



The Science of Adometry

Scientific Fractional Attribution

Shi Zhong, Ph.D.

Nena Marín, Ph.D.

October 12, 2011

About Adometry

Proven Technology

- **First use of data mining & machine learning**
 - Processing BILLIONS impressions/month
 - Click score: currency of the CPC industry
- **Pioneered the use of effectiveness metrics**
 - Improving display ad ROI
- **Advanced development in ad analytics**
 - Audience verification
 - Dynamic fractional attribution
 - Cross channel optimization

Proven Customer Relationships

Microsoft

facebook

Expedia.com

Local.com

at&t

moxy media

The All New lendingtree

ebay

looksmart

intel

adknowledge

TURN

demand MEDIA

LYCOS

CreditCards.com

Attribution Methodology Overview

- The Problem
- Existing Attribution Solutions
- Adometry's Model
- Dealing with Data Sparsity
- Validating the Model
- Actionability of the Attribution Model

Attribution: Why Science Matters?

- Current “Last Event Attribution” is flawed
- Marketers need a new scientific methodology to measure “ACTUAL” performance

How much should be spent on Display vs. Search?

Which Campaigns are performing well?

What frequency cap per site?

When should I begin my remarketing campaigns?

Existing Attribution Solutions

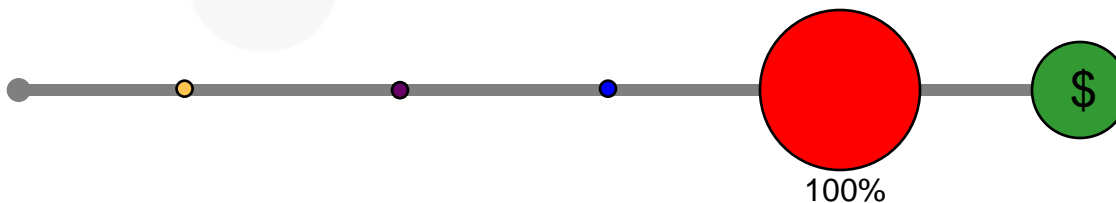
- Data silos
 - Channels & even campaigns evaluated in isolation
- Multi-touch attribution modeling is not scientific
 - Attribution models are arbitrary
- Attribution solutions look at a fraction of the data
 - Converting paths only or heavy sampling
- Result: Marketers don't understand "ACTUAL" performance

Characteristics of a Superior Solution

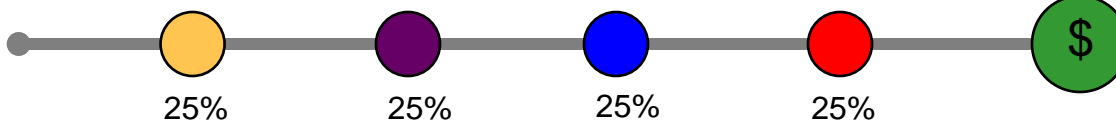
- **Analyze *100% of data*:**
 - Converting & non-converting data, no sampling
- **Methodology must be *Scientific*:**
 - Probability based model
- **Fractional weights must be *Data Driven*:**
 - Data will tell you the importance of each event

Different Attribution Models

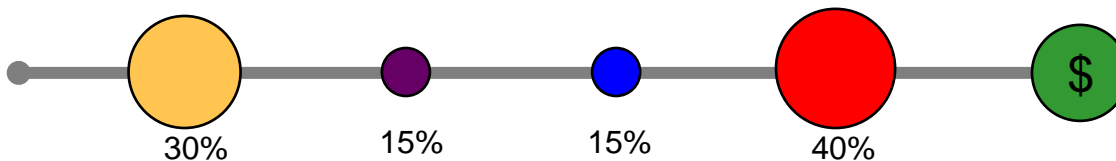
Last Event



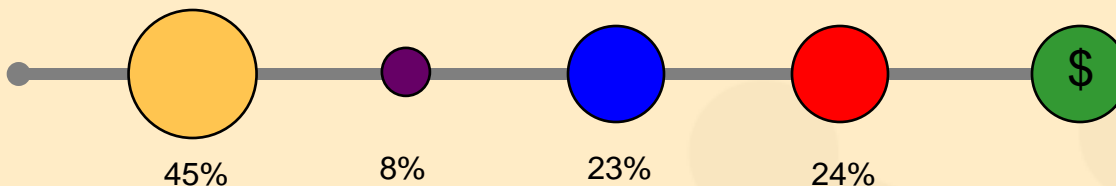
Even



Ad-Hoc
(fixed weights)



Adometry
Data Driven
(Probabilistic)



Question: How Important Is Each Event?

