What's Hot in Interaction Design?

An International Survey of Practitioners' Views on Personas

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Abstract— We report on findings from a 'state-of-practice' survey conducted with Interaction Design (IxD)/User Experience (UX) professionals called 'What's Hot in Interaction Design'. We focus on 20 items from the survey which elicited practitioners' usage of and attitudes towards personas. The survey items were derived from a review of academic and professional literature sources. The results show that practitioners think that personas have benefits, but come with associated resource demands and pitfalls, which we enumerate. We organize the results in terms of strength of opinion and discuss implications for methods, tools and curricula.

Keywords-personas; interaction design; persona usage; prioritising persona attitudes; theory and practice; tools and curricula.

I. INTRODUCTION

A persona is a user-model intended to support the design of a software product by anchoring design within a vision of intended users. Advocates argue that personas promote empathy and help focus design on the goals and characteristics of users. They are, however, not without detractors and although it has been 18 years since the publication of The Inmates are Running the Asylum [1], there has been little research to systematically elicit practitioners' attitudes about them.

In 1999, Cooper [1] introduced the idea of personas as a way of anchoring design within a vision of intended users. A persona is a kind of user-model—a *composite archetype* [2] drawn from behavioral data from users of an existing or intended digital product. A set of personas can be created where each represents a group of users with similar behaviors, attitudes, aptitudes, and needs. Methods for creating personas have been suggested by Cooper [2], Pruitt and Adlin [3], and Nielsen [4][5] with semi-automated methods also being proposed [6]–[8]. Personas have a role in the three phases of the User Centered Design (UCD): User Research & Requirements, Designing & Prototyping and Evaluation.

Despite the enthusiasm that some hold for personas, concerns have been raised about the resources required to create them [3][9]–[12] and their value to the design process [11]–[15]. A review of practitioners' attitudes towards personas via a selection of articles on professional websites revealed views ranging from strong advocacy to skepticism. To our knowledge, there has been little systematic research on attitudes towards personas held by the people who might use them—Interaction Design and User Experience professionals.

We conducted an online survey called 'What's Hot in Interaction Design' in order to elicit details of the current practices and attitudes of industry professionals. The survey spanned many topics of which personas was one. Our motivation was as a stimulus for considering new methods and tools, to inform university syllabus development, and simply to record current trends. The survey was in two parts: (1) an initial part about Interaction Design/User Experience practice in general ('main survey') which included 4 questions about personas, (2) an optional additional part ('persona survey') that had an additional 16 items (hereafter referred to 'A1' to 'A16' see TABLE I) which went into more detail about personas. Items were derived from a review of issues raised in the academic literature. The main survey was completed by 173 practitioners. 76 practitioners went on to complete the persona survey.

In this paper, we report results relating to persona use from both the main survey and the persona survey. We report an analysis of each item using significance testing and prioritize significant items using effect size (odds ratio) as a measure of relative strength of feeling.

In the next section (Section II), we review background literature which provided the basis for the persona survey items. In Section III, we discuss the survey and analysis method, and in Section IV we report the findings. In the final section, we summarize the results and discuss implications of our findings for interaction design practice.

II. LITERATURE REVIEW

A. Overview on Personas

Cooper introduced the idea of personas in 1999 [1]. Although a method for creating personas was not clearly articulated at that point, the idea attracted a good deal of attention. According to Cooper, personas offer a balance between formality and informality that carries more nuance than diagrammatic models through capturing users' goals, tasks, characteristics, and environments. The belief was that they could allow design teams from different disciplines and stakeholders to communicate about and empathize with the users and develop more focused designs. Methods for creating personas were subsequently offered that provided a structured approached to the development of personas. These included

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Pruitt, Grudin and Adlins' 'role-based perspective' [3, 9]; Cooper, Reimann and Cronin's 'goal-directed perspective' [1]; and Nielsen's 'engaging perspective' [4]. Cooper, Reimann and Cronins' [1] method is a 7-step approach representing user-goals and including activities, attitudes, aptitudes, motivations, and skills towards a product. Pruitt, Grudin, and Adlin [3, 9] agreed on the benefits of personas suggested earlier, but propose personas as a complementary tool. Their method is a 5-step approach that looks into massive data and attempts to verify the quality and adequacy of persona representation. Nielsen [4][5], who observed variations in persona use, criticized some practitioners for failing to fully appreciate the potential of personas and for adopting marketing archetypes as personas. She offered the 'Engaging Persona' process, which is a 10-step approach aimed at establishing common ground on gathering data related to user needs, attitudes and aptitudes and includes details such as social background, psychological characteristics, and emotional relationship to invoke empathy and avoid stereotyping [16]. The method also included some steps that focus on how to make personas accepted and used by team members.

