CHAPTER 6

MICROFOUNDATIONS AND RECURSIVE ANALYSIS: A MIXED-METHODS FRAMEWORK FOR LANGUAGE-BASED RESEARCH, COMPUTATIONAL METHODS, AND THEORY DEVELOPMENT

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ABSTRACT

This chapter argues that the primary reason for the underdeveloped state of microfoundations research in language and communications studies is methodological. It asserts that the long-standing methodological division between micro and macro analyses (traditionally small-scale and large-scale, respectively) has led to their continued theoretical separation. The paper draws from Giddens' theory of structuration and newly developed computational methods to outline an alternative, mixed-methods framework for discourse analysis that the author calls Recursive Analysis (RA). The author demonstrates the application of the RA framework through a case study of the electric vehicle industry that aligns small-scale and large-scale textual analysis to generate theoretical insights.

Keywords: Recursivity; structuration; textual data; text analysis; mixed-methods; multilevel; multidimensional data; methodology; data mining; machine learning

INTRODUCTION

The long-standing call within institutional analysis to return to microfoundations (Felin & Foss, 2005; Hwang & Colyvas, 2011; Leonardi & Barley, 2008; Powell & Rerup, 2017; Zucker, 1977) has generated much positive reaction but comparatively little research activity. Scholars have argued convincingly that "everyday" activities and processes are fundamental to producing and reproducing institutions (Smets, Aristidou, & Whittington, 2017). They have also delineated ways in which legitimacy is intimately tied to microevaluations of "validity" and "propriety" (Bitektine & Haack, 2015). Despite repeated calls, however, studies focused on the microfoundations underlying institutions are still few and far between. What explains the relative scarcity of microanalyses of institutions?

While there are different definitions of microfoundations and various ways of thinking about the underdeveloped state of microfoundations research (Eckardt et al., 2018; Gray, Purdy, & Ansari, 2015; Powell & Rerup, 2018; Tracey, 2016), I argue that the primary reason for the underdevelopment is methodological. The central issue concerns how to identify microprocesses in the first place. Where do they reside – in the heads of institutionally embedded actors (Gray et al., 2015)? In repeated inter- and intra-individual attempts at justification or evaluation (Bitektine & Haack, 2015)? In routines and practices (Smets et al., 2017)?

I call this research conundrum methodological, rather than simply empirical, since even if we were to identify the most critical of those microprocesses, we might still wonder how to study them and link them to macrophenomena (Cornelissen & Werner, 2014; Powell & Rerup, 2017; Schneiberg & Clemens, 2006; Suddaby, 2010). The central issue, therefore, is intimately tied to levels of analysis – a consequence of the phenomenological conflation between paying attention to microfoundations and studying them *independently* of their macro "effects" (Aguinis & Molina-Azorín, 2015; Gray et al., 2015; Harmon, Haack, & Roulet, 2018).

My argument for a methodological approach to generating more microfoundations research is based on a central assertion and two related distinctions. I assert that macro- and microlevel phenomena are *recursive*, or mutually *implicated* – one cannot exist, or be studied empirically, without taking the other into consideration. A similar assertion is made in practice theory (Smets et al., 2017), often using the apparent paradox of embeddedness (Barley & Tolbert, 1997; Lok & Willmott, 2018; Seo & Creed, 2002). In that context, the objective is to identify the implication of structure with agency.

My own assertion goes back to Anthony Giddens' notion of *structuration*, or the recursivity of structure with agency. In this chapter, I therefore propose what I call *Recursive Analysis (RA)*, a methodological framework that pays analytical attention to micro- and macrolevels at once (Giddens, 1984; Ragin, 1987). I draw on advances in computational methods to outline how the framework might combine techniques traditionally associated with small-scale, microstudies (e.g., intensive coding, grounded theory) with those normally practiced in large-scale, macrostudies (e.g., automated coding, dimensionality reduction). Such a framework would allow us to build out the research around *micro*studies while asserting their relevance as *foundations*.

However, I also distinguish between this use of recursivity and its application within language and communication studies (Gavetti & Warglien, 2015; Harmon, 2018; Li, 2017), my focus in this chapter. The objective in the linguistic context would be to link microlevel "practices" – utterances, arguments (Harmon, 2018; Harmon, Green, & Goodnight, 2015), narratives (Haack, Schoeneborn, & Wickert, 2012; Hardy & Maguire, 2010; Vaara, Sonenshein, & Boje, 2016) and similar communicative efforts – with macrolevel phenomena (Lok & Willmott, 2018) – discourse (Phillips, Lawrence, & Hardy, 2004; Vaara & Monin, 2010), frames (Cornelissen & Werner, 2014; Meyer & Höllerer, 2010), rhetoric (Green, Li, & Nohria, 2009; Suddaby & Greenwood, 2005), and similar communicative phenomena (Mohr, 1998; Mohr & White, 2008). If institutional theory, where the conundrum of microfoundations originates, is indeed a "theory of communication" (Suddaby, 2011, p. 188), then looking for the resolution of the conundrum in the communicative arena promises to be a fruitful task.

