1

Introduction

Abstract The first chapter briefly prepares the reader for the content of the book that follows. Facet theory and mapping sentences form the heart of both this chapter and the content of the book that follows. I offer definitions of facet theory and mapping sentences and I introduce the reader to the two forms of mapping sentence, namely, the traditional mapping sentence and the declarative mapping sentence, and how they are appropriate for quantitative and qualitative research respectively. The study of categories is also commented upon as this relates to mapping sentences. Additionally, I propose the neoteric usage of the mapping sentence as a stand-alone research tool without being embodied within full-blown facet theory. A distinctly philosophical outlook along with a qualitative understanding for social research is put forward. Examples of both a traditional and a declarative mapping sentence are given as to illustrate how this tool can be used to understand a specific type of communication. The chapter ends with a description of the chapter to follow.

Keywords Facet theory • Mapping sentences • Traditional mapping sentence • Declarative mapping sentence • Philosophy • Aristotle's categories

Initial Statements

I commence my writing by making initial statements about the contents of this book. These are important, as I believe they prepare readers for the text to come. First, this book is about facet theory and the mapping sentence which are ways of: (1) conceiving the world around us and (2) conducting research into human and non-human animals' experiences and behaviours.

Facet theory is an outlook upon the world that advocates the usefulness of identifying major sub-divisions of the phenomena that are being investigated and then further sub-dividing these divisions in order to better understand the phenomena. Having identified these sub-units, scholarship may most profitably proceed by investigating the part to part and part to whole relationships. The parts and sub-parts of an area of enquiry may be represented by writing these within a mapping sentence.

The *mapping sentence* is a linguistic framework that can depict the meaningful way in which the components of a phenomenon that is under investigation exist in terms of their part to part and part to whole relationships.

Introduction

Good research demands that the concepts it employs to be clearly defined. Furthermore, good research also requires for an unequivocal method that enables the establishment of the circumstances under which this concept is applicable, and when this is not applicable, to something in the world (Cartwright 2014). Within this book, I will provide support for the notion that mapping sentences are research devices that fulfil Cartwright's requirements. Mapping sentences may take one of two forms, traditional or declarative, but in either format, they are essentially somewhat rudimentary as they are simple statement in the form of a sentence of prose. Furthermore, mapping sentences are relatively simple research tools to create. With such simplicity in their nature, the reader may ask why

mapping sentences have been used in both applied and theoretical research in a broad array of research situations. This book will consider, and I hope answer, this question, but an initial reason I propose is that by using a mapping sentence the scholar is able to focus their attention in an unequivocal manner on their research questions and to keep their research 'on track'. Using a mapping sentence in their research design also provides a framework within which the phenomenon that is under investigation is clearly defined.

Both mapping sentences (Levy 1976; Hackett 2014a, b, 2016a, b, 2017a, b, 2018a, b, 2019a, b, c, 2020a, b; Hackett et al. 2011; Koval and Hackett 2016; Koval et al. 2016; Lou and Hackett 2018; Lustig and Hackett 2020a; Schwarzenbach and Hackett 2015) and facet theory (Borg and Shye 1995; Canter 1985; Dancer 1990; Guttman 1954; Hackett 2014a, 2019a, b; Hackett et al. 2019; Levy 1985, 1990, 2005; Lustig and Hackett 2020b; Shye et al. 1994; Tziner 1987), the broader approach to research from which the mapping sentence is taken, are research methods from the humanities and social science. They are specific ways in which a social science research project is undertaken, (i.e., the procedures for designing and executing a research project) are extremely important factors in determining the type and the quality of the information the research produces. Philosopher Nancy Cartwright (2014) emphasises this point when saying that it is crucial that the meaning of the concepts that are being investigated in a research project are specified in a clear way. Continuing, she that there is a further requirement and that is to determine if and when a particular concept applies is applicable to the domain into which you are conducting your investigation. As well as these requirements Nancy Cartwright (2014) goes on to state how "the two endeavours of characterising or defining concepts, on the one hand, and devising methods for determining when they obtain, on the other, must go hand in hand." (Cartwright 2014, p. 309). Throughout this book I will set out how I believe that the mapping sentence meets both of these needs and offers a framework for conducting well-conceived, appropriately designed and executed research by providing a framework within which research domain of interest is defined and also suggesting how information to interrogate a research question should be gathered and then analysed.

There is a great deal of similarity between both forms of mapping sentences (traditional and declarative). However, they are different and are used in different ways due to the different forms of information that they are used with: quantitative and qualitative respectively. The mapping sentence is able to bridge the boundaries between quantitative and qualitative researchers and in doing this, it provides an approach for conducting mixed-method social science and humanities research. One of the greatest strengths of the mapping sentence is that its use may facilitate a method to reason about a phenomenon that is of interest from perspectives that are both qualitative and quantitative. Canadian philosopher of science, Ian Hacking (1992) has written extensively in this area and has noted the way that different disciplines formulate and take as there own a sense of what is a reasonable manner in which to establish what is, and what is not, valid knowledge. For instance, statistical proofs may constitute a reasonable agreement for the establishment of truth for some disciplines. However, other disciplines see assertions that are valid as being derived from rich textual narrative that convey insight into the lives and experiences of individuals. It is my hope that, through the repeated use of the traditional and declarative types of the mapping sentence a common sense of what is a reasonable basis for statements of validity may be at hand.

