CHAPTER 4

Creating Questions

> "Alright," said Deep Thought. "The Answer to the Great Question…"
> "Yes…!"
> "Of Life, the Universe and Everything…" said Deep Thought.
> "Yes…!"
> "Is…" said Deep Thought, and paused.
> "Yes…!"
> "Is…"
> "Yes…!!!…?"
> "Forty-two," said Deep Thought, with infinite majesty and calm.
>
> Adams (2017, p. 180)

All human knowledge is anchored in human activity, and, without it, knowledge becomes meaningless. In *The Hitchhiker's Guide to the Galaxy* (Adams, 2017), a science fiction novel, the supercomputer Deep Thought is asked the ultimate question: What is the meaning of life, the universe, and everything? After computing for over seven million years, Deep Thought produces the answer: forty-two. An absurd answer to a fundamentally flawed question. The question is too ambitious. The question and answer are meaningless because they are not anchored in any frame of reference, such as a human interest (see Chapter 9). Thus, there is no criteria for assessing the answer.

In Chapter 3, we conceptualized theory as a tool (i.e., map or model) that enables human activity. Theories can thus be evaluated in terms of the activity enabled (or disabled). The question is not "what is the best map in absolute terms?" but rather "what is the best map for getting from A to B?" Without knowing what we are trying to do, or where we are trying to go, building a model is meaningless. What does the theory-as-tool enable us to do? What do we want the theory to enable us to do? And how can we find a theory that can enable us to do something new and exciting? More fundamentally, what is our interest in the world, and how should we convert this into guiding research questions?

The guiding proposal for this chapter is that *research is as much about creating questions as answering questions.* Most research methodology is focused on answering questions, yet, often, the most significant scientific breakthroughs (especially in social science) are characterized by asking new questions. The routine operation of science, what Kuhn (1962) characterized as "normal science," entails routine work on unsurprising questions that refine understanding within a paradigm. However, scientific breakthroughs, which Kuhn (1962) characterized as "revolutionary science," entail asking new questions, which launch science in a new direction. But where do these exciting new questions come from?

In this chapter, we examine the types of questions that guide research, distinguishing qualitative and quantitative questions. We differentiate between inductive, deductive, and abductive questions. Then, we consider how new questions arise: the role of data, logic, and human creativity. We conclude the chapter with pragmatist heuristics for creating insightful and useful research questions.

4.1 Qualitative versus Quantitative Research

Human interests are operationalized in research through questions. The research question expresses the will to know and do. Methodologies, both qualitative and quantitative, are tools for addressing questions. So what is the relationship between questions and methods? What is the range of possible questions? And which methods are best suited for which type of questions?

4.1.1 Incommensurable Paradigms?

It has been argued that qualitative and quantitative methods are incommensurable. Qualitative research focuses on contextualized meanings and interpretation, whereas quantitative research focuses on decontextualized variables and statistics (Coxon, 2005; Flick, 2002; Morgan, 2007; Power et al., 2018). Each makes a different assumption about what should be studied: measurable quanta for quantitative methods and interpretable qualia for qualitative methods (Shweder, 1996). One benefit of this incommensurability argument is that it has enabled the development of qualitative methods with tailored quality criteria (Bauer & Gaskell, 2000). As a result, the field of qualitative research has burgeoned to address questions that are beyond the scope of quantitative methods. To ignore these differences, to try and reduce one approach to the other, would be to ignore the added value of each method (Denzin, 2012).

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The strong incommensurability argument maintains that qualitative and quantitative methods stem from fundamentally different paradigms. Quantitative methods stem from realist and postpositivist paradigms, while qualitative methods stem from more constructionist paradigms (Guba & Lincoln, 1994). Building on this epistemological alignment, some authors have argued that mixed methods stem from a pragmatist paradigm (Feilzer, 2010; Morgan, 2007).

However, the incommensurability argument should not be overstated. Epistemology does not determine method; one can conduct realist qualitative research and constructionist quantitative research (Onwuegbuzie & Leech, 2005). Furthermore, focusing on what is actually done reveals that qualitative data are often analyzed quantitatively and quantitative results often require qualitative interpretation. Exceptions to any claimed essential differences abound. Qualitative research often makes frequency claims (e.g., "most participants," "some interviewees," "rarely observed"). Equally, quantitative research often hinges on qualitative assessments of validity (e.g., face validity, expert raters, human-labeled gold standard data). Accordingly, the qualitative/quantitative distinction has been described as incoherent and misleading (Krippendorff, 2019; Sinclair & Rockwell, 2016). At best, the terms "qualitative" and "quantitative" refer to family resemblances, and at worst, they are intergroup affiliations (Coxon, 2005). In either case, the idea of incommensurability is a barrier to mixed methods research (Morgan, 2007) that undermines the credibility of social science research (Onwuegbuzie & Leech, 2005). Mixed methods research argues that qualitative and quantitative methods are not incommensurable despite providing different insights. Indeed, they can be combined in nonduplicative and genuinely synergistic ways precisely because they serve distinct purposes.

A pragmatist approach contributes to differentiating qualitative and quantitative research by recognizing that each method addresses different questions. In one sense, the methods are incommensurable because they do different things and address different questions. A quantitative question about whether there is a between-group difference on a measure cannot, or at least should not, be tackled using qualitative methods. Equally, a qualitative question about how people pragmatically close conversations does not afford a quantitative approach. Nonetheless, despite this incommensurability of purpose, qualitative and quantitative methods are commensurable in other ways. Precisely because they do different things, they are chained together to ask sequences of questions (see Chapter 6). For example, the question "what is it?" and "how frequent is it?" are qualitative and quantitative questions that are nonduplicative and that synergize together.

