

# Online Advertising Incrementality Testing

## Practical Lessons, Paid Search And Emerging Challenges

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# Who we are ...



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\*Work done while employed at Yahoo! Research.

# Tutorial Parts

1. The basics: context and challenges
2. Incrementality Testing: concepts, solutions and literature
3. From concept to production: platform building, challenges, case studies
4. Deployment at Scale: test cycle and case studies
5. Emerging trends: identity challenges, industry trends and solutions

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# Part 4

## Deployment at Scale: test cycle and case studies

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# Experimentation: Incrementality Testing Cycle



## Experiment Design and Planning

Minimum **Detectable Lift**, Total **Audience Available**, **Hold-out** group size, **Exposed Audience Needed**, Experiment **Duration**, etc



## Intervention Execution

Start **holding out users randomly** from showing Ads. **Log “Ghost” Ad** impressions for these users



## User Tracking and Metrics

Track **user cohorts**. Compute **aggregate metrics** to guide **high-level decisions** and campaign tuning



## Incremental Performance and Recommendations

Document incrementality metrics, **CR lift**, **Cost per Incremental Action**. Provide **recommendations**, side effects and learnings

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# Testing Cycle

From the beginning to the end, step by step

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# Experimentation: Design and Planning

## Run statistical power analysis to manage expectations, budgets and duration



### Experiment Design and Planning

Minimum **Detectable Lift**,  
Total **Audience** Available,  
**Hold-out** group size,  
**Exposed Audience**  
Needed, Experiment  
**Duration**, etc

- In a period of time, given **existing advertiser data**:
  - **Number of users** exposed to impressions, conversions, impressions and total spend
  - **Metrics derived:** **converter rate, total audience, eCPM, ad frequency**
- Parameters to tune:
  - **Holdout size** (**never 50%!!**), minimum detectable lift, test significance

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# Power Analysis Simulation: 2 months of data

## Aggregate Statistics:

Converter rate: **XXX%**

Conversions per 100 users: **XXX**

Conversions per converter: **XXX**

Impressions per user: **XXX**

Experiment Users: **XXXM**

## Scenario Simulation:

Converter Lift precision: **5%**

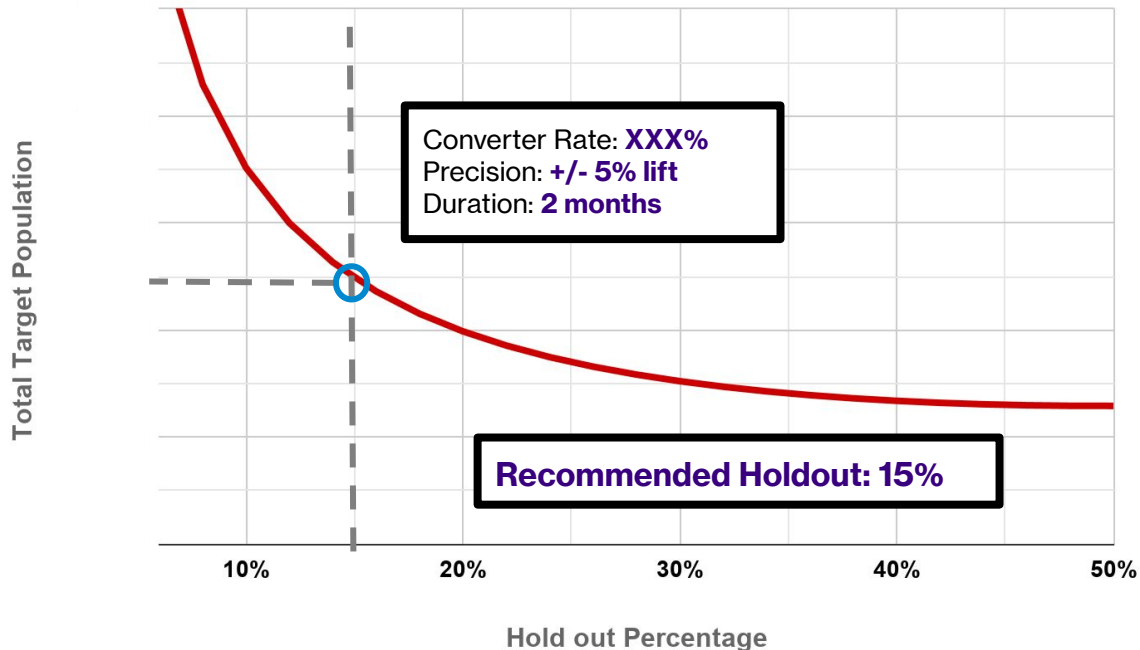
Expected Converter Rate:

