

A woman in silhouette is shown in profile, holding a glowing orb in her hand. The background is a warm sunset or sunrise with a bright sun low on the horizon. The overall color palette is dominated by oranges and yellows.

Delusion in Attribution:

Caveats in Using Attribution for Multimedia Budget Allocation

Prof Harald van Heerde

Google Analytics Solutions | Attribution

datalicious

OPTIMAHUB

Customer Journey Analytics
+ Marketing Attribution

ConversionLogic HOME PLATFORM

Attribution Evolved
Cloud Analytics + Machine Learning for
Enterprise Marketers

Marketing attribution:
Giving credit where credit is due



ssas
THE POWER TO KNOW.



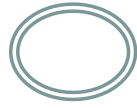
MARKETING SCIENCE INSTITUTE

RESEARCH PRIORITIES 2016–2018



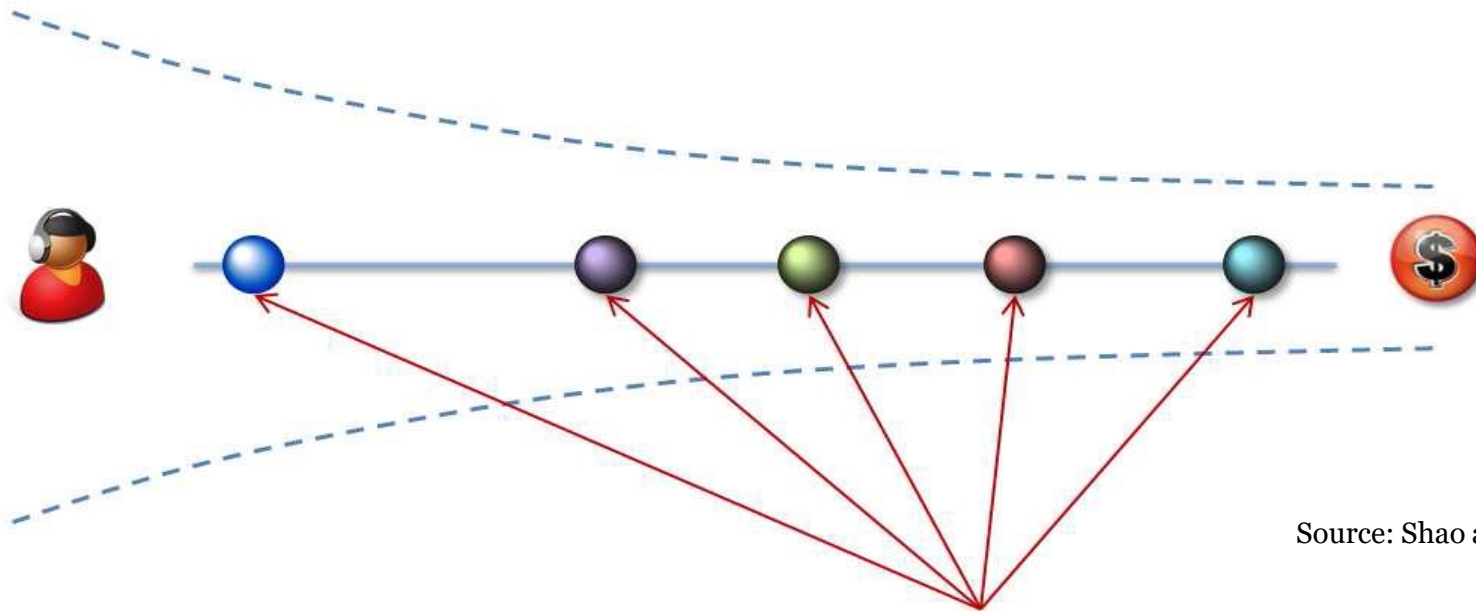
"#1 priority is **attribution!**"

Questions



- What is attribution?
- How can we calculate it?
- What can we use it for?
- What is the “delusion in attribution”?

Attribution

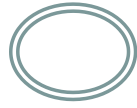


Source: Shao and Li (2011)

Assign credit% to each touch point

- Attribution: allocate appropriate credit for a desired customer action to each marketing touchpoint across all online and offline channels (Moffett et al. 2014)

Example of attribution outcome



Attribution

Caveat 1: Attribution only works for digital touchpoints, not for traditional advertising.

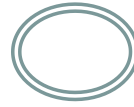


A pie chart with two segments: a larger olive green segment on the left and a smaller reddish-brown segment on the right. A callout box points to the olive green segment.