A further and final distinction is between this particular definition of the micro–macro divide and another (Harmon et al., 2018), which argues against uncritically equating the structure-agency and micro–macro debates. That line of reasoning aligns with my perspective here. But the reasoning also contends that micro- and macrolevels can often be independent (Jepperson & Meyer, 2011; Powell & Rerup, 2017). While micro and macro may very well be independent in some institutional contexts, I focus specifically on their fundamental recursivity, their mutual implication, within the communicative arena. Newer computational methods allow us to examine the veracity of that argument. This final distinction will become clearer as I develop my argument, present empirical examples and draw theoretical implications.

The chapter proceeds as follows: I begin by reviewing the argument for RA in detail; I then examine the methodological concepts that underlie recent analytical advances in computational methods; I then briefly explicate an empirical example, an application of the method to a study of the Electric Vehicle (EV) industry; next, I discuss the theoretical implications of the RA framework, including how an independent focus on micro- or macroanalysis can have unintended analytical and theoretical consequences; I conclude by discussing potential applications and limitations of RA.

METHODOLOGICAL AND THEORETICAL OVERVIEW

Challenges and Opportunities in Microfoundations Research

Scholars have long been concerned about too great a reliance on a limited number of conventional analytical methods in organizational and institutional analysis (Ragin, 1987; Ragin & Fiss, 2009; Suddaby, 2010). They have pointed to the adverse effects of such an exclusive reliance, namely the inability to address multilevel phenomena and address the microfoundations of institutional effects (Schneiberg & Clemens, 2006). In order to address fundamental theoretical questions about organizations and institutions, the clear implication is that we need

to collectively revisit our long-standing analytical tendencies while taking better advantage of novel methods and approaches (David & Bitektine, 2009).

Recent advances in data-analytic (so-called "big data") methods and the availability of large-scale text datasets together present a unique opportunity to revisit the macro–micro gap in organization studies and institutional theory (Barley & Tolbert, 1997; Yu, Jannasch-Pennell, & DiGangi, 2011). The opportunity to re-theorize the macro–micro gap is even greater, as much of the methodological progress in analyzing textual data has taken place in (and has so far been largely confined to) the technical disciplines of Computer Science (CS), Natural Language Processing (NLP), and Computational Linguistics. Those disciplines have taken center stage after the advent of machine learning (ML) and artificial intelligence (AI), which offer the ability to conduct *distant reading* (Moretti, 2005), which promises the ability to analyze and "comprehend" large-N text corpora in a fine-grained way normally reserved for small-N, deeply contextual analysis (Edelmann & Mohr, 2018; Nelson, 2017).

Novel computational methods that have only recently begun to enter organizational and institutional studies thus present the opportunity to radically alter, even permanently reduce, the small-N, large-N tradeoff (Ignatow & Mihalcea, 2017; Kobayashi, Mol, Berkers, Kismihók, & Den Hartog, 2017). These analytical advances allow us to revisit the methodological constraints built into important aspects of the micro–macro divide in institutional analysis. I rely on this newly available opportunity to propose combining the fine-grained detail of microlevel analysis with the scale and scope of macrolevel analysis. In what follows, I describe how advances in computational methods allow us to conduct research across the micro–macro divide but without painting ourselves into the methodological corner of cross-level research or the conundrum of inhabited institutions, the correlate of the paradox of embeddedness in structure-agency (Thornton, Ocasio, & Lounsbury, 2012).

My proposal in this chapter for what I have called RA therefore wagers that the methodological tail can wag the theoretical dog by drawing on advances in computational and text-analytic methods to further organizational and institutional analysis (DiMaggio, Nag, & Blei, 2013). Such a wager is especially appropriate early in the development of a field, when analytical advances initially outpace theoretical insights. Despite important methodological advances, the technical disciplines that have generated them also remain in many instances explicitly, and deliberately, *atheoretical* (DiMaggio, 2015), which opens the door for connecting across the disciplines in a way that advances both method and theory. It is equally appropriate since much of the microlevel activity that animates institutional phenomena takes place through communication channels and is both phenomenologically present and empirically discernible in communication processes (Bitektine & Haack, 2015; Green et al., 2009; Suddaby & Greenwood, 2005).

While studying microfoundations is a necessity, we can begin to resolve the field's methodological stalemate that I noted in the beginning – theoretical richness confronting empirical poverty – by reframing the question not as simply one of multiple *levels* but mixed methods (Eckardt et al., 2018; Molina-Azorin, Bergh, Corley, & Ketchen, 2017). Much of organizational and institutional

analysis conflates microlevel analysis with qualitative, small-scale studies such as conversation analysis and grounded methods and macrolevel ones with quantitative, large-scale studies such as correlational analysis and event-history analysis. As a result, we cannot help but assume that micro- and macroanalysis must be done in isolation. As I will argue, a mixed-methods approach taps into the empirical correspondence between the micro and the macro (Giddens, 1984; Gray et al., 2015; Kaplan, 2016) instead of allowing methodological limitations to dictate the questionable assumption of their independence.

