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Temporal factors in mental work: Effects of interrupted activities — Source link

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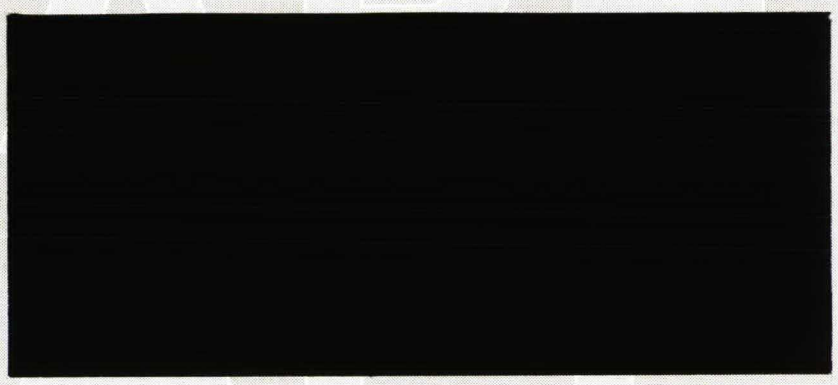

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Temporal factors in mental work: Effects of interrupted activities

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Keywords: Interruptions, psychological costs, strategies

Abstract

In this paper results will be presented from two experiments in which the effects of complexity and timing of interruptions on the processes that regulate work behaviour (e.g. strategies) and the psycho-physiological state of workers are studied. These experiments took place in a simulated office environment. In one experiment, carried out in The Netherlands, 40 professional secretaries participated as subjects in a repeated measurement design. The second experiment was carried out in Moscow and had the same design, subjects were 40 persons in various professions.

Data indicate that interrupted performance leads to higher subjective costs (i.e. mental load), and decrease of positive emotional feelings. An important finding in this respect is that people need more time to reoriented to the original task when the interruption has been rather complex. On the other hand results indicate that a few interruptions may have a stimulating effect. Furthermore the results show that people have various ways to deal with interruptions. These strategies seem to aim to control the disruptive effects of interruptions.

1. Introduction

The overall change in economic activity and the increasing use of computerized information systems in modern societies have contributed to the spread of new types of work, identified as 'knowledge work', 'mental information work', or 'computer mediated work' (Schäfer, 1988;

Roe, 1989; Roe et. al., 1994). This new type of work is mainly characterized by the absence of tangible work objects. People working in this domain predominantly work with virtual objects that are represented by information on a computer screen. As a consequence these tasks place high demands on the cognitive (information processing) system of the worker.

From a survey among the working population in The Netherlands it became clear that by 1991 over 55 % of the working population frequently worked with (personal) computers and modern communication devices (Roe, et.al., 1993). This illustrates that within approximately one decade these tools have become very important, and that this new type of work is rapidly growing.

In addition the widespread use of modern communication systems has also significantly contributed to the fact that the face of work has considerably changed. People have high expectations regarding the speed in which work can be completed when using computer systems. Modern communication devices (fax, e-mail, mobile telephone) make that people are within reach almost 24 hours a day. These factors have lead to an increased awareness that 'time is money', and consequently put a lot of pressure on people and cause high mental demands.

In this light it is evident that interruptions during work are sometimes regarded as annoying and frustrating because they keep people from their work. However, at other moments they seem to be most welcome for the same reasons. Interruptions are daily occurring 'events' in most professions, certainly in occupations in which 'information work' predominates (Krediet, 1994). Yet little is known about how they affect task execution.

With respect to the consequences for the worker Johansson & Aronsson (1984) made clear that specific interruptions during work, like computer breakdowns, are likely to cause mental strain and stress, especially when they are externally generated and beyond the operator's control.

In this study we will focus on the effects of interruptions on the regulation of behaviour. 'Interruptions' are defined as events which result in the cessation and postponement of ongoing activity. Typical for interruptions is that the main activity is resumed after a certain lapse of time.

