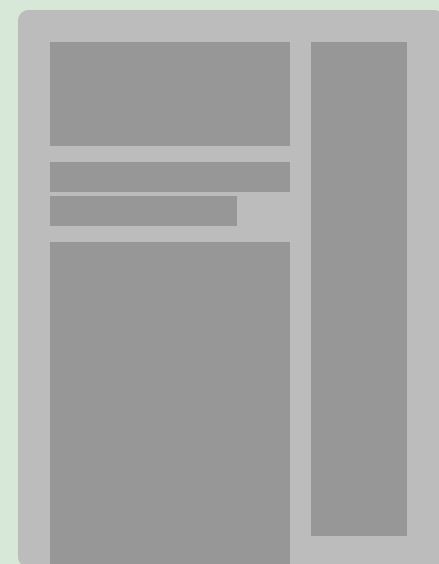


User-Aligned Web Interfaces: Just-in-Time Generative Adaptation of Existing UIs

Andrew Levada, Rustam Lukmanov
@ Innopolis University, 2026



web page



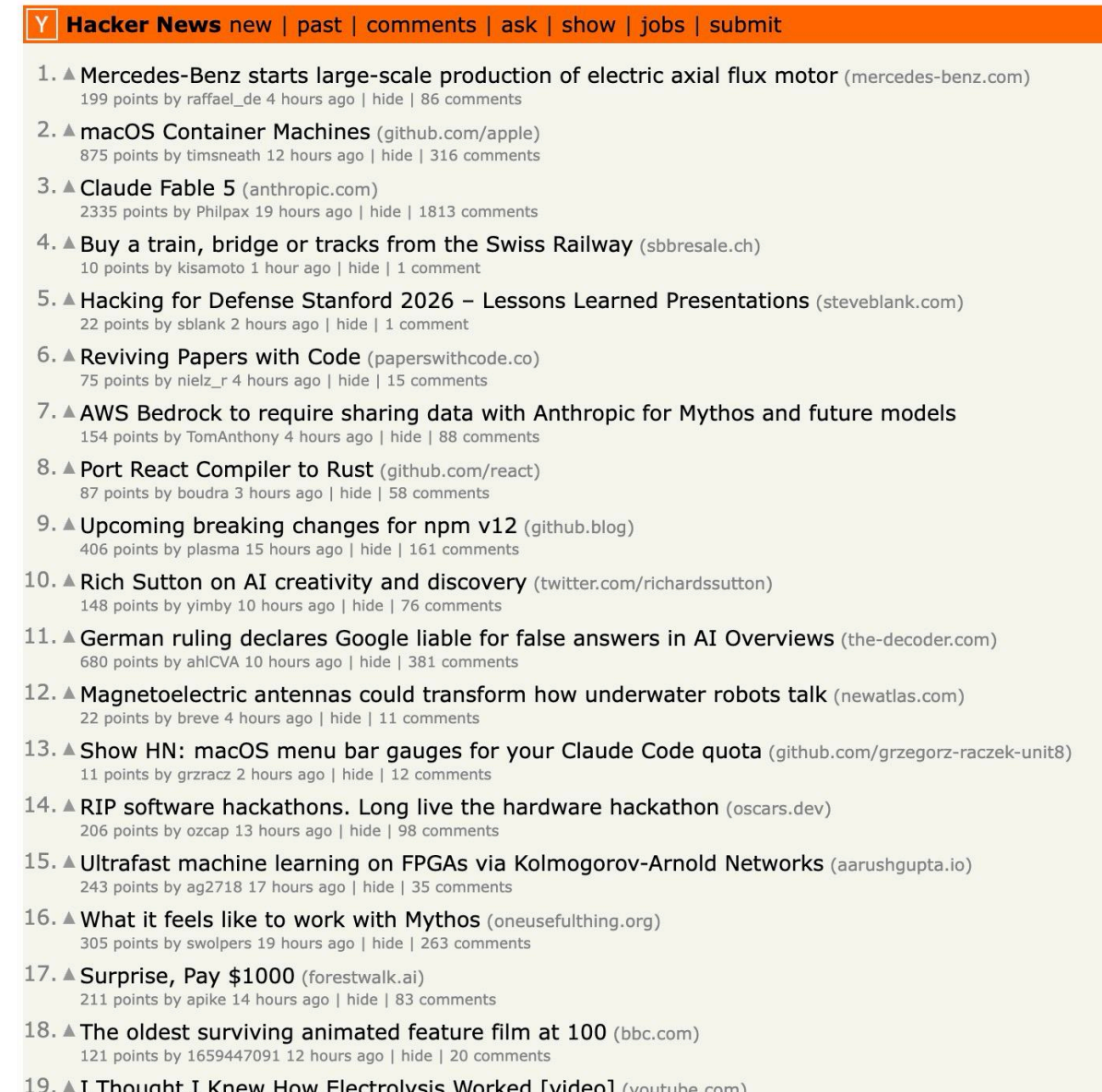
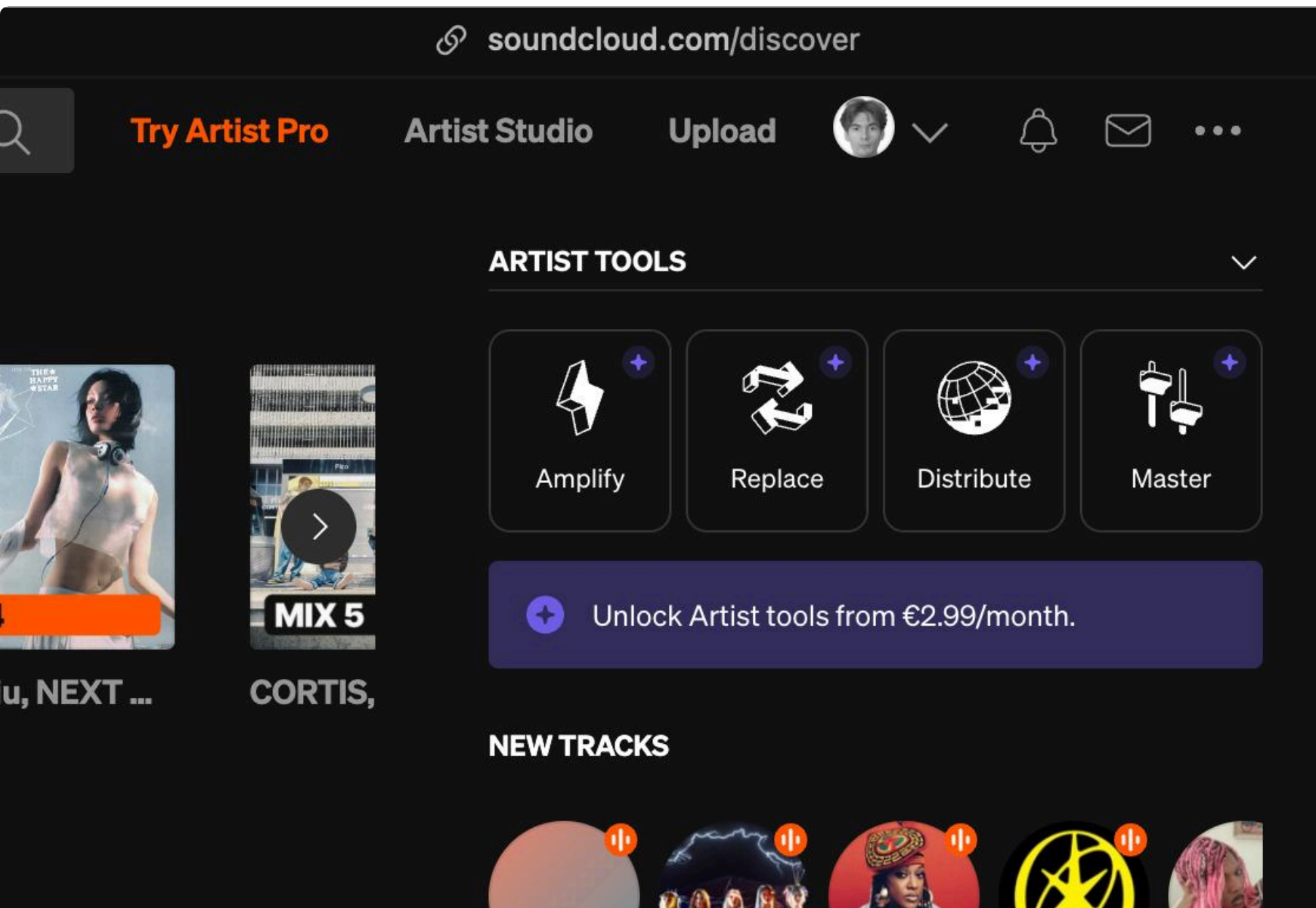
«Remove
the right sidebar»