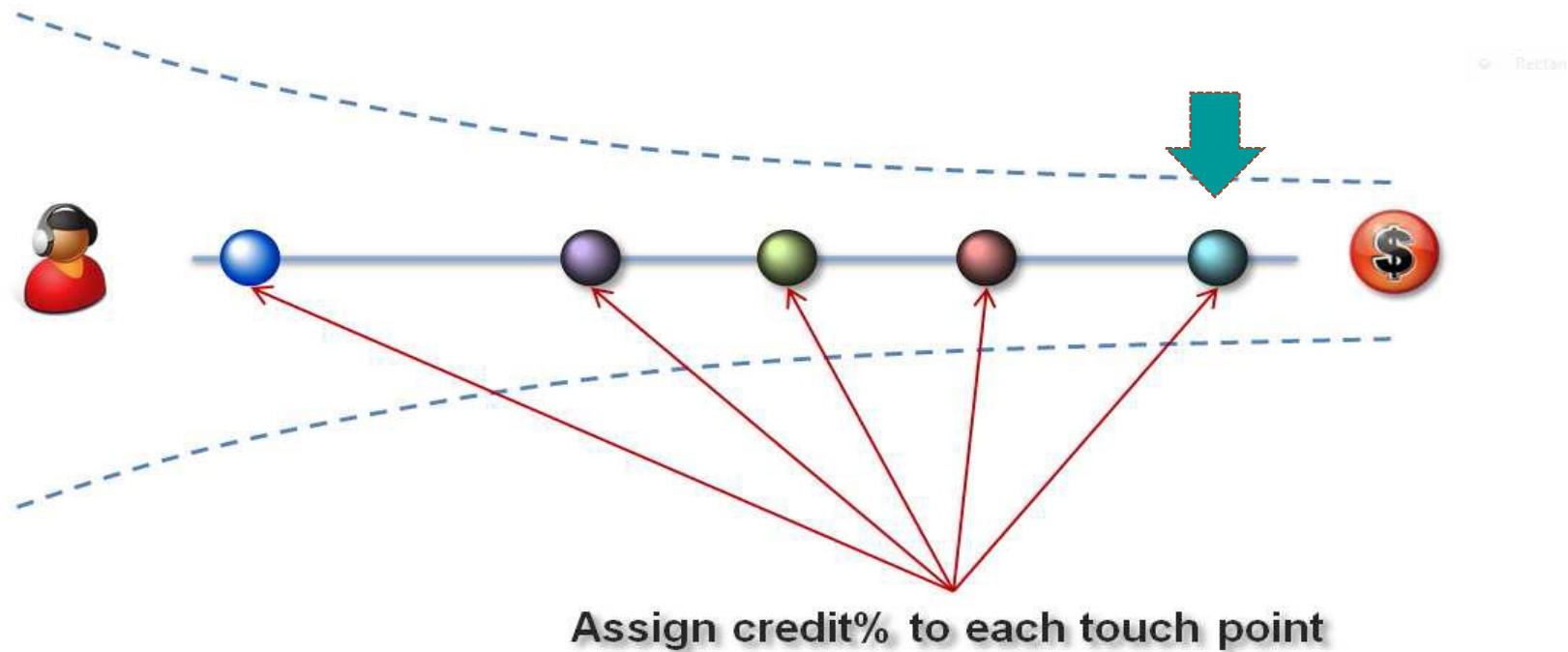
Channel	Percentage
Email	25%

Email, 25%

How can we calculate attribution?

