Algorithms and Pricing

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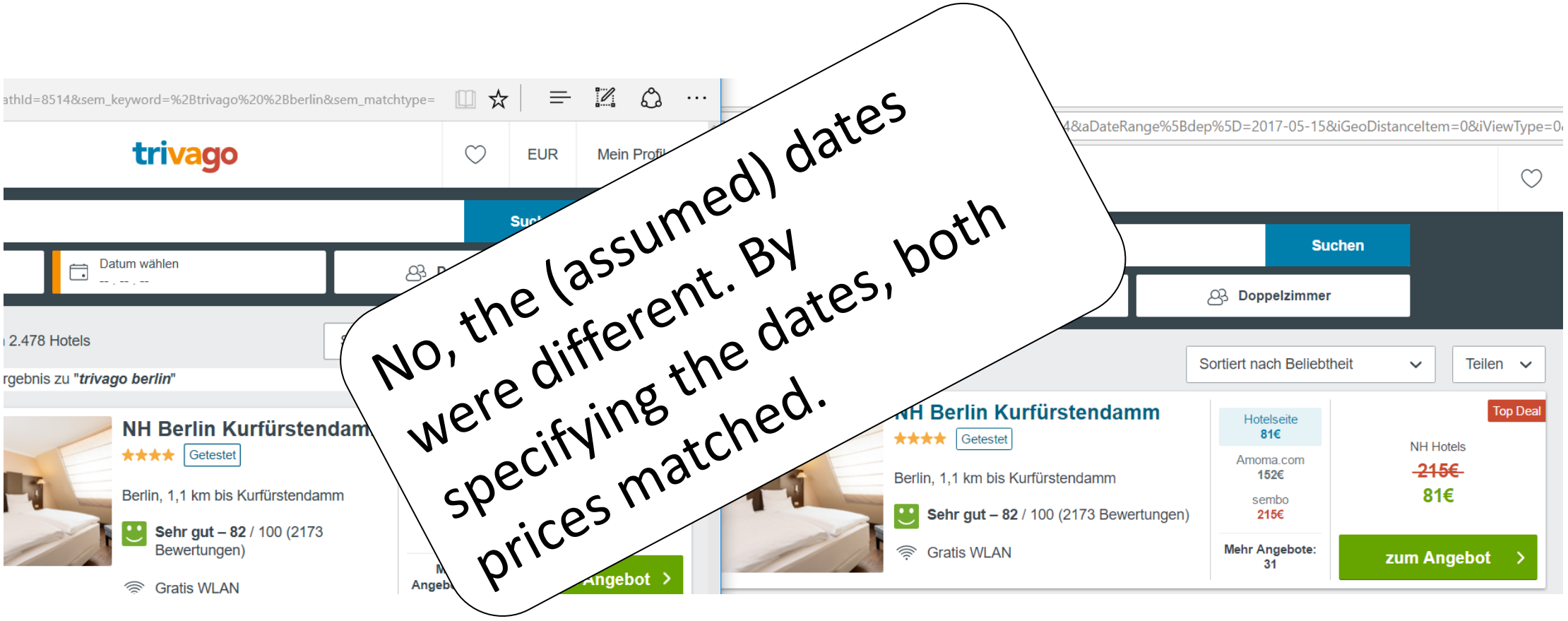
