Comfort and discomfort effects over time: the sweetness of discomfort and the pleasure towards of the end

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Abstract

In this paper the influence of effects over time on comfort and discomfort are studied. The principle of the the sweetness of discomfort at the beginning and the pleasure towards of the end is studied. An unpleasant experience could make a person more aware of the comfort in the next event: the sweetness of discomfort. In this paper literature has been found that supports this phenomenon.

Also, near the end of an event the expectation of what will happen could influence the comfort or discomfort. The hypothesis is that a situation with discomfort could result in less discomfort near the end due to the fact that the participant becomes aware of the fact that the situation will end soon. A secondary analysis of six studies where comfort in time is studied showed some support for the hypothesis. Three studies show a reduction in discomfort near the end, the others were difficult to interpret. Further research is needed to affirm the hypothesis.

Keywords: comfort, time, sweetness of discomfort, experience

1 Introduction

There is at least one thing on which passengers or end-users have more knowledge than comfort researchers and comfort designers (Vink & Brauer, 2009). That is the passengers' own sense of comfort or the end-users' own sense of comfort. Researchers and designers can't predict exactly whether a particular passenger feels comfortable in an airplane or whether an end-user will feel comfortable using the product. This is due to the fact that apart from the product or system that is designed many factors influence comfort. The mood of the participant has its influence, but also factors that are not always influenced by the product or system itself (Vink, 2014). A low office temperature due to a malfunctioning climate system will be appreciated coming from a cold freezing windy environment (Vink, 2014). And, a nice flight attendant can create comfort and passengers forget about the hard seat (Vink et al., 2012). Even a VR system with an attractive game can reduce the discomfort caused by limited leg space (Lewis et al., 2016). This seems a bit frustrating for designers of products and systems focused on more comfort.

However, on group level effects can be predicted and a good design will have its effects. The study of 10,000 passengers reported in Vink et al. (2012) showed that newer planes are regarded significantly better with respect to comfort than are older planes. These findings should give those involved in the airline industry a sense of satisfaction with regard to the job they have done in improving comfort. They have shown that it is possible to improve the comfort experience. Another more specific example that comfort can be influenced is the study of Bronkhorst & Krause (2005). They studied the whole train journey and determined which activities are done in the train seat. They adapted the train seat to the activities to create a comfortable experience. These activity supporting train seats were designed for the commuter train 'Long Island Railroad' bringing

passengers from Long Island to New York (Bronkhorst & Krause, 2005). It appeared that 83% of the passengers preferred the resulting seat to current seats and the comfort was higher.

There is another opportunity to improve the comfort experience. That is making use of the principle of the 'sweetness of discomfort' (Vink, 2014). The sense of the softness of a seat is dependent on the hardness of the previous seat (Veen & Vink, 2016). Veen and Vink (2016) showed that after sitting on a hard wooden stool, a test seat feels significantly softer than sitting in a comfortable chair and then sitting on a test seat. In this experiment the test seat was covered with a white blanket and the subjects were told that the seat differences would not be shown. In fact the seat was not changed. This information was not relayed to the test subjects. Before the test, subjects were instructed to sit on the stool and the luxury chair to become accustomed to the environment. Half of the subjects began with the 'hard stool' conditions and the other half began in the 'luxury soft chair' condition. At the same time the next day the subjects arrived to test the 'second seat' and the pre-condition was changed again. The results show for the pre-condition "stool" (the chair feels soft: 1 = I don't agree, 9 = I agree) a rating of 6,75 ± 1,94 on a 9-point scale and for the pre-condition "luxury chair" a rating of 4,96 ± 2,46 which was significantly different. So, the theoretical assumption is that precondition influences the sensation appears to be true. This can be applied in seat design for instance by starting with a hard surface and by pushing a button the seat becomes softer. This can be done by using the Vitamaterials air/foam cushion. This cushion is filled with air and rather hard. At the touch of a button the valve design allows the passenger's weight to exhaust the air from the cushion and provide a personalized contoured seat. This distributes weight evenly and it could be more comfortable than the previous hard state. It would be interesting to study if this is affirmed by research. So, sitting on a hard surface in the precondition could make the tested seat feel softer. For other sensors the principle of influence by the previous experience is described as well. Temperature is experienced differently when coming into an interior from a cold environment as opposed to coming in from a warm environment (De Dear & Brager, 2002). Retreating in and out of dark and light spaces influences our sensors. Our senses see the interior of an airplane differently when emerging from a dark jet way than when entering the airplane by stairs in open air (Vink, 2014). Konieczny (2001) found that comfort during the flight correlated most with the comfort preceding the flight ($r = 0.407$), fear of flying ($r = 0.492$), and attitude toward flying ($r = 0.367$). Correlations to other factors were weaker. This study infers that situations or experiences before the flight could influence the experience during the flight.

