Analyzing three popular effects to influence consumers’ price perception: left-digit-effect, scarcity-effect and pennies-a-day-effect

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1. Introduction: The irrational consumer
2. Research Method: Online testing
3. Results: Example from the Lab
4. Discussion: The pricing toolset
5. Outlook: What are the learning effects?
1. Introduction: the irrational consumer

2. Research method: online testing

3. Results: examples from the Lab

4. Discussion: the pricing toolset

5. Outlook: what are learning effects?
"Despite a body of literature on nudging people toward better decision-making (Thaler and Sunstein, 2009), there are not many real interventions successfully de-biasing consumers in mentioned inept decision-making." Houdek (2016).

"Drawing on aspects of both psychology and economics, the operating assumption of behavioral economics is that cognitive biases often prevent people from making rational decisions, despite their best efforts. (If humans were comic book characters, we’d be more closely related to Homer Simpson than to Superman.)" Ariely (2009)
Pricing Lab 16

Inconsistencies of behavioral pricing and economic theory

**Psychological Pricing Principles**

<table>
<thead>
<tr>
<th>Pricing Principles</th>
<th>Example Factors/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity Limits</td>
<td>„Limit 4 per Household“</td>
</tr>
<tr>
<td>Odd-ending prices</td>
<td>Use Nines at the Right-End of Price</td>
</tr>
<tr>
<td>Pennies-a-Day Pricing</td>
<td>„Just 50-Cents per Day“</td>
</tr>
<tr>
<td>External reference price</td>
<td>„Regularly $35, now $29“</td>
</tr>
</tbody>
</table>


**Overview on academic research**

- Larson (2014) reviews more than **fifty pricing psychology principles** for existing products, some of which may be inconsistent with traditional economic theories. Out of this portfolio:
  - "Odd-ending pricing involves using odd numbers, especially nines, on the right-hand side of prices. In many cases, prices that ended in nines ... produced higher sales than prices that were slightly higher or slightly lower.”
  - “Several studies concluded that **scarcity works** best with relatively high-priced, high-quality products.”
  - „**Pennies-a-day** pricing, where the price is described on a per-day basis, changes the temporal frame and can boost the demand.“

Source: exeo Strategic Consulting AG / Rogator AG.
Two basic problems in relation with psychological studies: lack of reproducibility and often underpowered studies

**Nature News (2015)**

- "Don't trust everything you read in the psychology literature. In fact, two thirds of it should probably be distrusted."
- "Publication bias: ...Boring but accurate studies may never get published, or researchers may achieve intriguing results less by documenting true effects than by hitting the statistical jackpot..."

**Statement of Daniel Kahneman (2017)**

- "I placed too much faith in underpowered studies: Nobel Prize winner admits mistakes"

According to the Schimmack et al. blog, "...readers of Kahneman's book, Thinking, Fast and Slow, should not consider the presented studies as scientific evidence that subtle cues in their environment can have strong effects on their behavior outside their awareness."

Remarkably, Kahneman took the time to post a detailed response to the blog, writing:

- "What the blog gets absolutely right is that placed too much faith in underpowered studies. As pointed out in the blog, and earlier by Andrew Gelman, there is a special issue in the collection because the first paper that Amos Tversky and I published was about the belief in the 'law of small numbers', which allows researchers to trust the results of underpowered studies with unreasonably small samples. We also cited Overall (1969) for showing 'that the prevalence of studies deficient in statistical power is not only wasteful but actually detrimental: it results in a large proportion of invalid rejections of the null hypothesis among published results.' Our article was written in 1969 and published in 1971, but it failed to influence its audience."

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## Study design: “Pricing Lab 2016”

### Pricing Lab approach

<table>
<thead>
<tr>
<th>Structure of the interview</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> Age, gender, internet usage</td>
<td><strong>Screening</strong></td>
</tr>
<tr>
<td><strong>B</strong> Consumer spending and structure</td>
<td><strong>Consumer decisions</strong></td>
</tr>
<tr>
<td><strong>C</strong> Exp. 1: 4 test groups</td>
<td><strong>Experimental testing</strong></td>
</tr>
<tr>
<td><strong>D</strong> Customer loyalty programs, car usage, ...</td>
<td><strong>Descriptive parameters / profiling</strong></td>
</tr>
</tbody>
</table>

### Study characteristics
- German population (18+ years); representative approach.
- Recruitment via Online Access Panels.
- Field: online interviews.
- Sample: n=500-1,000.
- Length of interview: appr. 12-14 minutes.
- Randomized test groups (identical structure).
- Experimental testing embedded in certain topics of the interviews.

