POIR 613: Computational Social Science

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Today

1. Reminder: project idea due in 10 days
   - One-paragraph summary of your project: research question, argument/hypotheses, methods/data. Can be tentative.
   - Due via email.
2. Experimental research in the digital age
3. Solutions for last week's challenge
4. Webscraping

Experimental research in the digital age

Experimental research in the digital age

Chen & Konstan (2015): Field experiments combine the control of laboratory experiments (high internal validity) with the generalizability of a real setting (external/convergent validity).

Challenge: cost, particularly if scale is sufficient to study high-variance social phenomena.

Digital technologies offer practical and cost-effective venues for conducting field experiments (*aka* **A/B tests**).

Given sufficient access and existence of software that allows randomization, researchers can study both short- and long-term effects of manipulations

How Obama raised $60 million using experiments

How Obama raised $60 million using experiments

6 Media variation $\times$ 4 button combinations $=$ 24 combinations

Which one do you think will get a higher conversion rate?

How Obama raised $60 million using experiments

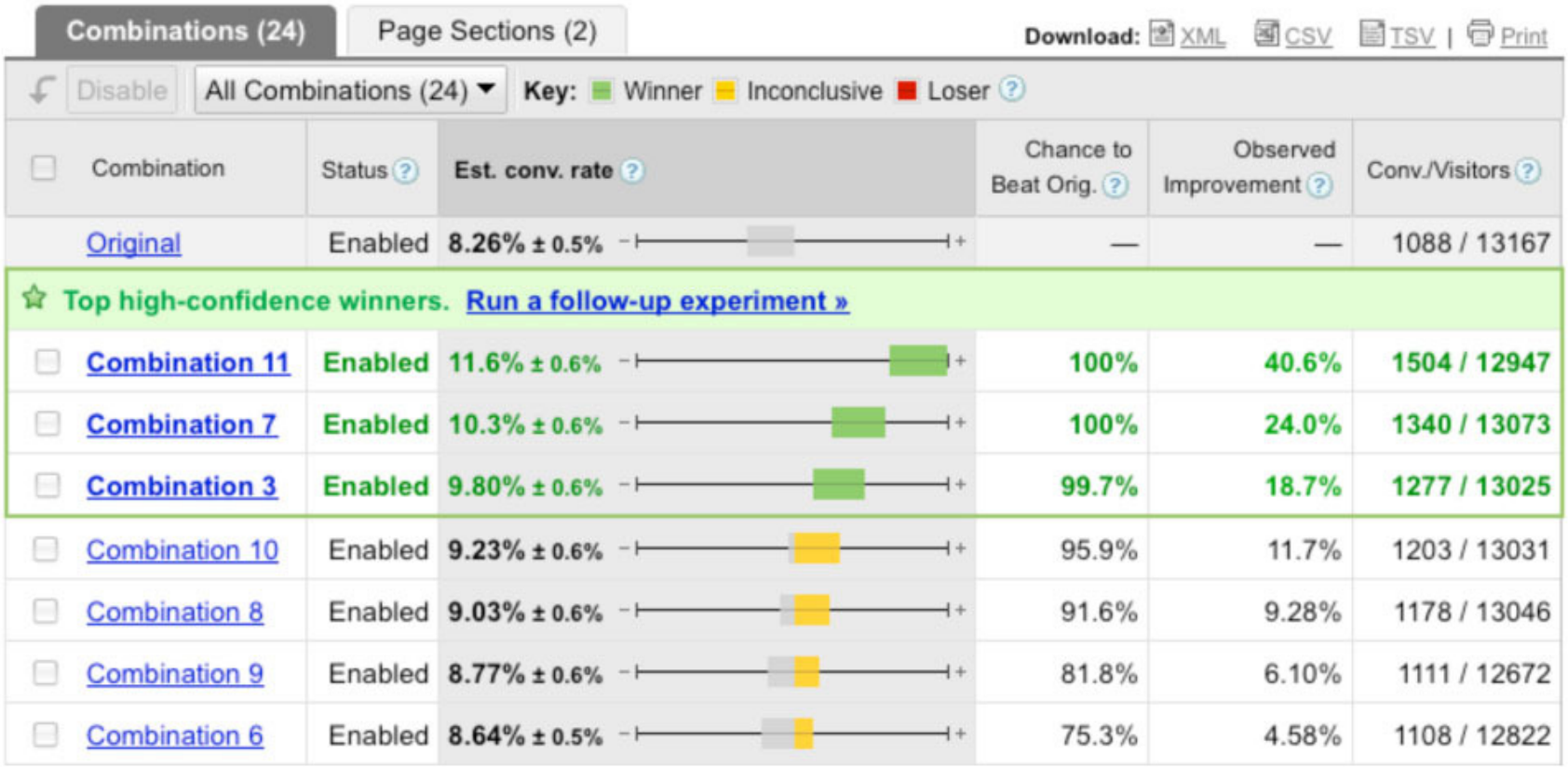
Combinations (24) | Page Sections (2) | Download: XML CSV TSV | Print