Control: **<XXX%**

Test: **>XXX%**

Test Significance: **5%**

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**Response: User  
signup/acquisition**



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# Experimentation: Intervention Execution



## Intervention Execution

Start **holding out users randomly** from showing Ads. **Log “Ghost” Ad** impressions for these users

## The test actually runs

- Run quick **sanity checks**:
  - Verify **impressions and ghost impressions** are generated
  - Is **percentage of control users** as expected?
  - **Define guidelines** to hit a button and stop the test if needed



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# Experimentation: User Tracking and Metrics

## Track user groups, metrics and mid-flight recommendations



### User Tracking and Metrics

Track **user cohorts**.  
Compute **aggregate metrics** to guide **high-level decisions** and campaign tuning

- Keep track of **top-level metrics**
  - Lift, incremental conversions, user ad frequency, CPIA, iROAS
- Pay special attention to **holidays** and fundamental user behaviour changes
  - For relevant holidays, **cumulative effects are realized** in these special periods (**ad stock realization**)
  - For irrelevant holidays sometimes **inventory becomes more expensive**

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# Experimentation: Performance and Recommendations

## Testing is expensive, thus document learnings and insights



### Incremental Performance and Recommendations

Document incrementality metrics, **CR lift**, **Cost per Incremental Action**. Provide **recommendations**, side effects and learnings

- Deliver **top-level metrics**
  - Including statistical tests and intervals

**These metrics will be compared and used to calibrate advertiser's financial models**

- Document lessons and **make recommendations**
  - What **can be learned from the test** beyond top-level metrics?
  - **Why** the test was (or was not) successful?
  - Make **business recommendations** and campaign management practices

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# **Case Studies**

**How success  
looks like**



# Business Use Cases: Recap

## *Barajas and Bhamidipati (2021)*

- **New advertiser** wants to *test waters* before fully deploying budgets
- Existing advertiser wants to **scientifically prove incremental value**
- Incrementality of **tactical practices** with external validity for future deployment
- Quarterly regular **strategic adjustments** (retrospectively)

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# Case Studies

**New advertiser wants to test waters  
before fully deploying budgets**

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# Onboarding Funnel: Key Findings

# +200%

Statistically Significant Lift Effect on  
**Landing Page Visits (funnel entry)**

# 12.4%

Consistently Positive Average Lift Effect  
on **Purchase Confirmation (successful  
end of the funnel)**

Incremental Funnel  
Entries and Successful  
Endings



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# Lift Results: Funnel Entries, Stages and Successful Endings

Lift on **Landing Page**, Funnel-entry Conversions

225% +/- 17%

Lift on **User Logins**, incremental quality (sticky) users

16.45% +/- 12%

Lift on **Complete Purchase Page Visit**, less funnel transitions

-6.58% +/- 8%

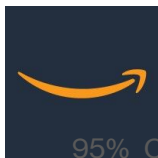
Lift on **Purchase Confirmation**, end-of-funnel conversions

12.4% +/- 10%

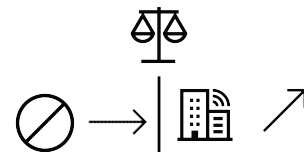
## Takeaways:

- Incremental Funnel Entries, with **sticky more valuable users** (more logins)
- More straight Purchases (end of funnel) with **less transitions** (complete purchase page)

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95% Confidence Intervals. Effects on funnel occurrences, not transitions.





**Marketing  
Effectiveness  
goes beyond  
one conversion  
metric**



# Case Studies

**Existing advertiser wants to scientifically prove incremental value**

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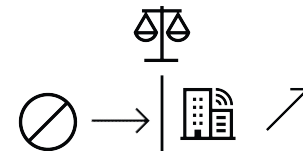
# Insurance quotes: Key Findings