B. Studies on Personas

Some studies have explored experiences and outcomes of persona creation and use. Blomquist and Arvola [13], for example, observed a design team's first experience with personas. Methods for creating personas were relatively under-developed at that time and the authors found designers lacked confidence in using them for communication or design, concluding a need for expertise and integrating personas within existing knowledge and practice. Chang et al. [17] reported a small study with practitioners comparing attitudes of some who used personas and some of who didn't. The study found more positive attitudes towards personas from those who use personas who found it an essential tool for design. The study also found practitioners experimenting with new approaches. Later, Miaskiewicz and Kozar [18] elicited perceived benefits of personas from 19 experts (practitioners who created and used them) and derived a ranked list of 22 benefits, including: providing audience focus, helping to guide decisions, supporting collaboration, acting as a communication aid and guiding evaluation. Mathews et al. [15] reported a study of 14 practitioners and observed that those trained on Cooper's method tended to champion personas, whereas those trained in Engineering and Computer Science were 'moderate' persona users, and those trained in HCI and Design were pessimistic. The study also indicated benefits of personas in helping understand users' needs and context and establishing common ground.

A number of literature sources draw attention to the cost implications of personas creation. LeRouge [19] argued that despite their cost implications, when personas are successfully integrated into a design process by trained team members, the benefits outweigh the costs. Billestrup et al. [20] designed a questionnaire survey to investigate the knowledge and use of personas across 60 software development companies within a specific geographical region . The results revealed that more than half of the respondents had not heard of personas while the other respondents stated that personas were not well integrated into the development process. In addition, some problems related to time and budget constraints, limited knowledge with persona methods and inadequacy/ shallowness of persona descriptions were reported.

Based on an observational study of design team conversations, Friess [11] questioned the benefits of personas as a tool for communication. Fries' study showed that despite time and resources spent on developing and refining personas, they were only referred to briefly in designers' conversations. Fries, however, resists the conclusion that personas are not useful with the observation that members of the design team who created personas invoked them in conversations much more often than other team members and stakeholders. Tharon [12] commented on the result that, "Leaving the development of the personas to a select few on the team seems likely to ensure that those few are the only members of your team who will benefit from the time and money invested in the personas development."

C. Personas and Empirical Methods of User Research

It is agreed across the several methods of creating personas [2]–[4][6]–[8][10] that personas should be derived from user research. The approach suggested by Cooper [1][2] was solely qualitative, involving informal manual clustering of users (based on 'behavioral variables'). Such an approach has raised questions about possibilities of exploiting quantitative data [3][8]–[10], as well as issues of sample size [3][6][8]–[10][14], adequacy of personas in terms of validity and human bias[7][8][10][14], and time and budget implications [3][6][8]–[10][12][14][15][21]. In response to such issues, some have proposed the integration of quantitative research and/or automating clustering methods.

Pruitt, Adlin, and Grudin [3][9] were the first to combine quantitative and qualitative methods based on existing data about users. Their clustering method remained manual and was performed by experts in user research. They suggested validating personas through "sanity checks" and "foundation documents" to link them with the original gathered data. Later, Chapman's and Milham's [14] discussed the unexplored limitations of the former persona methods in terms of significance, accuracy, validity, human bias, and relation to the design of the product. The subsequent authors focused on bringing some automation to the process to increase objectivity, improve validity by increasing sample size, whilst also improving the efficiency of the method and making it less dependent on research expertise.

Mulder and Yaar [10] proposed a mixed method for web design personas starting with a quantitative analysis of large-scale market research and website log data and using semi-automated clustering techniques to create market segmentation/user profiles, followed by qualitative analysis such as interviews, field studies or usability tests. Following this, McGinn and Kotamraju [8] suggested designing a survey with agreed attributes to collect large-samples of customer data. *Factor Analysis* (FA) was used from the initial groupings, followed by interviews with selected users to

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reveal the goals and motivation and to validate group membership.

Maikenzie et al. [7] proposed *Latent Semantic Analysis* (LSA) for semi-automated clustering of qualitative interview transcripts data, proposing this method to be "more efficient, less subjective, and less reliant on specialized skills". Brikey, Walczak, and Burgess [6] reported a study that classified the methods of creating personas in terms of *manual qualitative techniques and semi-automated techniques (*LSA, FA, principal component analysis (PCA) and multivariate cluster analysis (CA)). The findings indicated that LSA semi-automated method, when compared to the manual qualitative method, is not affected by the quantity of data, requires less expertise in clustering, is faster and cheaper, and minimizes human bias. The study also showed that the three automated clustering techniques didn't agree with the cluster assignment done by experts.

In her 10-step approach, Nielsen [4] applies quantitative and qualitative research methods and considers manual clustering techniques (affinity diagrams and empathy maps) to be performed by qualified team members. These approaches each in its own capacity have exploited at least one of the following: sample size, adequacy of persona, time and budget; yet all of them need the expertise in quantitative/qualitative data analysis for clustering users.

