The impact of chronotype in the perception of call center´s workers

S.M. Couto[a] , L.B.M. Guimarães[b]

[a] *Departamento de Engenharia de Produção, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brasil*

[b] *Departamento de Engenharia de Produção, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brasil*

Abstract

This paper shows the results of a study that evaluated whether chronotype (morningness/eveningness characteristics) impact the way workers, in a 24 hours operating call-center, perceive their work. Chronotype was identified based on the Horne and Ostberg Questionnaire (1976). The Macroergonomics Design technique (Fogliatto and Guimarães, 1999) was used to raise data concerned with ergonomics such as working environment, workstation, work organization and the content of the task. Results indicate that the allocation of workers from their respective shifts underrates their morning/evening characteristics and that there is a higher susceptibility in evening subjects working in a morning shift: they have more complains about work environment issues (mainly illumination), have more difficulties in waking up in the morning and feel more tired in the morning shift. Because allocating workers in a shift that is not compatible with their natural cycle might contribute to illness and dissatisfaction, it is important to consider individual differences, such as chronotype, when hiring workers, so that they can be addressed to a shift more suitable to their natural needs.

Keywords: shift work, chronotype, call-center, perception, work environment

1. Introduction

Shift work and night shifts are now an option for coping with the nowadays needs of production of goods and service. However, many studies have been pointing out the effects of the shift work on the worker's health. Fischer et al. [1] showed that shift work interferes with the physiological homeostasis, which is the steady state of a living organism considering his/her circadian rhythm and sleeping and eating habits. Other authors found that shift work can impact the cardiovascular system [2,3,4,5] the human reproduction [6] and morbidity [7]. Harrington [8] and Waterhouse et al. [9] showed that, besides impacting on health conditions, the work in shifts deteriorates both social and familiar relationships, mainly with sons and daughters [10]. The literature has stressed the negative impact on work performance [11,8,9].

Monk e Folkard [12] showed that people working in shifts tend to be more or less tolerant but will always suffer physically, mentally and socially. The damage can be cumulative. Aschoff [13], pointed out that working hours, social events, as well as any other event with a determined periodicity may act as synchronizers of the human circadian rhythm and when they conflict with the biological rhythm, as is the case of the shift work and night work, the subject might have problems since the alteration of

the timing of these factors does not alter the natural time clock of human beings.

Although generally described as an important aspect of human behavior, individual differences such as chronotype (morningness/eveningness characteristics) are not very much emphasized in ergonomic studies. However, it is a very important human characteristic resulting from the circadian cycle, that might influence people working in shifts that differ from their natural cycle.

People, naturally, have different biological rhythms, which favor their best performance in the morning, afternoon/evening or night and depending on that, people can be characterized as morning people or evening people [14]. Based on circadian variations of oral temperature, Horne and Östberg [15] noticed that morning people have performance highs significantly earlier than the evening people with higher temperatures during the day. This author proposed a questionnaire for discriminating between morning and evening people which was validated by their temperature curves.

Call centers are examples of places operating 24 hours a day. Attendants work in 6-8 hours shifts, and are supposed to help, by telephone, the costumers who called the service. Call centers are usually characterized by small, individual workstations equipped with a table, chair, computer and telephone [16] and mainly because of the demands for high productivity, long hours work and general physical/mental overload, many studies call for attention on the load imposed to call center workers [17], their anxiety in relation to work [18], and in relation to the conflict imposed by the relationship (sometimes difficult) with the customers [19]. However, no study discusses the additional stress due to the shift work.

This paper presents the results of a study [20], that investigated the effects of morningness/eveningness in call center workers operating in shifts. More specifically, the study verified whether the attendant operating in a shift different from the one more suitable to his/her circadian rhythm is negatively affected and shows more problems than average in terms of health, social, and family life.

2. Method

The subjects involved in the study comprised 165 out of the population of 171 call center workers of a mobile phone company in the state of Rio Grande do Sul, Brazil, working in fixed shifts of six hours. The circadian cycle of each of the 165 subjects, i.e., their morningness/eveningness characteristics, was established by a questionnaire adapted from the Horne and Ostberg [15] one. The H&O questionnaire results in a final score that varies from 86 to 16 points, which are the result of the arithmetic sum of the scores of all questions. People who score from 86 to 70 points are identified as morning people; from 59 to 69 points are people tending to morningness; from 42 to 58 points, people are supposed to be neutral; the ones scoring from 31 to 41 points tend to eveningness and subjects scoring from 30 to 16 points are identified as evening people.