A user had events E_1, E_2, E_3, E_4 and then converted.



What fractional credit w_i goes to each E_i ,

$$\text{subject to } \sum_{i=1}^4 w_i = 1$$

Answer: A Ratio of Conditional Probabilities

A measure of importance of each ad “event” in the sequence.

P(Conversion for Sequence)



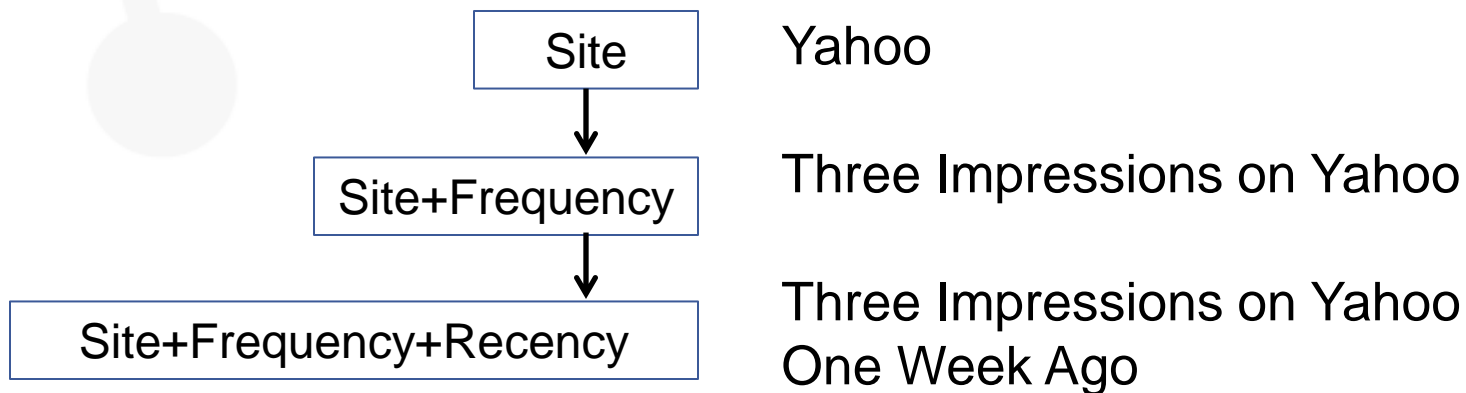
P(Conversion for Sequence *without* E_1)



$$w_1 \propto \frac{P(\text{Conversion for Sequence})}{P(\text{Conversion for Sequence without } E_1)}$$