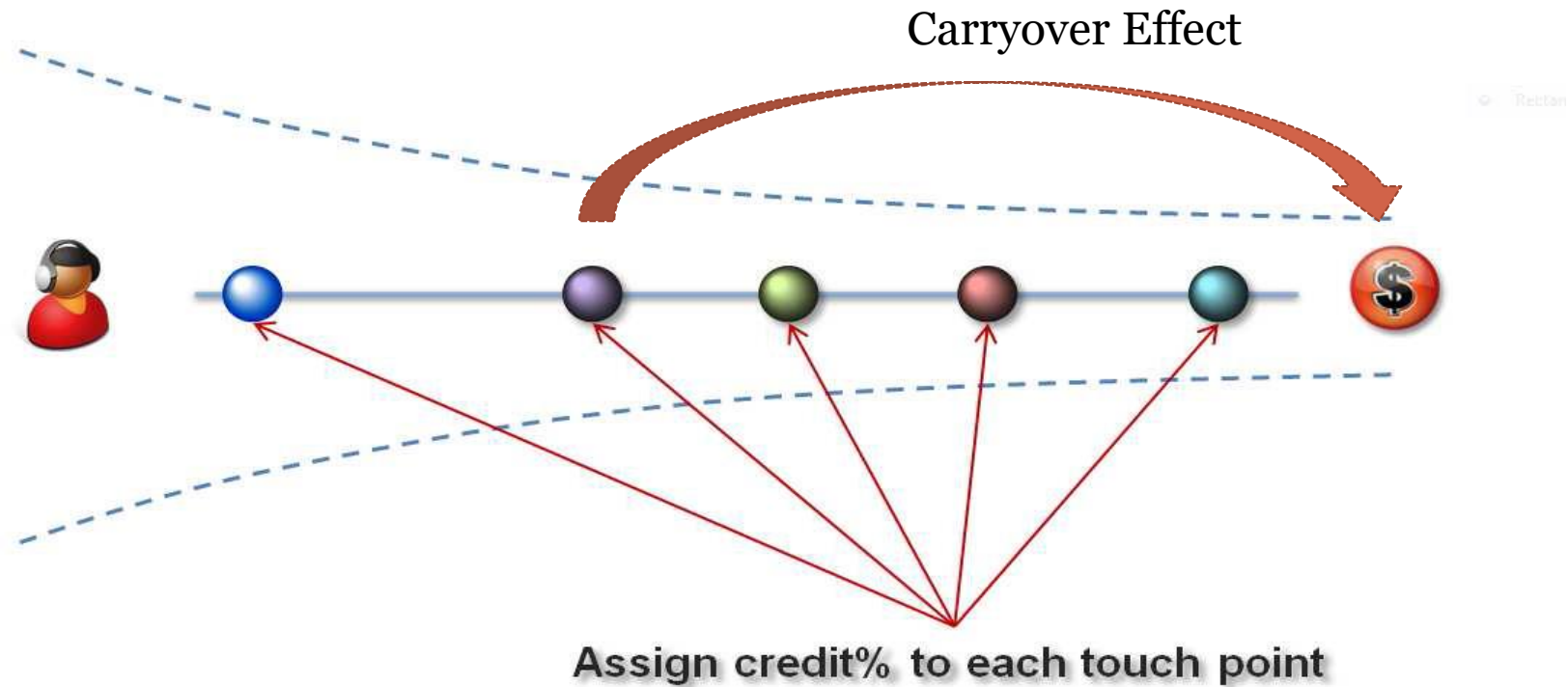


Last touchpoint attribution: 100% credit to this medium

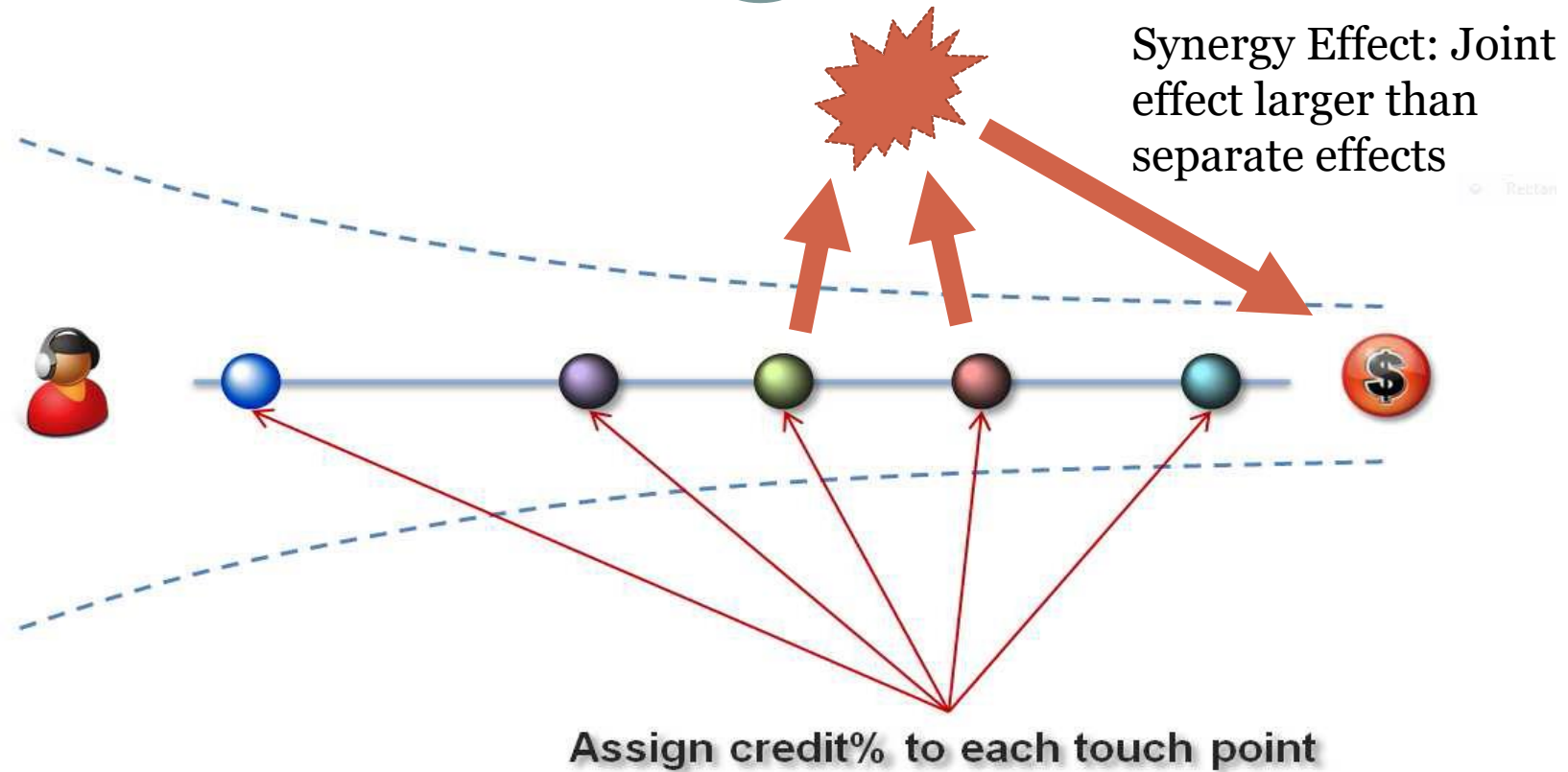


Source: Shao and Li
(2011)

Attribution needs to account for carryover



Attribution needs to account for synergy



10 Tactics for Building an Effective Attribution Management Program

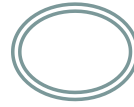
BY TIM WILSON, PARTNER, WEB ANALYTICS DEMYSTIFIED, INC.

Advanced attribution models are often used to find a model” at the outset of the analysis. Rather, the data itself is used to find a model. For example, in the field of Adometry, for instance, this is achieved by capturing data at the granular user level. Then, a series of actions are tracked to see if users had a similar experience. This can be compared to “C.” This is done to ensure that there is no bias in the process. And, it illustrates the attribution of each channel to the business results.