updated
web page

Background

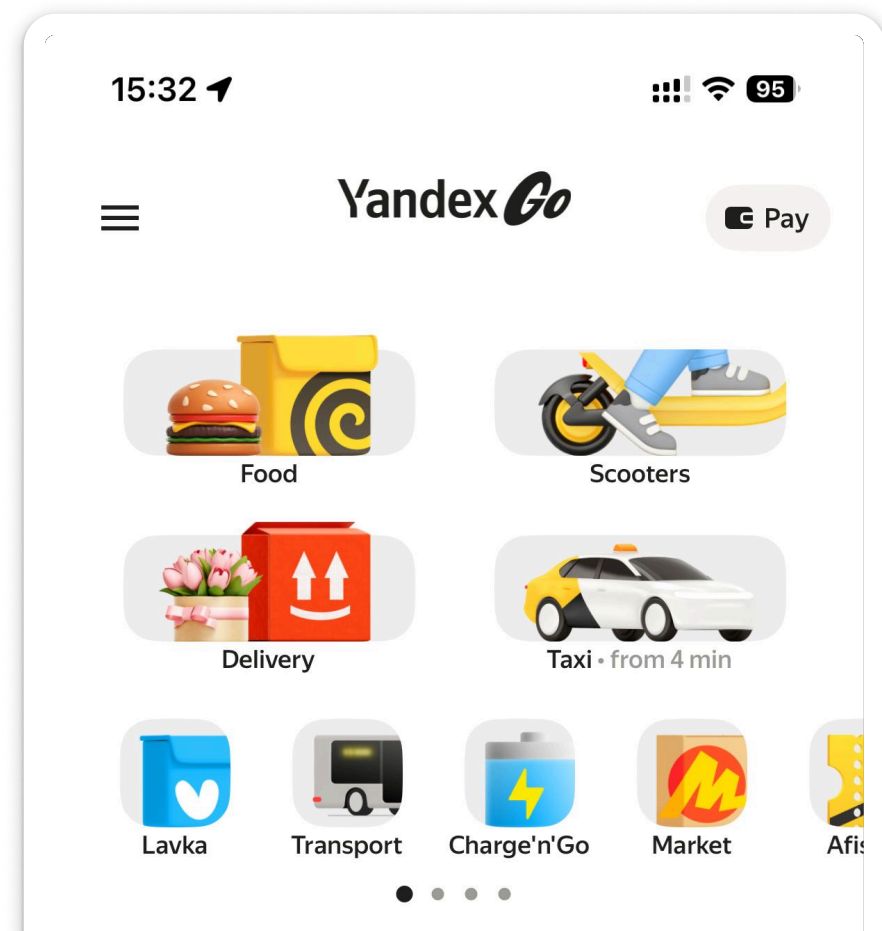
User Interfaces can be misaligned with the user



