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Diagnostic Decision Making in Oncology: Creating Shared Knowledge and Managing Complexity

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Drawing upon the concept of practice, the article explores diagnostic decision making in oncology through the analysis of informal conversations between doctors in an Italian hospital. The analysis shows that doctors rely on three collaborative practices: (a) joint interpretation, (b) intersubjective generation and validation of hypotheses, and (c) postponing the diagnostic decision. Through such practices, doctors jointly handle tough issues such as managing complexity, dealing with cognitive difficulties and limits of knowledge, and avoiding diagnostic errors. The article addresses some lacunae in the literature by providing empirical access to how decision making is done in an understudied and specialized branch of medicine.

INTRODUCTION

The article analyzes diagnostic decision making in oncology. Owing to its complexity, oncology is a particularly interesting context for analyzing medical thinking and doing. It is a branch of medicine that deals with a systemic illness with a complex pathogenesis: an illness that can extend to every organ of the body with a fatal outcome. Although it is a discipline with a high rate of development and scientific innovation, it is also a field—as a system of formalized and validated knowledge—in which there are wide margins of uncertainty (Han, Klein, & Arora, 2011). How do doctors manage this complexity and epistemic uncertainty? How do they make decisions in ill-structured situations? How do they keep the risk of diagnostic errors under control? In this article, we address these questions through analysis of a corpus of audio-recorded informal conversations between doctors collected in an Italian hospital. This study is, to our knowledge, the first to use empirical data of this kind to analyze these topics; thus, we believe it can furnish novel insights into diagnostic decision making in specialized medical domains.

In the study of medical diagnosis, decision making models and epistemologies have traditionally been informed by cognitivist and individualistic perspectives (see Han et al., 2011;

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Kostopoulou, Russo, Keenan, Delaney, & Douiri, 2012) that represent such processes as rational and linear:

> Doctors (and patients) are constantly called on to make decisions. To do so, they must identify the relevant information (such as the outcome of a clinical examination), develop a judgment (e.g., a diagnosis), choose a course of action among several possible on the basis of their preferences (e.g., a particular surgery), and then take action. (Motterlini & Crupi, 2005, p. 13; English translation by the authors)

On the basis of this model, medical diagnosis and decision making are then considered to be abstract mental processes that take place "before" practical action and independent of the professional domain in which these processes of choice occur.

This approach is consistent with rational choice theories that are widespread references in the interpretation of the decision making processes in many fields. The impact that formal logic had on research and theory on reasoning processes is also another factor that contributed to push decision making toward an idealized notion of pure rationality (Falmagne, 2000). To date, several authors have challenged such a model of linear rationality, highlighting a number of criticisms and limiting assumptions. As Oliver and Roos (2005) pointed out, most cognitivist studies into decision making rely on some key notions. The first is the notion that decisions are moments in time in which a course of action is selected. The second assumption is that decisions are rational, or logically consistent, purely cognitivist "if–then" decision processes. Third, decision making is frequently assumed to be a context-independent activity. With some exceptions, most of this research has involved the study of individuals in laboratory, rather than naturalistic settings (Fiske & Taylor, 1991).

Simon (1957) was among the first who showed that people seek solutions they consider good enough in a given situation, making decisions that are based on bounded rationality. More recently, researchers studying organizational decision making and naturalistic decision making situated decision makers within organizational contexts, exploring the structures and social norms that shape expectations and behaviors (Lipshitz, Klein, & Carroll, 2006; March, 1994; Szambok & Klein, 1995).

In line with these studies of decision-makers-in-context, the perspective adopted in this article views diagnostic decision making as a fundamentally social activity constituted in interaction and situated within real-world settings (Engeström & Sannino, 2012; Lave, 1988; Resnick, Säljö, Pontecorvo, & Burge, 1997; Scribner, 1986; Vygotsky, 1990). This perspective has a key defining characteristic in its reference to the concept of practice. Whereas practice-based approaches share family resemblances, "there is no unified practice approach" (Schatzki, 2001a, p. 11), nor is there agreement on what counts as a practice (Nicolini, 2012). Bernstein (as cited in Miettinen, Paavola, & Pohjola, 2012) proposed a distinction between "classical" and "new" approaches to practice related to different philosophical traditions. In this categorization, classical practice theories draw upon the dialectical tradition of Marx and Hegel, whereas new approaches draw upon the work of Heidegger and Wittgenstein. Within the classical tradition, cultural-historical activity theory (Engeström, Miettinen, & Punamäki, 1999) and a sociocultural perspective on practice (Chaiklin & Lave, 1993) have focused, among other things, on work conceived as an important human activity in which people "simultaneously create both themselves and their material culture" (Miettinen et al., 2012, p. 346).

According to this approach, cognition and action are both shaped by participation in purpose-oriented and socially organized systems of activity mediated by the tools available. Mediation is a key concept in the "classical" approach to practice that has its roots in the work of the Russian psychologist Lev Vygotsky. In Vygotsky's thought, mediation by tools and signs as cultural artifacts—first experienced by participating in social activity with others—is gradually internalized, thus becoming "internal speech" and individual thought. Internal cognitive processes are, therefore, social in origin, and they continue to operate through cultural tools for thinking. In workplaces, tools such as "scientific concepts" (as those of medicine), evidence from the disciplinary literature, and specialized language are used to reason and to make decisions in routine work activities (Hutchins, 1993; Lave, 1993).

We position our analysis of diagnostic decision making within the previously outlined sociocultural perspective on practice that considers cognition to be situated and distributed. We consider as "practice" what Schatzki (2001b) defined as "a set of actions," for example, "farming practices comprise such actions as building fences, harvesting grain, herding sheep, judging weather, and paying for supplies" (p. 56). In what follows, we refer to "practices" as the set of actions through which doctors make diagnostic decisions in a system of specialized medical activity such as oncology. Moreover, we combine in the term "practice" both the cultural/contextual dimension of actions and the cognitive one. On one hand, we consider this set of actions to be situated, mediated, and dependent upon the constraints and resources of the local domain of activity (i.e., oncology). On the other hand, we consider such actions as *loci* in which to study cognition as a social and cultural phenomenon (Cole, 1996; Goodwin, 1994; Hutchins, 1995; Lave, 1988). As Sylvia Scribner (1984) well pointed out, "The general construct of practice offers a possibility for integrating social-cultural and psychological levels of analysis and achieving explanatory accounts of how basic mental processes and structures become specialized and diversified through experience" (p. 13). In our approach, practice is, therefore, the key to describing the complexity of human cognition and its connections with the everyday activities in which it occurs (see also Resnick et al., 1997).

THE RELEVANCE OF DIAGNOSTIC COMMUNITIES

This view of practice is consistent with Lave and Wenger's (1991) construct of "community of practice." This construct well represents the importance of social life in shaping local cultures and ways of doing and thinking. In Wenger's (2002) definition:

> A community of practice is a group of people who share an interest in a domain of human endeavor and engage in a process of collective learning that creates bonds between them: a tribe, a garage band, a group of engineers working on similar problems. (p. 2341)

With this construct, Lave and Wenger (1991) located knowing, reasoning, decision making, and other cognitive phenomena in the practices shared by a community of practitioners.