Caveat 2: Attribution is a rather fuzzy concept, without an explicit analytical expression, so far...

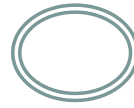
- **Scientific Literature:** increasingly sophisticated statistical methods for attribution:
e.g., Li and Kannan (2014); Xu, Duan, and Whinston (2014); De Haan, Wiesel, and Pauwels (2015); Zamora (2015); Li, Kannan, Viswanathan, and Pani (2016).

New, Straightforward Attribution Measure

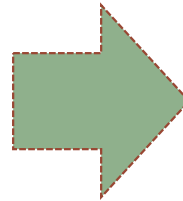
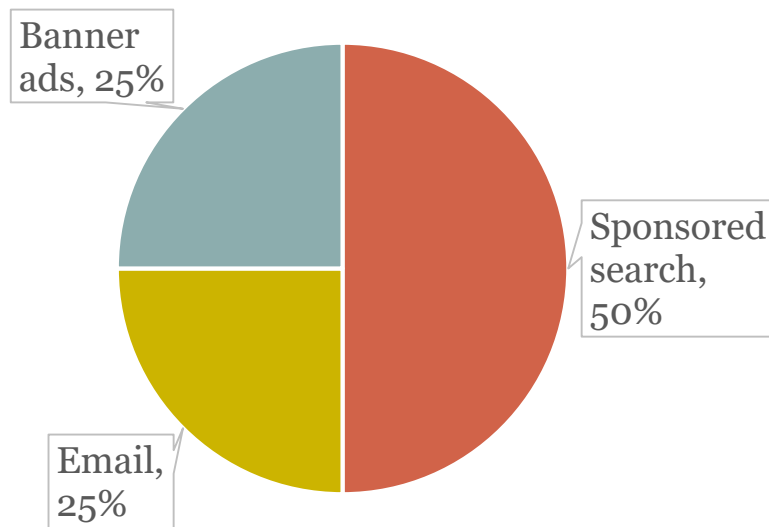


1. Estimate Probit Model to link the probability of purchase to current and past exposures to different media.
[Proc Nlmixed in SAS with random effects]
2. Model allows for carryover and interaction effects
3. Use model to calculate the relative contribution that each medium makes in influencing a purchase:
$$\frac{\text{Lift in purchase likelihood due to medium } m}{\text{Lift in purchase likelihood due to all media}}$$
4. Take average across purchases → Attribution to medium m

