

Naturalistic Decision Making: Establishing a Naturalistic Perspective in Judgment and Decision-Making Research

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“*Every* author [in the first book about NDM] said or implied strongly that he or she was interested in how decisions were *actually* made in the world. That is undoubtedly an interest of every person who identifies with judgment and decision making and many besides, but the implication virtually every time it was used was that decision theorists are *not* interested in how decisions are *actually* made... It is incumbent on the proponents of naturalistic decision making, or perhaps on the proponents of specific models, to be more explicit about the level of analysis that they are adopting, and to describe the grain at which they are investigating the processes of interest. In no chapter in the book was there a report of the research at a descriptive, operational level that would permit the sine qua non of scientific work, independent replication.”

Michael E. Doherty in “A Laboratory Scientist’s View of Naturalistic Decision Making.” (1993, pp. 381-382)

“Naturalistic inquiry, embracing the dual procedures of exploration and inspection, is clearly necessary in the scientific study of human group life. It qualifies as being “scientific” in the best meaning of that term.”

Herbert Blumer in “Symbolic Interactionism” (1969, p. 47)

Introduction

Within the psychological sciences, and the specialized field of judgment and decision making in particular, a growing number of international researchers have coalesced around the concept of a movement called “naturalistic decision making (NDM).” While strongly sensing that their work stands apart from “laboratory” or “traditional decision research,” they have struggled somewhat to articulate a shared boundary between their movement and other researchers within their field. Various attempts to distinguish NDM have focused on different characteristics of the subject of study, aspects of the situation of study, and the study setting itself. None, however, have sought to draw boundaries on the basis of what it means to be a naturalist; that is, on the perspective a naturalist takes and the methodological position a naturalist stands in. This paper offers an overview of the NDM movement, highlights the attempts to establish its boundaries and critical remarks of those attempts, then discusses the naturalist perspective and methodological position. A suggestion is made that the adoption of the naturalistic perspective can serve as the common ground for the NDM community and deal effectively with the common criticisms waged against it.

Brief Overview of NDM¹

The first observation about the NDM movement that ought to be made, and is usually true of any intellectual movement, is that it is comprised of a disparate group of people who cut across a wide range of professions, though most obligingly refer to themselves as “researchers.” There are practitioners who seek to solve problems in their own and others’ domains; academics, some of whom are also practitioners; government researchers who manage funding agencies; and the all-encompassing “behavioral scientists.” The movement has a small contingent of leaders though its membership is not exactly registered, draws inspiration from work done in many disciplines and across international borders, and, as will be shown below, puts forward a number of often-contradictory rallying cries.

Another observation of NDM is also a truism of any intellectual movement—it has a genealogy. While it is always dangerous to pose any such enterprise as monolithic and free from internal contradiction, it can be instructive to survey a movement’s sources of inspiration. One of NDM’s leading proponents, Gary Klein, has pointed to his influences as being threefold: German Gestalt psychologist Karl Duncker, Hubert Dreyfus’ classic critique of Artificial Intelligence, *What Computers Can’t Do*, and Adrian deGroot’s seminal work on the cognition of chess players. The Dreyfus connection is important for understanding another of NDM’s spokespeople, Mica Endsley—her graduate research advisor had been one of Dreyfus’ students (personal communication). David Woods reaches back to the 1930s for inspiration in understanding the “mutuality” of agents and environments (Woods, 2002). The tradition from which Kenneth Hammond springs can find its roots back to the establishment of the Vienna Psychological Institute, where his friend and mentor Egon Brunswik served as a research assistant under Karl

¹ The acronym NDM will be used throughout this paper to denote research conducted by researchers who count themselves, or who are counted by others, as included within the NDM community.

Buhler (c.f., Bower (2002); Hacothen (2002)).² Robert Hoffman finds seeds for NDM concepts in Immanuel Kant (personal communication).

Historians of the movement point to a series of conferences, beginning in 1989, as its points of maturation, though in fact individual researchers had been staking their own claims in NDM as early as 1984. Klein suggested that by mid-1984, there was already “a general interest in understanding the cognitive processes underlying naturalistic decision making” (Klein & Gordon, 1984). The first conference was initiated in 1989...in Dayton, Ohio, sponsored by the Army Research Institute, at which “some 30 behavioral scientists working in academic and non-academic institutions [discovered] that they shared many common themes [in their work], regardless of domain.” (Lipshitz, 2001) A second conference held in 1994, again in Dayton, attracted about 100 participants; a third was held in Aberdeen, Scotland in 1996. By the time of the fourth conference in Warrenton, Virginia in 1998, the movement was receiving cooperation from the American Psychological Association and Human Factors and Ergonomics Society (HFES). Reflecting its international membership, a fifth conference was sponsored by the National Defence College in Stockholm, Sweden, in 2000. In the States, HFES established a technical group in 1995, called ‘Cognitive Engineering and Decision Making,’ partly as an outlet for research and development along the lines of NDM. As of this writing, the technical group includes 527 members.