Empirical studies have described the importance of communities of practice in managing diagnostic work (see Gherardi, 2012). Viewed through a "practice lens," diagnostic work has proved to be shaped by organizational goals and tacitly shared priorities (Alby & Zucchermaglio, 2009; Boden, 1994; Button & Sharrock, 1998; March, 1991). Emblematic is Orr's (1996) study, which exemplified how the diagnostic process for expert technicians

was essentially narrative and cooperative. Orr showed that the interpretation of technology-mediated events is an inevitably problematic and discursive activity and that it constitutes a crucial component of a community's professional competence. It is, in fact, through joint accounts and interpretations that technicians construct a repertoire of distributed knowledge and pragmatic understanding, which is one of the most valuable and enduring outcomes of their collaboration.

Similarly, Toulmin (1996) highlighted the importance of doctors' experience for diagnostic reasoning and decision making: "The everyday skills of experienced doctors today take them beyond the limits of theory" (p. 211). In particular, he argued that there are not "typical" cases to be diagnosed, but situations that resemble one another only partially. Toulmin stated that doctors then need to consider the *family resemblances* among the varied patients' conditions, which extends beyond what he called a "theory of illness": "Patients go to doctors with many varied conditions, for pragmatic not theoretical reasons: the doctor first sorts them into those in urgent need of surgery, those who simply need a rest and a good meal, and so on" (p. 214). In so doing, doctors follow a situated rationality that enables them to deal with the complexity and local specificities of their diagnostic work.

Other naturalistic studies have highlighted that there are features of processes such as diagnosis, problem solving, and decision making that are not visible at an individual level and that emerge only with a detailed analysis of the community's work practices (see Alby & Zuccermaglio, 2006; Goodwin & Goodwin, 1996; Hutchins & Klausen, 1996; Roth, Multer, & Raslear, 2006). In particular, talk proves to be a key resource for dealing with problematic aspects of ongoing activities and for the organization of both aspects of distributed cognition and social organization of work (see Alby & Zuccermaglio, 2008; Boden, 1994; Goodwin, 1994; Hutchins, 1995; Streeck, Goodwin, & LeBaron, 2011; Zuccermaglio & Alby, 2012).

During some of the first ethnographies of medical activities, Cicourel (1985, 2002) observed the distinctive character and function of talking in organizing diagnostic reasoning and clinical understanding in medicine. He showed the discursive strategies with which more or less experienced doctors combine formalized medical knowledge with tacit, procedural knowledge and adjust them to the patient's case. Based on conversation analysis and ethnomethodological perspectives, an extensive literature has developed focusing on medical interactions (for a collection of studies, see Beach, 2012; Heritage & Maynard, 2006; Pilnick, Hindmarsh, & Gill, 2009). These studies have dealt with, among other things, the study of diagnosis and decision making in various medical fields (see Antaki, Barnes, & Leudar, 2005; Brookes-Howell, 2006; Heath, 1992; Koenig, 2011; Maynard, 1992; Opel et al., 2013; Peräkylä, 1998; Stivers, 2002).

The practice-based approach adopted here is different from this conversation analysis literature in two main respects: (a) the analyses intend to be more grounded on the many constraints and affordances of modern medicine as a set of specialized and complex institutional practices, and (b) the analyses take account of hospital diagnostic communities, going beyond the dyadic relationship between doctor and patient during medical examinations. Our study focuses on physicians in a hospital who share a history of diagnostic interactions as the basis, and the outcome, of a practice of talking to each other and sharing knowledge for diagnostic purposes. In this article, we explore in particular the practices through which doctors organize their diagnostic decision making during joint conversations about cancer cases.

RESEARCH METHOD, DATA CORPUS, AND ANALYSIS PROCEDURES

The research was conducted in a medium-sized public hospital serving a major city in central Italy. It had more than 150 overnight beds and more than 15 day-hospital beds. It employed about 800 workers. Cancer care was one of the many services delivered at the hospital.[1] We collected 8 hr of informal conversations between the chief oncologist with 20 years of professional experience and other physicians from oncology, hematology, anesthesiology, surgery, and nephrology. Conversations were audio recorded during the shadowing of the chief oncologist (see Czarniawska-Joerges, 2007). The data were recorded in the courtyard of the hospital, where the physicians met before the beginning of the workday, or in the hospital wards. More than half of the conversations had to do with patients' clinical cases. Other issues covered organizational, bureaucratic, or logistical matters or, to a minimal extent, the doctors' social lives, and politics. The focus of these routine conversations[2] were "nonstandard" clinical cases that activated collaborative diagnostic practices.

Conversations were transcribed verbatim, following a simplified version of the Jefferson's (2004) transcription system. The analysis moved through the following steps: (a) recurrent and independent readings of transcripts informed by a broad understanding of the concept of practice, as conceived in the theoretical introduction of the article; (b) development of interpretative categories of diagnostic decision making that took into account the features of the specialized medical domain of oncology. The development of interpretive categories followed what Scribner (1986) called a "functional" analysis conducted to grasp the "what-for of thinking, to examine how thinking is related to doing" (p. 16); and (c) highlighting empirical evidence for categories in the transcripts.

ANALYSIS

We recurrently identified in the data set: (a) practices of joint interpretation, (b) practices of intersubjective generation and validation of hypotheses, and (c) practices of postponing the diagnostic decision. As visible in the transcripts, such practices are intertwined in the ongoing development of the interaction; however, we distinguish them in the analyses to focus on their specific contribution to the diagnostic decision making process. In what follows, we present the analyses of two episodes illustrating the complexity of thinking and doing in a hospital medical community.

Episode 1: "So Maybe It's Just a Cancer"

In the first episode of diagnostic reasoning and decision making, "So Maybe It's Just a Cancer" the chief oncologist and a medical internist talk about a patient (a woman) hospitalized in the department of nephrology. They have been asked to provide a consultation. After their talk, the

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[1]Among the hospital's departments were psychiatry, intensive care, urology, surgery, nephrology, cardiology, general medicine, orthopaedics, and others.

[2]Interviews with doctors confirmed that such conversations are very common during the hospital's everyday activities.

oncologist reports their conclusions to the nephrologist, as we see in the second excerpt. The patient shows spots in the lungs of uncertain clinical evaluation. The excerpt begins when the oncologist asks his colleague if he has been contacted by the nephrologist "about that patient":

Excerpt 1: "So Maybe It's Just a Cancer"

Participants: ONC oncologist; MED medical internist

1. ONC: one more thing (0.2) Did Rossi *((the nephrologist))* happen to call you yesterday about that patient?

2. MED: yes.

3. ONC: but is she neoplastic[3] for you? (0.2) <u>for sure</u>?

4. MED: no.

5. ONC: <u>exactly</u> (0.2) indeed, I believe- (.) but-

6. MED: ()

7. ONC: m = hm. that's what I thought (0.2) that those things on the skin could be a <u>streptococcus</u>[4]

8. MED: a streptococcus or a ()

9. ONC: m = hm. (0.2) that's what I was thinking, indeed I told him that when I was-

10. because I told him a <u>possibly</u> neopla:stic patient (0.2) but not necessarily at all (.)