D. Professional Literature

We also conducted a review of professional magazines and association websites for articles on personas. Here, mixed opinions can be found along with specific concerns which in many cases echo those expressed in the academic literature. For example, Sholmo G. [22][23], an interaction designer intern at Cooper design agency, remarks, "For every designer who uses personas, I have found even more who strongly oppose the technique." He reflects on his own conversion from negative attitude to positive once he started to develop and use personas "properly" in his work. He attempts to convince detractors to change their perceptions and promotes the use of personas for those who are unfamiliar with the process. Similarly Kellingley [24], another advocate for the development of personas, agreed with many of the criticisms under three headings: "Personas are time-consuming", "Personas are expensive", and "Personas need time to show ROI". However, he argues that more time and money would be spent on building and rebuilding products without considering user requirements and personas. Accordingly, the attempt to reduce cost and time by cutting back on user research and abandoning the use of personas does not hold. In the same way, Paul B. [25] discusses three reasons that lead some peers to adverse personas as design tools. First, the use of "Analytics", which he argues can reveal many insights about the design components based on users' interactions, overlooks how UX designers work and merely specifies user behaviors which is essential to the UX strategy. Second, A/B and multivariate testing assesses alternative designs in terms of quantitative results, but do not suggest how to reach the best design. Third, in an agile environment UX practitioners feel a burden when creating and designing personas because of time constraints, which again reveals that there is a need for better ways of fitting personas in the UX process.

III. METHODS

A. Survey Design

The main survey contained 29 questions distributed across sections on: (1) demographics; (2) user research; (3) design and prototyping; (4) product development; and (5) evaluation. Section (1) contained questions asking the areas in which respondents had professional experience, the answers to which determined subsequent sections they were asked to complete. There were four questions about personas in the main survey across the remaining sections.

The persona survey contained 16 items. Each elicited agreement with a series of propositions on a five-point Likert scale. Each proposition represents a possible attitude towards personas. They were derived by collating reported findings and opinions (explicitly expressed or apparently assumed) appearing in a range of relevant academic sources (most appear in the literature review above) and a selection of industry blogs. The propositions are itemized in TABLE I. and each is mapped against its multiple sources.

Findings from previous studies were included because such studies were typically qualitative and/or longitudinal and based a small sample drawn from one specific contexts. In this sense, the survey can be seen as corroborating findings as well as opinions against a larger and more widely drawn sample. In some cases, sources contradicted each other. Here the survey can be seen as helping to resolve such conflicts. Thus, we believed we converged on a set of concerns that were relevant and might be profitably tested with reference to the experience of a larger sample of practitioners.

It is not uncommon for surveys to use both forward and reverse-keyed versions of items to control for possible acquiescence bias. However, Sonderen et al. [26] and Schriesheim & Hill [27] argue that there is little empirical evidence to support this recommendation and also demonstrate that it can increase respondent confusion and introduce difficulties in interpretation. In addition, including reverse-keyed items double the size of a survey which presumably can negatively affect completions and hence sample size. Hence, we opted for one item per proposition.

B. Participants and recruitment

The target population for the survey was UX/IxD practitioners. Respondents were recruited by non-probabilistic convenience sampling via invitations to online interest groups, and by snowball sampling via the researchers' professional networks. The requirement of working as a UX/IxD practitioner was included in invitations. Respondents were asked to give job titles as part of the survey and these were subsequently reviewed for relevance prior to analysis.

C. Data Analysis

Responses to each Likert item were coded on a scale of 1 to 5 where 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral*, 4 = *agree*, 5 = *strongly agree*. For each item, a lower bound one-

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sample, one-tailed sign test was performed to assess agreement according to the following hypotheses:

H0: The population median response is equal to or less than neutral ($\eta <= 3$) (i.e., non-agreement)

H1: The population median response is greater than neutral ($\eta > 3$) (i.e., agreement)

Given the multiple tests, Benjamini and Hochberg [28] method was used to control for inflated type I error rate ($\alpha_{adjusted}$ =.040625). The odds ratio (OR) -an unstandardized effect size statistic- was also computed for each item and to ultimately organize the responses in terms of strength of expressed opinion.