The chapter applies these insights to a review and explication of a case study of the modern EV industry undertaken by the author and co-authors (Tchalian, Glaser, Corso, & Kennedy, 2019). The case study demonstrates how the RA framework can help identify consistent, theoretically relevant *associations* present (but often *latent*) in large-scale textual data. Such associations define the interface of micro and macro, not because they lie *between* two entirely independent empirical or phenomenological levels but because they help identify underlying mechanisms that "partake" at once of both the micro and macro (Giddens, 1987). Doing so, I argue, will help organizational and institutional scholars begin to resolve a long-standing and fundamental conundrum – the *theoretical* dependence and *analytical* independence of micro- and macromethods.

THE RA FRAMEWORK
Microfoundations, Multiple Dimensions, and the Recursivity of Language

In the chapter in his *Social Theory and Modern Sociology* (1987) on Erving Goffman's classic texts, *The Presentation of Self in Everyday Life* (1956) and *Frame Analysis* (1974), Anthony Giddens argues for the "recursive" nature of microprocesses and macrostructures: he asserts that neither is independent of, but rather depends on and reproduces, the other. In doing so, he highlights Goffman's insistence that his study of microlevel interactions and the "interaction order" could and should be studied independently of macrostructures. Giddens takes issue with Goffman's insistence on what might be called a "flat" or "simple" ontology, whereby microlevel processes can be studies alone or directly aggregated into macrostructures. Giddens argues instead for understanding every social interaction as a practice characterized by recursiveness and implicated in producing and reproducing what we recognize as "social institutions" (Giddens, 1987, p. 135).

In one instance, Giddens (1987) points to Goffman's use of the work "talk" to describe his study of conversations in individual encounters. He distinguishes talk from "language," a "formal system of signs and rules" (p. 126), the formal conventions of signifying systems that Giddens defines as at once the source and product of such talk. The comparison is reminiscent of Ferdinand de Saussure's distinction in his *Course in General Linguistics* (1956) between *parole* and *langue*, the former equivalent to "talk," informal linguistic interactions, the latter to "language," the formal rules and structures of language. (Computational text-analytic methods such as NLP, similarly distinguish individual instances of a word, "tokens," from their abstract "types," a distinction we will return to in

discussing the methodological implications of micro–macro recursivity.) Without equating it directly with the structure-agency relation, Giddens' argument makes a specific claim regarding the macro–micro divide. According to the claim, the recursiveness of talk and language highlights the recursiveness of microlevel interactions and macrosocial structures.

Giddens' (1987) paraphrasing of Goffman in explaining the implications of studying an individual instance of "co-presence" and "its connections with broader ritual occasions of a macro-structural kind" (p. 132) is instructive in understanding the nature of that recursiveness. The former should not be regarded, Giddens (1987) argues,

> as an "expression" of the properties of institutions; it is a form of activity established "in regard" of those institutions. There is only a loose coupling to the qualities of the institutions themselves. (pp. 132–133)

Giddens pushes beyond such loose coupling, to characterize individual, micro-level interactions and social, macrolevel structures in their recursiveness, their ability to reproduce institutions in the very process of their being carried out. As Giddens (1987) argues, "individuals experience different contexts of co-presence as episodes within the time-space paths they trace out in the course of their day-to-day activities" (p. 137), a formulation remarkably consistent with current practice theory (Smets et al., 2017). In pointing to the "concurrent presence" of the macro in (and in congruence with) the micro, Giddens is arguing for more than simple path dependency; he is arguing for the macro partaking, being *implicated*, in the macro, and vice versa.

What matters to Giddens, and what I argue is consequential to the analysis of micro and macro units and levels of analysis, is precisely how each is recursively implicated in the other (Fig. 1).
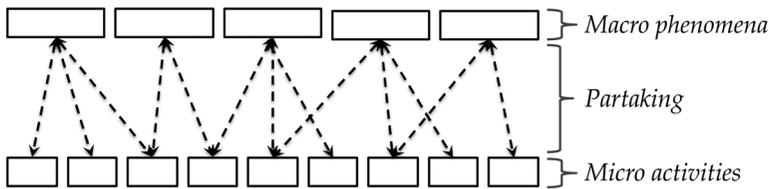

Fig. 1.   Empirical Model.