What Is a Facet?

There is a terse answer to the question: what is a facet? A facet is a category. When we think about the word category, we are referring to the classes into which people or things may be divided or allocated on the basis of the features that they have in common. In many ways, categories for building blocks that we use to interpret and make sense of things and events and are the essential conceptual constructs we use to enable us to understand the world in which we live. This is a bold statement but one that is supported by over two thousand years of scholarship. The importance with which the human potential for forming categories and the salient way in which these are used is alluded to by Gottfried Leibniz when he wrote: "A thing that can be divided into several (already actually

existing) is an aggregate of several, and… is not one except mentally, and has no reality but what is borrowed from its constituents." *Gottfried Leibniz, 1704* (Rescher 1991, p. 50).[1] A century later, another German philosopher Georg Hegel,[2] stressed the pervasive nature of categories by saying: "Even the ordinary, the 'impartial' historiographer, who believes and professes that he maintains a simply receptive attitude; surrendering himself only to the data supplied him—is by no means passive in regards the exercise of his thinking powers. He brings his categories with him, and sees the phenomena presented to his mental vision, exclusively through these…" Georg Hegel, *1837* (2010, p. 54)

We must ask however for more detail in our understanding of what a category is, what are the ways in which categories interact, how do we make use of categories in our thinking and speaking, what roles do categories play in our lives, what are the different varieties of categories and can categories have an objective existence, independent of our thoughts and language? These are fundamental questions about human existence that have attracted scientists and philosophers in their attempts to formulate answers. Isaiah Berlin provides a possible answer to these questions by citing Immanuel Kant as saying that the categories through which we all see the world are "… identical for all sentient beings, permanent and unalterable: indeed this is what (makes) our world one, and communication possible." (Berlin 2013, p. 10). In my writing, I will explore a particular approach to conducting research and into developing knowledge about the world that is based firmly in the understanding that this knowledge is categorial. This approach is known as facet theory which employs a device known as a mapping sentence to categorially depict behaviour and experience. It should be noted that below I will initially consider the metaphysical aspects of facet theory and mapping sentences. However, this will be a brief review of this area and I will delay an in-depth consideration until Chap. 2.

---

[1] The above is an extract from a letter sent in 1704 from German philosopher Gottfried Leibniz (1646–1716) to professor of philosophy and mathematics at Leiden University, Burcher de Volder (1643–1709), stating Leibniz's metaphysical stance (Leibniz 2013).

[2] Georg Wilhelm Friedrich Hegel: 1770–1831.

What Is Facet Theory?

Facet theory raises questions about the nature of part-hood in relation to the specific areas of research content under investigation. These questions come under the auspices of mereology. When we employ a facet theory perspective, along with using a mapping sentence, we are stating our belief that the phenomena we are investigating is most readily and fully understood by disassembling this into its constituent parts. Facet theory offers one way of understanding part-hood through the use of a mapping sentence. You may at this point be asking why we have to try to understand part-hood and you may feel that parts are natural qualities of events and that these may be investigated. However, identifying the extent of an event in terms of its parts may be problematic as may being able to state that the parts that have been identified actually come together to form a coherent and meaningful whole: in what way do the parts compose the whole? An example may help to clarify these points.

If we think about a physical location that we are interested in evaluating for its ability to satisfy users' needs, several questions regarding part-hood and composition arise:

- What are the boundaries of the location that we are interested in and what makes this a whole (how do we determine where we draw the boundaries to the location)?
- What are the parts of the location (how should we break-down the location when we try to assess satisfaction with the place)?
- If we can identify separate components of the location for the purpose of evaluating satisfaction with these, how and indeed do these parts of the location come together in a meaningful sense to form the place as a whole?
- What are the specific relationships between the parts we have identified as being separable?
- What are the relationships between the separable parts and the location as a whole?
- Who are the users and what are the characteristics of those users that relate to satisfaction with the location?

- Do all users understand the whole of the location, its parts, and the ways that these come together in the same way?

There are other questions that could be asked but those listed above serve to illustrate that it may not be a simple thing to identify what is the whole phenomena we are interested in, its parts and how these are assembled. Other questions that may be asked regarding part-hood can be illustrated if we continue the above example. Let us now imagine that the location we are assessing is a large shopping mall. We are now required to ask the following questions:

- What is the extent of the mall (does it include the car parks for the mall, access roads, the transit system that runs through the mall, the larger detached stores around the periphery of the mall site, access to surrounding towns, bus and train services, etc.,)?