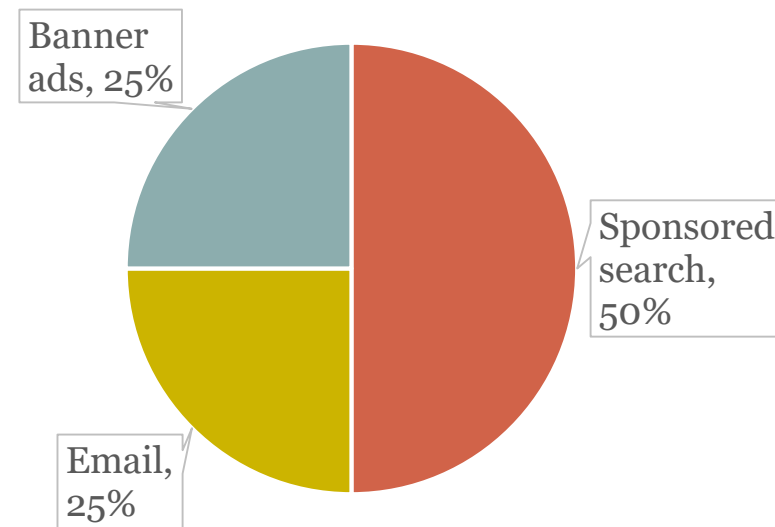
Should attribution be used for budget allocation?



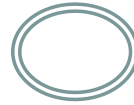
Attribution result



Budget allocation?

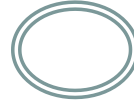


Caveat 3: Attribution → Budget allocation?



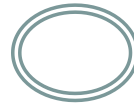
- Top benefit mentioned (by 72% of the respondents) in a survey of marketing managers is to use attribution to be better able to allocate budget and to improve marketing analytics (2012, p.5).
- Attribution models can impact and business value, but they do not guarantee the best outcomes for budget allocation decisions.
- Li and Kannan (2014, p. 1409): “This study has important managerial implications for marketing managers seeking optimal online advertising strategies.”
- Kannan, Reinartz, and Verhoef (2016, p. 1): “attribution models can provide insights for allocating marketing investments across channels.”

Attribution vs Optimal allocation



- What is attribution? A backward-looking summary of how much of a contribution each medium has made to a set of purchase outcomes
- What is optimal allocation? A forward-looking prescription on how to allocate a budget across media in order to maximize a profit outcome
- Comparison between:
 - Attribution given budget B spent on media
 - Optimal allocation of budget B across media to optimize profit