11. but I said (0.2) I said *it is <u>stra:nge</u> all these-* (0.2) *((stains, authors' note))*

12. if it was a <u>cancer</u> (0.2) all these metastases in the lungs *((would be impossible, authors' note.))*

13. tut *((shakes his head))* she has something like (0.5) it reminded me of (.) cryptoccoccus.[5]

14. MED: could be.

15. ONC: So I still know my medicine, right?

The social dimension of the achievement of a cancer diagnosis becomes visible when the daily interactions among physicians are analyzed. An interesting finding is that the diagnosis is not carried out only by the oncologist but developed as a *practice of joint interpretation* that involves different doctors with different expertise. Specialists share concerns and try to solve them through sophisticated forms of talk that support diagnostic decision making within an interdisciplinary field such as oncology.

What precisely is the contribution of the conversation between the oncologist and the internist with respect to the diagnosis? We first note that the diagnosis is not a quick and easy process: There is no immediate recognition or classification of obvious symptoms, but rather the initiation of a process of clinical reasoning "out loud." This practice enables the social distribution of interpretive resources while yielding a richer knowledge repertoire that is put to the service of clinical reasoning.

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[3]Neoplastic means related to a tumor or neoplasia.

[4]Streptococcus is a group of bacteria that may cause infections.

[5]Cryptococcus is a fungus.

It should be noted that the internist is required to provide an assessment of the tumor (turn 3) and that it is the oncologist who exhibits expertise as a medical internist (turn 13). This shows that there is a partial overlap between the skills of the two specialists—probably due to several factors, including their training and previous experiences—that is the premise and outcome of their everyday practice of collaboration. At the same time, the epistemic authority that each of them possesses with regard to their respective fields of medical specialization is visible in the conversation from the way in which the internist is considered to have privileged access to general medical expertise, such as reference to the Cryptococcus, and therefore is able to validate the oncologist's hypothesis ("So I still know my medicine, right?"; turn 15). Similarly, the oncologist gives an assessment of the neoplasia (turns 11–12), thus implying that he has a special "right" (Heritage & Raymond, 2005) to assess the neoplastic issue and exercising his ability to categorize events and to make specific knowledge on cancer matters available.

Let us now examine how such a joint interpretation develops. The conversation between the two doctors actually starts from the conclusions they have reached (turns 3–5) and goes on to provide the elements that supported the reasoning. They conduct a brief verification of their diagnostic hypotheses and then retrace together the information from which the conclusions have been reached. This process not only serves to justify the doubts on the neoplastic assumption, but also allows the generation of a new diagnostic hypothesis (the cryptococcus).

The confutation of the neoplastic hypothesis (turns 3–4) leads to guesswork formulated by the oncologist as personal opinions (turns 5, 7, 9). The argumentative force and plausibility of these speculations are increased by being shared and by having undergone this moment of intersubjective validation. It is noteworthy that in reasoning aloud, some items of information, rather than others, are selected as relevant for diagnostic purposes ("those things on the skin," turn 7; spots in the lungs similar to pulmonary metastases). These operations of "highlighting" (Goodwin, 1994) and classification (Bowker & Star, 1999; Goodwin, 1994, 1999) identify the signs and clues that may match with models of known illness or, in a comparative way, with characteristics of patients previously seen. This manner of arguing is similar to what in logic is called "abductive inference." Abductive reasoning is an inference that yields the best available explanation (the philosopher, Charles Peirce, first called it "guessing"). One hypothesis is favored over another because of its capacity to account for events otherwise unexplainable. Through these discursive inferential practices, doctors jointly try to build an interpretative relationship between, often contradictory, clinical evidence and known diseases (turn 7, turn 12).

In contrast with a model of linear rationality, we see that neither of the alternatives is discarded and that the conversation between oncologist and internist does not lead, for the moment, to the choice of the best hypothesis. Although the internist indeed shares the oncologist's doubts about the diagnosis of cancer, the alternative explanatory hypothesis on the spots on the lungs—a diagnosis of Cryptococcus—is still commented on by the internist with "could be." The frequent use of mitigators and dubitative formulations (turns 7, 10, 14) shows that the diagnostic interpretation is still uncertain and that the discussion between the two doctors is not conclusive. Such doubtful formulations are rather common in our data set and, as we have seen here, they support a *practice of hypothesis generation* in cooperative diagnostic work (but see Lehtinen, 2013, for different functions performed within genetic counseling).

After about 10 min the oncologist goes into the nephrology ward to report the outcome—still provisional but validated with the internist—of their diagnostic work on the patient. This conversation supplements the written advice that the oncologist has given to the nephrologist:

Excerpt 2

(10 min later, the oncologist goes to the nephrologist, NEF)

1. ONC: a gift? *((NEF gives him an envelope))* because (0.5)

2. also Cuomo *((medical internist))* has doubts about that- about the fact that that patient

3. could be <neopla:stic> (0.5) because I've <u>looked</u> at her (0.2)

4. I said, actually having written it in the report, I wrote

5. *((speaks while reading the envelops))* SO:: on the advice

6. I wrote that this patient is (0.2) <u>po:ssibily</u> neoplastic. (0.5) but.

7. the other idea I had was that it could be () just that.

8. NEF: m:: *((nods))*

9. ONC: because she *((the patient, N.d.A.))* is <u>stra:nge</u> to be a cancer. She doesn't even have a liver metastasis[6] (0.5)

10. but she's yellow.

11. NEF: m:: *((nods))*

12. ONC: I don't know (0.5) then she has some cu:rious <u>skin</u> lesions (.)

13. that remind me a lot of cryptococcus

14. NEF: m:. *((nods))*

15. ONC: I don't know (0.2) maybe then it's not like this (0.5) °but here° I had this idea.

16. so maybe it's just a cancer (0.2) but (.) in short, oh well

Compared with the written advice, the conversation between the oncologist and the nephrologist is much more complex. The oncologist cites the exchange with the internist in support of the plausibility of the neoplastic hypothesis (turn 2). The exchange that occurred with the internist exemplifies the *practice of validation of hypothesis* through which doctors can assess the robustness of their arguments and arrange subsequent actions. Thanks to such a practice, the oncologist can now propose to the nephrologist, with enough confidence, an alternative diagnostic hypothesis (turn 7) and strongly to support the reasons that refute the cancer hypothesis: at turn 9, he says, "because she's strange to be a cancer." This evaluative allegation is presented as a matter of fact, with independent certainty and validity. It reveals the premise on which the reasoning is based, whose diagnostic conclusions have already been formulated in the previous turns (turns 2–3, 6–7), at the very beginning of the encounter.