It can be seen that it is not a simple thing to define the extent of the whole mall—the extent of the phenomena under investigation. With this ambiguity in mind, the extremely important question therefore arises:

- Can a thing called the 'mall' be meaningfully said to exist (does it make sense to think of the mall as a whole or should we content ourselves with investigating the parts we have described above)?

The converse state also pertains and we must ask:

- Can the separate parts of the mall be said to have a coherent existence separate to their existence as a part of the mall (does it make sense, and is it a legitimate practice, to investigate individual components of the mall)?

Finally, if we do decide that the mall can be identified as a meaningful whole with the meaningful sub-components that we noted above, we have two extremely important questions to answer:

• How do the parts of the mall come together to form a whole (this is a question that is asking how, in the real world, do the parts of the mall come to possess a meaning as a mall, do the parts just sit next to each other relatively independently, are the amalgamations, do they merge to form composite identities, are they concatenations with different meanings as a whole dependent upon the order of their assembly, etc.,)?

Having thought about the many ways that part-hood could be present within the mall we then have to answer the question:

• How do we bring our research into the components of the mall together to allow us to make statements about the mall and its parts?

The above example of a mall is, I hope, useful in highlighting some of the dilemmas that are associated with any research project into any phenomena. Facet theory explicitly identifies the nature and roles of part-hood in research, but it does not create the part-hood issues which are present to varying extents in research regardless of how it is conceived. It is also important to note that whilst the parts of the mall are obvious in the example the illustration I gave could have been very different in terms of its subject matter. As an illustration of this, we can think of a research study that was concerned with the development or appraisal of a cognitive test. The same questions I listed above could be asked in this case as well. For instance:

• What are the boundaries of the test that we are evaluating or developing and what makes this a whole (how do we determine where we draw the boundaries to the test)?
• What are the parts of the test (how should we break-down the test when we use this to assess cognitive performance)?
• If we can identify separate components of the test for the purpose of evaluating cognitive performance, how and indeed do these parts of the location come together in a meaningful sense to form a measure of cognitive performance as a whole?
• What are the specific relationships between the parts of the test we have identified as being separable?

- What are the relationships between the separable parts of the test and the test as a whole?
- Who are the users and what are the characteristics of people taking the test that relate to performance of the test?
- Can a thing called 'cognition' be meaningfully said to exist (does it make sense to think of the cognition as a whole or should we content ourselves with investigating its parts)?
- Can the separate parts of cognition be said to have a coherent existence separate to their existence as a part of the test (does it make sense, and is it a legitimate practice, to investigate individual components of the cognition)?

The above are a few examples of how part-hood raises many questions that a researcher has to at least attempt to answer if they are to design and understand their research project.

Facet theory as an approach is explicitly concerned with part-hood as this is associated with a research domain and it proposes answers to the above question in the form of a mapping sentence for a research area. Facet theory is a categorial approach to research, an outlook on research that considers the categories and sub-categories (together these form the parts) of some aspect, for instance, of a person's existence (the whole in a specific sense). Within the world of research into the lives of human and non-human animals facet theory approaches incorporate philosophical ontologies (at this point we can think of ontology as being the study of the fundamental categories of existence within a specified context) with explicitly stated meaningful mereologies (empirical mereology is the real world study of the part to whole relationships of categories of existence). This book forms an account of the basics of the facet theory analytic approach, its application, and some of its contemporary extensions. However, especially in this second edition, the book lays particular emphasis upon the philosophical, qualitative, and even linguistic aspects of the theory. With this in mind, the book is a research-based reflection upon the development, applied utility and the conceptual underpinnings of facet theory and mapping sentences often as these have been used in my own research. It will become clear as the book progresses that I place considerable emphasis upon the mapping sentence, as, I will argue, the

mapping sentence constitutes what I consider to be the single most important and powerful aspect of the theory. In the text I initially chart the development of the facet theory approach, both as I have used this in my teaching and research over the past three decades, and as used by other academic and research professionals. I also note David Canter's investigative psychology, which was an important advancement in the facet approach (Canter and Youngs 2009) as well as his very recent forays into qualitative facet theory (Canter 2019).

However, as I have stated already, I consider the mapping sentence to be a cardinal aspect of the theory and more specifically in this book, I neoterically propose the mapping sentence as a stand-alone research instrument, and a project management and research presentation tool. Alongside the traditional mapping sentence, I offer the declarative mapping sentence as a template and rationale for qualitative research. This form of mapping sentence is derived from the traditional mapping sentence but has no stipulated outcome variable to guide, and in some cases to shackle, the interpretation of the information gathered. I also promote the stand-alone mapping sentence and the process of facet modelling to expiate some of the difficulties that arise in both traditional facet theory research (e.g., the limited number of facets in a study) and traditional multi-variable research (with its tendency to conduct atheoretical and non-cumulative research). Thus, in the present text, I will bring together contemporary facet theory based research, and suggest future directions the approach may take. At the heart of my suggestions are the propositions that both qualitative and philosophical research can benefit from adopting an orientation towards their research that incorporates facet theory in its extended form of the declarative mapping sentence.