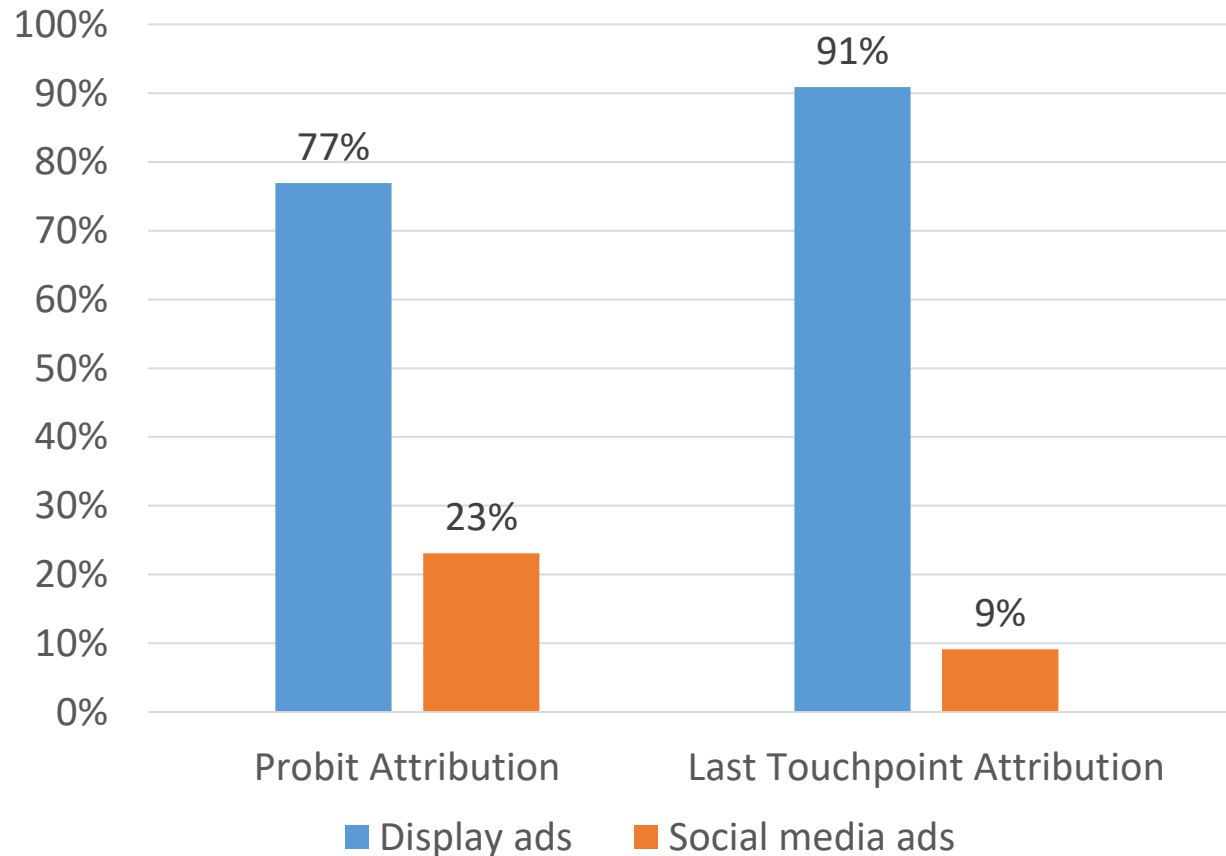
Attribution vs Optimal allocation



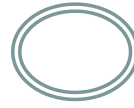
	Attribution	Optimal Allocation	Note
Depends on media effectiveness	✓	✓	The more effective the medium, the higher the attribution weight and optimal allocation weight
Depends on media exposure levels	✓	✗	The more a medium is used, the higher the attribution weight, but no effect on optimal weight
Depends on media cost	✗	✓	The more expensive a medium is to use, the lower the optimal weight but no effect on attribution.

Simulation with two media:

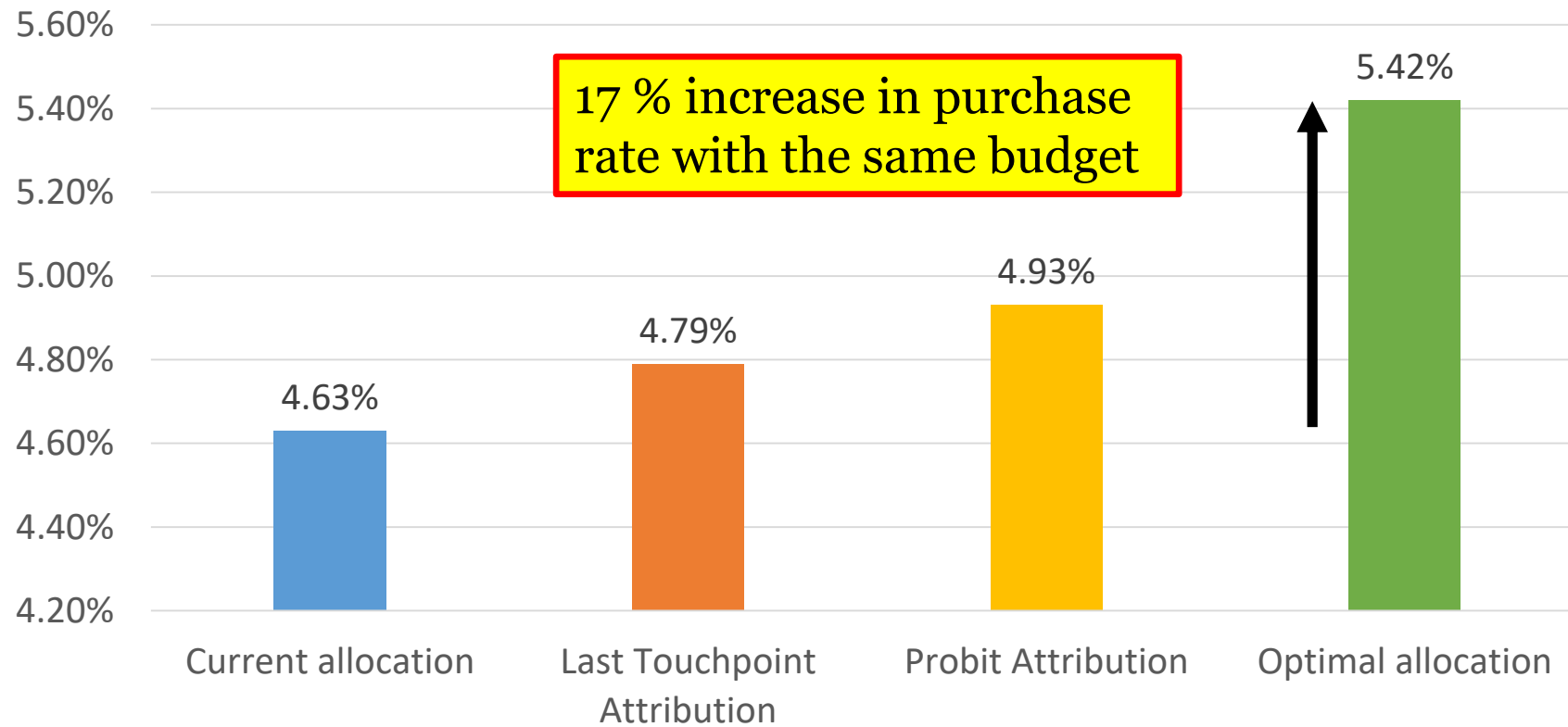
- Display Ads: high exposure frequency, low cost, low effectiveness
- Social Media Ads: low frequency, high cost, high effectiveness



