

The impact of increased smartphone use in trains

In designing interiors of cars, trains and airplanes it is important to have an idea what activities people perform. Therefore, activities of 354 1st and 2nd class train passengers were observed. Previous research has shown that train passengers spend their time mostly on reading, relaxing (i.e. staring or sleeping), conversing and working on laptop. The increased use of smartphones over the past years may affect the way train passengers pass time. However, data are not available to affirm this. To validate this assumption, recordings were made of activities in trains in 2017 and 2018. Results show that 48% of the passengers use their smartphone in the train, while in 2011 this was between 4 and 12%. This implies the need for new guidelines for train interior design and other vehicle interior design.

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Hiemstra-van Mastrigt (2015) showed in her PhD that, when designing a car, train, airplane interior or a passenger seat, it is important to adapt this to the activities passengers perform. Therefore, various studies have been performed to observe the activities (e.g. Groenesteijn et al., 2014; Kamp et al., 2011). However, these studies are conducted when smartphones were just upcoming. Nowadays, the smartphone has become a frequently used device in daily life (e.g., Lee et al., 2015). To operate a smartphone, the user must place the smartphone in his primary viewing area and use it either with one or two hands (Veen et al., 2014). The resulting posture might increase head or neck flexion, and accumulation of neck flexion devices could increase discomfort in the arm (Veen et al., 2014). Therefore, the influence of this trend on the design of interiors should be explored deeper in order to derive possible design guidelines. Many studies report the increase in smartphone use (e.g., Lee et al., 2015). According to International Data Corporation (IDC), one of the premier global market intelligence firms, the worldwide number of smartphone shipments increased from 300 Million in 2010 to 1.5 Billion in 2016 (IDC, 2018). In 2017, the number of shipments was also 1.5 Billion. This increase in smartphone use could influence the design of interiors as the postures could need a support by the physical design of the interior which is different from now. Groenesteijn et al. (2014) and Kamp et al. (2011) published data on the observed activities that train passengers perform. This was based on observations done in 2011 and earlier. The question is how much did

the smartphone use increase as pass time in train passengers seven years after previous studies?

Method

To study the effect of the increase in smartphones on the type activities performed by passengers in the train, the same observation method of Groenesteijn et al. (2014) and Kamp et al. (2011) was applied. Their method consisted of studying postures and activities. In this study we focus only on the activities. First, a pilot study was conducted to define the activities. The researchers walked through train carriages writing down the observed activities and the frequency of these activities. The results of the pilot study determined the activities for the study. During actual testing, a video recording was made with a hidden camera and while watching the video in the lab the activities were noted and listed on a tally sheet. The videos were only used by the researchers and later cleared for privacy reasons. In our study we observed activities of 354 train passengers (252 2nd class and 102 1st class). The following main activities (one per subject) were noted: working on laptop, listening to music, reading from paper, talking, writing, using PDA, making a call (using a smartphone), staring or sleeping, eating or drinking and 'other activity'. In the pilot study observing 40 passengers, we found it was hard to observe what type of activity the passengers did on their smartphone. In the observations of Groenesteijn et al. (2014), a distinction could be made between phoning and PDA use. In the pilot observations, it was often not clear whether passengers were phoning,

reading from the smartphone or listening to music. Therefore, it was decided to make one category 'smartphone use', which is a combination of the PDA use and phoning of the Groenesteijn et al. (2014) method. When subjects made a rhythmic movement, it was categorized as 'music/smartphone'. The recordings (observations) were made between April 2017 and March 2018 in 1st class and 2nd class on the NS intercity train from Leiden to The Hague Central (14 minutes) and TGV from Schiphol to Rotterdam (20 minutes). The sum of the observed activities was calculated and the percentage of the sum as well.