10.5%

**Converter rate lift**  
(Statistically significant)

\$XX

**Cost per Incremental Conversion** over 8 weeks of experiment



9.5%

**Lift in Avg conversions per user** (Statistically significant)

87%

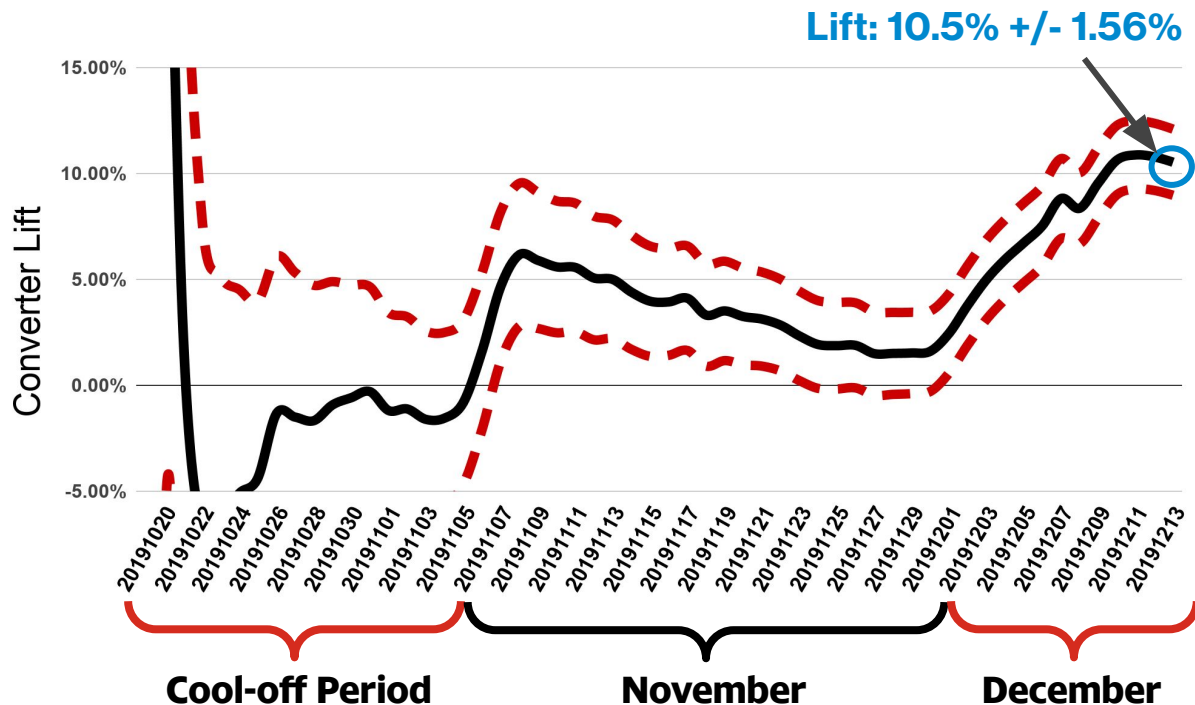
**Lower Cost per Incremental Conversion** than post-click CPA

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# Key Insights: Incrementality Real Study

Industry standard  
last-touch attribution  
undervalued native  
display programmatic  
advertising by 87%