TABLE I. THE 16 STATEMENTS USED AS ATTITUDINAL MEASURES TOWARDS PERSONAS

A1: Personas are time consuming to create/use. **Agree:** [3][8]–[10][12][19][20].**Disagree:** [6][7]
A2: Personas are expensive to create/use. **Agree:** [3][8]–[10][19][20]**Disagree:** [6][7]
A3: Representative personas require a lot of data. **Agree:** [3][8]–[10][19].**Disagree:**[17][29]
A4: Personas require expertise in qualitative research to create. **Agree:** [2][3][9][10][13][17][19]. **Disagree:** [6][7]
A5: Personas require training in persona methods. **Agree:** [2]–[4][8]–[10][15][19]
A6: Collaborating around personas is difficult. **Agree:** [3][9][13]. **Disagree:** [13]
A7: Personas are often not properly used by teams. **Agree:** [11][12]. **Disagree:** [3][7][13]
A8: Personas often represent extreme archetypes **Agree:** [2][10][21]
A9: Personas often lack important information related to goals, needs, behaviors, and attitudes. **Agree:** [20]. **Disagree:**[1]–[5][9][10]
A10: Persona sets often incorporate redundancy (multiple personas referring to the same characteristics).**Agree:** [2][3]
A11: Personas are helpful for understanding users' needs and context. **Agree:** [1]–[6][9][10][19][21]. **Disagree:** [13]
A12: Personas are helpful for making design decisions. **Agree:** [2][3][5][7][9][10][21]. **Disagree:** [13]–[15]
A13: Personas are helpful for implementing and building **Agree:**[2][3][5][9][10][19][21]
A14: Personas are helpful for evaluation. **Agree:** [10][18][19][21].**Disagree:**[20]
A15: Personas are helpful for communicating with stakeholders and team members. **Agree:** [1]–[5][7][9][10][19][21].**Disagree:** [11]–[13]
A16: The personas I use are usually well formed and adequate. **Disagree:** [20]

IV. RESULTS

A. Demographics

The main survey and the persona survey were completed by 173 and 76 practitioners, respectively, with the following self-reported demographics (number in main survey/number in persona survey):

- Job Titles: UX Designers (52/21), UX Researchers (27/13), Senior User Experience Designers (23/13), User Interface Designer / Information Architect (7/2), and others (64/27);
- Years of experience: > 5 yrs (79/36), 3 -5 yrs(45/17), 1 -2 yrs (26/11), < 1 year (23/12);
- Countries: UK (56/30), USA (35/13), Sweden (12/7), India (11/2), Norway (8/3), UAE (8/3) and 43/18 others;
- Organization size: 20-99 employees (34/14), 1000-4999 employees (31/13), 10000+ employees (24/13), 100-499 employees (24/6), 5000-9999 employees (20/8), 1-4 employees (12/3), 10-19 employees (9/5), 500-999 employees (8/8), 5-9 employees (6/6).

Respondents worked with digital products in the areas: websites (134/63), mobile solutions /applications (121/52), consumer technology (73/35), enterprise solutions (67/33), accessibility (62/24), visualization of big data (44/25), smart objects/devices (IOT)(31/10) and, tabletops/multi-touch surfaces (24/8), wearable technology (19/5), Robotics & AI (16/4), A/R (14/3), VR (11/2), others (35/14)

B. Persona Use

Of the 173 practitioners who completed the main survey 111(64%) reported using personas in some capacity. Of 105 respondents involved in user research, 78 (74%) reported using personas to represent/communicate user needs based on research studies. Of 109 respondents involved in design and prototyping, 69 (63%) reported using personas for motivating design ideas/decisions and 44 (40%) reported using persona-based inspection for creating/refining the concepts of design. Of 113 respondents involved in evaluation, 34 (30%) reported using persona-based inspection methods.

C. Results from the Personas Survey

We report responses to the items in the persona survey, including results of a one-sample sign test used to assess agreement with each proposition. In each of the bar charts (Fig. 1─16), the left end of the red arrow indicates the lower bound of the 95% confidence interval and the dot indicates the estimated population median. Note that in a number of cases these values are the same.

A1: Personas are time-consuming to create/use

Fig. 1 shows that the attitudes to this item were mostly positive with median and mode of 4. 62% responded on the 'agree' side of neutral (4 or 5) and 25% responded on the 'disagree' side of neutral (1 or 2). A one-tailed sign test was **highly significant** (p=.0004 and p-adjusted=0.03125) supporting H1 (agreement). The odds ratio was 2.5.

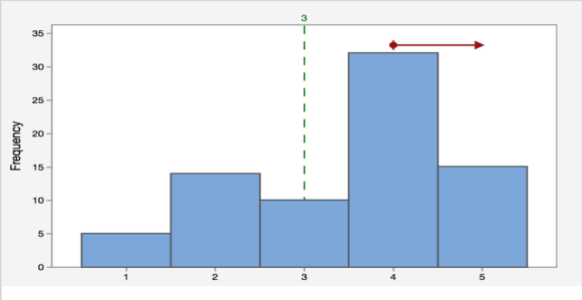

Figure 1. Personas are time-consuming to create/use

Conclusion: Practitioners tend to agree that personas are time-consuming to create/use.

A2: Personas are expensive to create/use

Fig. 2 shows that the attitudes to this item were fairly even around neutral with a median of 3 and mode of 4. 34% responded on the 'agree' side of neutral (4 or 5) and 25% responded on the 'disagree' side of neutral (1 or 2). A one-tailed sign test was **non-significant** (1-tailed *p*=.7052 and *p-adjusted*=0.046875) supporting H0 (non-agreement). The odds ratio was 0.9.

