A pilot study into users' anxiety
in the London Underground network environments
(for the purpose of re-designing safety information)

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Abstract

The aim of the study is to present a novel approach to help relieve customers' anxiety experienced in the London Underground environments, through enabling provision of re-designed safety information. In this paper, anxiety as an emotional state experienced when facing potential threat was measured through a self-report anxiety scale. The findings showed some of the anxiety-inducing situations in the environments experienced by passengers, which include seeing other passengers' anti-social behaviour, overcrowding, noise and late-night travel. The situations demonstrate when passengers' information needs (the gap between the required state of knowledge to resolve a problem in a situation and the current state of knowledge) might arise. Sense of control has been stated as one of the important factors which may buffer anxious arousal. This paper therefore discusses a pilot study which measures anxious arousal and shows preliminary results from the study, and also makes some suggestions based on the results of the study and the relevant literature.

Keywords: Anxiety, perceived control, information design, service design, public transport

1 Introduction

As competition amongst service providers is getting more intense, the importance of enhancement in customers' experience is drawing more attention for increasing their competitiveness and customer loyalty. The customers' emotional experiences have been highlighted by organisations, and regarded as one of the major criteria to be considered when attempting to enhance customers' experience (Lin and Liang, 2011). The growing recognition of the importance in public transport systems' marketability, competitiveness and customer loyalty represents aspects of public transport system as services. A positive influence of improvement of service quality, such as enhancement of safety and provision of information, on passengers' satisfaction and behavioural intention has been addressed (Lai and Chen, 2011). This paper reviews anxiety as an emotional state and some of the potentially influencing factors on anxiety state, and proposes re-designed safety information might be

able to mediate the impacts of the factors. Moreover, anxiety arousing situations will be investigated in the London Underground network environments. Anxiety is regarded as an emotional state associated with uncomfortable feelings, arises when facing potential threat. It deserves attention because anxiety inducing situations might lead to avoidance behaviour (Barlow, 2002; Spielberger, 1979), which might have a negative influence on customers' experience and loyalty. Anxiety is provoked when threats are appraised as uncertain, unpredictable and uncontrollable (Barlow, 2002, Spielberger, 1972). This cognitive appraisal stage is important, because its consequences can lead to anxious arousal. Understanding some of the factors that can provoke anxiety in customers may offer opportunities for service providers to mitigate it. Therefore, providing customers with information about what they may experience and how to cope with situations they may face in an 'understandable' format is an important aspect of effective service information design. Exposure to difficult situations could lead to occurrence of information needs, which are met by gaining information, but people hardly recognise the needs, and hardly know what information might be useful (Nicholas and Herman, 2009). This view suggests that service providers can be benefited by identifying and meeting the needs of customers by supplying suitable information in a timely manner. Studies on anxiety states and potential influencing factors can be regarded as criteria, which help define when information needs might arise. If users feel anxious about certain situations to which may be encountered in service environments, this might represent their lack of understanding about how to deal with the situations. Therefore, this study seeks to understand how the discrepancy can be narrowed by providing suitable information, fundamentally facilitating users' understanding. Also, this paper seeks to give insights to service providers, enabling them to re-create their information environments in a manner which is more understandable, responsive, and therefore, perceivably more comfortable for users, by minimising negative emotional arousal.

2 Literature review

2.1 What is anxiety and why is it important in service environments?

Freud (1924 cited in Spielberger, 1972) describes anxiety as "something felt", "an unpleasant affective state or condition of the human organism". Spielberger (1979) defines anxiety as an emotional state which accompanies "feelings of tension and apprehension" when the situation is appraised as threatening. Barlow (2002) addresses anxiety as an affective state which involves psychological or bodily responses when faced with future threat or danger especially when negative consequences are anticipated. Additionally, it accompanies vigilance that urges people to do something to influence the unfavourable situation. According to the Diagnostic and Statistical Manual of Mental Disorders, anxiety is addressed as response to anticipated future threat; muscle tension and vigilance are associated in readiness for future risk (American Psychiatric Association, 2013). Many views and definitions of anxiety display modest differences, however what they have in common is that individuals in the state experience negative and uncomfortable mental and/or somatic responses to potential risks. This state sometimes leads to avoidance behaviour (American Psychiatric Association, 2013), therefore, experiencing the state which is attributed to exposure to potential negative events in service environments might have a negative effect on customer experiences about the services. Therefore, it is advisable to identify perceived potential risks, which might provoke anxiety, and minimise its arousal. If individuals experience higher anxiety, then the environment is likely to be perceived less safe (Reisinger and Mavondo, 2005). In terms of its subjective nature, anxiety is experienced when situations are subjectively appraised to be dangerous, hence its arousal can vary among individuals and its triggers are not always

