Web Credibility Research:
A Method for Online Experiments and Early Study Results

BJ Fogg[1], Jonathan Marshall[1], Tami Kameda[1], Joshua Solomon[1],
Akshay Rangnekar[2], John Boyd[1], Bonny Brown[3]

[1]Persuasive Technology Lab
CSLI, Stanford University
Stanford, CA 94309
bjfogg@stanford.edu

[2]Reactivity
1301 Shoreway, Suite 425
Belmont, CA 94002
akshay@reactivity.com

[3]Vividence Corp.
1850 Gateway Dr., Suite 500
San Mateo, CA 94404
bonny@vividence.com

ABSTRACT
Through iterative design and testing, we developed a procedure for conducting online experiments. Using this research method, we conducted two recent studies on Web credibility. The data from the first study suggest that Web banner ads reduce the perceived credibility of a Web page's content. The data from the second study show that attribution elements—in this case, author photographs—can also affect the credibility of Web content. This research method and our early results have implications for both HCI researchers and Web site designers.

Keywords
Web credibility, online research, Web banner ads, content attribution, captology, Web design, user studies

INTRODUCTION
Because many Web sites contain incorrect or misleading information, Web designers face increasing pressure to create highly credible sites [6,3]. However, little public research has investigated what causes people to believe information on some Web sites but not others.

One study has examined factors that affect consumer trust in e-commerce settings [1]—an area related to Web credibility. Another study has examined Web credibility directly, but it involved only a handful of participants [2]—far too few to draw robust conclusions. The largest study focusing directly on Web credibility is an online study of over 1400 people [4,5]; however, this was a survey, not an experiment.

No one has yet publicly conducted large-scale experiments to determine how different elements in Web design can affect user perception of Web content, specifically the believability of Web information.

Therefore, the goal of our research has been twofold: (1) to develop a method for running controlled experiments online, and (2) to study how specific Web site factors affect people's perception of Web credibility. This short paper describes our recent progress toward these goals.

A METHOD FOR RUNNING EXPERIMENTS ONLINE
Over the course of six months, we used an iterative design process to develop a Web-based method for running true experiments. This online system introduces participants to a study, secures informed consent, presents the experimental stimulus (Web pages with different variables manipulated), takes dependent measures, and stores results in a database.

Although creating this system required significantly more work than designing a traditional laboratory experiment, an online research method allows investigators to run studies quickly, while including participants from around the world.

GENERAL PROCEDURE
The general procedure for both experiments in this paper is as follows: Through their e-mail newsletter, Vividence Corp. invited subscribers to participate in an online study, linking them to our research site, www.webresearch.org. Once at this site, participants were randomly assigned to an experimental condition; they then proceeded with the usual steps of a controlled study: introduction, informed consent, stimuli exposure, dependent measures, and debriefing.

STUDY #1: BANNER AD EXPERIMENT
In the first study we investigated how banner ads changed people's perception of a Web page's content. Not reported here in detail due to length constraints, this experiment was a 3 (ad condition) X 3 (article quality) between-subjects design and included 164 participants.

We first pretested many banner ads and selected two for this study: one with high perceived reputability (an ad for Lexus cars) and one with low perceived reputability (an ad for gambling). We then ran the study as described in the "General Procedure" section. Table 1 shows some results.

Credibility Measure (The questions below have been shortened.)	Web Page w/ <u>High</u> Reputable Ad (mean)	Web Page w/ <u>Low</u> Reputable Ad (mean)	Statistically Significant?
How **believable** is article?	.30	.13	NS
How **trustworthy** is article?	-.36	-.76	**p = .11**
How **competent** is article?	.01	-.17	NS
How **credible** is article?	-.09	-.60	**p = .07**
How **unbiased** is article?	.30	.10	NS
How **expert** is article?	-.25	-.76	**p = .02**
Composite Measure (combining all six items)	.02	-.35	**p = .08**

Table 1: How banner ads affect credibility of Web content.

As Table 1 shows, banner ads influenced how people perceived Web information. The low-reputability banner ad reduced perceived credibility of Web content significantly more than did the high-credibility ad. This is the first public study to document this effect.

STUDY #2: ATTRIBUTION ELEMENTS EXPERIMENT

The second large-scale study investigated how attribution elements—specifically author photos and names—affected how people perceived Web information. This study was a full-factorial design and included 484 participants.

Again, we conducted the study as described in the "General Procedure" section. We pretested many photograph styles and naming formats to identify those most suitable for this research. Tables 2 and 3 present the main effects of author photos and author names on Web article credibility.