4.1.2 The Integration Challenge

The core challenge of mixed methods theory is to conceptualize how qualitative and quantitative methods can be combined to produce insights that are not reducible to either method (Fetters & Freshwater, 2015a). This "integration challenge" goes beyond the idea that one has to choose either a qualitative-constructionist or quantitative-realist paradigm (Brown & Dueñas, 2020). Instead, it shifts the focus onto how methods can be productively combined. Addressing the integration challenge is essential for legitimating mixed methods research as adding value beyond what qualitative and quantitative research can do alone (Johnson et al., 2007) and creating guidance for mixed methods researchers to maximize synergies.

A foundational concept for theorizing integration is the metaphor of triangulation (Denzin, 1970). In navigation and geographic survey work, triangulation refers to calculating an unknown point by drawing a triangle with two known points and then using trigonometry to calculate the unknown location. When applied to qualitative and quantitative methods, the idea is that the findings from each method are compared for either validation or enrichment (Hussein, 2009; Moran-Ellis et al., 2006). Triangulation for validation assumes that the results common to both methods have high validity. Triangulation for enrichment assumes that the results found with only one method are not necessarily low in validity but, rather, may reflect a different aspect of (or perspective on) the phenomenon. Validation is duplicative (both methods converge), while enrichment is additive (each method contributes something different).

However, the concept of triangulation has received criticism for being a relatively static geometric metaphor (Fetters & Molina-Azorin, 2017a). The idea of triangulation fails to capture the generative and dynamic aspects of mixing methods. For example, in a review of mixed methods research Boeije and colleagues (2013) found that in addition to validation (e.g., for instrument development) and enrichment (e.g., by providing illustrations and nuance), mixed methods studies often enabled speculating about underlying mechanisms and generating plausible theories. That is to say, integrating (rather than triangulating) methods can reveal contradictions (Greene et al., 1989) and puzzling discrepancies (Bryman, 2006) that spur theory-building.

The core rationale for mixing methods is that it should add value beyond what either method can contribute alone (Fetters & Freshwater, 2015a). The challenge is to specify the relationships between the methods, data, and findings so that the synergy is more than accidental (Moran-Ellis

et al., 2006). To this end, Fetters and Molina-Azorin (2017b) identified fifteen dimensions of possible integration, including philosophical, theoretical, researcher, team, literature, sampling, design, research aims, data collection, analysis, and interpretation (see also Schoonenboom & Johnson, 2017). These insights direct attention toward the nodal points at which integration occurs, thus potentially isolating how integration can yield more than the sum of the parts (Åkerblad et al., 2021).

4.1.3 A Pragmatist Approach

A pragmatist approach can conceptualize not only how qualitative and quantitative methods are different but also why integrating them can be synergistic. While other paradigms bring into focus social justice (the transformative paradigm; Mertens, 2007) and compatibility (critical realism; Shannon-Baker, 2016), the pragmatist paradigm emphasizes the research purpose (i.e., what they actually achieve via research questions, hypotheses, aims, goals, and objectives).

At its core, pragmatism is a method for making ideas clear and distinct by focusing on their consequences (Peirce, 1878). Since the birth of philosophy, there have been debates about the meaning of truth, beauty, God, and so on. The tendency has been to rely on axioms and first principles. Pragmatism eschews this approach, instead grounding meaning, and by extension philosophy and science, in human activity. According to James (1907, p. 22), it entails "looking away from first things, principles, 'categories', supposed necessities; and of looking towards last things, fruits, consequences." For pragmatism, all beliefs, theories, and ideas are guides for action (Cornish & Gillespie, 2009). Simply put, meaning lies in consequences. The meaning of a bike is cycling; the meaning of food is eating; and, by extension, the meaning of a research method is in what it does.

Pragmatism is particularly suited to mixed methods research because it values each method for its contribution (Morgan, 2007). Thus, it offers an alternative to postpositivism and constructionism (Feilzer, 2010). Pragmatism is inclusive because, in the words of James (1907, p. 31), it has "no obstructive dogmas, no rigid cannons of what shall count as proof" and "will consider any evidence." Instead of asking whether methods are epistemologically commensurable, pragmatism asks what each method contributes to the problem at hand. "Pragmatists," Feilzer (2010, p. 14) writes, "do not 'care' which methods they use as long as the methods chosen have the potential of answering what it is one wants to know."

A pragmatist approach can contribute to the integration challenge. Instead of focusing on the rationales for mixed methods research in general (i.e., validating, enriching, developing, explaining), the pragmatist approach directs attention to the underlying qualitative and quantitative purposes, specifically to how these are combined. Thus, in contrast to the many typologies that differentiate qualitative and quantitative methods (Coxon, 2005; Sale et al., 2002), we focus on what these methods are used for within the broader logic of the research (see also Denscombe, 2021). Our aim is not to characterize qualitative and quantitative methods according to essential criteria or even identify family resemblances (Morgan, 2018). We aim to differentiate qualitative and quantitative methods in terms of what they are used for.

4.2 Differentiating Qualitative and Quantitative Research Questions

Charles Saunders Peirce (1955) identified three types of inference: induction, deduction, and abduction. Induction is based on learning from empirical observation, deduction is based on using prior experience and theories, and abduction entails speculating about possible theories. Induction seeks unbiased observation, deduction seeks logical consistency, and abduction seeks explanation. Peirce (1955) argued that all reasoning, whether in daily life or science, comprises an interplay of these three elementary forms of inference. For example, to address a problem, one usually needs to attend to particularities (induction), utilize prior experience (deduction), and make creative leaps (abduction).

Peirce's (1955) three inference types provide a framework for conceptualizing the breadth of possible research questions. Table 4.1 uses induction, deduction, and abduction to conceptualize qualitative and quantitative research purposes. There are three purposes for both qualitative (describing phenomena, theoretical framing, generating explanations) and quantitative (measuring phenomena, testing hypotheses, exploring associations) methods, and each has distinguishable questions, contributions, and indicative analyses. This typology is meant to be prescriptive rather than descriptive; it identifies what each method should be used for. Researchers can conceivably address any question with any method, but good research entails matching the method to the question (Bauer & Gaskell, 2000). This typology attempts to match recommended purposes, questions, and indicative analyses. The following subsections describe each inference type and the associated qualitative and quantitative purposes.

