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## 1

# Ethnographies of Diagnostic Work: Introduction

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Doctors, mechanics, technicians, helpline operators do it, as do the police, prison officers, therapists, designers and many other professionals. Diagnostic activity – aimed at identifying and categorising problems (or opportunities) and defining scope for action – is crucial in many different contexts; aviation (Dekker, 2005), the chemical industry (Reason, 1997), healthcare (Kohn et al., 2000), business (Weick and Sutcliffe, 2001), as well as engineering and design, are just some of domains within society that rely on it. The product – ‘the diagnosis’ – can be mundane (sometimes a cough is just a cough), or hugely consequential, such as the confirmation ‘you are well clear of friendlies’ in a 2003 friendly-fire incident in Iraq that killed one soldier and injured four others (Nevile, 2009). Diagnoses are important for a number of reasons: through diagnoses, understanding of underlying facts and causes can be measured or expressed quantitatively; diagnoses can be transformative, reflexively shaping the material and experiential reality of people’s lives; they can provide access to resources or treatment, and they can be a meeting-ground for different perspectives (those of patients and healthcare professionals, users and designers, or pilots and ground controllers, for example). Visions of alternative futures and the ‘mapping out’ of paths towards them are built on diagnoses of the status quo.

‘Diagnosis’ has predominantly been understood as a sophisticated process of forming, weighing up and testing hypotheses to determine the underlying causes, events or actions that lead to undesirable effects. In emergency situations, for example, ‘situation awareness’ – with parallels to diagnosis in medical settings – is said to require accurate perception and comprehension of the situation, its causes and implications (Singh et al., 2006). Situation awareness then informs decision-making (Endsley et al., 2003; Craig, 2001), and diagnostic ability is regarded as

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a core skill for emergency personnel, especially team leaders (Flin et al., 2008). It is mainly seen as a cognitive skill that requires individuals to process large amounts of diverse sensory and discursive information to form a mental model of the situation. Research suggests that experience can help professionals build schemata of typical situations, increasing their processing efficiency (Endsley et al., 2003) and pattern-matching abilities, which enable recognition-primed decisions and mental simulations of possible courses of action (Klein, 1998).

However seductive such accounts appear, they overlook or mystify important practices. They are based on representational theories that assume, in principle, that language, action and reality are separate elements, linked together through correspondence, and that accuracy can be perfected through rigorous (scientific) method. In his influential call for a 'new view of system safety', Dekker (2005) places such Cartesian abstractions and uncritical acceptance of 'folk models' at the heart of a crisis in research on system safety. He argues that far from being reducible to clearly identifiable sets of singular causes, most critical situations are the result of a 'drift' into failure. Appropriating Dekker's analysis for our own more broadly conceived purposes of engaged research (Sismondo, 2008), we argue that most realised opportunities are the result of purposeful attempts to steer towards them, but also affected by a similar (but more positive) form of drift. Moreover, if we take 'safety', 'failure' and 'success' as special cases of a much more generally observable manoeuvring of complex currents, we can bring Dekker's critique of the information-processing paradigm to a much wider range of concerns, including health and well-being, security, and sustainability. This translation is powerful because it connects an understanding of risk management with the creation and realisation of opportunities through design and policy in very complex and important areas. Dekker argues that in its effort to explain how people understand and organise their actions on and within complex, dynamic systems:

[t]he information-processing paradigm ... has mechanized mind, chunked it up into separate components ... with linkages between. [It] holds special appeal for engineering and other consumers of ... research results. ... [But i]n fact, such a model severely restricts our understanding ... We cannot begin to understand drift into failure without understanding how groups of people, through assessment and action, assemble versions of the world in which they assess and act.