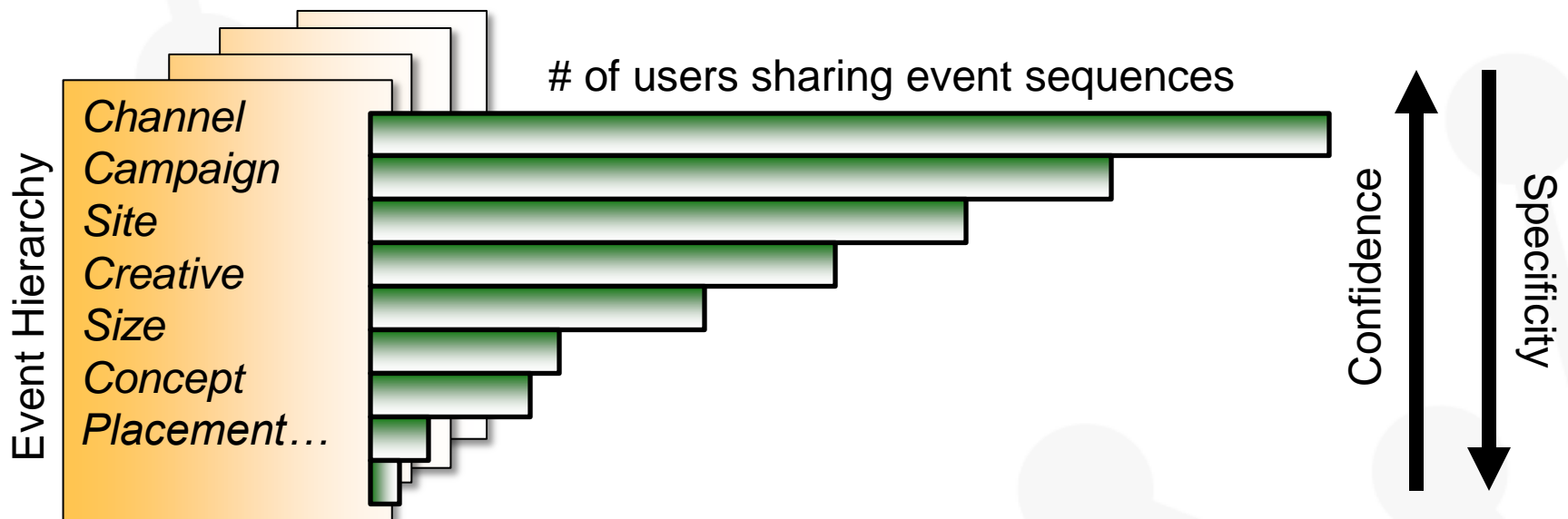
Event Definition

Each event can be defined at different granularity levels of an “event hierarchy”



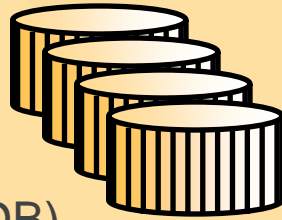
Robustness From Hierarchy

- At more granular levels
 - the model is more specific, but
 - the model confidence is lower due to data sparsity



Attribution Computational Architecture

Big Data
(column oriented DB)



Massive Computational Parallelism



By User Group



By Event Type



By Time Slice

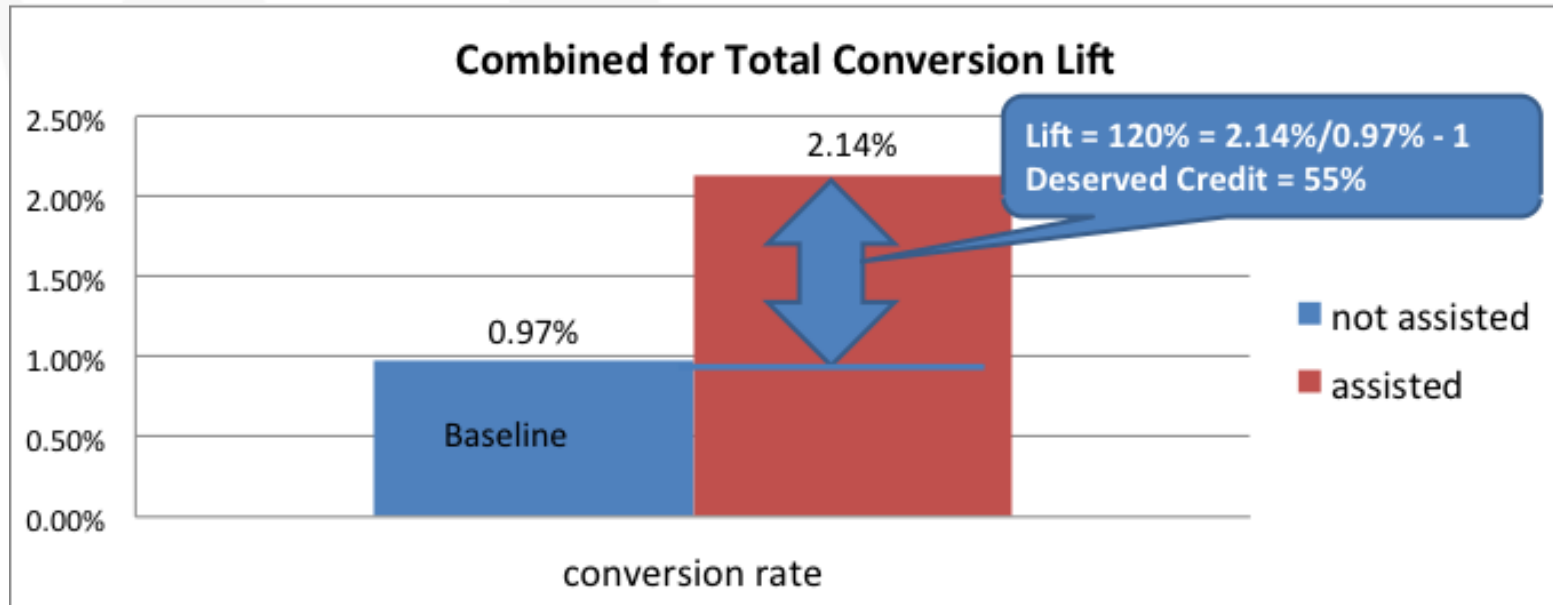
Validation Methodology with Lift Analysis