Interruptions usually are intrusions that divert the attention from work. Interruptions constitute an additional task with its own specific demands, but in order to be able to resume the original task the worker has to keep a certain amount of 'information' concerning the status of the main task available as well. Therefore interruptions are assumed to have a greater (negative) impact on mental information work, because this type of work already places higher demands on the cognitive system than is the case in traditional types of work.

The scientific interest in studying interruptions dates back to the twenties (Zeigarnik, 1927; van Bergen, 1968). These early studies tried to find empirical evidence for the existence of what Lewin has called 'tension systems' in the brain. Although these studies failed to reveal any empirical support for such a system, it was from a theoretically point of view an interesting attempt to contribute to the insight into how behaviour is regulated.

In a more recent study Gillie & Broadbent (1989) tried to explain the everyday experience that some interruptions have disruptive effects, while others have not. They did an experiment in which their subjects played a computer-based game. Subjects had to proceed along a certain prescribed route, while collecting various items at particular points: bread at the baker store, meat at the butcher's, and so on. The list of items that had to be collected varied from five to seven (manipulation of memory load). The interruptions were administered by presenting secondary tasks that varied from mental arithmetic tasks to a so-called free recall task. Furthermore the duration of the interruptions was manipulated.

The results of this experiment suggest that neither the duration of an interruption, nor the opportunity to control the point at which the main task is interrupted are crucial in predicting whether or not an interruption will have disruptive effects. The nature of the interruption, in terms of similarity to the main task, and complexity, in terms of information processing and/or memory demands, appeared to be much more important factors in this respect.

The aim of the study presented in this paper is to study the effects of interruptions during work on the execution of tasks, specifically with respect to tasks belonging to the domain of mental information work.

It was hypothesized that interruptions will cause deviations in the flow of activities, and that these deviations are greater when the number of interruptions increase and when the interruptions become more complex. Furthermore it was hypothesized that interruptions will lead to a greater demand on the cognitive resources resulting in a higher level of effort. In addition it was assumed that interruptions will affect the psychological state.

2. Methodology

Interruptions have been studied in a joint program between the Work & Organizational Research Centre of Tilburg University and the Laboratory for Work Psychology of Moscow State University. For this study an experimental approach has been chosen. To this end an office environment has been simulated in the laboratories in Moscow and in Tilburg. Special attention was given to the ecological validity of this experiment. Therefore this experiment has been performed in a realistic work environment with realistic tasks and with professional workers as subjects.

Two experiments have been conducted in parallel, based on the same general model, and using measures from a commonly established set of instruments. Since there were limited adjustments in experimental set-ups and design of the experiments, the studies can not be regarded as strict replications.

Design

On two consecutive research days subjects have worked half a day in the simulated office working on text editing tasks. In the Dutch experiment frequency and complexity of interruptions have experimentally been manipulated in a within-subjects design. On each research day subjects worked in three successive sessions. The first session was always without interruptions, and in the second and the third session subjects were 1 or 3 times interrupted (in a balanced order). The interruption could be a simple or complex interrupting task which was presented by telephone at fixed points in the task. The first session was a control condition (cf Figure 1a).

In the Russian experiment subjects worked in two experimental sessions on two consecutive research days and were administered 0 or 2 interruptions in a balanced order. The interruptions were either both complex, or both simple (cf. Figure 1b).

Day 1	0 Interruptions	1 Interruption Simple/Complex	3 Interruptions Simple/Complex
Day 2	0 Interruptions	3 Interruptions Complex/Simple	1 Interruption Complex/Simple

Figure 1a. Experimental Design in the Dutch study

Day 1	0 Interruptions	2 Interruptions Simple/Complex
Day 2	2 Interruptions Complex/Simple	0 Interruptions

Figure 1b. Experimental Design in the Russian Study

Procedure

During the experimental sessions in the laboratory subjects worked on a standardized text editing task. A number of prescribed adjustments to an existing text had to made. A set of similar tasks was available for the various sessions. In both studies the same task was used. During the experimental sessions the subjects were closely watched from the control room, and at certain fixed points during the execution of the task the experimenter made a telephone call to the subject, thus causing the interruption, to present the interrupting task.