That *congruence* is belied by the analytical techniques and tools traditionally used by researchers who study language and communication (Ignatow & Mihalcea, 2017; Kahl & Grodal, 2016; Loewenstein, Ocasio, & Jones, 2012). As Giddens (1987) puts it, many scholars mistakenly identify Goffman's works with the "qualitative study of the small scale" (p. 113) because he "employs none of the sophisticated modes of quantitative research or analysis favoured [*sic*.] by many sociologists" (Giddens, 1987, p. 113). While Giddens' statement is three decades old, modern social-science and organizational researchers do much the same in equating qualitative studies with micro analysis and quantitative ones

with macroanalysis. By allowing for the large-scale analysis of granular data, the advent of quantitative computational text analysis goes a long way toward belatedly making Giddens' argument. The congruence of traditional qualitative analysis (Glaser & Strauss, 1967; Miles & Huberman, 1994) with newer computational techniques and methods for text analysis (Krippendorff, 2004; Nelson, 2017) makes a renewed argument for the implications of each for, and in, the other and their complementarity within mixed-methods approaches (DiMaggio, 2015; Kaplan, 2016; Molina-Azorin et al., 2017).

In the next section, I present the three-part RA framework, anchoring each part in a related computational concept and the fundamental tradeoffs associated with it. I use the framework to structure the review of the EV case study in demonstrating the application of my argument about the methodological utility and theoretical value of RA.

Recursive Analysis: A Framework

The recursive framework I present here draws from the theory of structuration and the methods of ML, a sub-field of Artificial Intelligence (AI). AI is the name given to automated computational methods for extracting insights from data, originally developed in the 1940s. The field of AI has made rapid advances over the last two decades as a consequence of increases in data availability and computing power. ML is a category of AI techniques implemented through a core, repeatable process of "machine learning." Large volumes of data help a machine learn relationships by recognizing latent patterns – for instance, what textual attributes or features ("dimensions," in the common ML parlance), such as particular words, word combinations, or parts of speech tend to characterize or be closely associated with the EV market category.

Modern applications of ML methods often involve the use of NLP tools that help automate the identification of features. The first few steps often involve pulling, or "extracting," relevant details from a text corpus. NLP "packages" in open-source software, such as those written for the programing language Python (particularly the popular "scikit-learn" package) and the open-source analytical platform R, perform that extraction (Evans & Aceves, 2016). The extraction process automates many of the manual and often repetitive and labor-intensive tasks carried out in text-based coding (Glaser & Strauss, 1967; Krippendorff, 2004; Miles & Huberman, 1994; Nelson, 2017).

ML researchers have devised sophisticated techniques and methods for this kind of analytical work. Those methods generally follow a simple three-step process for data analysis and model building, from the application of *domain knowledge* through *knowledge discovery* (Maimon & Rokach, 2010, p.3). The RA framework focuses on the three critical steps in that process, starting with multidimensional data and ending with meaningful insights (Kobayashi et al., 2017):

As the Fig. 2 shows, analysis moves from greater to fewer dimensions, from an initial step of (1) dimensionality reduction, through the critical analytical step of (2) pattern recognition, to the final step of (3) generalization, drawing implications for a particular set of practices (in the technical disciplines) or for some aspect of the social world (in the social and organizational sciences) (Gibson, 2017).
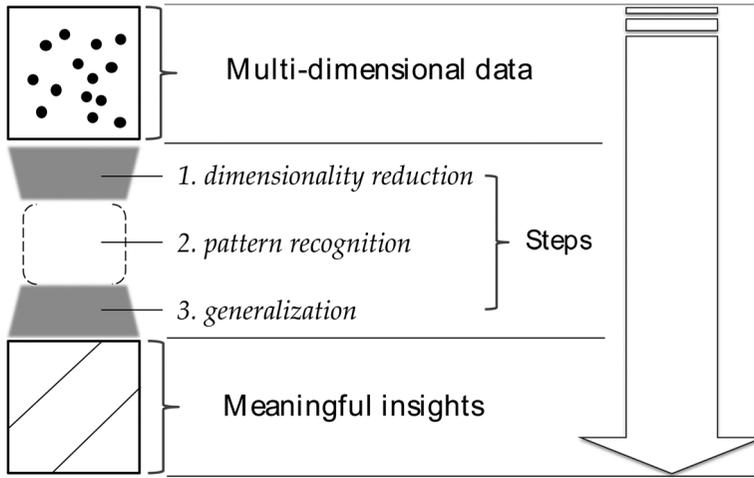
Fig. 2.   Analytical Process.

I adapt this three-step analytical process to propose the following mixed-methods RA framework.

The framework explicitly extends the fundamental analytical approach of dimensionality reduction, pattern recognition and generalization from ML (Fig. 2). Each analytical step in the framework has specific consequences for theory development. In the RA framework, every step includes more than one method, combining small-N and large-N analysis, which as I have suggested operationalizes analytically the latent recursivity across micro- and macrolevels that Giddens identified in Goffman. As the Fig. 3 shows, that greater freedom to vary and combine methods requires greater coordination at every step and across the steps between analysis and theory. And while theory is "generated" in the final step, as the second set of directional arrows suggest (and as I will suggest through the case study), every step has repercussions for every other and impacts theoretical outcomes. This approach is very much in keeping with the analytical ML process of discovery as well as the different strands of qualitative analysis (Eisenhardt, 1989; Gehman et al., 2018; Nelson, 2017; Tunarosa & Glynn, 2017). It is also in keeping with the phenomenological co-constitution of micro-level, foundational activities and processes and macro-level, institutional outcomes and phenomena.