The Need for Boundaries

While strongly sensing at times that their work stands apart from other research, the proponents of NDM have struggled somewhat to articulate a shared boundary between their movement and the other researchers within their field. Identifying the “other” is the first place one sees their struggle. I count 11 terms that have been used to characterize the “other” throughout the corpus of NDM publications:

- Laboratory
- Traditional (a.k.a. The Traditional Paradigm)
- Classical (Decision Making) [CDM]
- Rationalist
- Formal
- Outcome-oriented research
- Classical analytic techniques
- Standard normative approach
- Judgment and Decision Making [JDM]
- Behavioral Decision Theory / Making [BDT/M]
- Organizational Decision Making [ODM]

Lipshitz, Klein, Orasanu, and Salas (2001) characterized several of these as “sub-disciplines” (of the broader study of decision making) “which evolved partly as extensions of preceding sub-

² My own tree shares these roots. Coming from the London School of Economics, I find much resonance in the spirit of the NDM community with ideas found in Karl Popper’s writings on the logic of the social sciences. Karl Buhler co-sponsored Popper’s dissertation.

disciplines, and partly as a reaction to them (p. 231).” The family tree of decision-making studies is a gnarly one indeed.

The strongest statement of a need to establish boundaries was put forth in the first NDM book, *Decision Making in Action: Methods and Models*, when Orasanu and Connolly (1993) announced the “reinvention of decision making”:

We have referred to our general approach as a reinvention of decision making to signal the contrast between the traditional and the naturalistic paradigms... The NDM orientation is a sharp departure from the way decision research has been and generally still is conducted with naïve subjects, performing artificial tasks that lack meaningful consequences.

(p.19)

That boundaries continued to be important to the community in the early days can be seen in the title of a seminal work published in the premier journal *Human Factors* in 1996: “Establishing the Boundaries of a Paradigm for Decision-Making Research” (Cannon-Bowers, Salas, & Pruitt, 1996).

Others, however, noted more ambivalence in the movement:

Some of the authors (in the NDM community) treat naturalistic and classical decision theories as antagonistic, criticizing the limits of classical decision theory and showing little interest in the research generated by the classical tradition. Other authors are more conciliatory, appreciating the effort that has gone into classical decision theory over the past few decades and recognizing the value of this research within the boundaries where it is relevant. (Klein, Woods, & Orasanu, 1993, p. 409)

While sensitive to the ambivalence, Klein, Woods, and Orasanu sought to paint the proverbial line in the sand with super-strong paint: “To us, it is classical decision theory that is radical, not models of naturalistic decision making” (Klein et al., 1993). By 1997 still others (Pruitt, Cannon-Bowers, & Salas, 1997) in the movement were a bit more cautious, wondering

whether NDM could be seen as a Kuhnian “revolution in science,” and suggesting that “one [was] beginning to take place.” Yet to avoid some of the pitfalls that might accompany such a revolution, Pruitt and his colleagues (1997) left room for the “other” in the world of meaningful problems: “there is a place for [the classical decision making paradigm (p 40).” The most recent publication to “take stock of NDM” saw Lipshitz, Klein, Orasanu, and Salas looking to “foster a fruitful dialogue among the various three-letter approaches to decision making” (e.g., CDM, JDM, BDT/M, ODM as noted above) (Lipshitz et al., 2001).

While it is clear that there is ambivalence about the need for boundaries, it is still worthwhile to explore the reasons behind why some in the NDM community have felt a need to draw them. I suggest that three, intertwined reasons underlie the need:

- Disillusionment
- Normative differences
- Funding

Disillusionment

By disillusionment, I mean two mutually interacting and growing senses in two communities in the late-1970s and early 1980s: the research community and the funding community. On the research side, there was a growing sense that the research on decision making left a lot to be desired among some researchers. Gary Klein hinted at this sense when he noted that he was “motivated by curiosity about how people do so well under difficult conditions” (Klein, 1998). A closer look at his “motivation,” however, reveals how it grew out of disillusionment with the state of decision making in the early-1980s. In personal communication, Klein spoke of a “shattering of faith” in the “information processing” models of decision making he had been working in while an employee of the U.S. Air Force. His review of the state of research in a July 1984 research proposal that became the basis for NDM’s most widely-cited “recognition-primed decision” model of rapid decision making (hereafter: “RPD study”) is peppered with language that hints at the disillusionment at the time:

The approaches of decision analysis, statistical decision making, multi-attribute utility theory, Bayesian decision making, have all presented procedures for making optimal decisions in given situations...However, research has shown that subjects do not behave according to these models. After literally hundreds of studies directed toward assessing these models it is becoming apparent that unaided human decision making is qualitatively different from the process suggested by the normative decision analysis models (Klein & Gordon, 1984).

p. 9)

It must be pointed out that Klein's recent take on this situation differs somewhat from my framing of it as disillusionment. In fact, Klein (1997a) states that:

[t]here is little evidence that the NDM approach developed in reaction to traditional decision research. Typically, if that sort of reaction occurs, one finds a community of researchers breaking away from a larger group to form their own group. Instead, we see that few, if any, of the earliest NDM researchers were doing any work within the traditional framework, or had received any training in the framework. There was some frustration with the traditional view that failure to use various forms of decision analysis results in poor quality decisions. In many field settings, these strategies are difficult to carry out, and often cannot be used. This frustration translated into a curiosity about just what was going on in field settings. (p. 20)

I suggest that Klein's "traditional framework" is too narrowly conceived here. Klein runs the risk of suggesting that NDM researchers came from some completely unrelated field, explored the traditional view, understood that it was failing, became frustrated by the failure, then experienced the "translation" of that frustration into curiosity. By this reading, one is left to wonder from whence this curious bunch came, and where they might go next!

