

THE USE OF NARRATIVES FOR GENERATING KNOWLEDGE ABOUT THE ERGONOMISTS ROLE IN DESIGN PROCESSES

Jackson, JM^{1,2}; Dischinger, M³; Duarte, F²

1. FUNDACENTRO/RJ, Rua Rodrigo Silva, 26 – 5^o andar – 20011-902 – Rio de Janeiro/RJ – Brazil.
2. Departamento de Engenharia do Produto – COPPE – Universidade Federal do Rio de Janeiro
3. Departamento de Arquitetura e Urbanismo – Universidade Federal de Santa Catarina
E-mail: jmarcaljf@yahoo.com.br

This paper discusses the use of narratives for generating knowledge about the ergonomists role in design processes. A critical reading of two studies based on fieldwork was made. Both studies relied on ‘narratives’ as instruments to generate a new conception about the role of ergonomists in design process. However, in spite of their relevance, the authors were not concerned about the techniques used to write these stories. It seems that we ergonomists, need to develop the craft of writing in a ‘new’ and unusual direction, one that is already employed by other disciplines belonging to the social sciences.

Narratives, Design process, Ergonomic practice, Field studies, Writing

1 Introduction

How can ergonomics as a scientific discipline contribute to improving design work systems? Moreover, what are the contributions made by ergonomists through their participation in design processes?

Although such questions are recurrent in many ergonomic conferences and journals, it is clear that traditional mainstream experimental approaches to ergonomic research neither aim to, nor have the methods to answer them. For Dekker and Nyce (2004), ‘Ergonomics has not always explicitly considered the link from research to design’ (p. 1625) and there is no explanation of how ‘basic’ data produced by research can be used in the design process. One explanation for this situation might be that ‘the step from research to design is regarded as unproblematic’ (Dekker and Nyce 2004, p. 1625).

Precisely because of this it is crucial to understand how ergonomists influence the practice of design, and how they can be effective in social settings, i.e. contributing to designing better ways of working. Daniellou (1999) contests the general idea that ergonomists merely apply fundamental knowledge about humans at work, and demonstrates interest in a deeper investigation into ergonomists practice.

To reach an understanding of the specific role of ergonomists in the design process and their social activities, we need to bear in mind the premise that the use of Social Sciences research methods is fundamental. They are already employed in studies produced by other scientific disciplines – such as architecture and engineering – to generate knowledge about their professional practice in design processes.

While the use of such methods has already become an object of concern in Ergonomics (Daniellou 1999), discussion about how to analyze, treat and present results is still incipient. In this paper we intend to treat precisely these points, and to discuss how the

data that are the basis for published scientific investigation on this subject are treated, organized and presented in written form.

Bucciarelli (1984) considers these aspects in his classic study on the engineering design process. He writes that after two years of investigation:

It is time to fabricate meaning out of seven loose-leaf notebooks of a chronologically arranged stream of data, data disparity in form and in quality... All this constitutes the stuff of an analysis of the engineering design process. What to do with it, how to construct any analysis of merit, is the nagging question (pp. 187-188).

For Bucciarelli, the narrative and the topical mode are essential in order to frame his analysis. Regarding narratives, he affirms that

the narrative presents a compelling format for exposition and analysis. It can convey a strong sense of the dynamics of a process, inviting the reader to join in that process, indeed depending upon that engagement to affect an interpretation of events. While the phenomena it attends to may be restricted, if events are reconstructed with imaginative care the narrative will transcend its locale, the limits of the single individual, the team, the firm, and even the author, to speak to a general thesis (pp. 188-189).

If we look at the ergonomics research literature about ergonomists participation in design processes, i.e. if we aim to understand, ‘the ‘how’ in an ergonomic change team’ (as Theberge et al. [2006] have put it), we observe two related aspects. Firstly we agree with Lenior and Verhoeven (1990) that ‘in many publications the development of human-factors practice has been placed in an historical context by ergonomics practitioners’ (p. 643). Secondly, one important characteristic of these studies is that they used narratives implicitly, and therefore did not accord them a central place in the account of the research process (Burns & Vicente 2000, Broberg & Hermund 2004).

With the aim of making an in-depth contribution to this discussion, we will start by presenting aspects of the current debate concerning the role of ergonomists in design processes. We will then examine the forms in which data from research fields regarding this subject are organized and presented.

2 The role of ergonomists in the design process

Ergonomist participation in design projects can be conceived of in various ways. From a more traditional perspective, ergonomists may be seen as specialists in human factors and interfaces who apply specific knowledge, techniques and methods to the solution of problems or who evaluate the solutions proposed by the designers (Meister 1986).