(Dekker, 2005, p. xii)

While the authors in this collection acknowledge many of the insights of cognitivist models of research into diagnosis and the information-processing paradigm, they also draw on complexity theory, science and technology studies, ethnomethodology, conversation analysis, situated learning, and participatory and collaborative design, to fundamentally challenge simplistic characterisations that focus on individual cognitive and psychological abilities. Diagnoses are the product of complex and diverse processes, although not all diagnostic processes produce 'a diagnosis'. Moreover, diagnostic work is not just a professional, expert activity. It is much more pervasive, spanning collaborative professional judgements to aspects of everyday life: people discovering how a new piece of technology works (or why it doesn't), looking at the morning sky to decide what to wear, or assessing pedestrians' intentions when approaching a zebra crossing in a car. Whether professional or mundane, undertaken by experts or non-experts, diagnostic processes determine the accuracy of diagnoses and the appropriateness of actions. These processes embody people's understanding of the nature and status of diagnostic work, with important – and thorny – consequences. While diagnostic work is about problem solving or recognising opportunities for action, it cannot be separated from peoples' value judgements, which can be discriminatory and prejudicial. Processes of diagnosis and their products function as occasions for moral judgements on peoples' character, and diagnostic work opens up opportunities for political and professional leverage. In short, diagnostic work is premised on value judgements about what constitutes a worthwhile future and so privileges some things and people over others, an issue that is often neglected in the research into human factors.

Ethnographic studies of naturally occurring practices open up the 'how' of all of these dimensions and – by being attentive to the often deeply intertwined practices of sense-making, assessment and action – provide resources for new concepts. They shift the analytic focus from product to process, from 'the diagnosis' to 'diagnosing', 'doing diagnosis' or 'diagnostic work'. We talk about 'work' and diagnostic practices, because, although the differences are subtle, these terms most strongly suggest the diverse social, embodied and material interactions, which our studies reveal to be central to a 'new view' of diagnostic work.

*Ethnographies of diagnostic work* aspires to give shape to this emerging new view. We show how social scientists engage with what are clearly very prominent concerns for practitioners and others involved in diagnostic work: how do people make sense of objects, processes or bodies that do not work well? Is this what diagnosis is all about? How

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do they recognise and work towards realising opportunities? What are the intended and unintended (positive and negative) consequences of diagnostic work?

The move from 'diagnosis' to 'diagnostic work' also enables us to distinguish between different *degrees* of diagnostic work. There are the 'patchwork' improvisational practices that occur within the immediate context of action and allow unanticipated obstacles to be surmounted. There are also varying levels of intermediate steps required when obstacles prove more stubborn or when a more in-depth analysis is called for. These steps open up further possibilities for action and alternative futures. Then there is the elicitation of a 'root cause' – what might typically be thought of as *a* diagnosis. We can also discern a difference in the *object* of diagnostic work. For some people, critical situations are the focus of their work – doctors, for example, who diagnose diseases, or technicians who help callers resolve problems. Other kinds of problems – as well as opportunities – arise from diagnostic work in prototyping and design. The different degrees and objects of diagnostic work do not map neatly onto one another but, as the chapters in this book illustrate, dovetail in interesting and provocative ways. Moreover, the emphasis on 'work' in 'diagnostic work' highlights the tension between *embodied diagnosis* (in the sense that the diagnosis emerges from sensations experienced by a clinician when, for example, inserting a needle into the body of a patient) and *mediated diagnosis* (in which information may be given numerical values or is conveyed through communication technologies). Whereas the former brings a whole array of visceral-affective resources into play, the latter privileges discursive and technological resources. It is an interesting paradox that although embodied diagnoses rely more on the direct experience of the senses, this source of information is ephemeral and intangible. Diagnoses that draw heavily on medical or communication technologies, on the other hand, might provide more tangible information, but with layer upon layer of translation accompanying such mediations, the scope for error and inaccuracy is multiplied. Again, these different modalities of diagnostic work are not necessarily distinct but intersect to enrich, or sometimes confuse, the diagnostic picture. What is clear, however, is that diagnoses are often difficult to produce and hard to communicate.

