

Industrial Fatigue: A Workman's Great Enemy

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Abstract: This paper was a literature review of the concept of industrial fatigue. The paper described industrial fatigue as a normal physiological reaction to exertion, lack of sleep, boredom, changes to sleep-wake schedules, or stress; and as weariness, tiredness, exhaustion, or lethargy, which is generally linked to a feeling of lack of energy. Symptoms associated with fatigue were reported as including increased anxiety, decreased short term memory, slowed reaction time, decreased work efficiency, reduced motivational drive, decreased vigilance, increased variability in work performance, increased errors of omission and commission. Its causes were also found to include overtime work, sudden changes in the working environment, employment of middle-aged workers in the aging society, problems of working hours for part-timers, and changes in work. Moreover, its consequences were reported to include accidents and health challenges of multiple dimensions. The paper concluded on the note that for organizations must operate in an accident-free condition, fatigue has to be minimized to its barest minimum and in doing so workplace danger would either be completely eliminated, or at least minimized to its barest minimum.

Keywords: Industrial, Fatigue, Workman, Enemy, Great.

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I. Introduction

Fatigue can be described as lassitude or exhaustion of mental and physical strength/energy resulting from bodily labor or mental exertion. The issue of industrial fatigue needs to be of immense concern to both employers and employees as well because of its alarming consequences when ignored. While occupational safety and health has improved in recent decades, especially across the developed climes, fatigue remains a common problem in even in the developed countries (Lewis & Wessely, 1992); and if it is a common problem in the developed countries, what will it be among the developing countries? Fatigue is an important phenomenon in industrial psychology because it creates many problems including stress, weakness, tiredness, exhaustion and of course decreases in productivity. Employees recognize fatigue as a feeling of tiredness or pain; regard it as intrinsically unpleasant and undesirable. Fatigue is considered an internal precondition for unsafe acts because it negatively affects the human operator's internal state.

It is not an overstatement to say that a great chunk of industrial mishaps are caused by fatigued workers who no longer function in their optimal and natural capacity. Several cases of accidents have taken place in workplaces because the worker was fatigued. Whether it is about plane crashes, train running off the rail, vehicular accidents, machines related mishaps or people falling from high heights; these are accidents that fatigue can induce. For this and many more other reasons, industrial fatigue needs investigation, be it from the physiological, psychological and nervous point of view. Depending on the strength, stamina and preparation of individual, fatigue is manifested at different rates in different individual. It may be difficult to completely eliminate fatigue, but efforts at minimizing its occurrence can be made. This paper seeks to review literature on fatigue and pinpoint how dangerous it could be to the workman; in doing so, greater attention would be directed at reducing its occurrence in modern workplaces.

II. Literature

Industrial fatigue is a complex phenomenon resulting from several factors in technically innovated modern industries, and it appears as a feeling of exhaustion, lowering of physiological functions, breakdown of autonomic nervous balance, and decrease in work efficiency. Fatigue can be a symptom of a medical problem, but more commonly it is a normal physiological reaction to exertion, lack of sleep, boredom, changes to sleep-wake schedules, or stress. Fatigue, which is also known as weariness, tiredness, exhaustion, or lethargy, is

generally considered as a feeling of lack of energy. Fatigue is not the same as drowsiness, but the desire to sleep may accompany it. Apathy on the other hand is a feeling of indifference that may accompany fatigue or exist independently. Saito (1999) described fatigue as a state of being tired which is brought about by an excess of mental and physical work; and eventually results in lowering or an impairment of human functioning.

Saito further explains that fatigue in the workplace has dual aspects, mental and physical, which interact upon each other so closely that to evaluate them separately is impossible, and that it appears as a feeling of exhaustion, lowering of physiological functions, breakdown of autonomic nervous balance, and decrease in work efficiency (1999). For many people with chronic illness, fatigue is a symptom secondary to their disease, which results in a decreased ability to participate in the meaningful occupations (Glader, Stegmayr, & Asplund, 2002; Kluger, Krupp, & Enoka, 2013; Mathiowetz, Matuska, & Murphy, 2001). According to Venes (2009), chronic fatigue is “an overwhelming sustained sense of exhaustion and decreased capacity for physical and mental work at the usual level. . . long continued fatigue not relieved by rest . . .” (pp. 852-853). Fatigue decreases muscle strength and endurance of the whole body, cognition (especially attention), emotional regulation and overall life satisfaction while increasing depressive moods and anger (Bakshi, 2003; Finlayson, Preissner, & Cho, 2012).