The second form of disillusionment was growing in the funding and development sector, specifically in the U.S. Department of Defense. Klein's story behind the impetus for his 1984 proposal nicely summarizes this side of the disillusionment equation:

... in 1984...the Federal government issued a published notice asking for written research proposals to study how people make decisions under time pressure. The request came from the U.S. Army Research Institute for the Behavioral and Social Sciences, which is in charge of studying the human side of the battlefield equation...My research company wrote a short

proposal (it was requested to be only twenty-five pages or fewer), and we won the contract. Years later, during discussions with some civilians who administer programs at the Army Research Institute, I got some insight into why our proposal was judged favorably. They explained to me that the U.S. Government had spent millions of dollars in the 1970s and early 1980s finding out how people make decisions, and the Army had used these findings to build very expensive decision aids for battle commanders in the field. Unfortunately, most of the aids were disappointing. No one would use them. After ten years of research and considerable expense, they were not much further along than when they had begun. (Klein, 1998, p. 7-8)

Normative Differences

Concomitant with, or perhaps partially responsible for, the disillusionment were normative differences the NDM community felt from the traditional decision making community. From the earliest days the differences could be seen on two related fronts: philosophical and methodological.

Philosophical

This front represents the general outlook on the nature of human behavior. There are evident philosophical strands running through much NDM work. Perhaps the most frequently cited is the proposition that human beings are not simply information processors, engaged in analytical evaluation of and reaction to the environment and its various potential inputs. From the NDM perspective, human beings are acting organisms, taking their environment, themselves and their experience into account as they define (and redefine) situations and chart courses of action. They are inseparably nested in the world around them—living “is always an inclusive affair involving connection, interaction of what is within the organic body and what lies outside in space and time and with higher organisms far outside.” (Dewey, 1929, p. 230) Action is seen as an ongoing, emergent process where mistakes can and will be made and compensated for—optimal actions are not primary. Experience-based intuition, recognition-driven dispositions, and continuous assessment of one’s changing situation become the basis for ongoing courses of action. The tone is evidently Darwinian, and philosophically NDM can be properly viewed as a

continuation of traditions initiated by the pre-Socratics and emerging again in the writings of the pragmatists, critical rationalists, symbolic interactionists, and some phenomenologists.³

Methodology

The second normative pillar on which NDM rests is in the area of methodology – what is the proper/most fruitful way to study human action. Given its focus on the emerging process of action, NDM has sought methods to get at this *whole* unit of analysis. I will expand on this theme below. For now it is useful to note the adoption and adaptation of methods in allied fields of study, such as anthropology. Klein (1998) noted that he “learned a lot about doing field research” in his RPD study—he took on the assistance of an anthropologist in that effort.

Funding

The final reason underlying the need for boundaries is funding. The NDM community has always been made up of researchers in academia and industry, where competition for funding is notoriously fierce. On industry’s side (in the U.S.), most NDM researchers can be found in small businesses, and a significant portion of their funding is linked to the Federal Small Business Innovative Research (SBIR) program, which cuts across federal departments. The vast majority of such funding, however, has come through the U.S. Department of Defense. NDM research in the U.S. has rarely been funded by other major sources, such as the Departments of Justice, Health and Human Services, and Education. An informal estimate from Zsombok in 1997 of the funding for NDM research from the U.S. Department of Defense over the previous decade was in the range of \$25 million to \$35 million (Zsombok, 1997). In 2001, a consortium comprised of leading NDM researchers and computer scientists in industry and academia sympathetic to the movement was awarded a 5-year, basic research contract from the U.S. Army Research Laboratory worth over \$60 million. Boundaries have clearly been useful to the community in procuring much of this funding.

Attempts to Establish the Boundaries of NDM

In reviewing the NDM community’s attempts to establish boundaries, I have identified four themes on which they have suggested their major differences with their various “others” lie:

- A Focus on the Situation;
- A Focus on the Setting;
- A Focus on the Subject; and
- A Focus on the Practical.⁴

³ Another note about genealogy is useful here. Several key NDM figures cite phenomenologists as sources of inspiration. Anthropologist Edward Hutchins acknowledges Aaron Cicourel for help in writing his seminal work, *Cognition in the Wild*. Ranaan Lipshitz has made passing references to Heidegger, if only to suggest that he found “Heidegger’s terminology more than a bit opaque” (cf., Lipshitz, 2001). And Gary Klein has spoken of becoming interested in the phenomenological tradition while working as a Research Psychologist for the U.S. Air Force (personnel communication). That NDM shares some basic principles with symbolic interactionism should come as no surprise—Downes and Rock (1995) noted a “debate about whether significant differences exist between phenomenology and symbolic interactionism.” (p. 217)

⁴ I should note that Zsombok (1997) also offered four “defining markers for NDM research”:

In spelling these out, I shall also attempt to note their strengths and weakness as boundary markers for the NDM movement.

