4-2018

Persona perception scale: Developing and validating an instrument for human-like representations of data

Salminen JONI

Haewoon KWAK
Singapore Management University, hkwak@smu.edu.sg

João SANTOS

Soon-Gyo JUNG

Jisun AN
Singapore Management University, jisunan@smu.edu.sg

See next page for additional authors

Persona Perception Scale: Developing and Validating an Instrument for Human-Like Representations of Data

Joni Salminen
Qatar Computing Research Institute, Hamad Bin Khalifa University; and Turku School of Economics
jsalminen@hbku.edu.qa

Haewoon Kwak
Qatar Computing Research Institute, Hamad Bin Khalifa University
hkwak@hbku.edu.qa

João M. Santos
Instituto Universitário de Lisboa (ISCTE-IUL)
jmcsm@iscte.pt

Soon-Gyo Jung
Qatar Computing Research Institute, Hamad Bin Khalifa University
sjung@hbku.edu.qa

Jisun An
Qatar Computing Research Institute, Hamad Bin Khalifa University
jan@hbku.edu.qa

Bernard J. Jansen
Qatar Computing Research Institute, Hamad Bin Khalifa University
jjansen@acm.org

CHI'18 Extended Abstracts, April 21–26, 2018, Montréal, QC, Canada
ACM ISBN 978-1-4503-5621-3/18/04.
http://dx.doi.org/10.1145/3170427.3188461

Abstract
Personas are widely used in software development, system design, and HCI studies. Yet, their evaluation is difficult, and there are no recognized and validated measurement scales to date. To improve this condition, this research develops a persona perception scale based on reviewing relevant literature. We validate the scale through a pilot study with 19 participants, each evaluating three personas (57 evaluations in total). This is the first reported effort to systematically develop and validate an instrument for persona perception measurement. We find the constructs and items of the scale perform well, with factor loadings ranging between 0.60 and 0.95. Reliability, measured as Cronbach's Alpha, is also satisfactory, encouraging us to pursue the use of the scale with a larger sample in future work.

Author Keywords
Personas; Persona Perception; Persona Evaluation

ACM Classification Keywords
H.5.2. [Information Interfaces and Presentation] User Interfaces - Theory and methods, User-centered design

Credibility
Personas are not credible but considered "made up," not matching reality.
Consistency
Personas are "Frankenstein's monsters," incoherent compositions of disconnected data.
Completeness
Personas are missing crucial information to be of use.
Usefulness and Willingness to Use
Personas end up in "desk drawer" and not in actual used by decision makers.

Table 1: Persona Criticism.

Introduction

Personas are a commonly used technique in software development, design, and HCI studies. Yet, their evaluation is notoriously difficult [5], and there are no established, validated measurement scales to date. The question of validation is critical because If decision-makers do not trust the personas, their use is downplayed in real decision-making situations [31]. To address the issue of credibility, researchers have attempted to develop data-driven personas [1] [4] [28] [32]. The logic is that if the personas are based on quantitative data and forms of statistical analysis, the resulting personas can be considered as valid.

However, it is also possible to approach the problem of validation from another angle, specifically that of survey-based measurement, as commonly applied in psychology and marketing [15] [30]. In this vein, we can ask individuals how they perceive personas. Following such logic, our research purpose is to develop a measurement scale that captures key persona-related perceptions by end-users of personas. We achieve this by first reviewing literature, and then selecting relevant constructs and formulating items to measure them. Finally, we validate the scale through a pilot study with 19 participants familiar with the concept of personas, finding promising results for further use.

Theoretical Framework

Overview of Personas

Cooper [6] introduced personas in software development as a user-oriented technique for analyzing and communicating the goals and needs of different user types. Personas summarize core users or customers of an organization or a software system [3]. In addition to software development, personas have been widely used in other contexts, including design and online marketing [18] [23] [24]. Personas have also been used to analyze users of websites, mobile applications, games, users of public health services, and target groups of marketing campaigns [7] [22] [25] [29]. They can also be applied by corporate executives to craft customer-oriented strategies [16]. In these activities, personas as decision-making anchors can result in increased profitability [10].

Challenges of Personas

Despite the multiple benefits of personas that relate to user immersion, communication about customers among decision makers, and use of personas as mental models to constantly keep customers in mind [23], researchers have reported challenges and problems in their adoption and usage. One of the most common complaints is that the accuracy of personas is difficult to validate [8]. The sharpest criticism comes from Chapman and Milham [5] who argue that personas as fictional characters are beyond the scope of scientific validation. Another major concern is that personas are biased either by their creators' willingness to push for an agenda [26] [31], prejudices or personal biases [14] [20], or the unreliable responses given by the interviewed customers that may suffer from social desirability bias [9]. Table 1 summarizes the criticism toward personas under four main constructs.

