

WEATHER FORECASTING
AND THE REMAKING OF THE CHICAGO TRADITION

Phaedra DAIPHA, *Masters of Uncertainty: Weather Forecasters and the Quest for Ground Truth* (Chicago, University of Chicago Press, 2015)

What will it do next? Many people were asking this question, as hurricane Irma was making its way through the Atlantic Ocean, destroying much that stood in its way. Residents of Florida were asking this as they considering whether to leave their homes. Florida city officials were asking it as they were considering introducing measures such as mandatory evacuation. Storm chasers were asking it as they were searching for the eye of the storm. For answers people turned to meteorologists. Weather predictions became breaking news. But answering this question was not easy, even for meteorologists. Their predictions were not always correct. *Masters of Uncertainty* helps us understand why. Phaedra Daipha asks the question “how weather forecasters achieve coherence in the face of deep uncertainty, how they harness diverse information to project themselves into the future?” [138]. Her answer is based on an ethnographic fieldwork conducted in one of the 122 field offices of National Weather Services (NWS), which she calls Neborough.

Masters of Uncertainty is divided into 8 chapters. The introduction presents Daipha’s theoretical framework. It lays out the basic principles of “a sociology of decision making.” Chapter 1 describes the institutional context in which weather forecasters operate, discussing both the history of the profession as well as the organizational history of the NWS. Chapter 2 focuses on a weather forecasting shift. We get a tour of the Neborough office and follow the process of developing a weather forecast. Chapter 3 explores the art and science of predicting the weather. Chapter 4 focuses on how weather forecasters deal with risk and the types of errors that they commit. It describes two events in which forecasters were unable to accurately anticipate the weather. Chapter 5 discusses the temporal dimension of weather forecasting. Chapter 6 moves from production of weather forecasts to the consumption of weather forecasts. It investigates how forecasts are used by commercial fishers and captures the complicated relation of experts and their publics. The book concludes with an extension of the theoretical framework beyond the single case of weather forecasting to medicine, finance, and beyond.

There is much that I enjoyed about reading this book. *Masters of Uncertainty* is based on a carefully designed and well-executed study. The book combines rigour and imagination. It is well written, avoids unnecessary jargon, but is theoretically innovative. If sociologists can claim the right to expert knowledge, then Phaedra Daipha's account of the world of weather forecasters is an example of such. And to better understand Daipha's expertise it is worth contextualizing it because, to apply Daipha's words to her own work, "experts and expertise are established within particular 'communities of thought' precisely because they are also 'communities of practice'" [10].

Daipha's expertise is the product of interactions with the communities of practice of meteorologists and commercial fishers. Her interactions with those communities over the course of 22 months, first in 2003-2004 then again in 2008, provided her with the majority of the empirical material for the book. It also allowed her to acquire "interactional expertise," enabling her to follow the process of creating a weather forecast. However, Daipha's expertise is also the product of another community of practice: the one located at the University of Chicago. Daipha wrote her PhD at Chicago, which then became *Masters of Uncertainty*. While she left Chicago for Rutgers in 2007, the theoretical language of the book owes much to the Chicago community, something that she recognizes in her acknowledgments.

To capture the skilful action of weather forecasters Daipha uses the notion of collage. For her collage is the ability of weather forecasters to distil complexity and creatively combine abundant pieces of very different types of information into a coherent and meaningful gestalt. The theoretical framework of the book is itself such a collage. Daipha uses elements from Science and Technology Studies, phenomenology, ethnomethodology, various strands of practice theory, and Gerd Gigerenzer's ecological psychology. She is able to skilfully combine these very different approaches into something new and original.

Some of the most important pieces of this theoretical collage are the works of authors related to Chicago. We thus find extensive references and discussions of the works of John Dewey, George Herbert Mead, Erving Goffman, and Everett Hughes. We also find references to more contemporary authors such as John Levi Martin, Karin Knorr Cetina, and especially her supervisor Andrew Abbott. The book builds on many of the theoretical ideas that have been developed by Abbott. There is a focus on time and process, emphasis of the problem of excess and cognitive overload, as well as the idea that social processes have a tendency to reproduce themselves in fractals.