A Focus on the Situation

With this focus, NDM researchers have suggested their work picks up where other decision research has been neglectful; namely, in covering certain types of action situations and covering them wholly, not just a slice of them. Announcing the “reinvention” of decision making, Orasanu and Connolly (1993) argued that the “basic cause of the mismatch [between what is found in research on various aspects of decision making and descriptions of people trying to figure out what to do in the face of difficult circumstances] is that traditional decision research has invested most of its energy in only one part of decision making, which we shall refer to [as] the *decision event*...Research on decision events tends to focus on the ways in which decision makers pull together all available information into their choice of a best alternative” (p. 5). They went on to offer eight characteristics of naturalistic decision settings, which they believed, had “been neglected in past decision-making research, yielding perhaps a truncated view of human decision making.”

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|--|
| <p>Characteristics of Naturalistic Decision Settings
(Orasanu & Connolly, 1993)</p> <ol style="list-style-type: none">1. Ill-structured problems2. Uncertain dynamic environments3. Shifting, ill-defined, or competing goals4. Action/feedback loops5. Time stress6. High Stakes7. Multiple players8. Organizational goals and norms |
|--|

It is these characteristics of the situation that mark the proper object of study for the NDM researcher, though “it is not likely that all 8 factors will be at their most difficult levels in any one setting...” (p. 7). Others suggested additional characteristics, such as multiple goals,

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- array of *task and setting* factors;
 - *research participants* (*experienced* decision makers, not naïve subjects);
 - *purpose* of the research (discovering how experienced people *actually make decisions* in context-rich environments, not how they ought to make decisions in approximation to rational standards); and
 - *locus of interest within the decision episode* (not just in the option selection process, but also in *situation awareness*).

The first two are, for all intents and purposes, the same as my first and third. The other two, however, I suggest are rather difficult to distinguish from her first and from each other. I believe my analysis allows a look at more distinct themes.

decision complexity, quantity of information, and level of expertise (Cannon-Bowers et al., 1996).

Critique

As a potential stake in the boundary, this theme suffers from two shortcomings. First, one is left to wonder just how many factors need be present in a situation to classify it as a proper NDM study. Secondly, while it may be true that other decision research has neglected such action situations, there is seemingly no good reason why traditional researchers could not study such situations with a few of these characteristics. The list might serve as an invitation, rather than a boundary stake.

A Focus on the Setting

This theme has been most controversial within NDM research. It regards the proper setting for research; that is, where and how ought research be conducted. The usual boundary has been drawn between “field” or “natural” and “laboratory” or “Spartan” environments. Stress is placed on the “context” that field studies provide, as opposed to the “abstracted” and “reduced” perspective offered in the laboratory setting. A single rationale underlies the theme: that “very different conclusions may be drawn about the fundamental nature of human decision making depending on the tasks, methods, and participants” (Orasanu & Connolly 1993).

Critique

This seemingly straightforward and common-sense reason, however, has not guided NDM researchers down the same path. Witness the following quotes offered throughout the movement’s history by its chief spokespeople:

“Laboratory work must have a place in NDM.” (Pruitt et al., 1997, p. 40)

“The interest in field settings does not preclude laboratory paradigms.” (Klein, 1997b, p. 17)

“(Future work) will also include strategies for more controlled observations using simulations.” (Klein et al., 1993, p. 410)

“NDM proponents have generally rejected the notion of conducting laboratory studies; instead, they favor field research as a single alternative. Our opinion is that this position is extreme.” (Cannon-Bowers et al., 1996, p. 202)

“While field methods dominate, other methods may be used, such as simulation and laboratory techniques.” (Lipshitz, 2001, p. 343)

“NDM research does not mandate field studies as the only methodology. To the extent that laboratory studies can replicate the factors present in real-world decision making such that subjects take the tasks as seriously as they do in real life, lab studies can be considered as included under the umbrella of NDM research.” (Zsombok & Klein, 1997, p. 6)

I shall return to this theme later. For now, it is illuminating to note the vacillation.

A Focus on the Subject

This focus is about subjects of study. Here, the line of demarcation is whether the subject's experience is treated “as a nuisance variable (one to be controlled, counterbalanced, or otherwise ignored) or...as the focus of inquiry” (Pruitt et al., 1997, p. 37). A great deal of NDM research has sought to describe how experience is brought to bear in action, and how those without experience—i.e., novices—differ from experts. In 1993, Orasanu and Connolly introduced this theme as fundamental, on the same level as their focus on the situation:

A fundamental contention of this volume is that decision performance in everyday situations is a joint function of two factors: (1) features of a task, and (b) [sic] the subject's knowledge and experience relevant to that task. Past decision research has neglected these two elements in varying degrees. (p. 7)

Klein has suggested that this turn toward experience and its accompanying “sources of power” is a foundational difference between his work and the traditional researchers. Likewise, Pruitt et al. (1997) believe this to be NDM's hallmark feature: “...we now consider [the experience of the subject] the most essential factor [in recognizing an NDM study]” (p. 39). And the prevailing “definition” of NDM explicitly calls it out:

Naturalistic Decision Making is the study of how people use their experience to make decisions in field settings. (p. 11)

Critique

This theme seems strong as a boundary stake. Unfortunately, because NDM researchers have not settled the issue regarding the proper setting for their research, the strength of this stake is weakened. To say that experience matters implies that experience—how it develops and the processes by which it is brought to bear on the conduct of action—should be gotten at. NDM researchers who have suggested that laboratory research has a place in NDM have not suggested how experience can be explored in such a setting.