There has been much criticism of the ergonomist as an “evaluator”, since in this role interaction with project designers has not always been positive. McClelland (1990) argues for the need to shift the ergonomist’s function “from the traditional remedial role, being evaluator and critic, to a more prospective, process oriented way of thinking” (397). Rather than being considered as an expert trying to apply knowledge or techniques, the ergonomist should be seen as an agent in the project (McClelland 1990), or a “practitioner” who intervenes in the project’s context, as suggested by Daniellou (1999). The focus of the ergonomist’s activities, especially in the project’s early stages, is not necessarily on work instruments and interfaces but, rather, on the designers’ and managers’ (the “decision-makers”) ways of thinking regarding the work itself (Daniellou 1999). By drawing work descriptions early on in the design process, the ergonomist is in a position to partake in the definition of the project’s goals and in the negotiation of technical constraints. Thus his participation increases the chances of designing more adequate solutions for human work.

Seen in this light, the ergonomist's involvement is essentially social and the outcomes of such involvement depend on the degree of interaction secured with project designers and managers (Burns & Vicente 2000). It is for this reason that Jackson (1998) argues that the capacity to influence the progress of a design process does not depend solely on the quality of the presentation of ergonomic concerns, but also on the quality of the social construction that ergonomists put into practice. McClelland (1990) corroborates this vision and insists that: "influencing the attitudes and skills of individual designers is necessary but not sufficient to ensure that ergonomics issues receive appropriate attention during project development"; the ergonomist "should focus on understanding and contributing to the management of the design, and be more conscious that the ergonomist is a part of the process" (397).

Broberg and Hermund (2004) synthesize these constructs and issues in their proposal for a model in which the ergonomist's role is of a 'political reflective navigator', that is: 'political in the sense of pursuing a work environment agenda', 'reflective in the sense of being able to switch different roles and mobilize different types of knowledge', and 'navigator in the sense of knowing how to navigate in the complex organization surrounding the technological change process' (p.315).

From the information presented thus far, one can note some consensus in current forms of seeing the ergonomist's role in design projects. This agreement helps to support the validity of the results and reflections presented on this subject.

To extend this reflection further, some critical readings of the different modes in which researchers organize and present their scientific data drawn from fieldwork were made. Text descriptions, excerpts and reflections are reproduced in the following section.

3 Analysing some published researches

Daniellou (1999) has suggested three alternatives of analyzing ergonomist action in projects: the first regards work analysis, undertaken by an ergonomic researcher, of an ergonomist's activities; the second concerns the use of 'reflective practice'; and the third is the combination of the first two.

To analyze research on the ergonomist role regarding the way they organize and present results in design projects, two published studies were chosen, each one belonging to the first and the third categories established by Daniellou.

3.1 'The OHS consultant as a 'political reflective navigator' in technological change processes" (Broberg & Hermund 2004) – Paper published in an issue of the International Journal of Industrial Ergonomics.

Based on evidence from field studies on the work practices of OHS consultants in technological change processes, the authors propose a new role for these professionals as 'political reflective navigators'. In this proposal the OHS consultant is an 'actor' 'who pursues a work environment agenda in a complex network in which other actors pursue other agendas such as productivity, economics, quality, etc.' (p.315) Before presenting the ergonomics cases, the authors introduce the theoretical framework – the actor-network theory and the social construction of technology, – and discuss the role models for the OHS consultants.

The proposal of this new role for OHS consultants was based on four case studies of which only two are described in this paper. The first was the development of a new check-in desk at an airport, and the second was a new factory building. Semi-structured interviews with some of the project actors were carried out in order to elucidate 'step-

by-step how these technological changes took place, who was involved, how the OHS consultant came into play, and in what way and by which means the OHS consultant tried to solve and give advice' (p. 319). Briefly, the material contained some 'narratives / stories' of the actors in these processes.

The two cases supported the author's conception of a new model for the OSH role. Let us consider the mode in which they were described, – the first case is adequate for our purposes here. The case contained three stages: the presentation of the technological project (objectives and actors), the narrative of the actions of the OHS consultant, and the analyses of the OHS consultant's actions. An excerpt of their text serves to illustrate this narrative:

While still negotiating design specifications, the airport team wanted to visit another airport where they found the check-in desks to be aesthetically appealing. Since the OHS consultant was afraid that consideration of aesthetic dimensions would lead to neglect of the ergonomic dimensions, she contacted her OHS colleagues in the other airport beforehand, asking them to point out any ergonomic problems with the desks when presenting them to the airport teams (p.321).

The narratives, in both cases, contributed to elaborating and reinforcing the authors' conception of the new role of OHS consultant.

3.2 "*Entre situations de gestion et situations de delibération: l'action de l'ergonome dans les projets industriels*" (Jackson 1998) – **Doctoral thesis** published by the Université de Bordeaux 2.

Ergonomic practice can be seen schematically as a succession of methods applied at different project stages. However, subsequent reflection about participation processes in projects shows the inadequacy of this description. The author proposes an ergonomist model of action in design projects that considers not only their technical contribution, but also their action in social spaces. According to Jackson, in order to introduce future work issues as design constraints it is necessary to reframe the project spaces in order to create 'situations de gestion'. To prepare such spaces implies the need for constant interaction with other actors, and in particular with management actors.