explicitly identifiable (Spielberger, 1976 cited in Stephan et al., 1999). Consequently, it is appropriate to measure negative arousal which might be triggered by potentially taxing situations that customers might encounter, and then the levels of anxiety can be rated and identified. Thus, customers' anxiety can be a useful criterion to consider, because identification of scenarios which might trigger this state could help service providers to discover customers' pain points and aid stakeholders to seek solutions to the problems. It could also be said that paying attention to users' concerns enables service providers to see their service environments through a lens of users' anxiety, and therefore, respond to users' latent information needs which arise when encountering to difficult situations (Nicholas and Herman, 2009), which users might rarely recognise or expect to be supplied by service providers.

2.2   Sense of control, coping and anxiety

Craske (1999) argues that anticipatory anxiety is a response to approaching threat which is out of the "preferred mode of safety and control". As Barlow mentions (2002), perceptually uncontrollable situations are likely to evoke anxiety in circumstances that involve triggers. In other words, stimulating a sense of control might play an important role in reducing anxiety by buffering anxious arousal (Lazarus and Folkman, 1984), as studies have shown that perceived control and anxiety are negatively related (White et al., 2006; Hofmann, 2005). Controllability is defined as perceived ability to influence a situation or manage something in "situations beyond control" (Mardiyono et al. 2011). Another factor which influences anxious arousal is coping capacity (Spielberger, 1979). The degree of stress is influenced by the consequences of interaction between coping methods and potential harms. If individuals feel more helpless in dealing with stressful situations, they tend to experience greater stress (Lazarus and Folkman, 1984). It seems reasonable to argue that knowledge on coping resources and procedures in the threat appraisal stage has potential to buffer anxious arousal. Thus, appropriate information could be provided to help users enhance perceived control over, and ability to cope with aversive situations.

2.3   Information needs

It is regarded that information needs emerge when individuals experience dissatisfaction in their current situations, and they are sometimes shown as a discrepancy between the present circumstance and "a more informed state" to fulfil one's task (Shenton and Dixon, 2004). Atkin (1973) explains the needs arise from a "perceived discrepancy between the individual's current level of certainty about important environmental objects and a criterion state he seeks to achieve" (cited in Shenton and Dixon, 2004). "Need for information consists of the process of perceiving a difference between an ideal stage of knowledge and the actual stage of knowledge" (Sepstrup, 1977; Dervin, 1982 cited in Van De Wijngaert, 1999). Belkin (1982) proposes the ASK hypothesis which stands for "an anomalous state of knowledge" underlying information needs to present problems in information science in the context of communicating information between generators and users. It has been developed to demonstrate the state that users experience during use of systems of information communication, proposing that in most cases the anomaly is not easily identified by users as recipients of a system, and to a certain degree it is inappropriate because of their deficiency of knowledge or uncertainty of recognition of potentially related theories which might be useful (Fisher, 2005). Dervin (1976) argues that citizens hardly know what information they need. If they are asked, they might say they have information needs, however little information is used effectively to resolve daily problems. In a similar vein, Nicholas and Herman (2009) address that difficult situations create the needs, but people do not usually feel the necessity.

Additionally, when it comes to "unrecognised information needs", people's information needs are not always known and an information gap is not recognised, therefore they do not know that they can gain useful information. Furthermore, with reference to information needs and risk perception, in Huurne and Gutteling's study regarding risk information seeking, the results demonstrate that the greater the industrial risk is perceived, the more their information needs arise (2008). Therefore, in this research, the gap generated by the discrepancy between the passengers' current level and the required level of knowledge on how to handle difficult situations during the passengers' journeys will be assumed as when users' information needs arise.

