
Special Interest Group on Transparent Statistics Guidelines

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Abstract

Transparent statistics is a philosophy of statistical reporting whose purpose is scientific advancement rather than persuasion. At our CHI 2017 workshop, *Moving Transparent Statistics Forward*, we identified that an important first step is to develop detailed guidelines for authors and reviewers in order to help them practice and promote transparent statistics. We propose a SIG to solicit feedback from the CHI community on a first working draft of *Transparent Statistics Guidelines* and engage potential contributors to push the transparent statistics movement forward.

Author Keywords

Statistics; methodology; user studies.

Background

HCI is a large, multidisciplinary field drawing on a variety of statistical approaches. However, many of our existing practices have drawn increasing criticism, such as our overreliance on null-hypothesis significance testing (NHST), our lack of replications and meta-analyses, and our infrequent sharing of data or study materials. In our statistical practice, there has been too much focus on persuasion and not enough on transparency. Practices going against transparency have been criticized within both HCI [2, 3, 5, 7, 10] and related fields [4, 11, 12].

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Such practices are thought to have greatly contributed to the *replication crisis* in social sciences and medicine, a crisis that has received popular press coverage and may harm the credibility of science.

In order to promote positive change, the authors of this SIG proposal started a “transparent statistics @ CHI” movement in 2016 (transparentstatistics.org). Two CHI events were organized: the CHI 2016 Special Interest Group on Transparent Statistics [8] and the CHI 2017 workshop on Moving Transparent Statistics Forward [9]. At these two events, a series of incremental changes were proposed for the CHI community, such as more specific author and reviewer guidelines and badges for transparent statistical practices. This new SIG aims to build upon the enthusiasm generated by these two events and move forward by furthering the development of *transparent statistics guidelines* for HCI.

The organizers and attendees of the CHI 2017 workshop began drafting guidelines for authors and reviewers in order to help improve the transparency and quality of statistical reports in the field. After the workshop, the authors of this new SIG proposal worked together to consolidate a first working draft of transparent statistics guidelines. The purpose of this new SIG is to present the working draft, solicit feedback from the CHI community, and engage existing and new contributors in further developing the guidelines. The SIG meeting format will engage a wider audience of CHI participants who are interested, but who may not necessarily have a strong background or motivation enough to participate in a workshop style as in 2017 (workshops also have fewer participants by necessity). This is especially important because we wish the guidelines to be usable by researchers who do not necessarily have strong statistical background

or interest, but still wish to adopt a transparent statistics approach. We also wish the guidelines to reflect the interests of the broader CHI community.

Guiding Principles for the Transparent Statistics Guidelines

The working draft of the transparent statistics guidelines is available at transparentstats.github.io/guidelines. The document starts by laying out general guiding principles for the guidelines themselves. The purpose of the transparent statistics guidelines is not to admonish an entire field of researchers for their existing practices or to attempt to shame them to do better. The multifaceted nature of HCI means practices will always vary, and a fixed set of DOs and DON'Ts would be both too brittle to change over time and too restrictive in the face of the various ways of generating knowledge in our field.

Instead, the guidelines aim to advance a vision of *transparent statistical communication* for the field. Whatever the methods used, we can at least provide guidance that makes the communication of those methods more transparent, that makes reproduction and replication of work easier, and that makes evaluation of work (e.g., by peer reviewers) easier and more fair. *Transparent statistics* is a philosophy of statistical reporting whose purpose is to advance scientific knowledge rather than to persuade. This quote from Ronald Fisher captures the essence of transparent statistics:

“we have the duty of [...] communicating our conclusions in intelligible form, in recognition of the right of other free minds to utilize them in making their own decisions.” [6].

The working draft lays out nine high-level guiding

principles for transparent statistics: (1) faithfulness to the data and phenomena studied, (2) robustness to departures from statistical assumptions, (3) resilience to statistical noise, (4) full explanations of analysis processes and reporting strategies, (5) clarity and accessibility of study reports, (6) preference for simplest analysis procedures, (7) avoidance of analysis decisions that are contingent on data, (8) pursuit of statistical power and precision, and (9) making study material available.

Guidelines on Specific Topics

In addition to the general guiding principles, the transparent statistics guidelines are designed around particular topics in statistics that are relevant to both authors and reviewers. At the CHI 2017 workshop, we developed a list of topics (such as experiment and analysis planning, effect sizes, p-values, Likert-scale data, data transformation, and Bayesian inference). At and after the workshop, we focused on developing a single topic—effect sizes—in order to work out issues of how to effectively structure guidelines for a particular topic. After working out the bugs and format with that first topic, we will develop chapters on the remaining topics.

