

A Tool for Supporting Web-Based Empirical Research: Providing a New Basis for Web Design Guidelines

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Overview

- Current basis for Web design guidelines
- Next step: remote studies
- Difficulties
- Our solution: a holistic research tool
- Implications for research

Basis for Web Design Guidelines

- Expert evaluations
- Usability lab testing
 - Eyetracking
- Surveys

Next Steps

- Rigorous, externally valid, empirical research of online behavior
 - Remote, Web-based studies
 - Large samples
 - Real users in real time/space
 - Comprehensive measurements
(behavior, performance, perceptions)

Conducting Remote Studies

- Our Internet-based research process:
 - Identify adaptable site
 - Develop experimental conditions and measurement materials
 - Instrument test site
 - Run pilot study
 - Run series of final trials
 - Analyze data

Our Study: Hyperlink Wording

- Effect of generic, informative, and intriguing link labels on users' browsing behavior and comprehension

Link Wording		
Generic	Informative	Intriguing
Volcanoes	Samoa's Volcanic Origins	Samoa's Fiery Past
Biodiversity	Native Animal Diversity	Tropical Menagerie
Filariasis	Blood-Borne Disease	Insidious Blood Worms

Informative link wording

Intriguing link wording

Generic link wording

The image shows three overlapping browser windows from Microsoft Internet Explorer, each displaying a different link wording strategy for a 'Natural History Guide To American Samoa' website. Red arrows point from the labels above to the respective windows.


- Informative link wording:** The first window shows a sidebar with a list of categories: Marine (Damaged coral reefs, Overharvested giant clams, Long-lived reef fish, Fagatele Bay Marine Sanctuary, Reef-dwelling sea worms), Birds (Many-colored fruit doves, Insectivorous birds and bats, Unique native birds), Terrestrial (Aerial-rooting banyan trees, Fruit-eating bats, Samoa's volcanic origins, Native animal diversity, Wildlife food sources, Non-native pest species), Insects (Blood-borne disease, Mosquito-borne virus, Insect repellents), and People (American Samoa's history, Traditional Samoan culture). At the bottom, a link reads "Proceed to survey (after having browsed for 15 minutes)".
- Intriguing link wording:** The second window shows a sidebar with categories: Terrestrial (Otherworld invaders, Tropical menagerie, Flying foxes, Strangler figs, Samoa's fiery past, Nature's picnic basket), Marine (Secluded sanctuary, Ancient reef-dwellers, Solar-powered clams, Tasty worms, Snow-dusted reefs), Insects (Insidious blood worms, Bug busting, Jungle fever), Birds (Samoa's royal birds, Tiny forest jewels, Deadly predators), and People (The Samoan Way, The Samoan Saga). At the bottom, a link reads "Proceed to survey (after having browsed for 15 minutes)".
- Generic link wording:** The third window shows a sidebar with categories: People (Local history, Local culture), Insects (Insect avoidance, Dengue, Filariasis), Terrestrial (Bats, Banyan trees, Volcanoes, Animal foods, Biodiversity, Introduced species), Birds (Manu'an birds, Insect eaters, Fruit doves), and Marine (Giant clams, Coral reefs, Marine sanctuary, Sea worms, Reef fish). At the bottom, a link reads "Proceed to survey (after having browsed for 15 minutes)".

The rightmost window is a full page titled "Manu'an birds". It contains the following text:

Manu'an birds

The Manu'a Islands are famous for [local culture](#) and spectacular beauty, and they are an important part of [local history](#), but the wildlife is also special. There are four kinds of birds living in Manu'a that do not occur on Tutuila.

The most beautiful of these is Samoa's only parrot, the *segavao*, or blue-crowned lory. This is a tiny jewel of a bird, only 7 inches long, but colored with emerald green back and wings, ruby red face and throat, and a sapphire blue crown. *Segavao* often come in to villages to feed on the nectar of coconut (*niu*) and coral tree (*gatae*) flowers, but they are not easy to see in spite of their bright colors. Your first clue to their presence is often their high-pitched whistles.



Blue-crowned Lory (*segavao*)

Used with permission from Dick Watling

Another special bird of Manu'a is the *sega o le vau*, the lesser (Fiji) shrikebill. This is a charcoal-grey bird with tiny white corners on its tail. This bird is found nowhere else in the Samoan islands. *Sega o le vau* are usually heard before they are seen, as they often make a loud chatter as they poke through dead vines or *ie'ie* leaves. These birds often ignore people, and if you sit very still they will sometimes feed within arm's reach.

The spotless crane is a small black bird that is extremely rare and has

Remote Studies: Problems

- Common difficulties:
 - Generating and modifying test sites and surveys
 - Tracking dependent measures of interest
 - Interpreting data from log files
 - Aligning data across servers and formats
 - Exporting data to standard software
- Existing solutions: partial or high effort

Our Solution: Holistic Tool

- Set of PHP and Perl scripts that...
- Supports design, management, and conduct of remote experiments
- Streamlines:
 - Development of experimental materials
 - Data collection
 - Data analysis

Implications: Design

- All experimental conditions generated from single code source
 - e.g., without tool, recent study would have required >500 hand-coded changes to implement 5 conditions across a 19-page Web site
- Site-wide changes easily implemented
- Adding or removing conditions trivial
- Survey design/revision was simple

Implications: Measurements

- Allowed ID of specific links clicked
- Bypassed tedious log file analysis
 - Tracked by assigned ID, not IP address
- Stored path and survey data as single unit per participant

Implications: Data Analysis

- Data extraction facilitated by simple data file structure
- Data easily processed with familiar applications: SPSS, Excel, Access, etc.
- Relationships easily identified among behavior, performance, perceptions

Implications: Logistics

- Remote participation
- No special software required
- Single URL distributed
- Conditions automatically, randomly, and transparently assigned
- Data collected transparently
- Aberrant behavior easily identified

Implications: Research

- Tool facilitated a remotely-conducted, naturalistic study
 - Comprehensive measurements
 - Statistically significant results
 - Externally valid findings
 - Proof of concept for conducting online studies remotely

Moving beyond the usability lab offers a new basis for Web design guidelines

For Further Information

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