Q: In aggregate, how much credit should be given to assisting events prior to “Last Click”?

A: Measure “Lift” of assisting events on “Last Click” conversion rate

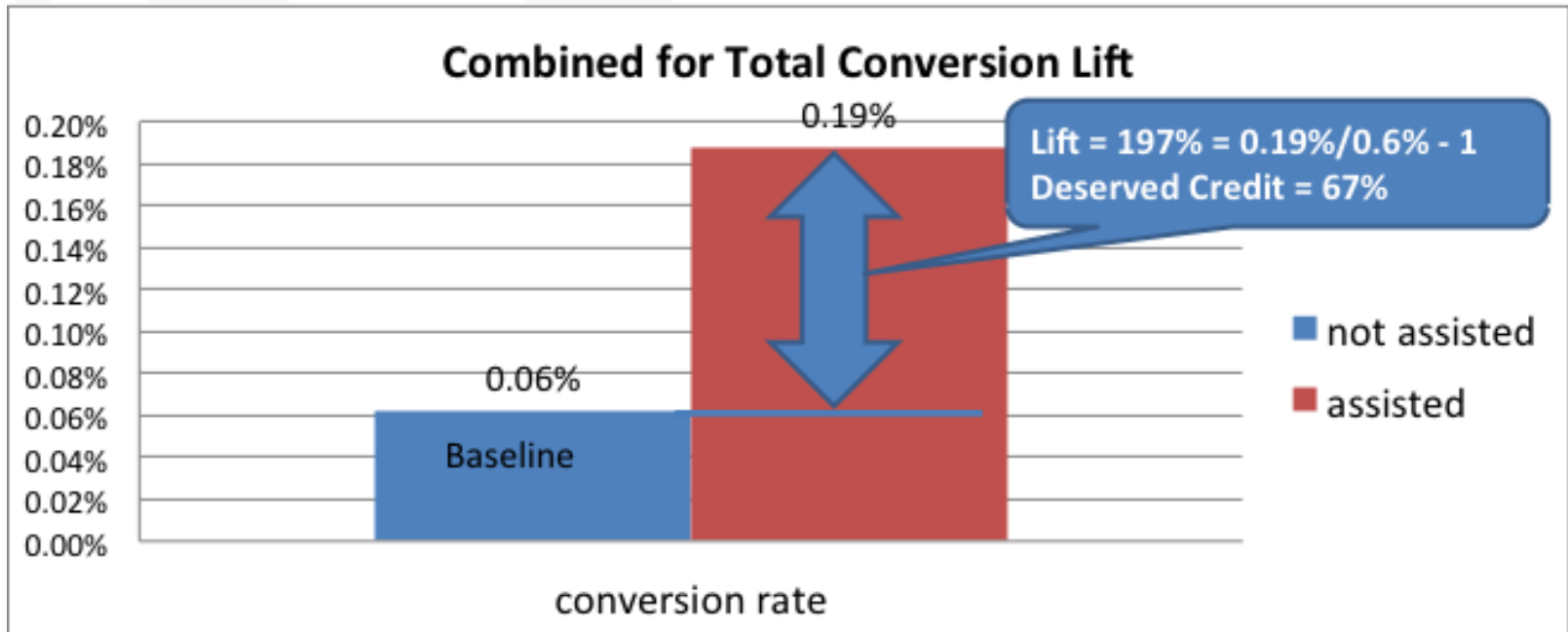
- Calculate assisting credit from lift
 - ✓ $\text{Lift} = (\text{CR1} / \text{CR0}) - 1$
 - CR1 = assisted conversion rate
 - CR0 = unassisted baseline conversion rate
 - ✓ The delta ($\text{CR1} - \text{CR0}$) should be credited to assisting events
 - $\% \text{ Assisting Credit} = (\text{CR1} - \text{CR0}) / \text{CR1} = \text{Lift} / (1 + \text{Lift})$