It should be also noted that in these two excerpts diagnostic talk shows, differently from other studies such as Antaki et al. (2005), an organization in which the "implication" comes first,

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[6]Metastasis is the spread of a cancer from one organ or part to another nonadjacent organ or part.

followed by the evaluations that led to the diagnostic outcome. This backward sequential organization of the argumentation seems to support the local purposes of their conversation (i.e., obtaining an independent judgment from the internist and avoiding "confirmation bias"; accounting for the requested advice and report). The judgment against the initial hypothesis is further supported with accounts suggesting a causal, but contradictory, link with the clinical assessment (turns 9–10) and partly compatible with other explanatory frameworks (turns 12–13). Numerous dubitative expressions (turn 12, turn 15) mitigate the validity and plausibility of the different diagnostic hypotheses, maintaining uncertainty.

We note here how the expertise distributed in the professional community is a resource used to account for the reliability of the available diagnostic hypotheses. Moreover, we see that the interaction between oncologist and nephrologist ends without a clear position being taken, so that all the diagnostic hypotheses are still feasible, including the initial one on cancer. This latter is recalled toward the end, and it is described as the simplest diagnosis (turn 16: "so maybe it's just a cancer"), in that it makes it possible to ignore the relationship with the complex and little-known configurations of the clinical evidence.

A time may come when, outside our present frame, a decision will be taken on how to treat the patient hospitalized in nephrology. Let us note, however, the temporal organization of this process. The diagnosis observed here has a provisional status. There is therefore a temporal evolution of the diagnosis, and there is a stage, particularly central to diagnostic reasoning, in which multiple interpretations are brought into play. A great deal of medical and nonmedical information is collected and selectively highlighted, creating an interpretative framework of increasing complexity.

This organization, which is unforeseen in the sequence of reasoning development on a logic of abstract rationality, seems to support a *practice of postponing the decision*, gaining time in which to collect and collate information, and in which events can be clarified, thereby reducing the possibility of making mistakes. Hence this is not an "empty" time, but one filled with, among other things, tests and examinations, exchanges with other physicians, and joint argumentations that support the processing and validation of information, producing as a (intermediate) result an increase in the complexity of the diagnostic picture. This collaborative practice appears to help to avoid diagnostic errors. In particular, it reduces, through the collaborative generation of hypotheses, the frequent mistake (Cartabellotta, 2001) of interpreting data as confirmation of the initial hypothesis.[7] Our analysis provides another illustration and validation of how systems of distributed cognition and communities of practice organize themselves in order to reduce risks of error in complex situations (see Hutchins, 1993).

Episode 2: "A Heavy Smoker"

The importance of talk among physicians in diagnostic work is highly visible in Excerpts 3, 4, and 5, in which the oncologist and a surgeon discuss possible diagnoses for a patient.

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[7]Studies on large samples of cases in various branches of medicine have found an incidence of serious diagnostic errors of about 15% to 20%, half of which have a probable impact on prognosis (Podbregar et al., 2001; Shojania, McDonald, Wachter, & Owens, 2004). In the United States, one fifth of lawsuits on medical issues concern diagnostic errors (Bartlett, 1998).

Biographical details of the patient, assessment of his health, examination results, theoretical statements regarding medical knowledge are intertwined in a narrative that leads to the production of several hypotheses and to the decision to proceed with a physical examination:

Excerpt 3: "A Heavy Smoker"

Participants: ONC oncologist; SUR surgeon

1. ONC: on the issue that concerns you (0.2) what did you decide?

2. SUR: which of the many? (.) because there are a lot

3. ONC: of the relative

4. SUR: what do I know (0.2) now we're wai[ting

5. ONC: [mah <ade:nocarcino:ma[8]> (0.5)

6. if it really is <u>that</u> (0.5) if he is someone who is (.) fine = fine = fine (0.5) you can also::

7. SUR: think that he even came fishing with me

8. ONC: you can also spare him ((*avoiding treatments, authors' note.*))

9. SUR: but it is very diffi[cult

10. ONC: [an <u>84-year-old</u> who is in good health (0.5) I mean.

The oncologist asks the surgeon about a patient who has some degree of kinship with the surgeon, hence the initial misunderstanding on an issue that concerns him (turns 1–3). Although the question asks for a decision, the response expresses doubt (turn 4). The oncologist formulates the current diagnosis and then immediately reduces its plausibility (turn 6), revealing it as a guess and making it provisional. Such an uncertain formulation leads to the *practice of intersubjective generation and validation of hypothesis* that allows doctors to build a scenario through which they can imagine possible courses of action (turn 8).

The words of the oncologist (turn 6) are received by the surgeon as a request for evaluation of the patient's overall health, to which he responds by introducing items of nonmedical information (turn 7) that make it possible to put the patient in the category of "84-year-olds who are in good health." What is interesting about this categorization of the patient's social identity is its impact on subsequent decisions concerning treatment (turn 8), further underlining the function of these narratives as places for the design of medical activities.

Another effect of the formulation of the diagnosis of adenocarcinoma is to "invite" hypothesis generation (i.e., thyroid cancer), as we see in the continuation of the physicians' conversation:

Excerpt 4

11. SUR: you know right (0.2) because (.) I was doing tests to see if it was thyroid

12. ONC: hm hm.

13. SUR: like this (0.2) just to [test

14. ONC: [yes (.) you told me

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[8]Adenocarcinoma is a cancer of epithelial tissue.

15. SUR: hm hm. and maybe today

16. ONC: however in my life (.) I've <u>never</u> se:en (0.5) a cancer stra- that makes- that is (0.2)

17. the thyroid is the one thing that you always suspect and it n<u>ever</u> is

18. SUR: no I've seen them

19. ONC: yes, no, me too I've seen thyroid cancers

20. but every time I started with the th[yroid cancer

21. SUR: [ah yes

22. ONC: all the times you thought that it was something else, that you said

23. *well let's exclude that it is thyroid* (0.2) it has never been.

24. SUR: °ah yes°(0.2) okay=okay

The surgeon does not provide the oncologist with any brand-new information (see turn 14). Therefore this communication goes beyond the sole purpose of informing: It creates the opportunity for *practices of joint interpretation* in which different but overlapping knowledges can work together.

The surgeon's communication elicits a comment by the oncologist on the diagnosis of thyroid in general. The oncologist's premise epistemically grounds the story by using his long, professional experience as a "warranty" (turn 16). He then increases the status of validity and generality of his opinion by presenting it as a certainty, as a "normal" rule to which to refer in professional practice (turn 17). The surgeon rejects the assertion and cites his experience as evidence (turn 18). This leads to a more detailed, limited, and contextualized reformulation by the oncologist (turns 19–24), with which the surgeon agrees. The oncologist, who now again speaks in first person, makes it clear that (a) the "real" thyroid cancers are those where thyroid cancer was the starting hypothesis, and (b) when thyroid cancer was a residual hypothesis, then the diagnostic process has always confirmed that it was something else.