In the case study below, I briefly describe each of the steps in Fig. 3, identify its benefits and tradeoffs with reference to both computational and qualitative analysis, and apply it to the analytical example that makes up the EV case study. Reconsidering the tradeoffs in light of the case study will help redefine the risks and challenges of exclusively macro and micro approaches and the same potential benefits of aligning them in complementary ways. Those benefits have implications for the analytical conundrum of microfoundations research I outlined earlier.
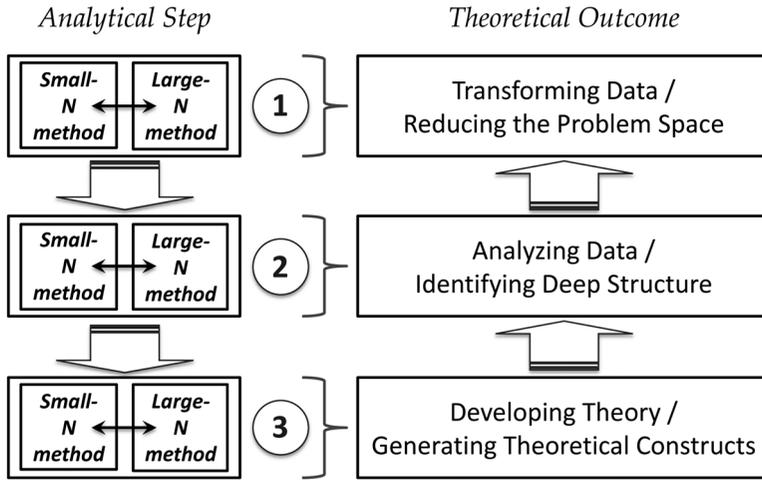
Fig. 3. The Recursive Analysis Framework.

Recursive Analysis: A Case Study

The analytical examples of the EV case are drawn from a study that my co-authors and I conducted of the modern re-emergence of the EV category (Tchalian et al., 2019). In the study, we call the EV a category exhibiting "extended nascency," since it has existed since the late 1800s but has not been an economically or institutionally viable category since losing the battle for dominant design in the early 1900s against the Internal Combustion Engine (ICE) and has been periodically reborn since. We used 25 years of textual data gathered from the Factiva database, namely newspaper stories that mention "Electric Vehicle" and its variants along with Press Releases about the first models of the three most prominent EV makers of the era, General Motors (GM), Tesla, and Nissan – the EV1, the Roadster, and the Leaf, respectively.

Our data start in 1990, the year that GM announced the first mass-produced fully-electric vehicle in the modern era, the Impact, renamed the EV1 when it launched in 1996 and shelved soon after, in 2003. They include the subsequent launch of Tesla's Roadster, which was launched in part as a reaction to GM's market exit. The data carry us through 2014, four years after the launch of the Nissan Leaf, when investments in the category began to substantially increase – aimed at increasing charging infrastructure, financial incentives, and regulatory pressure. Our research question is aimed at understanding GM, Tesla, and Nissan's distinctive strategic categorization efforts with regard to a category with historically negative associations and valence.

At the heart of the case study is the iterative, recursive approach to data analysis and theorizing depicted in Fig. 3. We began by analyzing the consistent linguistic patterns in each of the three firms' category association efforts (PR and marketing documents), comparing them against the development of the category as a whole. We qualitatively coded and analyzed a unique text archive (N=27), in order to inductively capture the microlevel communication, then replicated

the coding with NLP tools and custom computational coding procedures for the full Factiva text corpus ($N = 12{,}000$), in order to capture macrolevel category developments.

The analysis is divided into three stages corresponding to the three parts of the RA framework. I describe each step in more detail below. Since examining every aspect of the analysis is impossible (and unnecessary, since the analysis is available in the full paper), the substantive analytical details I present are the ones most relevant to the RA framework and its implications for microfoundations research.

1. Dimensionality Reduction: Reducing the Problem Space
The first and most important step in the RA framework is reducing the problem space. This step primarily involves transforming or reducing multi- or high-dimensional data, or data with a very large set of attributes or features.

The difficult balance between macro and micro, as traditionally defined, is illustrated in a fundamental tradeoff central to ML approaches, the "curse of dimensionality," whereby including too many features can introduce spurious relationships, while leaving out too many may abstract away too much signal along with noise. While the tradeoff is familiar from more traditional quantitative and statistical methods, it is particularly prevalent in ML and computational text analysis, which often deals with large-scale text corpora. Such corpora are comprised of multidimensional data, in which every individual word or phrase, whether its abstract linguistic "type" or its instantiation in a particular "token," can represent a dimension or feature.