Solutions to misaligned UIs

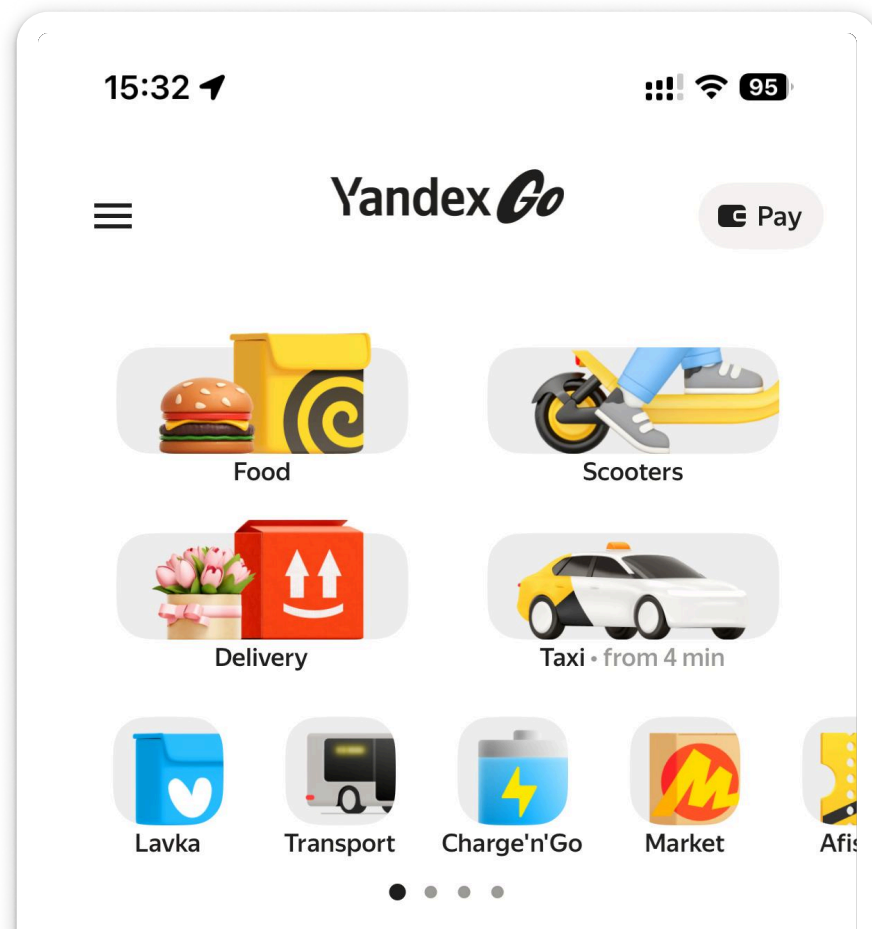
1

Adaptive interfaces

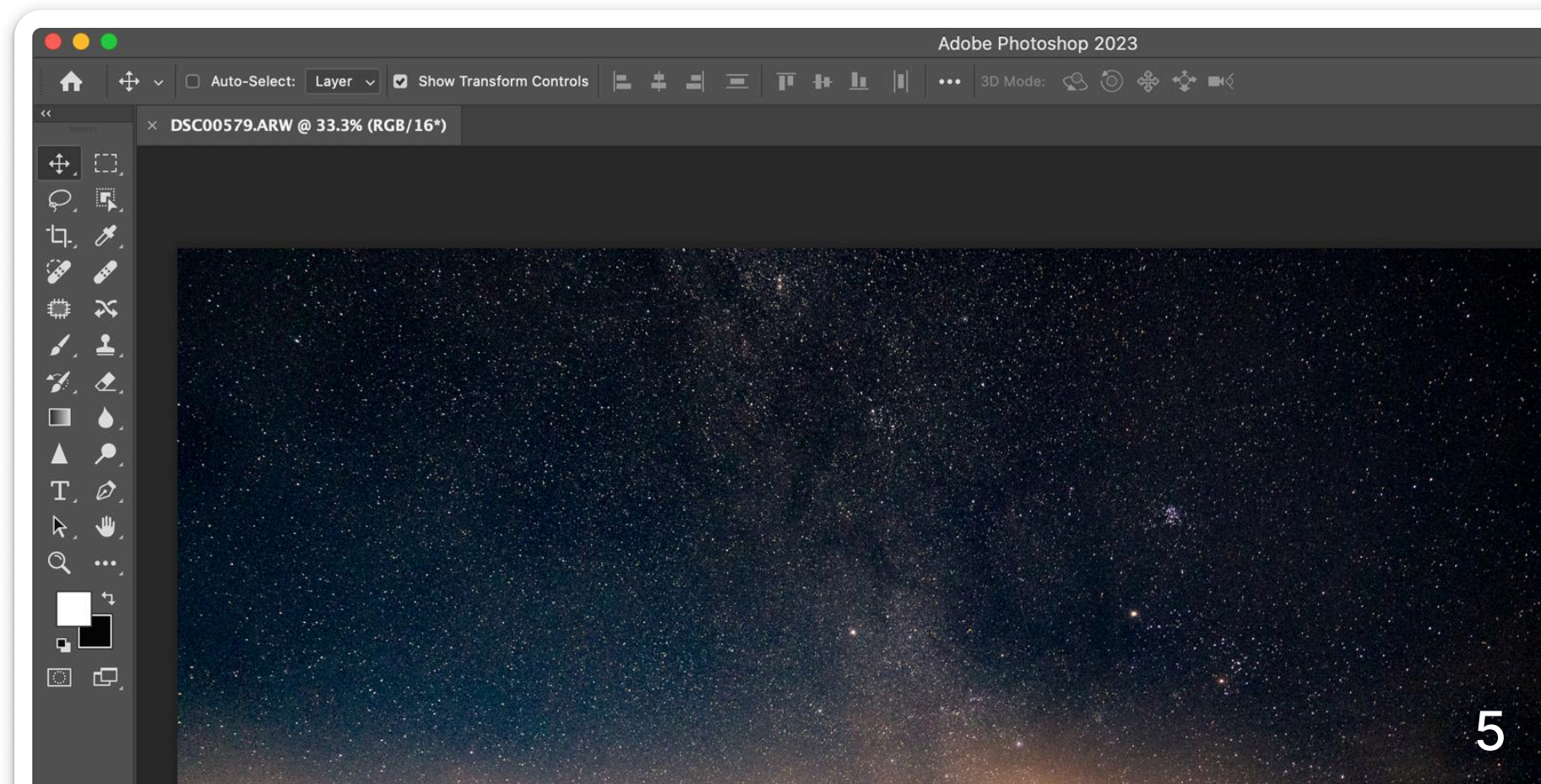


Solutions to misaligned UIs

1
Adaptive
interfaces



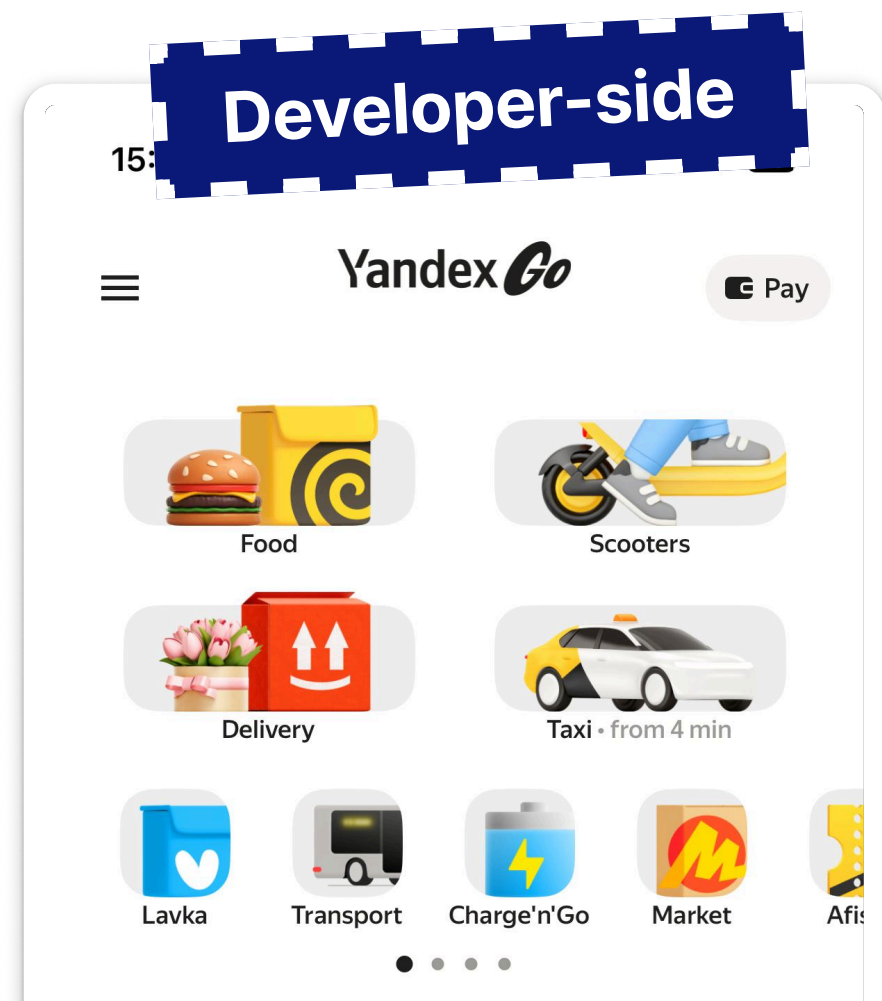
2
Customizable
interfaces



Solutions to misaligned UIs

