

# Cross-channel Multi-device Conversion Attribution

Qingchen Wang, Marc Salomon, Ger Koole, Maarten Soomer, Kevin Pak



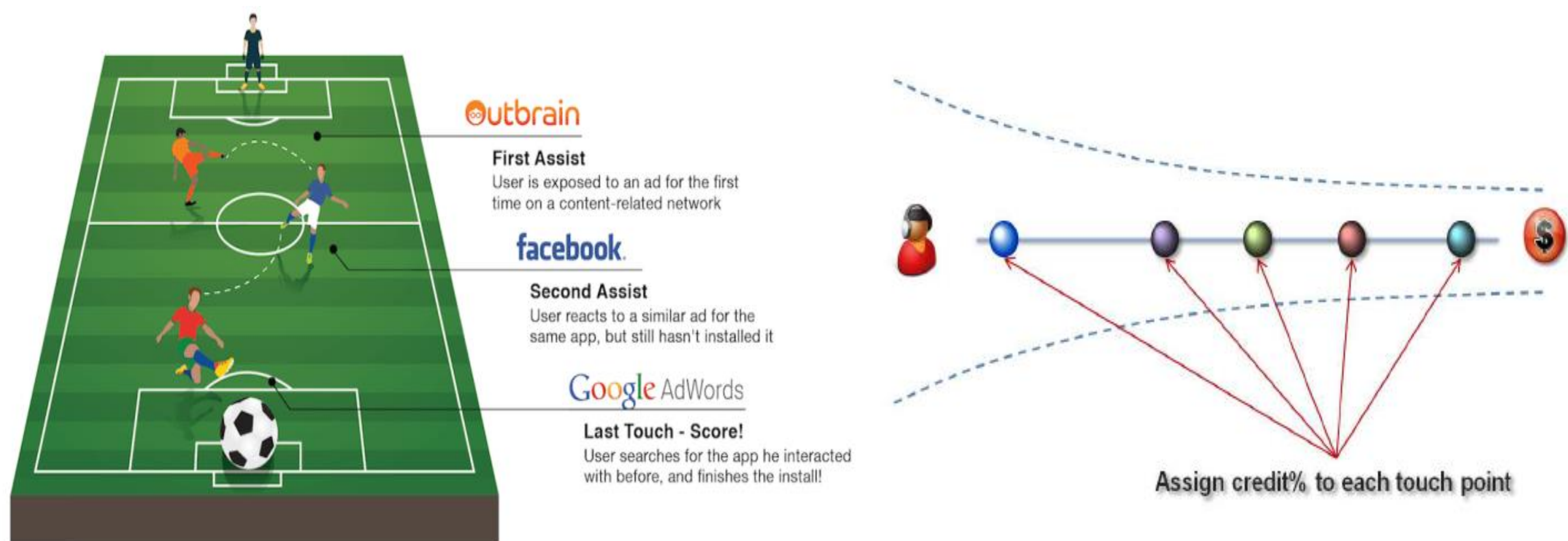
## Conversion Attribution

Advertising campaigns are often launched across **multiple channels**.

- Billboard, TV, radio, out of home, print, direct mailing.
- Web search, online display, social media (Facebook, Twitter), video (YouTube), mobile (browser and apps), and direct emailing.