Example #1: Google Content Network



- Measure “assist” value of impressions prior to last click on GCN
 - Roughly **56% conversion credit** should go to other sites
 - Last click model gives 100% credit to Google Content Network
 - Our fractional attribution model gives **54% total credit** to other sites

Example #2: YouTube



- Measure “assist” value of impressions prior to last click on *YouTube*
 - Roughly **67% conversion credit** for these users should go to other sites
 - Last click model gives 100% credit to *YouTube*
 - Our fractional attribution model gives **66% total credit** to other sites

Quantifying Assisting Credit from Display

Attribute by **adometry**

Dashboard **Cross Channel** Reach & Frequency Attribution Optimization Download Reports

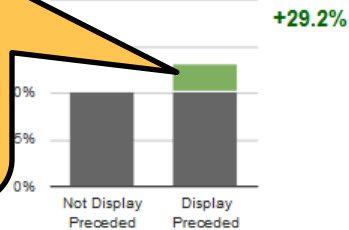
Conversion Summary **Lift Report**

Conversion Types

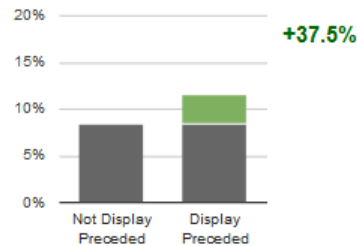
Quote Finish

Display-assisted Search has significant lift

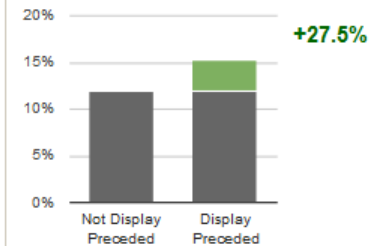
Search (All Events)
Visitor Conversion Rate



Organic Search Events
Visitor Conversion Rate



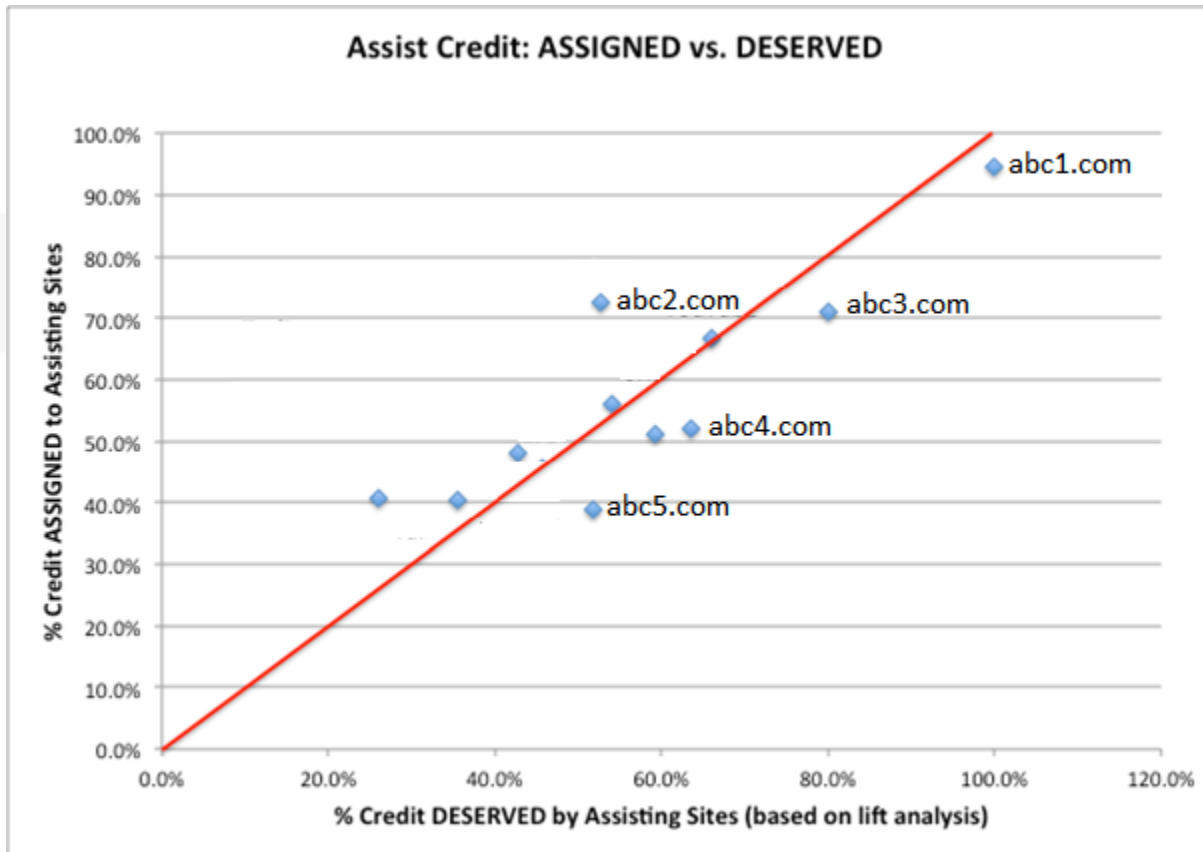
Paid Search Events
Visitor Conversion Rate