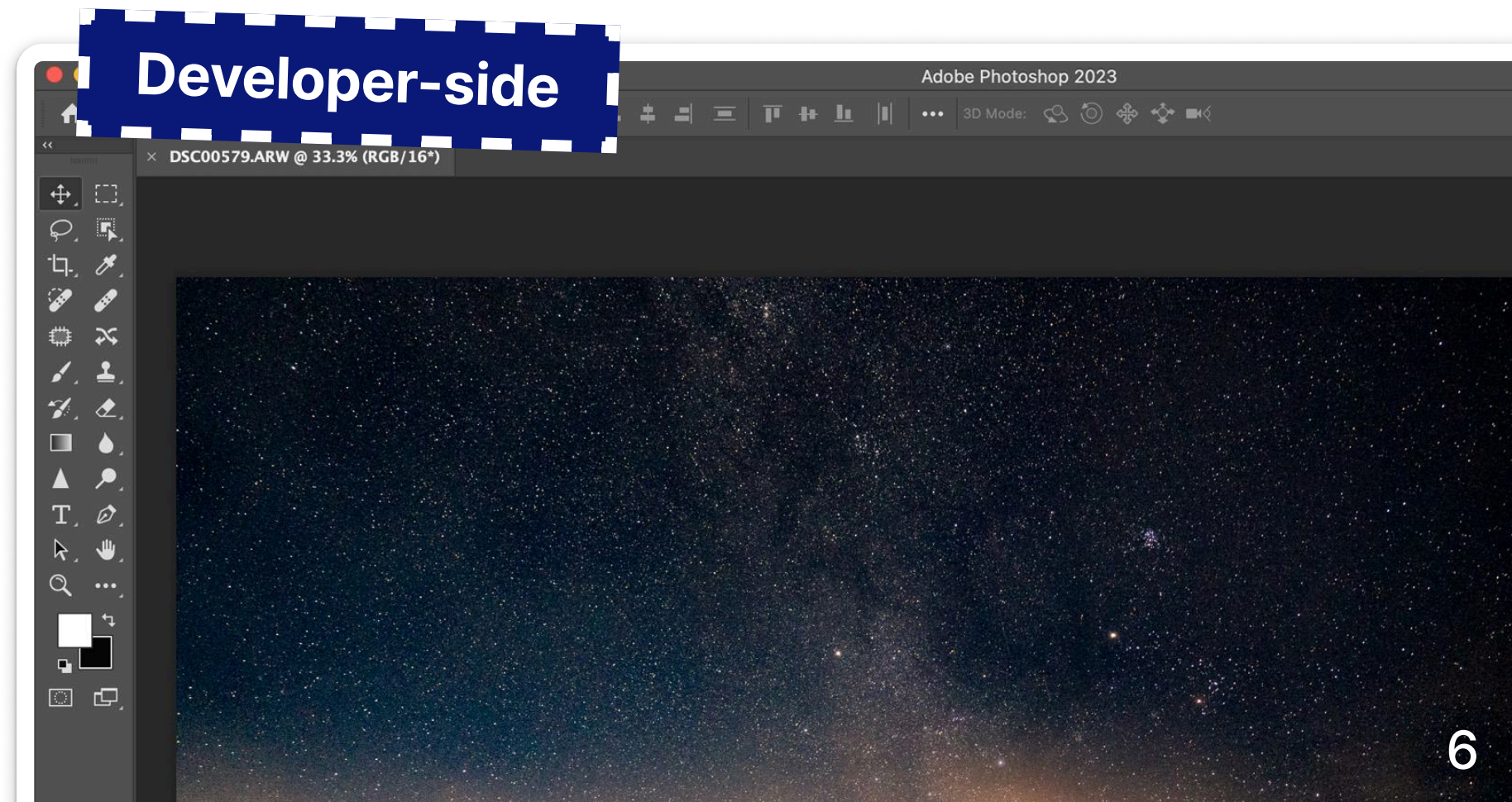
1

Adaptive
interfaces



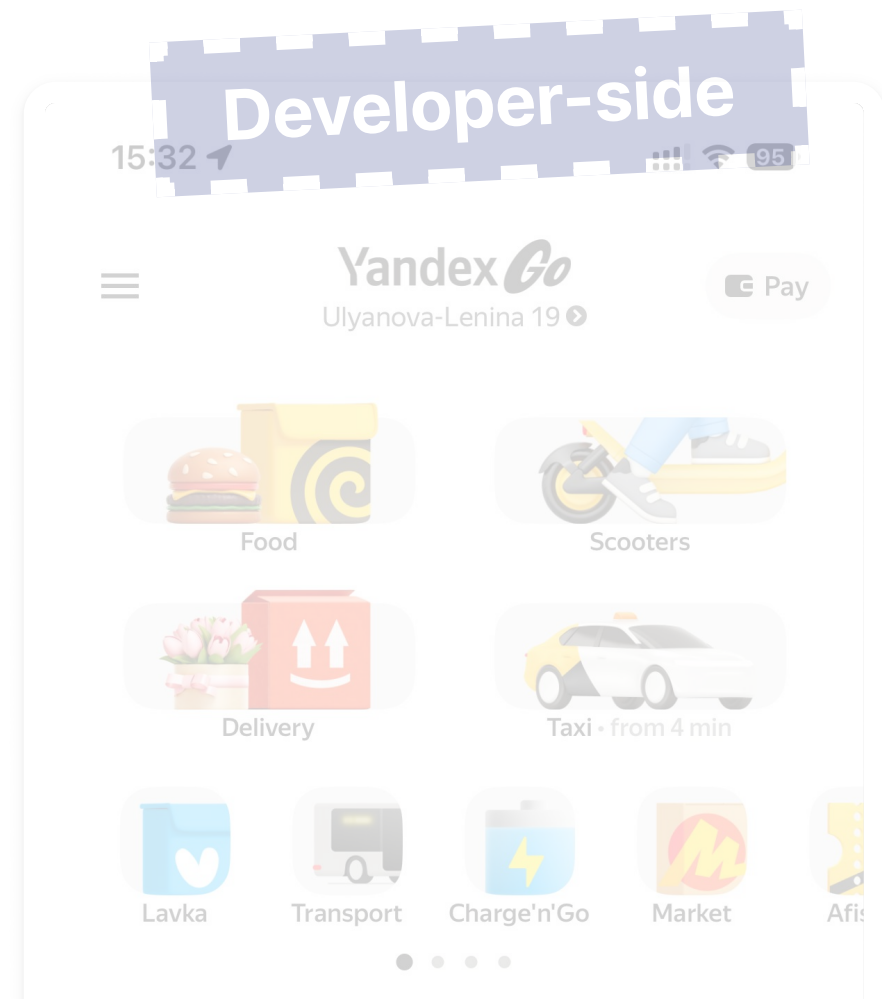
2

Customizable
interfaces

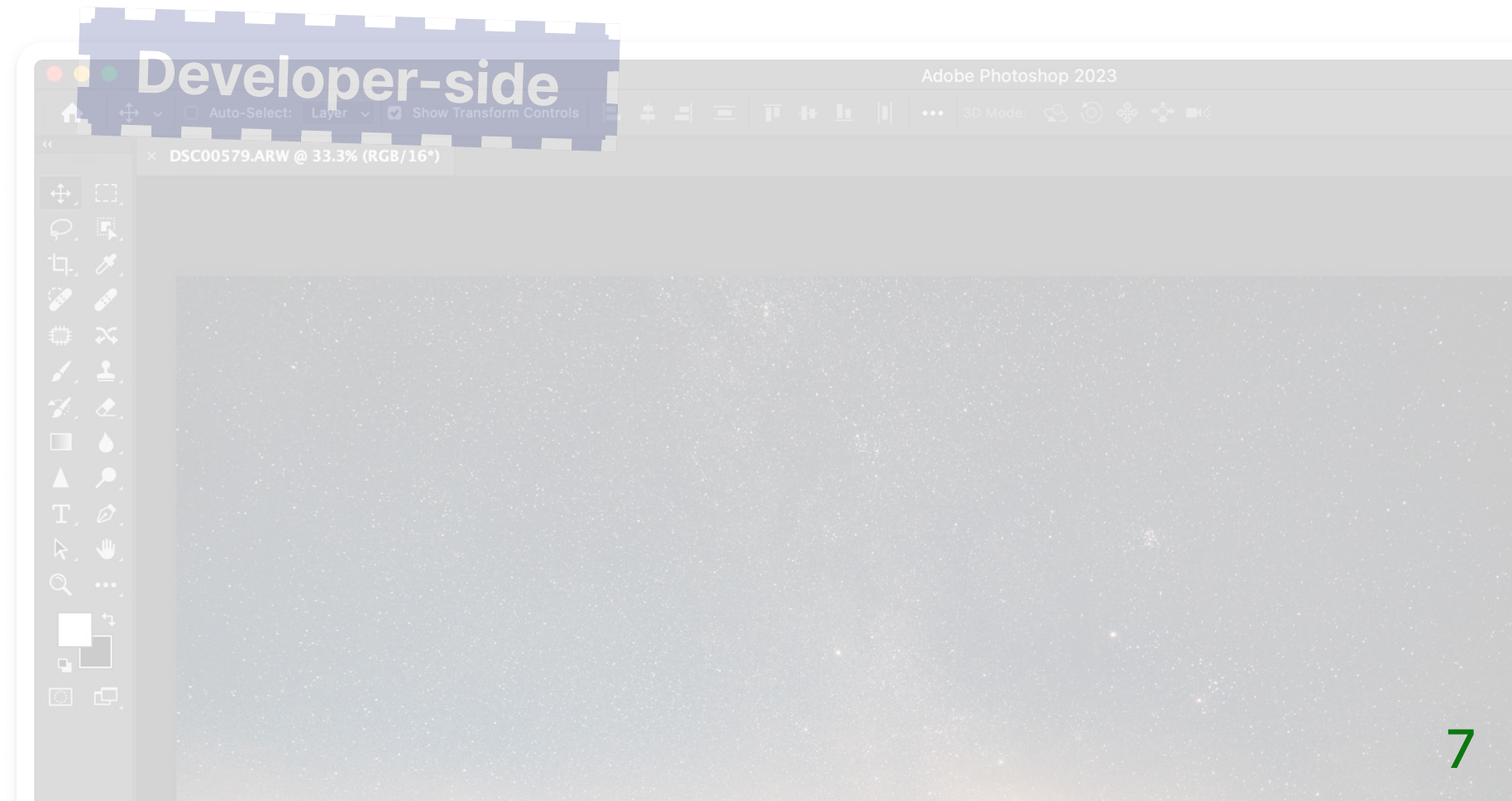


Solutions to misaligned UIs

1
Adaptive
interfaces



2
Customizable
interfaces



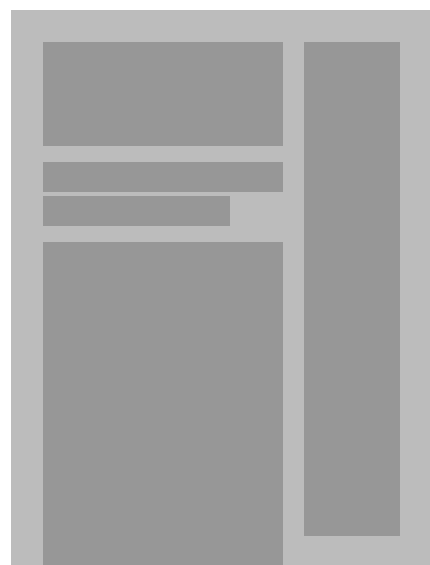
3
End-user