Within this monograph, the broad area of facet theory and basic information about the facet theory approach are reviewed, as are both its applied and more theoretical research perspectives: However, throughout, I emphasise the use of the theory in a qualitative research context. To these ends, examples of the application of the theory are given without statistical formulas or the inclusion of analysis algorithms for formal facet theory analyses (such traditional forms of analysis are statistical: Smallestspace Analysis (SSA), Multidimensional Scalogram Analysis (MSA) or Partial Order Scalogram Analysis (POSA)) as these are more

suited to a very different approach to facet theory to the one I adopt. The monograph takes the form of a research-based narrative rather than being a collection of readings or a formal guide as to how to conduct facet theory research.

This book differs from previously published books on facet theory as it is centred upon the possibilities of qualitative facet theory and the research-based development of the mapping sentence as a stand-alone approach, as a tool to theoretically structure research projects: an approach that guides research design, execution, and analysis. However, my understanding of facet theory does not inevitably employ the analysis of data structure or regional hypotheses implicit in traditional facet theory research (Hackett 2016b).

I also deliberate upon the use of the mapping sentence as a tool for integrating existing and contemporary research that originates from outside of facet theory and I present facet theory and mapping sentence applications to areas of research that are novel to the approach, such as: the development of an understanding of fine art painting (Hackett 2016a) and three-dimensional artwork (Hackett 2017a) with the subsequent production of artwork based upon this taxonomic knowledge. Furthermore, I illustrate the use of a mapping sentence and the theoretical foundations of facet theory with clients within psychotherapeutic situations and as a component of therapeutic interventions, which I call facet mapping therapy (Hackett 2019b).

Reflecting upon an established theory from viewpoints other than those traditionally associated with that theory may avail interesting and useful insight about the established theoretical approach and may assist in extending the approaches utility. An example of this observational 'side-step' is one that may allow the use of methodology from an approach without the constraints of the fully developed theory. Moreover, I opine that by taking a theoretically abbreviated, some would say debased and illegitimate, consideration of a theory it is sometimes possible to develop novel understandings and applications for the established theory. This may also suggest possible applied areas of utility for the relatively theoretical methodology used and perhaps for the 'full-blown' theory itself.

The facet theory approach incorporates the notion that an excellent way in which to produce research findings that are valid and reliable, a

research domain has to be broken down into parts that are significant to its subjects and then these components are pull together as a meaningful whole. The manner in which this mereological understanding of a research domain is broken-down and then reassembled is through clear and explicit establishment of context specific definitional categories. The importance of the employment of such categories is supported by the likelihood that research that proceeds without clearly defined content will at best produce results that are unlikely to contribute to a cumulative and comparable knowledge base in regard to the content. Undertaking research without a clearly defined content may also result in errors of validity and reliability of then research. Within the social sciences facet theory has addressed mereological research deign issues producing categorial definitions for a wide range of research domains allowing the production of research results that explicitly relate to given areas of research, (Hackett 2014a). Facet theory approach to social science research is founded upon the establishment of respondent defined categories and the exploration of how these categories come together within a person's meaningful experiences.

I argue that the most important and indeed unique aspect of facet theory research is the mapping sentence. The mapping sentence has several functions within the approach. For example, the mapping sentence:

- forms as an intricate series of connected hypotheses that form a coherent whole;
- it is a device for interpreting and communicating research results;
- it constitutes an apparatus for enabling comparability and standardisation between research findings.[3]

The mapping sentence is an extremely flexible tool and will form the heart of the treatise I put forward in this book. During my writing, I will elaborate upon how I have used the mapping sentence both within research that has been designed using facet theory as well as in research projects that were not conceived within the facet theory framework. In

---

[3] A mapping sentence may be defined as equivalent to the formal terms of notation found in set theory.

these latter instances, I have developed and used the mapping sentence as a stand-alone theoretical framework through which understanding may be developed about the world of human and non-human animal behaviour. To emphasise the integral role that the mapping sentence plays within a research project that has been designed throughout its whole process, Dov Elizur says:

> The mapping sentence presents the complete research design in the form of a sentence which is easy to comprehend, even without acquaintances with the terminology of set theory.
> Elizur (1970, p. 55)

As well as being easy to understand, the mapping sentence is a means through which the underlying psychological features or variables, or what we may call the constructs, that are the focus of a study may be clarified through the use of facet theory approach, as the facet approach, "provides a systematic way to develop clear theoretical constructs." (Yaniv 2014).[4] The ability to be able to define the constructs in a clear and ambiguous manner is essential when one is attempting to establish the validity of the findings that arise from a research study. This statement is largely self-obvious but often ignored. It is obvious when one considers that a valid statement is one that is addressing or talking about what it is claiming it is addressing and if there is any ambiguity concerning what it is your research is addressing then it becomes impossible to make valid claims on the basis of this research.