The current draft of the guidelines is available at transparentstats.github.io/guidelines. For each topic, we settled on a structure that consists of a general *FAQ* (frequently asked questions) followed by a set of *exemplars*, which demonstrate analyses on hypothetical datasets and include analysis code where appropriate. The choices made in the exemplars are grounded on the FAQ and on the high-level guiding principles. The combination of a FAQ and exemplars constitute a *chapter* providing guidance on a specific topic (e.g., effect size). While these guidelines are meant to provide a path for HCI researchers to better conduct and report statistics, we acknowledge

that there are still unaddressed issues (e.g., local standards for sample sizes in HCI [1]), as well as purposefully excluded issues that only loosely couple with statistics and are therefore beyond the scope of our effort (e.g., finding good research questions, UI design, etc.).

At the SIG, we will briefly present the state of the guidelines and obtain feedback on them from participants. We will also solicit contributors interested in creating guidelines on topics other than effect size in order to expand the guidelines. To that end, we will also describe how to contribute to the guidelines.

Contributing to the Guidelines

The transparent statistics guidelines are meant to be a collaborative artefact that enjoys the consensus support of the CHI community. As such, it welcomes contributions and comments from anyone within the community. The guidelines are written in RMarkdown and hosted on Github. To lower the entry barrier and allow anyone to easily comment and contribute, the initial version of each chapter is developed on Google Docs, allowing writing and commenting directly with a WYSIWYG interface. This first stage typically consists of developing the FAQ part, and delineating an initial structure for exemplars. After the content is adequately stable, it is ported to RMarkdown and version-tracked on Github. At this stage, major contributions can be done by forking and creating pull requests, as in typical open source software development. Contributors with less technical background can also comment on the content by creating Github issues. This stage mostly focuses in developing exemplars, although the FAQ can keep being refined.

Before the release of a chapter, two reviewers with subject matter expertise from the CHI community will review the

chapter through Github's in-line reviewing/commenting interface. Then, to ensure usability, the chapter will be tested with other two members without subject matter expertise. Once a chapter is released, any member of the CHI community will have the possibility of endorsing it, even if they did not contribute. Releases are never final: the transparent statistics guidelines are meant to evolve over time and reflect evolutions in the methodological debate within and outside CHI.

A working draft of the guide for contributors is available at github.com/transparentstats/guidelines/wiki. The guidelines are developed under the CC-BY 4.0 license (for the text) and the MIT license (for the code). These licenses are flexible enough to allow any researcher to, e.g., use exemplar code to analyze their data and release their code as supplementary material.

Conclusion

We propose this SIG as an effort to continue our nascent *transparent statistics* movement and foster active development from interested researchers in the HCI community. Specifically, we will present a working draft of the transparent statistics guidelines and a working draft of the development process, both developed based on the outcomes of the CHI 2017 workshop. We will solicit members of the HCI community for feedback on the guidelines and on the processes, we will recruit volunteers for developing the guidelines further, and we will lay out a working plan for the future.

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Supplementary Material for CHI SIG on Transparent Statistics Guidelines

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Background of Organizers

The organizers of this workshop started the "transparent statistics @ CHI" movement (transparentstatistics.org). As part of this, they organized the CHI 2016 Special Interest Group on Transparent Statistics (Kay et al., 2016b) and the CHI 2017 Workshop on Moving Transparent Statistics Forward (Kay et al., 2017).

Chat Wacharamanotham is an Assistant Professor at the University of Zurich. He studies how scientists use statistics, both in conducting statistical analysis and in consuming statistical reports. His previous study shows that students learn statistical procedures better through a guided interactive analysis tool (Wacharamanotham, 2015). He can be found online at: zpac.ch/chat

Matthew Kay is an Assistant Professor in the University of Michigan School of Information working in human-computer interaction and information visualization. He studies the communication of uncertainty in domains like personal informatics, everyday sensing and prediction, and scientific communication. He has also published work advancing the use of Bayesian statistics in VIS (Kay and Heer, 2016) and CHI (Kay et al, 2016a). His website is: <http://www.mjiskay.com>.