The description of the project, which is for the modernization of an insulator plant, contains details of the ergonomic interventions and their results, and two narrative accounts. These were written based on a systematic collection of data — project reports and documents, ergonomic reports, notes from project and ergonomic-team meetings, notes from interviews and ergonomic observations and analysis, a " *carnet de bord* " of the ergonomists' activities — which was validated by the ergonomic team members, the plant manager and the project leader.

The stories – one concerning the team's participation in the meetings at the beginning of the process, and the other describing participation in some of the meetings to define the specifications for a new control room – were used to demonstrate the thesis.

An excerpt illustrates some of the ergonomists' 'moves' concerning the plant (shop floor and offices):

The ergonomists found out, then, that the packaging operators in line A had only ten minutes to react in the event of an incident (estimated time to change the cylinders containing raw materials in one of the machines). Once ten minutes had elapsed, the line would have to be stopped, and rejects would be produced. Moreover, the methods agent did not know which products and respective quantities would be transferred from line B and packed in the packaging sector of line A through the new junction. Consequently, it was crucial for the ergonomists to question the reason for this junction in the production lines. Once these results

had been achieved, the ergonomists had enough elements to influence the studies, introducing the issue of packaging reliability (previously rejected by the plant's executives) and the need to give attention to the future products. (p. 174)

The two studies presented here have in common the fact that they relied on 'narratives' as instruments to generate a new conception about the role of ergonomists in design process. However, in spite of their relevance, the authors were not concerned about the techniques used to write these stories. As a consequence, the texts are not easy reading, and to a certain extent, they neglected the inner power of a narrative (see Bruner 1996).

4 Discussion

The growing use of methodologies deriving from the Social Sciences in the understanding of activities inherent to engineering projects can be explained through the need to perceive such activities as "situated actions". Although there is some controversy regarding the application of methods – ethnographic, qualitative studies or field studies – numerous authors agree on the interest of such methods, since they allow for a factual description of the project's reality and reinforce their social aspects (Granath 1991, Bucciarelli 1984).

In the specific case of ergonomics, an initial consensus emerges regarding the need for serious research based on social sciences methodology to increase the knowledge of ergonomists' social practice in projects (Daniellou 1991, Theberge et al 2006).

As stated by Granath (1991), an engineering design process is neither linear nor mechanical; it is a collection of events, actors and their interactions, and 'intermediary objects' that are designed. Every project is a social process (Bucciarelli, 1984) in which different, and at times opposed, interests and rationales coexist. The quality of any project depends on the intensity of the interaction between the different agents, hence the need to improve the management techniques to structure such relations.

In order to truly influence industrial projects, it seems to us that historical narratives of ergonomic practice are an important mode of framing and describing not only the understanding of the difficulties faced by ergonomists, but also the awareness of the strategies used to introduce human work perspectives in their respective contexts.

As we have shown in the two studies outlined in this paper, much research on ergonomic practice in design process relies on narratives or historical accounts, even if not explicitly. Studies present their methods of data collection, but do not explain the way in which they treat, organize and frame such data.

According to Bucciarelli description and analysis of the social context of design must be done by 'not neglecting the artifact but exploring the connections of context and artifact, process and product, the social and the technical' (p. 190). It is for this reason that we agree when he argues for the need to combine different modes for the framing analysis of a design process: the narrative and the topical mode. In fact, he explicitly discourses about how to write, how to express what he has observed, interpreted and analyzed, and he also discusses the craft of writing.

He discusses something that has never concerned ergonomic researchers, accustomed as they are to writing in the traditional style of scientific texts. It seems that we ergonomists, need to develop the craft of writing in a 'new' and unusual direction, one that is already employed by other disciplines belonging to the social sciences. In fact, writing is an essential issue of any research field as Vaughan (2004) asserted; 'analysis, writing and theorizing are integrated through the research process' (p. 315).

Working from an innovative perspective, we should also be concerned about the debate on validity criteria when we use these methodologies and approaches. To start the debate, we support the advances made by defenders of an epistemological approach to case or field studies. For instance, we agree with Dekker and Nyce (2004) when they propose plausibility as the main criteria for judging results obtained from field studies, i.e. whether the “statements ‘make sense’ given what the literature and other fieldworks have to say about the same issue” (p. 1636).

5 Final remarks

Even though the use of narrative forms does seem to contribute to the process of generating knowledge about ergonomic intervention in design processes, this mode of writing is only used in an implicit and instrumental manner. We argue here that the time has come for the ergonomic community to debate the criteria of its legitimacy and the conditions of its use.

If ergonomists really want to find their place in the field of design processes, it would be of great value for the whole ergonomics community – its researchers and practitioners – if the use of narrative and storytelling were to become an explicit mode of presenting the analysis of their professional actions, just as it has already been for many years in other design disciplines.

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