Source: *exeo* Strategic Consulting AG / Rogator AG
Ryanair campaign Oct. 2015: in addition to the basic offer (actual advertisement), the presentation of the offer was systematically varied

Experimental design to test promotional ads: Ryanair One Way Flights

Test group (randomized)

1. Prior to presenting the original sales ad a competitors offer was presented

2. Original Ad*

3. Even Price: Price was rounded to EUR 20,00

4. Reduced price (EUR 9,99) for limited number of seats

Framing-Effect

Left-Digit-Effect

Volume-Effect


Source: exeo Strategic Consulting AG / Rogator AG
Experimental design to test promotional ads: Smartphone flat fee

Prior to presenting the original sales ad a competitors offer was presented

First Framing-Effect

Original Ad

Even Price: Price was rounded to EUR 10,00

Left-Digit-Effect

Historical price „before EUR 14,99“ was deleted

Second Framing-Effect

Source: exeo Strategic Consulting AG / Rogator AG
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Ryanair ad: strong approval for "inexpensive offer" and "decoy offer" across test groups - experimental factors without significant influence

Statement evaluation: media campaign Ryanair (2015)

1. The price is inexpensive
2. The price is transparent
3. The offer has a good value for money
4. The offer is fair
5. I exactly know what I can expect
6. Looks like a decoy offer
7. I would like to purchase that offer

Significant differences (p<0.10)

Source: exeo Strategic Consulting AG / Rogator AG
The expected price (average price paid) of a Ryanair flight is about four times higher than the communicated reference price.

Estimated price for a flight differentiated by airlines (EUR, mean values)

<table>
<thead>
<tr>
<th>Price per flight</th>
<th>Total</th>
<th>Persons with airline usage</th>
<th>Persons without airline usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lufthansa (price set!)</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>AirBerlin</td>
<td>107</td>
<td>112</td>
<td>104</td>
</tr>
<tr>
<td>Germanwings (4U)²</td>
<td>101</td>
<td>104</td>
<td>100</td>
</tr>
<tr>
<td>Ryanair</td>
<td>79</td>
<td>78</td>
<td>80</td>
</tr>
<tr>
<td>Easyjet</td>
<td>86</td>
<td>92</td>
<td>83</td>
</tr>
<tr>
<td>Wizz</td>
<td>74</td>
<td>67</td>
<td>82</td>
</tr>
</tbody>
</table>

1) Only if known: Imagine an inner-European flight with Lufthansa would cost 150 EUR per route (1 adult, economy). What do you think, at what level the price for .. would be?

2) Germanwings has been rebranded to Eurowings in January 2016.

Source: exeo Strategic Consulting AG / Rogator AG
No significant influence of competition information and missing price anchor (before EUR 14.99) on the price image profile

Statement evaluation: Advertising for smartphone flatrate (1&1)

- The price is inexpensive
- The price is transparent
- The offer has a good value for money
- The offer is fair
- I exactly know what I can expect
- Looks like a decoy offer
- I would like to purchase that offer

Source: exeo Strategic Consulting AG / Rogator AG
iPads: the change in the information content and the price presentation has little influence on the image evaluation.

Statement evaluation: offer iPad Air

<table>
<thead>
<tr>
<th>Statements</th>
<th>Test group</th>
<th>Offer competitor</th>
<th>Original offer</th>
<th>+1 EUR</th>
<th>Only 1 available</th>
</tr>
</thead>
<tbody>
<tr>
<td>The price is inexpensive</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>The price is transparent</td>
<td></td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>The offer has a good value for money</td>
<td></td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>The offer is fair</td>
<td></td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>I exactly know what I can expect</td>
<td></td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Looks like a decoy offer</td>
<td></td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>I would like to purchase that offer</td>
<td></td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Mean value original offer: Top-2: 17%

Mean value original offer: Top-2: 24%

Mean value original offer: Top-2: 49%

Significant differences (p<0.10)

Source: exeo Strategic Consulting AG / Rogator AG
Milk (Discount Lidl): no significant odd-ending-effect – obviously the trading company has an influence on the products' price perception

Statement evaluation: Advertising “Bärenmarke” (offer at Lidl)