The aim of this book is threefold: Firstly, it challenges the conventional conceptions and boundaries of diagnosis. Secondly, and most importantly, it seeks a better understanding of how diagnostic work is done and what it does, contributing to scholarly debates about epistemic practices and cultures (Suchman, [1987] 2007; Lynch, 1993; Knorr-Cetina, 1999;

Mol, 2003). Drawing on a diverse range of perspectives and empirical settings, this book addresses the collaborative, socio-material, embodied and technologically augmented processes of diagnostic work, and their political and ethical dimensions. Thirdly, this book is motivated by the fact that as ethnographers all contributors have come into contact with the complex interdependencies that exist between moral, ethical, political and economic concerns, professional protocols, management, material infrastructures, and technologies. Some of these factors – or contributory currents to systems of diagnostic work – are amenable to design, turning, in a reflexive move, ethnographies of diagnostic work into ‘diagnostic work’ itself. The authors delineate the transformative potential of their analyses to offer practice-based, theoretically grounded insights for rethinking prevailing orientations and methods, building on traditions of ethnographically informed and participatory or collaborative design (Greenbaum and Kyng, 1991; Hughes et al., 1994; Suchman, 2002; 2007; Balka, 2006; Randall et al., 2007), hybrid studies in ethnomethodology (Garfinkel, 2002; Lynch, 1993), and the engaged programme in science and technology studies (Sismondo, 2008). Social studies of diagnosis have long demonstrated the transformative effects – personal, institutional, and otherwise – of having a diagnostic label, and highlighted the negotiations between lay and expert knowledge that lie behind diagnoses in a variety of different research domains including medical diagnosis (Straus et al., 1985), error and high-tech systems (Reason, 1997; Perrow, 1999), and computer technology (Suchman, 2007). This book continues this work, revealing important dimensions of these transformative practices, and we demonstrate how – in turn – such descriptions can contribute to a ‘new view’ of diagnostic work – ‘a transformation that has begun to identify both deep-rooted constraints and new leverage points’ (Dekker, 2005, p. xi) for theory, practice, policy, design, and management.

We deliberately juxtapose theoretically and methodologically diverse ethnographic explorations in a variety of medical and non-medical settings, ranging from concerns about prisoners at risk of self-harm or suicide, to telephone helplines for office device troubleshooting, and medical diagnostic tests such as angiograms. Bringing a focus on diagnostic work to these diverse practices and situations from different, but mutually sympathetic, analytical and empirical orientations produces creative friction and opens up a rich vein of inquiry for scholars, practitioners, designers and policymakers. We also intentionally stretch the concept of diagnostic work to include not only the actions that practitioners themselves would (or do) describe as diagnostic work, but

also practices that we as analysts consider to be sites of diagnostic work, even when practitioners may not without prompting acknowledge them as such. This decision and the collection as a whole is informed by a myriad of interdisciplinary discussions (with practitioners, scholars from a variety of disciplines, designers, engineers, members of the public, and more) that have drawn out important analogies and synergies. We have held two workshops, engaged in a collaborative review process, and have discussed drafts with experts in medical practice, health policy and service design (see Chapter 14). Our studies and conversations raise many important questions for the diverse audience this book aims to reach.

The main body of the book is divided into three parts. While the three parts have different emphases, they share a single purpose: to enable a deeper, broader and more relevant understanding of diagnostic work.

## **Part I: Finding fault with fault-finding**

The chapters in this section begin to address the notion of diagnosis by exploring specific forms of diagnostic work such as ‘troubleshooting’ and ‘reading the signs’. These chapters challenge the idea that diagnostic work is, essentially, a logical fault-finding endeavour, and in doing so they furnish a picture of diagnostic work with richly detailed descriptions of its embodied, material, social and organisational elements. In the first chapter, Anita Wilson looks at the work of prison officers in assessing the suicide risk of new arrivals. Quite apart from, and sometimes in spite of, the bureaucratic procedures in place to support the officers’ diagnostic work, Wilson reveals the prison officers’ sensitivity in ‘reading’ their charges’ bodies and behaviour through informal, pragmatic and routine ‘dynamic diagnosis’. She highlights the ongoing, dynamic nature of diagnostic work, and asks where and when diagnosis stops, if indeed it ever does. Wilson also draws attention to bodily inscriptions and visual texts that embody diagnostic evidence of previous self-harm. Diagnostic work in this setting requires being attuned to the circulation of informal assessments among prison workers, as well as ‘hands-on’ engagement with the prisoners to avoid a slide into bureaucratic risk assessment.