The same subjects fulfilled another questionnaire built on the basis of previous interviews with them. The goal of the 59 questions questionnaire was to evaluate their perception about themselves (i.e., how they feel during and after work and the quality of their sleep) and their work, according to six factors: how they feel during the workday, how they feel after the workday, work environment, workstation conditions, work organization, and the content of the task. According to the Macroergonomic Design [21], technique, the subjects are supposed to express their opinion on a 15 centimeters line [22]. The mark on the line sets the intensity of the answer, which can vary from 0 to 15.

A Qui–squared test was used to evaluate statistical association between morningness/evenigness characteristic and their preferable shift period. Analysis of variance (ANOVA) was used to compare the means of the attendant's answers. When the test was positive at 5% ($p<0,05$) the means were compared using the Duncan post hoc test.

3. Results and Discussion

As shown in table 1, the percentage of typically evening subjects is very low and there were no typically morning subjects in the sample. The majority of people tends to be in the center of the curve and can be considered as neutrals.

Table 1
Classification of the 165 sampled subjects according to the their morningness/eveningness characteristics

Subject's classification	Nº people	Total of points	Percent
evening	007	16 - 30	004,2
Tending to evening	031	31 – 41	018,7
Neutral	101	42 – 58	060,8
Tending to morning	026	59 – 69	016,3
Total	165		100

The results of the Qui-squared test in Table 2 show that there is a distortion between people allocation to the shift and the time of the day they wanted to work. The results suggest that the morning people would do better in the morning shift (adjusted residual = 3,2) and that evening people in the evening (adjusted residual = 3,2) and night shifts (adjusted residual = 3,9). This distortion might influence the way they deal with their job and impact on their health.

Table 2
Adjusted Residuals for preferable shift

Preferable shift		chronotype			Total
		evening people	Neutral	**Morning people**	
Morning	Nº observations	09	61	21	91
	Adjusted Residual	-4,7	1,8	3,2	
Afternoon	Nº observations	15	17	02	34
	Adjusted Residual	3,2	-1,5	-1,7	
Night	Nº observations	12	9	0	21
	Adjusted Residual	3,9	-1,8	-2,1	
Early morning	Nº observations	01	09	01	11
	Adjusted Residual	-1,2	1,5	-0,6	
Total	Nº observations	37	96	24	157

The analysis of the influence of chronotype on how the subjects perceive their work show that evening people are more sensitive to the environment conditions, mainly to the quality of the room illumination ($F(4, 157)=4,438$, $p=0, 002$) (see Table 3).

Table 3
Duncan's test for satisfaction with the quality of the room illumination. Means can vary from 0 (not satisfied) to 15 (very satisfied)

Satisfaction with the room illumination	N	Significance level = 0,05	
Morningness/eveningness characteristic and shift allocation		Mean answer of Group 1	Mean answer of Group 2
Evening people working in evening shift	15	7,18	
Evening people not working in evening shift	23	8,065	
Morning people working in morning shift	22		10,804
Morning people not working in morning shift	4		13,8

There was also a statistical difference in the quality of sleep of the subjects depending on their morningness/eveningness characteristic ($F(4, 152)=7,072$, $p=0, 000$). Duncan's post hoc test (see Table 4) showed that it is more difficult for evening people to wake up in the morning than it is for morning people, suggesting that they might have a desynchronization of their natural circadian rhythm.

The results also suggest the occurrence of chronic fatigue, independently of the morningness/eveningness characteristic of the workers. They complained about lack of patience, need for silence when they get home, headache and malaise (see Fig. 1). According to Seligmann-Silva [23], these are psychological disturbances, characteristic of chronic fatigue. Because fatigue was independent of chronotype, it is possible to state that the work itself is overloading the phone operators because of the way it is designed. The literature review already showed that this type of work is too stressing and therefore, should be reviewed. It is worth noting that the independence of fatigue from chronotype does not mean that the subjects should be allocated in any shift. Despite the problems that shift work is known to bring, and considering that it is a reality in modern life, it should be less harmful to allocate the shifts according to the morningness/eveningness characteistic of the workers.