Results

In figure 1, the results of this study are shown in comparison with the observed data by Groenesteijn et al. (2014). Reading from paper and using a laptop was reduced in the new observations compared with the Groenesteijn et al. (2014) observations. As is stated a rhythmic movement of the passenger made us categorize it as 'music/smartphone'. However, it could be that more passengers did listen to music as earphones were used more often, but could also be used in combination with a movie or phoning and some forms of music will not give a rhythmic movement. If we combine all smartphone use, it is 48.3% in 2017/2018 and 12.1% in 2011 by Groenesteijn et al. (2014) and 3.8% in the study by Kamp et al. (2011).

Discussion

In the study of Groenesteijn and colleges in 2011, the smartphone use was around 12%. In our study it was

around 48%, an increase of 36%. Although we need to take into consideration the different type of observations of train journeys, we can assess there is a considerable increase in smartphone use in the train. Moreover, IATA (2017) presented that 82% of the travelers on airports would like to have their information digital at their smartphones, which means that the majority of travelers has a smartphone. The method applied in this study was identical to previous studies on train passengers' activities. However, this study was performed in the Netherlands, while the 'Groenesteijn data' were gathered in France, Belgium and the Netherlands and the 'Kamp data' in the vicinity of Munich. The activities observed most by Groenesteijn et al. (2014) (i.e. reading, staring/sleeping, talking and working on laptop) were also observed in this study, but the smartphone is now the most frequent observed activity. A difficulty in observing from a video without interview or system

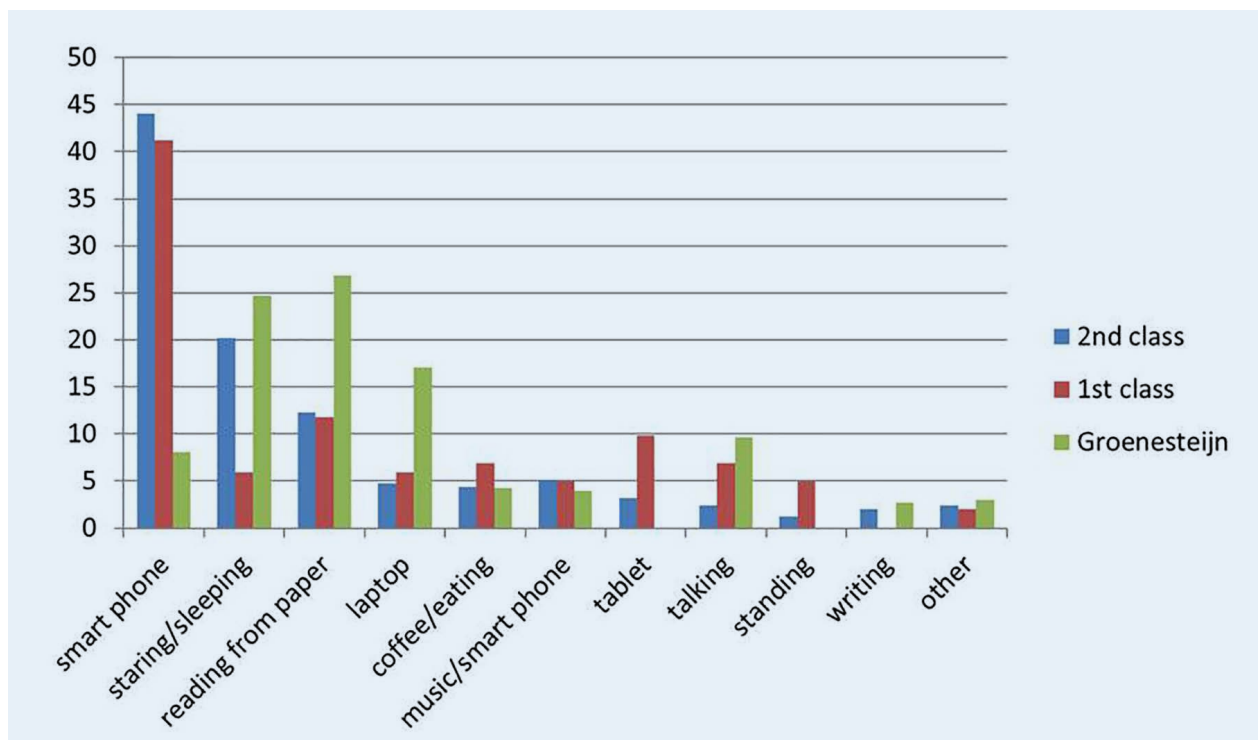


Figure 1. The results of the 2017/2018 observations compared with the observations of Groenesteijn et al. (2014)