Later in this book the process of conceiving of and then constructing a mapping sentence in order to bring clarity to the definition of both constructs and the overall area of a piece of research will be considered in some depth. However, in order to familiarise the reader with a mapping

---

[4] Yaniv (2014) states that "Facet Theory offers a unique perspective on the issue of construct clarity and is particularly suited to bridging the gap, presented by Suddaby (2010), between Eisenhardt (1989) and Dyer and Wilkins (1991) regarding the role of constructs in theory building." Yaniv notes how on Eisenhardt's understanding of a construct these are required parts when building a theory whilst Dyer and Wilkins' conceptions place the construct in a position of emergence from the data gathered. "Faceted definitions of theoretical constructs put together these two views." Yaniv (2014).

sentence it is useful as this point for me to provide some details about how mapping sentences are used.

Using Both Traditional and a Declarative Mapping Sentences

In all forms of a mapping sentence, multiple mutually exclusive categories define the content area of interest. To clarify understanding of what I mean by this statement, I offer an example mapping sentence that I will present in both traditional and declarative forms.

If we imagine that I am interested in analysing the exchanges of ideas that I have had with colleagues about Aristotle's metaphysical writing on *Categories* (Aristotle and Ackrill 1975), I may decide to write a mapping sentence about these exchanges and therefore construct a mapping sentence to account for these exchanges in the following ways. First, I could write a traditional mapping sentence that is an account of how successful I felt that any particular exchange I had had about Aristotle's *Categories* had been:

In the above, I formulated a traditional mapping sentence that would enable me to design a piece of research that was aimed to measure the particular variable of success associated with my experience of communications in regard to this part of Aristotle's scholarship. However, I may instead develop a mapping sentence in its declarative form with does not specify a specific form of output measurement within its content but rather clearly defines the subject matter of the research which may be associated with numerous outcomes or none:

When interpreting a mapping sentence the reader commences as if they were reading an ordinary English language sentence.[5] In the example I provide, the letter (x) designates an individual person who is the subject of the sentence. One then continues by reading through the sentence selecting one of the facet elements (these are the columns of italicised words) from each facet (the emboldened 'facet' names that label the vertical element lists of 'types' of content area) to form a sentence. In the cases

---

[5] Mapping sentences have appeared in languages other than English.

facet (a) **facet (b)**

Person (*x*) being an, {*American*} academic, from the disciplines of, {*philosophy* }

{*British* } {*gender studies*}

{*psychology* }

{*fine art* }

facet (c) **facet (d)**

submits a, {*question* } as part of a dialogue upon, {*categories in general*}

{*statement*} {*Aristotle* }

{*reply* } {*other philosophers* }

facet (e)

with the aim of, {r*esolving a specific problem* } and understand this exchange to

{*growing general knowledge* }

{*for other instrumental reasons*}

range

have been, {o*f greater success*} in terms of their intention within the specific dialogue.

{ *to* }

{*of lesser success* }

Fig. 1.1 Traditional mapping sentence for academic dialogue

facet (a)   **facet (b)**

person (*x*) being an, {*American*}   academic, from the disciplines of, { *philosophy*   }

                        {*British*   }   {*gender studies*}

                                                                            {*psychology*   }

                                                                            {*fine art*   }

facet (c)   **facet (d)**

submits a, {*question* }   as part of a dialogue upon, {*categories in general*}

            {*statement*}   {*Aristotle*   }

            {*reply*   }   {*other philosophers*   }

facet (e)

with the aim of, {r*esolving a specific problem*   }

                  {*growing general knowledge*   }

                  {*for other instrumental reasons*}

Fig. 1.2   Declarative mapping sentence for academic dialogue

of the mapping sentences in Figs. 1.1 and 1.2, the structural content of the mapping sentence enables any one of my exchanges with colleagues to be dissected into its pertinent sub-components (this statement is of course dependent upon the assumption that I have adequately typified all possible exchanges by using the facets and elements that I have selected). When it is read as a sentence, the mapping sentence permits the totality of any communication about the *Categories* that I have had with colleagues to be described and understood. This example mapping sentence is an initial attempt to describe the content area of academic discourse. The declarative mapping sentence in Fig. 1.2 can be understood by the preceding sentence. However, the traditional mapping sentence in Fig. 1.1 has an additional facet: a range facet. Through the inclusion of this facet, I have specified that my interest is focused exclusively upon how successful I understand each communication to have been. By including the range, I also provide a clear statement as to how success in regard to a communication about the should be measured and in this case that is somewhere between being of greater to lesser effectiveness. The range would typically be assigned a numerical value range, such as from 1 to 5. However, by stating a range facet I am limiting my interest to this one way in which a person may react to the content of the communication I am interested in (e.g., the *Categories*). In qualitative research, it is most likely that the researcher will have a broad interest in a person's understanding of the subject matter and will want to gather rich information that is not shackled but the definition of a range facet. In this case, the declarative mapping sentence is the appropriate choice.

