AdTel Case Study

MSBA 6440: Data-Driven Experimentation and Measurement
Professor Vitorino

*Source: Book **Testing 1-2-3** by Ledolter & Swersey*

AdTel Case

- **Decision:** Should Barrett Foods increase peanut butter advertising?
- **Experiment:**
  - split cable system 2,000 family panel
  - test group sees peanut butter ads over 12 months
  - control group does not
  - peanut butter purchases are recorded for both groups

Class Goals:

- **Practice** analysis of experimental data
- **Provide an introduction** to the topic "Challenges in Designing, Implementing and Learning from Randomized Experiments"

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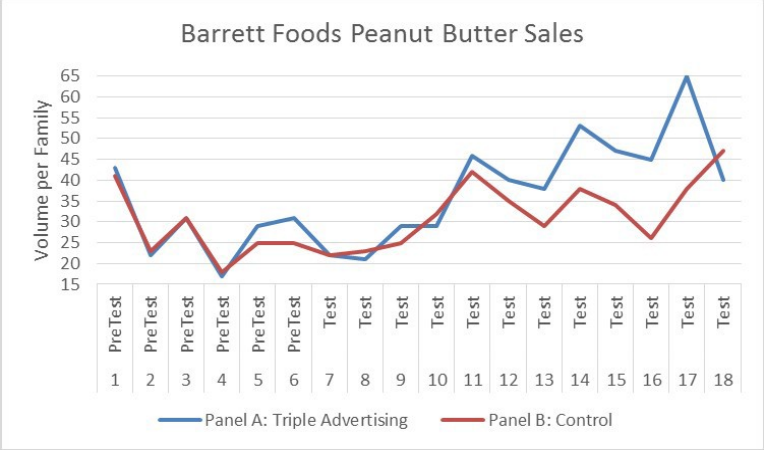
AdTel experiment results: Sales



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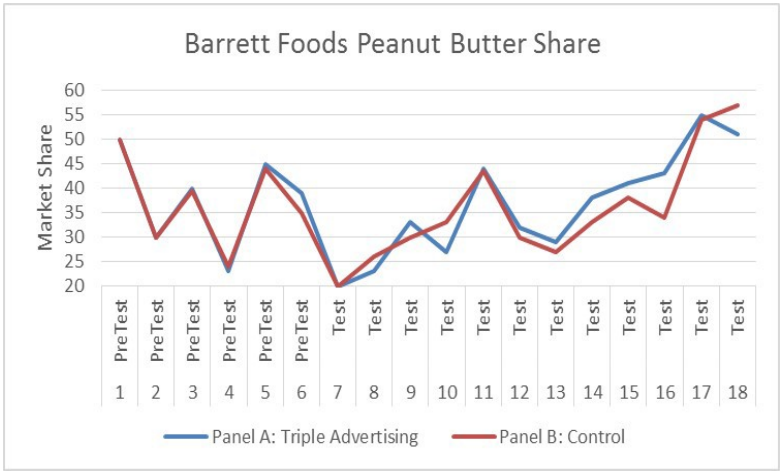
AdTel experiment results: Shares



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Question 1

- **Where did this number come from?**

"Management had estimated that a **15%** sales increase would be required to justify the added expense."

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Additional advertising expense

? × total sales × profit per unit ≥ $6M − $2M

↓

15%

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Question 2

- **What analysis supports this summary?**

"In summary, while we see some increase in volume due to the increased advertising, it is doubtful that this strategy meets management's goal of 15% sales increase that can be established with minimum 90% confidence"

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➔Management is only willing to move forward if the 15% increase can be established with 90% confidence.

↓

Confidence level: "How much of a chance are we willing to take that this program has negative return?" (risk tolerance, cash on hand, investor confidence)

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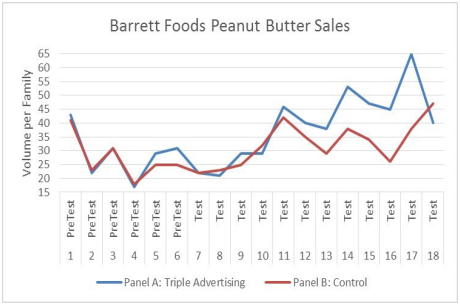

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Question: was the increase in sales enough to meet the management's goal?

