Pleasure and Suffering at Work in the Technical Act: A Case Study From a Garment Factory in a Context of Technological Transformation

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ABSTRACT

At a time when the transformation of human-machine relationships is instigated by technological advances, the redefinition of know-how, the relationships with the worker collective and the risks and impacts on health have been pushed aside by the emphasis given to technological potential. More than in technology itself, it is through the technical act that these relationships are embodied: a process developed through experience which is not neutral to its socio-technical and organizational context,

generating both pleasure and suffering. Through the analysis of work activity, using observations, individual and auto-confrontation interviews, a case study was conducted in a garment factory. Results give insight into four different dimensions which define efficient technical acts: understanding the machine, relationship with others, a job well done and risks and impacts on health. The management of these work dimensions is done to pursue a balance (which is always fragile) between work demands and health preservation.

Keywords: Human-machine relationship, Technology, Technical act, Operational leeway, Health and well-being.

INTRODUCTION

Technological transformation is at the center of changes that affect the current forms of work organization in different sectors of activity (Eurofound, 2018). However, technology-induced changes are never standard. On the contrary, they depend on the dynamics of each sector of activity, the company's history, and the territory which it is part of (Lacomblez and Melo, 1989).

In contrast to a very deterministic view that assumes a direct relationship between technology and productivity, and an indirect one when it comes to guaranteeing collective and individual well-being, the analysis conducted in the interdisciplinary domain of work psychology and activity-centered ergonomics has shed light on a set of work-related risks, such as work intensification (Cunha et al. 2021), and emerging impacts on health (Bobillier Chaumon and Clot, 2016, Bobillier Chaumon et al. 2019; Bobillier Chaumon, 2021).

Technology influences the way work is carried out, guides it, and even determines it by imposing the development of certain operative modes, which are not always consistent with the previous know-how (individual and collective) developed by workers throughout their career paths. Mechanization, firstly, and, in the last decades, automation promote an increasing distance between human operators and their work objects. Consequently, the difference between technique and technology gains relevance in this perspective (Leroi-Gourhan, 1965). Commonly used in an undifferentiated way, these constructs are related to different operative modes. Working with technology involves the mobilization of technical skills, whereas technique implies the incorporation of experience, throughout a long learning process of managing work variability through which workers develop regulation strategies (in order to reconcile the job demands with the preservation of health) (Engeström, 1999, Major and Vézina, 2015). This issue acquires greater relevance at a time when the pace of technological change in the workplace is intensified and the views interpreting human operator and technology as two separated realities are rethought.

Invoking the concept of "technical act" offers another perspective on human-machine relationships as “no tool is complete without the gesture that makes it technically

effective" (Leroi-Gourhan, 1965). Nonetheless, from a psychological point of view, the development of technical acts cannot be decoupled from what confers meaning to them: the activity. Hence, without framing the body in a system whose technical norms partly determine the resources for the activity, no technique is liable to be interpreted (Ouvrier-Bonnaz, 2010). This underlies the need for work activity analysis, considering what is done (which is observable through the result of worker's activity), but also what could not be done, what is redone, what one would like to have done differently, what one tries without succeeding, or what one gives up doing (Clot, 1999). This dimension is called the "reality of the activity" (le réel de l'activité) (Clot, 1999, Clot and Kostulski, 2011), which is not easily observable since it impacts at a psychological level (Clot and Kostulski, 2011). Here lies the preoccupations or the fear of leaving a task incomplete, for example. This dimension plays a cardinal role in the development of health and well-being at work.

Therefore, working is not reducible to the observable results of technical acts. On the contrary, health impacts tend to remain less visible, due to the belief that their verbalization means an inability to adapt to the "intrinsic" job demands, and that this may lead to their withdrawal from work.