Table 4
Duncan's Test for easiness of waking up

Awakening	N	Significance level = 0,05		
Morningness/eveningness characteristic and shift allocation		Group 1	Group 2	Group 3
Evening people not working in evening shift	23	6,018		
Evening people working in evening shift	15	6,68		
Morning people working in morning shift	22		12,286	
Morning people not working in morning shift	4			13,88

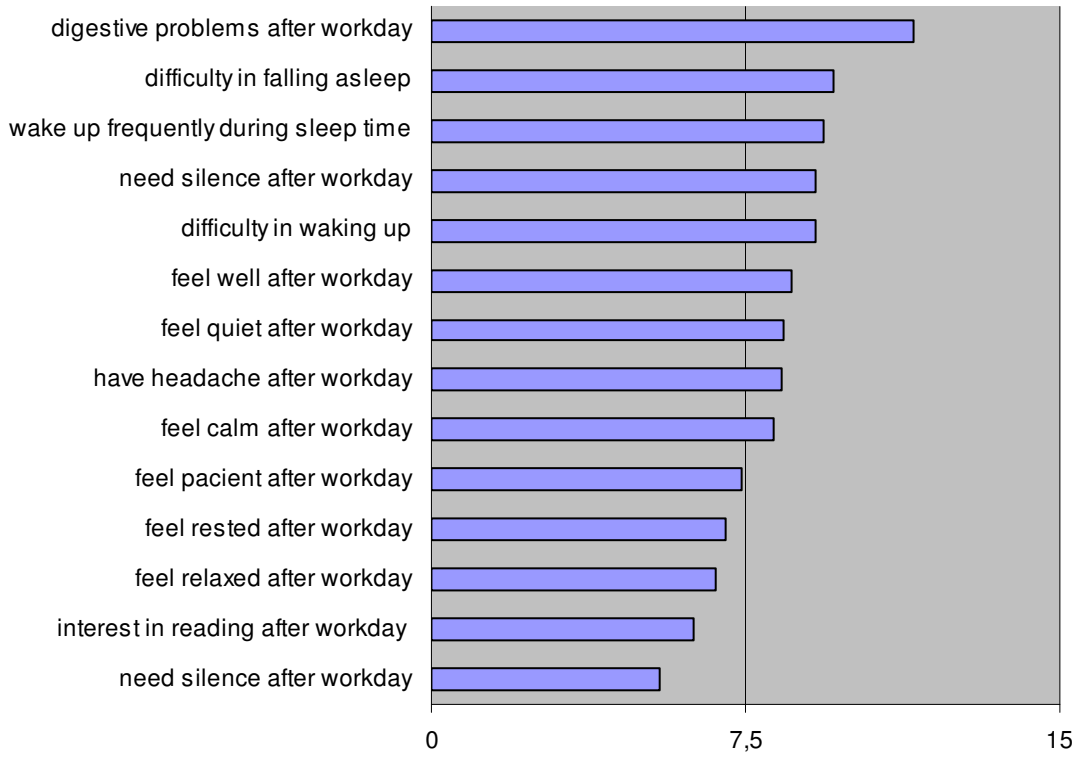

Fig. 1: Mean values of the worker's sensations after the work

4. Conclusions

The results of this study with telephone operators who work in shifts for a mobile telephone company in the state of Rio Grande do Sul, Brasil, showed that shift allocation do not take into account their morningness/eveningness characteristics although the employees prefer a shift that is compatible with their chronotype. The results also show that people respond differently to their work environment: evening people were more sensitive to environmental conditions and were less satisfied with the quality of illumination of the room, in comparison to morning people. Evening people also showed difficulty in waking up in the morning, which is expected since it interferes with their circadian rhythm. Another important finding is the sign of chronic fatigue among the operators. Considering the results, it is possible to suggest that individual factors are relevant for designing the work in shifts and that the goals of the phone operators' work should be reviewed. The problems like the ones raised in this study make it clear that not only ergonomic issues like work environment, workstation and work organization are important in making a workplace a good place to work: individual factors, like circadian rhythm, also play an important role and it should not be difficult to improve the quality of work life by allocating people in shifts that are more compatible with their natural cycle.

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