Making all steps in the journey highly comfortable probably does not automatically make the whole journey comfortable, because the human sensors record differences better than absolute values. Perhaps phases of discomfort or low comfort should be alternated with more comfortable phases to stimulate more awareness of high comfort or low discomfort levels: "the sweetness of discomfort". Of course the discomfort should not be so high that it makes the whole journey a terrible experience. Introducing a bed of sharp nails or introducing sounds above the pain level is not advised as an object of study. The challenge is to find the ideal balance between comfort and discomfort experiences for the entire travel journey.

Apart from the influence of the phase at the beginning of the comfort experience the end phase also has opportunities for comfort increase. An old study of Kahneman et al. (1993) showed that the end of a pain period the human experience can be improved by adding a phase where the pain is slowly reduced. This resulted in a better experience then when the situation was immediately ended. The study also showed the discomfort experience reduced towards the end in both situations, while the condition was the same. The question is whether the findings of this pain experiment are valid for long term comfort and discomfort studies as well. Therefore, in this paper a few recent studies were taken from the literature where long term comfort experiments were done and where data in time were gathered. The hypotheses is that in a situation where comfort is low or discomfort is high the discomfort reduces towards the end of the experiment or the comfort increases near the end.

2 Methods

To test the hypotheses a secondary analysis was performed on six studies mentioned in five journal papers with data on comfort or discomfort in time. A study of De Lille et al (2016) on comfort during the flight, a study of Sammonds et al. (2017) on discomfort sitting 140 minutes in a car seat, a study of Smulders et al. (2016) sitting 90 minutes in a business class seat, a study of Wenhua Li et al. (2017) on sitting 3 hours on a seat simulating a 28", 30" and 32" pitch and two studies of Bazley et al. (2015) on discomfort during the workweek. De Lille et al (2016) asked 149 travelers on the comfort of their last flight on a scale from 1-10 10 being the maximum comfort and they calculated the average. Sammonds et al. (2017) used the discomfort

scale defined in ISO 2631-1 and studied 10 subjects in the driving positions in a driving simulator and calculated the average. Smulders et al. (2016) studied 12 subjects sitting 90 minutes in two types of business class seats. In the secondary analysis the average discomfort is calculated over the 12 subjects and the 2 conditions of the Smulders' study. In the study of Wenhua Li et al. (2017) the discomfort was recorded in 18 healthy subjects seated for three hours in three different seat pitches (32 inches, 30 inches and 28 inches). A seat pitch is the distance from a point on a seat to the exact same point on the seat in front. A 28 inch pitch is usually a situation where there is limited legroom although that is dependent on the thickness of the backrest as well. The Body Part Discomfort Scale described by Corlett and Bishop (1976) was used in this study. Bazley et al. (2015) studied the discomfort in a workweek in two professions: 16 engineering professionals located in the USA with a workweek of 4 days and 18 plasterers located in Ireland both with five days' workweek. The comfort was recorded 3 times a day for the engineers and one time (after lunch) for the plasterers and the values of the different subjects were averaged.

3 Results and Discussion

Based on the hypothesis the comfort would raise near the end of the activity or the discomfort would reduce. Out of the six figures based on the five afore mentioned papers describing the discomfort pattern in time three affirm the hypothesis. In the other three it is less clear. In figure 1 the comfort increases at the end where passengers know that they approach the destination. In figure 5 the discomfort reduces during the last work day and figure 6 also shows after lunch a reduction knowing that the end of the week is approaching. One figure (figure 2) does not affirm the hypothesis. Figure 2 shows that the discomfort increases also near the end. Figure 3 and 4 could be seen in different ways. Figure 3 shows no further reduction in discomfort, which could affirm the hypothesis, but it could also be that the minimum in comfort is reached which will not further decrease in this business class seat. The discomfort in figure 4 continues to increase for the 28 inch seat, which is very narrow having very little leg room, for the 30 and 32 inch the increase in discomfort is grows less, which could be caused by the fact that end is near.

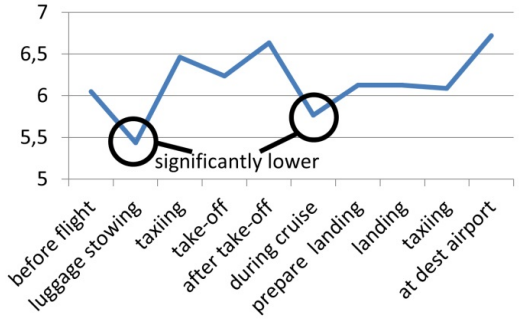

Fig. 1. Comfort during a flight (Lille et al, 2016)

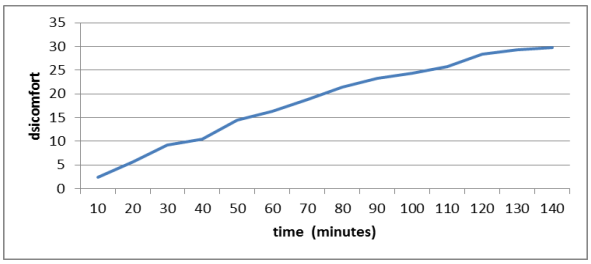

Fig. 2. Driving discomfort (Sammonds et al., 2017)