Table 4.1 *Typology of qualitative and quantitative research purposes*

		Induction Observing with limited theory	**Deduction** Expecting based on a theory	**Abduction** Creating new theory
Qualitative	Purpose	Describing phenomena	Theoretical framing	Generating explanations
	Questions	What is X? How do they do X? What happened? What is the experience of X? What are the marginalized views?	Does idea X provide insight? Does X occur as expected in context Y? Is X different because of Y? Does typology X fit the data? Do cases differ as expected?	Why is X? What might cause X? Why was X not present? How might X change if Y? What process might underlie X?
	Contributions	Detailed descriptions, categories, summaries, particulars, actors' accounts, subjective experiences	A lens for viewing the data, linkages between observation and the literature, categorizations based on the literature	Explanations, research questions, novel theory, new hypotheses, synthesizing insights
	Analyses	Thematic analysis, grounded theory, interpretive phenomenological analysis, thick description	Conversation analysis, dialogical analysis, theoretically motivated observation, comparative case studies	Abductive analysis, root-cause analysis, investigating outliers, problematizing, explanatory case studies
Quantitative	Purpose	Measuring phenomena	Testing theory	Exploring explanations
	Questions	Is measure X reliable and valid? How frequent is X? Does X change over time? What are the attitudes toward X? What statistical model of X emerges?	Is X associated with Y? Does Z mediate the association? Does Y predict X? Does manipulation Y increase X? Do the data fit model X?	What is associated with X? Does anything predict X? Might Y cause these clusters? Are there any possible mediators? Is a confounding variable missing?
	Contributions	Frequencies, descriptive statistics, differences, changes over time, clustered data, data-driven models	Associations, predictors, probabilities, causal evidence, statistical evidence for/against a theory	Plausible relationships, new hypotheses, multivariate visualizations, research questions, predictions, potential causes
	Analyses	Quantification, descriptive exploratory data analysis, content analysis, attitude measurement, exploratory factor analysis, unsupervised modeling	Null hypothesis testing, one-tailed tests, Bayesian inference, experiments, confirmatory factor analysis, simulations, tests on out-of-sample data	Correlation tables, heatmaps, speculative data analysis, within sample statistical modeling

4.2.1 Inductive Questions

Induction entails moving from the observation of regularities to a general statement. For example, if one observes a class in session every Monday at noon in room 1A, one infers the rule that there is always a class on Mondays at noon in room 1A. Induction is quintessentially empirical. The prototypical case is that, given previous observations, one infers that the sun always rises in the east. Induction starts with observation and builds theory bottom-up, remaining as close as possible to the data. Inductive research can be either qualitative or quantitative.

Describing Phenomena. Qualitative inductive research contributes thick description, using words to richly document a phenomenon, including its variants and relation to context. It often entails understanding the subjective world of others. Qualitative inductive questions include: What is X? How do they do X? What is the experience of X? Contributions to these questions are evaluated in terms of the subtlety of the description, reflexivity in observation, and participation of the researched. Ideally, the observations form an interlocking web that richly conveys what happened, people's beliefs and practices, and subjective experiences.

Measuring Phenomena. Quantitative inductive research focuses on measuring observables and abstract constructs using counts, ranks, and scaled scores. Measurement necessarily makes theoretical assumptions about the phenomenon (e.g., identifying valid observable indicators of a phenomenon, determining the most appropriate type of measurement), but it aims to foreground the phenomenon rather than the theory. Measuring questions include: Is measure X reliable and valid? How frequent is X? What statistical model of X emerges? Contributions to these questions are usually evaluated in terms of operationalization, sampling, reliability, and validity. Ideally, a measure captures what it claims to measure and can be generalized to a population.

Inductive research is often devalued as merely descriptive (Gerring, 2012). But detailed observation is the basis of science (Rozin, 2009). When we encounter a strange object, we look at it from different angles, pick it up, and squeeze it to ground our emerging understanding in empirical experiences (Blumer, 1969). Preconception is a liability for induction, potentially suppressing peculiarity (Feyerabend, 2001). The aim is to be "open" to the data, to be sensitive to peculiarity, and to be willing to be surprised. Science without induction would produce concepts disconnected from experience. But science based only on induction would cease to have bold and ambitious theories.

4.2.2 *Deductive Questions*

Deduction entails moving from a general statement, or assumption, to a logically implied conclusion. For example, knowing the finding that classes have been observed in room 1A on Mondays at noon, one expects this to be the case next Monday at noon. The quintessential deduction is a syllogism. All men are mortal (first premise), Socrates is a man (second premise), and therefore, Socrates is mortal (conclusion). Given the theory (first premise) and the observation (second premise), one can deduce the empirically verifiable hypothesis that Socrates will eventually die. Deduction is rationalist; it is what Descartes used to argue that his own doubting was indubitable. Deductive research starts with expectations based on the literature (given X and Y we expect Z) and logic (theory A predicts X, but theory B predicts Y; which is right?). Again, it has both qualitative and quantitative variants.

Theoretical Framing. Qualitative deductive research entails using theory to frame or guide inquiry. Framing uses theory as a conceptual lens, sensitizing the researcher to observable, but conceptual, phenomena. It includes, for example, using theories of conversation, impression management, or nonverbal behavior to analyze a face-to-face interaction. Typical framing questions include: Does idea X provide insight? Does typology X fit the data? Do cases differ as expected? Contributions to these questions are evaluated in terms of how suited the theory is to the phenomenon, whether the framing produces insight, and whether the theory is being overextended, oversimplified, or overly imposed.