programming

Research Question

How can LLM-based end-user programming counteract missaligned UIs?

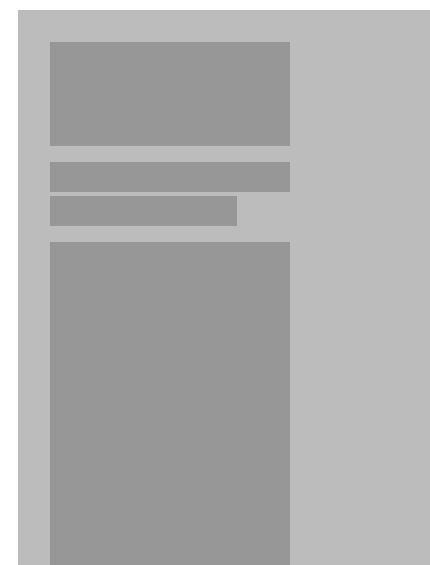
Scope: Web pages in browser

The Internet Shaper system and how it works

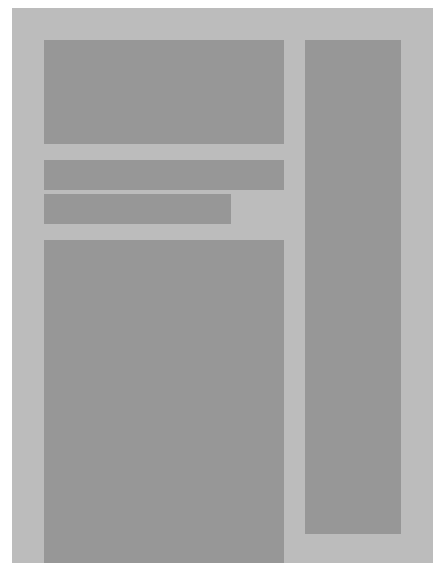


web page

«Remove
the right sidebar»