Daipha thinks with and sometimes against the Chicago tradition, while introducing new elements into it, such as for example her strong emphasis on materiality.

Masters of Uncertainty is an ethnographic case study of an occupation. It contextualizes the actions and interactions of the members of that occupation, that is to say, it locates them in space and time. In that it resembles much of what has been traditionally associated with Chicago sociology. However, what it shares with some of the more recent work related to Chicago is a more explicit emphasis on the processual nature of social life and a re-evaluation of pragmatism both as an action theory and a more general approach to conducting research.

Like some of the other recent work from Chicago [Abbott 2001; Abbott 2016; Menchik 2014]¹, Daipha focuses especially on the temporal dimension of social life. In Chapter 5, which is one of the more interesting of the book, Daipha discusses the different “temporal regimes” of meteorological decision making. She distinguishes between “emergency decision making” and “extended alert decision making”, and between “near term” and “long term decision making”. In making such distinctions Daipha is able to capture, what Andrew Abbott has called, the “two ways of thinking about time” [Abbott 2016: 180–183]. Firstly, there is time understood as a sequence of events (*chronos*). This sequence can be observed and captured by somebody from outside of the process. Thus, Daipha describes the organizational rhythm of NWS and the annual switch between forecasting during the winter and during the summer. We also learn about the daily rhythm of a meteorological shift. But there is also time as something that is experienced within the social process, by the participants of those events: a passage from their anticipations about an uncertain future into memories about the past (*kairos*). We therefore get to know how weather forecasters anticipate the weather, but also how they deal with and interpret a situation of having a previous forecast miss the mark. In her analysis Daipha is able to weave together these two ways of thinking about temporality.

Following the work of Abbott in emphasizing the processual and relational aspect of social life, Daipha shows that, in the world of

¹ Andrew Abbott, 2001, *Time Matters: On Theory and Method* (Chicago, University of Chicago Press). Andrew Abbott, 2016, *Processual Sociology* (Chicago, Chicago University Press). Daniel A. Menchik, 2014.

“Decisions About Knowledge in Medical Practice: The Effect of Temporal Features of a Task”, *American Journal of Sociology*, 120 (3): 701–749.

weather forecasting, social time does not exist outside of action and interaction. The world of weather forecasting is constantly remaking itself through the actions and interactions of weather forecasters and their publics. However, even though Daipha's sociology of decision making focuses on the dynamics of the moment, she nevertheless situates those moments within the context of more extended processes of the changing institutionalized decision making environment. We thus learn about the emergence of weather forecasting as an enterprise, a process that started in the late 18th century. We learn about the rise of meteorology as a scientific profession that has successfully claimed jurisdiction and control of expert knowledge. We learn the organizational history of the National Weather Service and the transformation of a quasi-monopolistic industry to a competitive industry in the late 19th century. We learn about the process of mediatisation of weather forecasting, which has taken place since the 1970s, and the technological revolution that took place in the second half of the 20th century. We also get to know about the more recent process of digitization, a process that Daipha was able to document first hand during her initial fieldwork in 2004, when it was just beginning, and again during her ethnographic revisit in 2008, when digitization was already in full swing.

The world of weather forecasting is particularly well-suited to theorize about the processual nature of social life. Norbert Elias, a processual sociologist if there ever was one, used the metaphor of the wind to explain the problem with "process-reduction" in sociology. Elias wrote "we say the wind is blowing, as if the wind were actually a thing at rest which, at a given point in time, begins to move and blow. We speak as if the wind were separate from its blowing, as if a wind could exist which did not blow [...] This reduction of processes to static conditions, we shall call 'process-reduction' for short" [Elias 1970/2012: 106-107]². In a processual account, society is not theorized as a stable system of rules and norms that sometimes get moved and transformed during a breakdown or by the emergence of a new social movement, but rather a never ending process where stability is often only apparent and is something to be explained [Abbott 2016]. The social process in some ways resembles the one studied by meteorologists. Weather patterns are the result of long term processes like global warming; intermittent changes related to local phenomena such as for example El Niño, as well as day-to-day variations in