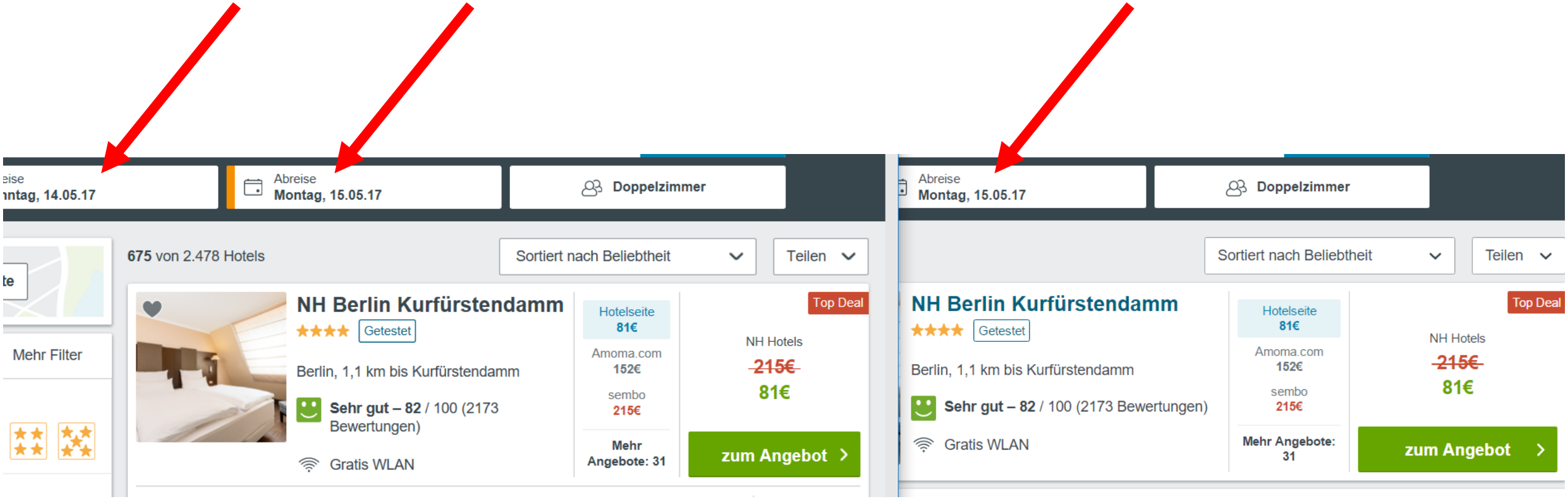
Do we get different prices as individuals?



