

FACEBOOK

Facebook Personalized Advertisements

DMC Forum
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The Facebook Ad Auction: Philosophical Approach

Problem: For each ad-slot, there are millions of ads to choose from.

Our Belief: Optimal long-term strategy is to focus on **maximizing user value**

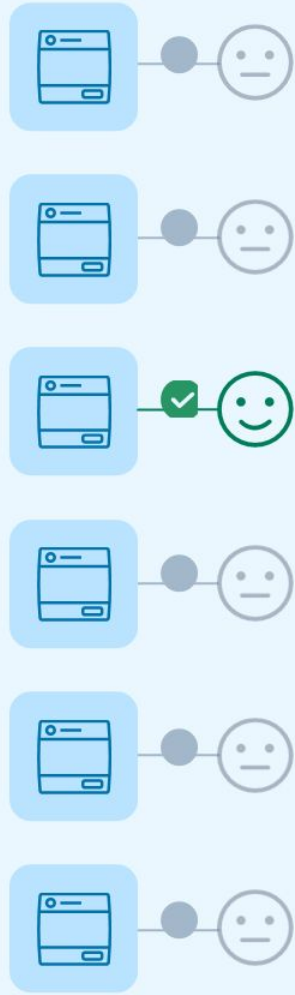
- Value for people → repeat purchases*
- Repeat purchases → value for businesses
- Value for businesses → long-term sustainable spending on Facebook advertising

Our Approach:

- Run an auction where Facebook acts as the user's agent
- For each ad, generate a “total bid” that represents our best estimate of the expected value it would create for the viewer if shown.
- Select the ad with highest “total bid”

*Our data shows that just one bad buying experience drastically reduces likelihood of ever making a purchase again

Non-personalised advertising



Personalised advertising



Formula for “Total Bid”

$$\text{Final-Bid} = P(\text{Conv} \mid \text{imp}) * \text{Advertiser-Bid} + \text{correction_factors}$$



Estimated likelihood of a conversion given an impression



How much the advertiser is willing to pay for a conversion (e.g. purchase)

Assumption: This is a **lower bound** on user value



Examples include:

- Repetition penalty
- Misleading experience penalty
- Others...

Formula for “Total Bid”

$$\text{Final-Bid} = P(\text{Conv} \mid \text{imp}) * \text{Advertiser-Bid} + \text{correction_factors}$$



This estimate comes from machine learning systems. It is a “personalized” estimate of the probability.

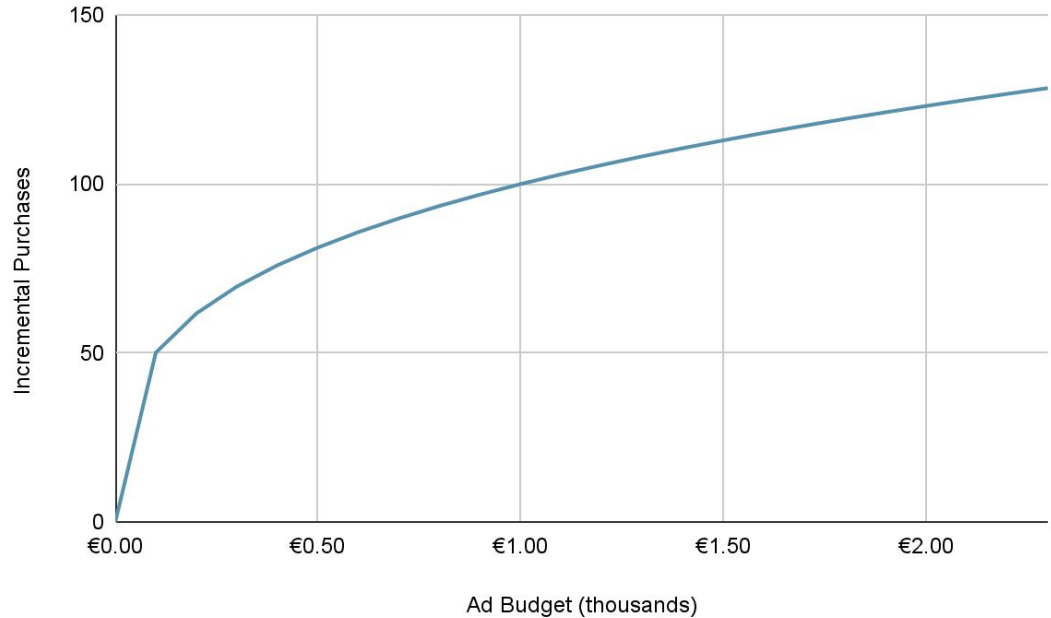
The important input factors include:

- Data about the person viewing the ad
- Data about the ad itself
- Data about the context where the ad will be shown