Testing Hypotheses. Quantitative deductive research focuses on testing, namely, using theory (i.e., the literature) to specify an expectation that can be compared to observations. The classic case is null hypothesis testing, where a falsifiable statement about the relationship between variables is stated before the research is conducted and then statistics are used to calculate the likelihood of the observed results. Typical testing questions include: Is X associated with Y? Does Z mediate the association? Do the data fit model X? Contributions to these questions are evaluated in terms of the logic that leads to the expectation, priors, operationalization, and potentially confounding variables.

Deductive research is a mainstay of qualitative and quantitative research (Scheel et al., 2020; Tavory & Timmermans, 2014). Deduction is powerful because it leverages the literature (previous studies and theories) so that the research does not start anew but builds on prior insights. We see farther than our predecessors not because we have better vision but because we stand upon their shoulders (John of Salisbury, 1159). Science

without deduction would cease to be cumulative. But science based only on deduction would yield deductions entirely disconnected from practical experience.

4.2.3 Abductive Questions

Abduction entails reasoning from observation and prior expectations to forge a new theory beyond both. For example, observing a class in room 1A on Mondays at noon but finding that there is no class on a particular Monday at noon, one generates the plausible explanation that there might be something called a "timetabling department" that has changed the rules or a thing called "term time" that suspends the rule. In either case, abduction explains the anomaly by introducing an idea outside the data (i.e., the timetabling department, term time). Abduction often begins with a disruptive fact or contradiction (Tavory & Timmermans, 2014); the outcome is an explanation that, although not in the data, explains the data. Einstein's theory of general relativity explained observables with nonobservables (i.e., spacetime). Darwin's theory of evolution postulated a mechanism he did not observe (i.e., natural selection). What makes abduction inferential (rather than unconstrained imagination) is that a "hypothesis cannot be admitted, even as a hypothesis, unless it be supposed that it would account for the facts" (Peirce, 1955, p. 151).

> A mass of facts is before us. We go through them. We examine them. We find them a confused snarl, an impenetrable jungle. We are unable to hold them in our minds. We endeavor to set them down upon paper; but they seem so multiplex intricate that we can neither satisfy ourselves that what we have set down represents the facts, nor can we get any clear idea of what it is that we have set down. But suddenly, while we are poring over our digest of the facts and are endeavoring to set them into order, it occurs to us that if we were to assume something to be true that we do not know to be true, these facts would arrange themselves luminously. That is abduction. (Peirce, 1992, pp. 531–532)

Generating Explanations. Qualitative abductive research is widespread and aims to generate explanations and theories (Power et al., 2018). Being close to raw data, observing particularities, and being relatively free to approach the phenomenon from multiple theoretical standpoints make qualitative research fertile soil for generating plausible explanations (Tavory & Timmermans, 2014). Typical questions include: Why is X? What might cause X? What process might underlie X? Contributions to these questions are not judged by the logic of derivation (deduction) or by the rigor

of the process (induction). It does not matter if the abductive leap occurs while lucid dreaming or sitting in the bath; what matters is whether it aids understanding, chimes with prior theories, explains the puzzling observations, and yields productive lines of action.

Exploring Explanations. Quantitative abductive research aims to stimulate ideas by exploring relationships within data. Although often undervalued relative to hypothesis testing, exploring the associations between measures can spur the creation of new hypotheses firmly grounded in data (Tukey, 1977). Typical exploring questions include: What is associated with X? Does anything predict X? Is a confounding variable missing? Contributions to these questions, as with qualitative abduction, are evaluated not in terms of the rigor of the observations or the logic of the deduction but in the fruitfulness of the emergent insights.

Abductive research has received little theorization, possibly because it entails a creative leap outside standardizable procedures (Tavory & Timmermans, 2014). However, induction and deduction are insufficient to explain most scientific breakthroughs in the natural (e.g., heliocentrism, theory of natural selection, dark matter, the structure of the double helix) or social (e.g., equality, feminism, power, impression management, ideology, culture) sciences. Abduction is aided by sensitivity to contradictions and anomalies, and openness to revising one's expectations. In short, abduction thrives when there is a puzzle to solve. Science without abduction would cease to have revolutions. But science built solely on abduction would perpetually introduce new ideas without any criteria for evaluating them.

4.2.4 Matching Questions to Methods

A pragmatist approach to research questions starts with the insight that methods are tools for action. Instead of trying to distinguish methods from first principles, methods are differentiated in terms of their research purposes.

The typology in Table 4.1 guides when to use qualitative, quantitative, and mixed methods. Scholars have characterized differences in epistemology (Denzin, 2012) and subject matter (Shweder, 1996) and distinguished family resemblances (Coxon, 2005; Morgan, 2018). But we propose a contingency table of when to use qualitative, quantitative, and mixed methods. Qualitative methods can describe phenomena, provide theoretical framing, and generate explanations. Quantitative methods can measure phenomena, test hypotheses, and search for explanations. Mixed methods

are necessary when research benefits from multiple purposes (e.g., describing a phenomenon to measure it better, generating hypotheses about why an experiment produced surprising results). Differentiating these purposes can guide researchers in selecting suitable methods for the problem they are addressing. This can help researchers avoid the "methodological monologic" described by Bauer and Gaskell (2000, p. 338):

> The hammer is not well indicated for certain tasks – repairing a water pipe, for example. The skillful person will select the appropriate tool for the particular task. But if the person only knows how to handle the hammer, then all problems of fixing things in the household become a matter of hammer and nail. This implies that proper indication necessitates the awareness of and competence in using different methodological tools. To transform every piece of social research into a set of interviews or a discourse analysis, or for that matter an experiment, is to fall into the trap of methodological monologic.