Credibility

Since persona creation is typically of qualitative nature, it lacks the credibility of numbers and is, to some, interpretative and subjective instead of scientifically justifiable [5]. Personas that are built from relatively few qualitative interviews may not represent the underlying user groups in a statistically valid manner.

Clarity
Persona information is clearly presented (e.g., too small font or low-resolution images may confuse or annoy users and influence persona perception).
Empathy
Personas are sympathized by the respondent.
Familiarity
Personas remind the respondent of people he or she knows.
Friendliness
Personas are perceived as friendly by the respondent.
Interpersonal attraction
Personas are perceived as attractive by the respondent.
Liking
Personas are liked by the respondent.
Similarity
The respondent feels like the persona is like him or her.

Table 2: Constructs from HCI and Psychology Literature.

Even when using the best practices of qualitative inquiry, number-oriented decision makers may consider personas as 'nice narratives' instead of serious decision-making instruments [27]. This disconnect can occur because the personal experiences of decision makers conflict with personas [5]. This may result in holding on to one's existing beliefs instead of abstract personas. We capture these dynamics in the survey with the dimension of *Credibility* (4 items, e.g., "This persona seems like a real person.").

Consistency

Moreover, using data points from several unrelated datasets may result in the composite description problem in which the personas are pieced together [5]. Bødker et al. [2] refer to such patched up personas as "Frankenstein's monsters." For example, the participants in the study of Matthews et al. [21] found personas confusing, abstract, and unrealistic. In our measurement scale, this notion is covered by the *Consistency* dimension (4 items, e.g., "The picture of the persona matches other information.").

Completeness

Chapman and Milham [5] also point out the problem of persona attributes. The more attributes one adds, the more there are possible personas with different combinations of the attribute values. At the same time, the representativeness of each combination of the available data becomes smaller. Chapman and Milham [5] argue attribute selection is arbitrary so that it is not possible to distinguish between relevant and irrelevant information of a persona. At worst, the chosen information becomes distracting and misleading for the end users of personas [21]. Bødker et al. [2] report that their personas were perceived as very general and not actionable by the end-users. We capture this problem in our survey through the *Completeness* dimension (4 items, e.g., "There is plenty of information about the persona.").

Willingness to Use and Usefulness

Finally, there are concerns relating to the use of personas in real decision making. For example, Rönkkö et al. [27] report a case where a significant amount of time was used to develop personas that were never implemented in practice. Matthews et al. [21] found that although used for communication, personas had little to no impact on the actual work practices of designers. Friess [11] conducted an ethnographic study on the use of personas among designers and found that personas were rarely evoked in real decision-making situations. These findings highlight the risk of personas being forgotten after their creation. In our instrument, this effect is captured in the dimensions of *Willingness to Use* (2 items, e.g., "I would make use of this persona in my work.") and *Usefulness* (3 items, e.g., "I found this persona helpful for understanding the customer base."). Willingness to use is often used in information system science (ISS) studies [19].

Interpretation of Personas

Interpretation of personas has also been found problematic, as users of personas tend to perceive them differently. For example, Rönkkö et al. [27] found conflicting views of the core customer persona between two teams despite the displayed persona information being the same for both. This makes us assume that persona perceptions are likely influenced by intervening factors that are participant-specific. In other words, we should include some "soft" measures in the instrument. We thus surveyed the literature from psychology and

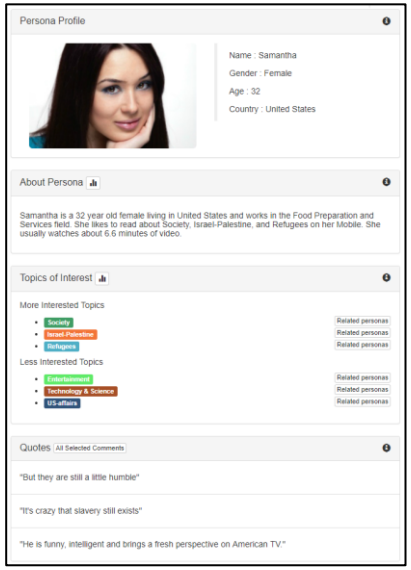

Figure 1: Example of Survey Personas. Each Respondent Was Shown the Same Three Personas. One Persona was Asian, One Middle-Eastern and One Caucasian.

human-computer interaction (HCI) and identified the constructs shown in Table 2 that we believe make sense in the context of personas. For example, *Empathy* was measure with 4 items (e.g., "I can imagine a day of the life of this persona."), *Similarity* with 6 items (e.g., "I like the same things as this persona."). Each construct had 4-6 items (apart from *Willingness to Use* that had 2). Due to space limit, we only provide examples of the items in this work.