A completely different non-medical site of diagnostic work is introduced by Jacki O’Neill (Chapter 3). She presents an ethnography of a call centre where troubleshooters attempt to diagnose and fix problems with large office devices, like printers, for example, over the phone. The caller is usually the user of the device, a non-expert located at the site

where the device is installed. The asymmetries of expertise and access to physical evidence and the strategies that the people involved devise to work around them highlight important aspects of remote diagnosis. Most significantly, the chapter draws attention to the social and organisational intertwining of intervention and diagnosis, as call-takers instruct callers to undertake certain investigative or remedial actions and report on their effects. O'Neill's analysis explores, but also actively engages with the relationship between users, diagnostic objects, and experts, by using ethnographic insight to inspire and inform technology design.

The conception of successful troubleshooting as occasions of immediate, expert '*gestalt*' recognition of problems and solutions is undermined further by Johan Sanne's demonstration of how inadequately these metaphors capture the character of this work. His analysis of troubleshooting in railway maintenance underscores the value of experiential knowledge, outlining how it elaborates knowledge developed in training courses. He explores the notion of a 'naturally occurring curriculum' (Thornton Moore, 2004), and examines the ways in which the successful troubleshooter is rewarded through affirmation of his or her professional identity. In focusing on difficult cases where closure is achieved through discursive and embodied means of probing problems and community expertise, he demonstrates what troubleshooting means in this context. His chapter develops Bruno Latour's observations of how people make matter 'speak' (2000; 2004) in guiding diagnostic activities.

A deeper appreciation of the use of the senses in medical diagnostic activity is explored in Dawn Goodwin's discussion (Chapter 5) which also bridges the first section with the rest of the book. Goodwin's focus is on anaesthetists who, tasked with rendering their patients unconscious or locally anaesthetised and thus unable to elicit accounts about sensory experiences, must rely on their own senses and on technologically augmented means to make the physiological processes of fully or partially anaesthetised bodies speak. She illustrates how in anaesthetic practice, diagnostic work rarely means the identification of a disease but instead entails a process of coming to know the specificities of a patient's condition through embodied work with and on the patient's body. This knowledge allows anaesthetists to tailor their care ever more closely to the patient's needs. Knowledge of the specificities, however, is sometimes not enough. Goodwin traces how a sceptical approach to clinical evidence and a willingness to consider alternative readings of the situation are, at once, demanded by diagnostic work and yet undermined by an impoverished understanding of the concept.

Part I exhibits how, although frequently conceived of as a 'moment' of cognition, diagnosis must also be seen as a material, embodied, collaborative process involving expert skills, careful sensory and social engagement with human agencies (for example, in medical consultations and encounters between prison officers and prisoners), and non-human agencies (such as office printers or switch heaters used to keep railway lines free from ice). Some activities involve situated knowledge, for example, of a particular printer's location near a radiator. Some demand 'scientific' epistemic practices, for instance, hypothesis formulation, measurements, or comparison. Yet others require creative, affective and intuitive ways of knowing, such as a prisoner's 'feeling that my head's away' (Wilson, Chapter 2).

## Part II: A topography of diagnostic work

Part II extends the move from description and critique into 'new views' of diagnostic work. Jessica Mesman's chapter 'Diagnostic work in collaborative practices in neonatal care' examines forms of dynamic 'interactional' diagnostic work required in teamwork where safety is critical. Her study of collaboration in the process of inserting a tube into a prematurely born baby's windpipe for artificial respiration reveals that diagnostic work is not only aimed at identifying problems, but that it is also an important part of knowing when things are going right. By detailing the 'diagnostic' strategies staff use to attune their actions and improvise the assembly of human skill, physiological and material agency and technological support, she provides insight into the practices and constraints of a 'positive mode' of diagnosis.

Where Mesman inverted the analytical direction from problems to positive opportunities for action, Firth and Emmison (Chapter 7) invert the direction of analytical attention: instead of concentrating on the activities of professional diagnosis undertaken by the call-takers at a software helpline, they draw out the diagnostic work *callers* have to engage in to understand and support the call-takers' needs. Firth and Emmison's analysis of complex collaborative relations between callers and call-takers provides insight into another critical dimension of diagnostic work. Studying the moment-to-moment unfolding of the conversations, they exhibit callers' diagnostic strategies such as contingently adapting their narrative and proffering candidate diagnoses. The analysis further specifies the emerging 'new view' by showing how this involves delicately negotiated choreographies of turn taking, creating space for probing questions and accounts of activities on both

sides, a dance that the participants collaboratively organise by paying attention to delicate cues.