Fatigue is the transitory period between awake and asleep; if fatigue goes uninterrupted, it can lead to sleep; according to Lal and Craig (2001).

Similarly, Gander et al. (2011) define fatigue as:

“...the inability to function at the desired level due to incomplete recovery from the demands of prior work and other activities”. Acute fatigue can occur when there is inadequate time to rest and recover from a work period. Cumulative (chronic) fatigue on the other hands occurs when there is insufficient recovery from acute fatigue over time. Recovery from fatigue, i.e. restoration of function (particularly of cognitive function), requires sufficient good quality sleep” (574.)

Lerman et al. (2012) agree with most part of this definition; but with the added caveat that there is a difference between sleepiness and fatigue. Sleepiness refers only to the tendency to fall asleep, while fatigue is the body's natural reaction to sleep deprivation *or* physical and mental exertion. In other words, a person can be fatigued not because of a lack of restorative sleep, but due to strenuous physical and/or mental work. Lerman et al. (2012) would therefore state that recovery from fatigue could include rest that does not involve sleeping. Williamson et al. (2011) concur that fatigue is both a physical and mental state, defining fatigue as “a biological drive for recuperative rest” (499).

To classify the types of fatigue that occur in occupational environments, Bills (1934) established definitions and distinctions for three types of fatigue: physiological (reduction of physical capacity), objective (reduction in work) and subjective (feelings of weariness). Not too long ago, systematic studies seem to find between three and five dimensions, including general fatigue (tired, bushed, exhausted), mental fatigue (cognitive impairment), physical fatigue, and sleepiness (tendency to fall asleep), and sometimes motivation or lack of activity” (Akerstedt et al, 2004). The distinction between acute fatigue and cumulative or chronic fatigue (e.g. used by the USCG, 1998) may be an interesting one with regard to prevention. Acute fatigue is limited to the effects of a single duty period, such as a 9 to 5 hours working day, which may result in a 'micro sleep' (just being away for a split second) or actually falling asleep.

Cumulative fatigue occurs when there is inadequate recovery between these duty periods. Thus, cumulative fatigue usually presents a picture of day-to-day changes for the worse. It is clear that causal factors as well as preventive measures may be very different, dependent on the type of fatigue. In order to actually fall asleep, one often is chronically fatigued and has accumulated a sleep deficit over time. Chronic fatigue therefore, is considered to be a precursor of acute fatigue, but environmental factors may additionally be important. Falling asleep will occur sooner when the tasks and working conditions are dull, monotonous, and when the temperature is high. On the other hand, it is unlikely to fall asleep in a hectic environment, and when a lot of activity takes place. Ergonomic equipment, machines and soft ware that is designed according to ergonomic standards may also limit negative consequences when the seafarers' behaviour is impaired due to fatigue.

Symptoms of Fatigue

Studies on fatigue have identified a number of symptoms that indicate its presence, including:

- Increased anxiety,
- Decreased short term memory,
- Slowed reaction time,
- Decreased work efficiency,
- Reduced motivational drive,
- Decreased vigilance,
- Increased variability in work performance,

- Increased errors of omission which increase to commission when time Pressure is added to the task, and
- Increased lapse with increasing fatigue in both number and duration (Mohler, 1966; Dinges, 1995).

Other fatigue symptoms are:

- Weakness, lack of energy, tiredness, exhaustion
- Passing out or feeling as if you are going to pass out
- Palpitations (feeling your heart beating)
- Dizziness
- Shortness of breath
- Vertigo (the feeling that you or your environment is moving or spinning. It differs from dizziness in that vertigo describes an illusion of movement. When you feel as if you yourself are moving, it's called subjective vertigo, and the perception that your surroundings are moving is called objective vertigo).

Causes of Fatigue

In reporting the causes of fatigue, Saito (1999) reported that fatigue is caused by many kinds of factors in the workplaces, including the following:

- Overtime work
- Sudden changes in the working environment due to high-technological innovations such as automation and introduction of ultramodern techniques
- employment of middle-aged workers in the aging society,
- Problems of working hours for part-timers,
- Changes in work, personnel cuts, reconstruction of enterprises.