The normative character of diagnostic practice is built in contested interactions like these, in which, as we see, the agreement is not granted, but requires sharing and negotiating a practical knowledge and the beliefs that shape it. Thanks to the activation of a diagnostic community and through "war stories" like this one (Orr, 1996), practical knowledge can be formulated, shared, and checked, becoming an interpretative resource for future diagnostic interactions. Besides thyroid cancer, later in the conversation, the two doctors formulate other diagnostic hypotheses:

Excerpt 5

25. ONC: oh well anyhow in [short

26. SUR: [so you say that is not- that it is useless to do something?

27. ONC: no=no (.) one moment. (0.5) it's not a prostate, right?

28. SUR: no.(0.2) I don't think so.

29. ONC: did you do his PSA[9] ?

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[9]PSA is a screening test for prostate cancer.

30. *((SUR nods))*

31. ONC: that's why I said *let me examine him* (0.2) I'm not gonna kill him

32. if I examine him by hand? (0.2) I'll say that I am the ear specialist, the pediatrician,

33. SUR: yes

34. ONC: the gynecologist,

35. SUR: yes, right

36. ONC: I can even see him (0.5) on the day that I'm on call (0.5) so in a setting,

37. in a non=non-cancer setting

38. SUR: because we have to to speak to Como *((medical internist))* I think he did it to him

39. ONC: of course he did it to him. (0.5) then obviously it won't be.

40. SUR: I thought of the prostate as well. but I noticed () pulmonary, the lymph nodes,

41. ONC: °it will be a lung cancer° (0.2) does he smoke then?

42. SUR: yes.

43. ONC: then that's it.

44. SUR: a heavy smoker.

Faced with the possibility of doing nothing (diagnostic failure), the oncologist restarts the process of hypotheses generation (i.e., prostate and lung cancers). Prostate cancer is considered not very likely (turn 28), but it is still checked and kept available (though with caution; turn 39). There follows a humorous dialogue in which a physical examination is proposed (turns 31–37). The surgeon's concerns regarding the patient's psychological protection are made explicit and, through irony, signalled as exaggerated (turn 31), but taken into account (turns 36–37). A clinical observation by the surgeon about the lungs and lymph nodes allows the oncologist to formulate a fourth hypothesis (a fifth, if one includes that of doing nothing), which is lung cancer. This hypothesis greatly increases in likelihood after the information that the patient smokes, to the point of being formulated as a certainty by the oncologist (turn 43), and further reinforced by the surgeon (turn 44).

The argumentative strength with which the last hypothesis is presented might induce us to suppose that this is the definitive diagnosis for this patient. However, it should be borne in mind that the function of these *practices of joint interpretation* is not to reveal the correct diagnosis, in spite of their definitive formulation. Also here in the "smoker's case," other conversations and diagnostic practices, including the physical examination, and still awaited test results relative to the other hypotheses, are necessary before arriving at the final decision. As in other professions, these conversations enable the doctors to imagine and explore possible courses of action in order eventually to reach a decision (Alby & Zuccermaglio, 2007, 2008; Newmann, 1998; Ochs, Gonzales, & Jacoby, 1996). Such *practices of joint interpretation* give the diagnostic hypothesis, not an abstract possibility but a concrete and situated one: They are in fact modeled on the individual patient, within "dense" interpretative frameworks that combine medical and nonmedical knowledge, like fishing or smoking. The patient appears at the beginning as "an 84-year-old who is fine," is later represented through the organs of his body, those possibly affected by the disease

("a possible prostate," lung, lymph nodes), and then returns as a "whole" described as "a heavy smoker" in the final part of the interaction.

This bricolage helps to keep different agencies and information together in the same interpretative framework, combining the results of a thorough check on parts of the patient's physical body with the autonomous and independent behaviours of the patient as a social body, including his habits and his lifestyle. Such practices increase the interpretative resources and create complex scenarios in which to reason while postponing the final diagnostic decision.

CONCLUSIONS

There are few studies on diagnostic decision making that focus directly on oncology. Our article has contributed to the gap in the literature by providing a unique empirical analysis of how diagnostic decision making is accomplished in naturally occurring medical interactions. Our analysis shows that doctors rely on three collaborative practices to organize the diagnostic decision making process. Let us discuss them in further detail.

Practices of Joint Interpretation

Our analysis has shown that an essential part of diagnostic reasoning happens "aloud" and is distributed in the interactions among the actors of a diagnostic community. As we have seen in the episodes analyzed, the activation of a diagnostic community provides access to diverse types of expertise, information, and clinical data about the patient while it allows the maintenance and development of repertoires of practical knowledge to which the doctors refer in a shared manner. We have seen how doctors repeat information and hypotheses that have already been mentioned previously, thus showing the importance of practices of joint interpretation for the ongoing diagnostic work. What doctors bring to these practices is a long experience of similar situations that serves as their toolbox for formulating hypotheses and making decisions. An interesting point here is how talk and reasoning are closely intertwined, mutually dependent in the development of interpretative practices. Through such practices doctors accomplish, *at a collective level*, the matching of the clinical evaluation with the known models of the illness.

Practices of Intersubjective Generation and Validation of Hypothesis

Doctors build argumentative contexts in which hypotheses can be generated and tested, assessing the robustness of their arguments and arranging subsequent actions (e.g., further exams and consultations). These argumentative practices are the "creative engine" whereby the hypotheses increase—like the five hypotheses in the second episode—and interweave with other ongoing medical practices. It is thanks to the embeddedness within a texture of hospital activities that the formats of doctors' joint hypothetical reasoning do not follow the sequential pattern of linear rationality but exhibit a reverse sequence in which the diagnostic outcome is the first thing to be communicated (see Episode 1).

Another important difference with respect to models of linear rationality is that hypotheses are, for the time being, not really "alternatives." There is no best hypothesis that is immediately chosen over the others. They are all at stake, although with different degrees of probability.

Practices of Postponing the Diagnostic Decision

Doctors do not rush into a definitive decision. Rather, they gain time in which to collect and collate information, to make a number of diagnostic hypotheses with provisional status, and to engage in joint argumentations that validate and complete information, thereby reducing the possibility of making errors. In the data that we analyzed, the diagnosis evolved over time and went through a phase of impasse of variable duration across the data set. In such a phase of impasse, a great deal of clinical information is highlighted, collected, and put into play; hypotheses are formulated and kept available; and an increasingly complex diagnostic picture is created. This is different from what is recommended by rationalist models that emphasize reduction of informational entropy, and cognitive strategies for certainty, but similar to recent observations on human cognition proceeding through cycles of disorder and reorder (Hutchins, 2012).

Postponing the diagnostic decision is thus a practice that helps in dealing with the complexity and uncertainty that characterizes oncology as a branch of medicine. In this scenario, what at a first glance may be seen as a doctor's indecisiveness reflects the degree of "relative knowledge" of current medical science and, therefore, the doctor's experience and familiarity with that knowledge made of situated certainties (Fox, 1957; Montgomery, 2006).