² Norbert Elias, 1970[2012], *What Is Sociology?*, Vol. 5, edited by S. Mennell (Dublin, UCD Press).

temperature. Similarly, in a processual approach social structures of the world of weather forecasters emerge out of overlapping processes taking place across different scales of time and space. Some of these processes take a long time (emergence of the weather forecasting profession); others take a few years (digitization), while still others occur quickly (the career of a particular forecast). Some are cyclical (the move from summer forecasting to winter forecasting and back), while others are linear (again digitization). Some extend across the social space and go beyond weather forecasters (the move from the written word to image representation), others involve only weather forecasters or a particular NWS office. Thus, within a processual approach, the task of the social scientist in some ways resembles that of the weather forecaster, who in order to capture weather patterns has to skilfully combine data across scales of time and space, a point that was recently made by Andrew Abbott.³

Besides a focus on time and process, Daipha's work shows an extensive involvement with pragmatism. In this regard her work too belongs to a community of thought with some of the other recent work from Chicago [Abbott 2016; Martin 2011]⁴. From pragmatism Daipha takes a focus on materiality, an action theory centred on the notion of habit, and an understanding of what constitutes an explanation in social science.

Daipha strongly emphasises the impact of technological change on social life. Arguing against conflating pragmatism with symbolic interactionism, she focuses on the impact of materiality and technology on the practices of weather forecasters. Thus, *Masters of Uncertainty* should particularly appeal to those interested in the intersection of technology and science studies and the sociology of professions. Daipha shows how recent technological development has created a situation in which the jurisdictional struggles of weather forecasters do not take place against another profession or against lay persons' knowledge but rather against machines and computer models. Contemporary weather forecasters prove their expertise both to themselves and to others by being able to "beat the models" in anticipating the future. They do this by switching between different models and juxtaposing them but also by stepping away from their

³ Andrew Abbott made this point when referencing Phaedra Daipha's work during a 2016 speech in Frankfurt entitled "Processual Social Theory." Video from this speech can be found on <http://www.normativeorders.net/de/veranstaltungen/ringvorlesungen/38->

[veranstaltungen/ringvorlesungen/4522-processual-social-theory](http://www.normativeorders.net/de/veranstaltungen/ringvorlesungen/4522-processual-social-theory).

⁴ John Levi Martin, 2011. *The Explanation of Social Action* (New York, Oxford University Press).

instruments of observation and observing the weather more directly. Rather than engage in what Daipha calls *screenwork*, weather forecasters go outside of their office in search of “ground truth”. They experience the weather using different senses, not only by looking at the clouds, but also by listening to the wind or feeling the raindrops with their hands. In other words, even in such a highly technical environment, the cognition of weather forecasters continues to be embodied. Daipha also shows how recent digitization trends have forced weather forecasters to switch from being a primarily literary speciality to one that produces pictorial representation of weather. While focusing on the role of technology on decision making and on the world of weather forecasting, Daipha is able to avoid simple technological determinism. She shows how technological innovations are incorporated, used, contested and transformed within the particular community of practice of weather forecasters.

As well as investigating material aspects of social life, from pragmatism Daipha takes an action theory centred on the notion of habit. Over the last 20 years there has been a revival of interest in a pragmatic theory of action. However, in the US the great majority of this interest has been purely theoretical. And Daipha does not shy away from theoretical discussions, as she compares her pragmatic approach with the recent developments in cognitive sciences, such as the “dual-process models” of cognition. But in contrast to the purely theoretical work on pragmatism, the book illustrates the benefits of pragmatism through an empirical study. Daipha shows that, while in the long run weather forecasters have been struggling over jurisdiction and ability to claim expertise, on a day-to-day basis they have to deal with much more practical problems related to their task at hand. They do this through a mix of “intelligent habits” and “routine habits,” a distinction she takes from Dewey. When solving those problems, the means and the ends, the diagnosis and the prognosis are often difficult to separate. Weather forecasters have to cope with an excess amount of information. They have to distil this excess in a way that is understandable to the public but remains authoritative. To capture their practical ability to cope with this situation Daipha introduces the notion of *aesthesis*: “shared models of looking reasoning and doing.”