Credibility Measure (The questions below have been shortened.)	No Author Photo (mean)	Casual Author Photo (mean)	Formal Author Photo (mean)	Statistically Significant? (between groups)
How **believable** is article?	.70	.41	.92	**p = .03**
How **trustworthy** is article?	.17	-.17	.41	**p = .003**
How **competent** is article?	.35	.15	.67	**p = .02**
How **credible** is article?	.34	.15	.47	NS
How **unbiased** is article?	.76	.58	.63	NS
How **expert** is article?	.27	-.09	.47	**p = .009**
Composite Measure (combining all six items)	.42	.17	.60	**p = .02**

Table 2: How author photos affect credibility of content.

As Table 2 shows, a photograph of an author had significant effects on how people perceived the credibility of the article on the Web page. Specifically, a formal photograph of the author led people to believe the article more, to see it as more trustworthy, to find it more competent, etc., when compared to the same article displayed with an informal photograph. In short, the photograph style had a sweeping effect on perceptions of the article's credibility. This is the first study to show this effect.

Credibility Measure (The questions below have been shortened.)	No Author Name (mean)	Casual Author Name (mean)	Formal Author Name (mean)	Statistically Significant? (between groups)
How **believable** is article?	.44	.90	.51	**p = .02**
How **trustworthy** is article?	.17	.21	.03	NS
How **competent** is article?	.37	.36	.39	NS
How **credible** is article?	.21	.36	.31	NS
How **unbiased** is article?	.78	.70	.60	NS
How **expert** is article?	.19	.26	.17	NS
Composite Measure (combining all six items)	.36	.48	.32	NS

Table 3: How author names affect credibility of content.

Unlike an author's photograph, an author's name had only a limited effect on how people perceived the article, as shown in Table 3. Surprisingly enough, the article with the casual byline ("by Bobby Johnson") was perceived as more "believable" than the same article listing a formal name for the author ("by Robert M. Johnson, M.D."). The reason for this result is not yet clear. No other effects were found.

BRIEF OVERALL DISCUSSION AND IMPLICATIONS

The online research procedure described here is an early attempt to harness the Internet's power and reach to experimentally answer questions about Web credibility. We invite other HCI researchers to use this approach or to build on this foundation. (See www.webcredibility.org for details on our study designs, data analyses, and findings.)

The findings presented here are limited and preliminary. Much remains to be learned. We need to further analyze the data sets, such as examining other variables (demographics, experience, etc.) and testing for interactions.

Despite the early nature of our method and data, this study suggests implications for HCI research and Web design:

1. HCI practitioners can quickly test specific elements of Web design and get solid quantitative answers. Ads and attributions are just a beginning.

2. Online studies offer advantages in speed never before possible. Once set up, studies take hours to run, not weeks.

3. Online studies allow global reach, which is especially appropriate to questions about the Web.

4. Although banner ads are often said to be ignored, they are not transparent to users. Ads can reduce Web credibility in varying degrees.

5. Sites seeking credibility (e.g., those for health information) should allow only the most reputable ads to appear on their pages.

6. Users respond more readily to author photographs than to author names. Bylines may be relatively less important.

7. Not all author photos boost credibility; some reduce it. Designers should carefully select—and ideally pretest—photos of Web content contributors.

REFERENCES

1. Cheskin Research, S.A.S., *eCommerce Trust Study*. 1999. See www.studioarchetype.com/headlines/etrust_frameset.html

2. Critchfield, R. *Credibility and Web Site Design*, 1998. See www.warner.edu/critchfield/hci/critchfield.html

3. Fogg, B.J. and Tseng, H. *The Elements of Computer Credibility. Proceedings of the CHI99 Conference on Human Factors and Computing Systems*, 1999 (pp. 80-87), ACM Press.

4. Fogg, B.J., Marshall, J., Laraki, O., Osipovich, A., Varma, C., Fang, N., Paul, J., Rangnekar, A., Shon, J., Swani, P., & Treinen, M. Elements that Affect Web Credibility: Early Results from a Self-Report Study. *Proceedings of ACM CHI 2000 Conference on Human Factors in Computing Systems*, 2000 (pp. 287-88): ACM Press.

5. Fogg, B.J., Marshall, J., Laraki, O., Osipovich, A., Varma, C., Fang, N., Paul, J., Rangnekar, A., Shon, J., Swani, P., & Treinen, M. What Makes A Web Site Credible? A Report on a Large Quantitative Study. *Proceedings of ACM CHI 2001 Conference on Human Factors in Computing Systems*, 2001. ACM Press.

6. Morkes, J. and Nielsen, J., *Concise, Scannable and Objective: How to Write for the Web,* 1997. See www.useit.com/papers/webwriting/writing.html