Additionally, other contributory factors to workplace fatigue include the amount and quality of sleep (Stutts et al., 2003, Rogers et al 1999), the disruption of circadian rhythms (Akerstedt and Wright, 2009), Shift work (Shen et al., 2006, Costa, 2003; Hossain et al., 2003), and sleep-related disorders (Connor et al., 2001). Others are length of working hour, age, health status, general sleep quality, experience at work, motivation, home/family life and responsibilities and commuting times. Others are Rogers et al, (1999), 'travel stress' (DeFrank, Konopaske and Ivancevich, 2000); insufficient rest, too much, or too little stimulation at work, lack of opportunity for different work tasks (Konz 1998).

In a more concise approach, a body going by the title - ORR - Managing Rail Staff Fatigue (2012) has categorized the causes of fatigue into the following:

- 1** Work related factors; such as timing of working and resting periods, length and number of consecutive work duties, intensity of work demands.
- 2** Individual factors; such as lifestyle, age, diet, medical conditions, drug and alcohol use, which can all affect the duration and quality of sleep.
- 3** Environmental factors such as family circumstances and domestic responsibilities, adequacy of the sleeping environment.

Consequences of Fatigue

Fatigue is a symptom that makes participation in meaningful occupations increasingly difficult, often resulting in decreased or ceased participation, which negatively affects an individual's quality of life (Stout & Finlayson, 2011). A fatigued individual will be less alert, less able to process information, will take longer to react and make decisions and will have less interest in working compared to a person who is not fatigued. Fatigue therefore increases the likelihood of an individual making errors and adversely affects task performance especially in tasks requiring:

- Vigilance and monitoring
- Decision making
- Awareness
- Fast reaction time
- Tracking ability
- Memory

Driver fatigue, in particular, has been identified as a major factor contributing to crashes in haul truck traffic (Orchansky et al., 2010; Santos et al., 2010; Schutte and Maldonado, 2003). Young and Hashemi (1996) found that there were basically two types of drivers that are typically involved in fatigue-related crashes: those

with regular sleep patterns who developed fatigue on the job, and those with irregular sleep patterns who were fatigued before getting behind the wheel. This finding reinforces the idea that fatigue should be conceptualized as both a lack of sleep and physical/mental exertion. Fatigue has been shown to cause significant and frequent health impacts such as coronary disease, hypertension (Dembe, Erickson, Delbos, et al., 2005), diabetes (Harma, 2006), insomnia (Taris, Beckers, Dahlgren, et al., 2007) and injuries (Sparks, et al., 1997) among workers in multiple industries.

Fatigue Management

There are a number of actions that employees can take to help mitigate their fatigue, whether it is work-related or non-work related. The following information may be useful to pass on to employees.

Table 1 Fatigue mitigation strategies

Factors to be considered	Recommended Actions
Diet for night shift workers	<ul style="list-style-type: none"> ✓ Be prepared and organised beforehand—bring healthy meals and snacks to night shift ✓ Eat a balanced nutritious diet, including plenty of fruits and vegetables ✓ Stick to normal day shift meal times as far as possible ✓ Don't eat between 3 am and the end of night shift ✓ Avoid large meals one to two hours before sleeping ✓ Avoid high-energy (high-fat), high-carbohydrate meals during night shift
Recovering from or preparing for work	<ul style="list-style-type: none"> ✓ Have an afternoon nap before the first night shift
Personal factors affecting sleep	<ul style="list-style-type: none"> ✓ Avoid excessive alcohol as this can disturb your sleep ✓ Avoid caffeine after midnight when on night shift
Medical conditions affecting sleep, such as sleep apnoea	<ul style="list-style-type: none"> ✓ Seek medical advice
Poor sleep environment	<ul style="list-style-type: none"> ✓ Install heavy curtains that keep the light out ✓ Reduce the volume of the telephone and the television – don't keep them in the bedroom ✓ Insulate the house and/or have air conditioning on to drown out background noise ✓ Keep the bedroom cool ✓ Let neighbours and friends know that you are a shift worker and when you need to sleep so they don't mow lawns or visit at these times. Use a simple sign on the door, or in a window that neighbours and visitors can see.
Poor sleep practices (e.g. watching television in bed, drinking coffee or alcohol or eating a heavy meal before going to bed)	<ul style="list-style-type: none"> ✓ Get into a routine for going to sleep (e.g. take a warm shower or relaxing bath before going to bed, listen to soothing music) ✓ Avoid heavy meals, alcohol and tea or coffee before going to bed
Poorer sleep quality, more fragmented and less deep restorative sleep in people over 45 years of age	<ul style="list-style-type: none"> ✓ Consider moving out of shift work if you find you are more a 'morning' person and cannot get enough sleep when on night shifts
Hectic social life	<ul style="list-style-type: none"> ✓ Plan your social activities and ensure you get sufficient sleep before starting work
Second jobs	<ul style="list-style-type: none"> ✓ Follow your employer's procedures about disclosure ✓ Ensure you get adequate sleep for both jobs

