IMPACT OF COMPUTERIZATION ON THE WORK ACTIVITY: A CASE OF TEMPORAL MANAGING OF TASKS

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Abstract
The ergonomical analysis of two posts of supervision and information in two stations in Paris, one of them is classic and the other computerized, shows that the operators face a complex situation of work burden. This burden is characterized by a multitude of tasks which are of various natures, diverse complexity that the operators haven't the initiative. They have to manage, in different settings and temporal environments, the unity of a composed process of discontinued and independent events. As a result, it would create interfering situations which are a source of trouble in the development of work. In addition, and in order to compensate all these tasks, the operator should put many strategies of temporal control during the achievement of each task.

The analysis of all this according to the computerization of tasks and the professional experience constitutes the object of this article.

Key words
Computerization, interference of tasks, temporal control, professional experience.

IMPACT DE L'INFORMATISATION SUR L'ACTIVITÉ DE TRAVAIL : LE CAS DE LA GESTION TEMPORELLE DES TÂCHES

Résumé
L'analyse ergonomique de deux postes de surveillance et de renseignement appartenant à deux gares de transport parisien, dont l'un est de conception classique et l'autre informatisée, a montré que les opérateurs y sont confrontés à une situation de charge de travail caractérisée par une multiplicité de tâches de nature variée, de complexité diverse, dont ils n'ont pas l'initiative. Ils doivent donc gérer, dans différents cadres et milieux temporels, un ensemble de processus composés d'événements discontinus et indépendants les uns des autres, et dont l'occurrence peut créer des situations d'interférence et donc être source de perturbations dans le déroulement du travail. Aussi, pour les compenser, les opérateurs mettent-ils en oeuvre plusieurs modes de contrôle temporel au cours de la réalisation de chacune des tâches. L'analyse de ces derniers en fonction de l'informatisation des tâches et de l'expérience professionnelle constitue l'objet de cette communication.

Mots clés
Informatisation, interférence de tâches, contrôle temporel, expérience professionnelle.

INTRODUCTION

The object of this article is to prove and analyze the different methods of temporal control that the operators use for the compensation of troubles caused by situations of interference between tasks.

The origin of this analysis is the problems faced in the management of centers of supervision and information's of two Parisian transport stations. One of them is classic and the other is computerized.

In the situations of works which have numerous tasks in general "The subject is required to divide his attention between many resources of information and to answer them in an independent way. In other words, he must do many things at the same time" (7). In fact, these situations known as "Tasks in time sharing" are characterized as "the situations, where a subject having a multitude of simultaneous tasks, are achieved under constraint of time". (3). However, it is necessary, precisely in ergonomics, to distinguish between two forms of situations of work in time-sharing. (In just one condition) only if the required methods of regulations are different :

- The situations of multiple tasks for which the subject can foresee the division of his time between all the tasks and therefore to planify his activity.
- The situations of interfering tasks in which the subject is faced to the unexpected occurrence of tasks, which the execution needs a temporal regulation and which involve the temporal management of all the tasks and the temporal control of each of them.
- In the frame of the systematic analysis of this regulation's process (6), we demonstrate that the temporal control implements a multiplicity of activities which as a hypothesis varies with the professional experience, the type of tools used and the complexity of tasks involved.
- According to its nature, we can think that the control can bear on (5) :
- The hierarchical priorities of treatment (4) ; (1).
- The regulations concerning the communication (2) : The narrowness of interlocutors' network, the reduction of the duration of communications and collective synchronization of actions.

METHODOLOGY OF OBSERVATION AND ANALYSIS OF METHODS OF TEMPORAL CONTROL

In order to compare methods of temporal regulation according to professional experience and type of tools available (classic or modern), the sessions of observations were carried out during hours of crowd because the high frequency of interfering tasks. The communications were recorded by a tape recorder. Different actions were noted down. For the different methods of temporal control, available facts of observation let us indicate, from a clinical analysis, the degree of priority of treatment of each task, according to different and independent variants, and calculate the number of appearances of communications using a network of cooperation and the percentage of reduction of their duration.

The synchronization of collective actions was analyzed on the basis of an example which was enough to show its existence without permitting any other treatment of these observed cases.

NUMEROUS STRATEGIES OF TEMPORAL REGULATION

Hierarchy of priorities of cases treatment

In certain conditions of interference between two or more tasks, the operator is obliged to give priority of treatment to one of them neglecting the others or postponing their execution. This effective hierarchy of priorities depends on many factors.

- In classic or computerized situation ; the regulation of traffic then the information to passengers have always the priority for all the agents over the administrative tasks. Supervision, management of installation and information occupy variant and concurrent intermediate places except in classic situation in which unity is hierarchical if they want to experiment them.
- Whatever the considered situation of work is, the hierarchy of tasks is more marked among the experimented operators than among the inexperienced. We can suppose that for these latters, the priority of treatment hasn't been constructed yet, except by explicit orders concerning the traffic regulation and passengers' informations.
- For all the operators, the computerized situation tends to attenuate the hierarchy in comparison with the classic situation. The computerization causes a limitation of this temporal regulation's strategy.