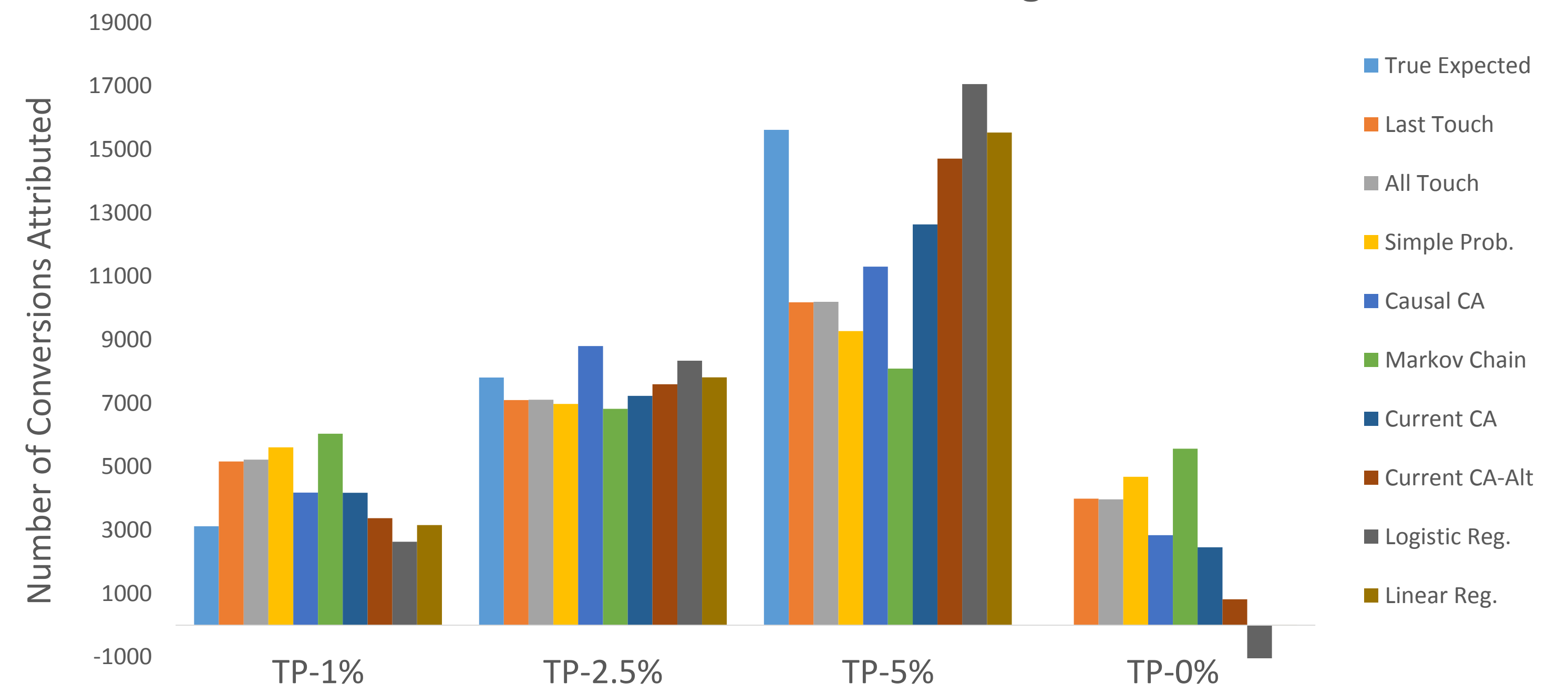
What is the **incremental effect** that an advertising activity (touch point) has on the likelihood of converting?

- Credit is awarded to the advertising channels/vendors proportionally to their incremental effects.



## Are the models any good?

Attribution Results with Different Algorithms



	Last Touch	All Touch	Simple Prob.	Causal CA	Markov Chain	Current CA	Current CA-Alt	Logistic Regression	Linear Regression
Mean Abs Error	24320.47	24314.79	28632.73	42261.41	33987.68	14071.27	4243.42	8068.55	835.13