Differentiating qualitative and quantitative methods in this way gives each method a separate domain of legitimacy. From this standpoint, asking whether qualitative methods are better than quantitative methods, or vice versa, is like asking whether a hammer is better than a saw. It depends on what you want to do. Moreover, to assume that social science can get by with only one of these methods is to dismiss an entire row of indicative questions in Table 4.1. Both qualitative and quantitative methods are legitimate because they are the best tools we currently have for specific purposes.

4.3 Heuristics for Creating Questions

Popper (1934) influentially separated the context of discovery (creating hypotheses) from the context of justification (testing hypotheses). He argued that the philosophy of science and epistemology related only to the context of justification. "The act of conceiving or inventing a theory," Popper (1934, p. 7) wrote, "seems to me neither to call for logical analysis nor to be susceptible to it." Popper's focus was on theory testing, and specifically falsifying a theory, without concern for how the theory was created. This influential view has created a huge gap in the literature. While the literature on hypothesis testing fills many library aisles, there are only a handful of publications on creating questions worth testing. However, creating questions is central to scientific progress, especially paradigm shifts.

The gap in the literature is, perhaps, as much a function of a lack of progress as of willful neglect. As Jaccard and Jacoby (2020, p. 52) write,

in a book on creating theory, "there is no simple strategy for generating good ideas or explanations." Despite several academics tackling question creation, no eloquent theory or multistep procedure can guide researchers infallibly toward a profound insight.

A pragmatist approach is comfortable with this uncertainty (Rorty, 1989). Instead of any guarantees of insight, we only have tips, tricks, and heuristics – a bricolage of suggestions that have been fruitful in the past. We begin by reviewing these heuristics in terms of Peirce's (1955) distinction between induction, deduction, and abduction. We then argue that these heuristics are not mutually exclusive, and thus moving between inductive, deductive, and abductive heuristics is a potent context for discovery.

4.3.1 Creating Questions Inductively

Although high-quality inductive research, such as detailed observation, should be the bedrock of science, it is disappointingly rare in social science (Blumer, 1969; Gerring, 2012) and psychology (Rozin, 2001; Rubin & Donkin, 2022). Psychology has been overly focused on deductive development of hypotheses and subsequent confirmatory statistical testing, while devaluing nonconfirmatory or exploratory research (Krpan, 2022; Scheel et al., 2020). But confirmatory research should not be rushed into; it is the last step in a sequence of questions that begins with patient and detailed description and concept formation (Scheel et al., 2020). Without these rigorously inductive descriptions, concepts risk becoming vague, disconnected from everyday life, and low in validity despite being reliable. If the creation of new questions comes only from deduction, then it is overly determined by the literature and insufficiently attentive to our continually evolving practical problems.

Beyond psychology, detailed description is widespread (Rozin, 2009). Darwin's theory of evolution by a process of natural selection did not arise through deductive hypothesis testing; rather, it rests upon numerous patient descriptions. Similarly, Crick and Watson's breakthrough model of the double helix is, first and foremost, a description. Turning to the social sciences, conversation analysis (Schegloff, 2007) is also built on elaborate and painstakingly detailed descriptions. In sociology, Goffman's (1959) groundbreaking analysis of self-presentation in everyday life is also based on rich descriptions of human interaction. Psychology, in contrast, is rushing headlong into experimentation without extensive description (Rozin, 2009; Rubin & Donkin, 2022). Such premature enthusiasm for confirmatory research, with a disregard for descriptive research, is likely

counterproductive for a young science, like psychology, that is striving for scientific legitimacy (Krpan, 2022; Scheel et al., 2020). It can, for example, lead to overextended theories that fail to replicate, and which thus foster skepticism in psychology (Baucal et al., 2020; Mede et al., 2021; Open Science Collaboration, 2015).

Blumer (1969), a neopragmatist building on the work of George Herbert Mead, used the term "inspection" to conceptualize the inductive phase of social research. Inspection aims to describe the peculiarity of a phenomenon. Consider encountering a strange, suggestive, and confusing physical object:

> [W]e may pick it up, look at it closely, turn it over as we view it, look at it from this or that angle, raise questions as to what it might be, go back and handle it again in the light of our questions, try it out, and test it in one way or another. (Blumer, 1969, p. 44)

Inspection tries to put aside assumptions and expectations. It entails attending carefully to the empirical particulars. Inspection is part of our natural everyday attitude, and it is also a hallmark of science.

Inspection can be both qualitative and quantitative. For example, inspecting people talking could include counting the number of participants or conversational turns, noting a peculiar tone of voice, or understanding the content of what was said. Qualitative inductive research is good for close-up inspection, rich description, revealing practices, identifying heuristics, and finding puzzles (Becker, 1998; Crano et al., 2014). Quantitative inductive research identifies differences between groups, changes over time, and outliers (Jaccard & Jacoby, 2020). And combining these inductive methods can produce added synergies. For example, one might start by using qualitative research to describe a feature of talk (such as conversational repairs; Schegloff, 1992) and then quantitative research to measure the frequency of the phenomenon (conversational repairs occur every 1.4 minutes; Dingemanse et al., 2015).

Inductive inspection helps generate questions because it ensures that the research is firmly anchored in what is going on. It can reveal the boundary conditions for a previously established phenomenon (Jaccard & Jacoby, 2020), a challenging or conflicting observation (Crano et al., 2014), or simply a novel event (Becker, 1998). The critical ingredient is being attuned to peculiarity (Becker, 1998; Crano et al., 2014; Jaccard & Jacoby, 2020; McGuire, 1997). In so far as inductive inspection conforms to expectation, it yields data, and in so far as it disrupts expectation, it yields disruptive data that can generate new theory (Chapter 3).

Valuable sources for inductive question generation include participant observation, deviant case analysis, biographies, diaries, news stories, historical events, introspection, role play, and even fictional stories (Jaccard & Jacoby, 2020). It can also be valuable to talk to practitioners to understand the frontline issues and the existing practical solutions (Jaccard & Jacoby, 2020). Going further in this direction, participatory action research is a useful methodology for harnessing and building on the insight of communities to generate novel questions (McIntyre, 2008).