Focus on Practical

This final theme highlights the fact that many NDM researchers view their movement having grown out of attempts to tackle practical problems. Klein (1997b) put it this way:

“Work in NDM is often informed by practical problems, as opposed to testing hypothesis derived from theories” (p. 12).

And Pruitt et al. (1997) also drew a distinction between “...real problems rather than presupposed theories...” The tone around the theme strikes one as that of pride over the proverbial “ivory tower,” with heralds going out to remind researchers that “NDM stands for” the practical problems – “the proof of our labors rests in our ability to apply theories and findings. We need to develop applications that are consistent with NDM philosophy” (p. 40).

Critique

What limits this theme as a boundary stake is that it nearly benches NDM off the scientific playing field. While the application of social and psychological theoretical systems and concepts can (and should) be used as one potential test of their veracity, “...it is important to recognize that not all problems of applied [social science] are pertinent to, or contribute to, the development of science...[A]ny discipline has technical and internal problems that are important to resolve and deal with, if the field is to progress, but they may have no conceivable relationship to pressing [applied] problems” (Clinard, 1966, p. 410-411). To the extent that the NDM movement wishes to be considered a genuine scientific endeavor, it must not lose sight of this key point.

Naturalistic Perspective and Methodological Position

In introducing the NDM community, I have attempted to show how its membership has attempted to draw boundaries between themselves and other judgment and decision making researchers. In demonstrating the ambivalence about the nature of these boundaries – indeed about whether there ought to be boundaries at all – I suggest that the NDM community seems only loosely united around the notion that they are different, that something about what they do ought to be taken as revolutionary, or at least unique. But their unity comes accompanied by

feelings of confusion about the nature of their distinctiveness. This position has been stated by others:

“...the NDM researchers are still experiencing something of an identity crisis...in their attempt to establish a place for NDM within general decision theory, while striving to demonstrate how it has something new to offer.” (Flin, Salas, Strub, & Martin, 1997, p. 4-5)

I suggest that NDM is different, yet not for the any of the four themes stated above. I suggest that where NDM researchers have adopted the naturalistic perspective and methodological position, they can be considered distinct in their field of science. I do not believe any NDM researchers have explicitly stated this. It might seem at first glance that the “Focus on Setting” theme accomplishes this statement. However, Orasanu and Connolly’s (1993) original statement did not go very far in providing a case for adopting the naturalistic perspective. Moreover, it seems that the NDM community since that statement has not been consistent with their original notion of the relevance of studying in the field.

In what follows next, I shall attempt to provide the case for adopting the naturalistic perspective, and outline the methodological tenets that follow from it. While I do not wish to suggest that the NDM community’s “true” or only roots lie in a crusade for the naturalistic perspective—it has always had other concerns—I do suggest that the community’s most valuable contributions have come when its members adopted the perspective. And I believe that the movement’s advance might be furthered by an explicit statement of the foundation for the perspective, a statement that thus far has not been offered. NDM’s spokespeople have put forth foundational statements on their perspectives, but these have for the most part not served them (in getting publication outlets and funding) as well as they might have hoped. They have been attacked on issues of hypothetico-deductivism, rigor, sample size, and generalizability. Thus, I shall also demonstrate where I believe NDM researchers have ineffectively replied to their critics on the topics of hypothetico-deductivism, rigor, sample size, and generalizability, with the intention of suggesting fresh replies.

The Naturalistic Perspective and Methodological Stance

I know of no more lucid statement of the naturalistic perspective and its methodological stance than that offered by Herbert Blumer (1969). Published in 1969, Blumer’s devastating critique of the state of the psychological and sociological sciences remains highly relevant today. Indeed, as one of his students, Lonnie Athens, noted a decade ago, “Blumer’s critique of the quantitative techniques used in the social sciences today has never really been effectively refuted, although it has been effectively ignored. (Athens, 1992, p. 101)

Boundaries were as important to Blumer as they seem to be to some in the NDM community (perhaps even more important given the ambivalence some have felt in attempting to

establish them in NDM). Indeed, Blumer (1969) clearly saw the value in establishing sharp boundaries “between naturalistic inquiry...and the formalized type of inquiry so vigorously espoused in current methodology”—they served an emancipatory purpose:

This opposition needs to be stressed in the hope of releasing social scientists from unwitting captivity to a format of inquiry that is taken for granted as the naturally proper way to conduct scientific study. The spokesmen for naturalistic inquiry in the social and psychological sciences today are indeed very few despite the fact that many noteworthy studies in the social sciences are products of naturalistic study. The consideration of naturalistic inquiry scarcely enters into the content of present-day methodology. Further, as far as I can observe, training in naturalistic inquiry is soft-pedaled or not given at all in our major graduate departments. There is a widespread ignorance of it and an accompanying blindness to its necessity. (Blumer, 1969, p. 47)⁵

As the opening quote demonstrates, Blumer equated naturalistic inquiry with his conception of science, *the latter being possible only through the former*. In what follows, Blumer makes the normative case for naturalistic perspective while blatantly calling out its opposition:

