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Číslo 1

Roger Haslam. *Ergonomics at 60: mature, thriving and still leading the way*. Pages: 1-5.

It is in our nature to mark anniversaries, with anniversaries containing zeros singled out for particular celebration. First appearing in 1957, the arrival of 2017 sees Ergonomics enter its 60th year of publication, a milestone for the discipline. Ergonomics was the first major journal in the field, followed shortly in 1958 by Human Factors, the journal of the USA Human Factors and Ergonomics Society. Applied Ergonomics entered publication in 1970, with the much younger sibling International Journal of Industrial Ergonomics entering the scene almost 30 years later in 1986. Other Ergonomics Journals now exist, but these four are the most influential, as listed by the Journal Citation Reports 'Ergonomics' category.

N. Perrin Jegen & P. Chevret. *Effect of noise on comfort in open-plan offices: application of an assessment questionnaire*. Pages: 6-17.

Open-plan offices account for 60% of French office workspaces. The noise levels recorded in this type of environment are much lower than those encountered in industrial workplaces. Nevertheless, surveys show that noise is considered by employees as the main source of discomfort. A first questionnaire dedicated to noise discomfort was produced in 2013 and tested on a panel made up of 217 people working in 7 French companies. Today, it also makes it possible to address the issues of fatigue related to ambient sound, but above all, the survey aims to study the differences in how ambient noise is perceived depending on the type of open-plan office. On the basis of that new version, a second survey has been conducted in 23 open-plan offices, making it possible to collect the responses from 617 employees. Most of the results of the first survey have been confirmed, with an increase in the significance of the statistical analyses. Moreover, French Standard NF S 31-199, which is currently being drafted, establishes a typology of open-plan office spaces according to the types of work done in them. Based on this typology, it appears that when dealing with the impact on noise on workers, a distinction has to be made between the types of open plan offices. **Practitioner Summary:** Surveys conducted in open-plan offices show that noise is considered by employees as the main source of discomfort even if the noise recorded in this type of

environment is not hazardous. This work presents the result of a large survey dedicated to noise discomfort conducted in 23 open-plan offices.

- **Keywords:** Open-plan office, ambient noise, office ergonomics, ergonomics tools and methods, sound perception

Yu Huang & Weikang Jiang. *The effect of exposure duration on the subjective discomfort of aircraft cabin noise*. Pages: 18-25.

The time dependency for subjective responses to noise has been a controversial question over many years. For durations of up to 10 min, the discomfort produced by three levels of noise (ie 60, 70 and 80 dBA) was investigated in this experimental study to determine the relation of discomfort to the time duration of noise. The rate of increase in discomfort with increasing duration was 1.5 dB per doubling of exposure duration, whereas it is currently assumed to be 3 dB per doubling of exposure duration. The sound dose level (SDL) was proposed to predict the discomfort caused by noise of long duration. The combination of SDL and vibration dose value (VDV) provided more consistent estimates of the equivalent comfort contours between noise and vibration over durations from 2 to 32 s than the combination of sound exposure level and VDV or that of sound pressure level and r.m.s. acceleration. **Practitioner Summary**: The discomfort produced by noise of long duration can be well predicted from a new definition of sound dose level, where the discomfort increases at 1.5 dB per doubling of exposure duration.

- **Keywords:** Noise, discomfort, duration

Richard J. Holden, Rupa S. Valdez, Christiane C. Schubert, Morgan J. Thompson & Ann S. Hundt. *Macroergonomic factors in the patient work system: examining the context of patients with chronic illness*. Pages: 26-43.

Human factors/ergonomics recognises work as embedded in and shaped by levels of social, physical and organisational context. This study investigates the contextual or macroergonomic factors present in the health-related work performed by patients. We performed a secondary content analysis of findings from three studies of the work of chronically ill patients and their informal caregivers. Our resulting consolidated macroergonomic patient work system model identified 17 factors across physical, social and organisational domains and household and community levels. These factors are illustrated with examples from the three studies and discussed as having positive, negative or varying effects on health and health behaviour. We present three brief case studies to illustrate how macroergonomic factors combine across domains and levels to shape performance in expected and unexpected ways. Findings demonstrate not only the importance of context for patients' health-related activities but also specific factors to consider in future research, design and policy efforts. **Practitioner Summary:** Health-related activities of patients are embedded in and shaped by levels of social, physical and organisational context. This paper combined findings from three studies to specify 17 contextual or macroergonomic factors in home- and community-based work systems of chronically ill patients. These factors have research, design and policy implications.