Even restricting myself to just the limited number and type of exchanges that may have occurred between my colleagues and I, the mapping sentence and its facets are almost certainly inadequate to fully describe all of the exchanges that occurred. However, a mapping sentence may progress from being a theoretical initial mapping sentence to a full-blown mapping sentence. It achieves this move from being a hypothesis of a content area to become a 'valid' representation of a content area through rigorous scholarship and often empirical investigation. Facets and their elements are added, deleted and have elements added or elements deleted, as these parts of the mapping sentence are pertinent to the area of inquiry. For example, *facet a* in the example mapping sentences in

Figs. 1.1 and 1.2 is a facet that embodies the country of origin of a participating academic from whom I engaged with in a communication. This facet has two elements: British and American. After examining the data that has arisen from the content area the mapping sentence defines (in this example, academic exchange) it may be apparent that country of origin does not have an important effect in the exchanges. Therefore, this facet may be deleted from the mapping sentence. However, we may feel that other descriptive facets may be pertinent influences upon our data. For example, we may come to believe that the type of institution a person works at is an important facet (here the elements may be community college, research university, new university, Red-Brick, etc.). In this instance, this facet, with its appropriate elements, would be incorporated into the mapping sentence and evidence sought to justify their inclusion. Facet elements are treated in a similar fashion and added or deleted on the basis of their explanatory utility to the subject area of the mapping sentence.

It is important to note that the mapping sentences in my example are hypothetical descriptions of the academic discourse content area. In research that utilises a mapping sentence approach, existing research literature is examined to identify the usefulness and applicability of mapping sentence that have been developed and used in published research. When such a mapping sentence is discovered, it may then be used to design subsequent studies. Furthermore, if after a literature search it is found that no mapping sentence exists for the area with which you are concerned it is possible to look at research that does not use a mapping sentence or facet theory in its design. Such publications may be inspected to see if a theoretical structure for pertinent aspects of the research or variables are present which may be adapted and incorporated to form the basis for an initial mapping sentence. It is therefore important to note that mapping sentences may therefore be used within an overarching conception of facet theory or they may be employed as stand-alone instruments for guiding and interpreting research that is concerned with complex situations or events.

Conclusions

In this chapter, I have briefly introduced both facet theory and mapping sentences whilst at the same time illustrating the two forms of mapping sentence. I have also distinguished between these two mapping sentence types (declarative and traditional mapping sentence) in terms of their applicability to qualitative and quantitative forms of research. In this first chapter, I have offered a consideration of some attempts that have been made to understand complex human behaviour in both a quantitative and qualitative sense. In the second chapter, this understanding is enhanced by drawing upon research in the areas of philosophy, metaphysics, ontology, mereology, neuroscience, psychology, and other select areas. The pervasive human characteristic or predisposition of making and using categories of objects and events will be considered. Furthermore, I review how categories are employed as a means to allow the simplification of the perceptual process, and the way in which animals (both human and non-human) understand their worlds. Facet theory and the mapping sentence are defined as category analysis procedures.

Selected Further Reading

Borg, I., & Shye, S. (1995). *Facet Theory: Form and Content* (Advanced Quantitative Techniques in the Social Sciences Series). Thousand Oaks, CA: Sage Publishers.

Canter, D. (Ed.). (1985). *Facet Theory: Approaches to Social Research*. New York: Springer Verlag.

Hackett, P. M. W. (2014). *Facet Theory and the Mapping Sentence: Evolving Philosophy, Use and Application*. Basingstoke: Palgrave Macmillan Publishers.

Hackett P. M. W. (2016b). Facet Theory and the Mapping Sentence As Hermeneutically Consistent Structured Meta-Ontology and Structured Meta-Mereology. *Frontiers in Psychology*, section Theoretical and Philosophical Psychology*, 7*, 471. https://doi.org/10.3389/fpsyg.2016.00471

Hackett, P. M. W. (2017). A Mapping Sentence for Understanding the Genre of Abstract Art Using Philosophical/Qualitative Facet Theory. *Frontiers in Psychology, 8*, 1731.

Hackett, P. M. W. (2018). Declarative Mapping Sentence Mereologies: Categories From Aristotle to Lowe. In P. M. W. Hackett (Ed.), *Mereologies, Ontologies and Facets: The Categorial Structure of Reality* (pp. 135–160). Lanham, MD: Lexington Publishers.

Hackett, P. M. W. (2020). *Declarative Mapping Sentences in Qualitative Research: Theoretical, Linguistic, and Applied Usages*. London: Routledge.

Hackett, P. M. W., & Fisher, Y. (Eds.). (2019). *Advances in Facet Theory Research: Developments in Theory and Application and Competing Approaches*. Lausanne, Switzerland: Frontiers Media SA.