Subjects

Subjects in the Dutch experiment were 40 professional secretaries employed by the university. They volunteered to participate (informed consent) during work time, and received an additional financial reward. They worked on standardized word processing tasks which took approximately fifty minutes to complete. The complex interrupting tasks were tasks with high similarity to the main task and constituted of additional text editing and required subjects to leave the current document. The simple interrupting task was a request for some information (i.e. telephone number) that had to be looked up.

In the Russian experiment 31 staff members of the Moscow State University volunteered to participate as subject, and also received a financial reward. All subjects had experience with word processing tasks.

Variables

The variables and measures that have been taken in this study focused on three levels: a) behavioral aspects: work activity, b) psychological reactions, and c) physiological reactions of the subjects. Video recordings of work behaviour were made and have been analyzed afterwards. By means of time-line analysis irregularities in the work flow have been distinguished.

In the Dutch study changes in the psychological state were measured by the PANAS (Watson & Clark, 1988) which measures the amount of Positive and Negative feelings. In the Russian experiment the scale for Well-being, Activity and Mood (WAM, Zinchenko, Leonova, & Strelkov, 1985) was used. Furthermore in both studies the Rating Scale Mental Effort (RSME, Zijlstra, 1993) was used to assess the level of effort expenditure. The RSME has proven to be an adequate indicator of psychological costs. In addition in the Russian experiment the Critical Flicker/Fusion Frequency (CFF) technique was used to register differential thresholds in the visual system. Changes in this threshold are related to the neural system. The CFF score can be parted in a stability index (CFF2), which is regarded as an indicator for effort, and an index for activation (CFF1) (Volle, et al., 1978, 1980).

These measurements have been taken as pre- and post measurements of the various experimental sessions, and subsequently difference scores have been calculated.

The results have been analyzed by analysis of variance using the ANOVA module of SPSS PC+.

3. Results

The results will be presented in two sections. In the first section the results concerning behavioral aspects will be presented, i.e. the influence on the flow of activities. In the second section the results on the psycho-physiological state of the subjects will be presented.

3.1 Behavioral aspects

The experimental sessions have been recorded on videotape, and have been analyzed afterwards with the help of an event recorder.

First of all the total flow of activities has been broken down by making the following categorization of types of actions: a) task related actions, b) interruption handling actions, c) supportive actions, and d) non-relevant actions.

Task related actions are defined as those actions directly related to completing the task, such as inserting text. Supportive actions are defined as those actions that are not directly aiming at accomplishing the goal of the task, but are supportive in the sense that they provide information for, or ensure the progress of the main task. Examples are asking for help, adjusting the printer set up, etc. Non-relevant actions are those actions that neither are aiming at accomplishing the task, nor are obviously supportive. Examples of such actions are eating, smoking, looking out of the window, etc.

The number and duration of the various actions have been registered, and categorized. Analyses of variance showed that the factor 'interruptions conditions' had no significant effects on the number and duration of the various actions outside the interruption interval.

The interruption interval itself has been subdivided into segments by marking the moments between which subjects picked up the telephone receiver (start of the interval) and put the telephone receiver down again. Furthermore the moments at which subjects started to work

again on the main task, and the point at which they resumed their activities again where they had stopped it, were marked. This resulted into four episodes:

1. interruption reception & execution: subject answers the telephone, and listens to instructions/questions, provides the required information, or starts working on the interrupting task, puts down the receiver again.
2. interruption completion: in relevant cases subject completes the interrupting task.
3. change-over: there is no visible activity, the assumption is that the subject disengages from the interrupting task, and reorients to the main task.
4. resumption: the subject resumes working on the main task, and returns to the point where his activities were interrupted.