Method

We searched the literature for suitable items for measuring the chosen constructs. To improve content validity, we used expert validation [12] by asking four experts of personas for their feedback on the scale. Based on their comments, we adjusted the wordings, items, and constructs. After this, we pilot tested the survey at the Qatar Computing Research Institute (QCRI) among researchers from various backgrounds. The average age of respondents was 34 years, their roles including Researchers (7), Scientists (4), Software Engineers (2) and Others (6). 15 respondents (79%) were male, 4 (21%) female. All respondents were familiar with the concept of persona. Each respondent evaluated three personas, leaving us in total 19 x 3 = 57 persona evaluations. The personas were generated automatically from the social media data of a large Middle-Eastern media company using a process described in Salminen et al. [28]. Fig. 1 shows an example of the personas shown to the respondents.

We validated the pilot survey as follows. First, an initial Exploratory Factor Analysis (EFA) was done to identify dimensions with the potential of having multiple factors. Second, a Confirmatory Factor Analysis (CFA) was conducted separately for each dimension (due to the low sample size). Finally, Cronbach's Alphas were calculated for each sub-scale to estimate reliability. Due to the low sample size, it was not possible to estimate an EFA with all items simultaneously. However, estimating separate EFA's with Direct Oblimin rotation [13] revealed that none of the dimensions had more than a single-factor solution. This decision was substantiated by the following criteria: Kaiser's criteria, scree plot analysis, and explained variance [13]. Because of this, the analysis immediately proceeded to the CFA stage, with the models being specified based on initial expectations.

Results

During estimation, the following occurrences were noted. First, the *Clarity* dimension exhibited a negative covariance matrix, commonly known as a Heywood case [17]. This was solved by removal of item Clarity 2, allowing the model to be estimated. Second, *Willingness to Use* could not be estimated as it only contained two items. Thus, we merged the *Willingness to Use* and *Usefulness* dimensions into a single factor; however, under this specification item Usefulness 2 was removed as it fell under the 0.50 loading threshold, threatening factorial validity. Following the previous analysis, Cronbach's Alphas were calculated for each scale to measure internal consistency (with the same assumptions as the previous analysis). The results are summarized in Table 3 (assuming that *Willingness to Use* is merged with *Usefulness*). Overall, we find that reliability is quite good for all scales and no further removal of items is required.

Conclusion and Future Work

In this research, we developed and pilot-tested a survey instrument for measuring persona perceptions.

Factor	Cronbach's Alpha
Credibility	0.90
Clarity	0.83
Completeness	0.93
Consistency	0.80
Empathy	0.94
Familiarity	0.90
Friendliness	0.91
Interpersonal attraction	0.84
Liking	0.89
Similarity	0.94
Usefulness + Willingness	0.93

Table 3: Reliability Scores.

Several constructs arising from HCI and psychology were found reasonable in the context of personas. The tested constructs are conceptually meaningful, derived from prior literature, and provide good loadings in the factorial solution. The limitation of this work is twofold: the sample is small, and the respondents do not use personas in their everyday work. Even though the participants were familiar with the concept of personas, true immersion is likely to be achieved only by showing real personas of one's own organization. Nevertheless, this research is helpful in providing indicative data for the scale validation purpose. We are now ready to administer a larger survey with the persona perception instrument to a business professional audience to achieve a greater sample size and validity.