Drawing on her ethnography Daipha is able to study this practical sensibility and capture action as it unfolds. However, because her research design included an ethnographic revisit of her field site, she was also able to capture change over time. Her research illustrates very well the pragmatic idea that problematic situations over time become

routine, while new problematic situations emerge and have to be dealt with. Her use of the ethnographic revisit to capture this process is particularly effective and could be fruitfully used in other contexts as well.

The engagement with pragmatic tradition extends beyond action theory and involves a more general approach to conducting research. Daipha references a quote from William James: “The whole point of it [pragmatism], is its concrete way of seeing. It begins with concreteness and returns and ends with it” [11]. Avoiding abstractions, the book provides a thick description of the life worlds of her interlocutors, hoping that the reader will be able “to translate into their own terms the world and practice of weather forecasting” [197]. This theorization of explanation as translation of lifeworld experience echoes some of the other work carried out by authors from Chicago: Abbott’s description of various types of explanation in social science [Abbott 2004]⁵, as well as John Levi Martin’s theorization of a good sociological explanation as one that avoids abstractions and focuses on the “retrieval of the concrete”: “allow[ing] others to inhabit a coherent word, to “get” the principles at work” [2011: 334]⁶.

Instead of a conclusion Daipha lays out a general research agenda for “a sociology of decision making,” which would investigate the role of prospection in other domains of social life. However, before we will be able to move forward with this task at hand, three problems will have to be solved. Firstly, as Daipha points out, we need closer emphasis on how knowledge and expertise is acquired by individuals. This will benefit from a closer discussion of the notion of *habitus* and works within this research tradition, which are rather absent from Daipha’s theoretical collage. Secondly, we need a better theorization of the link between what Daipha calls the “micro context of action” and the “institutionalized environment,” between the day-to-day struggles with practical problems that her work focuses on, and the larger social transformations that are occurring. Finally, there is a need to introduce the element of power in decision making. Even though Daipha writes about conflict within the NWS organization and discusses gender differences among weather forecasters, as well as their struggles with technological innovation, the relation of power to prospection is not emphasized. And for a good reason. Nearly everybody has an interest in the weather being predicted correctly

⁵ Andrew Abbott, 2004, *Methods of Discovery: Heuristics for the Social Sciences* (New York, WW Norton & Company).

⁶ John Levi Martin, 2011. *The Explanation of Social Action* (New York, Oxford University Press).

[cf. Fine 2007: 204]⁷. The element of conflict is thus limited when anticipating the future and building forecasts (although Daipha shows how it quickly appears when a forecast goes wrong and there is blame to go around). However, as we move away from weather forecasting and into the study of social movements, politics or financial markets, as suggested in the final pages of the book, the interests of various actors become less aligned and conflict over possible and probable futures takes centre stage. In those contexts some actors have a clear interest in shaping the expectations of others in a way that will be beneficial to them. And often they have the ability to do so quite effectively. How and why they are able to do this is a crucial question. In other words, a sociology of decision making that focuses on prospection will need to include, what Jens Beckert has recently called, the “politics of expectations” [Beckert 2016]⁸. It requires the development of a pragmatic theory of power, where having power means having the ability to structure the anticipations and the ends in view of others in line with one’s own interest.

For much of the second half of the 20th century there has been an ongoing discussion about the existence of a specific Chicago School. While cases have been made on both sides of the argument, it should not be disputed that there is a long lineage of outstanding sociology produced by people related to the University of Chicago. Phaedra Daipha’s ethnography of weather forecasters is a recent addition to that lineage.

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⁷ Gary Alan Fine, 2007. *Authors of the Storm: Meteorologists and the Culture of Prediction* (Chicago, University of Chicago Press).

⁸ Jens Beckert, 2016, *Imagined Futures. Fictional Expectations and Capitalist Dynamics* (Cambridge, Harvard University Press).