ML researchers have developed a series of analytical methods for filtering, re-engineering, transforming, combining or otherwise selecting or reducing the number of dimensions that go beyond traditional statistics and variance-based methods (Maimon & Rokach, 2010). Importantly, such large-N methods align with small-N, often qualitative, methods with a similar objective (Ragin, 1987). For instance, when conducting what has come to be called first-order coding of small-N data in grounded theory (Glaser & Strauss, 1967) and its modern analogs, in particular what has come to be called the "Gioia method" (Gioia, Corley, & Hamilton, 2013), researchers pay attention to particular, consistently occurring empirical aspects of an object of study – such as the most commonly occurring terms, associated pairs, or other relational patterns in a text corpus. Computational methods share the same objective of reducing the multiple dimensions of a dataset to a more analytically relevant and manageable number.

The two methods, micro and macro, respectively, share a fundamental analytical principle about dimensionality reduction. My co-authors and I took that analytical principle a step further by incorporating in it Giddens' insight about the partaking of microlevel activity and macrolevel phenomena. We noticed in our small-N coding, for instance, that verbs, and in particular "to be" (is, are, will be, can be, should be) played a fundamental role in category associations. They linked automotive firms and models to particular features and benefits of the EV and adjacent automotive and non-automotive categories.

This intensive microlevel coding of individual texts, combined with the macrolevel discovery across a substantially larger text corpus, helped us reduce the problem space but also better bridge the micro–macro divide, generating fine-grained analysis at scale. By replicating the microcoding in our macroanalysis but also expanding it, based on novel associations our computational analysis revealed, our aim was to operationalize the empirical partaking, the recursivity, of micro and macro in our analytical method. Our iteration across qualitative and computational methods helped refine our approach and reduce our analytical attention to empirically and theoretically relevant dimensions.

It is important with regard to this first step not to make a logical leap between large text corpora and macrostructures or phenomena. So while microcoding and macroanalysis of media-related texts analytically partake of the recursivity of micro and macro, that is due to there being an explicit proxy in our study for the macrolevel EV category. The same would not be true of the firm-level PR documents alone, micro and macro coding of which could certainly be methodologically useful, and was for us, but less theoretically meaningful. In our EV study, we deliberately microcoded our entire small-N corpus in our initial exploratory coding, in order to better capture as many associations as possible that we could search for and analyze at scale. We supplemented that coding with additional features captured in our large-N computational coding.

2. Pattern Recognition: Identifying Deep Structure
Identifying deep structure is the second step in the RA framework and the central one in any analytical or interpretive process – pattern recognition.

The numerous tradeoffs associated with this second analytical step for both small-N and large-N data are familiar from canonical studies of social-scientific method (Eisenhardt & Graebner, 2007; Krippendorff, 2004; Ragin & Amoroso, 2011). For small-scale data, the Gioia method standardizes what is sometimes an implicit analytical decision in qualitative coding (Cornelissen, 2017). Researchers may observe regularities or patterns in their underlying data during "first-order" coding, identifying frequent or consistent relationships. Likewise, when performing "second- order" coding, researchers may observe that the sets of words consistently associated with two competing firms converge or diverge as a market category develops.

In ML, this step generally involves recognizing and revealing latent associational patterns (Kennedy, 2005, 2008). NLP-based approaches such as Topic Modeling (Blei, Ng, & Jordan, 2003; Mohr & Bogdanov, 2013) align well with such thematic coding and the generating of theoretical concepts (DiMaggio et al., 2013). Topic modeling identifies mathematically consistent co-occurrences of words (often reduced to a set of relevant ones, as in our step one) that constitute "topics," or themes. While such mathematically generated themes are only the beginning of theorizing (Hannigan et al., 2019; Kaplan & Vakili, 2015), that fact is no different in small-N, traditionally qualitative (Gioia et al., 2013; Glaser & Strauss, 1967; Langley & Abdallah, 2011), or indeed large-N, traditionally quantitative (Eisenhardt & Graebner, 2007), approaches.

For the purposes of the RA framework, it is this central step of pattern recognition that best captures the analytical recursivity and theoretical partaking of the micro and the macro. In conducting our EV study, my co-authors and I operationalized the micro–macro partaking by incorporating it into a recursive method that closely aligned our analysis across our small-N and large-N corpora. We employed methods familiar from grounded theory and qualitative analysis but also informed by prior work and theorizing (Rosa, Porac, Runser-Spanjol, & Saxon, 1999) as well as our theoretical objective – analyzing consistent patterns associated with the EV category. (We took that objective a step further by also paying attention to associational patterns and mechanisms across firm-level documents and category-level ones, shading our analysis into the territory of larger debates about microfoundations and embedded agency mentioned at the start.)