Detailed observations of the video-recordings made clear that subjects respond to interruptions in a variety of ways. Actually a number of strategies can be distinguished (see Figure 2). The strategies differ in the extent to which the interrupting telephone call is responded to immediately or with delay, and executed before, in parallel to or after the main task is resumed.

Strategy	Sequence of operations
1 Immediate-Prior	signal -- pick-up --listen/execute -- lay down -- (execute)
2 Delayed-Prior	signal -- continue task -- pick-up -- listen/execute -- lay down -- (execute)
3 Immediate-Parallel	signal -- pick-up -- continue task and listen/execute -- lay down -- (execute)
4 Delayed-Parallel	signal -- continue task -- pick-up -- continue task and listen/execute -- lay down -- (execute)
5 Immediate-Posterior	signal -- pick-up -- listen -- lay down -- continue task -- execute

Figure 2. Interruption Handling Strategies

The data on the occurrence of the various strategies under the experimental conditions are presented in Table 1(a and b). It appears that in the Dutch experiment the first two strategies are most popular. The most common strategy appears to be to answer the telephone and execute the interrupting task immediately. However, the experimental conditions do have some effect

on the choice of strategies. As the number of interruptions increase, the subjects adopt a different strategy. The 'delayed-prior' strategy becomes more prevailing in those conditions.

This can be interpreted as if subjects try to get some control (as far as possible) over the moment at which they let the intrusion (and thus the possible disruptive effects) take place.

Table 1a. Frequencies of interruption handling strategies in the Dutch study

Strategy	All interruptions	Simple interruptions	Complex interruptions	One interruption	Three interruptions
1 Immediate-Prior	115	24	15	39	76
2 Delayed-Prior	114	11	10	21	93
3 Immediate-Parallel	26	2	8	10	16
4 Delayed-Parallel	59	3	7	10	49
No. of cases	314	40	40	80	234
Significance test		$Chi^2 = 7.32$; df 3; $p < .10$		$Chi^2 = 11.87$; df 3; **$p < .01$**	

Table 1b. Frequencies of interruption handling strategies under conditions of simple and complex interruptions in the Russian study

Strategy	All interruptions	All simple interruptions	All complex interruptions
1 Immediate-Prior	79	64	15
2 Delayed-Prior	9	5	4
3 Immediate-Parallel	17	10	7
4 Delayed-Parallel	5	3	2
5 Immediate-Posterior	3	0	3
No. of cases	113	82	31
Significance test		$Chi^2 = 7.35$; df = 4; $p < .20$	

The results of the Russian study are a little bit different (Table 1b). Here the subjects seem to hang on to the 'immediate' strategies. The incidence of delays in picking up the phone is less frequent. This may reflect the difference in professional background of the subjects. The Dutch subjects are professional secretaries who are quite used to being interrupted by telephone, because this happens numerous times everyday. This is different with the Russian scientists.

In Table 2 (a and b) the means and standard deviations of some relevant time parameters concerning the work activities and the length of the various episodes of the interruption interval from the Dutch study are presented.

Table 2a. Means and standard-deviations of time parameters (secs.) for conditions with 0, 1 and 3 interruptions in the Dutch study (N = 40)

Variables	0 Interruptions Means (S.D.)	1 Interruption Means (S.D.)	3 Interruptions Means (S.D.)
Duration of task performance			
Total Work Time (TWT)	2376.7 (938.3)	2753.0 (883.0)	3537.8 (930.8)
Total Interruption Time (TIT)	-	646.2 (590.0)	1505.0 (612.1)
Total Time on Task (TOT)	2376.7 (938.3)	2106.8 (583.0)	2032.8 (589.3)
Duration of Interruption			
Reception & Execution & Completion (PIT)	-	628.1 (590.0)	1381.3 (601.7)
Change-over (CHT)	-	3.8 (5.1)	11.7 (9.5)
Resumption (RT)	-	14.3 (29.1)	112.0 (175.5)

Table 2b . Means and standard deviations of time parameters (secs.) for conditions with simple and complex interruptions in the Dutch study (N = 40)