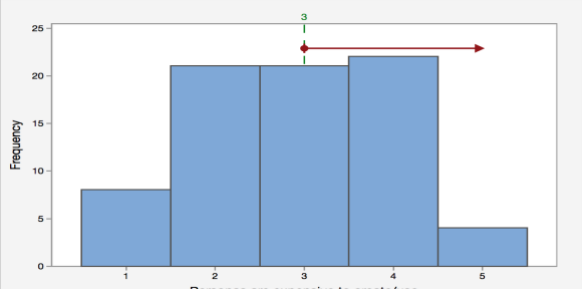

Figure 2. Personas are expensive to create/use

Conclusion: Practitioners tend **not to** agree that personas are expensive to create/use.

A3: Representative personas require a lot of data

Fig. 3 shows that the attitudes to this item had a median and mode of 4. 54% responded on the 'agree' side of neutral (4 or 5) and 16% responded on the 'disagree' side (1 or 2). A one-tailed sign test was highly significant (1-tailed *p* <.0001 and *p-adjusted*=.003125) supporting H1 (agreement). The odds ratio was 3.4.

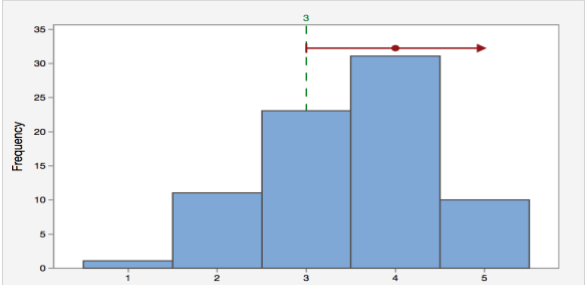

Figure 3. Representative personas require a lot of data

Conclusion: Practitioners tend to agree that representative personas require a lot of data.

A4: Personas require expertise in qualitative research to create.

Fig. 4 shows that the attitudes to this item had a median and mode of 4. 72% responded on the 'agree' side of neutral (4 or 5) and 14% responded on the 'disagree' side (1 or 2). A one-tailed sign test was highly significant (1-tailed *p* <.0001 and *p-adjusted*=.00625) supporting H1 (agreement). The odds ratio was 5.

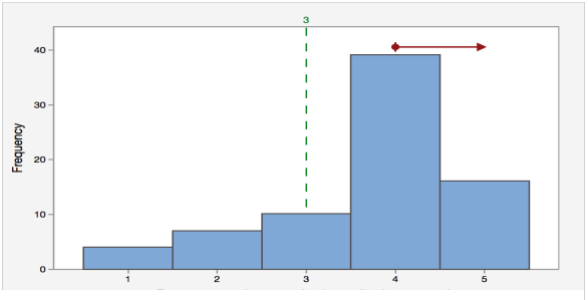

Figure 4. Personas require expertise in qualitative research to create

Conclusion: Practitioners tend to agree that personas require expertise in qualitative research to create.

A5: Personas require training in personas methods

Fig. 5 shows that the attitudes to this item had a median and mode of 4. 66% responded on the 'agree' side of neutral (4 or 5) and 13% responded on the 'disagree' side (1 or 2). A one-tailed sign test was highly significant (Z = 3.846, 1-tailed *p*<.0001 and *p-adjusted* =.00937) supporting H1 (agreement). The odds ratio was 5.

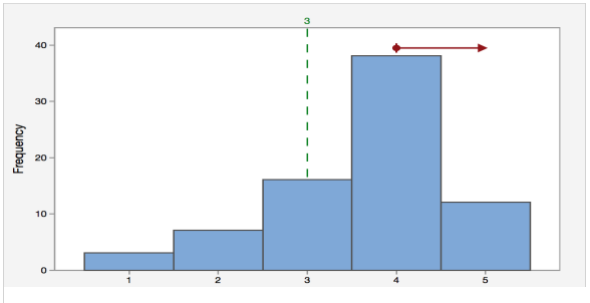

Figure 5. Personas require training in personas methods

Conclusion: Practitioners tend to agree that personas require training in personas methods.

A6: Collaborating around personas is difficult

Fig. 6 shows that the attitudes to this item had a median of 3 and mode of 2. 34% responded on the 'agree' side of neutral (i.e., 4 or 5) and 39% responded on the 'disagree' side (1 or 2). A one-tailed sign test was non-significant (1-tailed *p*=.748 and *p-adjusted*=.05) supporting H0 (neutral or disagree) with an odds ratio (OR≈0.9).

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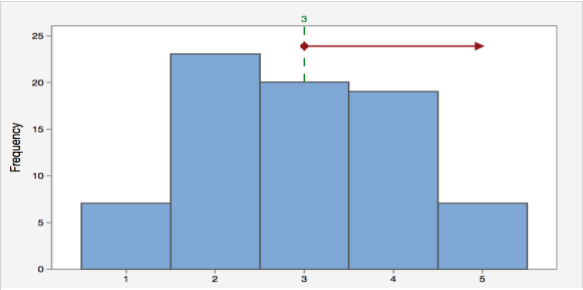

Figure 6. Collaborating around personas is difficult

Conclusion: Practitioners tend **not to** agree that collaborating around personas is difficult.

