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How do ergonomists influence work situations?

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To begin with, I do not believe that there exists such a thing as “interventions in ergonomics”. What exists are interventions “of ergonomists”: it is not the discipline which intervenes, but persons. They do it in a diversity of frameworks, with different statuses, different origins of the requests, different objects, different resources and constraints.

Now, what is an intervention? Intervening means “coming among others”. The ergonomist is in the arena, among other people, not on the cliff – nor on the side of the field, advising them from a distance. He/she is there because he/she has been requested to help to solve a problem or to manage a project. He/she will endeavour to lead the company stakeholders to make decisions, to take actions or to develop practices that they would not have developed without his/her presence. He/she is the bearer of knowledge about human at work, but also of values and criteria, such as promoting health, the sustainable efficiency of the system, and the development of people and organisations. But how does he/she act ? By which mechanisms does he/she influence the situation?

- The first and most common answer brought to this question is the technological approach: the ergonomist acts by *applying* scientific knowledge about the human at work to solve the problems he/she addressing. This standpoint is widely shared worldwide. And it is true that the ergonomist brings interdisciplinary knowledge about the humans, their physiology, their cognition, their subjectivity. Unfortunately, we have been knowing for many years, notably thanks to Schön and Argyris, that practitioners *do not apply* scientific knowledge to solve a problem. Because what they come across in the workplace is not a problem, but, as Schön says, “a mess”. The problem is not yet set when they arrive, or it has not been formulated in the right way. There is no one single way of setting the problem which has to be solved; the solution is not known in advance and is not unique; and the path from the problem to the solution is not defined in advance. From that point of view, the practitioner in ergonomics is in the same cognitive situation as a designer or an architect who will have to “converse with the situation” to “make moves” and anticipate their consequences. As in the case of the architect, different ergonomists would design different answers and different solutions – which is not a weakness but a strength.

- Second possible proposal: the ergonomist acts by changing the stakeholders’ *representations* about work and the workplace. This is one of the bases of “activity centred ergonomics”, and I have contributed twenty years ago to promote this idea. Today, I think that it is a necessary, but not a sufficient description of our forms of action. Yes, ergonomists strive to modify the company stakeholders’ representations of what is happening in the workplace, by making them discover the difference between prescribed work and real activity.

Because designers and organizers have set up the means for work. But, in spite of the attention paid to this anticipation, what will happen in real time always differs from what has been planned: the material drifts from its reference state, the tools wear out, incidents occur, customers have unexpected demands, etc. Any worker has to compensate for the limitations of design anticipations. To take care of the situation as it is, the worker mobilizes his/her body, his/her intelligence and experience, his/her networks, but also his/her subjectivity and values to strive to do “a job well done”. He/she puts into play an adaptive activity to try to balance production goals, expectations of customers or colleagues, the actual state of the system and means available for work, the abilities, limitations and variations of his/her body, and the compliance with his/her values. He/she continuously elaborates trade-offs between those contradictory drives; in difficult situations, the inevitable imperfection of those compromises may result in problematic outcomes in terms of performance and/or health . We now know that the outcome mainly depends on the *operational leeway* the worker has to adapt his/her operating strategies to the variability of the context. Activity analysis is an attempt to understand the *determinants* of this adaptive activity, its favourable outcomes and its failures.

Changing the stakeholders’ representations of what really happens in the workplace means inviting them to observe the workplace from the activity point of view, that is from a different viewpoint, which they have never adopted, from which it is possible to understand in different terms the problems of production, health, or safety that they are facing, and which allows them to imagine and discuss original ways out of these problems.

Adopting this viewpoint, that of work activity, it is also possible to anticipate the consequences of possible changes, through simulating possible future work. If such and such design decision is made, how will it be possible to work, not only in standard cases but also when greater variability occurs? Let us simulate it!

Changing representations of work activity, and focusing on future possible activity at the design stage, is necessary. But the ergonomists’ practices of activity analysis and simulation in the last two decades have revealed that it is not enough. It is not sufficient to analyse and circulate the *determinants of work activity* at the workplace to trigger relevant changes. There are two reasons for that:

- The first one is that one cannot reflect about the *limitations* of something when he/she is convinced that it cannot change. The limits to action are limits for thought. Therefore it is hopeless to convince stakeholders that a change is necessary when they are convinced it is impossible. The ergonomist not only has to change the representations of what exists, but also, and as a condition to this, to show that something else is possible.

- The second reason why it is not enough to change the representations of work activity and of its determinants is that it is also necessary to understand and influence the *determinants of these determinants*: How are decisions made? Why is the workers’ knowledge not taken in account at the design stage? Why do workers have to cope daily with the same difficulties without any improvement occurring? Why is there such an unbalance between top-down and bottom-up information flows? Why do local managers have so little power of decision?

- The third proposal is, then, that ergonomists do not only contribute with recommendations to existing decisions processes, but that they try to influence *the structure of the decision processes* themselves:

- the ergonomist suggests a systemic approach: a given workplace cannot be improved independently of its relations with upstream and downstream workstations, nor independently of rethinking the work organisation and the local managers' power of decision;

- the ergonomist promotes the need to confront different types of knowledge – that means he/she supports the “right to play” of stakeholders that were usually left by the wayside: operators, shop floor managers, etc. Debates between different logics, controversies between different standpoints are necessary to cope with all the aspects of any workplace. The ergonomist does not only recommend the participation of a number of stakeholders: he/she has methods to generate this participation at the right moments in a relevant and efficient way;

- the ergonomist fuels these debates with knowledge about work and about humans, their physiology, their cognition, their subjectivity, knowledge which has been produced in an interdisciplinary framework by human factors and ergonomics for 70 years. But the ergonomist also brings new methods, new descriptions, new models of existing and future activity;

- he/she tries to shift the focus of work organisation from “the search for the one best way” to “the development of relevant operational leeway everywhere”, from centralism to subsidiarity, from top-down prescription to participation.

- This is the practice of many ergonomists, which cannot be confined to the application of scientific knowledge about the human at work. On the contrary, the discipline of ergonomics should recognize that practice is a relevant source of knowledge, if practice is conceptualized and modelled. Many excellent ergonomists worldwide have developed strategic skills and practices that have never been taught or even mentioned during their degree course. Ergonomics needs research about the ergonomists' craft.

- What is at stake is our responsibility, as teachers, to prepare future ergonomists for what they should really do : not only to apply scientific knowledge, but to be able to understand the preoccupations that are beyond expressed requests, to articulate different stakes from different stakeholders, to detect the operational leeway that exists in work situations and that which is missing, to make strategic analyses of organisations and decision processes to influence them, and to develop a reflective practice, which is the basis for the development of the discipline and the profession.