Variables	Simple interruptions Means (S.D.)	Complex Interruptions Means (S.D.)
Duration of task performance		
Total Work Time (TWT)	2208.1 (633.5)	3279.0 (763.2)
Total Interruption Time (TIT)	130.4 (70.3)	1138.0 (418.2)
Total Time on Task (TOT)	2077.7 (598.4)	2141.0 (579.5)
Duration of interruption		
Reception & Execution & Completion (PIT)	110.2 (59.9)	1122.0 (413.9)
Change-over (CHT)	2.7 (3.0)	4.8 (6.4)
Resumption (RT)	17.5 (38.3)	11.2 (17.0)

The results in Table 2a show that the total work time (TWT) increases significantly ($F(1,156) = 29.1$; $p < .001$) when the number of interruptions increases. However, the time spend on the main task (TOT) decreases somewhat when subjects are interrupted more frequently. In the Russian study also a reduction of TOT has been found (Table 3a and 3b). Although this result was not statistical significant, the fact that is has been found in both studies makes that we should take this finding seriously. This finding suggests that the occurrence of interruptions can lead to an improvement of the efficiency of task performance. Additional interruptions make the subjects spend more time on the interrupting tasks, but the increase is less than proportional. Interruptions seem to have a stimulating effect on subjects.

In Table 2b the means and standard deviations of the length of the various episodes of the interruption interval of conditions with simple and complex interruptions are presented as well.

From this table it can be read that complex interruptions take more time to handle. It is interesting to note that 'change-over' effects are greater after complex interruptions ($F(1,37)=3.8$; $p=0.05$). It apparently takes longer to disengage and reorient to the main task after a complex interruption. This suggests an after-effect of interruptions.

Table 3a. Means and standard-deviations of time parameters for conditions with and without interruptions in the Russian study (N = 31)

Variables	0 Interruptions Means (S.D.)	2 Interruptions Means (S.D.)
Duration of task performance		
Total Work Time (TWT)	2177.5 (722.1)	2489.9 (820.3)
Total Interruption Time (TIT)	-	377.1 (128.0)
Total Time on Task (TOT)	2177.5 (722.1)	2112.8 (785.7)

Table 3b. Means and standard-deviations of time parameters for conditions with simple and complex interruptions in the Russian study (N = 31)

Variables	Simple Interruptions Means (S.D.)	Complex Interruptions Means (S.D.)
Duration of task performance		
Total Work Time (TWT)	2253.1 (781.7)	2605.5 (800.6)
Total Interruption Time (TIT)	167.0 (74.2)	501.1 (181.7)
Total Time on Task (TOT)	2086.1 (75.9)	2104.4 (833.4)
Duration of interruption		
Reception & Execution & Completion (PIT)	139.3 (61.6)	469.6 (172.4)
Change-over (CHT)	2.7 (4.0)	4.3 (4.9)
Resumption (RT)	25.0 (27.2)	27.2 (24.2)

There was no significant effect on 'resumption time'. The results of the Russian study confirm the finding that complex interruptions require more time for the 'change-over' period ($F(1,30)=4.3$; $p=0.04$).

The results of the Dutch study showed that the number of interruptions had a significant effect on 'change-over' and 'resumption time' as well. The effect on 'change-over' can simply be explained by the fact that 3 interruptions have three change-over periods. However, with respect to resumption the increase in time is disproportionate, the increase now is approximately 8 times the time of one interruption. This points in the direction of a non-additive effect of multiple interruptions.

3.2 Psycho-physiological state

Tables 4a and 4b contain the means and standard deviations of the effort ratings and results of the emotion questionnaire PANAS, as measured in the Dutch experiment.