Impact on Purchase Probability



Purchase Probability for Different Allocations

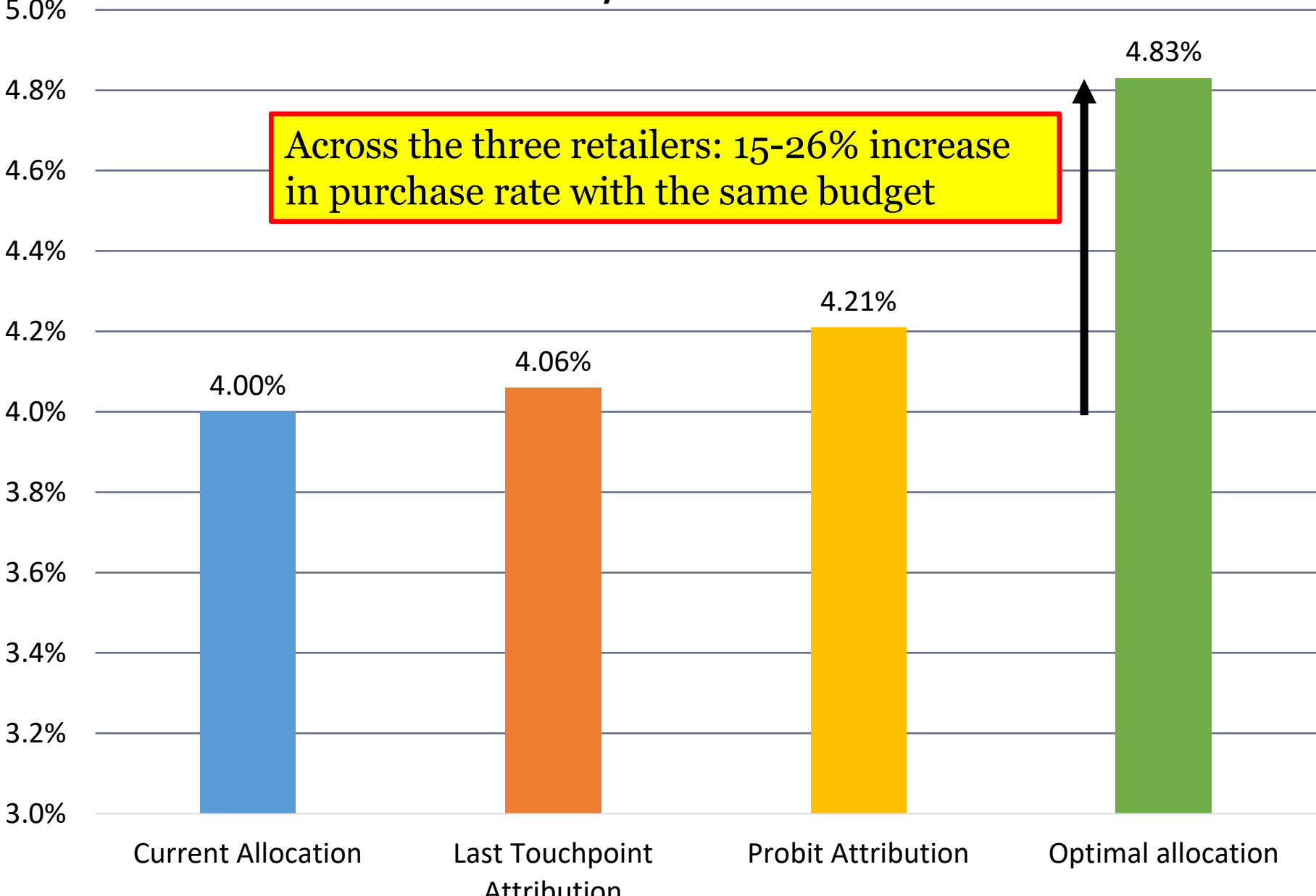


Empirical Application: Wharton Customer Analytics Initiative (WCAI)

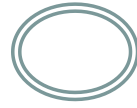
- Three apparel retailers: B1, B2, B3

	B1	B2	B3	
Number of customers in sample data	7,703	5,176	2,699	
Number of observations in sample data	200,612	177,608	74,935	
Total purchases	8,484	7,114	2,733	
Purchase conversion, %	4.2	4.0	3.6	
Number of touchpoints per medium	Email	185,611	176,120	56,606
	Organic Search	18,600	21,538	7,015
	Catalog	5,373	4,229	2,125
	Paid Search	4,789	8,966	3,688
	Referral	2,806	4,924	1,256
	Social	1,120	981	4,076

