More than a bit of coding: (un-)Grounded (non-)Theory in HCI

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Grounded Theory Methodology (GTM) is a powerful way to develop theories where there is little existing research using a flexible but rigorous empirically-based approach. Although it originates from the fields of social and health sciences, it is a field-agnostic methodology that can be used in any discipline. However, it tends to be misunderstood by researchers within HCI. This paper sets out to explain what GTM is, how it can be useful to HCI researchers, and examples of how it has been misapplied. There is an overview of the decades of methodological debate that surrounds GTM, why it's important to be aware of this debate, and how GTM differs from other, better understood, qualitative methodologies. It is hoped the reader is left with a greater understanding of GTM, and better able to judge the results of research which claims to use GTM, but often does not.

CCS Concepts: • **Human-centered computing → HCI theory, concepts and models**.

Additional Key Words and Phrases: grounded theory, research methods

ACM Reference Format:
Tom Cole and Marco Gillies. 2022. More than a bit of coding: (un-)Grounded (non-)Theory in HCI. In *CHI '21: ACM CHI Conferences in Human Factors in Computing Systems, April 30–May 6, 2022, New Orleans, LA.* ACM, New York, NY, USA, 17 pages. https://doi.org/10.0000/0000000.0000000

1 Introduction

Grounded Theory Methodology (GTM) is a powerful way to develop theories in domains where there are obvious opportunities to contribute in the form of carefully developed *explanatory* conceptual theories. Nascent areas of academia stand to particularly benefit from this approach, and the results of grounded theory can serve as fantastic platforms for further discussion and research. As such, the method has a lot to offer the field of HCI and it is important that the method is well-understood and used deployed effectively.

GTM originates from the fields of sociology and health care that in recent years it has gained a degree of recognition and 'use' in the overlapping fields of HCI and Game Studies. However, 'Grounded Theory' as a label does not represent a single universally agreed on methodology, and the fragmented way it can be interpreted and deployed has caused confusion and controversy [8, 10, 22]. GTM is often treated as a single, agreed set of methodologies and principles — glossing over nearly 50 years of heated and rigorous academic debate in the process. Even more worrying, many researchers state that they have used grounded theory in their research when they very clearly have not. This presents major problems when assessing the contributions of research and how results (in this case it *should* be theories) have been arrived at. It is imperative that if a researcher claims they have used a certain research method or carried out certain tests with the data that they have actually done so. This is no less important in qualitative work than it is in

Manuscript submitted to ACM

quantitative work involving statistical methods [39]. It's equally important that reviewers are conscious of the factors that must be taken into consideration when a project claims to have used GTM.

This article aims to provide an introduction to GTM for HCI researchers who are interested in using, or are reviewing works, that claim to use qualitative research methods. It explains why it is important to include a clear indication of what variant/interpretation of GTM is being used and explores some of the philosophical differences between the major schools within GTM. Readers will then be better able to evaluate the merits of projects that claim to use a 'grounded theory' approach. Unfortunately, many claim use of GTM inaccurately and do not show a real understanding of GTM, its variants, its rich tradition and how this impacts their results, conclusions and how their work is received by others. What follows therefore takes the form of a methodological explanation, a brief literature review of grounded theory, with a set of suggested steps for embarking on a grounded theory project, and a list of points where GTM is often deployed incorrectly.

We start with an overview of the major variants of Grounded Theory Methodology (GTM), the elements they share and how the implementations differ. There will not be a debate around the *merits* of the different interpretations of the methodology directly, but rather the differences will be presented openly so that the reader is better able to evaluate the relative merits for themselves. It is hoped that the reader is left with a deeper understanding of why certain approaches are more appropriate for some projects than others. We then give an outline of an example GTM project, and analyse the most common errors and pitfalls of projects where grounded theory is claimed, but not used properly.

The contribution of this work is four-fold:

(1) Raising awareness of the potential of a qualitative research methodology that is powerful and of great utility to the field of HCI, that is well-established in other fields but less known and often misunderstood within HCI.
(2) Providing an introduction for researchers, students and reviewers who wish to evaluate whether this is an appropriate research methodology for their project.
(3) Clarify why it is important that researchers understand the method, the steps and rigour required and make an *informed and conscious* decision on their methodology before embarking upon a grounded theory project. Also, why reviewers should demand this be made clear in a study that claims grounded theory as its methodology.
(4) Making clear the distinction between GTM and other qualitative data analysis methodologies — particularly thematic analysis.

Ultimately, we hope to impress upon the reader how much GTM has to offer, and that it is far more than just applying 'codes' to some data.

2 Brief Description of Grounded Theory Methodology

Grounded Theory Methodology (GTM) is a qualitative research methodology. It is a set of tools and techniques for rigorously collecting and analysing data in an area of interest, resulting in a novel theory that explains one or more processes and/or phenomena in that domain. Using these techniques means that the theory is 'grounded' in the data — hence the name. GTM provides a framework to guide planning a research project, carrying out the research and writing up the results.

Small amounts of data are collected at first and then analysed by applying codes that explain or briefly describe what is happening in a section of the data. Doing so 'breaks up' the data into chunks to be manipulated and analysed. These codes are compared to each other, and a theory or thought is constructed about what is happening in the data. These early codes and thoughts inform future data collection and analysis. The process of data collection, analysis,

and directed further data collection is *iterative* and continues until a strong theory is produced that explains what is happening in the data.

The idea of grounded theory is that the researcher keeps an open mind and stays flexible and reflexive in relation to potential theory generated by the analysis and 'what they feel the data is saying'. It is a powerful way to generate novel insight on an area, and therefore is useful where there is little research to relate to in a nascent field, but also when looking to make a novel contribution to a well-established body of literature.