A7: Personas are often not properly used by teams

Fig. 7 shows that the attitudes to this item had a median of 4 and mode of 5. 78% responded on the 'agree' side of neutral (i.e., 4 or 5) and 4% responded on the 'disagree' side (1 or 2). A one-tailed sign test was highly significant (1- tailed $p<.0001$ and *p-adjusted*=.00125) supporting H1 (agreement). The odds ratio was 19.7.

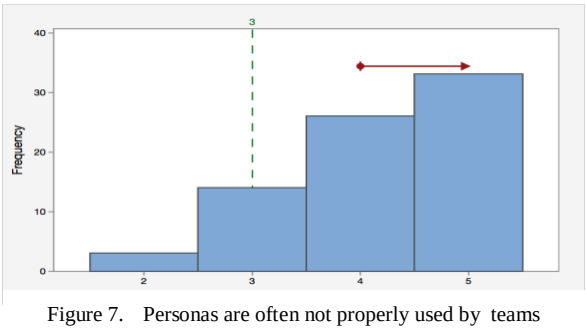

Figure 7. Personas are often not properly used by teams

Conclusion: Practitioners tend to agree that personas are often not properly used by teams.

A8: Personas often represent extreme archetypes

Fig. 8 shows that the attitudes to this item had a median and mode of 3. 43% responded on the 'agree' side of neutral (4 or 5) and 22% responded on the 'disagree' side (1 or 2). A one-tailed sign test was found to be significant (1-tailed $p=.025$ and *p-adjusted*=.0344) supporting H1 (agreement) with an odds ratio of 1.9.

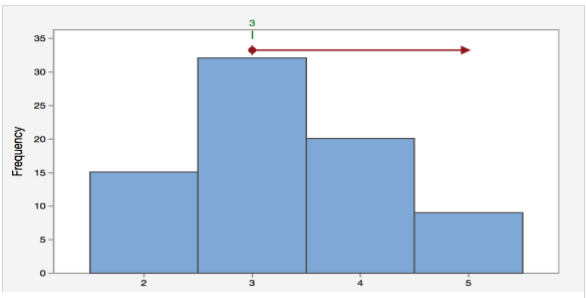

Figure 8. Personas often represent extreme archetypes

Conclusion: Practitioners tend to agree that personas often represent extreme archetypes.

A9: Personas often lack important information related to goals, needs, behaviors, and attitudes.

Fig. 9 shows that the attitudes to item had a median and mode of 3. 42% responded on the 'agree' side of neutral (4 or 5) and 26% responded on the 'disagree' side (1 or 2). A one-tailed sign test was found to be non-significant (1-tailed $p=.064$ and *p-adjusted*=.0438) supporting H0 (neutral or disagree) with an odds ratio of 1.6.

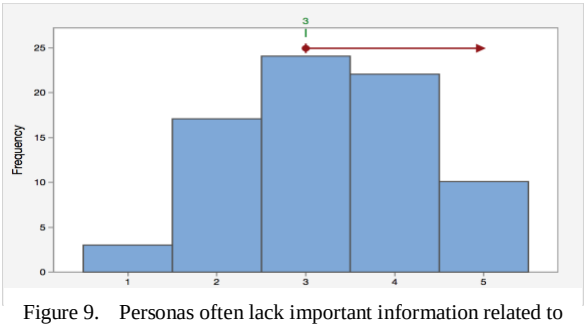

Figure 9. Personas often lack important information related to goals, needs, behaviors, and attitudes.

Conclusion: Practitioners tend **not to** agree that personas often lack important information related to goals, needs, behaviors, attitudes.

A10: Persona sets often incorporate redundancy

Fig. 10 shows that the attitudes to this item had a median and mode of 3. 42% responded on the 'agree' side of neutral (4 or 5) and 26% responded on the 'disagree' side (1 or 2). A one-tailed sign test was found to be significant (1-tailed $p=.064$ and *p-adjusted*=.0438) supporting H1 (agreement). The odds ratio was 1.8.

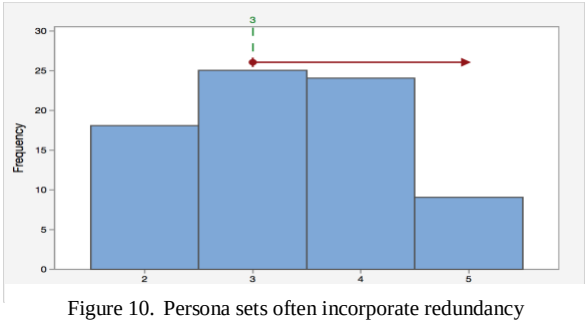

Figure 10. Persona sets often incorporate redundancy

Conclusion: Practitioners tend to agree that personas often incorporate redundancy.