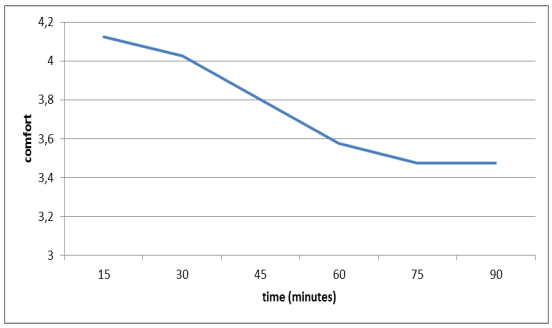

Fig. 3. Business class comfort (Smulders et a., 2016)

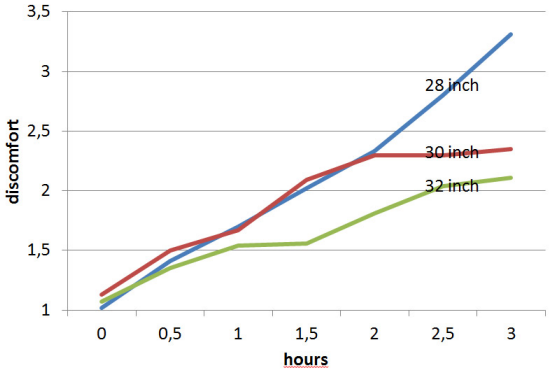

Fig. 4. Discomfort in 3 pitches (Wenhua Li et al., 2017)

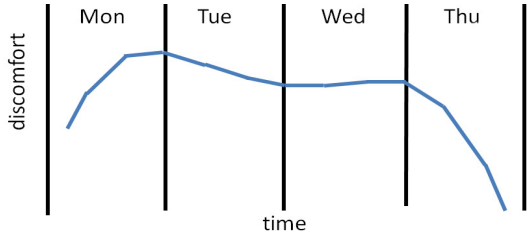

Fig. 5. Discomfort for engineers (Bazley et al., 2015)

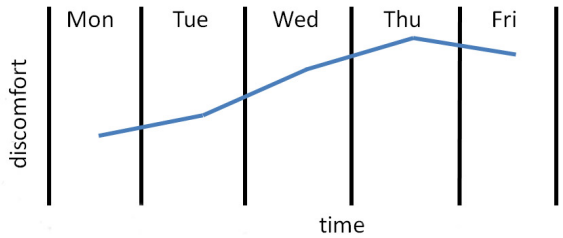

Fig. 6. Discomfort for plasterers (Bazley et al., 2015)

Drawing a conclusion from these six studies should be done with care. Statistics on significance is missing and it is not sure whether the subjects were aware of the fact that the experiment was almost done near the end. In the case of the workweek and the flight it is clear that participants knew that end is near. However, in the other papers nothing is reported on the fact that people could see a watch or have other information about the end of the test. The fact that the end of an experience is important has been described before (e.g. Fredrickson, 2010). Kahneman et al. (1993) also describe the positive affect associated with hope for a good outcome. Also, regarding comfort the phenomenon has been described before. Bazley & Vink (2016) describe that for students on Friday, before the weekend, the comfort levels were significantly higher than Thursday, the day before (t-test for paired comparison, $p < 0.05$).

So, this paper is only an indication that the hypothesis could be true. More research is needed in which different endings should be compared. The comfort in time could be studied of endings where participants are aware of the end compared with those who are not aware of the time the experiment or experience stops. This should have its influence on the comfort experience. Even a condition could be added as described in Kahneman et al. (1993) in which the discomfort is slowly reduces instead of immedialtely. If the hypothesis is true this has implications for the journey design. In long rows informing the participants on the end could reduce discomfort and in travelling more information on the time to go could be useful as well. Also slowly reducing the discomfort like in the experiement of Kahnemann et al (1993) could be added. It could be applied in a taxI ride as well. For instance, being in a foreign taxi could create uncertainty of the travel time and create discomfort. This discomfort could perhaps be improved near the end by showing the expected arrival time or the expected travel time. Also, for research this has implications. Preferably the ending time should not be mentioned as it could influence the comfort or discomfort scores.

4 Conclusion

Comfort and discomfort are influenced by previous experiences and effects over time. There are indications that when a person enters an event the comfort levels are dependent on where a person has been and what the comfort experience was. An unpleasant experience could make a person more aware of the comfort in the next event. Also, the end of the event (e.g. an experiment or a happening in daily life) could be influenced by the expectation of what will happen. A situation with discomfort could result in a less discomfort near the end due to the fact that the participant becomes aware of the fact that the situation will end soon and the comfort will become better (or the discomfort will become less). The hypothesis is that for a situation where comfort is low the comfort increases near the end. Or in a situation where discomfort is high the discomfort reduces towards the end. There are indications that the hypothesis is supported by a few studies, but further research is needed to affirm this.

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