There are, broadly, three main schools of thought regarding the implementation of GTM — Classic/Glaserian, Straussian, and Constructivist. Despite the differences and heated methodological debate that has taken place from GTM's creation 1967 and still continues today, all variations of GTM share a common set of principles and tools:

- *Production of a theory*: What distinguishes GTM from other methodologies is that its product is a **theory which explains** what is happening in a domain, and **not a categorical or detailed description** of the domain.
- *Coding*: The practice of applying labels to parts of the data (be this words, sentences or paragraphs in a transcript, areas of an image, time points in a film etc.) with words that describe what is happening in that section (often using gerunds to emphasise the process present [11]). Coding takes place at several stages of the investigation, but all GTM projects begin with initial or 'open' coding, with various strategies for intermediate, or 'focused', coding later on. Earlier stages attempt to 'fracture' data into parts to be manipulated and worked with. Later stages of coding reconnect these pieces into meaningful complexes as categories and (later) concepts.
- *Simultaneous data collection and analysis*: The parallel and iterative processes of collection and analysis of data. Unlike conventional research thinking (where data is collected and then analysed), grounded theory encourages instant analysis of any data collected — which informs further data collection. In this sense, rather than the data posing a question and analysis providing an answer, during GTM collection and analysis of the data are deeply entwined in an on-going conversation.
- *Theoretical sampling*: The act of iteratively seeking data which will challenge, enrich, or reinforce the **concepts** being developed or produced, according to the theoretical ideas currently being produced. New data is *not* led by a need to represent diversity amongst participants or data sources, but to fully flesh-out and challenge a developing category or concept in the theory.
- *Memoing*: The production of theoretical ideas and musings about the nature of the codes being produced and the data being collected. Thoughts and ideas that arise during collection and analysis are noted and expanded upon through writing. Eventually these memos will help form the basis of an emerging theory.
- *Constant Comparison*: The ongoing of comparing codes with codes, categories with categories, codes with categories, memos with codes and categories etc. as the project progresses through multiple rounds of data collection and analysis. This is the core process that leads to the creative and interpretive connections that lead to theory generation. A method for this can be writing codes/memos/categories on post-its and moving them around a whiteboard/wall, or using a software program to achieve something similar.
- *Theoretical Sensitivity*: This refers to the ability of the researcher to sense 'what is going on?' in the data as they become more immersed in it and work with it throughout the course of a project. A researcher's sensitivity depends on themselves as an individual and how much self-insight they possess, on their intellectual history to date, and their ability to keep an open mind as they work with the data at hand.
- *Theoretical Saturation*: The point at which new data collected from the domain isn't adding anything further to the properties of categories or concepts that have occurred during analysis. This is not the same as 'there

is nothing new in the data'. Data collection always reveals new insights and ideas, but during the course of a GTM project it may not add anything which challenges or enhances the developing theory.

- *Theoretical Integration*: In the final stages of a GTM project the researcher will integrate all the parts of the developing theory into one cohesive whole, whilst also drawing on elements of extant theory. This aids in adding explanatory power to the novel theory, and in situating it in relation to the wider body of knowledge.

3 History of GTM

3.1 Origins

The term 'Grounded Theory' was coined by Barney Glaser and Anselm Strauss (in '*Discovery of Grounded Theory*' [26]) to describe the new methods they created to use in their study of palliative healthcare [28]. They produced it at a time when quantitative, empirical methodologies were dominant in the Social Sciences over exploratory, qualitative methodologies. Glaser and Strauss argued that other qualitative methodologies at the time tended to rely on a somewhat restrictive set of 'grand' theoretical traditions (e.g. Marxist analysis or psychoanalytic analysis) which were not always appropriate or useful. They felt that many social scientists were preoccupied with testing and applying other people's theories, and not doing enough work to build *new* theoretical insight in the field of the social sciences [21]. At the same time the qualitative methods and practices available were viewed as lacking discipline and cohesion, resulting in weak, less meaningful results. Glaser and Strauss therefore sought to provide a degree of empiricism and transparent rigour to the production of high-quality qualitative theoretical results, without feeling the need to fully yield to prevailing positivist values at the time.

Initially the primary method was referred to as 'constant comparison' [26], but progressive developments yielded a full research methodology. Constant comparison's main aim was to identify conceptual themes or categories within data relating to a substantive domain of study, such that those concepts can be employed in the production of a novel theory about the primary concern within that domain. A set of clear and transparent methods were devised to lend rigour and transparency to the process of theory generation.

3.2 A difference of opinion — Glaser and Strauss

The original 'Discovery' text [26] had areas that were vague and caused confusion. For example — Glaser and Strauss had assumed that most readers would understand what was meant by 'coding', and its place in the GTM framework. Glaser wrote a series of shorter instructional texts (most notably *Theoretical Sensitivity*[21]) in response to these criticisms. A number of years after his work with Glaser, Strauss worked with Juliet Corbin to write *Basics of Qualitative Research* [37]. *Basics of Qualitative Research* summarised this prior work in the constant comparative method and grounded theory methodology, and presented it as a more accessible guidebook on GTM. The purported readability and greater availability of the various editions of this work has placed this guide at the forefront of many researcher's initial attempts to use GTM, and is often the only source consulted (closely followed by Charmaz [11]).