[N]aturalistic investigation [is] investigation that is directed to a given empirical world in its natural, ongoing character instead of a simulation of that world, or to an abstraction from it (as in the case of laboratory experimentation), or to a substitute for the world in the form of a preset image of it... [The naturalistic perspective]...recognizes that the genuine mark of an empirical science is to *respect* the nature of its empirical

⁵ Though Blumer might be interested to learn of the growing interest in the research community and its sponsors in the NDM movement, his comments remain apropos.

world—to fit its problems, its guiding conceptions, its procedures of inquiry, its techniques of study, its concepts, and its theories to that world. It believes that this determination of problems, concepts, research techniques, and theoretical schemes should be done by the direct examination of the *actual* empirical...world rather than by working with a simulation of that world, or with a preset model of that world, or with a picture of that world derived from a few scattered observations of it, or with a picture of that world fashioned in advance to meet the dictates of some imported theoretical scheme or of some scheme of “scientific” procedure, or with a picture of that world built up from partial and untested accounts of that world...[T]he nature of the empirical...world is to be discovered, to be dug out by a direct, careful, and probing examination of that world...It is exemplified among the grand figures of the natural sciences by Charles Darwin (emphasis added). (pp. 21-47)

It is worth note to emphasize here Blumer’s use of the word “actual.” As Doherty (1993) notes in the opening quote, the term has been used by some in the NDM community to stress their research approach of describing the processes their subjects employ in the course of conducting themselves—in other words, their appreciation of the naturalistic perspective. Indeed, Klein’s RPD study explicitly stated this as an objective: “One of the goals of this proposal is to support the development of a model of how people actually make decisions” (Klein, 1984). We should ask, though, what is assumed when one states they are studying the “actual” world—that is, what is assumed about that world that lets one know when they are in touch with it? For the naturalist studying human behavior, a few basic assumptions about subject matter are taken for granted:

- They will assume at a minimum that people are active participants in their world, engaged in and directing the processes of living.
- They will assume that people have perspectives about their world (that is, that things and situations in the world hold different meanings for people), that such perspectives can change over time and space and as people interact with the world and particularly with

other people and themselves, and that such change is processual, emergent in the ongoing experience of living.⁶

- Finally, they will assume that this active, perspective-laden experience of living is the ultimate unit of analysis for their field of study—one will know he/she has reached it when he/she can interpret and define a situation and a matching action as if he/she were living it him/herself.⁷

Robert Prus (1989), another Blumerian, has noted that researchers who do not accept these basic assumptions seemingly set themselves apart from their fellows:

If researchers can think, experience dilemmas, develop strategies, selectively present themselves to others, and make ongoing adjustments through internal conversations, would it not also make sense to see if other people could do likewise? (p. 288)

For Blumer, a methodological stance logically follows from the adoption of the naturalistic perspective. In laying out this stance, Blumer presaged some of the criticisms waged against the NDM community. His strategy for dealing with these criticisms, however, is far more radical than those that Lipshitz (2001) offered (i.e., that experimentation “standards of rigor” and “theoretical strategies” are “inappropriate” or “irrelevant”). Blumer’s position asserts rather that naturalistic inquiry is the more rigorous approach:

The merit of naturalistic study is that it respects and stays close to the empirical domain. This respect and closeness is particularly important in the social sciences because of the formation of different worlds and spheres of life by human beings in their group existence. Such a world or sphere of life is almost always remote and unknown to the research scholar; this is a major reason why he wants to study it. To come to know it he should get close to it in its *actual* empirical character... This is not a simple matter of just approaching a given area and looking at it. *It is a*

⁶ Disciplines might hold others, but these seem basic to naturalists

⁷ More will be said on this below. Here it is worthy to note that Lipshitz has put the notion of “situation-action matching decision rules,” which NDM researchers often seek as an explanation, in the simple form: “Do A because it is appropriate for situation S.”

tough job requiring a high order of careful and honest probing, creative yet disciplined imagination, resourcefulness and flexibility in study, pondering over what one is finding, and a constant readiness to test and recast one's views and images of the area...It is not "soft" study merely because it does not use quantitative procedure or follow a premapped scientific protocol. That it is demanding in a genuinely rigorous sense can be seen in the analysis of its two fundamental parts... "exploration" and "inspection" (emphasis added). (pp. 21-47)

By exploration, Blumer meant a flexible procedure in which a researcher gains familiarity with the empirical world under study while simultaneously "developing and sharpening his inquiry so that his problem, his directions of inquiry, data, analytical relations, and interpretations arise out of, and remain grounded in," that same empirical world. This agrees with, yet goes beyond, the notion stated by Lipshitz (2001) that "the methods must be suitable to the research questions," for it is not only methods that must be suitable. Where one's research question concerns the world of human action, one must direct his or her inquiry *directly* to that world bearing in mind that as one comes to understand it better the research enterprise is subject to change. By suggesting a flexible procedure, Blumer (1969) does not advocate "soft" research; rather, he draws attention to the fact that conducting research is a process, not a procedure:

The purpose of exploratory investigation is to move toward a clearer understanding of how one's problem is to be posed, to learn what are the appropriate data, to develop ideas of what are significant lines of relation, and to evolve one's conceptual tools in the light of what one is learning about the area of life...The procedure should be adapted to its circumstances and guided by judgment of its propriety and fruitfulness...[Researchers need not be] pinned down to any particular set of techniques...(pp. 40-41).