A11: Personas are helpful for understanding users' needs and context

Fig. 11 shows that the attitudes to this item had a median and mode of 4. 83% responded on the 'agree' side of neutral (i.e., 4 or 5) and 8% responded on the 'disagree' side. A one-tailed sign test was highly significant (1- tailed $p<.0001$ and

p-adjusted=.015625) supporting H1 (agreement). The odds ratio was 10.5.

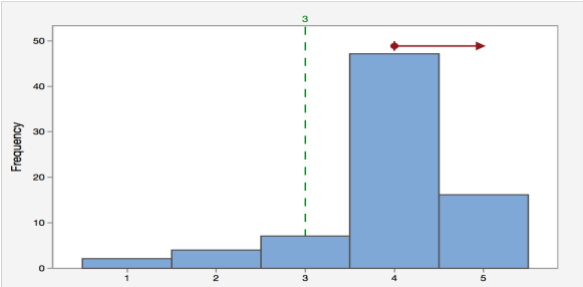

Figure 11. Personas are helpful for understanding users' needs and context

Conclusion: Practitioners tend to agree that personas are helpful for understanding users' needs and context.

A12: Personas are helpful for making design decisions

Fig. 12 shows that the attitudes to this item had a median and mode of 4. 72% responded on the 'agree' side of neutral (i.e., 4 or 5) and 11% responded on the 'disagree' side (1 or 2). A one-tailed sign test was highly significant (1-tailed *p*<.0001 and *p-adjusted*=.01875) supporting H1 (agreement). The odds ratio was 6.9.

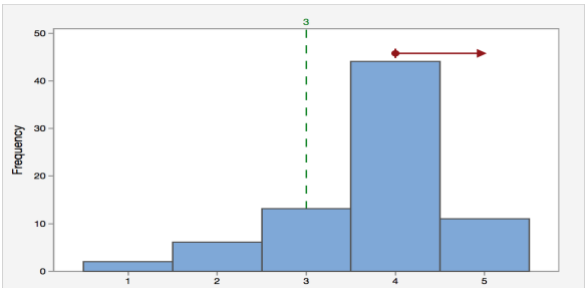

Figure 12. Personas are helpful for making design decisions

Conclusion: Practitioners tend to agree that personas are helpful for making design decisions.

A13: Personas are helpful for implementing and building

Fig. 13 shows that the attitudes to this item had a median of 3 and mode of 4. 47% responded on the 'agree' side of neutral (4 or 5) and 28% responded on the 'disagree' side (1 or 2). A one-tailed sign test was highly significant (1-tailed *p*= .0318 and *p-adjusted*= .040625) supporting H1 (agreement). The odds ratio was 1.7.

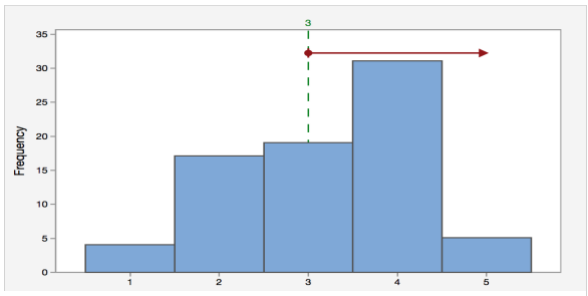

Figure 13. Personas are helpful for implementing and building

Conclusion: Practitioners tend to agree that personas are helpful for implementing and building.

A14: Personas are helpful for evaluation

Fig. 14 shows that the attitudes to this item had a median and mode of 4. 68% responded on the 'agree' side of neutral (i.e., 4 or 5) and 12% responded on the 'disagree' side (1 or 2). A one-tailed sign test was highly significant (1-tailed *p*= .0318 and *p-adjusted*= .021875) supporting H1 (agreement). The odds ratio was 5.8.

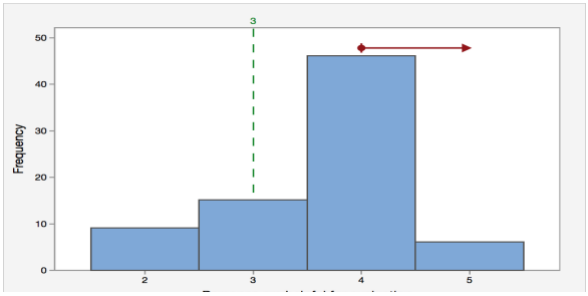

Figure 14. Personas are helpful for evaluation

Conclusion: Practitioners tend to agree that personas are helpful for evaluation.

A15: Personas are helpful for communicating with stakeholders and team members

Fig. 15 shows that the attitudes to this item had a median and mode of 4. 75% responded on the 'agree' side of neutral (4 or 5) whilst 11% responded on the 'disagree' side (1 or 2). A one-tailed sign test was highly significant (1- tailed *p*<0.001 and *p-adjusted*= .025) supporting H1 (agreement). The odds ratio was 7.1.