Source: Workplace Health and Safety Queensland 2008, *Managing fatigue: A guide for the workplace.*

Other studies have investigated job rotation as a control for most types of fatigue. Job rotation is a method of rotating workers across various tasks that have different physical and mental demands over time and it is a promising method to manage worker fatigue (Jonsson (1998). Job rotation has been implemented in many settings including refuse collecting (Neter, Wasserman & Kutner, 1990), cashiering and poultry processing (Henderson, 1992). Jonsson (1998) claimed that this strategy is ideal for construction because it is especially useful for dynamic tasks that require variations in muscular load. Furthermore, job rotation reduces errors and increases employee job satisfaction (Gabriel, Asawo & Idris, 2016). Developing a proper job rotation plan involves determining which jobs to include, the rotation sequence and the proper rotation intervals

Importance of Managing Fatigue in the Workplace

- Improved health and safety
- Reductions in absenteeism and staff turnover
- Improved performance and productivity
- Reductions in accidents and injuries

- Reduction in job dissatisfaction

Industrial Studies on Fatigue

Several studies have been done concerning industrial psychology, very few of them are considered here.

- **Age and fatigue**

Published literature reviews of fatigue studies show some correlations of age and fatigue with time of day. For instance, young drivers (under 30 years of age) are more susceptible to drowsiness that can cause car crashes in the late night and early morning hours. Older drivers (over 64 years of age) are more susceptible to drowsiness that causes car crashes in the afternoon (Milia et al., 2011). A reason for this difference can be that biological systems begin to deteriorate around 45-50 years of age – around this time, people experience a tendency toward morningness (waking and being more alert in the morning hours) and reduction in deep sleep (Milia, 2011). Regardless of age, drivers with fewer hours of sleep had elevated odds of being involved in a sleep-related crash (Stutts et al., 2003). Young and Hashemi (1996) found that there were basically two types of drivers that are typically involved in fatigue-related crashes: those with regular sleep patterns who developed fatigue on the job, and those with irregular sleep patterns who were fatigued before getting behind the wheel. This finding reinforces the idea that fatigue should be conceptualized as both a lack of sleep and physical/mental exertion.

- **Socio Economic Status and Fatigue**

Socioeconomic status appears to have an indirect correlation with fatigue, namely that those with higher socioeconomic statuses are less likely to be fatigued or experience fatigue-related incidents. This may be because those with higher-paying jobs are more likely to have better agency over their working conditions, workload, and schedules, which indicates that they have more means to manage fatigue (Milia et al., 2011).

- **Work Schedule and Fatigue**

Regarding work schedules, research in this area has found that injury risk increases in the eighth hour of work and continues to increase after twelve and sixteen hours of work. Vesgo et al. (2007) found that the number of hours worked in the week prior to an incident is related to safety risk – the probability of a safety incident increased 88% for those who worked more than 64 hours the week before. Shift work also increases the risk of injury; researchers have found that few employees are able to physically cope with third-shift work, showing elevated risk of metabolic syndrome, circadian rhythm disruption, sleep disruption, and fatigue (Milia et al., 2011). Similarly, risk of injury was found to be 30% higher on night shift compared with morning, risk is highest in the first few hours, and risk increases over consecutive night shifts so that the 4th night shift is 36% higher risk than 1st (Hobson, 2004). 60-70% of shift workers will report difficulty with sleep, sleepiness on the job, or actually falling asleep unintentionally while at work (Rosekind, 2012). Fatigue has been estimated to be the key factor in as many as 41% of accidental injuries and deaths caused by human error (Sallinen, 1997) (Hobson, 2004 & Sallinen, 1997 were cited in Energy Institute, 2006).