Our analyses describe the kind of situated rationality that inform decision making when observed in real-world settings. Compared to the three key defining notions of decision making in the model of linear rationality described in the introduction, the practices analyzed display different features. First, diagnostic decision making shows a temporal evolution, which includes a stage in which uncertainty is at its maximum, hypotheses proliferate, and informational complexity increases. Second, decision making does not follow a sequential pattern of rational and linear causality ("if–then") but relies on a practical logic that account for the interlink with other work practices (such as accounting for a consultation) and accordingly shapes the organization of the argumentation (which in this case became "then–if"). Third, diagnostic decision making results are shaped by the local constraints of the specialized medical domain and the opportunities of the context. In particular we observed how, in this interdisciplinary hospital, doctors exploit the distributed knowledge of their diagnostic community to make hypothetical reasoning easier to master in a complex domain such as oncology, overcoming limits in individual knowledge and cognition. So doing, doctors follow an economic logic that optimizes efforts. The solutions observed are sorts of "translations into practice" of the inferential principles and theories of medicine as a formalized system of knowledge in ways that take account of local resources and constraints, limits to the doctors' knowledge and mental abilities, and the social organization of work within professional communities.

More generally, our article, drawing upon the concept of practice, shows an approach to understanding and improving decisions-in-context. A better understanding of the practices that organize decision making can be used to support existing medical diagnostic communities or inform the practice-driven redesign of work processes while, more in general, improving our knowledge of the social organization of cognition in complex domains of activity.

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REFERENCES

Alby, F., & Zucchermaglio, C. (2006). "Afterwards we can understand what went wrong, but now let's fix it." How situated work practices shape group decision making. *Organization Studies*, *27*, 943–966. doi:10.1177/0170840606065703

Alby, F., & Zucchermaglio, C. (2007). Embodiment at the interface: Materialization practices in web design. *Research on Language and Social Interaction*, *40*, 255–277. doi:10.1080/08351810701354714

Alby, F., & Zucchermaglio, C. (2008). Collaboration in web design: Sharing knowledge, pursuing usability. *Journal of Pragmatics*, *40*, 494–506. doi:10.1016/j.pragma.2007.10.008

Alby, F., & Zucchermaglio, C. (2009). Time, narratives and participation frameworks in software troubleshooting. *Computer Supported Cooperative Work (CSCW)*, *18*, 129–146. doi:10.1007/s10606-008-9090-7

Antaki, C., Barnes, R., & Leudar, I. (2005). Diagnostic formulations in psychotherapy. *Discourse Studies*, *7*, 627–647. doi:10.1177/1461445605055420

Bartlett, E. (1998). Physicians' cognitive errors and their liability consequences. *Journal of Healthcare Risk Management*, *18*(4), 62–69. doi:10.1002/jhrm.5600180407

Beach, W. A. (Ed.). (2012). *Handbook of patient–provider interactions: Raising and responding to concerns about life, illness, and disease*. Cresskill, NJ: Hampton Press.

Boden, D. (1994). *The business of talk: Organizations in action*. Cambridge, England: Polity Press.

Bowker, G. C., & Star, S. L. (1999). *Sorting things out: Classification and its consequences*. Cambridge, MA: MIT Press.

Brookes-Howell, L. C. (2006). Living without labels: The interactional management of diagnostic uncertainty in the genetic counselling clinic. *Social Science & Medicine*, *63*, 3080–3091. doi:10.1016/j.socscimed.2006.08.008

Button, G., & Sharrock, W. W. (1998). The organizational accountability of technological work. *Social Studies of Science*, *28*, 73–102. doi:10.1177/030631298028001003

Cartabellotta, A. (2001). Ragionamento diagnostico, Evidence-based Medicine e linee guida [Diagnostic reasoning. Evidence-based medicine and guidelines]. *Rivision of Medical Laborator – -JLM*, *2*, 1.

Chaiklin, S., & Lave, J. (Eds.). (1993). *Understanding practice: Perspectives on activity and context*. Cambridge, England: Cambridge University Press.

Cicourel, A. V. (1985). Raisonnement et diagnostic: le rôle du discours et de la compréhension clinique en médecine. *Actes de La Recherche En Sciences Sociales*, *60*, 79–89. doi:10.3406/arss.1985.2292

Cicourel, A. V. (2002). La gestion des rendez-vous dans un service médical spécialisé [The management of encounters in a specialized medical service]. *Actes de La Recherche En Sciences Sociales*, *143*, 3–17.

Cole, M. (1996). *Cultural psychology: A once and future discipline*. Cambridge, MA: Harvard University Press.

Czarniawska-Joerges, B. (2007). *Shadowing and other techniques for doing fieldwork in modern societies*. Frederiksberg, Denmark: Copenhagen Business School Press.

Engeström, Y., Miettinen, R., & Punamäki, R.-L. (1999). *Perspectives on activity theory*. Cambridge, England: Cambridge University Press.

Engeström, Y., & Sannino, A. (2012). Concept formation in the wild. *Mind, Culture, and Activity*, *19*, 201–206. doi:10.1080/10749039.2012.690813

Falmagne, R. J. (2000). Positionality and thought: On the gendered foundations of thought, culture and development. In P. H. Miller & E. Scholnick (Eds.), *Developmental psychology through the lenses of feminist theories* (pp. 191–213). New York, NY: Routledge.

Fiske, S., & Taylor, S. (1991). *Social cognition* (2nd ed.). New York, NY: McGraw-Hill.

Fox, R. C. (1957). Training for uncertainty. In R. K. Merton, G. Reader, & P. L. Kendall (Eds.), *The student-physician: Introductory studies in the sociology of medical education* (pp. 207–241). Cambridge, MA: Harvard University Press.

Gherardi, S. (2012). Docta ignorantia: Professional knowing at the core and at the margins of a practice. *Journal of Education and Work*, *25*, 15–38. doi:10.1080/13639080.2012.644902

Goodwin, C. (1994). Professional vision. *American Anthropologist*, *96*, 606–633. doi:10.1525/aa.1994.96.3.02a00100

Goodwin, C. (1999). Practices of colour classification in professional discourse. In A. Jaworski & N. Coupland (Eds.), *The discourse reader* (pp. 474–491). London, England: Routledge.

Goodwin, C., & Goodwin, M. H. (1996). Seeing as a situated activity: Formulating planes. In D. Middleton & Y. Engeström (Eds.), *Cognition and communication at work* (pp. 61–95). Cambridge, England: Cambridge University Press.

Han, P. K. J., Klein, W. M. P., & Arora, N. K. (2011). Varieties of uncertainty in health care: A conceptual taxonomy. *Medical Decision Making: An International Journal of the Society for Medical Decision Making*, *31*, 828–838. doi:10.1177/0272989X10393976

Heath, C. (1992). The delivery and reception of diagnosis in the general practice consultation. In P. Drew & J. Heritage (Eds.), *Talk at work: Interaction in institutional settings* (pp. 235–267). Cambridge, England: Cambridge University Press.

Heritage, J., & Maynard, D. W. (Eds.). (2006). *Communication in medical care: Interaction between primary care physicians and patients*. Cambridge, England: Cambridge University Press.

Heritage, J., & Raymond, G. (2005). The terms of agreement: Indexing epistemic authority and subordination in talk-in-interaction. *Social Psychology Quarterly*, *68*, 15–38. doi:10.1177/019027250506800103

Hutchins, E. (1993). Learning to navigate. In S. Chaiklin & J. Lave (Eds.), *Understanding practice: Perspectives on activity and context* (pp. 35–63). Cambridge, England: Cambridge University Press.