Table 4a. Means and standard-deviations of emotional state (PANAS-questionnaire) and effort ratings (RSME) in the Dutch study (N = 40)

Variables	0 Interruptions Means (S.D.)	1 Interruption Means (S.D.)	3 Interruptions Means (S.D.)
Current emotional state			
PAS	63.6 (10.2)	60.7 (9.7)	60.9 (10.2)
NAS	29.7 (8.2)	29.1 (7.7)	29.6 (7.2)
Effort			
RSME	55.6 (33.7)	66.9 (36.2)	84.8 (41.7)

Table 4b. Means and standard-deviations of emotional state (PANAS-questionnaire) and effort ratings (RSME) in the Dutch study (N = 40)

Variables	Simple Interruptions Means (S.D.)	Complex Interruptions Means (S.D.)
Current emotional state		
PAS	77.8 (22.9)	80.9 (19.6)
NAS	65.3 (35.1)	63.1 (36.5)
Effort		
RSME	85.2 (31.6)	81.4 (29.1)

As can be read from Table 4a Positive emotions (PAS) are slightly (not significantly) decreasing when the number of interruptions increases, while negative emotions (NAS) remain at the same level. An increase in complexity of interruptions appears to cause an increase in positive emotions, and a decrease in negative emotions. However, both changes are not significant.

Effort ratings increase significantly ($F(2,37)=3,6$; $p=.04$) as the number of interruptions increase, while the increase in complexity leads to lower effort ratings (although not significant).

In interpreting this result it should be mentioned that the Dutch subjects reported the experimental situation (and task) to be somewhat dull in comparison to their normal work situation. Interruptions can thus be seen as a source of stimulation and distraction. Especially more complex interruptions lead to more positive feelings, and reduction of subjective costs (as measured by the RSME). However, the increase in number of interruptions has the opposite effect: less positive feelings and higher subjective costs.

The results with respect to subject's psycho-physiological state and effort from the Russian experiment are presented in Tables 5a and 5b.

Table 5a. Means and standard-deviations of emotional state (PANAS-questionnaire) and effort ratings (RSME) in the conditions with and without interruptions in the Russian study (N = 31)

Variables	0 Interruptions Means (S.D.)	2 Interruptions Means (S.D.)
Current State		
WAM	47.1 (7.7)	47.0 (7.7)
Effort		
RSME	34.2 (20.2)	34.7 (10.4)
CFF2	1.0 (2.1)	1.2 (2.6)
Activation		
CFF1	37.4 (3.3)	37.1 (3.6)

Table 5b. Means and standard-deviations of emotional state (PANAS-questionnaire) and effort ratings (RSME) in the conditions with simple and complex interruptions in the Russian study (N = 31)

Variables	Simple Interruptions Means (S.D.)	Complex Interruptions Means (S.D.)
Current State		
WAM	47.1 (7.5)	47.4 (7.5)
Effort		
RSME	32.5 (21.2)	33.1 (20.4)
CFF2	1.4 (2.3)	1.8 (2.9)
Activation		
CFF1	37.5 (3.6)	37.0 (3.9)

Although the effects of the factors 'presence', and 'complexity' of interruptions are not significant, some tendencies can be noted. Interruptions apparently lead to slightly reduced well-being (WAM) and increase in Effort (RSME and CFF2), but no change in activation (CFF1). While the increasing complexity seems not to have affected the psycho-physiological state of the subjects, it has to be noted that slightly more effort is required indicating that subjective costs are increasing.
However, it should be stressed that these results have not reached statistical significance, and thus conclusions must be tentative.

4. Discussion

The results of this study give us the opportunity to have a close look at an every day phenomenon: the influence of interruptions on the regulation of work behaviour. Whenever people are interrupted during their work it is evident that their flow of activities is temporary halted. After a first glance on the results of this study one would assume that the interruption has no consequences for the task after the main activities have been resumed. Initial analyses revealed that the number and duration of the categories of main activities, supportive activities, and non-relevant activities have not been affected by the distinguished interruption conditions.