We therefore used our prior coding for category labels and product features and benefits, as well as types of association – direct, indirect, and ambiguous (the last of which was a result of the discovery process). We identified each of those sets of associations with their linguistic markers and grouped like ones together. Our intensive qualitative analysis revealed that certain features and benefits seemed to cluster together, appearing regularly in close proximity to each other. We also replicated our qualitative method in the form of fine-grained, automated algorithms using NLP tools.

We programed those associations with automated "parsers" that capture sentence-level relationships (available in Python's "NLTK" package, a family of NLP tools designed for such purposes, which we then customized to align with our qualitative coding). The tool gave us the opportunity to identify the same linguistic markers we coded for in our small-N corpus while being able to replicate the identification of associational patterns in automated fashion and on a larger scale. A secondary analysis used "word embedding" tools (available in Google's Word2Vec package), which identify the context in which particular words of interest are located. This additional automated sub-step allowed us to discover new types of association and identify a larger series of latent patterns not available in the small-N corpus. The small-scale and large-scale versions in this central step of pattern recognition directly informed each other, once again operationalizing analytically the theoretical recursivity between micro and macro.

It is worth noting that, although the second step in our EV study started with qualitative coding of the unique small-scale text corpus we had created for the purpose, it is just as appropriate to start with an inductive computational approach such as topic modeling with a relevant large-scale text corpus (kaplan & vakili, 2015).

3. Generalization: Generating Theoretical Constructs

Generating theoretical constructs is the third, inferential step that may include analysis and further interpretation beyond identifying deep structure. This final step in the process generalizes the analysis back "out" to social and institutional phenomena.

For small-N datasets, the Gioia method standardizes the process of generating theoretical concepts or constructs. In a classic study also based on small-N data,

for instance, Barley (1986) compared the adoption of a new technology at two CT scanning facilities and observed not only that the adoption played out differently across the two organizations but theorized how the disparate use and treatment of the technology helped bring about different organizational structures.

In the RA framework, this final step closely parallels a fundamental tradeoff between model fit and generalizability. If a model proves a poor fit to data in a study, it is clearly not useful. If it fits them too well, it is unlikely to generalize effectively beyond them. This challenge is known in ML as the problem of under- or over-fitting of the model to the data, respectively. The same underlying tradeoff between analysis and generalization holds for the theoretical development central to our EV study or Barley's. In reviewing this final step in the case study, therefore, I refer to these macro–micro challenges as *theoretical* under- and over-fitting, respectively.

For larger methodological and theoretical purposes, the question of model fit represents the conventional dividing line between qualitative approaches – traditionally, small-N, case study methods, prone to under-fitting – and quantitative ones – traditionally large-N, quantitative ones, prone to over-fitting (Eisenhardt, 1989; Gehman et al., 2018). As applied in organizational research, the dividing line has therefore become theoretically self-fulfilling, especially with the ubiquity of variance-based quantitative methods such as multiple regression (Ragin, 1987; Ragin & Pennings, 2005) and the subsequent rise of qualitative methods based on grounded theory (Gehman et al., 2018; Glaser & Strauss, 1967). At the same time, it has too often become analytically irrelevant. In studying quantitative phenomena, researchers often need to abstract away from specific cases. Likewise, in aiming at the laudable goal of conducting in-depth, context-rich analyses of small-scale data, researchers sometimes too quickly make the inferential leap to a larger social phenomenon (Gehman et al., 2018).

As we might expect, the third and final step, "theory development," led to the chapter's primary theoretical contribution. As I explained above, the analytical objective was to identify the different category placement efforts of GM, Tesla, and Nissan, by way of associational patterns, under correspondingly parallel but also contextually different circumstances. Without going into too great detail, it is worth noting for our purposes here that our recursive methodology helped us capture each firm's categorization strategy by aligning micro-level coding with macro-level computation, which together helped us uncover latent associational patterns that were also theoretically meaningful. The addition of computational analysis and its alignment with qualitative coding helped us deepen our discovery process while also expanding it to the large text corpus, adding substantial rigor to our theoretical conclusions. And because the micro and macro analyses informed each other, together they allowed us to more effectively avoid both theoretical under- and overfitting.

Recursive Analysis: Implications

The triple challenge of the curse of dimensionality, model fit, and under-/over-fitting defines the classes of potential risks associated with various kinds of research. In aggregate, the tradeoffs associated with each challenge reinforce the dividing

line in organizational research between small-scale and large-scale research while they often inadvertently reproduce it.

The difficult tradeoff between under-fitting and over-fitting, for instance, has limited our ability to see how micro and macro phenomena partake of each other, as Giddens argues, and how the qualities of each can also prove complementary. And as I have argued, the intermediate step of identifying patterns in the data and the final step of abstracting from data or generalizing to theory too quickly all carry substantial methodological and theoretical implications and costs. I suggest that the analytical correspondence between certain small-N and large-N methods allows and encourages us to use both methods at once, each aligning with and reinforcing the other.