Steve Haroz is a postdoctoral researcher at Sorbonne University. He researches how the brain perceives and understands visually displayed information, and he has experience with the experiment design and statistical practices in both computer science and psychology. Steve also maintains a list of InfoVis publications which include statistically analyzed quantitative experiments: steveh.co/experiments

Shion Guha is an Assistant Professor in the Department of Mathematics, Statistics and Computer Science at Marquette University. He studies the different aspects of privacy in social networks, often from a developing context and more recently, algorithmic accountability, transparency and harm, particularly in crime analysis. He has recently published methodological papers of interest to the HCI community in JASIST, GROUP, and Social Media+Society. His website is: www.shionguha.net

Pierre Dragicevic is a permanent research scientist at Inria since 2007, and studies information visualization (infovis) and HCI. He is interested in reforming statistical practice in these fields, with a focus on replacing dichotomous testing with estimation thinking. He gives regular talks (e.g., at the [BELIV 2014](#) biannual workshop and at the [BioVis 2016](#) conference) and publishes papers on the topic (Dragicevic et al, 2014, Dragicevic, 2016). He also maintains a Web page with reading material: www.aviz.fr/badstats

Communities to which this SIG will be of interest

We believe this SIG will be of interest to the following communities:

- HCI researchers and students who have some experience in conducting and analyzing user studies and endorse the values of transparent statistics. They may be interested in how they can **help advance statistical practice** in HCI and in how they can help shape new standards of practice for statistical communication in the field. From our previous SIG and Workshop, we already gathered 100+ interested members on the transparent statistics mailing list.
- HCI researchers and students whose primary focus is not statistics but who (perhaps begrudgingly) need to conduct studies and do statistics to validate/evaluate the output of their research. Such researchers are found across CHI and related communities (CSCW, Ubicomp, UIST, VIS, CogSci, etc.), and may include computer scientists, designers, psychologists, or e-health researchers. They are mostly concerned about **getting their ideas published** and having impact in real-world systems, all topics the guidelines aim to cover.
- HCI researchers and students who are interested in using the guidelines for educating themselves and **improving their methods** of statistical analysis and reporting.
- HCI reviewers and meta-reviewers who want to **write better reviews**, i.e., reviews that are fair and helpful to authors, and encourage and reward good statistical practice and transparency.
- Experts from other disciplines, who may be interested in **sharing their expertise** with the CHI community: psychologists, statisticians, methodologists, and medical researchers.

Assumed attendee background

We hope to attract students, researchers and practitioners spanning the CHI communities outlined above (CSCW, Ubicomp, UIST, VIS, CogSci, etc.), including statisticians and researchers with a strong background in statistics. We expect participants who already attended our CHI 2016 SIG or our CHI 2017 workshop and registered to our mailing list. Because our goal is both to engage experts to contribute to the transparent statistics guidelines and to get early feedback on these guidelines, we will not assume all attendees have a strong statistical background. Potential attendees with minimal statistical background will be able to contribute by testing the current version of the guidelines and its effect size exemplars in particular. We will ask these participants to bring their own data to the SIG session.

Approach for organizing and presenting the SIG

The SIG will be organized into two parts. The first part will be a brief presentation of the working drafts of *i)* the transparent statistics guidelines and *ii)* the guidelines' development process (before CHI, participants will be encouraged to read the documents, comment, and file git issues), followed by a plenary discussion about the collaboration and review process. The second part will be a breakout group to work on refining and testing the effect size guidelines.

- 5 min: Quick introduction to the “transparent statistics” initiative and a rough schedule.
- 20 min: Introduction to the current version of the guidelines and an overview of how to contribute. This will lead us to briefly describe an overview of the effect size guidelines and an opportunities for SIG participants to collaborate and contribute to the guidelines collocated. We will also discuss the collaboration process on Google Doc and Github, as well as the review and test process.
- 30 min: Breakout group:
 - For participants with statistical expertise: review and discuss the guidelines
 - Participants with less statistical background will work in pairs to test the guidelines by applying them to improve their own published paper. They will note down problems and potential improvements on a shared Google Docs.
- 25 min: Summarizing the progress and recruiting contributors for the guideline

For more details on these topics, see our extended abstract submission.

Plan to attract attendees

If accepted, the SIG will be announced to the 100+ members of the transparent statistics mailing list. In addition, we represent and have contacts in a diverse set of communities related to our proposal, including VIS (Dragicevic, Haroz, Kay), UIST (Dragicevic, Wacharamanatham), social computing and CSCW (Guha), UbiComp (Kay), psychology and cognitive science (Haroz), e-health (Kay), and statistics (Guha). Using our combined professional and social networks, we will reach out to attract additional attendees via:

- Social media (Facebook, Twitter, Foursquare)
- Community and departmental mailing lists (e.g. CHI, SOUPS, Cornell, Northwestern, UW, UM, INRIA, cognitive science)

The response to the 2016 SIG (which was standing-room only) and to last year's workshop (20 attendees) suggests that there is enough interest from the community to drive a successful SIG.

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