The price is inexpensive
The price is transparent
The offer has a good value for money
The offer is fair
I exactly know what I can expect
Looks like a decoy offer
I would like to purchase that offer

Source: exeo Strategic Consulting AG / Rogator AG

Significant differences (p<0.10)
Amazon Prime: experimental test to proof the „Pennies-a-day-Effect“: absolute figures below 1 EUR work best

Statement evaluation: promotion Amazon Prime

<table>
<thead>
<tr>
<th>Statements</th>
<th>Original offer</th>
<th>Price reduced</th>
<th>Same price</th>
<th>Same price</th>
<th>Same price</th>
</tr>
</thead>
<tbody>
<tr>
<td>The price is inexpensive</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>The price is transparent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>5</td>
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<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: exeo Strategic Consulting AG / Rogator AG

Significant differences (p<0.10)

Effekt size d=0.48 (medium)

Top-2: 33 %

Top-2: 40 %

1=Totally agree
6=Totally disagree
In Nov. 2016 Amazon announced a price change for its service Prime: a price increase of > 40 % (per year)

Price change for Amazon Prime in Germany: Increase from EUR 49 to EUR 69 per year

Price increase of EUR 20 (41 %)

... for existing customers: delayed price increase

Additional EUR 1,67 per months

... improved portfolio (value to customer)

Source: exeo Strategic Consulting AG / Rogator AG
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Today, there is a toolset of different methods to optimize pricing available – experimental designs are one option.

### The toolset for decision making in pricing

<table>
<thead>
<tr>
<th>Market framework</th>
<th>Volatile</th>
<th>Robust</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Driven by suppliers: <strong>Store-Test</strong> or online sales test</td>
<td>Price-Sensitivity-Measurement (price thresholds)</td>
</tr>
<tr>
<td></td>
<td>Driven by buyers: „Pay-What-You-Want (PWYW)“</td>
<td>Direct measurement Willingness to Pay (WTP)</td>
</tr>
<tr>
<td>2</td>
<td>Experimental designs</td>
<td>Conjoint Measurement (Indirect Preference-measurement)</td>
</tr>
<tr>
<td></td>
<td>Audions (driven by suppliers)</td>
<td>Direct measurement Willingness to Pay (WTP)</td>
</tr>
<tr>
<td></td>
<td>Audions as Price-line.com (driven by buyers: „Ask Your Own Price“)</td>
<td></td>
</tr>
</tbody>
</table>

**Focus**

- Focus on price only
- Focus on price+
Online experimental testing as a compromise between field and traditional laboratory experiments

**Natural Field Experiments**

- ... the environment is one where the subjects naturally undertake these tasks and where the subjects do not know that they are in an experiment.

- Ideal? Not necessarily:
  - (A) Prices will undoubtedly impact conversions (like Orbitz); risk to lose credibility with prospective customers.
  - (B) There are many places where it is illegal to arbitrarily vary your price.
  - (C) Costs to conduct a field experiment.

**Traditional laboratory experiments**

- “… one that employs a standard subject pool of students, an abstract framing, and an imposed set of rules”

  - “In practice, however, few experimenters ever examine field behavior in a serious and large-sample way.* It is relatively easy to say that the experiment could be applied to real people, but to actually do so entails some serious and often unattractive logistical problems” (Harrison & List, 2004).

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**Pricing Lab-Approach**

- Experimental designs as part of online interviews
- Representative approach / sample size \( n=500-1.000 \)
- Real life promotional ads

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* Example: „Participants: Fifty-two undergraduate students from a large northeastern university participated in the experiment in return for partial course credit.”; Thomas & Morwitz (2005).

Source: [exeo] Strategic Consulting AG / Rogator AG
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Outlook: what are the basic learnings?
And: what can we do to improve the decision-making in pricing?

Conclusion 1
- There are biases in the consumers’ price perception, but this is not necessarily the rule.

Conclusion 2
- Most (of the own) experiments indicate that consumers’ price perceptions are relatively robust.

Conclusion 3
- The assumption of the Homo Oeconomicus is as wrong as the assumption of the irrational consumer.

Conclusion 4
- Behavioral pricing is an important aspect in pricing, but clear instructions for action (if ... then ...) are difficult to derive.

Conclusion 5
- Experimental online designs represent an effective and cost-efficient method to measure price image effects.
Thank you for your attention!

Literature


Source: exeo Strategic Consulting AG / Rogator AG