However, Glaser is highly critical of his co-originator's interpretation of the methodology, to the extent that he claims that the methods described in '*Basics of Qualitative Research*' were **not** grounded theory at all, but another form of qualitative data analysis. His particular concerns were with what he termed a 'worrisome concern with accuracy and detail', and over what he perceived as a high risk of 'forcing' categories onto the data, as opposed to allowing codes and categories to arise from the ground up from the analysis of the data. He wrote the rather polemic *Basics of Grounded*

Theory: Emergence vs. Forcing [22] specifically as a rebuttal to Strauss and Corbin. Interestingly, Strauss never ever engaged in debate with Glaser, and never replied to him. The acrimony was entirely one-sided from Glaser's side.

After Strauss's death, Corbin alone continued to update and publish new editions of '*Basics of Qualitative Research*' (2nd: 1998, 3rd: 2008, 4th:2015), which maintained the divergence from the original texts [21, 26], and Glaser has continued to argue that it is not grounded theory as described in '*Discovery*'. Over time, these approaches have come to be commonly referred to as 'Straussian', and 'Glaserian' (or 'Classic' Grounded Theory, as Barney Glaser and his followers refer to it themselves.)

3.3 The 'Constructivist Turn'

In the late 90s and early 2000s Kathy Charmaz, responding to concerns in some circles about the treatment of participants and the perceived positivism in GTM, wrote about how a more constructivist mindset should be brought to the methods of GTM [10]. Charmaz and others were concerned that GTM presented as an overly positivist methodology. Their contention was that codes, categories and theory *do not 'emerge'* from the data as if they were always present, waiting to be 'discovered' (as Glaser asserts), but *are co-constructed by the researcher and participant* in the process of data collection (often by interview) and analysis [36]. This implicitly suggests that the role of the researcher in the production of data needs to be acknowledged and the researcher's prejudices, views and intellectual history taken into account during the analysis.

Glaser's response was to assert that GTM has no inherent need to be constructivist in its approach, that the constructivist turn was pointless and a distraction away from the true nature of GTM. The views and thoughts of the researcher are 'simply another variable' — an extra piece of data, to be considered in the analysis with other data [19], according to the Glaser dictum that "all is data" [24].

At the time of writing, Glaser continues to promote 'Classic' Grounded Theory, and Charmaz continues to promote the constructivist-oriented variant of GTM [11]. Others such as Clarke have extended GTM to produce other constructivist, and more sociology-focused, qualitative methodologies such as Situational Analysis [14]. Juliet Corbin, who continues to edit the foundational volume that she co-wrote with Anselm Strauss [15] has progressively become more constructivist in her outlook in more recent editions.

4 Variations of GTM

4.1 Glaser/Classic Grounded Theory (G-GTM)

Glaser's Classic Grounded Theory Methodology (G-GTM) is quite radical. He states that the process should be as inductive as possible, and as such the researcher should initially avoid literature with *direct* relevance to the domain of interest (a broad literature review is fine and encouraged), avoid setting out a research question too early, and avoid using rigid practices or methods to code raw data. This is so that the researcher's creative insight isn't narrowed prematurely, and so that codes and categories aren't 'forced' on the data and so that original and novel insights can be made. 'Forcing of the data' is Glaser's phrase for applying extant pre-existing codes and categories to the data, rather than allowing codes and categories to emerge from the data during the analysis. For this reason, G-GTM practitioners are strongly opposed to a pre-research literature review.

Importantly, G-GTM is not intended to be a methodology exclusive to sociology or a specific tradition within qualitative research, but a general purpose methodology for the production of theory in *any* substantive domain [29]. Other variants tend to assume practitioners operate within the social sciences, and therefore ascribe to a philosophical

position that underpins their exposition of GTM. For example, Charmaz has included material covering this since the first edition of her textbook [11] and Corbin has included a chapter on philosophical considerations underpinning the research from the 3rd edition of her textbook onwards [15]. Glaser feels that this is unnecessary, and a distraction from the 'doing' of Grounded Theory.

Glaser does not contend that a constant comparative coding strategy could ever yield an objective and definitive set of codes from which to build theory [21]. This contrasts with Strauss and Corbin, who tend to emphasize 'complete', accurate, and *verifiable* coding strategies around a set of pre-determined research questions as a set of methods that are fully compatible with GTM [37]. However, Glaser claims that Strauss isn't presenting a GT methodology at all, but rather a sophisticated set of tools for Qualitative Data Analysis (QDA) [22]. His main concerns are:

- Grounded theory is a set of methods that can be flexibly used regardless of philosophical background and of field. Glaser does not see the need for the researcher to accept a certain philosophical position in order to use GTM.
- Strauss and Corbin's emphasis on producing a detailed model as being obstructive to the real power of GT. Glaser instead insists the product of a grounded theory must be a succinct and easily expressible word or phrase that is readily understandable and has 'grab' [21]. For example, 'supernormalising' — where people who have previously been ill go to great efforts to show everyone that they have not only recovered, but are better than they were before the illness — when they really are not (this was the core concept from Kathy Charmaz's PhD thesis, which was co-supervised by Glaser [13]).
- Glaser thinks Strauss and Corbin should not concern themselves with 'worrisome accuracy' [19, 22] and transcribe interviews. Instead they should only take brief field notes of observations and thoughts during the interview for later contemplation.
- Glaser advocates delaying a focused literature review, and insists that the researcher must enter that domain with as little fore-knowledge of it as possible. To possess extensive knowledge of the domain 'pollutes the mind' of any researcher, reduces or removes the chances of novel theory being produced and results in the unconscious 'forcing of data' i.e. a top-down application of codes to data that does not really warrant it, rather than allowing codes and categories to arise inductively from the 'bottom-up' [21–23]. A broad literature review is acceptable however, since this sensitises the researcher to a wide array of concepts which would increase their theoretical sensitivity (sensitivity to relevant emerging theory and concepts).
- Glaser gives primacy to the autonomy of the researcher, who usually works alone. He views the need for 'verification' as a dangerous restriction on the creativity of the researcher and their sensitivity to the emergent theory from the data.