Purchase Probability for Different Allocations



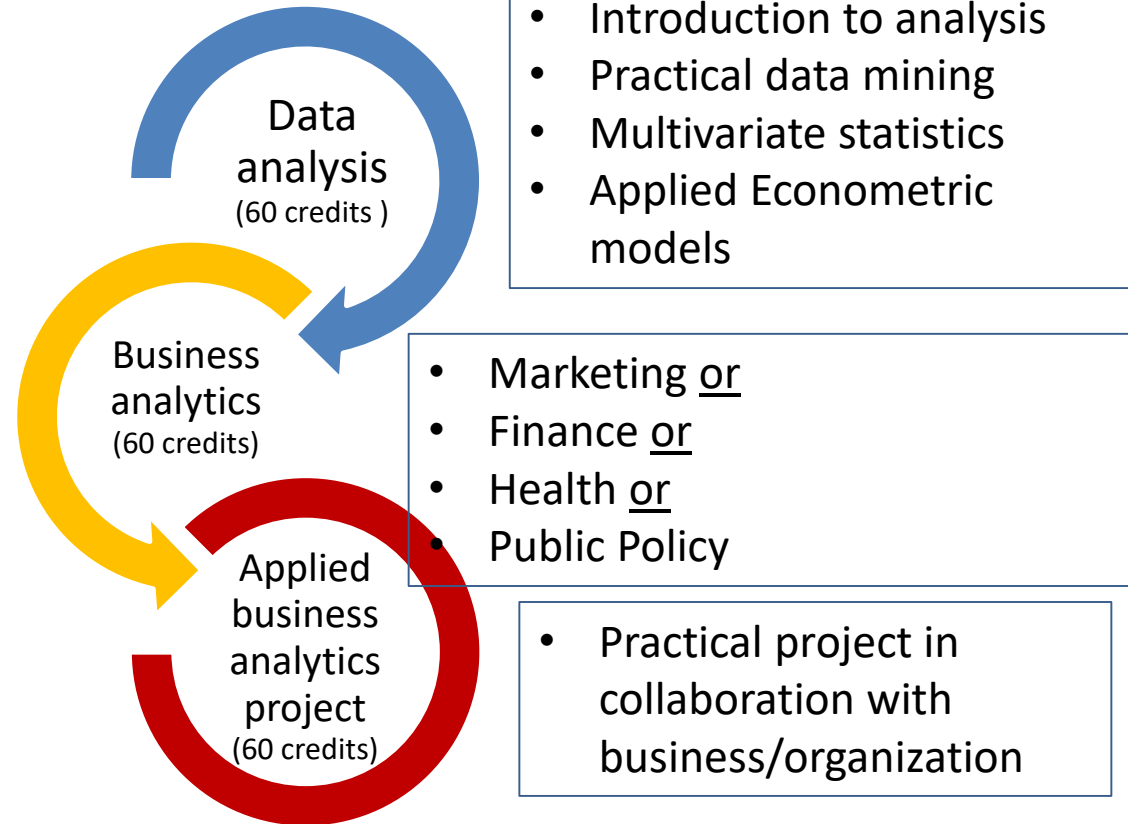
Discussion: Delusion in Attribution



- Attribution increasingly “hot” in marketing analytics, **but...**
 1. Attribution has myopic focus on digital media
 2. Attribution is rather fuzzy, so far.
 3. Attribution cannot be used for budget allocation
- New comparison with optimal allocation:
 - Attribution grows in advertising intensity
 - Allocation does not grow in advertising intensity
- Temptation to use attribution percentages as guideline for allocation → **Don't or you will overallocate to high-frequency media**

Masters in Analytics [Business]

180 credit masters	Auckland and Wellington	Block mode	12 or 24 months
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For more information click [here](#).

Massey University forges 'Big Data' partnership with SAS

Programme aims to help address the skills shortage and provide SAS skilled business graduates “who will hit the ground running”.



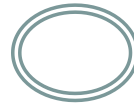
Divina Paredes (CIO New Zealand)

21 September, 2015 10:49



“Our students will not only get a Master of Analytics but also SAS certification for many of its licensed courses,” says Paas. “These are the most widely-used analytics software packages for big data applications and therefore highly sought after by employers.”

Thanks for your attention



- Email: heerde@massey.ac.nz
- Article: Danaher, Peter J. and Harald J. van Heerde (2018), “Delusion in Attribution: Caveats in Using Attribution for Multimedia Budget Allocation” forthcoming, [*Journal of Marketing Research*](#).