What is seen on the screen? Exploring collaborative interpretation, representational tools, and disciplined perception in medicine

Andreas Gegenfurtner, University of Turku, Centre for Learning Research, Assistentinkatu 7, 20014 Turku, angege@utu.fi

Abstract: Diagnostic decision-making in medicine involves meaning-making of what can be seen on medical images, such as positron emission tomography (PET) pictures. This meaning-making is seldom an individual activity; rather it involves interactional practices between clinical staff, and between the physician and the specific representational technology. This poster presentation contributes to earlier studies on professional vision and disciplined perception in that it emphasizes the role of feedback, power relations, and ontogeny that shape collaborative interpretation of what is seen on the screen. Taking an analytical perspective founded in ethnomethodology and conversation analysis, this study will closely examine participants of a medical training in PET reading to be held in a Finnish university hospital in spring 2009. Video-recorded data will be analyzed using discourse analytical methods with a focus in understanding the appropriation of professional concepts and analytical skills in relation to feedback, ontogeny, and power. Practical and theoretical implications are outlined.

Introduction
Diagnostic decision-making in medicine involves meaning-making of what can be seen on medical images, such as X-ray photographs or positron emission tomography (PET) pictures. In clinical practice, seeing and interpreting the features of medical images are not exclusively cognitive processes located within an individual. Rather seeing is “a socially situated activity accomplished through the deployment of a range of historically constituted discursive practices” (Goodwin, 1994, p. 606). These discursive practices form what Goodwin describes as professional vision (1994, 1997), and they are negotiated around a common object of disciplined perception (cf. Lindwall & Lymer, 2008), in this study: pictorial representations of the human body produced by a positron emission tomographer.

The increasing use of digital imaging technologies creates a number of challenges to professional and educational practice in medicine. First, it is evident that different representational tools have different affordances asking for different diagnostic skills. For example, while an X-ray photograph is an analogical, two-dimensional, and static image, a positron emission tomography (PET) picture is digital, three-dimensional, and dynamically changeable by the physician. Digital imaging techniques thus not only require seeing and interpreting what is seen but also modifying (zooming, rotating) the image to see each relevant aspect; they require a certain level of skillful human-computer interaction. Second, the increasing use of digital technology also transforms the clinical institutional context. It forms new discursive practices that are needed to diagnose digitally-processed images. It also creates new expert cultures within new communities of practice that develop around new medical computer tools. Third, the use of digital imaging techniques implies changes in how to address the development of visual diagnostic expertise (Crowley et al., 2003; Morita et al., 2008) in medical professional training. More specifically, it is still unclear how to promote the transfer of diagnostic skills from one technology to another and how to help reducing errors in the diagnostic process that result from personal histories. Also, there is still an interest to explore how computers are used in and for professional training, and how technology in medical education mediates human interactions and learning. To summarize, the use of technology challenges the development of professional vision and diagnostic expertise; it shapes the clinical institutional context; and it impacts medical education and training.

Following a dialogic approach (Arnseth & Ludvigsen, 2006), the purpose of this study is to explore how power and ontogeny shape the meaning-making process of what is seen on a PET screen. It is assumed that both personal learning histories and the power to perform operational actions related to the representational tool shape the practices of collaborative interpretation. The next section illustrates how this study aims to explore the interdependencies between, on one hand, the cognitive and perceptual processes of physicians associated with medical image diagnosis and, on the other, the institutional context, i.e. the representational tool and its mediation of interactional practices.

Method
The sample of the study will be participants of a medical training course on PET reading to be held in a Finnish university hospital in May 2009. The course is designed for physicians who are already experts in reading X-ray images and who are now also using PET in their everyday clinical work. Taking an analytical perspective founded in ethnomethodology and conversation analysis (Goodwin, 2000; Ivarsson, Linderoth, & Säljö, in press; Jordan & Henderson, 1995; Lindwall & Lymer, 2008), the study will examine episodes of how a training
instructor and two training participants negotiate meaning of what they see in a PET image. We will collect a material of about 6 hours of these learning episodes. The video-recordings will be transcribed and analyzed using discourse analytical methods with a focus in understanding the appropriation of professional concepts and analytical skills related to feedback, ontogeny, and power. Additionally, we will employ an audit procedure to assure the quality of our qualitative observation study; this might help increase the visibility, comprehensibility, and acceptability of the research conducted (cf. Akkerman, Admiraal, Brekelmans, & Oost, 2008).

Discussion and Conclusion
This poster presentation outlines a study that aims to closely examine the discursive practices associated with diagnosing medical images. The analysis of a digital representation of the human body for diagnostic purposes involves meaning-making of what is seen. This process of meaning-making is a social process, since it involves interaction on two levels: interaction between the physicians and human-computer interaction. The process of meaning-making is proposed to be shaped by power relations (“Who has the power to manipulate the image? Who has the mouse to click on the screen?”). It also shaped by feedback given by the medical teacher (Ericsson, 2004), and by the personal history of the interpreters: Based upon their previous experience in reading X-rays, the training participants might experience conceptual conflicts in the course of collaboratively interpreting the PET image. The purpose of this study is to explore these interdependencies between feedback, power, ontogeny, technology, and seeing on the PET screen.

This research has several practical and theoretical implications. (1) Concerning its significance for theory development, the study contributes to previous attempts in understanding professional vision and disciplined perception (Goodwin, 1994, 1997; Lindwall & Lymer, 2008). It aims to unravel the influence of power relations and ontogeny on the collaborative interpretation of what is seen on the screen. These findings might be relevant for future conceptualizations of disciplined perception in the context of medical image diagnosis. (2) Concerning its significance for educational practice, this study will address the interdependencies between gaze, thinking, and technology to trace how training participants learn to interpret medical images, especially in relation to feedback. Moreover, it will highlight the need of equally distributing power between training participants to guarantee an optimal development of visual diagnostic expertise (cf. Crowley et al., 2003; Morita et al., 2008) for each trainee. Last, the in-depth analysis of interactional practices might inform future teaching practices of PET reading and the design of medical training programs.

References