References

1. Jisun An, Kwak Haewoon, and B. J. Jansen. 2017. Personas for Content Creators via Decomposed Aggregate Audience Statistics.
2. Susanne Bødker, Ellen Christiansen, Tom Nyvang, and Pär-Ola Zander. 2012. Personas, people and participation: challenges from the trenches of local government. ACM Press, 91.
3. Yen-ning Chang, Youn-kyung Lim, and Erik Stolterman. 2008. Personas: From Theory to Practices. *Proceedings of the 5th Nordic Conference on Human-computer Interaction: Building Bridges*, ACM, 439–442.
4. Christopher N. Chapman, Edwin Love, Russell P. Milham, Paul ElRif, and James L. Alford. 2008. Quantitative Evaluation of Personas as Information. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* 52, 16: 1107–1111.
5. Christopher N. Chapman and Russell P. Milham. 2006. The Personas' New Clothes: Methodological and Practical Arguments against a Popular Method. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* 50, 5: 634–636.
6. Alan Cooper. 2004. *The Inmates Are Running the Asylum: Why High Tech Products Drive Us Crazy and How to Restore the Sanity*. Sams - Pearson Education, Indianapolis, IN.
7. Jianming Dong, Kuldeep Kelkar, and Kelly Braun. 2007. Getting the most out of personas for product usability enhancements. *Usability and Internationalization. HCI and Culture*: 291–296.
8. Shamal Faily and Ivan Flechais. 2011. Persona Cases: A Technique for Grounding Personas. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ACM, 2267–2270.
9. Robert J. Fisher. 1993. Social Desirability Bias and the Validity of Indirect Questioning. *Journal of Consumer Research* 20, 2: 303–315.
10. Forrester Research. 2010. *The ROI Of Personas*. .
11. Erin Friess. 2012. Personas and Decision Making in the Design Process: An Ethnographic Case Study. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ACM, 1209–1218.
12. Hunter Gehlbach and Maureen E. Brinkworth. 2011. Measure twice, cut down error: A process for enhancing the validity of survey scales. *Review of General Psychology* 15, 4: 380.
13. Joseph F. Hair, William C. Black, Barry J. Babin, and Rolph E. Anderson. 2009. *Multivariate Data Analysis*. Pearson, Upper Saddle River, NJ.
14. Charles G. Hill, Maren Haag, Alannah Oleson, et al. 2017. Gender-Inclusiveness Personas vs. Stereotyping: Can We Have it Both Ways? ACM Press, 6658–6671.
15. Janet Ilieva, Steve Baron, and Nigel M. Healey. 2002. Online surveys in marketing research: Pros and cons. *International Journal of Market Research* 44, 3: 361.

16. Angus Jenkinson. 1994. Beyond segmentation. *Journal of targeting, measurement and analysis for marketing* 3, 1: 60–72.
17. Stanislav Kolenikov and Kenneth A. Bollen. 2012. Testing Negative Error Variances: Is a Heywood Case a Symptom of Misspecification? *Sociological Methods & Research* 41, 1: 124–167.
18. Tom van Laer and Ian Lurie. 2017. *The Seven Stages of the Digital Marketing Cycle*. Social Science Research Network, Rochester, NY.
19. Matti Mäntymäki. 2011. *Continuous use and purchasing behaviour in social virtual worlds*. Turku School of Economics Ae-3:2011.
20. Adrienne L. Massanari. 2010. Designing for imaginary friends: information architecture, personas and the politics of user-centered design. *New Media & Society* 12, 3: 401–416.
21. Tara Matthews, Tejinder Judge, and Steve Whittaker. 2012. How Do Designers and User Experience Professionals Actually Perceive and Use Personas? *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ACM, 1219–1228.
22. L. E. Nacke, Anders Drachen, and Stefan Göbel. 2010. Methods for evaluating gameplay experience in a serious gaming context. *International Journal of Computer Science in Sport* 9, 2: 1–12.
23. Lene Nielsen and Kira Storgaard Hansen. 2014. Personas is applicable: a study on the use of personas in Denmark. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, ACM, 1665–1674.
24. John Pruitt and Jonathan Grudin. 2003. Personas: Practice and Theory. *Proceedings of the 2003 Conference on Designing for User Experiences*, ACM, 1–15.
25. Blaine Reeder and Anne M. Turner. 2011. Scenario-based design: A method for connecting information system design with public health operations and emergency management. *Journal of biomedical informatics* 44, 6: 978–988.
26. Kari Rönkkö. 2005. An Empirical Study Demonstrating How Different Design Constraints, Project Organization and Contexts Limited the Utility of Personas. *Proceedings of the Proceedings of the 38th Annual Hawaii International Conference on System Sciences - Volume 08*, IEEE Computer Society, 220.
27. Kari Rönkkö, Mats Hellman, Britta Kilander, and Yvonne Dittrich. 2004. Personas is Not Applicable: Local Remedies Interpreted in a Wider Context. *Proceedings of the Eighth Conference on Participatory Design: Artful Integration: Interweaving Media, Materials and Practices - Volume 1*, ACM, 112–120.
28. Joni Salminen, Şengün Sercan, Kwak Haewoon, et al. 2017. Generating Cultural Personas From Social Data: A Perspective of Middle Eastern Users.
29. David Meerman Scott. 2007. *The New Rules of Marketing*. Hoboken, New Jersey: John Wiley and Sons.
30. Seymour Sudman, Norman M. Bradburn, and Norbert Schwarz. 1996. *Thinking about answers: The application of cognitive processes to survey methodology.* Jossey-Bass.
31. Christopher James Vincent and Ann Blandford. 2014. The challenges of delivering validated personas for medical equipment design. *Applied Ergonomics* 45, 4: 1097–1105.
32. Xiang Zhang, Hans-Frederick Brown, and Anil Shankar. 2016. Data-driven Personas: Constructing Archetypal Users with Clickstreams and User Telemetry. *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*, ACM, 5350–5359.