As the EV case study demonstrates, the alignment can go a long way toward acknowledging how macro structures and micro activities, practices and processes partake of one another analytically and take advantage of that fact methodologically in deploying what I have called the RA framework. It also helps operationalize the analysis of micro- and macro-level data on their own empirical terms, not as substitutes for but complements to each other. More important still, by aiming explicitly for alignment across small-scale and large-scale data (Fig. 3), this kind of analysis operationalizes the *empirical* partaking (Fig. 1) that Giddens identifies between microprocesses and macrophenomena in an expressly recursive analytical process (Fig. 2).

CONCLUSION

My review of how my co-authors and I examined the development of the EV category proposed *RA* as a methodological framework. I argued that the conflation between small-N data and qualitative methods and large-N data and quantitative methods belies the recursivity between micro practices and macro phenomena. The assumed independence of the two analytical methods therefore also belies the independence of the two levels. The review of our case study demonstrated instead their interpenetration and recursivity, the partaking of the micro in the micro and vice versa.

Our EV study presented an ideal case to review from a methodological and theoretical perspective (Hitlin & Piliavin, 2004). Methodologically, the correspondence between specific instances of language use and institutional regularities represents an opportunity for studying how micro-level activity and macro-level legitimacy partake of, and are implicated in, each other. Theoretically, a model that examines the correspondence between language and institutions (Suddaby, 2011) helps us better understand the process of institutional creation, construction, and maintenance (Kennedy, 2008; Kennedy & Fiss, 2013).

Implementing the RA framework I propose in this chapter should help address what I have called the theoretical under-fitting, or contextual thinness, of exclusively quantitative methods and the theoretical overfitting, or contextual narrowness, of exclusively qualitative methods. As the review of the case study suggests, the directional sequence from qualitative observation to quantitative

confirmation, is context-dependent and therefore largely accidental (Tunarosa & Glynn, 2017). At the heart of ML, and the analogous RA framework I am proposing, is exploration, or induction. But just as there is no necessary equivalence between micro processes and qualitative analysis or macro phenomena and quantitative analysis, there is none between qualitative analysis and exploration / induction or quantitative analysis and confirmation / deduction (Ragin, 1987; Ragin & Amoroso, 2011). The methodological equivalent to Giddens' recursivity of *langue* and *parole* may very well be the power of a more flexible approach such as the one I propose here in generating the *abduction* that helps recognize patterns (step two) or, in some cases, even reduce the problem space (step one) or generate theory (step three), in every case and in aggregate partaking of both micro and macro (Kennedy & Fiss, 2013; Ragin, 1987). From this vantage point, movement from quantitative exploration, using inductive computational techniques, to qualitative complexity and confirmation is just as likely as the opposite and more common case (Cornelissen, 2017).

Finally, the RA framework I propose recognizes the opportunities afforded by advances in computational methods, which make possible the scaling of fine-grained analysis. The proposed framework likewise recognizes the lag that the advances have created between theory and method. By charting a primarily technical course, such advances have generated findings with a largely atheoretical import, in effect creating an unintended paradigm shift (Kuhn, 1970) and, consequently, a methodological gap – one that calls for a return to microfoundations implicitly misidentify as a gap between theory and empirics. If we recognize the gap as primarily methodological, we can begin to find our way out of the current theoretical stalemate about microfoundations by working "back" from method to theory, closing the phenomenological loop. Doing so requires sustained attention to developing mixed-methods approaches that unite micro and macro as well as data and theory.

Advancing a recursive research agenda will allow us to harness technical developments and discoveries to reconfigure and re-invigorate urgent theoretical questions (Molina-Azorin et al., 2017). Not all data, textual or otherwise, will conform to those described in the case study above (Edelmann & Mohr, 2018). Likewise, not all research questions are appropriate for the RA framework developed in this chapter. But applied more deliberately and consistently, a research approach based on recognizing the multidimensional and recursive nature of textual and linguistic data in particular should help move us toward empirically measuring theoretical constructs and therefore toward asking and answering more large-scale, theoretically relevant research questions that remain unaddressed, such as: How do industries emerge (Kennedy, 2008; Kennedy & Fiss, 2013)? How do large-scale institutional "epiphenomena" (categories, logics) come to be, and how are they instantiated (Thornton et al., 2012)? When do widely held and deeply embedded assumptions, values, and ideologies (Giorgi, Lockwood, & Glynn, 2015; Tchalian, Alsudais, & Ocasio, 2019) change and when do they remain genuinely stable despite larger institutional shifts, and why? Implementing such a methodological approach requires the development of additional technical expertise in computational tools and methods. But unlike the more technically inclined disciplines from

which the methods originate, it aims to achieve the primary objective of organizational and institutional insights, a fundamentally theoretical orientation regarding the relevance, purpose and meaning of our research questions.

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