Searching for „Trivago“ in Google on Chrome, searching for Berlin

Searching for „Trivago Berlin“ in Google on Edge


Abreise
Montag, 15.05.17
Doppelzimmer
675 von 2.478 Hotels
Sortiert nach Beliebtheit
Teilen
Mehr Filter
NH Berlin Kurfürstendamm
Getestet
Berlin, 1,1 km bis Kurfürstendamm
Sehr gut – 82 / 100 (2173 Bewertungen)
Gratis WLAN
Hotelseite
81€
Amoma.com
152€
sembo
215€
Mehr Angebote: 31
Top Deal
NH Hotels
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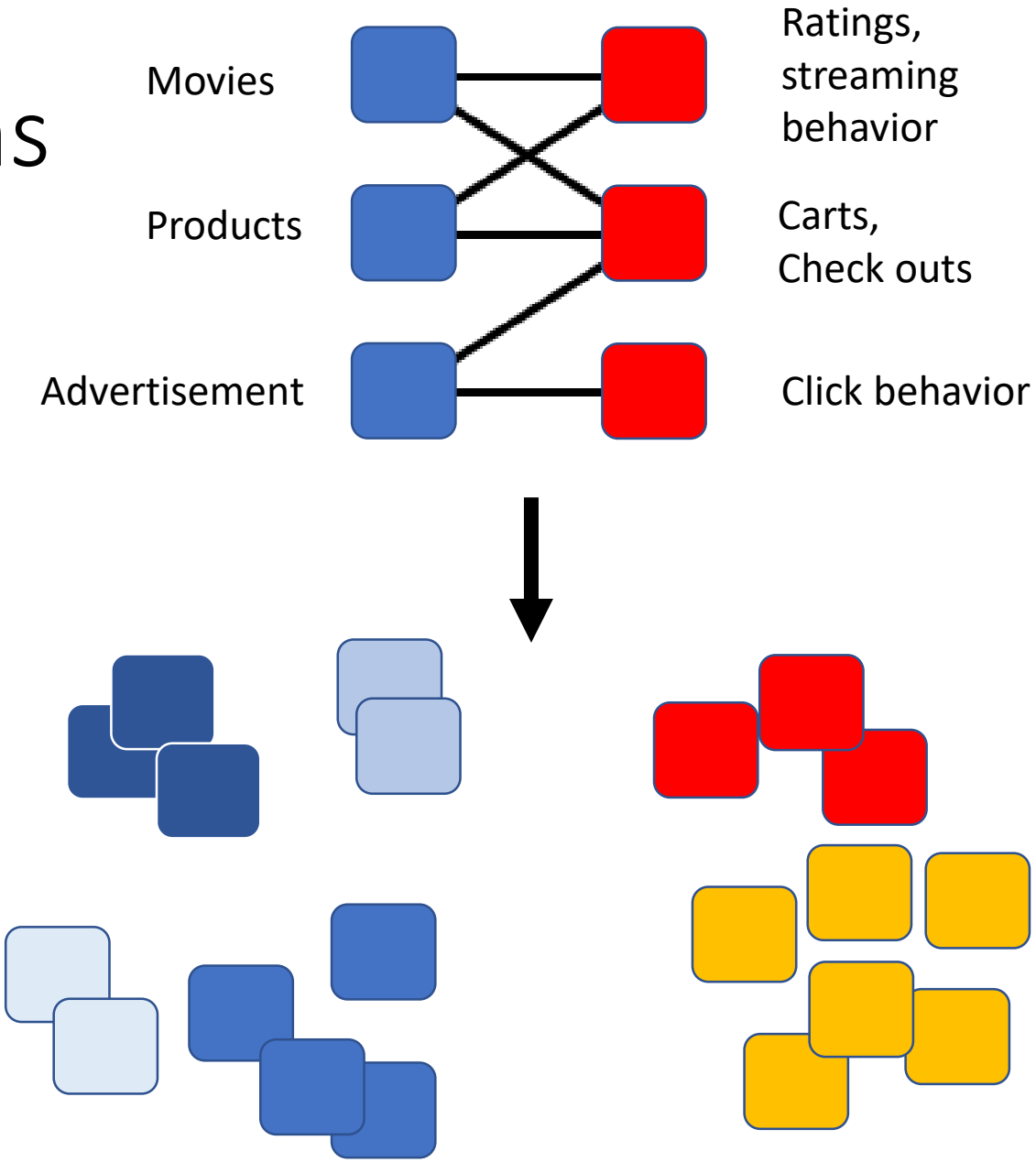
What is an algorithm?