The end goal in G-GTM is the *discovery* (rather than production/construction) of a *concise conceptual hypothesis* relating to the primary independent variable present in the domain being studied [21]. To this end Glaser advocates early conceptual abstraction, and criticizes S-GTM (and other similar variants by extension) for being overly concerned with accurate and detailed description, and model building. For Glaser the process of conceptual coding rests on the 'sensitivities' of the researcher and should lead almost immediately to conceptual theorization about the domain rather than 'objective' model building within the domain data (for Glaser, categorising codes is not enough to constitute a theory — whereas it could be for Strauss).

How these 'sensitivities' can be said to apply within an allegedly 'objectivist' and, ostensibly, inductive discovery of a theory is an ongoing point of debate (e.g. [30]).

4.2 Strauss (S-GTM)

Unlike Glaser's claim to philosophical-neutrality, Strauss explicitly acknowledged the heavy influence of symbolic interactionism and pragmatism on his interpretation of grounded theory. As well as a philosophical difference of opinion, they parted ways on several points of procedure.

Strauss and Corbin advocated full-transcription of interviews and detailed notes of interactions for later reference so that no detail of an encounter was lost to faded memory. Similarly, in contrast to the emphasis on abstraction and conceptualisation of Glaser's interpretation, Strauss and Corbin encouraged the construction of a detailed, accurate and verifiable model of categories and concepts. In S-GTM there is no real need to reach a single abstract core concept — a set of *related* categories that together offer an explanation for the patterns in the data counts as theory. Earlier editions advocated for axial coding — where the researcher attempts to align codes and categories along a single line continuum in order to bring some structure to the analysis. However, this was deprecated from the 3rd edition onwards.

Strauss and Corbin also advocated a literature review prior to investigation so that the domain of inquiry could be accurately identified, research questions formulated and so that successful proposals for funding and grants can be written. S-GTM advocates spending a significant amount of time researching and formulating the exact research question(s) that the researcher wishes to answer, and presents a number of conceptual questions the researcher might ask of the data in order to ensure that the researcher gains a relatively complete (and therefore detailed), verifiable model of the social processes employed by domain actors. A more detailed and focused literature review should be left till later to help relate the theory to other works within the field. It is worth noting that whilst earlier versions of S-GTM, by the nature of their emphasis on producing a *detailed and complete* model of the domain, lean more towards the positivist position, Corbin's views and recommendations in later editions have progressively moved towards those of constructivists such as Charmaz and Clarke.

4.3 Charmaz/Constructivist (C-GTM)

Glaser's insistence on the validity and utility of the inductive creation of generalized, abstract, conceptual (but still substantive) theory from data, has drawn substantial criticism. Charmaz deals with the supposed criticism that GTM is apparently objective or positivist by stating that knowledge is neither produced out of nothing, nor discovered — instead the researcher co-creates meaning within the domain they are studying [10, 11, 36]. Methods and results, therefore, should not only reflect the stories of the actors concerned but also be mindful of the values and stories the researcher themselves bring to **their** interpretation of that data. This is despite Glaser *emphasising* the creativity and autonomy of the individual researcher, and that this is something they should be aware of and preserve at all costs.

Similar to Strauss, Charmaz does not advocate strategies for isolating the researcher from pre-existing theory as Glaser does [21, 22], but rather proposes that a researcher use their knowledge of possible relationships between the actors in the research process to develop conceptually rich *narratives* which are important to both researcher and subjects. Similar to Strauss she prefers detailed analysis of carefully recorded interactions (usually transcriptions of recordings) between the researcher and their respondents to accurately represent the interactive research process (compare this to Glaser, who refutes recording or transcribing interviews and instead depends on brief field notes).

In keeping with his own dictum of "all is data", Glaser sees the views and values of the researcher as simply another kind of data to be analysed [24]. Whilst Glaser sees any concern with accuracy or verifiability as being unnecessarily restrictive, many see G-GTM's failure to fully address the role the researcher and their background plays in collection and interpretation of data, as well as the 'smash and grab' approach to data collection and potentially dismissive attitude

to interviewees, as too great to ignore [36]. Glaser sees the advent of C-GTM as unnecessary [19], although it has been observed that the challenge presented by Charmaz is never really addressed by Glaser [7].

4.4 Summary of the differences between the variants

Table 1 presents a summary of the differences between these three main variants — some of which can be quite subtle. This table does not offer a definitive rendition of each, but rather is presented to illustrate how the relative differences between the variants can be understood, and help the reader choose the approach that is most appropriate for a potential research project.

We hope this also makes it clear how it is not enough to cite a single 'classic text' of GTM (e.g. [11, 15, 21, 26]) in the methods section, without qualification. The researcher must make sure they are fully informed of the method which they claim to use. They may well find themselves allying with one tradition on some points, but with another tradition on others. Even if they do not, they should make their positions and epistemological views clear. This need not be laborious and detailed, but it is important that this is made clear so that the contribution of the work can be read and appropriately assessed.

That the three GTM variants appear to disagree on important issues of concern in research practice is not to say that these approaches are all *utterly* irreconcilable. We suggest that the primary difference between them can be understood best in terms of the kind of result expected from the process.