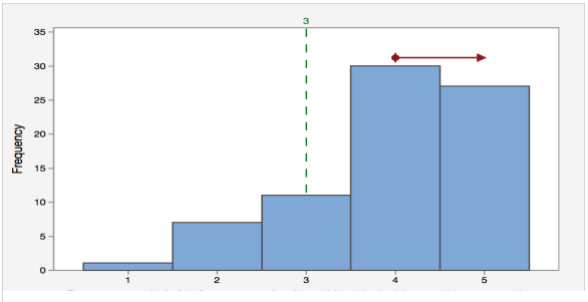

Figure 15. Personas are helpful for communicating with stakeholders and team members

Conclusion: Practitioners tend to agree that personas are helpful for communicating with stakeholders and team members.

A16: Personas I use are usually well formed and adequate

Fig. 16 shows that the attitudes to this item had a median of 3 and mode of 4. 49% responded on the 'agree' side of neutral (4 or 5) and 16% responded on the 'disagree' side (1 or

2). A one-tailed sign test was highly significant (1-tailed *p*=0.003 and *p-adjusted*= .028125) supporting H1 (agreement). The odds ratio was 3.

Figure 16. Personas I use are usually well formed and adequate.

Conclusion: Practitioners tend to agree that the personas they use are usually well formed and adequate.

We use the odds ratio to judge relative strength of opinion. TABLE II shows the items ordered by odds ratio. We use descending order (most strongly held view at the top). The 13 significant items are displayed first followed by the 3 non-significant items (A9, A2, A6).

V. CONCLUSION

Existing persona studies are typically qualitative/ethnographic or case studies. They tend to involve small samples of practitioners with findings developed inductively. These studies are valuable for raising issues, but any generalization is problematic. Also, the claims in the literature are also diffused, uncorroborated and cannot be prioritized.

The 'What's Hot in Interaction Design' survey, with the additional persona survey component, represents one of the largest studies of personas that we know of to-date. It allows a quantitative analysis of the views of a large number of practitioners in relation to issues previously raised in the literature and which in many cases were a source of disagreement. It does this in a way that allows generalization and comparison between issues (i.e., prioritization). The results show that persona use is quite prevalent amongst IxD/UX practitioners, particularly to capture the results of user research but also to support design activities and to some extent, to support evaluation.

Practitioners revealed strong opinions relating to challenges that are faced with personas such as the need for expertise in persona methods and expertise in qualitative research, as well as questions of user sample size and the amount of data required to create personas. However, the main challenge (high OR) turns out to be that, in the practitioners' views, personas are not properly used by teams.

Although previous research (TABLE I) included an agreement about financial costs (A2) and collaboration effort (A6), our findings show that practitioners had an overall neutral opinion towards them. The former might be explained by the fact that practitioners are more affected by time implications than they are by implications for budgets. The latter might be explained, not by a lack of collaboration difficulties, but by a lack of collaboration. On the other hand, our findings and literature tend to disagree on the question of personas lacking important information related to goals, needs, behaviors, and attitudes.

TABLE II. PRIORITY OF ATTITUDES TOWARDS PERSONAS BASED ON THE DESCENDING ORDER OF OR RATIOS.

Priority	Attitude	OR
1	A7: Personas are often not properly used by teams.	19.6
2	A11: Personas are helpful for understanding users' needs and context	10.5
3	A15: Personas are helpful for communicating with stakeholders and team members	7.1
4	A12: Personas are helpful for making design decisions	6.9
5	A14: Personas are helpful for evaluation	5.8
6	A5: Personas require training in persona methods.	5
7	A4: Personas require expertise in qualitative research to create.	5
8	A3: Representative personas require a lot of data.	3.4
9	A16: The personas I use are usually well formed and adequate.	3.1
10	A1: Personas are time consuming to create/use.	2.5
11	A8: Personas often represent extreme archetypes	1.9
12	A10: Persona sets often incorporate redundancy (multiple personas referring to the same characteristics)	1.8
13	A13: Personas are helpful for implementing and building	1.7
14	A9: Personas often lack important information related to goals, needs, behaviors, and attitudes	1.6
15	A2: Personas are expensive to create/use.	0.9
16	A6: Collaborating around personas is difficult.	0.9

Our overall findings also provide an indication for the need for persona methods and tools that address the problem of using personas by teams and other challenges whilst maintaining personas benefits. It elicits the requirements for a personas tool that can support practitioners in their work and target the reported practitioners' issues.

In future work, we plan to follow up on the findings reported here by exploring them more deeply in an interview

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study with IxD/UX practitioners and which will be helping further in the design/development of a persona tool. And as educators, given that personas are usually perceived as beneficial in the UCD, we would do well to include personas in our university syllabi but to find approaches that overcome or at least educate students about the challenges of resources and common pitfalls.

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