- **Keywords:** Healthcare ergonomics, macroergonomics, self-care, sociotechnical systems, qualitative research

Alina Maria Fleştea, Oana Cătălina Fodor, Petru Lucian Curşeu & Mircea Miclea. *'We didn't know anything, it was a mess!' Emergent structures and the effectiveness of a rescue operation multi-team system*. Pages: 44-58.

Multi-team systems (MTS) are used to tackle unpredictable events and to respond effectively to fast-changing environmental contingencies. Their effectiveness is influenced by within as well as between team processes (i.e. communication, coordination) and emergent phenomena (i.e. situational awareness). The present case study explores the way in which the emergent structures and the involvement of bystanders intertwine with the dynamics of processes and emergent states both within and between the component teams. Our findings show that inefficient transition process and the ambiguous leadership generated poor coordination and hindered the development of emergent phenomena within the whole system. Emergent structures and bystanders substituted leadership functions and provided a pool of critical resources for the MTS. Their involvement fostered the emergence of situational awareness and facilitated contingency planning processes. However, bystander involvement impaired the emergence of cross-understandings and interfered with coordination processes between the component teams. **Practitioner Summary:** Based on a real emergency situation, the present research provides important theoretical and practical insights about the role of bystander involvement in the dynamics of multi-team systems composed to tackle complex tasks and respond to fast changing and unpredictable environmental contingencies.

- **Keywords:** Multi-team system, leadership, team processes, emergent phenomena, informal structures

Dae Shik Kim, Robert Wall Emerson, Koorosh Naghshineh & Alexander Auer. *Drop-off detection with the long cane: effect of cane shaft weight and rigidity on performance*. Pages: 59-68.

Most travellers who are blind rely on a long cane to detect drop-offs on their walking paths. We examined how different cane shaft materials affect drop-off detection performance through providing different vibrotactile and proprioceptive feedbacks to the cane user. Results of the study showed a significant interaction between cane shaft weight and how the cane is used. A heavier cane was advantageous for detecting drop-offs when the individual used the 'constant contact technique' – cane tip stays in contact with the walking surface at all times – but not when he used the 'two-point touch technique' – cane tip is rhythmically tapped on the surface. In addition, a more flexible cane was advantageous for detecting drop-offs when the two-point touch technique was used but not when the constant contact technique was used. It is recommended that, when blind individuals select a cane shaft material, they consider which long cane technique they use more often. **Practitioner Summary**: Long cane shaft material affects how well a blind individual can detect drop-offs. A heavier shaft was advantageous when using the constant contact technique (cane tip stays in continuous contact with the surface), while a more flexible shaft was better when using the two-point touch technique (cane tip rhythmically taps the surface).

- **Keywords:** Biomechanics, perception, equipment design, hand–arm vibration, long cane for the blind

Khairil Anas Md Rezali & Michael J. Griffin. *Transmission of vibration through gloves: effects of contact area.* Pages: 69-81.

For three samples of material (12.5, 25.0 and 37.5 mm diameter) from each of three gloves, the dynamic stiffnesses and the vibration transmissibilities of the materials (to both the palm of the hand and the thenar eminence) were measured at frequencies from 10 to 300 Hz. Additional measurements showed the apparent masses of the hand at the palm and the thenar eminence were independent of contact area at frequencies less than about 40 Hz, but increased with increasing area at higher frequencies. The stiffness and damping of the glove materials increased with increasing area. These changes caused material transmissibilities to the hand to increase with increasing area. It is concluded that the size of the area of contact has a large influence on the transmission of vibration

through a glove to the hand. The area of contact should be well-defined and controlled when evaluating the transmission of vibration through gloves. **Practitioner Summary:** The transmission of vibration through gloves depends on both the dynamic stiffness of glove material and the dynamic response of the hand. Both of these depend on the size of the contact area between a glove material and the hand, which should be taken into account when assessing glove transmissibility.

