Now is the time for a comfort congress

Naddeo A.[1], Mansfield, N.[1], Frohriep, S.[3], Vink, P.[4]

[1]Dept. of Industrial Engineering, University of Salerno, ITALY
[2]Department of Engineering, Nottingham Trent University, UK
[3]Group Advanced Engineering, GRAMMER AG, GERMANY
[4]Faculty of Industrial Design Engineering, TU-Delft, NETHERLANDS

Corresponding Author:Prof. A. Naddeo, e-mail: anaddeo@unisa.it,

Comfort is in our daily lives

When buying a bed, a chair or a car, taking the train, holding a hand tool or flying across the ocean, comfort comes into play. Users interact with products and rate their experience. Therefore, designers and manufacturers of products such as seats, cars, beds, hand tools, and production lines strive for optimal comfort. If we look at some trends like “attention to health”, “ageing workforce (and population)”, “environmental awareness and sustainability” and “attention to well-being”, (dis)comfort is an important consideration (Vink & Hallbeck, 2012). This means that in our daily lives we are confronted with comfort.

Only the user decides whether it is comfortable

A difficulty in studying comfort is that a product in itself can never be comfortable (Vink, 2005). It becomes comfortable (or not) in its use. Despite an ongoing debate in the literature on the meaning of comfort (de Looze et al., 2003), it is generally accepted that comfort is a construct of a subjectively defined personal nature. The user decides whether or not a product is comfortable, or leads to discomfort, by using the product. Some have defined loose ‘comfort’ boundaries as an experience where pain receptors are not active (e.g. Mansfield et al., 2014) but even this is a difficult working boundary in some situations such as healthcare where comfort and pain can occur simultaneously. This makes designing a comfortable product difficult. On the other hand it is not impossible to design comfortable products. Efforts are being made to understand the genesis of the holistic comfort impression and to define the different aspects of comfort and corresponding test methodology for using human beings as measurement tools (Frohriep, 2009). One aspect is that the comfort experience cannot be better than its weakest aspect. On the other hand, several studies show that paying attention to a better product or service lead to more comfort, or less discomfort (Vink, 2005). However, there is certainly room for knowledge development supporting the design of more comfortable experiences.

Challenge for companies

The main challenge for companies that spend money and time for launching more appealing products on the market is to understand which mental/physical/physiological/environmental mechanisms act in creating a (dis)comfort perception. Thus, in product design, designers and engineers, supported by Psychologists, Physiologists, Ergonomists, posture experts and so on.., try to work towards defining a comfort-driven step to take into account the improvement of comfort (or the decrease of discomfort) as new, mandatory, functional requirements of a new product (Cappetti, 2017). Nevertheless, they still do not have methods and instruments, nor models or experience, to optimize products for comfort. As tools and knowledge for the early stages in the design process are missing, much is done in a late phase of the design. (Dis)comfort assessments have to be done as an "evaluation" step in the design process with higher costs and few possibilities to make changes for improvement.

Comfort in scientific literature

In the scientific domain the word comfort is often mentioned. Vink & Hallbeck (2012) report 104,794 double reviewed papers in 30 years (between 1980 and 2010) including the term discomfort or comfort. Most of these studies refer to temperature related discomfort or patient comfort. Bazley et al. (2015) showed more recently that in the scientific literature between 2003 and 2013 more papers are focused on discomfort than on comfort. Also in this study, patient (dis)comfort is the most mentioned within these 10 years. Other studies mention visual comfort, musculoskeletal discomfort, thermal comfort and discomfort, vibration and comfort related to products. The latter concerned only 5% of the papers. So, arguably, the most important application of comfort research into product design is a low priority in the literature.

Papers on theories related to comfort are rather underdeveloped. There are papers explaining more about the concept of comfort. Helander and Zhang (1997) describe terms underlying the concept of comfort and discomfort and De Looze et al. (2003), Kuijt-Evers et al. (2004), Vink & Hallbeck (2012) and Naddeo et al., (2014) made models to explain and describe (dis)comfort. In addition, comfort and discomfort in relation to products is studied (e.g. Mansfield et al., 2014; Sammonds et al., 2017; Hiemstra-van Mastrigt et al, 2015, Naddeo et al., 2015)). Most of these studies concern sitting. Even models that attempt a multi-factorial approach including, for example, dynamics, static, fatigue and temporal factors (Ebe and Griffin, 1998; Mansfield, 2005) tend to use a 'black box' to describe the components building these factors rather than building from the fundamental biomechanics, physiology and neurology.

This means that the theoretical foundations for comfort research remain underdeveloped, but the number of papers touching comfort knowledge continues to expand.