Through a case study in the textile sector, the pleasure/suffering dynamic that permeates human-machine relationships was explored based on the construction of methodological mediators. These mediators are particularly important due to the fact technical acts are only partially observable, as previously mentioned. Such mediators aim at allowing the access to workers' viewpoints on what they live through at work. This is, if the development of the technical act is not neutral, how does the pleasure/suffering dynamic take place in the human-machine relationship? And what is developed by workers to guarantee successful technical acts?

METHODOLOGY

PARTICIPANTS AND CONTEXT

The sample consists of ten female operators with an average age of 40.6 years from different production sectors of a garment factory in Portugal. The factory has approximately 300 workers, most of whom are female, and produces garment pieces for high-end clients with demanding quality standards. Each production sector is specialized in a part of the process, and there is interdependence between them, so any delay has implications for the following sectors.

PROCEDURE

The methodology was drawn on a qualitative approach from the analysis of work activity, using a set of methodological mediators, including observations, individual semi-structured interviews and auto-confrontation interviews supported with video

recordings of sequences of activity (Clot and Kostulski, 2011, Mollo and Falzon, 2004). For coding and thematic data analysis, the NVivo 12 software was used. The coding strategy followed a data-driven approach. Additionally, observational data was treated using Actograph® software to complement the interview analysis.

RESULTS AND DISCUSSION

For this study, the analysis was focused on the work activity performed with traditional sewing machines (situation 1) and with automated sewing machines at an early stage of the production process (situation 2). To select these work situations, the contrasting levels of automation technology in each of these sectors were taken into account. In the first work situation, the workers are mostly highly experienced, having worked in factory settings with traditional sewing machines most of their lives. On the other hand, in the second work situation, within a more recent sector, workers are younger, and, in some cases, this is their first job. In this sector, pre-cut pieces (e.g., linings, pockets) are prepared by the workers in order to be sewn by automated machines (which are supervised by these workers). Afterwards, these pieces are distributed to the other production sectors for the assembly of the garments. When analysing the interviews, four main themes emerged: "Understanding the machine", "Relationship with others", "Job well done", and "Risks and impacts on health", each representing different work dimensions.

UNDERSTANDING THE MACHINE

The learning process of working with a technological artifact (e.g., a machine) is not purely restricted to learning its characteristics. It is both an instrumentalization process (Rabardel and Béguin, 2005) and a reconfiguration of experience and their own experience at work (Engeström, 1999, Rabardel, 1995). In this dimension "Understanding the machine", the workers verbalized the importance of this appropriation. They explained aspects of their learning process, such as how they developed resources (e.g., certain "tricks"), which allow the management of job demands, using the knowledge they have about the machine and the materials (e.g., type of fabric) within the available operational leeway.

In both work situations, the workers have learnt to solve issues (e.g., incidents; breakdowns) by themselves when the machines are not working properly in order to not interrupt their work having to wait for external help: "*my machine stops working properly and I solve it*". This enables them to keep up with the demanding production objectives and to not compromise the flow of the production chain. Such appropriation processes go further, as they customize their machines, calling them "*my own"* and personifying them: "*I wouldn't change my machine for anything*"; "*The sound of it, the way it is, everything is different*". This symbiosis and the relationship created with the machine is mentioned by Dejours (2006) as essential for mastering its use. Such a relationship offers protection as the initial refusal to swap

to different machines, even when requested by a supervisor, will lead to losing the machine's reference points (e.g., knowing the sounds of the machine itself, which allows the development of anticipatory strategies, such as the need to change the bobbin before the thread finishes to not compromise the pieces while they are being sewn). Also, these elements come to show how such a relationship is a source of pleasure when it has an impact on the perception of a job well done (e.g., "[when] *there's no item that comes back to get fixed, this is very important for us*") and, simultaneously, a source of suffering when work has to be redone (e.g., "*What makes me suffer the most is when work comes back*"), through physical pain caused by work (e.g., "*Most of the pain is in my left arm*"; "*I lie down with it* [pain] *and wake up with it*") or their efforts are dismissed.