	Search (All Events)		Organic Search Events		Paid Search Events	
	Not Display Preceded	Display Preceded	Not Display Preceded	Display Preceded	Not Display Preceded	Display Preceded
Increase in Visitor Conversion Rate		+29.2%		+37.5%		+27.5%
Average Credit Display Deserves in Conversion Paths with Search and Display	22.6%		27.3%		21.6%	
Total Users	441,148	538,322	205,556	271,066	223,569	242,554
Converted Users	44,717	70,504	17,216	31,209	26,846	37,135
Visitor Conversion Rate	10.1%	13.1%	8.4%	11.5%	12.0%	15.3%

Display Assisted Lift Analysis

- Deserved credit values computed based on lift analysis
- Assigned credit values based on our fractional attribution



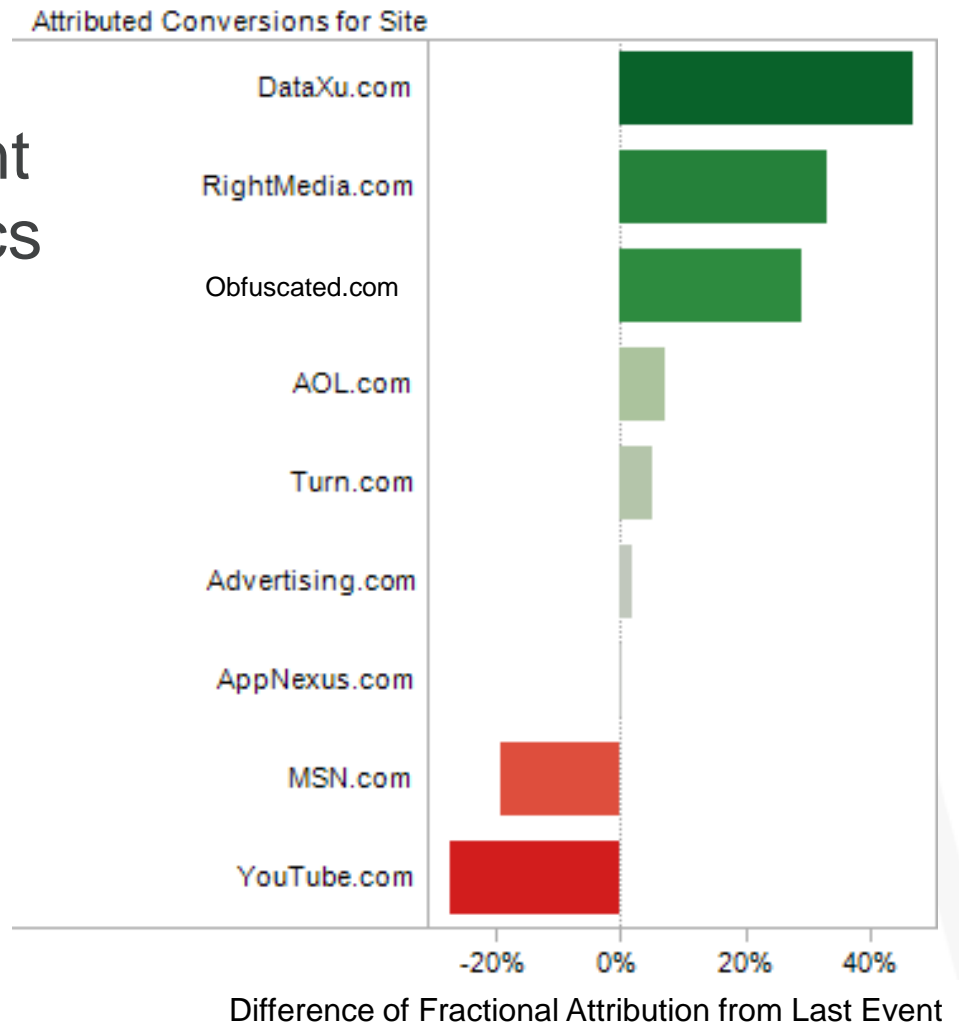
Examples

Actionable Insights

- Example #1
 - How the KPI metrics are different from last event
- Example #2
 - How these differences can lead to wrong decisions
- Example #3
 - How wrong metrics lead to wrong optimizations