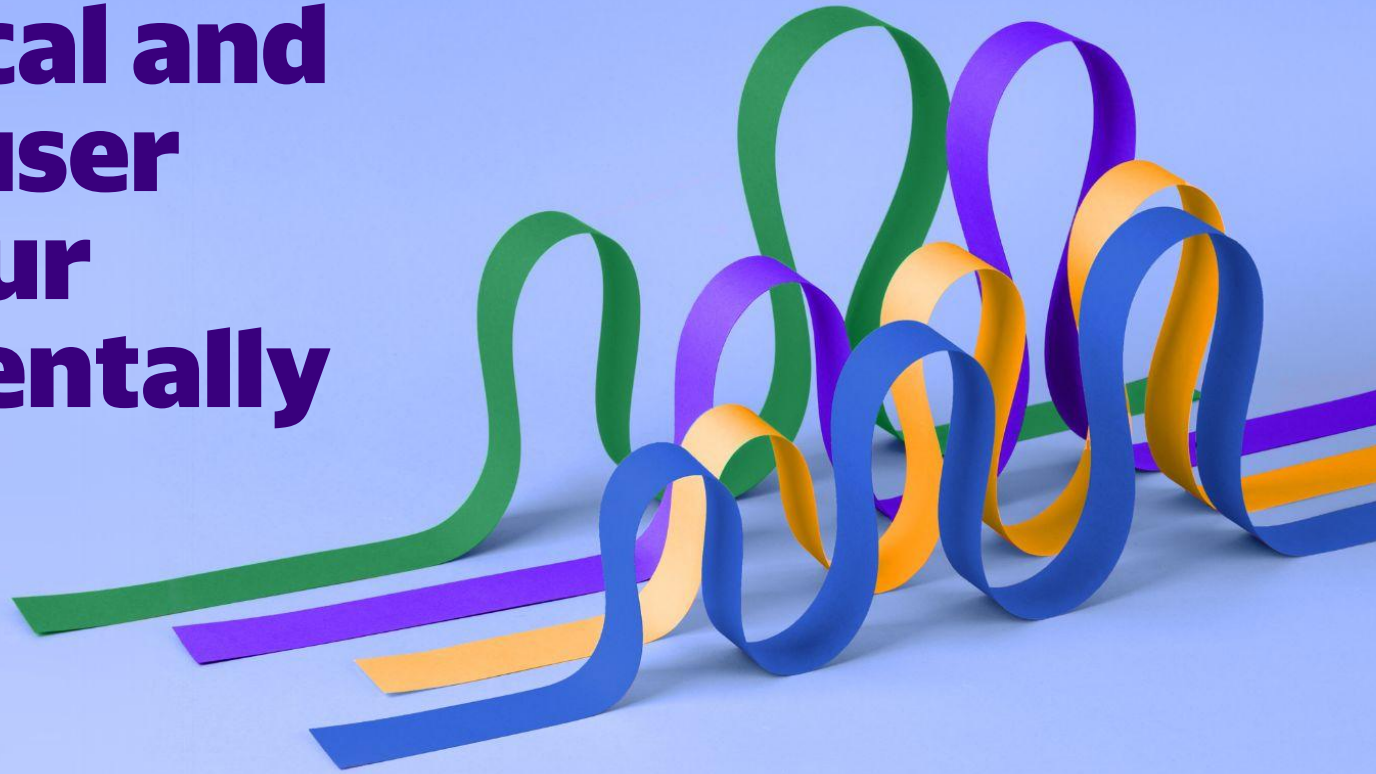


Cumulative converter lift progression. 95% confidence intervals are displayed. Conversion definition: insurance quote. Duration: 8 weeks, 10/18/2019 - 12/12/2019. Holdout size: 10%.

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**Seasonalities  
are critical and  
change user  
behaviour  
fundamentally**



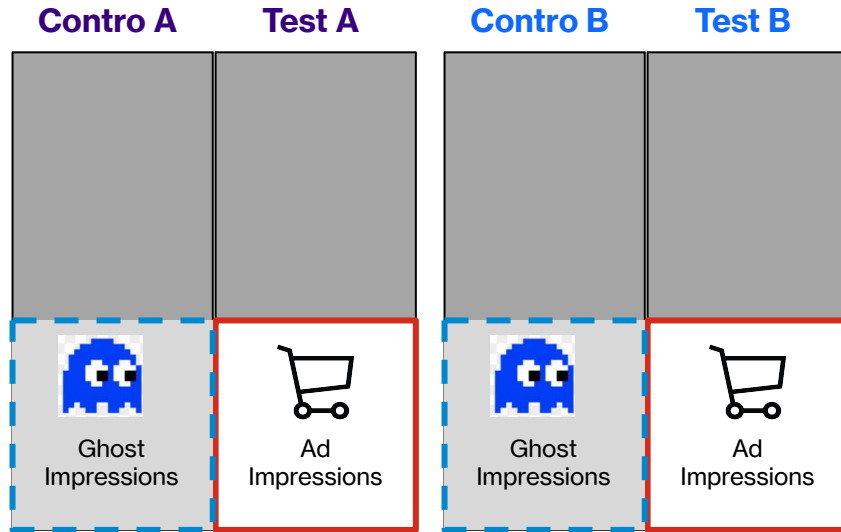
# Case Studies

## Incrementality of tactical practices

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# A/B test + Incrementality test: Multi-cell testing



A benefit from double blind designs, an A/B split test fits easily to run a multi-cell test

User split is required to test A and B tactical practices

# Tactical Practices on user Signups: Key Findings

**4.5%**

**Tactic A** cell reached  
Statistically Significant  
**Converter rate lift**

**2.2%**

**Tactic B** cell reached  
Statistical Significant  
**Converter rate lift**

**Tactic A  
outperforms  
Tactic B**

**\$XX**

**vs**

**\$XX**

**Cost per Incremental  
Converter Tactic A**

**Cost per Incremental  
Converter Tactic B**

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Experiment eligibility: first impression. All converters after first impression (any touch). 90% confidence intervals



**Test your best 2  
or 3 tactics  
maximum**

**Statistical mass  
is generally a  
constraint**



# What if we can't randomize user ids?

We'll review identity challenges and trends in the next and last part of the tutorial....

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