Case studies are a particularly compelling method for generating research questions inductively. Too often, research cuts up phenomena in unnatural ways, with the actual sequence of events suppressed. In qualitative research, quotations from people unfamiliar with one another, perhaps even from different regions, are presented side by side, without regard for the sequencing of what was said. In quantitative research, the focus is on central tendencies and averages (which may not exist in any single case), with outliers discounted or even removed. Case studies, in contrast, focus on a singular event and conceptualize it holistically – as a system of people and parts. There is no statistical average or central tendency; there just is what happened. This bedrock level of "what actually happened" is fertile soil for creating new questions (Eisenhardt, 1989). Why? Because theories can become detached from actual events. And despite the sometimes-low status of descriptive research, observations of particulars (i.e., what actually happened) should always be privileged over abstract theory (i.e., what is expected to happen). Thus, juxtaposing grand theories with specifics can reveal oddities, which grow into disruptive facts, or anomalies, becoming the wellspring of a new idea.

4.3.2 Creating Questions Deductively

Deduction is often proposed to be the ideal method for creating questions. Theories are used to create research questions and hypotheses that are tested empirically (Popper, 1969). The key to generating questions deductively is conceptual analysis, especially thinking through the logical implications of theories (Jaccard & Jacoby, 2020; McGuire, 1997).

A common approach to deductive question generation is to take an established concept and identify subtypes and variants, perhaps manifesting in peculiar contexts (Crano et al., 2014). This is aided by defining concepts, refining concepts, challenging definitions, and speculating about subtypes and unaccounted-for variables, and introducing novel concepts (Jaccard & Jacoby, 2020). For example, the contact hypothesis (Allport,

1954) originally proposed that contact between outgroups could reduce prejudice under certain conditions. Initially, these conditions were concise: The contact should be between people of equal status, sharing a common goal, with the parties being interdependent in the achievement of the goal, and the contact should be supported by relevant laws, institutions, and customs. However, since this original formulation, the theory has been refined through numerous questions (Hewstone & Brown, 1986; Paluck et al., 2019). These refining questions include: What if the outcome of the joint activity ends in failure? What if the members of one group are not prototypical? And what about the frequency of contact? Or what about pressure to achieve the goal? What if member behavior is or is not seen to be prototypical of their group membership? What if the contact is face to face, technologically mediated, or even imagined? Such question generation is within-paradigm, leading to refinements of the original theory.

Although identifying subtypes and subconditions is widespread, it is often unsatisfying. In the case of the contact hypothesis it has been criticized for producing "an open-ended laundry-list of conditions" (Pettigrew, 1998, p. 69). Each additional condition, mediation, or variable does refine the theory, but it makes the theory conceptually weak, as it becomes a list of if-then propositions. Newell (1973) famously characterized this type of theorizing as trying to "play 20-questions with nature." That is to say, deduction is used to pose binary questions to nature that are tested with an experiment. This, Newell argues, necessarily produces fragmented "if-then" type theories. This mode of theorizing, and developing questions, is suited to testing big theories once they are in place, but it is not suited to generating big integrative theories.

A more exciting way to generate research questions deductively is to take an idea that seems obvious and investigate the alternative (Jaccard & Jacoby, 2020; McGuire, 1997). The world is rarely one-sided, and there are usually contexts in which the opposite holds. For example, Billig (1985) noted that most of the literature on social identity had focused on categorizing (i.e., grouping people into categories), and he made a compelling case for the counterbalancing process of particularizing (i.e., seeing people as individuals and not categories). Relatedly, Gillespie (2007a) shows how within moments of differentiation from outgroups there can also be moments of identification. Finally, Moscovici and colleagues (1994) observed that conformity (or majority influence) must have a counterbalancing mechanism that prevents everyone from becoming the same (i.e., total conformity), and they advanced the influential concept of minority influence. This kind of deductive theory generation is stimulated by taking

theories to extremes (e.g., if there was only conformity) and then probing the processes that prevent the extreme.

A final approach to the deductive creation of research questions is to hold multiple theories in mind, such that tensions can be surfaced and competing accounts for observations can be generated (Crano et al., 2014; Jaccard & Jacoby, 2020). We can never have complete certainty in any theory, and thus it is prudent to entertain multiple possible theories. Like the lost explorers described by Midgley (2003; see Chapter 3), it is prudent to operate with multiple mental maps. The idea that a theory is infallible and timeless is an obstacle to this mode of deductive speculation because it blinds one to anomalies and leads to discarding alternative theories prematurely. When Darwin (2001) sailed on the HMS *Beagle*, he entertained both the biblical view of the earth being created a few thousand years ago and the challenging ideas of Lyell that the earth's geology was shaped over millions of years. Darwin's theory of evolution was not a direct contribution to the debate about the age of the earth, but the heretical idea that the earth was much older than traditionally assumed was necessary for him to formulate his theory of natural selection. The point is that, given that theories are tools (Chapter 3), more theories enable more diverse ways of thinking about and acting on observations. In short, more paths of action in and through data increase the potential to find a novel pathway, question, or theory.

4.3.3 Creating Questions Abductively

Scientific revolutions have rarely been the result of mere induction or deduction; they have usually entailed a creative leap of abduction. The idea that the planets revolve around the sun, that evolution operates by natural selection, and that space and time are relative to the observer all entailed abductive leaps. Somewhat more controversially, but nonetheless abductively, are the social science theories that conceptualize the mind as a computer, people as utility maximizers, and languages as underpinned by a universal grammar. None of these ideas were deduced from first principles. None of them were created by merely aggregating observations. In each case, there is a creative leap of abduction that goes beyond the evidence and preexisting ideas.