Rigor, then, for the naturalist is to be fostered and admired—it is utterly appropriate and relevant. However, it is demonstrated not by strict obedience to some prescribed protocol but by unwavering respect for the empirical world of study. Meticulousness ought to describe the manner by which the researcher has described his/her units of analysis after having carefully dug them out, not how carefully he/she processed his/her statistical analysis of data removed from the empirical world. Scrupulousness should be applauded for the documentation of the research processes, the challenges presented thereby, and the efficacy of the manner by which they are dealt with, not for following the same course laid out by another to seek answers to the same question. The criteria for judging the quality of studies is the extent to which a researcher has come to know his/her selected domain of interest. And this will always be difficult. Indeed, rigor for the naturalist implies another sense rarely experienced by non-naturalist—it can be downright arduous. The empirical world is “out there” and on its own time.

Flexibility in exploration should not be mistaken for the inductive approach, or “inquiry-guided research,” or “hypothesis-free inquiry,” as some have suggested is the nature of qualitative research (Lipshitz, 2001); Weick 1968). On the contrary, key to the process of research for Blumer (1969) is the active assessment of one’s theories about their subject of study:

It is particularly important in exploratory research for the scholar to be constantly alert to the need of testing and revising his images, beliefs, and conceptions of the area of life he is studying. Part of such testing and revision will come from direct observation and from what informants tell him, but since his task extends to a probing into areas beneath those known to his informants, he should cultivate assiduously a readiness to view his area of study in new ways. (p. 41)

Thus, rigor is also to be had in the severity by which one tests his/her concepts. Where one has submitted his/her notions about the empirical domain to their strictest test—the procedure for which will be determined by that same empirical domain—he/she can honestly claim his/her study to have the utmost measure of thoroughness. Blumer looks to the greats for recommendations on how to test one’s concepts:

One is to ask oneself all kinds of questions about what he is studying, even seemingly ludicrous questions... The other... is to record all observations that challenge one’s working conceptions as well as any observation that

is odd and interesting even though its relevance is not immediately clear; Darwin has indicated from his personal experience how readily such observations disappear from memory and that, when retained and subjected to reflection, they usually are the pivots for a fruitful redirection of one's perspective. (p. 41-42)

Thus, the guiding principle is that of conjecture and refutation, a constant interaction between hypothesis and empirical data, with the former implicating the test and the latter being the fodder for it. The *tabula rasa* is *not* the starting point – there is no such thing as hypothesis-free inquiry (cf., Popper, 1994).

A final principle that lays the foundation for exploration is around the notion of sample size. On this measure, the naturalist in the social sciences can find support from his/her colleagues in the biological sciences. “*In The Art of Scientific Investigation*, W.I. Beveridge, a former professor of animal pathology at Cambridge, has remarked that ‘more discoveries have arisen from intense observation of very limited material than from statistics applied to large groups’ (see Athens, 1992). The naturalist is after neither a few nor many “scattered observations”; he/she seeks to thoroughly investigate his/her unit of analysis in as many instances as he/she needs to in order to exhaust, if only temporarily, the observations that are relevant to his/her inquiry.

Beyond exploration lies inspection, the analysis of the results from the exploratory stage and the continuation of the process of conjecture and refutation. By invoking the notion of inspection, Blumer sought to get away from a sterilized, proceduralized scheme of analysis that emphasizes the setting of a theory and its concomitant “variables”—the discrete entities that easily translate into number but which in the process destroy the integrity of the whole unit of analysis—and employs certain, “precision” techniques to get data and explain relations between them. Inspection implies more “intensive focused examination of the empirical content of whatever analytical elements are used for the purpose of analysis” and the relations between them. Rather than prescript a step-by-step method for analysis, Blumer called for a procedure of:

...examining the given analytical element by approaching it in a variety of different ways, viewing it from different angles, asking many different questions of it, and returning to its scrutiny from the standpoint of such questions. The prototype of inspection is represented by our handling of a strange physical object; we 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. This close shifting scrutiny is the essence of inspection. Such inspection is not preset, routinized, or prescribed...Instead, inspection is flexible, imaginative, creative, and free to take new directions. (p. 44)

Thus, the two complementary processes of exploration and inspection become the *sine qua non* of the naturalistic endeavor. But how might one know he/she has reached the end of his/her endeavor? The question is related to the notion of generalizability—how does one know when his understanding of his/her world of interest “generalizes” to the rest of the world? The reply for the naturalist is simply to state that his/her work is never done. Through the process of inspection he/she will ask as many questions as he/she can, form concepts about what he/she sees, and then go back to the empirical world to test those concepts. But the concepts and theories about their relationships will forever be conjectural. He/she may saturate his/her concepts in the empirical world and even consider how they might bear in tests in other worlds, but the process of conjecture and refutation will be larger than him/her, larger than his/her study. It will necessarily implicate his/her colleagues, and challenge them to refute his findings. Generalizability is interlocked with this process. It cannot be had through methods of sampling, or attempts at “representative design” that seek to simulate the empirical world (cf., Hammond, 1993). The naturalist can and should propose his/her concepts as applicable in other areas of life, just as he/she ought to consider how others’ proposed concepts sustain the tests he/she subjects them to from his/her corner of the world.