Levy, S. (1976). Use of the Mapping Sentence for Coordinating Theory and Research: A Cross-cultural Example. *Quality and Quantity, 10*(2), 117–125.

Shye, S. (Ed.). (1978). *Theory Construction and Data Analysis in the Behavioral Sciences*. San Francisco: Jossey-Bass Publishers.

Shye, S., Elizur, D., & Hoffman, M. (1994). *Introduction to Facet Theory: Content Design and Intrinsic Data Analysis in Behavioral Research* (Applied Social Research Methods Series) (Vol. 35). Thousand Oaks, CA: Sage Publishers.

Tziner, A. E. (1987). *The Facet Analytic Approach to Research and Data Processing*. New York: Peter Lang.

References

Aristotle, & Ackrill, J. L. (translator) (1975). *Aristotle's Categories and de Interpretatione*. Oxford: Oxford University Press.

Berlin, I. (2013). *Concepts and Categories: Philosophical Essays*. Princeton University Press.

Borg, I., & Shye, S. (1995). *Facet Theory: Form and Content* (Advanced Quantitative Techniques in the Social Sciences Series). Thousand Oaks, CA: Sage Publishers.

Canter, D. (Ed.). (1985). *Facet Theory: Approaches to Social Research*. New York: Springer Verlag.

Canter, D. (2019). Qualitative Structural Theory: A Basis for Decision- Making. *International Studies of Management & Organization, 49*(3), 265–282. https://doi.org/10.1080/00208825.2019.1627705.

Canter, D., & Youngs, D. (2009). *Investigative Psychology: Offender Profiling and the Analysis of Criminal Action*. New York: Wiley.

Cartwright, N. (2014). Causal Inference. In N. Cartwright & E. Montushi (Eds.), *Philosophy of Social Science: A New Introduction* (pp. 308–326). Oxford: Oxford University Press.

Dancer, S. (1990). Introduction to Facet Theory and its Application. *Applied Psychology: An International Review, 39*, 365–377.

Dyer, W. G., & Wilkins, A. L. (1991). Better Stories, Not Better Constructs, to Generate Better Theory: A Rejoinder to Eisenhardt. *Academy of Management Review, 16*, 613–619.

Eisenhardt, K. M. (1989). Building Theories from Case Study Research. *Academy of Management Review, 14*, 532–550.

Elizur, D. (1970). *Adaptation to Innovation: A Facet Analysis of the Case of the Computer*. Jerusalem: Jerusalem Academic Press.

Guttman, L. (1954). A New Approach to Factor Analysis: The radex. In P. Lazarsfield (Ed.), *Mathematical Thinking in the Social Science* (pp. 258–348). New York: Columbia University Press.

Hackett, P. M. W. (2014a). *Facet Theory and the Mapping Sentence: Evolving Philosophy, Use and Application*. Basingstoke: Palgrave Macmillan Publishers.

Hackett, P. M. W. (2014b). An Integrated Facet Theory Mapping Sentence Descriptive Model of Contextual and Personal Life-Elements Associated with Students' Experiences of Studying Abroad. *Journal of International Students, 4*(2), 163–176.

Hackett, P. M. W. (2016a). *Psychology and Philosophy of Abstract Art: Neuro-aesthetics, Perception and Comprehension*. Basingstoke: Palgrave Macmillan Publishers.

Hackett, P. M. W. (2016b). Facet Theory and the Mapping Sentence As Hermeneutically Consistent Structured Meta-Ontology and Structured Meta-Mereology. *Frontiers in Psychology*, section Theoretical and Philosophical Psychology*, 7*, 471. https://doi.org/10.3389/fpsyg.2016.00471

Hackett, P. M. W. (2017a). *The Perceptual Structure of Three-Dimensional Art, Springer Briefs in Philosophy*. New York: Springer.

Hackett, P. M. W. (2017b). Opinion: A Mapping Sentence for Understanding the Genre of Abstract Art Using Philosophical/Qualitative Facet Theory. *Frontiers in Psychology*, section Theoretical and Philosophical Psychology*, 8*, October. https://doi.org/10.3389/fpsyg.2017.01731

Hackett, P. M. W. (Ed.). (2018a). *Mereologies, Ontologies and Facets: The Categorial Structure of Reality*. Lanham, MD: Lexington Books.

Hackett, P. M. W. (2018b). Declarative Mapping Sentence Mereologies: Categories From Aristotle to Lowe. In P. M. W. Hackett (Ed.), *Mereologies,*

Ontologies and Facets: The Categorial Structure of Reality (pp. 135–160). Lanham, MD: Lexington Publishers.

Hackett, P. M. W. (2019a). *The Complexity of Bird Behaviour: A Facet Theory Approach*. Cham, CH: Springer.