- **Keywords:** Anti-vibration gloves, biodynamics, transmissibility, impedance, hands

R. Ittianuwat, M. Fard & K. Kato. *Evaluation of seatback vibration based on ISO 2631-1 (1997) standard method: The influence of vehicle seat structural resonance*. Pages: 82-92.

Although much research has been done in developing the current ISO 2631-1 (1997) standard method for assessment seat vibration comfort, little consideration has been given to the influence of vehicle seat structural dynamics on comfort assessment. Previous research has shown that there are inconsistencies between standard methods and subjective evaluation of comfort at around vehicle seat twisting resonant frequencies. This study reports the frequency-weighted r.m.s. accelerations in $X-$, $Y-$ and $Z-$ axes and the total vibration (point vibration total value) at five locations on seatback surface at around vehicle seat twisting resonant frequencies. The results show that the vibration measured at the centre of seatback surface, suggested by current ISO 2631-1 (1997), at around twisting resonant frequencies was the least for all tested vehicle seats. The greatest point vibration total value on the seatback surface varies among vehicle seats. The variations in vibration measured at different locations on seatback surface at around twisting resonant frequencies were sufficiently great that might affect the comfort assessment of vehicle seat.**Practitioner Summary:** The influence of vehicle seat structural dynamics has not been considered in current ISO 2631-1 (1997). The results of this study show that the vibration measures on seatback surface at around vehicle seat twisting resonant frequency depends on vehicle seats and dominate at the top or the bottom of seatback but not at the centre.

- **Keywords:** ISO 2631-1 (1997), vehicle seat structural dynamics, human vibration, ride comfort

H. I. Castellucci, P. M. Arezes, J. F. M. Molenbroek, R. de Bruin & C. Viviani. *The influence of school furniture on students' performance and physical responses: results of a systematic review*. Pages: 93-110.

The purpose of this study was to determine, using a systematic review, whether the design and/or dimensions of school furniture affect the students' physical responses and/or their performance. Of the review studies, 64% presented positive results, i.e. proven effects; 24% presented negative effects or no change/effect; and the remaining 12% showed an unclear effect. The compatibility between school furniture dimensions and students' anthropometric characteristics was identified as a key factor for improving some students' physical responses. Design characteristics such as high furniture, sit-stand furniture, and tilt tables and seats also present positive effects. Finally, we concluded that further research should be conducted exploring various aspects of those variables, particularly focusing on more objective measures complemented by controlled and prospective design. **Practitioner Summary:** A systematic review of the literature presents a clearly positive effect of school furniture dimensions on students' performance and physical responses. Similar results appeared when school furniture design was tested. However, studying the effects of design and dimensions together produced an unclear positive effect.

- **Keywords:** Classroom, workstation, design, dimension

Chao-Yin Wu, Hsiao-Rong Huang & Mao-Jiun Wang. *Baby carriers: a comparison of traditional sling and front-worn, rear-facing harness carriers*. Pages: 111-117.

The baby sling is a traditional baby carrier in Asia and the front-worn harness carriers are adapted in modern society. We compared the baby sling with front-worn harness carrier in terms of the physiological responses of the baby caregiver. Ten females (aged 23–32 years) and 10 males (aged 23–35 years) were recruited to participate in this study. Each subject was asked to carry two different weight baby dummies (7 and 10 kg) using three different baby carriers. The electromyography (EMG), shoulder tactile pressure, skin temperatures as well as heart rate were measured during baby carrying. The traditional baby sling and the two front-worn harness carriers showed little differences in EMG activities, shoulder tactile pressure and exercise intensity. Carrying two different weighted baby dummies caused significant differences in EMG and shoulder tactile pressure. Based on the findings of this study, recommendations about the improved baby carrier design are proposed. **Practitioner Summary:** This study compared traditional sling and front-worn harness baby carriers using caregivers' physiological responses including electromyography, shoulder tactile pressure, skin temperature and heart rate. Differences found between the carriers provide valuable information for baby carrier design and recommendations for the baby-carrying task.