A Final Word on the Logic of the Social Sciences

Lest Blumer’s characterization of the process of scientific discovery be taken as outlandish, it is worth comparing his perspective on several points to those of another defender of science, Karl Popper. While some view his endorsement of the hypothetico-deductive nature of scientific progress as antithetical to qualitative research (recall: “hypothesis-free inquiry”), I suggest that such characterizations of qualitative research stem from a fundamental misunderstanding of Popper’s, and indeed Blumer’s, approach. For Popper, all scientific knowledge arises out of the same place as do Blumer’s—problems—and he advocated the same qualities of rigor for the social scientist:

Knowledge does not start from perceptions or observations or the collection of data or facts; it starts, rather, from problems...For every problem arises from the discovery that there is something amiss within our

supposed knowledge...or, to be more accurate, from the discovery of an apparent contradiction between our supposed knowledge and the supposed facts...As in all other sciences, we are in the social sciences either successful or unsuccessful, interesting or dull, fruitful or unfruitful, in exact proportion to the significance or interest of the problems we are concerned with; and also, of course, in exact proportion to the *honesty, directness and simplicity* with which we tackle these problems. (Popper, 1994, pp. 65-66)

Starting with problems, the social scientist moves to tentative solutions, which are in-turn tested with reference to the empirical world. How the scientist moves, thus, is determined by the problem at hand, not by “misguided and erroneous methodological approach of naturalism or scientism, which urges that it is high time that the social sciences learn from the natural sciences what scientific method is”(p. 67). Nor should the scientist proceed along so-called lines of “objectivity,” in which he/she seeks to play the role of the Martian observer, freed from the binds of theoretical and social prejudice to pursue strictly observational and descriptive methods to produce inductive generalizations. In place of “scientism,” Popper offered the methodology of conjecture and refutation, whereby concepts are constantly developed and tested against the empirical world. And Popper turned the notion of “objectivity” on its head – rather than connoting the Martian perspective, objectivity ought to refer to the process of criticism, both the process of conjecture and refutation the researcher undergoes and the wider social community of criticism in which science takes place.

By seeing science as beginning with problems and proceeding along the lines of honest, direct inquiry of the empirical world, submitting one’s concepts and data to continuous interaction, Popper can be taken in agreement with Blumer’s approach, that of the study of *actual* human behavior. And like Blumer, a good barometer of the quality of such study is how close one gets to the actual world. For Popper, one knows he has reached the actual world when his concepts reflect the understanding of action in its context:

Objective ‘understanding’ consists in realizing that the action was objectively *appropriate to the situation*. In other words, the situation is analysed far enough for the elements which initially appeared to be psychological (such as wishes, motives, memories and associations) to be

transformed into elements of the situation...[A] man with particular memories or associations becomes a man whose situation can be characterized by the fact that he is equipped objectively with particular theories or with specific information... (Popper, 1994, p. 79).

Blumerians and NDM researchers alike should find much resonance with Popper's words on methodology in the social sciences.

Suggestions for Common Ground within NDM

In summary, the naturalistic perspective brings home the necessity to respect the very nature of what one reports to study. Its accompanying methodological stance, with a focus on the processes of exploration and inspection, serves not only as a guide to conducting scientific research but also as a response to critics who do not appreciate it. For on such issues as hypothetico-deductivism, rigor, sample size, and generalizability naturalistic researchers stand as genuine scientists in the best meaning of that word. The *sine qua non* of scientific work is, *pace* Doherty, direct, interactive contact with the actual empirical domain and the testing of concepts and theoretical schemes. Science can and will continue without replication. In the words of Marvin Thordsen, an NDM researcher of wildland firefighters, "The forest fire only burns once" (personal communication). Scientific study of the experience of those firefighters must take one to the scene, to feel the heat, to smell the smoke, to touch the hose, so that the concepts one develops about that world can be tested against observations of it. Bone fide understanding cannot happen otherwise.

I believe the naturalistic perspective can and should serve as the cornerstone for the NDM movement. There is little doubt that some of its most nourishing fruits have come when its proponents adopted it. Klein's RPD study is widely cited as the prototypical NDM study, and he has freely admitted to learning "a lot about doing field research" in its course. Hutchins (1995) ethnography of shipboard navigation teams stands as another cornerstone achievement. And it is also quite clear that NDM's chief spokespeople have suggested an appreciation for the perspective. Orasanu and Connolly offered early the deceptively simple notion that the very nature of understanding human decision-making behavior can change based on the task, methods, and participants. More recently, Klein has cleverly suggested that the common methodological perspective on rigor—the one that states rigor is had by the proper implementation of some or another method—will only result in "rigor mortis." Yet, NDM as a whole cannot be considered a movement of the naturalistic perspective. *Nearly all of the spokespeople cited above have called for the employment of methods that do not aim at get one closer to or be better able to dig into the empirical domain of human action and the processes of living.* Rallying cries that have sought to align NDM researchers with "laboratory" researchers and their pet methods have in turn weakened their own sense of uniqueness, and run the risk of arresting the development of the field. Common ground for NDM researchers can and should be

had on the side of the naturalistic perspective, and the “identity crisis” would thereby be alleviated.

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