Hutchins, E. (1995). *Cognition in the wild*. Cambridge, MA: MIT Press.

Hutchins, E. (2012). Concepts in practice as sources of order. *Mind, Culture, and Activity*, *19*, 314–323. doi:10.1080/10749039.2012.694006

Hutchins, E., & Klausen, T. (1996). Distributed cognition in an airline cockpit. In Y. Engeström & D. Middleton (Eds.), *Cognition and communication at work* (pp. 15–34). Cambridge, England: Cambridge University Press.

Jefferson, G. (2004). Glossary of transcript symbols with an introduction. In G. H. Lerner (Ed.), *Conversation analysis: Studies from the first generation* (pp. 13–23). Amsterdam, the Netherlands: John Benjamins.

Koenig, C. J. (2011). Patient resistance as agency in treatment decisions. *Social Science and Medicine (1982)*, *72*, 1105–1114. doi:10.1016/j.socscimed.2011.02.010

Kostopoulou, O., Russo, J. E., Keenan, G., Delaney, B. C., & Douiri, A. (2012). Information distortion in physicians' diagnostic judgments. *Medical Decision Making*, *32*, 831–839. doi:10.1177/0272989X12447241

Lave, J. (1988). *Cognition in practice: Mind, mathematics, and culture in everyday life*. Cambridge, England: Cambridge University Press.

Lave, J. (1993). The practice of learning. In S. Chaiklin & J. Lave (Eds.), *Understanding practice: Perspectives on activity and context* (pp. 35–63). Cambridge, England: Cambridge University Press.

Lave, J., & Wenger, E. C. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, England: Cambridge University Press.

Lehtinen, E. (2013). Hedging, knowledge and interaction: Doctors' and clients' talk about medical information and client experiences in genetic counseling. *Patient Education and Counseling*, *92*, 31–37. doi:10.1016/j.pec.2013.02.005

Lipshitz, R., Klein, G., & Carroll, J. S. (2006). Introduction to the special issue. Naturalistic decision making and organizational decision making: Exploring the intersections. *Organization Studies*, *27*, 917–923. doi:10.1177/0170840606065711

March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, *2*, 71–87. doi:10.1287/orsc.2.1.71

March, J. G. (1994). *A primer on decision making: How decisions happen*. New York, NY: Free Press.

Maynard, D. W. (1992). On clinicians co-implicating recipients' perspective in the delivery of diagnostic news. In P. Drew & J. Heritage (Eds.), *Talk at work: Social interaction in institutional settings* (pp. 331–358). Cambridge, England: Cambridge University Press.

Miettinen, R., Paavola, S., & Pohjola, P. (2012). From habituality to change: Contribution of activity theory and pragmatism to practice theories. *Journal for the Theory of Social Behaviour*, *42*, 345–360. doi:10.1111/j.1468-5914.2012.00495.x

Montgomery, K. (2006). *How doctors think: Clinical judgment and the practice of medicine*. New York, NY: Oxford University Press.

Motterlini, M., & Crupi, V. (2005). *Decisioni mediche. Un punto di vista cognitivo* [Medical decisions. A cognitive point of view]. Milan, Italy: Raffaello Cortina Editore.

Newmann, W. W. (1998). Foreign policy decision making, garbage cans, and policy shifts: The Eisenhower administration and the "Chances for Peace" speech. *The American Review of Public Administration*, *28*, 187–212. doi:10.1177/027507409802800205

Nicolini, D. (2012). *Practice theory, work, and organization: An introduction*. Oxford, England: Oxford University Press.

Ochs, E., Gonzales, P., & Jacoby, S. (1996). "When I come down I'm in the domain state": Grammar and graphic representation in the interpretive activity of physicists. In E. Ochs, E. A. Schegloff, & S. A. Thompson (Eds.), *Interaction and grammar* (pp. 328–369). Cambridge, England: Cambridge University Press.

Oliver, D., & Roos, J. (2005). Decision making in high velocity environments: The importance of guiding principles. *Organization Studies*, *26*, 889–913. doi:10.1177/0170840605054609

Opel, D. J., Heritage, J., Taylor, J. A., Mangione-Smith, R., Salas, H. S., DeVere, V., . . . Robinson, J. D. (2013). The architecture of provider–parent vaccine discussions at health supervision visits. *Pediatrics*, *132*, 1037–1046. doi:10.1542/peds.2013-2037

Orr, J. E. (1996). *Talking about machines: An ethnography of a modern job*. Ithaca, NY: Cornell University Press.

Peräkylä, A. (1998). Authority and accountability: The delivery of diagnosis in primary health care. *Social Psychology Quarterly*, *61*, 301–320. doi:10.2307/2787032

Pilnick, A., Hindmarsh, J., & Gill, V. T. (2009). Beyond "doctor and patient": Developments in the study of healthcare interactions. *Sociology of Health & Illness*, *31*, 787–802. doi:10.1111/j.1467-9566.2009.01194.x

Podbregar, M., Voga, G., Krivec, B., Skale, R., Pareznik, R., & Gabrscek, L. (2001). Should we confirm our clinical diagnostic certainty by autopsies? *Intensive Care Medicine*, *27*, 1750–1755. doi:10.1007/s00134-001-1129-x

Resnick, L. B., Säljö, R., Pontecorvo, C., & Burge, B. (Eds.). (1997). *Discourse, tools and reasoning: Essays on situated cognition*. Berlin, Germany: Springer.

Roth, E. M., Multer, J., & Raslear, T. (2006). Shared situation awareness as a contributor to high reliability performance in railroad operations. *Organization Studies*, *27*, 967–987. doi:10.1177/0170840606065705

Schatzki, T. R. (2001a). Introduction: Practice theory. In T. R. Schatzki, K. D. K. Cetina, & E. V. Savigny (Eds.), *The practice turn in contemporary theory* (pp. 10–23). London, England: Routledge.

Schatzki, T. R. (2001b). Practice mind-ed orders. In T. R. Schatzki, K. D. K. Cetina, & Savigny, E. V. (Eds.), *The practice turn in contemporary theory* (pp. 50–64). London, England: Routledge.

Scribner, S. (1984). Studying working intelligence. In B. Rogoff & J. Lave (Eds.), *Everyday cognition: Its development in social context* (pp. 9–40). Cambridge, MA: Harvard University Press.

Scribner, S. (1986). Thinking in action: Some characteristics of practical thought. In R. J. Sternberg & R. K. Wagner (Eds.), *Practical intelligence: Nature and origins of competence in the everyday world* (pp. 13–30). Cambridge, UK: Cambridge University Press.

Shojania, K. G., McDonald, K. M., Wachter, R. M., & Owens, D. K. (Eds.). (2004). *Closing the quality gap: A critical analysis of quality improvement strategies (Vol. 1: Series overview and methodology)*. Rockville, MD: Agency for Healthcare Research and Quality.

Simon, H. A. (1957). *Administrative behavior*. New York, NY: Macmillan.