- G-GTM seeks a theory in the form of an abstract and succinct hypothesis concerning the one key variable in the system which has the most effect.
- S-GTM more often attempts to construct a less-abstract theory underpinned by a detailed, multi-layered and verifiable model of how the numerous variables in the system interact.
- C-GTM produces a theoretical output which sits between the other two types while also explicitly appending observations about the imputed, implicit thoughts, hidden narratives, and contexts of the individual actors and the researcher. It is more concerned with giving an authentic 'voice' to the participants than S-GTM or G-GTM.

One key difference between the variants is that G-GTM strives for one single theoretical category that ties all the codes and categories together. In contrast, S-GTM and C-GTM recognize that there will more likely be several major themes and categories needed to give an account for what is happening within the domain of study. This variability in the conception of 'theory' has lead some commentators to take issue with the idea that GTM produces theory at all [38]. Such criticisms may depend upon which variant of GTM is being discussed, what one feels a theory should amount to, as well as one's understanding of the imputed epistemology proposed by the three main variants of the methodology. There is evidently room within GTM to account for a number of different perspectives.

Glaser regards these differences to be of critical importance. Any variant which prioritises data accuracy or verification over conceptualization, and any clear promotion of researcher sensitivities or biases over the inductive construction of theory from domain data, is deemed by him to be a re-modelling of the methodology to the point that such new versions are no longer GTM, but rather a form of Qualitative Data Analysis (QDA) which mis-appropriates the jargon of GTM [19, 22, 25]. Glaser's focus is on keeping the process of GTM 'purely inductive', and maintaining researcher autonomy and creativity so as to give maximum chance for novel theory to arise from the GTM process. The philosophical challenge to pure induction is long standing and most modern thinkers recognize that knowledge cannot reliably be formed inductively from data. Therefore, it must be constructed, in some respects by the researcher's own engagement with the data they collect and analyse. At the very least it seems that many researchers acknowledge that the process

	G-GTM	S-GTM	C-GTM
Philosophical Position	More positivist	Earlier editions ('90, '98)- more objectivist. Later editions ('08, '15) - more constructivist	Constructivist
Data collection	Selective (only field notes) **Explicitly against detailed observation**	Accurate (Full transcription)	Accurate (Full transcription)
Primary source of Data	"All is data", but still mainly interviews.	Interviews and other written data	Interviews mainly, but other data can be used.
Status of researcher	Researcher as 'objective analyst'. Can analyse self as another 'variable'.	Variable according to philosophical position. Must be self-reflective.	Co-constructor of data.Constant need for self-reflexivity. **Explicitly concerned over role of researcher's interpretation of data**.
Broad literature review	Good for 'theoretical sensitivity'	Essential to identify research question and sensitise researcher	Necessary for sensitisation to subtleties in data and participants
Focused literature review	Avoid until after theoretical saturation (to avoid bias). Post-saturation, useful for write-up, context and integration with field.	Delay till later to help contextualise theory	Necessary to be sensitised to subtleties in data and participants More substantial later on to contextualise theory
Research question	Undefined at start. Only approximate area of interest to be decided. Question arises from intial data analysis	Well-defined before research	Approximate before research Subject to modification during project
Variations in coding strategy	(extant) 'theoretical' coding optional.Line-by-line open coding encouraged Simpler, more straight forward	Axial coding to assist in discovery of core category (NB: Axial coding deprecated from 3rd edition onwards) More complex and detailed	Axial coding optional (caveats apply) Line-by-line open coding strongly encouraged Simpler, more straight forward
Desired result	Simple explanatory theory around a core concept that underpins process(es) observed in data	Detailed model of categories and codes around core/axial concepts.	Powerful core concept(s) that explains/underpins participants stories.
Main quality concerns	Fit Explanatory power Relevance to domain Adaptability to similar/other areas	Model fit to data **Verifiability** **Completeness**	Fit Explanatory power Conveying peoples' stories. Confirmation of utility by participants
Key Question	*"Is this concept useful for explaining the patterns we see in the domain?"*	*"Is this conceptual model accurate, complete and correct?"*	*"Does this concept explain and convey what people have said and/or feel?"*

Table 1. Summary of differences in GTM variations

is an abductive [11] interplay between the data and the researcher's 'sensitivities' rather than purely an inductive, mechanistic, 'discovery' of the theoretical 'truth' by a tabula rasa researcher.

This suggests that the methodology according to Glaser is **not**, and never was, pure positivist objectivism and the accusation that it *is* is more likely to constitute an argument against the more detailed verificationist approach of Strauss [22]. In this sense then, the approaches of Glaser and Charmaz could be said to be closer to each other than either of them are to Strauss and Corbin — even if they may not wish to admit this!

5 Erroneous Claims and Misuse of GTM

Although it lay in obscurity for the first 20 years or so of its existence, since the 1990s GTM has increased in popularity to the point where it is considered by many to be the most popular qualitative research method amongst the social sciences — 'fashionable', even [5, 8]. Indeed, a search for the term "grounded theory" in CHI proceedings shows the

number of papers citing the use of grounded theory in their analysis has approximately doubled in the last 10 years [1]. However, its new found popularity within HCI is a double-edged sword. The increased use of the methodology has not brought with it the same level of awareness of it's history, the important debates that surround it, and how to make use of it with rigour and accuracy. Subsequently, GTM is still, not without reason, treated with caution from many areas of academia and yet not taken seriously enough from others [8].

Many qualitative research methods use some of the same tools that grounded theory does — such as coding, categorisation and comparison of codes. This has led many to assume that all that is required for a study to be labelled a grounded theory is to apply some codes to some data (often interview transcripts). Coding, comparison and categorisation are incredibly useful tools, but if they are used to identify themes in the data — that is thematic analysis. If they are used to produce a taxonomy or model (as opposed to an explanatory theory) — then that is another form of qualitative data analysis, but it is *not* a grounded theory project either in practice, nor in the results.