## CA in the industry (rule-based)

1. Last touch attribution (LTA)

2. First touch attribution

3. Linear attribution (all touch)

Attribute equal value to all TPs

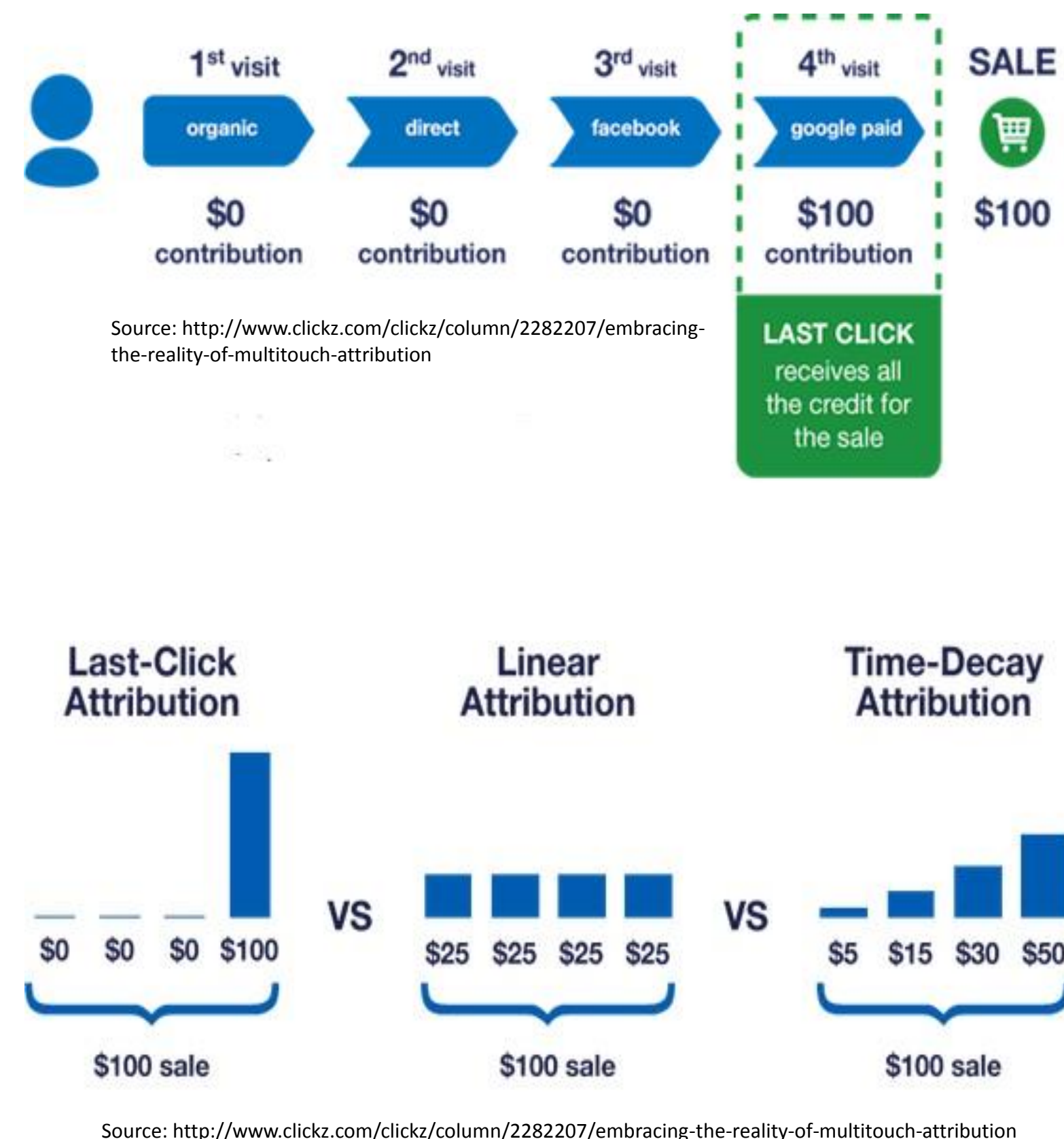
4. Time-decay attribution

5. Bathtub attribution

Attribute conversion to first and last TPs

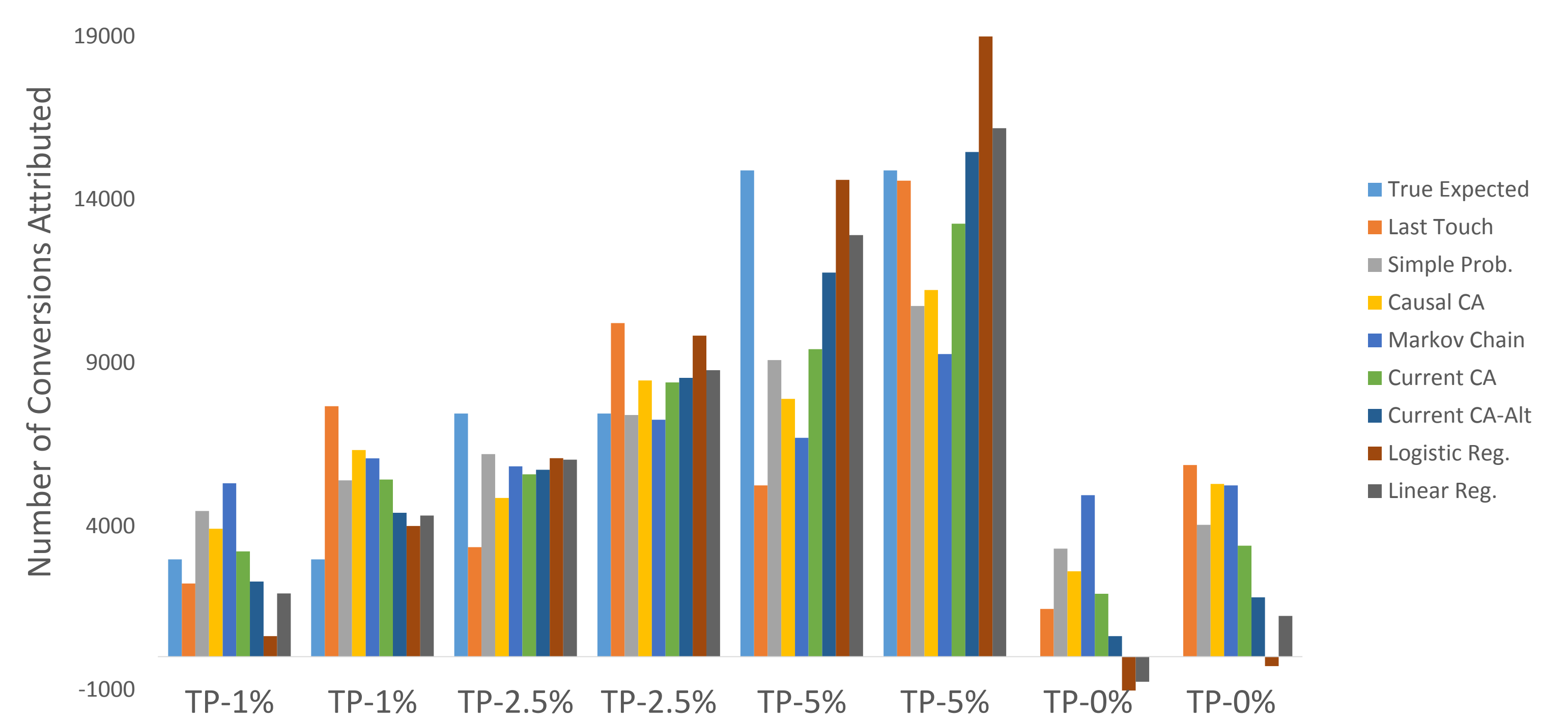
6. Engagement mapping

Attribute conversion based on user-specified weights



## Effect of fragmented data

Attribution Results with 20% Broken Paths



	Last Touch	All Touch	Simple Prob.	Causal CA	Markov Chain	Current CA	Current CA-Alt	Logistic Regression	Linear Regression
Mean Abs Error	29570.26	22501.12	26867.18	27053.08	31224.05	17921.30	11052.31	15043.63	10418.12

## CA in papers (data-driven)

Simple probabilistic model (Shao and Li 2011)

Computes the  $empirical P(conversion | TP_i)$  for all  $i$  and then get the relative contribution of each TP

Logistic regression (Li and Kannan 2014, Nottorf 2014)

Treat CA as a **binary prediction problem** and use the estimated coefficients to derive the marginal contribution of each TP

Survival analysis (Manchanda et al 2006, Papelnjak 2010)

Treat CA as a survival analysis problem with **conversion as death** and estimates the effect of each TP on the rate of death

Markov chain (Anderl et al 2013)

Treat each TP as **states** in a Markov chain with conversion as the absorbing state. Consumers move from one state to another down the conversion path

Hidden Markov models (Abhishek et al 2012)