One of the dimensions of the pleasure/suffering dynamic at work comes from the operational leeway (Coutarel et al. 2015, Norval et al. 2019) available for workers to control the way they do their work. The recognition achieved from being able to see the final high-quality pieces put together and knowing it was their own experience that allowed this to happen shows the importance of an efficient technical act. In the second work situation, the workers carry out a set of preparation tasks that come before the automated machine work, with clearly demarked boundaries between the technical act and the moment technology is in action. Instead of this being a moment of relief from job demands, it is psychologically demanding due to the possibility of producing defective pieces, without having the chance to act and recover the error (e.g., when the two sides of a pocket are not sewn in line). In this moment, the operational leeway to develop technique and engage in the technical act is more restricted by the characteristics of this task.

RELATIONSHIP WITH OTHERS

Work activity is always marked by a specific social dynamic. The interpersonal relationships, rules, norms, and forms of work organization will shape the ways workers develop their technical act. When workers learn to "interpret" their machines, predict problems and actively solve them quickly, this helps them achieve the daily production objectives, which are collectively shared and gain recognition in the social sphere (Rabardel and Béguin, 2005). Plus, work in these production sectors is interconnected and interdependent, which means what they do is impacted by the work done previously but will also impact the work of the person who comes next. This, in itself, can be a source of suffering when work does not fulfil the quality demands and is sent back to the production lines to be fixed. Even if this is not frequent, it is always considered a critical moment.

In the relationship with others, the worker collective assumes an important role as it is also through shared experience which the technical act is developed. The workers mentioned specific strategies used to manage their work, which were taught to them by supervisors or colleagues (e.g., *"That colleague of mine would say "do it like this, because it makes it easier" and it was true, she would say it and it would work.").*

Given the production demands, tension in the relationship with their superiors, who prescribe the objectives or require them to change to a different machine, can cause suffering as the recognition of their efforts is not felt. Besides the role this plays in identity, the recognition of workers' efforts can ease work-related suffering as meaning is given to them (Dejours and Deranty, 2010). In the case of situation 2, this has particular relevance, as in their own words they "*provide work for the whole factory"*. The inability to provide work and have the next person waiting also has implications for the workers operating with more traditional sewing machines: "*I cannot let my colleagues in front stop*"; "(…) *we start to see that our rhythm isn't too good* (…) *We start to see there's no work ahead of us, colleagues waiting for our work*". Of course, these relationships are mediated, toughened, or weakened through the environment in which they are circumscribed by: "*When the objectives are very demanding, the truth is that the relationships become harder because of it*".

Recognition, however, can come from being chosen to do harder jobs such as samples – pieces done for the very first time to be presented to the end clients before being produced in the production sectors. Therefore, samples demand expertise and very effective technical acts as they must learn how it can be done, while having very demanding time restrictions and pressure to fulfill requirements. An example which, then again, reflects the pleasure/suffering dynamic.

These work requirements are also what shapes the operational leeway through which workers can engage in the technical act. By limiting in time and having very specific quality and production demands, this margin becomes lower.

A JOB WELL DONE

Following this viewpoint, it is through their experience, and the existing operational leeway that operators develop strategies to do the job well done (efficient technical acts). Work experience allows them to identify certain visual characteristics of the product (e.g., the way it "*hangs*"), and guarantee requirements are being fulfilled. For example, identifying what the end client will or not allow "*We also associate the brand with the end client* (…) *It depends on what the client demands*". In some cases, highly experienced workers mentioned having experience from previous factories with similar productions.

By making sure the pieces do not have flaws, they are not sent back to be redone, and, therefore, the number of pieces that need to be produced can be attained. The workers stated how they always attempt to achieve, in their own words, "*perfection*". Even though these guidelines - the visual aspects, client's specificities and requirements, production, and quality demands - were mentioned by the workers, there are differences in the strategies used to achieve them. The examples regarding "tricks" they develop to operate with the machines and solve issues faster, as well as certain gestures they adopt, illustrate this and demonstrate how different operative modes are developed even under similar working conditions, such as two operators within the

same sector who use marks to guide where they need to sew. One would stop and confirm mark by mark if it was being sewn properly, and the other would focus only on what she described as the "critical mark" and sew without stopping as many times as possible. Different ways of doing the job, but the same productive outcome.