E.g. For one person the estimate may be 1%, for another person 2%

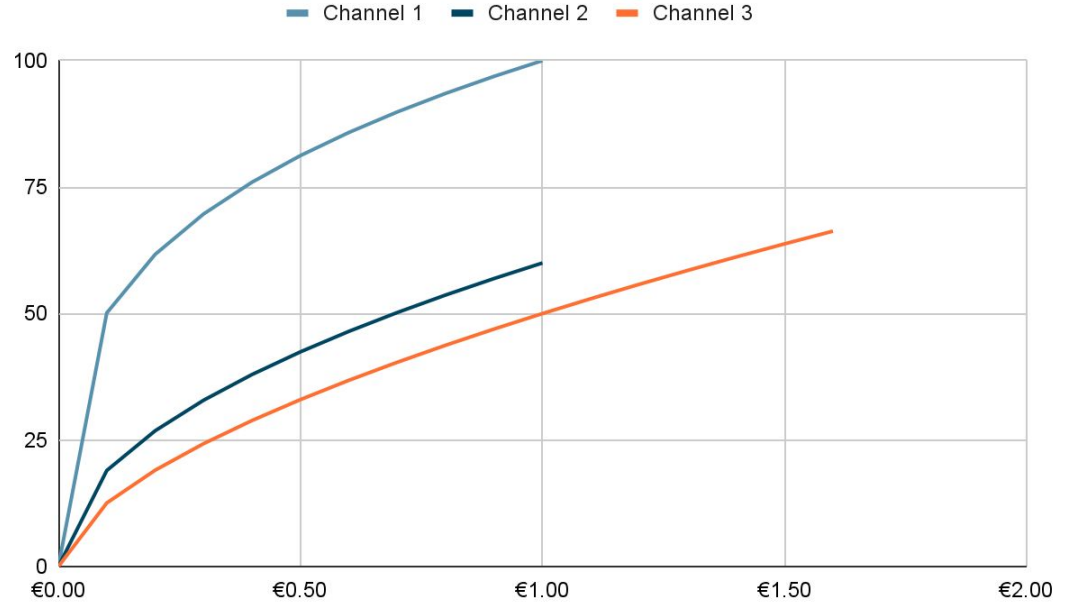
Diminishing Returns in advertising

- Businesses who buy ads care about “return on investment”
- They look at “unit economics”
 - What is the marginal cost of a conversion?
 - What is the profit per conversion?
- They stop spending where the “marginal cost of a conversion” is equal to the “profit per conversion”
- Assume profit per conversion is €30
- This business will stop spending at €1000.
- Spending more than that would result in a net loss.



Ad buying across multiple channels

- Businesses tend to buy ads across multiple channels
- For each channel, their budget is dictated by the performance of that channel (that is, where the marginal cost of a conversion is equal to profit)
- Channels are largely independent. Buying across more channels allows businesses to reach a larger set of people, in different context.
- As such, improvements to the efficiency of one channel does not result in a drop in ad spend on another channel.
- In this diagram, each curve ends at the point where the next conversion costs more than €30



The Ecosystem Impacts of Removing Personalization

- Imagine the counterfactual situation where $P(\text{conv} | \text{imp})$ ONLY uses data about the ad and the context (non-personalized ranking).
- The effect will be that $P(\text{conv} | \text{imp})$ becomes the average conversion rate for that ad in that context.
- $P(\text{conv} | \text{imp})$ will now vastly overestimate the true conversion rate for some cohorts, and will vastly underestimate it for other cohorts.
 - Significantly less total value is created for people and businesses
 - Advertiser budgets will be allocated more inefficiently
- The ad with the highest $P(\text{conv} | \text{imp}) * \text{advertiser-bid}$ will basically win all the auctions.
 - Significant reduction in ad diversity. People experience less relevant and more repetitive ads.
 - Businesses with a high advertiser-bid (large profit margins) who sell products with wide appeal now dominate. Businesses with lower profit margins, or who sell niche products (average conversion rate is lower) will never win the auction. Adverse impact on entrepreneurs*

*I've experienced this when I was operating a startup

The Ecosystem Impacts of Removing Personalization

- We ran just such a test.
- We compared:
 - A test group where $P(\text{conv} | \text{imp})$ was personalized
 - A control group where $P(\text{conv} | \text{imp})$ was not personalized
- All other factors held the same.
- This resulted in a >50% drop in publisher revenue (on average across the network)
- Implication: Loss of personalization will also have a significant adverse impact on ads-supported businesses. They may no longer be able to stay profitable offering free (or discounted) content.
- Results: ([link](#))

10M

active advertisers on our platforms

SMBs using
personalised ads

74%

important for business success

SMBs using
Facebook Apps

76%

effective in finding new customers
for their business

Source: Dynamic Markets: Unlocking small business innovation and growth through the rise of the personalized economy, Deloitte, 2021



Thank You