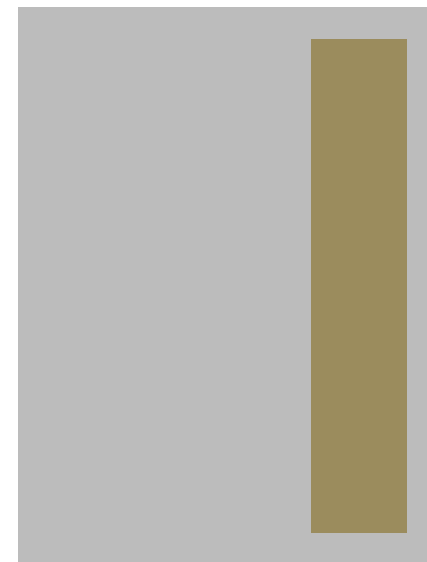


updated
web page

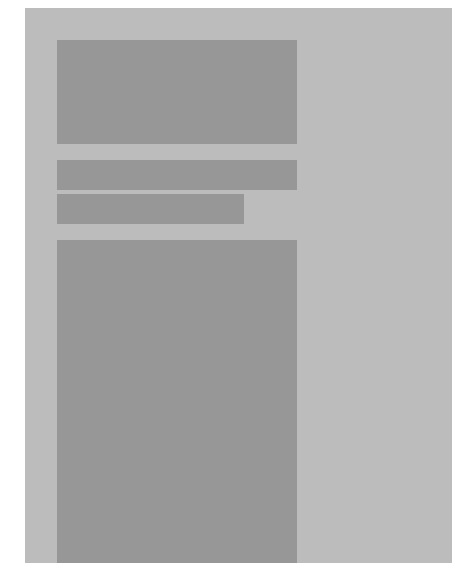


HTML code
of the web page

«Remove
the right sidebar»



Changes to the
HTML as
{ oldText: string;
newText: string }



HTML code of the web page
with changes applied

Baseline

Problems with Baseline

Problems with Baseline / Web page code size

DOM sizes analysis — characters
Raw & visible DOM (n=74 snapshots)

Representation	Mean	Median	Min	Max
Raw DOM	948.6k	708.5k	50.1k	4.41M
Visible DOM	422.0k	295.2k	21.2k	2.35M

DOM compression — tokens
Raw & visible DOM (n=74 snapshots)

Representation	Mean	Median	Min	Max
Raw DOM	339.3k	240.9k	18.5k	1.34M
Visible DOM	162.8k	107.9k	7,188	1.03M

Web Page DOM compaction algorithm

1. Remove non-structural markup
2. Attribute filtering
3. High-frequency class removal (5% threshold)
4. Single-child wrapper collapse
5. Repeated-sibling truncation ←
6. Whitespace normalization

Repeated-sibling truncation

```
1 <body>
2   <div id="root">
3     <button type="button" title="Go">Go</button>
4   </div>
5   <ul id="list">
6     <li><span>A</span></li>
7     <li><span>B</span></li>
8     <li><span>C</span></li>
9   </ul>
10 </body>
```

Original HTML

```
1 <body>
2   <div id="root">
3     <button type="button" title="Go">Go</button>
4   </div>
5   <ul id="list">
6     <li><span>A</span></li>
7     <!-- -2 siblings -->
8   </ul>
9 </body>
```

Repeated-sibling truncation

DOM sizes analysis — characters

With compressed DOM · compression = visible median ÷ compressed median (n=74 snapshots)

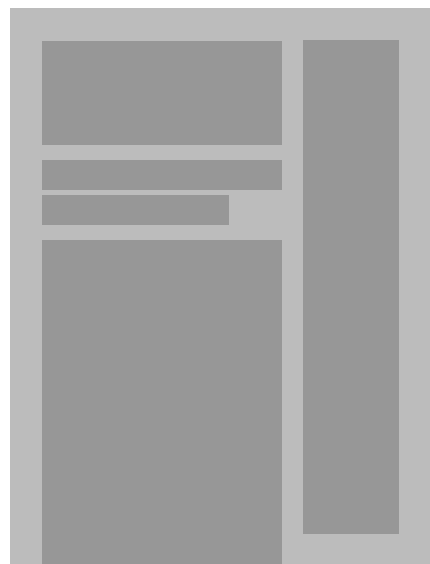
Representation	Mean	Median	Min	Max	Compression
Raw DOM	948.6k	708.5k	50.1k	4.41M	—
Visible DOM	422.0k	295.2k	21.2k	2.35M	—
Compressed DOM	35.7k	21.4k	1,854	332.5k	÷13.8×

DOM compression — tokens

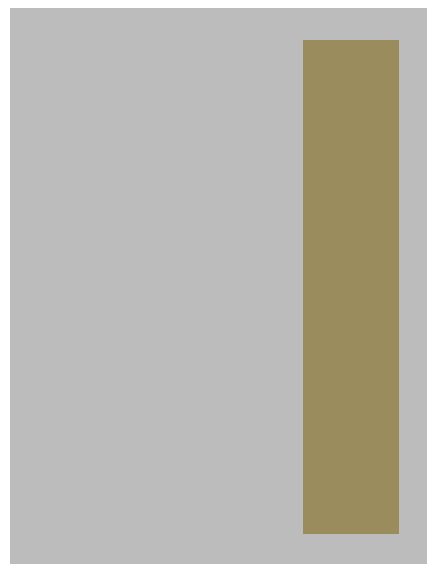
With compressed DOM · compression = visible median ÷ compressed median (n=74 snapshots)

Representation	Mean	Median	Min	Max	Compression
Raw DOM	339.3k	240.9k	18.5k	1.34M	—
Visible DOM	162.8k	107.9k	7,188	1.03M	—
Compressed DOM	11.1k	6,612.5	522	107.9k	÷16.3×

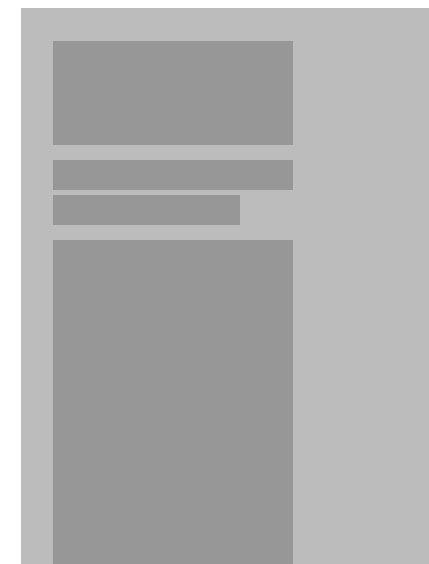
Problems with Baseline / It's not persistent



