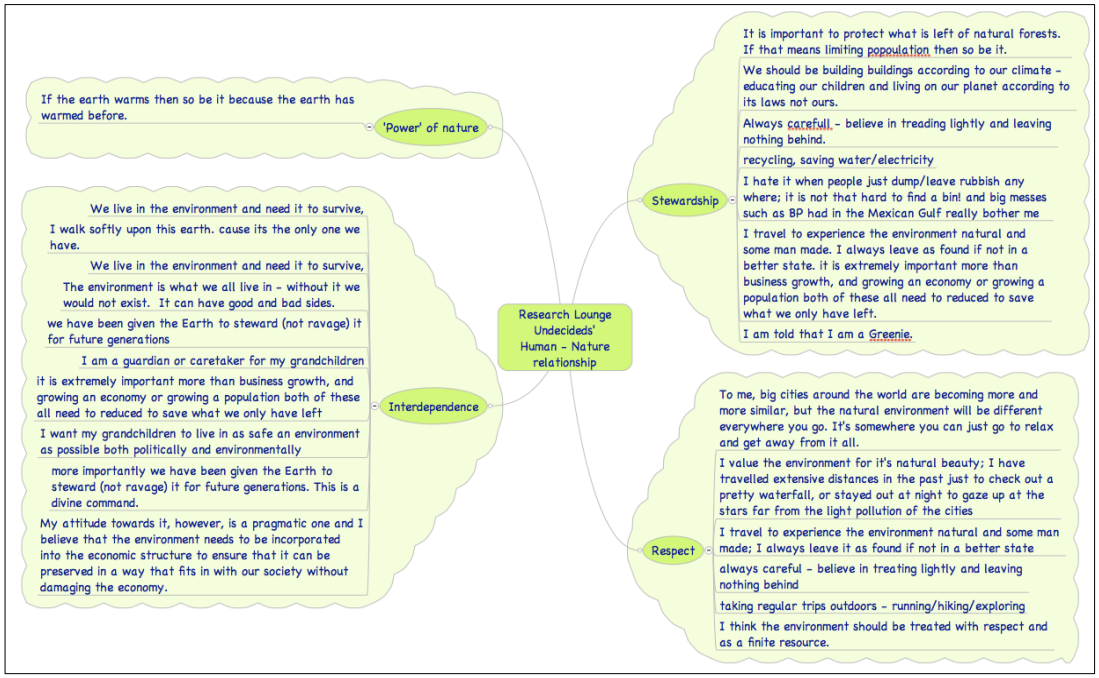

Figure 1. Mind map of Research Lounge Undecideds' human – nature relationship

Within these maps, I pasted quotes from my participants under the themes that I previously created in NVivo. While this process required going again through the empirical material, I realised that some of the quotes did not really fit with other quotes under a theme and I recoded them. This process was part of the axial coding process. It helped me to redefine my codes and enabled me to look at my empirical material in a different way via visual representations. In a next step towards theoretical coding, I looked at the quotes that I placed under a certain theme and started to re-interpret what I was seeing in these quotes. I merged some codes together and regrouped quotes together under sub-codes as they represented a common meaning. This way I created a more succinct version of the mind maps, which started to tell a story rather than just representing what participants said. For example, as shown in Figure 2, it appeared that although Research Lounge Undecideds reflected on 'stewardship' with regards to their relationship with nature, such 'stewardship' had different or multiple meanings for participants.

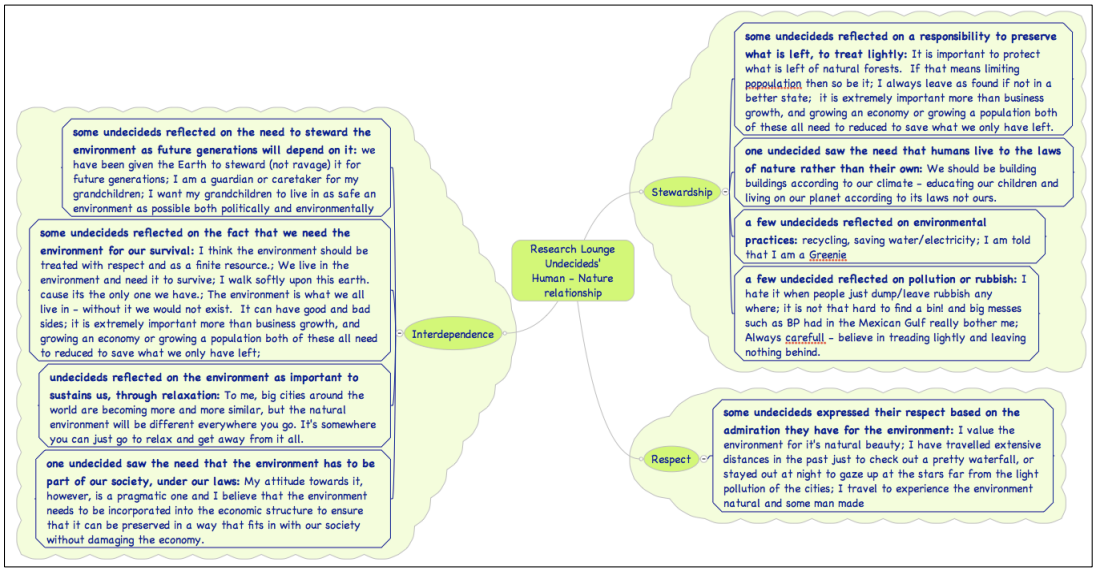

Figure 2. Succinct mind map of Research Lounge Undecideds' human – nature relationship

Based on the succinct mind maps that I created I started presenting my participants' voices in a narrative style. I presented these voices in respective chapters in my thesis by focussing on each group, Research Lounge Believers, Non-believers, and Undecideds, separately. The writing process itself continued to be part of the interpretation process, as I tried to make sense of what I saw in the maps and within participants' reflections. I reflected on similarities and differences of perceptions and practices between the three groups, and only then, the five behaviour groups emerged. Based on shared perceptions and practices with regards to lifestyles and travelling, participants were grouped into the *'no need'*, *'stay the same'*, *'more aware'*, *'do my bit'*, and *'changed'* behaviour groups. However, besides identifying emerging themes and behaviour groups, what were the overarching themes and underlying processes of meaning-, sense-, and decision-making? In order to crystallise these, I had to explore my participants' responses and my interpretations further. I extracted and summarised the overarching grounded theory themes and concepts and identified the embedded theoretical concepts of the four underlying theoretical constructs. These theoretical constructs of *knowledge*, *responsibility*, *efficacy*, and *agency* were identified as constituents of the meaning-, sense-, and decision-making processes, with *knowledge*, *responsibility*, and *efficacy* mediating *agency*. Based on the overall grounded theory themes and concepts, as well as the theoretical constructs, I developed my grounded theory of Mediating Climate Change Agency.

Conclusion

The above reflection provides one account of how a novice qualitative researcher approached challenges during empirical material analysis and how using mind maps helped her to 'see' emerging themes and to represent her participant's voices. Based on the emergent character of the research, the researcher was reflexive with regards to decisions she made during the research process. When faced with the challenge of not being able to 'see' the concepts and theory emerging while using NVivo, she followed Hine (2005) and adapted, changed tools and introduced further tools. Starting out as a novice grounded theory researcher, the researcher used a manual coding strategy. Growing as an apprentice, the researcher changed the data collection strategy and explored different software tools for her data analysis. Reflections on

the usefulness of specific tools within the research provide other researchers with valuable insights into possible challenges they could well face, too.

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