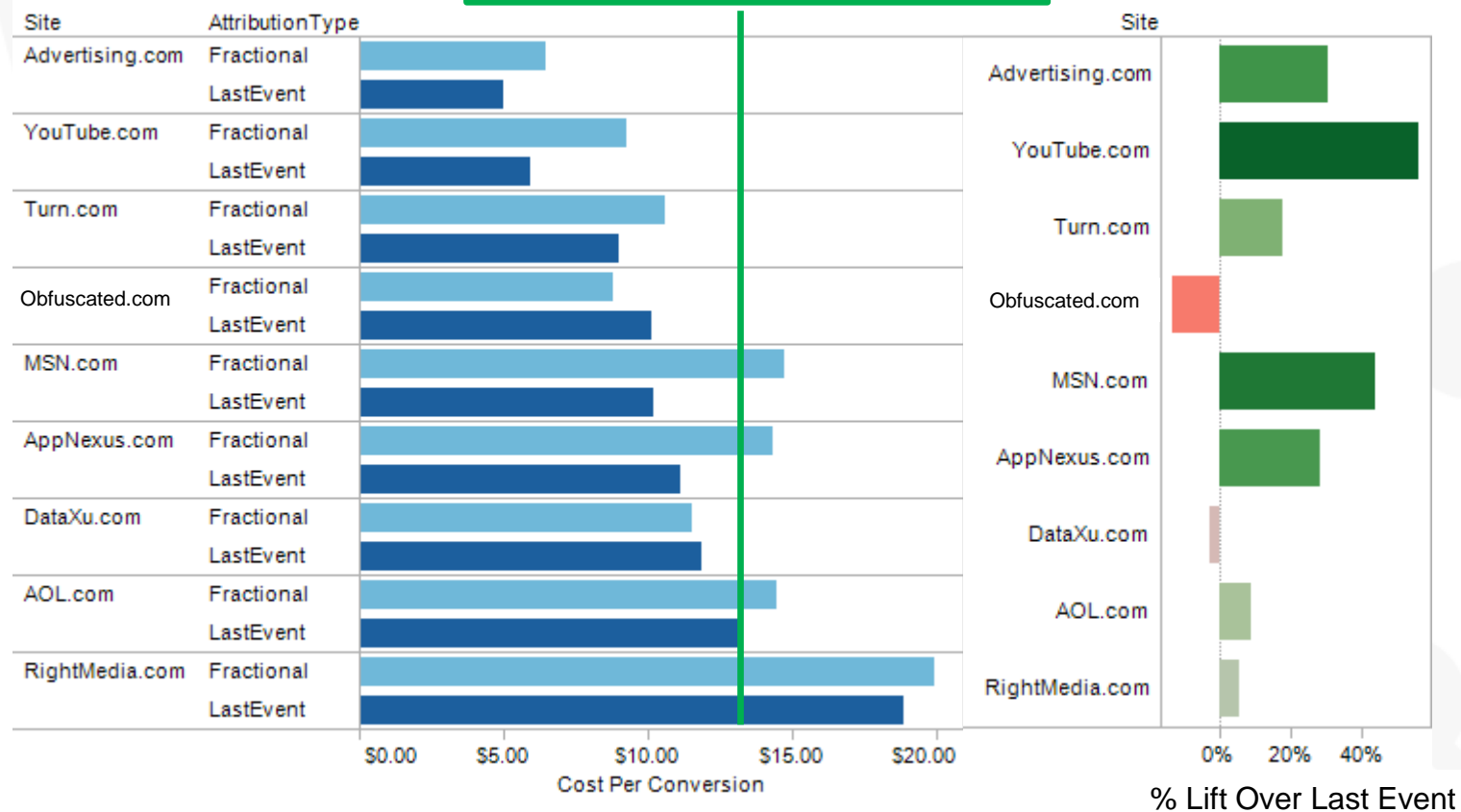
Example #1: Fractional Vs. Last Event

- Fractional Attribution metrics provide different & more accurate metrics
- High/Low performing sites are different
- Optimization decisions will be different



Example #2: Wrongly Calculated Metrics = Wrong Decisions

Target Cost per Conversion



Example #3:

Wrongly Attributed Revenue = Wrong Optimizations

userid	publisher	date	creative size	Adometry Attribution		last event revenue
				credit	revenue	
225	MSN.com	5/2/2011 17:33:06	160x600	4%	\$ 1.62	\$ -
225	Advertising.com	5/5/2011 20:10:40	300x250	10%	\$ 4.52	\$ -
225	appnexus	5/6/2011 4:26:22	160x600	9%	\$ 3.72	\$ -
225	Youtube	5/12/2011 7:07:02	300x250	8%	\$ 3.28	\$ -
225	DataXu	5/16/2011 11:09:12	728x90	10%	\$ 4.34	\$ -
225	Turn.com	5/18/2011 19:57:40	728x90	12%	\$ 5.42	\$ -
225	Turn.com	5/18/2011 19:58:49	728x90	12%	\$ 5.07	\$ -
225	appnexus	5/23/2011 5:47:10	160x600	9%	\$ 4.06	\$ -
225	MSN.com	5/23/2011 13:44:22	160x600	6%	\$ 2.70	\$ -
225	Anonymous.com	5/23/2011 13:44:39	160x600	21%	\$ 8.96	\$ 43.70

Revenue Allocation by Publisher	Adometry Attribution		Last Event