Abduction entails going beyond the data to posit something that explains the data. Although Sherlock Holmes (Doyle, 1892) frequently describes his own method as deduction, it is usually abduction; there is a weaving of a pattern and the positing of a story behind the events that makes sense of

the events. "Abductive inference," Krippendorff (2019, p. 38) writes, "is Sherlock Holmes's logic of reasoning." When Sherlock Holmes is confronted with the ostensibly bizarre facts of a case (e.g., the stabbed murder victim in a windowless room locked from the inside), the process of abduction is to imagine possible scenarios. The first step is to attend to the stubborn facts (e.g., the locked door, the footprints, the hesitant responses). The second step is to generate plausible explanations (e.g., was it suicide, was the victim hypnotized, might the victim have been fatally wounded and sought refuge in the room). Abduction is the process of simulating possible explanations until, like a key in a lock, the explanation fits the facts.

Creating questions abductively entails imagination. Abduction is not about what *is* (either empirically or logically); it is about what *might be*. It entails leaving behind the here and now to viscerally inhabit alternative scenarios (Zittoun & Gillespie, 2015). It brackets aside assumptions and aims to generate plausible accounts that might (or might not) explain the known facts. Often, such imagination will not provide added explanatory power. But, sometimes, it provides the seed for a new line of inquiry. Abduction is facilitated by questioning assumptions, challenging taken-for-granted theories, focusing on the most irrefutable details, and being playful in generating alternatives but harsh in evaluating them. Abduction entails tolerating competing and even incompatible theories, seeking peculiarity and anomalies, and pursuing possible lines of inquiry regardless of how surprising or heretical they are.

To generate explanations abductively, the researcher should continually ask "what?" and "why?" (Becker, 1998; Jaccard & Jacoby, 2020). First, it is important to fixate on what actually happened, the sequence of events, and the step-by-step details of the case. These details are the obstinate data to be explained. Second, each datum within the tangled mess of facts should be probed: Why did X happen? Why did Y not happen? What else could have happened? To this end, one needs to be clear about the difference between the facts to be explained (the "what") and the speculations about those facts (the "why"). As Sherlock Holmes said: "It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts" (Doyle, 1892, p. 163). The "what" (or data) are firm anchor points, the "why" are speculations. The "what" should be shorn of interpretation, the "why" is enhanced by imagination. The "what" can never lead one astray, but the "why" can bring false hope, and become a chimera that inhibits progress with dead ends. The "what" is in the past, and not open to revision, while the "why" should always be open to revision.

To think creatively about the "why" – that is, to generate explanations for the "what" – can be enhanced with analogies and metaphors (Haig, 2005; Jaccard & Jacoby, 2020). As discussed in Chapter 3, human understanding is grounded in the here and now of daily practice. Metaphors pervade social science. They underpin theories in psychology (e.g., the mind as a computer; Leary, 1990), communication (e.g., the conduit metaphor of message transmission; Axley, 1984), human development (e.g., organic growth; Zittoun & Gillespie, 2020), sociology (e.g., mechanism and functionalism; Swedberg, 2020), and economics (e.g., the marketplace; McCloskey, 1995). Indeed, in this book, we have relied heavily on metaphors, such as likening theories and methods to "tools" and describing abduction as "Sherlock Holmes style" of inference. Hiding metaphors is blinding; being open about them enables discussing the potentials and pitfalls of all metaphors (Swedberg, 2020), and in so doing, one can liberate the imagination to try alternative metaphors, to see what they elucidate, prompt, and enable.

Finally, thought experiments are a particularly powerful (but often neglected) method for developing research questions abductively. Thought experiments have had a significant impact on science and have been central to several breakthroughs. Einstein (1982; Norton, 1991) famously used thought experiments, such as trying to chase light and being on a train moving at the speed of light. Searle (1982) powerfully argued against strong artificial intelligence using the thought experiment of a person in a room converting inputs into outputs using an incomprehensible rulebook. Putnam (1974) argued that meanings are not just in the mind by positing a twin earth in which everything was identical except the chemical composition of water. In the veil of ignorance thought experiment, Rawls (1971) asks how one would decide upon the rules of society before knowing one's position in society (i.e., profession, ethnicity, gender, income, wealth, social status). Thought experiments do not need to be elaborate scenarios. For almost any social phenomenon, one can engage in basic thought experiments by asking: Could this have occurred a thousand years ago? Might this occur a thousand years in the future? How would this play out in a world where everyone had perfect information, nobody lied, there was no emotion, or everyone was equal? Literature is an excellent resource for thought experiments. Franz Kafka (1915) explores what it is like to wake in the morning transformed into a huge insect. Phillip K. Dick (1962) explores what life in America might have been like if it had lost World War II. Cixin Liu (2014) examines what might happen to human society if it was known that aliens were en route and would arrive in 450 years.

While some have argued that thought experiments are merely arguments dressed up as stories (Norton, 1991), this is to underplay their value for us *as humans*. As argued in Chapter 3, knowledge is "for us" and works best when anchored in everyday life. Thought experiments are invaluable because they give us more than a dry argument, mere numbers, or prediction. Instead, they provide a visceral and meaningful simulation, anchored in an intelligible first-person perspective. They enhance our embodied identification and thus ground abstract thought in everyday human activity (Ludwig, 2007). In short, thought experiments are "intuition pumps" (Dennett, 1991, p. x) that enable us to "feel" problems from the inside, take ideas to extremes, and run simulations with impossible conditions (McGuire, 1997). This playfulness stretches the space of the possible, opening a semantic space within which abductive questions arise.