3   Methodology

In this study, the scope of the investigation was set to the Underground services in London. The London Underground system is one of the biggest Underground networks in the world (Guo and Wilson, 2011), and is one of the major public transport methods in the city, which carries more than 1.3 billion passengers per year (TfL, 2016). Several studies have attempted to investigate anxiety or stress associated with public transport use and air travel (Cheng, 2010; Currie et al., 2013; Gidron, 1999; Bricker, 2005), however the Underground systems have had little attention regarding anxiety among passengers. It has been presumed that difficult situations faced when using the services, which might be perceived as insecure, consequently would lead to passengers' anxiety. In order to mitigate passengers' anxiety, situations which incorporate potential risk factors amongst passengers in the environment should be identified (Kraaij et al., 2003). Consequently, in this study, a range of factors reviewed from literature regarding public transport safety and quality, risk perception, users' satisfaction and experience (Blainey et al., 2012; dell'Olio et al., 2011; Stradling et al., 2007) were selected and assessed to discover if they trigger passengers' anxiety. An exploratory questionnaire was designed, developed and tested, which was aimed to identify most anxiety inducing situations, and to detect patterns between data sets to see if there is similarity between situations. Using a questionnaire is beneficial because ease of coding questions and responses can be achieved, and it is time and cost saving (Gray, 2014). The questionnaire includes self-report anxiety scales which are extensively used to examine anxiety effeciently (Antony et al. 2002). The designed questionnaire was reviewed by two academics at Brunel University London, and the study was approved by the Brunel University Research Ethics Committee. The data were collected from May until June, 2015. The selected mode was self-administered paper and online questionnaire. The participants who agreed to take part in the study read and signed on the participant information sheet.

3.1   The structure of the questionnaire

The questionnaire consists of demographic questions, such as gender, age and residence, inquiries about general opinions on services, such as comfort and safety, followed by self-report anxiety scales. For measuring the level of anxiety, the respondents were asked to rate how much they agree with each item describing difficult situations during the journey, for example, "I feel anxious when trains are crowded.". Five-point Likert scale was employed, ranging from 1 (Strongly agree) to 5 (Strongly disagree).

3.2   Analysis

Fitting the purpose of the study, exploratory data analysis was utilised to analyse the data. The method has benefits, for example, it allows researchers to see "what is going on", moreover, to discover patterns and trends (Behrens and Yu, 2003). First of all, mean values of each item

measuring anxiety were calculated to determine most anxiety-inducing situations, since the main purpose of this study is to identify potential anxiety triggers, which can help indicate situation-specific anxiety in the environments which need to be tackled through provision of re-designed information. Also, scatter plots were used to discover relationships by displaying regression lines between sets of data (Hartwig and Dearling, 1979). IBM SPSS Statistics 20 was employed for the analysis.

4 Findings

4.1 The sample

The data were collected from 81 respondents, including 43 females and 38 males living in and outside London. The respondets were Brunel University students and their acquantinces who were personally asked to participate in the study. Age distribution is shown below.

Table 1: Age distribution

Age	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total
N	2	26	22	6	13	10	1	1	81
Percent	2.5	32.1	27.2	7.4	16.0	12.3	1.2	1.2	100

4.2 Anxiety triggering events and common characteristics of the situations

Table 2: Top 11 anxiety triggering situations

	Situations	Mean	Std. Deviation	N
1	Seeing other people's anti-social behaviour	2.04	.872	81
2	Overcrowding in trains	2.25	.874	81
3	Too much noise in trains	2.40	.918	81
4	Late-night travel	2.44	1.225	81
5	Long waits at platforms	2.52	1.026	81
6	Disruptions	2.53	1.141	81
7	Missing train announcements	2.59	1.191	81
8	Missing platform announcements	2.60	1.114	81
9	No access to toilets	2.63	1.269	81
10	Hard to find information from signs	2.69	1.056	81
11	Don't know where I am while staying on trains	2.90	1.197	81

Coded (1=Strongly agree, 2=Agree, 3=Neutral, 4=Disagree, 5=Strongly disagree).