III. Conclusion

Industrial fatigue is a state of lassitude or exhaustion of mental and physical strength resulting from bodily labor or mental exertion in an industrial domain. Fatigues are not the same as drowsiness, but the desire to sleep may accompany fatigue. Apathy on the other hand is a feeling of indifference that may accompany fatigue or exist independently. Fatigue is caused by several factors ranging from those that are personal to the individual or those externally induced by the work environment and job design. Some of the factors mentioned included overtime work, sudden changes in the working environment due to high-technological innovations such as automation and introduction of ultramodern techniques, employment of middle-aged workers in the aging society, problems of working hours for part-timers, changes in work, personnel cuts, reconstruction of enterprises among others. Going by the avalanche of problems and fatality associated with fatigue at workplaces, the need to manage fatigue cannot be over emphasized. If organizations must operate in an accident-free condition, fatigue has to be minimized to its barest minimum, and in doing so workplace danger would either be completely eliminated, or at least minimized to its barest minimum.

References

- [1]. Akerstedt, T., Knutsson, A., Westerholm, P., Theorell, T., Alfredsson, L., & Kecklund, G. (2004). Mental fatigue, work and sleep. *Journal of Psychosomatic Research*; 57:427-433.
- [2]. Akerstedt, T. & Wright, K.P., (2009). "Sleep loss and fatigue in shift work and shift work disorder," *Sleep Medicine Clinics*, 4, (2), 257-271
- [3]. Bakshi, R. (2003). Fatigue associated with multiple sclerosis: Diagnosis, impact and management. *Multiple Sclerosis*, 2003(9), 219-227.
- [4]. Connor, J., Whitlock, G., Norton, R., & Jackson, R., (2001). "The role of driver sleepiness in car crashes: A systematic review of epidemiological studies," *Accident Analysis & Prevention*, 33, (1), 31-41

