
On the Need for Standardized Methods to Study the Social Acceptability of Emerging Technologies

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Abstract

Social acceptability of technologies is an important factor to predict their success and to optimize their design. A substantial body of work investigated the social acceptability of a broad range of technologies. Previous work applied a wide range of methods and questionnaires but did not converge on a set of established methods. Standardized or default approaches are crucial as they enable researchers to rely on well-tested methods which ease designing studies and can ultimately improve our work. In particular, there are no validated or even widely used questionnaires to investigate the social acceptability of technologies. In this position paper, we argue for the need of a validated questionnaire to assess the social acceptability of technologies. To open the room for discussions, we present an initial procedure to build a validated questionnaire, including the design of a study and a proposal for stimuli needed for such a study.

Author Keywords

Virtual reality; social acceptance, virtual reality glasses.

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Introduction & Background

In our recent work, we aimed to investigate the social acceptability of using mobile virtual reality (VR) glasses in public. To our surprise, we could not identify well-established methods to study the social acceptability of emerging technologies. Looking at previous work, we found individual approaches and diverse methods. As we found no well-established mean to measure the notion of social acceptance, we adapted a questionnaire from the previous work [11] and followed our own procedure. As the questionnaires on social acceptance we reviewed, including the questionnaire we used, have not been developed applying well-established scientific methods [5], research on social acceptance might leave room for improvement.

The lack of well-established methods hinders research on social acceptability for some reasons. Without well-established methods, researchers and practitioners have to invest the effort to develop their own approaches. The lack of a default approach that is used in the typical study makes it hard or even impossible to compare results across studies. The quality of the methods used in many studies will be limited as not all researchers are experts in developing questionnaires and designing studies.

Questionnaires are a well-established instrument within human-computer interaction (HCI) to collect empirical data. Standardized questionnaires exist that enable to measure a variety of dependent variables in controlled experiments, such as task load [6], usability [3] or fatigue [2]. Such measurements ensure that most studies in HCI come with very reasonable design, techniques can be compared across studies to a certain degree, and new researchers must not reinvent the wheel.

In research on social acceptability, a common approach is using images or video showing the use of the technology

and measuring social acceptability with a set of self-defined questions. Ronkainen et al. [14] asked participants "Would you use this feature on your own phone?" and provided a set of answers. Rico & Brewster [13] as well as Ahlström et al. [1] asked participants where (e.g., at home, while driving, and at work) and in front of whom (e.g., alone, partner, and strangers) they would use the presented interactions. Provita et al. [12] developed a questionnaire with 13 items around the themes interaction, user, and device to assess the social acceptance of technologies shown in videos. Koelle et al. [8] used abstract pictograms as stimuli and utilized a questionnaire with five semantic differentials (tense-serene, threatened-safe, unsure-self-confident, observed-unobserved skeptic-outgoing).

Montero et al. differentiate between user's and spectator's social acceptance [10]. In a survey, they ask the open question "What would you think if you saw someone else performing this gesture" as well as how participants would feel on performing the gesture at home or in public on 6 point scales. Most related to our work is Kelly & Gilbert's WEARable Acceptability Range (WEAR) scale that aims to predict the acceptance of wearable devices [7]. The author provides a comprehensive list of 50 questions. Unfortunately, the questionnaire has not been validated but only been tested with a single device. Furthermore, the questionnaire specifically targets wearable devices, and the number of questions has to be reduced to remain usable in a study.

In this workshop paper, we propose to develop a standardized approach for assessing the social acceptability of emerging technologies and prototypes. To provide a basis for discussion, we present a working definition, questionnaire construction, and study aiming to develop a validated questionnaire to assess social acceptability. During the workshop, we hope to get feedback on our approach.



Figure 1: Photos of a person interacting with mobile and wearable systems.

Developing a Social Acceptability Questionnaire

From our own research on social acceptability, we learned that social acceptability depends on the perspective of the surveyed person. “Is it acceptable for me to *perceive you* with a novel device”, or “is it acceptable for me to *have* this novel device while being surrounded by people?”. The context in the second options depends on the ability of the surveyed person in perspective taking with the person wearing or interacting with the stimuli. This potentially confounds the searched construct(s), when each question does not ensure that the asked person can emphasize with the person wearing the device. For practicality, the type of questionnaire is important: In HCI, e.g., it is practical to ask anonymously for impressions via online surveys and to ask participants for their acceptability of humans with the device. Additionally, the questionnaire must ensure that the researcher can compare both, the social acceptance of the device itself as well as the ways of how the device is used.