- **Keywords:** Consumer ergonomics, health care ergonomics, physiology, user testing, baby carrier

Camilla Munch Nielsen, Nidhi Gupta, Lisbeth E. Knudsen & Andreas Holtermann. *Association of objectively measured occupational walking and standing still with low back pain: a cross-sectional study*. Pages: 118-126.

Objectives: This cross-sectional study investigated the association of objectively measured walking and standing still time at work with low back pain (LBP) intensity among blue-collar workers. **Design**: A cross-sectional study. **Methods**: 187 workers attached two accelerometers for diurnal standing still and walking measurements, which were categorised using tertiles. Workers' self-reported LBP intensity (scale 0–9) was categorised into low (0–5) and high pain (6–9). **Results**: Of the 187 workers, 17% reported a high level of LBP. Results of the multi-adjusted logistic regression analysis demonstrated a negative association between walking and high LBP intensity (OR 0.24 CL 95% 0.07 to 0.79). The results between standing still and high LBP intensity were mixed and non-significant. **Conclusion**: Blue-collar workers who walk more at work tend to have low LBP. These results should be verified using objective measures in a prospective design. **Practitioner Summary:** Most studies on the association of occupational walking and standing still with LBP have used poor self-reported measures. This study investigated the association of objectively measured time spent walking and standing still at work with LBP among blue-collar workers. A significant negative association between walking and LBP was found. However, because of the cross-sectional design, these results should be further investigated in prospective studies.

- **Keywords:** Low back pain, ActiGraph, objective measurements, occupational standing still, occupational walking, blue-collar workers

Nicholas J. La Delfa, Diane E. Grondin, Jocelyn Cox, Jim R. Potvin & Samuel J. Howarth. *The biomechanical demands of manual scaling on the shoulders & neck of dental hygienists*. Pages: 127-137.

The purpose of this study was to evaluate the postural and muscular demands placed on the shoulders and neck of dental hygienists when performing a simulated manual scaling

task. Nineteen healthy female dental hygienists performed 30-min of simulated manual scaling on a manikin head in a laboratory setting. Surface electromyography was used to monitor muscle activity from several neck and shoulder muscles, and neck and arm elevation kinematics were evaluated using motion capture. The simulated scaling task resulted in a large range of neck and arm elevation angles and excessive low-level muscular demands in the neck extensor and scapular stabilising muscles. The physical demands varied depending on the working position of the hygienists relative to the manikin head. These findings are valuable in guiding future ergonomics interventions aimed at reducing the physical exposures of dental hygiene work. **Practitioner Summary**: Given that this study evaluates the physical demands of manual scaling, a procedure that is fundamental to dental hygiene work, the findings are valuable to identify ergonomics interventions to reduce the prevalence of work-related injuries, disability and the potential for early retirement among this occupational group.

- **Keywords:** Dental ergonomics, dental hygiene, physical demands, neck, shoulder

Wendy Jones, Roger Haslam & Cheryl Haslam. *What is a 'good' job? Modelling job quality for blue collar workers*. Pages: 138-149.

This paper proposes a model of job quality, developed from interviews with blue collar workers: bus drivers, manufacturing operatives and cleaners (*n* = 80). The model distinguishes between core features, important for almost all workers, and 'job fit' features, important to some but not others, or where individuals might have different preferences. Core job features found important for almost all interviewees included job security, personal safety and having enough pay to meet their needs. 'Job fit' features included autonomy and the opportunity to form close relationships. These showed more variation between participants; priorities were influenced by family commitments, stage of life and personal preference. The resulting theoretical perspective indicates the features necessary for a job to be considered 'good' by the person doing it, whilst not adversely affecting their health. The model should have utility as a basis for measuring and improving job quality and the laudable goal of creating 'good jobs'. **Practitioner Summary**: Good work can contribute positively to health and well-being, but there is a lack of agreement regarding the concept of a 'good' job. A model of job quality has been constructed based on semi-structured worker interviews (*n* = 80). The model emphasises the need to take into account variation between individuals in their preferred work characteristics.

- **Keywords:** Job quality, good jobs, good work, health, bus drivers