

Conversion Rate Optimization Through Evolutionary Computation

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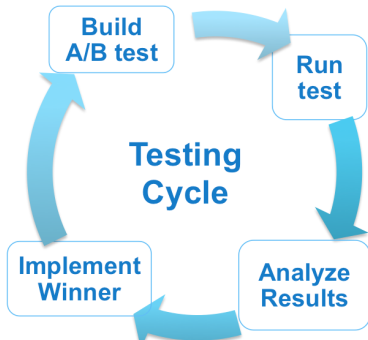


Conversion Rate Optimization (CRO)



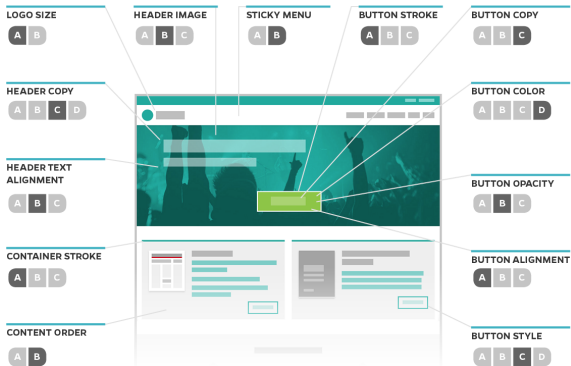
- ▶ How to design effective web pages
 - ▶ Convert casual web browsers to paying customers
- ▶ “Holy grail” for the e-commerce industry
 - ▶ \$72B spent in 2016 to drive traffic; Conversion rates 2-4%
 - ▶ CRO grown three-fold in 3 years
- ▶ → *A real-world problem that people care about*

State of the Art: Human Design



- ▶ CRO has develop into “Conversion Science”
 - ▶ A/B testing is the main tool
 - ▶ Companies provide tools: Optimizely, VWO, Adobe,...
- ▶ → *CRO is a difficult problem*
- ▶ → *Significant human expertise exists*

Evolutionary CRO with Ascend



- ▶ Evolving the web page designs (with GAs)
 - ▶ Humans define the search space
 - ▶ Candidates tested on real users in real time
- ▶ EA discovers interactions that humans miss
 - ▶ New cognitive science!
- ▶ → *What works is poorly understood*
- ▶ → *Opportunity for discovery*

Ascend Case Study

SEARCH PROGRAMS

STEP ONE
Bachelor's

STEP TWO
Healthcare

STEP THREE
Select a Program

SEARCH NOW

SPONSORED

Control

CHOOSE A PROGRAM

STEP ONE
Bachelor's

STEP TWO
Healthcare

STEP THREE
Select a Program

FIND MY PROGRAM

SPONSORED

Candidate 70: 46.6% ↑

- "Choose a Program" Banner Text
- Pink Form Background and Border Color
- White Submit Button Background Color
- "Find My Program" submit button text
- Black submit button text color

CHOOSE A PROGRAM

STEP ONE
Bachelor's

STEP TWO
Healthcare

STEP THREE
Select a Program

FIND MY PROGRAM

SPONSORED

Candidate 41: 41.7% ↑

- "Choose a Program" Banner Text
- Lime Green Form Background and Border Color
- White Submit Button Background Color
- "Find My Program" submit button text
- Black submit button text color

CHOOSE A PROGRAM

STEP ONE
Bachelor's

STEP TWO
Healthcare

STEP THREE
Select a Program

SEARCH PROGRAMS

SPONSORED

Candidate 93: 38.3% ↑

- "Find Programs" Banner Text
- Purple Form Background and Border Color
- Blue Submit Button Background Color
- "Search Programs" submit button text
- Black submit button text color

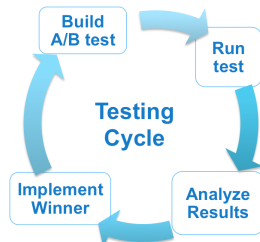
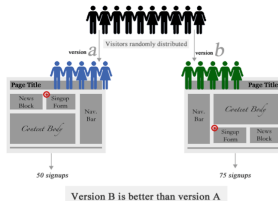
- ▶ A lead generation site for educational programs
 - ▶ Already optimized by human experts
- ▶ Ascend found several solutions 38-46% better
 - ▶ An "ugly widget generator"
 - ▶ Improvement verified through customer A/B tests
- ▶ → *A compelling arms-length evaluation*

Human-Competitiveness Industrialized

Industry	# of Values	# of Elements	# of Combinations	Length of Test	CVR Increase
Leading European Travel Site	18	9	512	8 weeks	43%
Digital Commerce Payments	20	9	1,152	3 weeks	9%
Intimacy Apparel Retailer	15	4	160	8 weeks	38%
Top AU Beauty Retailer	28	8	6,912	8 weeks	6%
Classic Car Reseller	30	8	28,800	3 weeks	434%
Leading Mobile Network	42	9	1,296,600	6 weeks	75%
Comparison Shopping	40	8	241,920	9 weeks	31%
Annuities	11	3	48	12 weeks	24%
Flower Retailer	16	8	256	8 weeks	35%

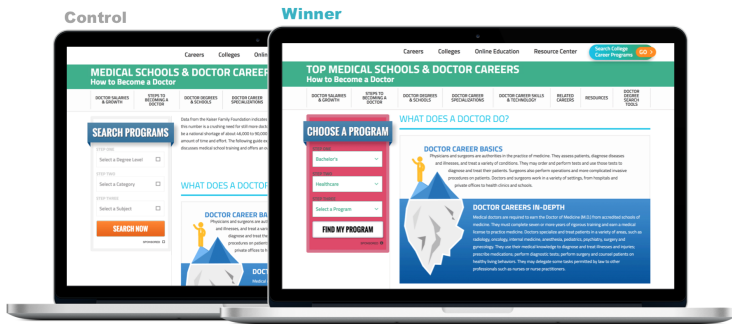
- ▶ Ascend solves a wide range of CRO problems
 - ▶ Different search space sizes
 - ▶ Different traffic volumes
 - ▶ Different industries
- ▶ → *A general, comprehensive method for CRO*

Human-Competitive Criteria



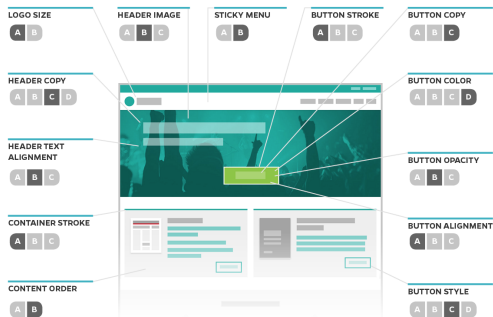
- ▶ (E) “A long-standing problem with increasingly better human solutions”
 - ▶ Iterative A/B testing process
- ▶ (F) “The result is an achievement in its field”
 - ▶ Improves on best result of professional human experts
- ▶ (G) “A problem of indisputable difficulty”
 - ▶ An entire science/engineering field focused on it

Why Is Ascend Awesome?



1. Evolution solves an important real-world problem
 - ▶ People pay to get evolution results
 - ▶ → *A new level of arms-length evaluation*
2. It industrializes human-competitiveness
 - ▶ Improves performance routinely, over and over again
 - ▶ → *A new level of human-competitive results*
3. It empowers people to do better (instead of replacing them)

Conclusion



- ▶ CRO is a challenging problem that people care about
- ▶ EA beats human designs routinely
- ▶ → *EA is transforming a whole field of science/engineering*