GTM is often held to be an inductive *or abductive* process, depending on which school of GTM is adhered to. Glaser and Classic Grounded Theorists would say GTM is inductive, whereas Straussian and Constructivist Grounded Theorists would assert GTM is an abductive process. Indeed, this is the first of many areas of debate amongst grounded theorists.

In our experience, many papers state that GTM is inductive, without any real evidence that they understand what this position entails. Most researchers of a more 'modern' epistemological mindset, and particularly those of a constructivist position, would likely find that describing GTM as an *abductive* method is less problematic.

It is worth pausing to very briefly review the differences between deductive, inductive and abductive forms of logic — especially since 'abductive' logic/reasoning is seldom discussed.

Deduction is where a specific conclusion is derived from general or universal premises which are known to be true and certain. Therefore, the conclusion is guaranteed. e.g. Socrates is a man, all men are mortal. Therefore, Socrates is mortal.

Deduction is used to make predictions about the future, but is non-ampliative — that is it cannot add to current knowledge due to its strict requirements for the premises to be 100% certain in order to draw valid conclusions. If the premises are true, then the conclusions must also be true (if they are validly drawn). Deduction is truth-preserving.

Induction is where a generalised conclusion is formed based on the observation of a number of specific instances. Cause and effect is observed, and a set of rules or hypotheses are generated to link the two. Inductive reasoning can be strong (if there is a lot of evidence available and the conclusion is highly probable) or weak (less evidence and probability is low). There is always an element of probability involved, and conclusions can be false even if the premises are true. A common example often given is, "All the swans I have seen are white, therefore all swans are white." This isn't true — black swans do exist, although it is highly probably in most parts of the world that the next swan observed will be white, and that the observer may never see a black swan in their lifetime.

Induction is also used to make predictions about the future, and is ampliative — it **does** add to current knowledge, even if that knowledge may not be certain and true (as in deduction), 'merely' likely or probable. Induction is therefore not truth-preserving like deduction is.

Abduction is where a best or *most likely* explanation for a specific situation is drawn from an *incomplete* set of observations. Again, probability is involved and the conclusion is likely. Abduction is often summarised as "inference to the best explanation" There could be a number of possible explanations for the set of observations,

> but one explanation is more likely than the others based on the (limited) information at hand. e.g. Medics use abduction to diagnose a patient. They cannot be sure they have all the correct information, and it may not even be possible, but they make an 'inference to the best explanation' given the information available when making a diagnosis.
>
> Whilst deduction and induction work from premises through to conclusions (i.e. using the past or present to predict the future), abduction works in the *reverse fashion* and uses current observations to provide explanations for probable causes (i.e. using the present to explain the past). This also means that, like induction (but unlike deduction), abduction is not truth-preserving.

It is, however, up to the researcher to make clear their informed opinion of where they stand and why they have chosen a particular 'flavour' or tradition of GTM.

In researching this article we first scanned through the CHI and CHI Play proceedings for the years 2016-2021 (the last five years at time of writing) and selected papers that contained 'grounded theory', 'grounded analysis' and similar phrases in their titles or abstracts. We feel it would not be feasible to analyse every single HCI-related outlet for this paper, and so these two conferences were selected because they are two premier venues for publishing HCI-related work. We then searched the proceedings using the search term "grounded theory" (exactly, in quotes) to search for the phrase anywhere in the paper, and not just the title. This was to ensure that the work had claimed use of GTM for the paper, rather than just mentioning and/or discussing it. We downloaded a selection of these papers as they were presented in the search results. Once we had downloaded a selection of approximately 25 papers, we read through them and studied their methodology to see if they first claimed to use grounded theory in their project, and then to see if they had actually carried out grounded theory in a rigorous manner.

Many recent research studies claim to use grounded theory, but a closer read reveals that their methodology is not grounded theory, but a different form of qualitative data analysis. Seasoned commenters on grounded theory have commented on this at length [4, 5, 8, 22, 23, 25] and we have also found this to be the case from our own experience. In common with these other authors, we have found that many studies purporting to be grounded theory studies have actually used a form of thematic analysis as their method (for an explanation of thematic analysis, the reader is referred to Braun and Clarke's well-known primer [6]), or have simply used preliminary coding strategies whilst dispensing with subsequent stages essential to Grounded Theory.

However, just because a piece of research has claimed use of grounded theory incorrectly, does not mean that research should be discounted or have its value questioned. It simply means that they have achieved their results with *something other than GTM*, and that GTM is not the term they should be using to describe their methods. A call for greater clarity over language and terminology is not a call to devalue *the work* that misuses that terminology — it should be obvious that the contribution to the relevant field still stands. This would be tantamount to, as the saying goes, 'throwing the baby out with the bathwater'. For this reason, this article does not critique individual papers in detail, but simply cites them as examples of papers where GTM does not *appear* to have been rigorously implemented. Having said that, it possible that some revaluation of works may be required, in the light of clarifications on terminology and processes discussed here.

The main issues noticed with publications were:

- **The lack of a theory.** Frequently a study will claim to use a grounded theory approach, but has instead provided a description or detailed taxonomy rather than a theoretical *explanation* for what is happening in the area of interest [2, 3, 17, 32].