Advertising.com	10%	\$ 4.52	\$ -
appnexus	18%	\$ 7.78	\$ -
DataXu	10%	\$ 4.34	\$ -
MSN.com	10%	\$ 4.32	\$ -
Turn.com	24%	\$ 10.49	\$ -
Youtube	8%	\$ 3.28	\$ -
Anonymous.com	21%	\$ 8.96	\$ 43.70

Overestimated
“Anonymous.com”
revenue / sale &
Underestimated
the rest

Why Attribution Science Matters

Increased Profits

Better Optimization

Better Planning

Better Insights

Adometry Attribution



Questions?

info@adometry.com

Ad Analytics

Improving Online Ad Performance

Validate

Attribute

Verification

Ad verification

- IO compliance
- Brand safety
- Effectiveness metrics

Audience verification

- Reach & frequency
- Demographics

Attribution

Fractional attribution

What really drives conversion

Cross channel

- Display
 - campaigns
 - sites
 - placements
- Search (SEM and SEO)
 - campaigns
 - sites
 - keyword groups
- Email

Optimization

Campaign optimization

Reallocate spend to improve results

Optimize for KPIs

- Conversions
- Unique visitors
- Reach
- Searches



Thank You!

Next Webinar, November 2, 2011

2:00 pm – 3:00 pm EST

The Science of Adometry: Optimization!

[Register Today!](#)