HTML code
of the web page

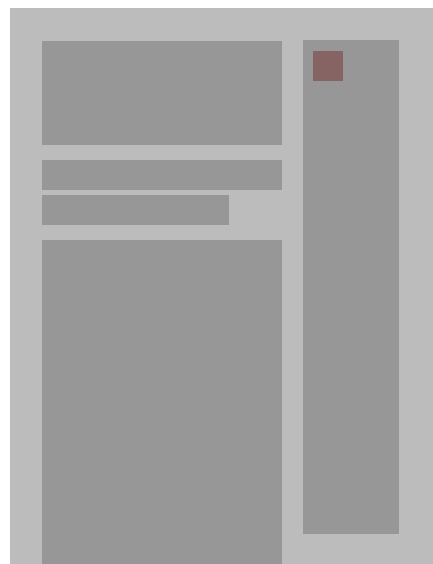


Changes to the
HTML as
{ oldText: string;
newText: string }

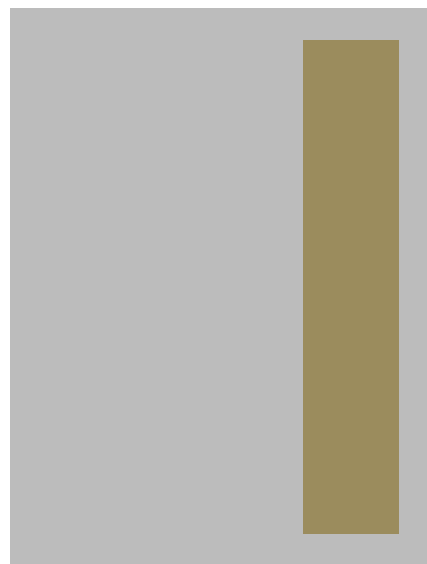


HTML code of the web page
with changes applied

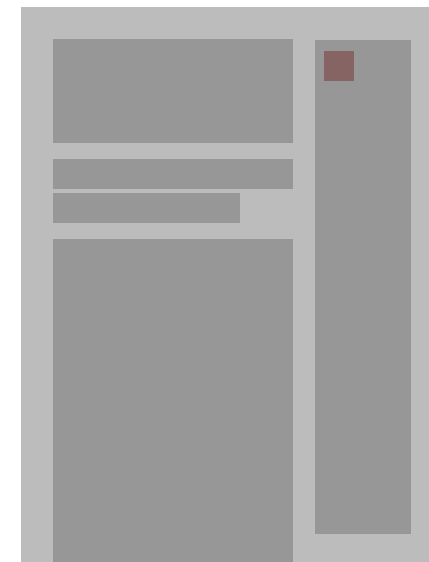
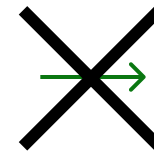
Problems with Baseline / It's not persistent



HTML code
of the web page



Changes to the
HTML as
{ oldText: string;
newText: string }



oldText mismatch!

Mechanism for persistence — Rules Engine

oldText

```
<div id="root"><button type="button"  
class="purchase" title="Go">Go</butt...
```

newText

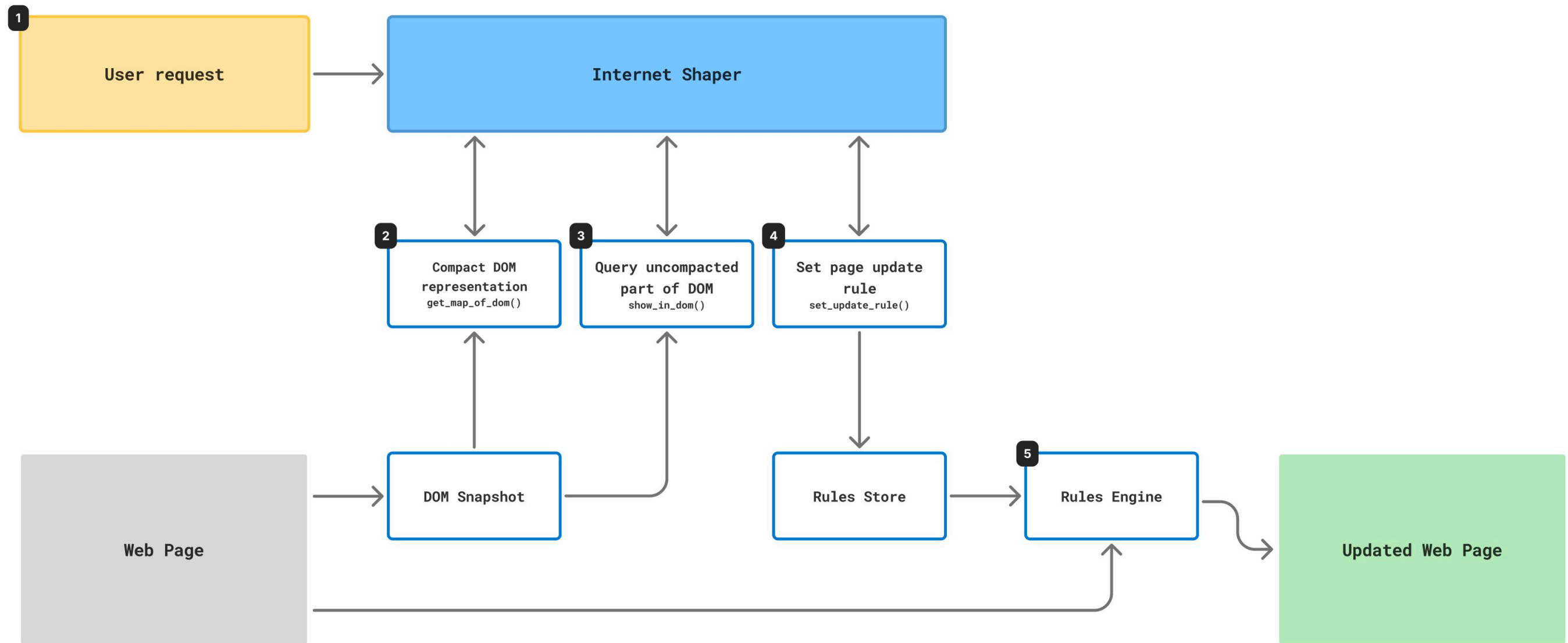
```
<div id="root"><button style="backgrou  
nd=white;" type="button" class="purc...
```