- [5]. Costa, G., (2003). "Shift work and occupational medicine: An overview," *Occupational Medicine*, 53, 83-88.
- [6]. Dembe, A., Erickson, J., Delbos, R., et al. (2005). The impact of overtime and long work hours on occupational injuries and illnesses: New evidence from the United States. *Occupational and Environmental Medicine*, 62(9), 588-597.
- [7]. Dinges, D. F. (1995). Performance effects of fatigue. *Fatigue Symposium Proceedings*. Washington, DC: National Transportation Safety Board.
- [8]. Energy Institute (2006), Improving alertness through effective fatigue management, London, <http://www.energyinstitute.org/technical/human-and-organisational/factors-humans-factors/fatigue-improving-alertnesimproving-fatigue-management>
- [9]. Finlayson, M., Preissner, K., & Cho, C. (2012). Outcome moderators of a fatigue management program for people with multiple sclerosis. *American Journal of Occupational Therapy*, 66, 187-197
- [10]. Gabriel, J.M.O.; Asawo, S.P. and Idris, A. B. (2016). Workers satisfaction through vertical job loading among casual employees of oil and gas companies in Nigeria *Nigerian Journal of Oil and Gas Technology* 2(1), 66-77.
- [11]. Gander, P., Hartley, L., Powell, D., Cabon, P., Hitchcock, E., Mills, A., Popkin, S. (2011). Fatigue risk management: Organizational factors at the regulatory and industry/company level. *Accident Analysis and Prevention*, 43, 573-590
- [12]. Glader, E. – L., Stegmayr, B., & Asplund, K. (2002). Post-stroke fatigue: A two-year follow-up study of stroke patients in Sweden. *Stroke*, 33, 1327-1333.
- [13]. Harma, M. (2006). Workhours in relation to work stress, recovery and health. *Scandinavian Journal of Work, Environment and Health*, 32(6), 502-514
- [14]. Hossain, J.L., Reinish, L.W., Kayumov, L., Bhuiya, P. & Shapiro, C.M. (2003). "Underlying sleep pathology may cause chronic high fatigue inshift-workers," *J. of Sleep Res.*, Vol. 12, pp. 223-230.
- [15]. IMO (2001a). Guidelines on fatigue. International Maritime Organization, London
- [16]. Kluger, B., Krupp, L., & Enoka, R. (2013). Fatigue and fatigability in neurologic illnesses: Proposal for a unified taxonomy. *Neurology*, 80(4), 409-416.
- [17]. Lerman, S., Flower, D., Gerson, B., & Hursh, S. (2012). Fatigue risk management in the workplace. *Journal of Occupational and Environmental Medicine*, 54(2), 231-258.
- [18]. Mathiowetz, V. G., Finlayson, M. L., Matuska, K. M., Chen, H. Y., & Luo, P. (2005). Randomized controlled trial of an energy conservation course for persons with multiple sclerosis. *Multiple Sclerosis*, 11, 592-601.
- [19]. Mohler, S. R. (1966). Fatigue in aviation activities. *Aerospace Medicine*, 37, 722-732.
- [20]. Milia, L., Smolensky, M., Costa, G., Howarth, H., Ohayon, M., & Philip, P. (2011). Demographic factors, fatigue, and driving accidents: An examination of the published literature. *Accident Analysis and Prevention*, 43, 516-532. ORR (2012) Managing Rail Staff Fatigue [pdf online] <Available at: [http:// orr.gov.uk/_ data/assets/pdf_file/0005/2867/managing_rail_fatigue.pdf](http://orr.gov.uk/_data/assets/pdf_file/0005/2867/managing_rail_fatigue.pdf)> Last accessed November 2014
- [21]. Rosekind, M. (2012) Fatigue, Shift Work, and Sleep Disorders: Key Lessons from Transportation Accidents, presented at Harvard Sleep and Shift Work Symposium, NTSB, 27 September 2012, retrieved from http://www.nts.gov/doclib/speeches/rosekind/Rosekind_120927.pdf
- [22]. Shen, J., Botly, L.C., Chung, S.A., Gibbs, A.L., Sabanadzovic, S., & Shapiro, C.M., (2006). "Fatigue and shift work," *Journal of Sleep Research*, 15, 1-5.
- [23]. Sparks, K., Cooper, C., Fried, Y., et al. (1997). The effects of hours of work on health: A meta-analytic review. *Journal of Occupational and Organizational Psychology*, 70, 391-408.
- [24]. Stout, K., & Finlayson, M. (2011). January 24). Fatigue management in chronic illness: Assessment, treatment planning, and interventions. *OT Practice*, 16(1), 16-19.
- [25]. Stutts, J.C., Wilkins, J.W., Osberg, J.S. & Vaughn, B.V., (2003). "Driver riskfactors for sleep-related crashes," *Accident Analysis & Prevention*, 35, (3), 321-331.
- [26]. Taris, T., Beckers, D., Dahlgren, A., et al. (2007). Overtime work and well-being: Prevalence, conceptualization and effects of working overtime. In S. McIntyre & J. Houdmont (Eds.), *Occupational health psychology: European perspectives on research, education and practice* (Vol. 2). Maia, Portugal: ISMAI.
- [27]. Tharmaphornphilas, W. & Norman, B. (2004). A quantitative method for determining proper job rotation intervals. *Annals of Operations Research*, 128(1-4), 251-266.
- [28]. USCG. Crew fatigue and performance on U.S. Coast Guard Cutters. US Coast Guard Research and Development Center. Report No. CG-D-10-99, October 1998.
- [29]. Vegso, S., Cantley, L., Slade, M. (2007). Extended work hours and risk of acute occupational injury: A case-crossover study of workers in manufacturing. *American Journal of Industrial Medicine*, 50, 597-603
- [30]. Venes, D. (2009). *Taber's Cyclopedic Medical Dictionary*. (21st Ed.). Philadelphia, PA: F.A.Davis Company
- [31]. Williamson, A., Lombardi, D., Folkard, S., Stutts, J., Courtney, T., Connor, J. (2011). The link between fatigue and safety. *Accident Analysis and Prevention*, 43, 498-515.
- [32]. Workplace Health and Safety Queensland 2008, Managing fatigue: A guide for the workplace. Retrieved from <http://www.worksafe.tas.govt.au>
- [33]. Young, T., Hashemi, L. (1996). Fatigue and trucking accidents: Two modes of accident causation. Paper presented at the Human Factors and Ergonomics Society Annual Meeting.

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