The Comfort Congress

So, more knowledge is coming available and it could mean that interest in comfort is growing. This made us (the authors) decide in 2016 to organize a congress on the topic comfort in 2017.

The aim of the comfort congress is to create a platform for product comfort research. It will provide an opportunity to discuss comfort definitions and models, methods and methodology of assessing and quantifying comfort, system science approaches, and application examples. Importantly we want to build bridges between those who use comfort models to design products and researchers who are motivated to improve the understanding of human comfort.

Researchers will share studies, theories, methods and technologies in the realm of comfort, encompassing all human-machine interfaces. Research fields include body support systems, such as seats and bedding, vehicle and aircraft seats and interiors, consumer products, environmental factors and the tools to research them. Research topics cover the wide range of physical, physiological and psychological human-product interaction, among them product usability, fit and hold analysis, visual comfort, thermo-physiology, well-being, and perceived product quality.

The papers

The papers submitted are organized is two parallel sessions. Session A papers concern comfort theory and human perception in the clusters methodology, modelling, psychophysics, and dynamics. Session B papers are dedicated to measurement and products in the clusters tools, thermal comfort, seating, and other applications.

The presenting researchers represent a broad array of research institutions and countries, from our host country Italy, over Great Britain, The Netherlands and Germany, to France, the United States of America, and Japan.

The Aim

The aim is to form a knowledge base, start an exchange, present and advance comfort research. The best participating papers will be published in a special issue of a scientific journal based on the congress proceedings to disseminate current comfort research. The future of comfort begins in Salerno in June 2017, and we welcome you: Make yourselves comfortable.

References

1. Bazley, C.M.,. 2015. Beyond Comfort in Built Environments. PhD thesis, TU-Delft.
2. Cappetti, N., A. Naddeo, R. Califano, and M. Vallone. 2017. Using Axiomatic Design to Identify the Elements that Affect the Evaluation of comfort/discomfort Perception. Advances in Intelligent Systems and Computing. Vol. 487. doi:10.1007/978-3-319-41688-5_21. www.scopus.com.
3. Ebe, K., Griffin, M. J., 2001. Factors affecting static seat cushion comfort. Ergonomics, 44(10), 901–921.
4. Frohriep, S., 2009. „Comfort Evaluation in Simulations: Meaningful Use of Virtual Comfort,“ Proceedings of Digital Process Management and the Digital Factory, June 16 – 18, 2009, pp. 179 – 184, Magdeburg.….
5. Helander MG, Zhang L. 1997. Field studies of comfort and discomfort in sitting. Ergonomics 40; 895–915.
6. Hiemstra-van Mastrigt, S., 2015. Comfortable passenger seats. Recommendations for design and research. PhD thesis, TU-Delft.
7. Kuijt-Evers LFM, Groenesteijn L, Looze MP de, Vink P. Identifying factors of comfort in using hand tools. Applied Ergonomics 2004;35(5):453-458. 02

8. de Looze, M. P., Kuijt-Evers, L. F. M., Dieën, J. van, 2003. Sitting comfort and discomfort and the relationships with objective measures. Ergonomics, 46(10), 985–997. doi:10.1080/0014013031000121977.
9. Mansfield, N.J., 2005.Human Response to Vibration, CRC Press, London, UK, 2005.
10. Mansfield, N.J., Mackrill, J., Rimell, A.N. and MacMull, S.J., 2014. Combined effects of long-term sitting and whole-body vibration on discomfort onset for vehicle occupants. ISRN automotive engineering, 2014.
11. Naddeo, A., Cappetti, N., D'Oria, C., 2015. Proposal of a new quantitative method for postural comfort evaluation. International Journal of Industrial Ergonomics, 48, 25–35. doi:10.1016/j.ergon.2015.03.008
12. Naddeo, A., Cappetti, N., Vallone, M., Califano, R., 2014. New trend line of re-search about comfort evaluation: proposal of a framework for weighing and evaluating contributes coming from cognitive, postural and physiologic comfort perceptions. In T. Ahram, W. Karwowski, & T. Marek (Eds.), AHFE 2014, Krakow, Poland, 19-23 July 2014
13. Sammonds, G.M., Fray, M. and Mansfield, N.J., 2017. Effect of long term driving on driver discomfort and its relationship with seat fidgets and movements (SFMs). Applied Ergonomics, 58, pp.119-127.
14. Vink, P. (ed), 2005, Comfort and Design: Principles and Good Practice, Boca Raton: CRC Press
15. Vink, P., Hallbeck, S., 2012. Editorial: Comfort and discomfort studies demonstrate the need for a new model. Applied Ergonomics, 43(2), 271–276. doi:10.1016/j.apergo.2011.06.001.