Hackett, P. M. W. (2019b). Facet Mapping Therapy: The Potential of a Facet Theoretical Philosophy and Declarative Mapping Sentences within a Therapeutic Setting. *Frontiers in Psychology*, section Psychology for Clinical Settings. https://doi.org/10.3389/fpsyg.2019.0122

Hackett, P. M. W. (2019c). Declarative Mapping Sentences as a Co-ordinating Framework for Qualitative Health and Wellbeing Research. *Journal of Social Science & Allied Health Professions, 2*(1), E1–E6.

Hackett, P. M. W. (2020a). *Declarative Mapping Sentences in Qualitative Research: Theoretical, Linguistic, and Applied Usages*. London: Routledge (In Press)

Hackett, P. M. W. (2020b). The Declarative Mapping Sentence as a Framework for Conducting Ethnographic Health Research, In P. M. W. Hackett, & C. Hayre (eds.), *Handbook of Ethnography in Healthcare Research*. Routledge (In Press).

Hackett, P. M. W., Sepulveda, J., & McCarthy, K. (2011). Improving Climate Change Education: A Geoscientifical and Psychological Collaboration. In *New horizons for Facet Theory: Interdisciplinary Collaboration Searching for Structure in Content Spaces and Measurement* (pp. 219–226). FTA Publication.

Hackett, P. M. W., Shaw, R., Boogert, N., & Clayton, N. (2019). A Facet Theory Analysis of the Structure of Cognitive Performance in New Zealand Robins (Petroica longipes). *International Journal of Comparative Psychology, 32*, 40605.

Hacking, I. (1992). "Style" for Historians and Philosophers. *Studies in the History and Philosophy of Science Part A, 23*(1), 1–20.

Hegel, G. (2010). *The Philosophy of History*. Whitefish, MT: Kessinger Publishing, LLC.

Koval, E., & Hackett, P. M. W. (2016). Hermeneutic Consistency, Structured Ontology and Mereology as embodied in Facet Theory and the Mapping Sentence. In *Proceedings of the 15th International Facet Theory Conference*.

Koval, E. M., Hackett, P. M. W., & Schwarzenbach, J. B. (2016). Understanding the Lives of International Students: A Mapping Sentence Mereology. In K. Bista & C. Foster (Eds.), *International Student Mobility, Services, and Policy in Higher Education*. IGI Global Publishers.

Leibniz, G. W. (2013). *The Leibniz-De Volder Correspondence: With Selections from the Correspondence Between Leibniz and Johann Bernoulli* (The Yale Leibniz Series) (P. Lodge, Trans.), New Haven, CT: Yale University Press.

Levy, S. (1976). Use of the Mapping Sentence for Coordinating Theory and Research: A Cross-cultural Example. *Quality and Quantity, 10*(2), 117–125.

Levy, S. (1985). Lawful Roles of Facets in Social Theories. In D. Canter (Ed.), *Facet theory: Approaches to Social Research*. New-York: Springer.

Levy, S. (1990). The Mapping Sentence in Cumulative Theory Construction: Well-being as an Example. In J. J. Hox & G. de Yong (Eds.), *Operationalization and Research Strategy* (pp. 155–177). Amsterdam: Swetz & Zeitlinger.

Levy, S. (2005). Guttman Louis. *Encyclopaedia of Social Measurement, 2*, 175–187.

Lou, L., & Hackett, P. M. W. (2018). Qualitative Facet Theory and the Declarative Mapping Sentence, Contemporary Data Interpretations: Empirical Contributions in the Organizational Context. In *Organization 4.1: The role of values in Organizations of the 21st Century*. ISSWOV.

Lustig, K., & Hackett, P. M. W. (2020a). *Mapping Sentence Pocket Guide*. San Francisco: Blurb Publishing.

Lustig, K., & Hackett, P. M. W. (2020b). *Philosophy of Facet Theory Pocket Guide*. San Francisco: Blurb Publishing.

Rescher, N. (1991). *G. W. Leibniz's Monadology: An Edition for Students*. Pittsburgh: University of Pittsburgh Press.

Schwarzenbach, J. B., & Hackett, P. M. W. (2015). *Transatlantic Reflections on the Practice-Based Ph.D. in Fine Art*. New York: Routledge Publishers.

Shye, S., Elizur, D., & Hoffman, M. (1994). *Introduction to Facet Theory: Content Design and Intrinsic Data Analysis in Behavioral Research* (Applied Social Research Methods Series) (Vol. 35). Thousand Oaks, CA: Sage Publishers.

Suddaby, R. (2010). Editor's Comment: Construct Clarity in Theories of Management and Organization. *Academy of Management Review, 35*, 346–357.

Tziner, A. E. (1987). *The Facet Analytic Approach to Research and Data Processing*. New York: Peter Lang.

Yaniv, E. (2014). Faceted Definitions. In A. C. Michalos (Ed.), *Encyclopaedia of Quality of Life and Well-Being Research*. Dordrecht: Springer.