- An algorithm is **a proven procedure to solve a mathematical problem**.
  - Or, given two cities A and B, and a street map, find the shortest path from A to B.
  - E.g., given the products and their popularity find the best prices according to some price model.
- Algorithms from machine learning try to find rules and patterns in heap of data

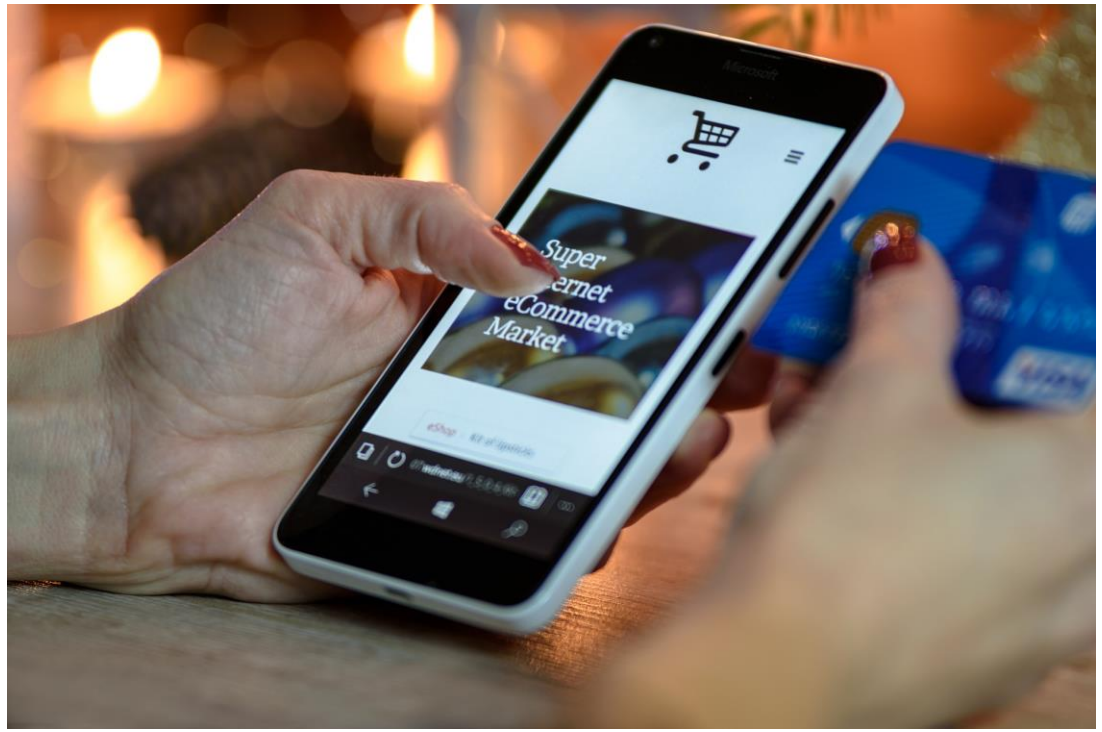
Recommendation systems

- Quite primitive algorithms to find patterns in consumer behavior.
- In the main setting, we have some product and some human behavior.
- Now, an algorithm can be used to:
  - Find products that illicit common human behavior.
  - Find humans that behave similar with respect to the product.
- Grouping of products and categorization of humans



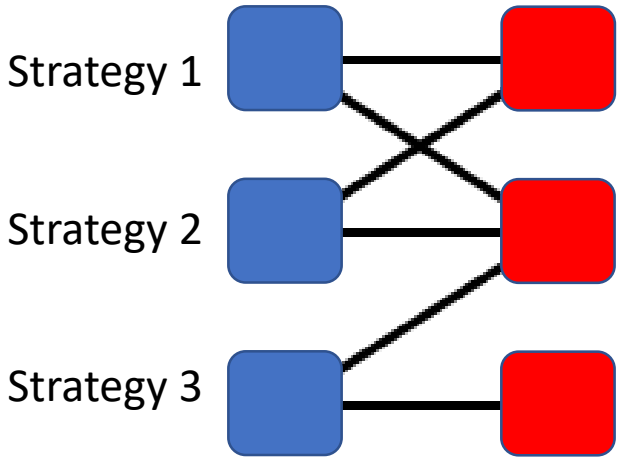
How does it work?

- Just one method:
  - For each good, count the number of pairs of humans with the same, wanted behavior (e.g., people who liked movie A and movie B)
  - Compare to expected value in a well-defined statistical model (e.g., reduce by expectation if both movies are bestsellers)
- The actual intelligence is in the human behavior.
- The machine just identifies the pattern.



A powerful method: AB-Testing

- With costs for personalized websites, personalized discounts, personalized prices, personalized memberships… going to zero,
- …. and people categorized into groups of similar people,
- … and products categorized into groups of similar products,
- …. AB-testing is achievable:
  - Put people from one category randomly in one of two groups (treatment and control group)
  - Treat differently (show different prices, different advertisement, different information, ….)
  - Measure the effect on the wanted human behavior.



Any human behavior of interest:

Ratings,
Streaming behavior,
Carts,
Check outs,
Click behavior

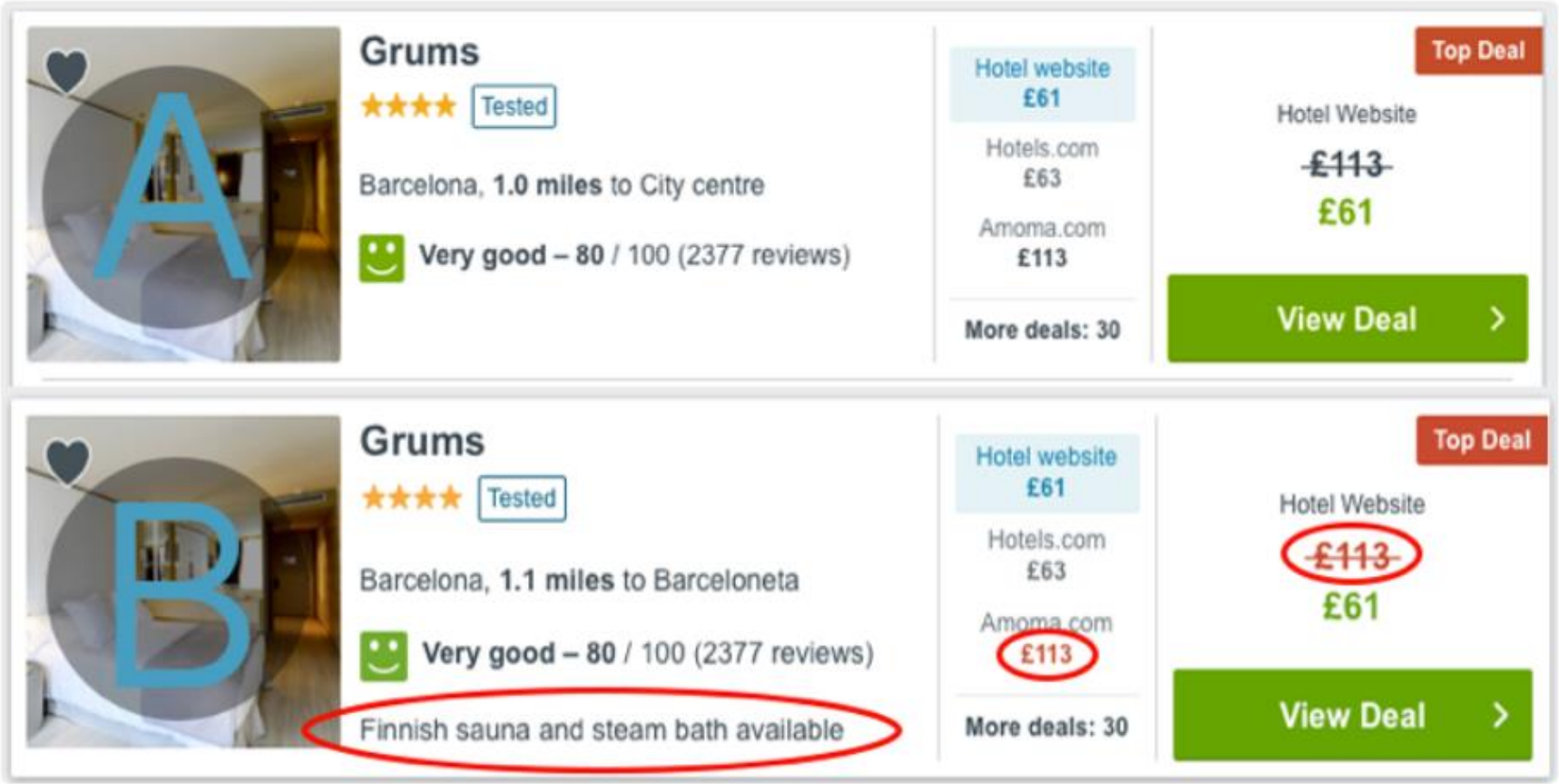
Example

Google checked whether to use 10 or 30 results on the first page[1].

- A difference in milliseconds in computing time.
- Users were significantly less likely to use Google when it took longer to load the page.

1 https://www.cnet.com/news/were-all-guinea-pigs-in-googles-search-experiment/
For other examples, see here (unverified) https://www.designforfounders.com/ab-testing-examples/

AB-Testing at Trivago



As posted by Nidhal Satouri https://nidhalios.github.io/AB-Testing-Trivago-post/

Can personal pricing be achieved?

- Definition:
  - A price that is individually tailored to each user, based on their history with the site, their similarity to other users, and the similarity of the products they are interested in.
- YES.
- Do we see it now?
- It does not seem so.
  - Consumers react badly to this kind of pricing behavior.

Most seemingly personalized pricing is dynamic pricing

- Algorithms can also find regular dynamic patterns
  - Seasonal sales
  - Willingness to buy at different times of day
- Data warehouses know exactly the number of seats/rooms left;
  - This enables KONTINGENT based prices
  - These are not individual as each user will see the same price at the same time

There‘s a continuum

What to do?

- Control by black-box-methods with automated tools for discrimination
  - Steering (different orders of results)
  - Different layouts, additional labels, banners, …
  - Different prices or discounts
- If there is some proof for discrimination, you need technicians to look ‚under the hood‘.
- It might be downright manipulation or come from the interactions of the users with the algorithm.

ALGORITHM WATCH

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