- **Overly detailed theory.** A grounded theory should be simple to convey, have strong and immediate explanatory power, and have the ability to suit a number of domains with some modification. Glaser and Strauss referred to these criteria as fit, grab, work and modifiability. Charmaz reformulated these as credibility, originality, resonance and usefulness. A good grounded theory should also make sense to the people who work in the context from which it is derived — the participants themselves. They do not need to agree with it, but should at least be able to understand it [8, 11, 26].
  An author may claim that they have an explanatory theory, which may well be true in some senses, but it is too detailed and therefore too specific to that particular situation to be of use outside of a very specific problem area — again veering very close to being a *description* rather than an explanatory theory or abstract concept [2, 31, 42].
- **Coding some data, and stopping there.** Applying codes to data is a very common method that is used as part of a wide range of methods for qualitative research, and is by no means specific to grounded theory. Codes should provide a stepping stone to greater conceptualisation and abstraction. Sometimes, if a code seems to be particularly useful or resonate across the data, it will be 'raised' to be a concept or category. Coding, without the constant comparison and eventual abstraction that leads to theory, does not constitute a grounded theory. GTM involves open coding as only the *first* of many stages of the methodology — focused coding, memoing, interleaved analysis and data collection, theoretical sampling, constant comparison, theoretical saturation, integration etc. Coding alone doesn't mean that the researcher has used grounded theory, any more than mixing some chemicals together and watching what happens means they have used the objective scientific method [31, 41].
- **A top-down approach.** In GTM codes, concepts, categories and meaning are derived iteratively from the *data upwards*, rather than data being 'forced' into a pre-determined framework from the *researcher/concept downward* This can happen where the stated research question is very specific before research has begun. This runs the risk of making any theories appear as though they were a foregone conclusion, and makes it incredibly difficult to prove that researchers remained spontaneous, open and flexible to 'where the analysis wishes to take them' [33, 35, 40].
- **Collection of all data before analysis/separate data collection and analysis stages.** The interleaving of data collection and analysis is absolutely critical to the practice of grounded theory. Without analysis of the data and the resultant memoing guiding where to look next for more data, there can be no constant comparison of codes and emergent categories. There can be no theoretical saturation — how can you ensure that your codes and categories are fully-explored (saturated) if all of your data has been collected already? If you are certain that you are able to collect all the data you need before *analysis*, how can any resultant theory be said to be grounded in the data and inductively derived from the bottom-up, when it is clear that you have pre-existing ideas and desires about what you will find in the data — inferring a (possibly unconscious) top-down approach? [18, 31, 34]
- **Not using theoretical sampling.** Theoretical sampling is the practice of collecting extra data *in response to the developing theory*. The main purpose of this is to fully explore all the properties and characteristics of codes and categories that arise from analysis, and to test the theory that is evolving from the researcher's analysis, not to provide balance or diversity in the group of participants. In practice, if using interviews with participants as your main data source (as is common in qualitative projects), this means purposefully recruiting people who you think will have useful or interesting things to say on ideas and concepts that have arisen from the analysis

> you have done so far, and not in order to ensure population balance along the lines of gender, age, occupation, ethnicity etc. [2, 3, 32].
>
> This is not to say that diversity in research and participant recruitment in HCI research is anything less than an incredibly important topic. But it is not so important for a GTM project. The diversity of participants and their viewpoints can be commented on and acknowledged in various ways if appropriate, but it is not what *drives* the ongoing recruitment for a GTM project.

If it's not a theory, you have not used grounded *theory*. If it has not been generated bottom-up from the data, it is not *grounded* theory.

To be clear, this is not a statement on the superiority of one qualitative research method over another — such a statement would evidently be fatuous, and the researcher must select a methodology that suits the project at hand. It is simply making the distinction between GTM and other methodologies clear, making a plea for researchers to provide more accurate descriptions of the methodologies they use, make clear their assumptions made before and during research, and for researchers to pay the same diligence to understanding their *methodology* as they do to understanding their subject area.

For further information the reader is encouraged to consult sources referenced in this paper, although they may wish to begin with a practical introductory source such as Bryant [9] or Mills and Birks [5].

6 Example GTM Project

To help the reader understand how a GTM project looks in practice, the following steps are an example of the practical steps that a GTM project may go through from beginning to end. Due to the flexible and reflective nature of GTM, this is by no means a definitive procedure, but hopefully illustrates what the above philosophy and principles look like when carried out. Specifics on how that stage has been implemented in this research is given where appropriate/possible.

(1) Researcher identifies area for investigation.
   - Area may be roughly defined, or area of focus may be more detailed in the form of research question(s). This depends on the style of GTM chosen and other factors (see above).
   - Literature review prior and during research varies according to style of GTM and philosophical position.

(2) Researcher collects **small** amount of data
   - This can be pre-existing such as written material or, more commonly, generated through interview and possible transcription of the interview . *This would only be a few articles or a single interview.*

(3) Researcher applies codes to this data.
   - Data can be pre-existing written material or generated through interview and transcription.
   - 'Codes' are short labels which summarise/describe what is happening in just that line/section of data.
   - Coding can be done section-by-section, line-by-line or ad hoc/only where something 'interesting' occurs. The most common practice for initial coding is line-by-line [12, 16, 22], with section-by-section or ad-hoc coding reserved for later focused coding phases.

(4) Researcher looks at codes generated for any emergent ideas or patterns, and writes a 'memo' to record thought process.
   - Memos are written on codes, reflections on groups of codes, and ideas sparked by certain codes and phrases used in source material. A memo is simply a written account of the thought process — important both for in-the-moment processing and later retrieval and reflection during theory development and write-up.

- Memos occur at *any time* throughout project, but particularly between sessions of data collection and analysis. They should happen whenever the researcher has a realisation or 'significant thought'.
- At the start of a project patterns and emergent ideas are ill-formed and difficult to come by. The researcher needs to continue with the project and 'trust in the process' at this point.
- Later memos may well be 'memos about memos' depending on the state of development of the emerging theory.