4.3.4 Mixing Induction, Deduction, and Abduction

It is a mistake to oppose induction, deduction, and abduction. Morgan (2007; table 2), in an otherwise excellent article, claims that a pragmatist approach focuses on abduction instead of induction (which he associates with qualitative research) or deduction (which he associates with quantitative research). But Peirce (1955, 1992) valued all three modes of inference and argued that they work best in tandem. Abandoning any mode of inference would be antipragmatist, because it would be a tribal affiliation to one form of inference; it would fail to leverage the insight that each mode of inference can provide. Peirce's (1955) differentiation between induction, deduction, and abduction is conceptual. In any practical context, these modes of inference work together, yielding synergies that cannot be reduced to any one mode of inference operating in isolation.

When trying to solve a problem, we leverage insights from the past (deduction), attend to the concrete particulars of the problem (induction), and make leaps of speculation (abduction). Peirce (1974, sec. 1.72–1.74) gives the example of Kepler's discovery of the laws of planetary motion. Throughout a long investigation, Kepler weaves together previous theory, empirical observations, and abductive reasoning to arrive at his theory. Without induction, his theory would have been disconnected from empirical observation. Without deduction, he would not have been able to frame certain observations as surprising. Without abduction, he would not have been able to leap beyond both observations and existing theory to realize that planetary orbits were elliptical rather than circular.

In social science, these three modes of inference are woven into the fabric of most empirical articles. The introduction section is usually deductive, drawing inferences from the existing literature. The empirical findings should be inductive, with inferences being based on the data collected and the analyses performed. Abductive inference is sometimes evident in a surprising research question that posits a novel angle on an established problem and sometimes evident in the interpretation of surprising findings. The key point is that these three modes of inference synergize: Deduction leverages the past to generate expectations; abduction generates ideas that escape the confines of deductive expectation; and induction tames unfounded expectations and excessive speculation.

Moving between modes of inference can help to generate research questions. This moves beyond discovering tensions between observations (induction) or between theories (deduction) and opens the possibility of discovering tensions between what is expected and what is observed, between what should be and what might be, and between what is and what could be (Jaccard & Jacoby, 2020; McGuire, 1997). The point is that moving between modes of inference opens the research process up to additional and productive tensions that can spur insight and foster new research questions.

Research questions can also be generated by moving between qualitative and quantitative methods. This is an extension of moving between modes of inference. Each mode of inference (i.e., induction, deduction, and abduction) has qualitative and quantitative variants (see Table 4.1). It has long been argued that mixing methods is a powerful means of generating new theories (Greene et al., 1989). The core idea is that integrating qualitative and quantitative methods should lead to a 1 + 1 = 3 synergy, but specifying how this occurs is challenging (Fetters & Freshwater, 2015a). The theoretical literature on mixing methods tries to identify how this creativity is more than accidental and can be traced to particular integrative strategies (Åkerblad et al., 2021) and dimensions of integration (e.g., assumptions, aims, data, interpretation; Fetters & Molina-Azorin, 2017b).

Table 4.1 differentiates both modes of inference and qualitative and quantitative methods. This provides a basis for conceptualizing emergent synergies. It is precisely because each mode of inference and method does something different, and answers different questions, that they are complementary rather than competing. Thus, these methods can be chained together to produce synergistic findings. For example, describing a phenomenon qualitatively ("what is it?") often leads to measuring the phenomenon quantitatively ("how frequent is it?"); testing a theory ("does the

data cluster according to typology X?") often leads to a qualitative search for an explanation ("why did the clustering not work?"); and generating an explanation ("what might cause X?") feeds forward into testing the explanation ("does Y cause X?"). These chains of investigation are examined in detail in Chapter 6.

Mixing modes of inference, and associated methods, increases the chances for disruption. Such disruptions are central to scientific progress (Kuhn, 1962). While much science is routine, entailing fitting data to theories to flesh out a given paradigm, there are key turning points in science, revolutions, that establish new paradigms. Whether engaged in normal (i.e., within-paradigm) or revolutionary (i.e., paradigm-creating) science, the key is to be sensitive to anomalies such as disruptive observations, confounded expectations, and contradictory theories. Normal and especially revolutionary science progress by addressing such anomalies. It follows that any research practices that increase the chance of anomalies arising will advance science and lead to increasingly robust knowledge. Research that is siloed within a subdiscipline, operates with a narrow range of methods, or insulates itself from real-world practices and consequences is protecting itself from disruptive surprises and, thus, the potential for scientific progress.

4.4 Being Sensitive to Surprise

From a pragmatist standpoint, the key to creating questions is being sensitive to surprise. What does it feel like to make a discovery in social science? What is the phenomenology of an emerging insight? It is, we argue, the feeling of something odd, out of place, oversimplified, difficult to empathize with, glossed over, or otherwise puzzling; in short, it is the feeling of surprise. As we argued in Chapter 3 and will develop in Chapter 9, humans are future-oriented. Knowledge crystalizes experience from the past to prevent surprises in the future (Friston, 2010; Peirce, 1955). If we create theories to reduce surprise, it follows that being sensitive to surprises will guide us toward increasingly robust theories.

There are many sources of surprise: data, contradictory theories, daily practices, logical puzzles, and emerging phenomena. But, in each case, the phenomenological experience is the same: There is a kink in the logic, effort is required to overcome it, and the path of least resistance is to skip over it. The surprise can be accompanied by emotions of discomfort, disappointment, or even defensiveness. But this feeling of resistance, this desire to bypass the uncertainty in favor of more familiar ground, is the

feeling of being at the edge of knowledge. Arguably, this is the moment of science: The deciding factor is whether one pauses and probes or whether one passes by.

Pausing and probing are done by asking questions. At the heart of science, even within the phenomenology of the moment of discovery, is turning surprises into productive research questions. Research methodology is the formalization of ways to answer questions rigorously. There is a circular dynamic: Questions beget answers, and answers beget questions. A pragmatist approach to methodology aims to make this loop more effective, creative, and ethical. Within this loop, research questions form the connecting thread, linking human interests to the consequences of knowledge and providing the criteria for choosing data (Chapter 5) and methods of analysis (Chapter 6).