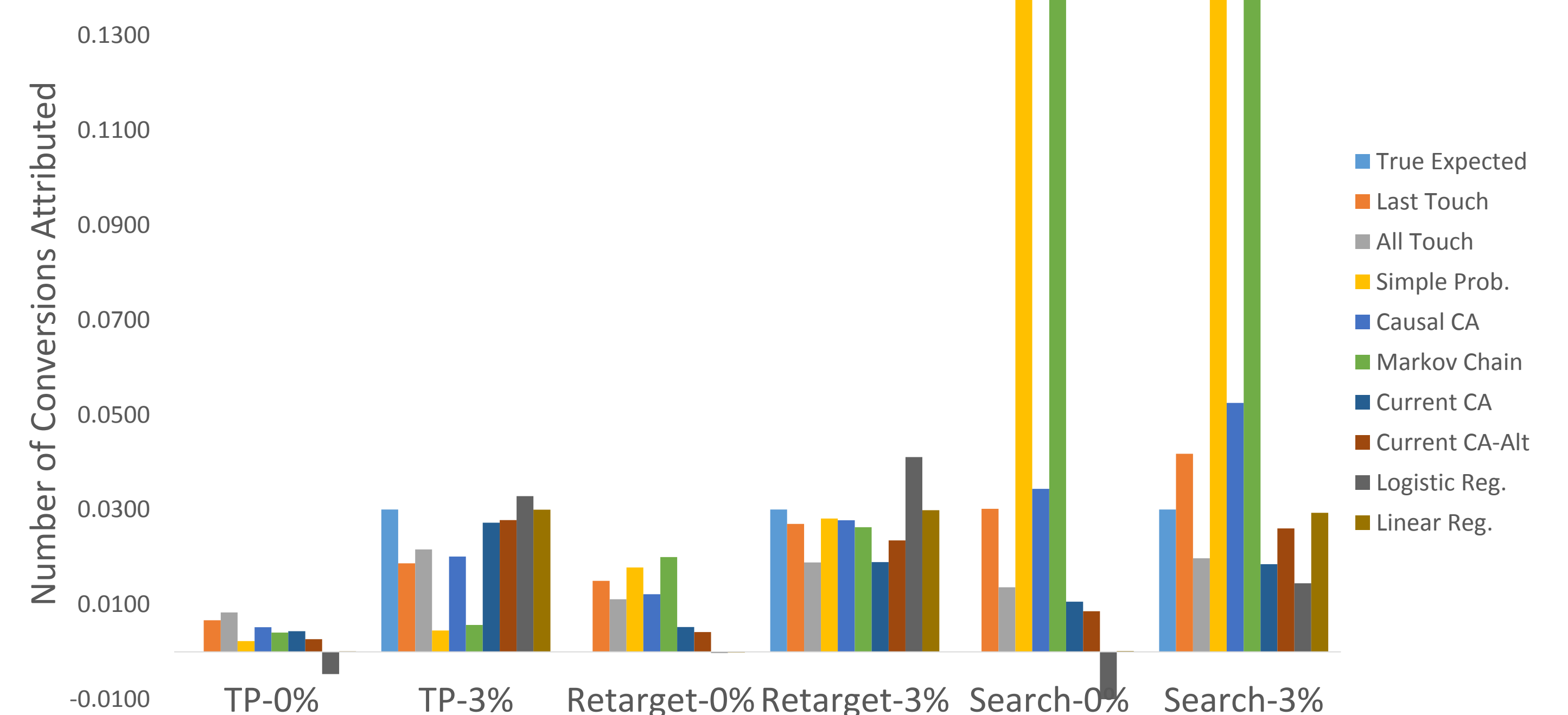
Consumers have **latent intrinsic states** (disinterested  $\rightarrow$  interested) and reach TPs based on which state he/she is in

Vector-Autoregressive model (Wiesel et al 2011)

Treat CA as a **time series** problem with advertisement channel spend and sales dependent on spend and sales in previous time step. Uses aggregate-level data

## Effect of targeting

Attribution Results with Different Algorithms



	Last Touch	All Touch	Simple Prob.	Causal CA	Markov Chain	Current CA	Current CA-Alt	Logistic Regression	Linear Regression
Mean Abs Error	0.0779	0.0628	0.5605	0.0998	0.4833	0.0456	0.0281	0.0447	0.0039