Among 27 items which were assessed by the respondents, closer attention needs to be given to these eleven situations because they are likely to be regarded as anxiety triggering situations, since thier the mean scores were calculated lower than 3, which was 'Neutral' response. As mentioned earlier, 'Strongly agree' response was coded as 1, and 'Strongly disagree' response was coded as 5, which means the lower the mean scores are, the greater the levels of anxiety are. Presentations of lower standard deviation values could be interpreted that the result of appraisal of a potential risk inherent in a situation was appraised as threatening more consistently among the respondents being less affected by the respondents' individual characteristics. The most anxiety arousing sitation is when seeing other passengers' anti-social behaviour. It has been addressed as a serious problem in public transport system environments (Moore, 2011). Overcrowding also can be seen as a situation which arouses anxiety, this result supports the House of Commons Transport Committee's view that crowding might be appraised as threatening and stressful (2003; Cox et al., 2006). Noise can be seen as a anxiety provking element among the respondents. Late-night travel is an anxiety-inducing event among the respondents, it has been widely stated as a concern

among female users (Loukaitou-Sideris and Fink, 2008). Although passengers' anxieties are induced by different circumstances, referring back to the literature on anxiety, the common attributes of the anxiety evoking conditions can be interpreted that they sense perceived threat inherent in the environments. In other words, passengers sense future risks arising from a thought "Bad things might happen to me, and I might not be able to cope with it." (Barlow, 2002). Especially, passengers might feel unsafe in the four top-ranked situations for fear of having incidents or unpleasant events. These circumstances may be regarded as difficult situations when customers information needs may arise due to uncertainty about the consequences of the events, and about how to cope with them (Case, 2007). The trends shown in the graphs (Figure 1, 2 and 3) below support that the sitautions are likely to be positively related, since the regression lines slope upward from left to right (Bluman, 1998). In other words, when the respondents feel anxious about other passengers' anti-social behaviour, they tend to feel anxious about noise, and crowding on trains thinking about negative consequences, such as, meeting with an incident. In terms of the differences in gradients, it could be interpreted that a steeper slope represents that stronger tendency of existence of pairs of responses between values of X and those of Y, whose values of X (which are responses to seeing anti-social behaviour) are smaller than those of Y (which are responses to the other three situations). Since regression lines are drawn coming "closest to the majority of points" (Clegg, 1982).
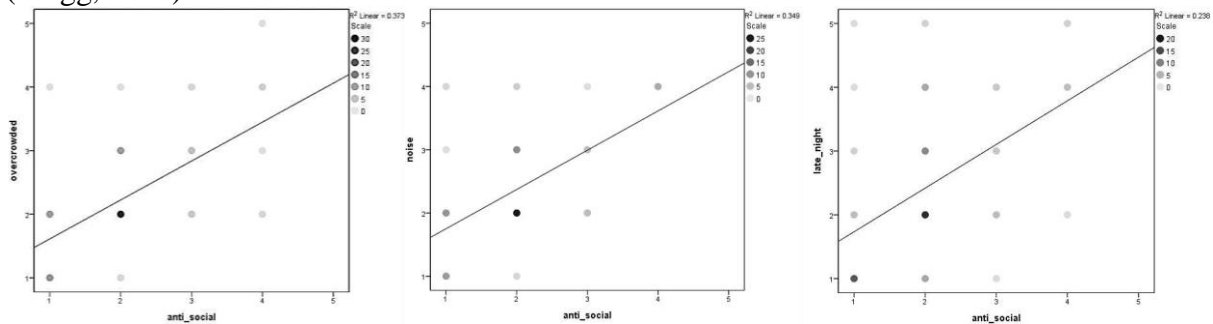

Figure 1 (Left). Scatter plot of the level of anxiety about other passengers' anti-social behaviour (X-axis) versus the level of anxiety about overcrowding on trains (Y-axis)

Figure 2 (Middle). Scatter plot of the level of anxiety about other passengers' anti-social behaviour (X-axis) versus the level of anxiety about noise on trains (Y-axis)

Figure 3 (Right). Scatter plot of the level of anxiety about other passengers' anti-social behaviour (X-axis) versus the level of anxiety about late-night travel (Y-axis)

Additionally, other situations (Items 5-11) seem to arouse anxiety for possible reasons, such as, thinking that they might not be able to get to destinations on time, experiencing difficulties or inflexibility in navigating, re-routing or lack of route knowledge, or thinking that they might not be able to meet thier physiological needs.