However, if we take a closer look at some relevant time parameters, it becomes clear that as the occurrence of interruptions increases relatively less time is spent on the main task (TOT), while the increase of time spent on the interrupting task (TIT) is more than proportional. This finding illustrates that interruptions have an extended effect that exceeds the interruption interval itself. The interpretation could be that interruptions have a stimulating effect in the sense that people are activated to work faster, which may result in improvement of efficiency.
In addition the fact that the 'change-over' interval increases as interruptions become more complex also indicates that interruptions have an 'after-effect'. This has been interpreted as showing that it apparently takes longer to disengage and reorient to the main task as the interruptions become more complex. Complex tasks call for more elaborate cognitive processes from which it is less easy to disengage. This finding is supported by theoretical notions on the depth of processing (Craik & Lockhart, 1972, Craik, 1977), and is in line with the findings of Gillie and Broadbent (1989).

Altogether these findings make clear that being interrupted during work not only means that for some restricted time (the interruption interval) people have to perform an additional task, but that these additional demands also influence the remaining work period. These findings support the first hypothesis.

The general picture from the results on psychological state and effort indicate that in both studies interruptions hardly have influenced the psychological state of the subjects. In this respect it should be brought to mind that the nature of the task and interruptions have been chosen to resemble reality as much as possible. The whole experimental set-up had a high ecological validity, except that the Dutch subjects evaluated the experimental situation as rather dull. This applied in particular to the conditions without interruptions and with one interruption. This may explain the, on first sight somewhat counter-intuitive, results of lower effort ratings, and more positive feelings when interruptions become more complex.

Nevertheless there seems to be a tendency towards decreasing positive feelings, and higher subjective costs (higher effort ratings) as the number of interruptions increases. This indicates that interruptions may become annoying as they occur too frequently. Being interrupted once in a while may improve efficiency, which is experienced positively. However, too many interruptions may prevent the execution of the main task, which in fact is contra-productive. It is plausible that this is accompanied with negative feelings.

The results concerning the variations in strategies can be viewed from this perspective as well. The most prevailing strategy appears to be the one in which the telephone is answered immediately. Only when the occurrence of interruptions increases the 'delayed' strategy is more frequently used. Delaying the response might be interpreted as trying to get some control over the intrusion. It should be noticed that the telephone is a very intrusive medium. In practice people hardly ignore the telephone, only in rather extreme situations the phone is not answered. The present popularity of telephone answering devices can also be seen as an attempt to reduce, or control the intrusiveness of the telephone.

5. Conclusion

The studies described in this paper have by and large resulted in a consistent picture of the effects of interruptions on task execution and subject's state.

The results of this study make clear that the influence of interruptions extend the interruption interval itself. In other words there are 'after-effects' of interruptions. A 'change-over' period has been distinguished in which people apparently have to make a cognitive shift from one task to the other. This makes clear that interruptions constitute additional (cognitive) demands which brings along additional 'psychological costs'.

In certain situations interruptions may have a stimulating effect. In particular when the task or work situation is not challenging, the additional demands posed by the interrupting task may have a stimulating effect. However, this is only true to a limited extent. When the number of interruptions increases negative experiences tend to prevail. The stimulating effect results in an increase of efficiency. Apparently the efficiency cannot be improved beyond a certain level, due to the higher 'costs' associated with the cognitive shifts. This suggests an inverted U-curve with respect to the optimal effect of interruptions.

Work situations in which people are frequently interrupted may lead to additional work pressure, because completion of the main task can come at stake. In addition to the increase of work pressure resulting from economic demands and usage of information - and communication technology these work situations constitute high stress risks.

Interruptions pose additional cognitive demands. In particular with respect to jobs in the domain of 'mental information work' it is recommendable that the potential risks of stress and errors are acknowledged. The results of this study suggest that adequate measures should be taken to guarantee workers in these situations at least a few uninterrupted working hours a day.

The results of both studies are consistent and therefore seem to be valid. Moreover these studies, although performed in a laboratory, have high ecological validity because realistic tasks have been used in the experimental set-up and professionals acted as subjects. This approach,

which can be designated as 'experimental work psychology', appears to be a sensible way to study complex aspects concerning the regulation of work behaviour.

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