Stivers, T. (2002). Participating in decisions about treatment: Overt parent pressure for antibiotic medication in pediatric encounters. *Social Science & Medicine*, *54*, 1111–1130. doi:10.1016/S0277-9536(01)00085-5

Streeck, J., Goodwin, C., & LeBaron, C. (Eds.). (2011). *Embodied interaction: Language and body in the material world*. Cambridge, England: Cambridge University Press.

Szambok, C., & Klein, G. (Eds.). (1995). *Naturalistic decision making*. Hillsdale, NJ: Erlbaum.

Toulmin, S. E. (1996). Concluding methodological reflections: Elitism and democracy among the sciences. In B. Gustavsen & S. E. Toulmin (Eds.), *Beyond theory: Changing organizations through participation* (pp. 203–225). Amsterdam, the Netherlands: John Benjamins.

Vygotsky, L. (1990). *Pensiero e linguaggio* [Thought and language] (L. Mecacci, Ed.). Bari, Italy: Laterza.

Wenger, E. C. (2002). Communities of practice. In N. J. Smelser & P. B. Baltes (Eds.), *International encyclopedia of the social & behavioral sciences* (pp. 2339–2342). Oxford, England: Pergamon Press.

Zucchermaglio, C., & Alby, F. (2012). Planning and assessing performance through narratives in soccer team meetings. *Qualitative Research in Sport and Exercise and Health*, *4*, 459–469. doi:10.1080/2159676X.2012.693523

APPENDIX

Excerpts in Italian

Excerpt 1: "So Maybe It's Just a Cancer"
1 ONC: un'altra cosa (0.2) che per caso: t'ha chiamato ieri Rossi ((il nefrologo)) per quella ma:la:ta?
2 MED: sì.
3 ONC: ma è neoplastica secondo te ?(0.2) sicuramente?
4 MED: no.
5 ONC: Appu:nto (0.2) infatti. io=credo (.) ma-
6 MED: ()
7 ONC: è. quello pensavo io (0.2) che quelle cose alla pelle potrebbero essere uno streptococco,
8 MED: uno streptococco o un ()
9 ONC: è. (0.2) quello stavo a pensà io infatti gli ho detto che quando m'hanno-
10 perché infatti gli=avevo=detto una paziente possibilmente neopla:stica (0.2) però non è detto affatto (.)
11 però ho detto (0.2) ho detto *è stra:no tutte ste- *(0.2) ((macchie N.d.A.))
12 se fosse un cancro (0.2) tutte ste metastasi polmonari ((sarebbero impossibili, N.d.A.))
13 ntz ((cenno di diniego)) questa c'ha qualcosa de:: (0.5) a me ricordava (.) il criptococco
14 MED: può darsi.
15 ONC: Allora me la ricordo ancora la medicina, eh?

Excerpt 2
1 ONC: un regalo? ((NEF gli consegna una busta indirizzata a lui)) no perché (0.5)
2 anche Cuomo ((internista)) esprime perplessità (.) su quella. sul fatto che quella paziente
3 possa essere <neopla:stica> (0.5) perché io me la sono guardata (0.2)
4 ho detto, essendo scritto sulla consule:nza, io ho scri:tto
5 ((parla mentre legge ciò che è scritto sulla busta)) per=cui ALLORA sulla
6 consulenza ho scritto che questo paziente è (0.5) possibilmente neoplastico. (0.5) ma
7 l'altra=idea che mi ero fatto è che fossero () e ba:sta.
8 NEF: m:: ((annuisce))
9 ONC: perché è stra:na per essere un cancro. non c'ha manco una metastasi epatica (0.5)
10 però è gialla.
11 NEF: m:: ((annuisce))
12 ONC: non lo so (0.5) poi c'ha delle curio:se lesioni cuta:nee (.)
13 che a me mi ricordano tanto il criptococco
14 NEF: m:. ((annuisce))
15 ONC: non lo so. (0.2) magari non è così (0.5) °però ecco° m'ero fatto st'idea.
16 magari poi è solamente un cancro (0.2) però (.) insomma vabbè

Excerpts 3–5: "A Heavy Smoker"
1 ONC: per la questione che ti riguarda (0.2) poi che hai deciso?
2 SUR: quale delle ta::nte? (.) perché sò parecchie
3 ONC: del del parente
4 SUR: e che ne so (0.2) mò sta stiamo aspetta[:ndo
5 ONC: [mah <ade:nocarcino:ma> (0.5)
6 se è veramente quello (0.5) se è uno che sta (.) bene=bene=bene (0.5) lo puoi pure::
7 SUR: figurati che è venuto pure a pesca con me
8 ONC: lo puoi pure graziare
9 SUR: è ma è diffici[le
10 ONC: [un ottantaquattrenne che sta be:ne (0.5) voglio=dì.
11 SUR: sai no (0.2) perché (.) stavo facendo pro:ve che fosse tiroide
12 ONC: è.
13 SUR: così (0.2) giusto per pr[ova
14 ONC: [sì (.) me l'hai detto

15   SUR: è. e forse oggi:::
16   ONC: comunque in vita mia (.) non ho mai <u>vi:sto</u> (1.0) un cancro stra- che fa- <u>cioè</u> (0.2)
17   la tiroide è una co:sa (.) che si sospetta <u>sempre</u> e non è mai.
18   SUR: no <u>io</u> l'ho visti
19   ONC: sì:: no, li ho visti anch'io i cancri alla tiroide (.)
20   però:: tutte le volte che partivo con il cancro alla ti[ro- cioè
21   SUR: [ah sì
22   ONC: tutte le volte che pensavi che era un'altra cosa, che hai detto *
23   bè escludiamo che sia tiroide* (0.2) non era mai.
24   SUR: °ah sì °(0.2) va bè=va bè
25   ONC: va bè comunque non-[insomma
26   SUR: [quindi tu dici che no:::n (.) è <u>inu</u>tile fare qualcosa?
27   ONC: no=no (.)un <u>momento.</u> (0.5) non è una prostata, vero?
28   SUR: e no.(0.2) non credo.
29   ONC: pi esse a gliel'hai fa-?
30   *((SUR annuisce con il capo))*
31   ONC: e per questo dicevo (.) *fammelo visità* (0.2) mica che te l'a- te=te l'<u>accoppo</u> (.)
32   se lo guardo con le mani (0.2) io dico che faccio <u>l</u>'otori::no, il pedia::tra,
33   SUR: sì
34   ONC: il gineco::logo,
35   SUR: sì va bè.
36   ONC: lo posso pure guardare::(0.5) il giorno che sono di guardia. (0.5) cioè in ambiente,
37   in ambiente non=non oncologico
38   SUR: perché bisogna sentire Como ((medico internista)) credo che gliel'abbia fatto
39   ONC: °sicuramente gliel'ha fatto (0.5) non <u>sarà</u> poi ovviamente.
40   SUR: c'avevo pensato pure io alla prostata. però ho notato () polmonare, i linfonodi,
41   ONC: °sarà un cancro al polmone° (0.2) lui fuma poi?
42   SUR: è.
43   ONC: e allora è que:llo.
44   SUR: un grandissimo fumatore.