Working Definition

To develop tools or procedures to assess a concept, it is necessary to define the concept. Authors from social psychology state that “Social acceptance means that other people signal that they wish to include you in their groups and relationships.” [9, 4]. DeWall and Bushman further describe that “Social acceptance occurs on a continuum that ranges from merely tolerating another person’s presence to actively pursuing someone as a relationship partner. Social rejection means that others have little desire to include you in their groups and relationships” [4]. While social acceptance is well-defined in interpersonal relations, the definition of social acceptability for technology is still not sufficient. Therefore, we develop a working definition assuming that technologies can cause social acceptance *and* social rejection. Adopting the meaning from social psychology, we use the following working definition:

Working definition: *Social acceptability of a technology describes the effect of using the technology on social acceptance and social rejection. A technology with high social acceptability increases the desire of others to include users of the technology in their groups or relationships. A technology with low social acceptability increases the desire of others to exclude users of the technology from their social groups or relationships.*

Questions

Previous questions asking for the acceptance of devices or interactions can be categorized into the following dimensions: usability benefits (“Is doing/wearing this okay, when this provides me a certain feature worth to do/wear it?”) [14, 10, 7], social environment (“Is it okay to do/wear the device when I’m together with friends/colleagues/strangers?”) [14], perspective (“As an observer, I do not care, but I would never do/wear this”) [10], comfort (“To do/wear this, looks somehow uncomfortable, thus, I do not accept it.”) [7], the presented scenario (“Is it the right time/location/situation to do/wear this?”) [14, 7, 10], and the individual technology affinity (“Is the surveyed person rather (not) affine to new technology?”) [8]. While asking for usability benefits, it is necessary to convey that the surveyed person knows about all (dis-)advantages when using the device. The first step of the questionnaire development should consider the impact of each factor on the construct(s) that should be finally measured using the dependent variable(s).

Index Construction

Semantic differentials deliver high contrasts, but it is likely, that social acceptance is a construct with a rather negative tendency ranging from “I wouldn’t accept it.” to “I wouldn’t mind” instead of “I’d accept it”. We aim to target 8-12 questions, which will finally provide parametric data based on 7-point Likert items. For the questionnaire construction, we

start with a set of items given by the literature review. We unify the formatting of the questions and conduct an on-line survey using a mixed-design approach with multiple conditions and question sets. We will collect pictures from the authors' research papers with a person using new prototypes, technologies, and interaction techniques. Stimuli selection should broadly cover and modulate the spectrum of social acceptability (e.g. Figure 1). Images must be replicated to ensure that all images have the same style. Consequently, we captured a single person using/wearing the device in front of a neutral background as stimuli example.

For index construction, it is useful to have a corresponding measure of the subjective or perceived acceptability to check whether the objective manipulation has the intended effect. *Interpersonal warmth* and *aesthetics* are useful to include, because they are dominant dimensions in the social perception of other humans. In the initial round, we will present 10-20 stimuli with multiple sets including 20-30 questions asking for usability benefits, social environment, perspective, comfort, scenario, and the acceptance itself. Participants will be asked if they would describe themselves as open to new technologies, familiar or interested in new techniques. Openness to new technologies must be considered to learn how one's own affinity to new devices and prototypes modulates acceptability and if the final questionnaire must include individual attitudes for the subjects' weights.

Validation

Constructs will include sanity-check-items verifying the correctness of the indices. Sanity checks will likely have high validity and correlate with other constructs but not necessarily meet the criteria of the constructs we are interested in. If the factor analysis items can vary from the dimension of the sanity check (low factor loadings), new items

should be added in the next round. This process must be repeated until the items of each construct provide high correlation without showing a high correlation with the warmth or aesthetics construct. Multidimensional scaling (MDS) and principal component analysis (PCA) will help to assess the structure of the data. The analysis must ensure that the items belong to non-overlapping and distinct regions and measure the corresponding concepts. Constructs should be decorrelated and should have good discriminant validity and high reliability. Then, the factors warmth and aesthetics should be isolated from other constructs. Potential emerging constructs should be considered separately.

Conclusion & Future Work

Social acceptability is important to predict the success and optimize the design of technologies. In this workshop paper, we argue that standardized approaches and questionnaires to study social acceptability are important to foster research in HCI. We provide a working definition of the term social acceptability by adopting work in social psychology. Based on a review of previous work, we propose a method to develop a reliable and validated questionnaire to assess social acceptability.

To develop a useful and usable questionnaire assessing social acceptability, it is necessary to discuss the definition of the underlying concepts as well as the procedure with the community. With this paper, we hope to provide a first step towards standardized approaches to assess social acceptability.

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