However, maintaining quality levels while achieving production goals within constrained work environments with strong temporal demands and still preserving health is not a tension-free dynamic, which permeates workers' attempts to build their professional paths in health and skills (Gaudart, 2016).

RISKS AND IMPACTS ON HEALTH

Risks and impacts on health that emerge in this context were verbalized by the workers and take on different forms. Fatigue, physical pain from cumulative risks related to the rhythm of work, and the perception work causes a rapid health deterioration were mentioned, but also other less visible dimensions such as mental/non-physical suffering too.

No work context is ever free from risks, but when mobilizing resources through know-how and operative modes to achieve a job well-done, some of these workers end up exposing themselves to further risks and accumulating costs for their health. Impacts such as musculoskeletal problems typically associated with textile industrial settings (Ghram et al. 2010) accidents or incidents with needles, electric shocks, discomfort due to the noise, and getting their hands stuck in the machines, as well as other issues such as insomnia or sleep problems: "*Even today I dreamt about it* [the factory]. *It does not let me sleep, because we go home and just think about how we have to be back here the next day";* stress "*I started to feel dizzy and so, it was already stress itself*"; and medication consumption (to sleep, treat anxiety symptoms or ease muscle pain) were also found.

In the group of workers who use traditional sewing machines (situation 1), one of the biggest causes of distress mentioned was, as previously stated, when work returns to them to be redone. This challenges the meaning of work and the constructed experience, as if it was no longer valid in this situation. Also, it jeopardizes production for the time which they take to redo those pieces, generates tension between the different members of the organization, but also means the same strainful physical and mental resources will have to be used once again.

In contrast, in situation 2, an example was observed when the workers, during the machine process, would bend over and use a pair of scissors to adjust the piece to its mould and make sure the work came out as intended. In the context of auto-confrontation interview (in which this videotaped sequence of the activity was viewed), one of these workers mentioned how she was taught this by her line manager. The effort is made even though it has negative consequences for her own health. Therefore, in the development of an efficient technical act, it is not always

possible to preserve health.

CONCLUSIONS

At a time when technology changes the forms of work organization and reconfigures how work is developed (e.g., through automation), less tangible risks emerge. Thus, the analysis of the human-machine relationships cannot be understood from an approach cantered exclusively on technology's potential (Silva and Cunha, 2021). Such a view does not allow us to know how these relationships are constructed on a day-to-day basis, in the face of production requirements and constraints associated with the organization of work, and within a worker collective capable of supporting the value of technical expertise.

On the one hand, according to Gaudart (2016), the workers collective supports the construction of sustainable and competent professional paths. On the other hand, in the absence of a collective which values the technical act as a sign of expertise in response to different job demands, it can be a threat to well-being.

When changes are implemented in the techno-social sphere, workers are required to do a reconstruction of experience that is not always visible, either in the reappropriation of technological artifacts, or in the restructuring of the technical act itself, which can imply new impacts on health. Therefore, understanding how technical acts are efficient cannot overshadow how difficulties are managed, how they are permanently altered, and their recognition.

The results presented in this study show how the pleasure/suffering dynamic always corresponds to a fragile balance, as it is the result of a daily construction, and its evaluation cannot be merely punctual. At the present moment, is this the time to think about how technology can be used as a mediator for health surveillance?

Further investigation on the impact work has on health in this context is being done as the team is developing an ecological momentary assessment device for self-report of well-being dimensions This device will also be a mediator in the access to these subjective dimensions, complemented with a questionnaire for job quality assessment which will be applied to a larger sample in the factory.

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