Narrowness of interlocutors' network

The appearance of interfering tasks reduces clearly the interlocutors network of the supervision center and this for all the operators in the two situations. Only the concerned interlocutors with the event are informed. The others will receive the informations afterwards, when the situation become calm (without tasks interference). If not they have to look after it themselves, which represents effectively time gain. However, the importance of this network decreases lightly in the computerized situation and also with the inexperienced operators regarding the experienced ones.

In classic situation and without interference like in the computerized situation, the experienced operators have effectively a relation (in 78% to 93% of cases) with 7 interlocutors to treat for example a task of regulation : the passengers, the agents of station, the pilot information desk, the other stations of the same line and the agents of other means of transport (buses, underground, SNCF).

In the situation of interfering tasks, the communication network is limited on the first hand by their nature and on the second hand by the classic and computerized situations. That' why the operators will limit this network.

- To the five first interlocutors in classic situation (in 64% to 65% of cases) and only to the three first in computerized situation when it is a matter of interference of simple tasks (information, supervision and administrative tasks) (in 54% to 71% of cases).
- To the three first interlocutors in classic situation (in 90% to 100%) and to the two first cases in the computerized situation in the case of interference with more complex tasks (management of installation, regulation and informing the passengers) (in 100% of cases).
- The occasional disturbance with the appearance of interfering tasks is compensated with a progressive narrowness of interlocutors field by the experienced operators according to the complexity of tasks. This will increase with the introduction of the computerized tools which shows a limitation of the extension of social field mobilized by the recuperation of disturbances.

Shortening of communications
The operators frequently used phoned, and radioed communications to sent or receive necessary information's in order to excuse their work. In situation of interfering tasks, another method of control of time is used by the operators in order to alleviate the temporal constraints and the complexity of tasks which appear by the reduction of communications' duration. The percentage of reduction of communications duration is :

- It is less important when it is a complex task (traffic regulation) than when this communication concerns a less urgent task (management of installation).
- It is more increased with the experimented than with the inexperienced.
- The global reduction of duration of these communications is obtained in four distinct manners: shortening the silence during a conversation, the contractions of certain messages, accumulation of messages in the same conversation and the use of information code.

Shortening the silence during a conversation
This method of regulation has been observed notably during the execution of tasks of traffic regulation, during for example a conversation with the PC concerning the alteration of train missions, the operator uses the documents of work (handbook of train's work) while speaking in order to avoid the cutting of the conversation. These cuttings (silence) are due to the information research in the papers of the computer screen. They are not frequent in normal situation of work.

In a global manner, the duration of silence during a conversation is much more reduced in classic situation than in a computerized one. It is the same with experimented operators regarding inexperienced. With the formers, it goes to maximum of 17 seconds in computerized situation without interference to 3 seconds in classic situations with interference. Never the less with the inexperienced operators the duration of silence varies between 26 to 8 seconds using the same variants.

Contraction of certain messages
The number of contraction of messages in order to reduce the duration of communications will increase with professional experience and in the presence of interfering tasks. But contrary to last studied cases, the computerization allows the experienced operators to have a more important contraction of work.

Accumulation of messages in the same conversation
The number of cases of accumulated messages in the same conversation raised also with the professional experience and in the presence of interfering tasks. On contrary, it decreases with the computerization.

Use of information code
Similar to the contraction of messages, the number of cases of use of the information code increases according to three used variants : professional experience, presence of interfere tasks and computerization.

Synchronization of collective actions
Certain events need an important coordination of jointly realized actions between the operators of supervision center and the station agents. For example, the operators has to organize help for a passenger suffering from a malaise in the platform. This latter should send the reception agents to know exactly the placement of the sick person (north south or center), his identity and his health state as a result they determine if the needs to next to

firemen or simply he needs some care just in his place. The coordination between operators and reception agents is relying on verbal exchanges by radio. They can be formed of suggestions of information in order to help the organizations of operations. These verbal communications convey from temporal information's which allow the adjustment of the team to the taking place of operations and their coordination added to the environmental change. They refer to

- The present which punctuates the beginning or the end of the event.
- The future which allows to know how much time separates the future event from the present moment.
- The past which enables the estimation of how much time has flown from the beginning of the event.

CONCLUSION

It appears that the management of interfere tasks is based up on the temporal control strategies in a part. For example, the operator of the supervision center arranges in a hierarchical way the priorities of treatment, reduces the cooperation network, modifies the nature and duration of communications and tries to synchronize his actions. The strategies have as goal to compensate the disturbances due to situations of interfering tasks and to computerization of work instruments.

From a practical point of views our study has permitted to propose ways of actions for :
The amelioration of agents to technical know ledge but also more specifically to the management of survey center in order to take into account the effective activities and to allow the transmission of competence and know-how of experienced operators.

At the organization level, our propositions allow the reorganization of the jobs and the relation inter and intra-services in order to assure a good coordination notably in disputant situations. However, the change may imply some innovations more or less easily integrated in the conventions of Human Resources management.

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