5   Design intervention plans

5.1   Problems of the current safety information and suggestions for improvement

It is felt that the current information environments regarding passengers' safety have not been designed to prioritise its potential buffering effects against anxiety, which might be effective when passengers are vigilant for potential risks. For example, passengers are allowed to use safety resources, such as emergency alarms, and buttons to speak to drivers in carriages only in case of emergency when accidents actually occur, such as fire. Also, service providers are reluctant to inform their locations and usage, since they are concerned about misuse (Culling

et al., personal interview, October 20, 2015). Moreover, the information environments seem to lack guidance on coping procedure, such as step-by-step information delivering processes to follow conveyed through understandable forms, and presentation of holistic information about locations and usage of safety facilities located in stations and trains.

In an emergency
1. Press the emergency alarm button
2. Speak into the grille
3. Follow instructions from staff

Do not take any risks

1. Lift flap and push button
2. Await response from driver

Penalty for improper use

Figure 4 (Left). Help point at station and instructions for usage in emergency

Figure 5 (Right). Emergency alarm in train and instructions for activation in emergency

Therefore customers' knowledge on coping with aversive events and on proper use of safety facilities might have not been accumulated properly. In other words, passengers might find the situations less controllable than actually they are. In addition, if they are less aware of coping procedures with harnessing physical and human safety resources, as well as a method to communicate with service providers to report problems and ask for help, they would potentially experience a sense of helplessness. Anxiety might arouse accordingly.

Therefore, in the next stage of this study, enhanced information design techniques will be strategically implemented to fill the cognitive gap as defined earlier. This will then be tested to discover if the intervention addresses and reduces customers' information needs in anxiety inducing situations. In order to achieve this, safety information will be re-designed aiming to boost users' perceived control over the negative situations by suggesting possible coping resources and options which are mentioned as stress buffers (Terry, 1991), explaining facilities to utilise and activate at hand, and demonstrating procedures to follow as a form of information on coping procedures. Also, the intervention will emphasise the importance of creating more responsive service environments for users. Responsiveness might be related to the concept of communication between users and service providers. For example, the importance of communication between police and citizens is addressed in the sense that communicating information can be a type of an activity to interact with public which contributes to enhancing confidence in police (Bradford et al., 2009), which is accounted for by police engagement (understanding people's concerns, informing people), and police effectiveness (tackling problems effectively) (Jackson and Bradford, 2010), which is explained that its deficiency could lead to worry about crime (Box, 1988). Therefore, recommendations are suggested that scenario-based passenger education programmes can be developed, which inform and advise passengers on how to secure personal safety in anxiety inducing situations, potentially through trainings, through videos or posters and signage at stations and trains, or on the website.

6   Discussion

The findings produced from this exploratory study demonstrate the anxiety-inducing situations associated with the London Underground travel, which help identify and clarify the potential gap that needs to be filled. Additionally, the potential relationships among the situations are presented. Psychological stress is defined as "a particular relationship between

the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (Lazarus and Folkman, 1984). In this sense, investigating users' perception of potential danger seems appropriate, when attempting to identify stressful situations and problems that may need to be tackled to relieve the anxiety associated with them, and to resolve accompanied problems. As anxiety is a response to potential threat, it is reasonable to say that the difficult situations are appraised as threatening and lead to perceived uncontrollability (Barlow, 2002). In difficult situations, information needs are likely to arise. Thus, re-designed safety information is required to be intervened prior to this point to mitigate the arousal by enhancing the passengers' perceived sense of control, and facilitating their cognitive coping process.

7 Conclusion

Despite the relatively small size of the sample, the findings from the pilot study clearly present a range of negative situations that can be perceived as threatening by passengers, and potentially provoke anxiety. Comparisons among groups of users would be more feasible if the sample size was large enough, for example, comparison between young and elderly users, which might be worth conducting as a future study. The outcomes of this study show the potential to open up the possibility of discovering users' latent information needs, associated with securement of their personal safety. It was found that the top four anxiety triggers in the London Underground environments rated by the survey respondents were; seeing other passengers' anti-social behaviour, overcrowding, too much noise, and late-night travel. It is hoped that the findings, which identified some anxiety state triggers regarding anticipated negative consequences, due to the potential for incidents could suggest the possibility to service providers that improved information systems may help enhance the user experience. Theoretically, lack of perceived control is an important factor which is related to the experience of anxiety. Further work will focus on design interventions which are designing, developing, and testing with the aim of boosting users' sense of control in contemplations of stressful situations, by supporting the information needs through provision of re-designed safety information which will facilitate their cognitive coping process.

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