(5) Using the results of step 4, researcher determines where/how to collect more data, and does so.
- This is 'theoretical sampling'.
  The researcher's primary concern is **not** to sample for population balance (i.e. along gender, age, educational or racial lines), but to respond to gaps and suggestions in the developing theory. The focus on recruitment is on collecting data that will challenge, test, expand, add more detail to and develop ideas and potential lines of enquiry suggested by the analysis so far.

(6) Researcher repeats steps 2 to 5 as many times as is necessary
- Theory emerges half-formed from early rounds of coding and analysis.
- Emerging theory determines direction of next round of data collection, coding and analysis (leading, eventually, to theoretical saturation — see step 7).
- Researcher remains flexible and open-minded to directions the data and analysis might take them.
- Over time certain codes become more important/useful in explaining what is happening in the data, and get raised to categories and/or concepts. Codes then become 'properties' of these categories and concepts.
- Each round of data gathering and analysis should be used to test, challenge and improve the developing theory.

(7) Researcher stops collecting data when new data does not suggest any new properties of categories in the emerging theory.
- This is 'theoretical saturation'.
- Not to be confused with 'stop collecting data when there's nothing new to be found'. Any new data collection will usually yield new items to think about. However, the important question is are they related to the **current developing theory**?
- Does this data contradict the theory, and therefore suggest it needs modification?
- Does the theory, at this point, feel well-tested and strong, and therefore *not* require modification in response to new data on the codes and concepts that are involved?

(8) Researcher writes up theory and integrates it within other theory for the literature for that domain.
  More classical approaches to GTM will leave a specific literature till this stage i.e. post-theoretical saturation. Only at the write-up stage will they look to see how this theory integrates and relates to pre-existing theory in the area under investigation.

7 Discussion

In this paper we provided a (**very** abridged) history of grounded theory methodology from its inception till now, highlighting the core areas of difference and argument. Unlike many other research methods, GTM is a highly-contested space, with significant debates, disagreements and schisms littering its 50 year or so history. Many of these debates are continuing, and most likely will remain in perpetuity. This means it is important that when the researcher embarks

upon a grounded theory analysis, time is taken to acquaint one's self with the issues at stake, the core areas of debate, and come to an informed and conscious decision on how, and why, they will carry out their research.

GTM has sometimes been treated as a 'catch-all term' to cover up lack of rigour and direction with methodology [8], but it should not and does not have to be this way. GTM is particularly suited to nascent areas with little existing research available, but it also able to produce significant and novel insights into well established areas. However, this great potential comes with a duty to treat GTM itself with the systematic rigour that it also demands of its practitioners. For this reason we provided an overview of the methods used in all 'flavours' of GTM, and a comparison between the three predominant traditions to help researchers orient themselves accordingly. Although they share a significant amount, there is still many areas where the traditions do not align. This emphasises how it is not sufficient to simply claim 'grounded theory analysis' in the methods section with a single reference to classic text, no more than it would be to claim 'statistics was used' with a single citation of a popular statistics manual.

Some might feel tempted to dismiss these concerns as an over-prescription of the methods of GTM. We feel we have made it clear that the issues highlighted by the different traditions here (e.g. induction vs. abduction?, nature of recruitment and theoretical sensitivity, judging when the analysis is complete) are too large to be overlooked and taken for granted. It should also be noted that we have done our best to ensure that none of the three traditions discussed here (Classic/Glaserian, Straussian, Constructivist) have been given preferential treatment. That is the for the researcher to decide for themselves when the time comes.

To help researchers navigate the 'slightly choppy waters' of Grounded Theory, we included both a list of common pitfalls observed amongst papers that claim grounded theory, and an example timeline for how a grounded theory project might look in practice. A substantial reason for the amount of methodological debate amongst grounded theorists is that the earlier 'classic texts' were silent on a number of important issues (particularly those by Strauss and Glaser such as [20, 26, 27]), and so allowed confusion and a variety of interpretations to spring up. GTM's more flexible and iterative nature also prevents many from properly getting to grips with the methodology. It is hoped that the 'Example GTM Project', whilst not a de facto template for carrying out a grounded theory analysis, will at least help those who struggle to see how GTM looks like as practiced in a real research project.

8 Conclusion

Grounded Theory Methodology is a flexible, powerful and useful methodology specifically geared towards exploratory qualitative research. As such, it's of great utility to the field of HCI. However, it is commonly misunderstood. Although it is a detailed and rigorous methodology it is often treated rather casually and/or as one homogenous method, with little knowledge or regard for the results of over 50 years of contentious and heated debate.

In this article we provided an overview of the history, methods and main traditions of GTM, as well as some potential pitfalls that may occur if not fully versed in the method and aware of the potential issues before embarking upon a grounded theory analysis. To further help support those curious about GTM, we also provided a potential outline of how a GTM project may look like in practice, and therefore help illustrate how it is substantially different to other forms of qualitative data analysis.

GTM is commonly claimed within the field of HCI, but a full awareness of what the methodology actually requires does not appear to match it's level of popularity as yet. It is hoped that the points raised in this article will help establish clearer standards for assessing work that uses GTM, both for the researchers writing it, and for the reviewers assessing its contribution to the field.

Acknowledgments

This work was partially funded by EPSRC grant EP/L015846/1 (IGGI). Thanks to Sarah Wiseman (Goldsmiths, University of London) and John Hamon Salisbury (Independant scholar) for discussions and input on earlier drafts of this paper.

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