that tracks the activities is that only the person holding the smartphone is seen. Activities could be listening to music, reading, watching video, sms, WhatsApp, surfing et cetera. It could even be a combination of these activities. The listening to music can be underestimated as a rhythmic movement of the body is not always needed listening to music.

Using a smartphone is usually observed in an upright position (Groenesteijn et al., 2013). It might increase the head flexion, which could cause neck discomfort and lifting the device to avoid neck flexion might increase the discomfort in the arm. Perhaps an addition to the requirements for train seat design should be a support for the smartphone as described by Veen et al. (2014).

References

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Samenvatting

Voor het (her)ontwerp van auto-, trein- en vliegtuiginterieurs is het belangrijk te weten welke activiteiten passagiers doen. Eerder onderzoek uit 2011 toonde aan met observaties dat passagiers vooral lezen, ontspannen zitten (staren, slapen), praten of werken op een laptop. De laatste jaren is in het algemeen het gebruik van 'smartphones' behoorlijk toegenomen en de verwachting is dat dit invloed heeft op hoe passagiers hun tijd in te trein besteden. Dat is echter nog niet onderzocht. Resultaten van dit onderzoek, waarbij 354 treinpassagiers in de periode 2017-2018 zijn geobserveerd, bevestigen dat zij meer tijd aan hun smartphone besteden. Achtenveertig procent van de passagiers gebruikte de smartphone op het moment van observatie, terwijl dit in 2011 tussen de 4 en 12 procent was. Het is sterk aan te bevelen dat bij het ontwerpen van voertuiginterieurs rekening wordt gehouden met deze sterke toename in het gebruik van smartphones.

Hoewel al onze zintuigen een rol kunnen spelen bij het leren van nieuwe informatie, zijn de ogen vaak cruciaal om snel informatie op te nemen. Correct leren kijken

kan van groot belang zijn, bijvoorbeeld om te bepalen of een situatie veilig is, en zo niet, of er personen of materialen in de omgeving zijn die potentieel gevaar lopen. Hoe je mensen bewust kan leren kijken door middel van *eye-tracking* wordt door Karlien Berghman (VHP) beschreven in het tweede dossierartikel.

Ook training kent beperkingen. Een training kan te kort zijn om alle gewenste kennis over te dragen, te moeilijk om te begrijpen, of te veel informatie trachten over te brengen, om enkele voorbeelden te noemen. In veel gevallen kan training simpelweg niet altijd gegeven of gegarandeerd worden. Een laatste middel om de gebruiker toch te helpen het product te leren gebruiken is de aanwezigheid van goede gebruikersinstructies. Gebruikersinstructies dienen dan zo duidelijk mogelijk te worden opgesteld. In het laatste dossierartikel behandelen Linda Giesselink en Frauke Schuurkamp (UL-Wiklund) dan ook geteste vereisten voor het maken van goede instructies die de kans verhogen dat gebruikers veilig met producten interacteren.

Het (correct) leren gebruiken van een product is een onderwerp dat mij veel bezighoudt, niet alleen binnen mijn werk. In een wereld waarin het lijkt alsof het aantal producten eerder toe dan af zal nemen, wordt het belang van goede instructies, training en inherente veiligheid en efficiëntie van producten alleen maar belangrijker. Hoe je gebruikers kan leren omgaan met producten, diensten en processen zal in de toekomst, ongetwijfeld en noodzakelijkerwijs, nog uit vele hoeken belicht worden.

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