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3 steps:

1) Calculate 90% CI for true difference between sales of A (treated) and B (control)

2) Calculate average sales for B (control)

3) Calculate % increase for both ends of the interval using 1) and 2)

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Our quantity of interest is: d = (sales for A) – (sales for B)
Note that this is different from a difference in means test. In the AdTel case, we are comparing the difference month-by-month (not the differences in the averages for all 12 months).

One sample t-test for d

```
d=salesA-salesB
t.test(d, conf.level = 0.90)
```

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3 steps:

1) Calculate 90% CI for true difference between sales of A (treated) and B (control)

d = (sales for A) – (sales for B)

With 90% confidence, the true difference between sales of A and B is within the range:

$$\bar{d} \pm \frac{1.80 \times s_d}{\sqrt{n}} \approx 7.00 \pm \frac{1.80 \times 9.98}{\sqrt{12}} = 7.00 \pm 5.17 = (1.83, 12.17)$$

- s_d is computed from the 12 observations of the monthly difference.
- Since n=12<30 we use $t_{0.90}(12-1) = 1.80$ instead of a normal.

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We don't stop here because we are not interested in testing whether the sales increase is greater than zero!
We are testing whether sales benefits exceed advertising costs.

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2) Calculate average sales for B (control) = 32.58

3) Calculate % increase for both ends of the interval using 1) and 2)

% increase: $21.5\% \pm 15.9\% = (5.6\%, 37.4\%)$ with 90% confidence

➔ The lower limit of a 90% confidence interval for the % increase in sales amounts to only 5.6%!

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Question 3

- **What do we think about this?**

"AdTel maintained a 2,000-family panel. ... Television sets owned by half of the test families were wired to cable A, while those of the other half were wired to cable B. The panels were carefully balanced according to demographic characteristics and shopping preferences."

- Can we assume that this panel will act the same as the audience who will see the real ad?
- What about using only those who completed their diaries?
- Why do we need to "carefully balance" the two groups? Why not just randomize?

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Question 3

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Random Sampling may not be "Random Enough"!

➔ *"Inefficient"!*

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Question 4

- **What do we think about this?**

"By the push of a button, AdTel was able to block the commercial broadcast on one side of the cable and simultaneously cut in the desired test commercial, while the other side carried the regular program."

- What is this "regular program"? Is it a good control?

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Question 4

- **What do we think about this?**

"By the push of a button, AdTel was able to block the commercial broadcast on one side of the cable and simultaneously cut in the desired test commercial, while the other side carried the regular program."

- What is this "regular program"? Is it a good control?
  - *A common control for an advertisement is to cut in a public service announcement or another advertisement from an unrelated category.*

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Question 5

- **What do we think about this?**

"The panel families recorded their purchases in weekly diaries."

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"The panel families recorded their purchases in weekly diaries."

- *Do you remember when you last bought peanut butter?*

- *What if peanut butter advertisements increase your recall of your purchases?*

- *More automatic measurement (now available) decreases variation and potential for confounds.*
  - *Nielsen home scan*
  - *Online measurement*

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Question 6

- **What's with the increase in sales during the test period? Is this a problem? Is our hypothesis test valid?**

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- **What's with the increase in sales during the test period? Is this a problem? Is our hypothesis test valid?**
  - *Something may have caused peanut butter sales to go up in that period (bad economy? study on health benefit of peanuts?)*
  - *Analyzing the difference between the treatment a good control makes it easier to ignore these other potential influences, so long as the test and control groups are equally affected by the outside influence.*

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Question 7

- **What if we had found that advertising increased *market share*, but had a negligible effect on volume? What would the recommendation have been?**

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- *Just because we find an effect it does not mean that it has business relevance!*

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