Relevance Rating	Variation	Est. conv. rate	Chance to Beat Orig.	Observed Improvement	Conv./Visitors
Button	Original	**7.51%** ± 0.2%	—	—	5851 / 77858
5 / 5	Learn More	**8.91%** ± 0.2%	100%	18.6%	6927 / 77729
	Join Us Now	**7.62%** ± 0.2%	73.5%	1.37%	5915 / 77644
	Sign Up Now	**7.34%** ± 0.2%	13.7%	-2.38%	5660 / 77151
Media	Original	**8.54%** ± 0.2%	—	—	4425 / 51794
5 / 5	Family Image	**9.66%** ± 0.2%	100%	13.1%	4996 / 51696
	Change Image	**8.87%** ± 0.2%	92.2%	3.85%	4595 / 51790
	Barack's Video	**7.76%** ± 0.2%	0.04%	-9.14%	3992 / 51427
	Sam's Video	**6.29%** ± 0.2%	0.00%	-26.4%	3261 / 51864
	Springfield Video	**5.95%** ± 0.2%	0.00%	-30.3%	3084 / 51811

Outcome variable: sign-up rates

Dashboard shows sign-up rates for each separate variation

How Obama raised $60 million using experiments



Combinations (24) | Page Sections (2) | Download: XML CSV TSV | Print

Disable | All Combinations (24) | Key: Winner Inconclusive Loser

Combination	Status	Est. conv. rate	Chance to Beat Orig.	Observed Improvement	Conv./Visitors
Original	Enabled	8.26% ± 0.5%	—	—	1088 / 13167
Top high-confidence winners. Run a follow-up experiment »					
Combination 11	Enabled	11.6% ± 0.6%	100%	40.6%	1504 / 12947
Combination 7	Enabled	10.3% ± 0.6%	100%	24.0%	1340 / 13073
Combination 3	Enabled	9.80% ± 0.6%	99.7%	18.7%	1277 / 13025
Combination 10	Enabled	9.23% ± 0.6%	95.9%	11.7%	1203 / 13031
Combination 8	Enabled	9.03% ± 0.6%	91.6%	9.28%	1178 / 13046
Combination 9	Enabled	8.77% ± 0.6%	81.8%	6.10%	1111 / 12672
Combination 6	Enabled	8.64% ± 0.5%	75.3%	4.58%	1108 / 12822

Dashboard shows sign-up rates for each separate variation

The winner

Original sign-up rate: 8.26%
New sign-up rate: 11.6%
Change: +40.6 lift in sign-up rate

10MM people signed-up through splash page during campaign

Without experiment, number would have been 7.2MM

That's 2.8MM fewer email addresses

Average donation per email address is $21

2.8MM x $21 = $60MM !!!

Experimental research in the digital age

Experimental technologies for online interventions:

1. **Email and text messages**
   - More likely to get subjects' attention
   - e.g. Blair *et al* (2017): randomized text messages in India to encourage people to report corruption
2. **Modified web interface**
   - Manipulation: platform features, exposure to information, display of specific web elements, etc.
   - e.g. Bakshy *et al* (2012): social cues on FB ads
3. **Bots**
   - Program or script that makes automated requests
   - e.g. Munger (2016): reducing harassment on Twitter
4. **Add-ons**
   - Additional software that nudges or tracks subjects
   - e.g. Guess (2016): web tracking software to observe individuals' news consumption in response to monetary encouragement to seek information

Experimental research in the digital age

What can go wrong? (And potential solutions)

1. Logging errors: covariate balance in pre-treatment variables, A/A tests
2. Novelty effects: longer experiments
3. Multiple testing: Bonferroni correction
4. High significance due to large sample sizes: Cohen's D
5. SUTVA (interference between units): better research design
6. The 'free beer' problem: social science theory!

Side note: power calculations

- **Power** is the probability of detecting a specified *effect size* with specified sample characteristics (*size* and *variability*)
- Four interrelated components:
  1. Sample size
  2. Effect size you want to detect
  3. Desired significance level (false positive rate you're fine with)
  4. Power
- Before you run an experiment, you can compute necessary sample size assuming other 3 components:

```
> power.prop.test(p1=0.30, p2=0.35,
sig.level=0.05, power=0.80)
```