The study by Paula Byrne and Katrina Stengel (Chapter 8) brings us back within the walls of the hospital. They describe the practice of angiography, the materials involved and the preparatory work necessary for this procedure. In doing so, they develop a comprehensive picture of diagnostic work in this setting that elicits the hints, prompts, questions and queries that nudge the physician towards an opinion and informs how the angiogram is carried out. Nevertheless, they discuss the angiogram as a critical 'definitive' juncture in the patient's trajectory. 'Definitive-ness' seems, on the one hand, actively made in a process that tightly connects human and material agencies: the angiogram is a highly technical procedure and yet its meaning rests upon percentage estimations by the physicians and recourse to the patients' experience of symptoms; it provides seemingly unassailable evidence and yet its results are contested by patients whose symptoms persist. On the other hand, 'definitive-ness' seems to be a fact, with an agential force all of its own, reflecting the primacy that visual evidence commands.

In the British National Health Service's 'NHS Direct' helpline call centres, 'definitive-ness' of diagnosis hangs as a threat over the work of the operators. Jill Pooler articulates the delicate line nurse call-takers tread, given that they are not allowed to provide diagnoses in their conversations with advice-seeking callers. As one might expect, this gives rise to puzzling, if not 'perverse', contortions to 'conceal' or 'deny' diagnostic work. This chapter conveys the highly restrictive 'linguistic uniform' (Crawford et al., 1998) which constrains what callers can say, the help nurses can offer in response, and how nurses define their work. The caution that censors nurses' interactions is oppressive, clearly rooted in conventional conceptions of what diagnosis is (with its attendant notions of accountability, responsibility and potential culpability). Yet both nurses and callers show remarkable resourcefulness in fulfilling their roles, in giving and appropriating meaningful advice. It is in opening up the practical accomplishment of diagnostic work for analysis that features and practices important for a 'new view' of diagnostic work become visible.

Rich descriptions such as the ones presented in Part II begin to provide resources for a more sensitive and multidimensional conceptualisation of diagnostic work. Ethnographic approaches can help analysts move beyond problematic assumptions in the literature about causality and retrospective discoveries of error coloured by 'hindsight' (Dekker, 2005; Wears and Nemeth, 2007), because they enable insight

into the entanglements of cause and effect at the coalface of diagnostic work. Participant observation reveals the deeply collaborative nature of diagnostic work (oriented to what is going right as well as to what might be going wrong). It highlights the unfolding prospective and retrospective performativity of diagnosis, that is, it shows that diagnostic work shapes reality, as in the case of angiography patients and professionals. Careful analysis reveals the dilemmas of accountability enshrined in – and actively produced through pursuing – diagnosis as an expert, ‘definitive’ label rather than a collaboratively achieved, temporary and necessarily partial understanding. Moreover, the studies in this section make pervasive processes of dynamic diagnosis visible that moor and inform action at all points – a notion that is developed further in Part III.

### **Towards a New Conceptualisation of Diagnostic Work**

Part III looks at both the potential and the challenges of a new view of diagnostic work, and offers some methods of addressing the challenges. Building on the previous chapters, the authors further explore the inescapably entangled nature of categorisation, assessment and action, and moral and political choices. Appreciative inquiries into people’s practices of assembling versions of the world in which they can assess and act (Dekker, 2005) do not only enable researchers to present such practices for scrutiny. They can also inform change, connecting new views of diagnostic work with new conceptualisations and practices of design and innovation.

Monika Büscher and Preben Holst Mogensen open the exploratory venture with a study of police and fire service officers’ collaborative practices of producing situation awareness at a large, but relaxed, public entertainment event. However, the analysts’ and the practitioners’ aims in this study go beyond achieving a better understanding of existing professional practices. The study is part of a ‘living laboratory’ approach to collaborative innovation, where prototype technologies are implemented to support experimental exploration and ‘colonisation’ of possible futures. The process of colonisation and the shape of emergent future practices are at the heart of the analysis, because they harbour important insights for the design not just of new technologies, but for the collaborative design of new, technologically augmented, working cultures. The study reveals, for example, phenomenological forms of micro-diagnosis – ‘material methods’ or practices of making

matter 'speak' (Latour, 2000; 2004) – that allow people to create new moorings for new physical and virtual mobilities and collaborations between officers on the ground and in the event command centre, supported by the prototype technologies. The 'diagnostic' combination of observation with hands-on participant intervention (Holmberg, 1955; Kjærsgaard and Petersen, 2002) in everyday life through living laboratories informs new technology design philosophies and approaches.

Drawing on ethnographic fieldwork in a dementia care unit, Ingunn Moser analyses the uses of a new therapeutic instrument (the *Marte Meo Method*, meaning literally 'my own power') to investigate what it makes possible and how it changes dementia care. The *Marte Meo Method* is a form of intervention that has its focus on the interaction and communication between, for instance, people with dementia and their carers, and it seeks to strengthen the relational and communicative competence of carers in order to facilitate better interaction and care. At the centre stand video recordings of interaction, and guidance worked up through collaborative analysis of these recordings. The powerful form of reflective practice evident in the interaction between the *Marte Meo* therapist and the carers offers a new way of handling problematic activities. On the basis of her fieldwork Moser shows the interplay between the *Marte Meo Method* as a form of therapeutic intervention and as a form of non-biomedical diagnosis. What is more, Moser explores how the method reflexively challenges the initial diagnosis and disease-definition, and outlines scope for action, as well as prompting a reconsideration of conventional conceptions of diagnosis and care.

Whereas Moser discusses the possibilities that arise from non-biomedical conceptualisations of diagnosis, Alexandra Choby turns our attention to the ethical and political implications of a biomedical conceptualisation of diagnosis, and the power relations between patients, nurses and doctors in particular. Choby's fieldwork at a tertiary epilepsy centre explores the socio-technical work practices involved in the construction and evaluation of videoelectroencephalography (VET) images. She suggests that physicians discursively deploy the concept of wilfulness as a framing device to produce diagnoses known as pseudoseizure (a form of hysteria). Choby reveals the co-production of biology and morality in diagnostic work by showing how 'independent' truths are actively produced and strategically employed in doctor-patient encounters. Diagnostic work is not just social in the sense of collaborative work, but also social in the sense that diseases or problems have multiple, complex causes, with some – especially socio-economic

ones – impossible for medical staff to address, placing professionals on a hunt for causes that *can* be addressed.

Mark Rouncefield and his colleagues draw us into a discussion of ‘Suspicious Minds’, describing in rich detail the epistemic practices radiologists employ as they collaborate with expert systems that algorithmically ‘detect’ breast cancer risks. Far from being a primarily cognitive act, reading mammograms draws on a range of material practices, such as pointing with a pen and using a magnifying glass to better visualise aspects of the image. In their analysis, Rouncefield and colleagues trace how diagnostic decisions are made accountable by being grounded in a repertoire of professional practices and techniques for ‘seeing cancers’. Motivated by engagement in the design of the computer aided detection system, these researchers use ethnographic methods with the aim of complementing the traditional evaluation of this system by clinical trials. Consequently, they can identify not only whether or not the system works, but what the system is good at doing and when it performs poorly. Further iterations of the system can therefore be designed to finesse a dovetailing of human and machine capabilities.

By arguing that the notion of suspicion as a state of mind must be replaced with more sensitive ethnographic explications of the precise practices of ‘doing suspicion’, Rouncefield et al. show how ‘we cannot go on together with suspicious minds’. Quoting Elvis’s lyrics, they conclude that analysts can no longer innocently assume that diagnosis is predominantly about processing information and individual cognitive skill. Instead, analysts must look at social, material and embodied practices of diagnostic work. Rouncefield et al. then lead us into a concluding discussion of the ‘new view’ of diagnostic work and its implications. The final chapter seeks to promote interdisciplinary conversations about the relevance of the studies presented in this book and the implications for practice, policy and design, by documenting boundary-spanning connections that emerged in discussions with practitioners from medical practice, policy research and service design.

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