querySelector

```
button.purchase
```

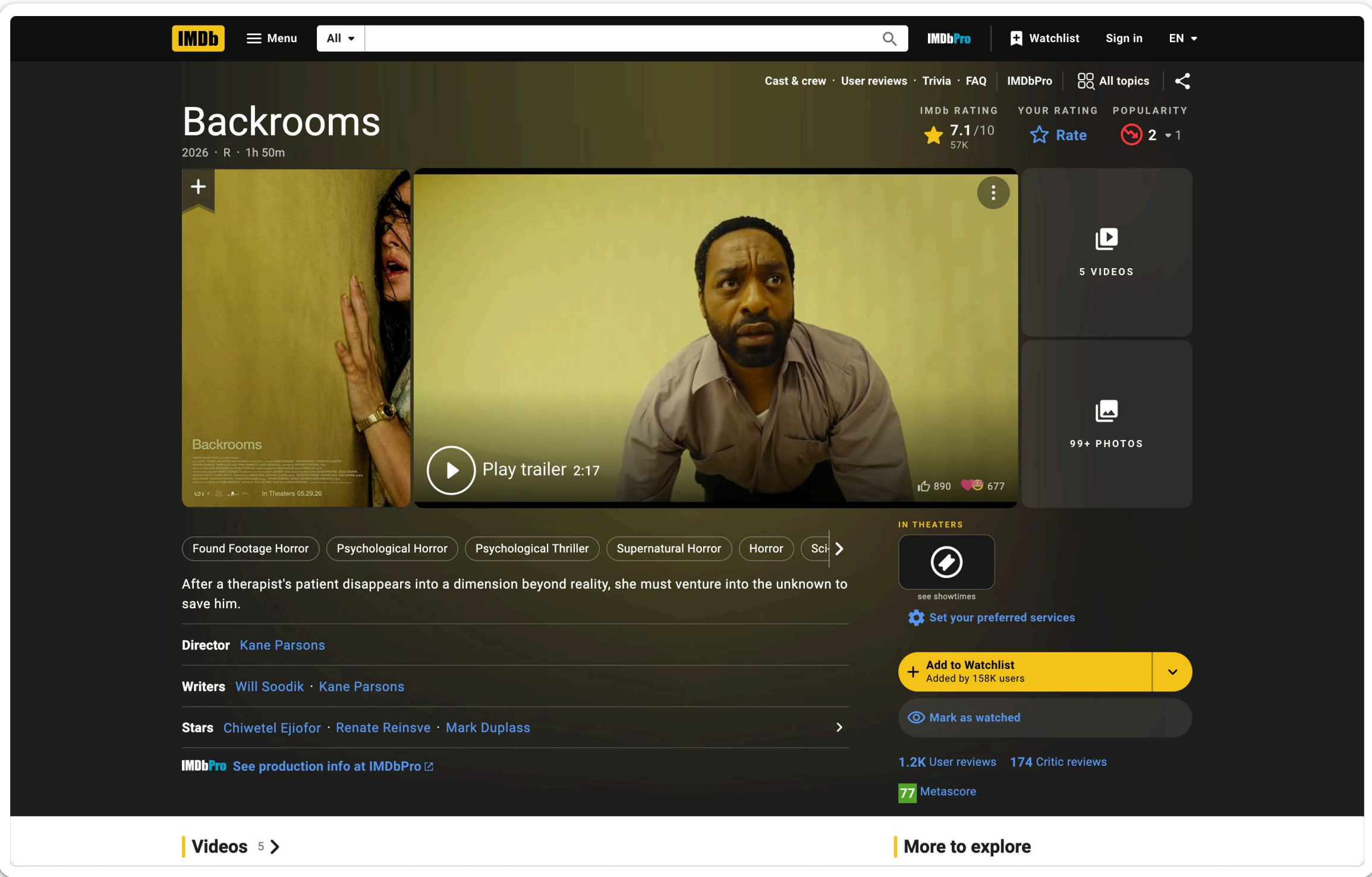
jsLogic

```
element.style.background = white
```

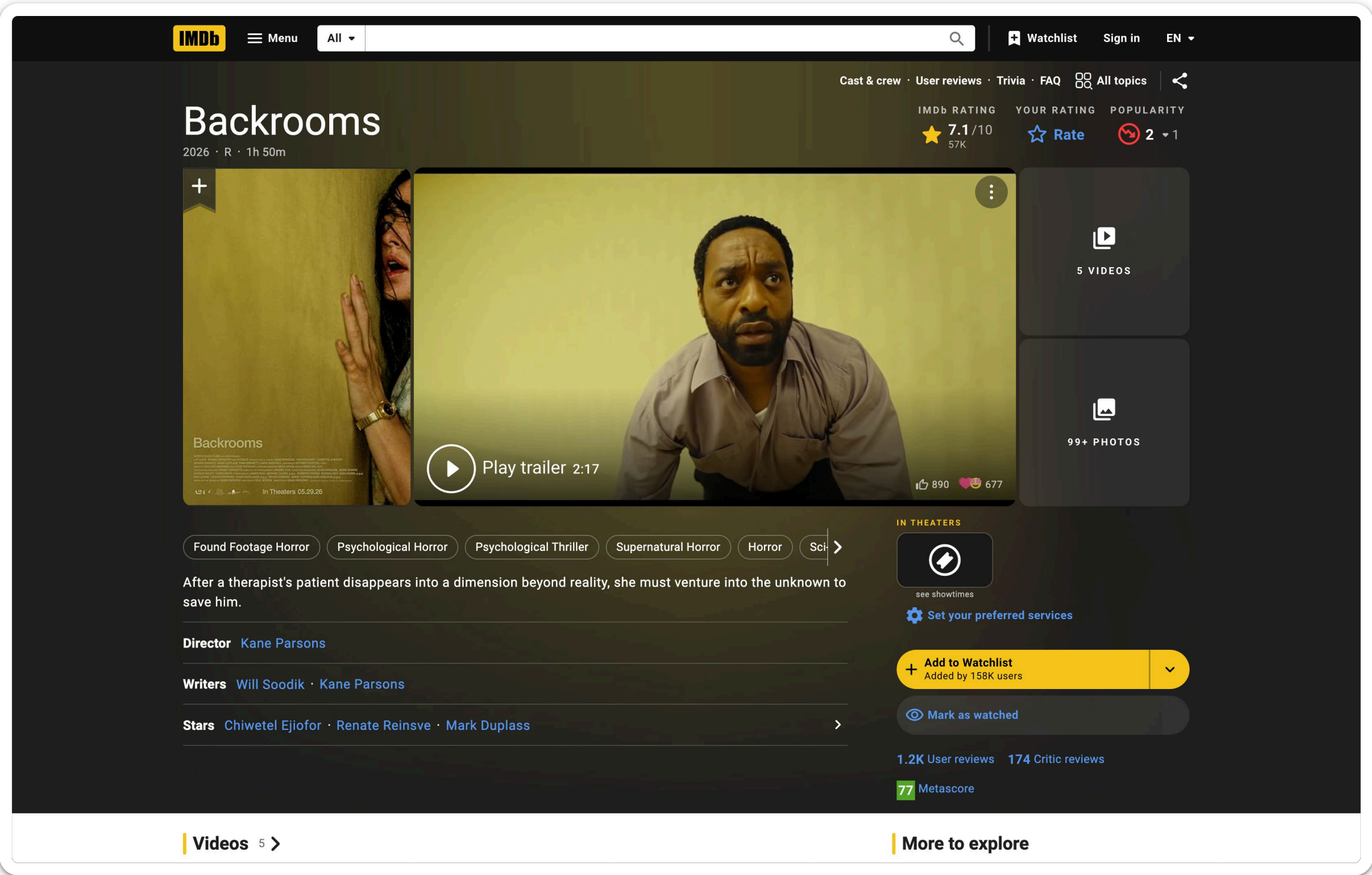



Internet Shaper

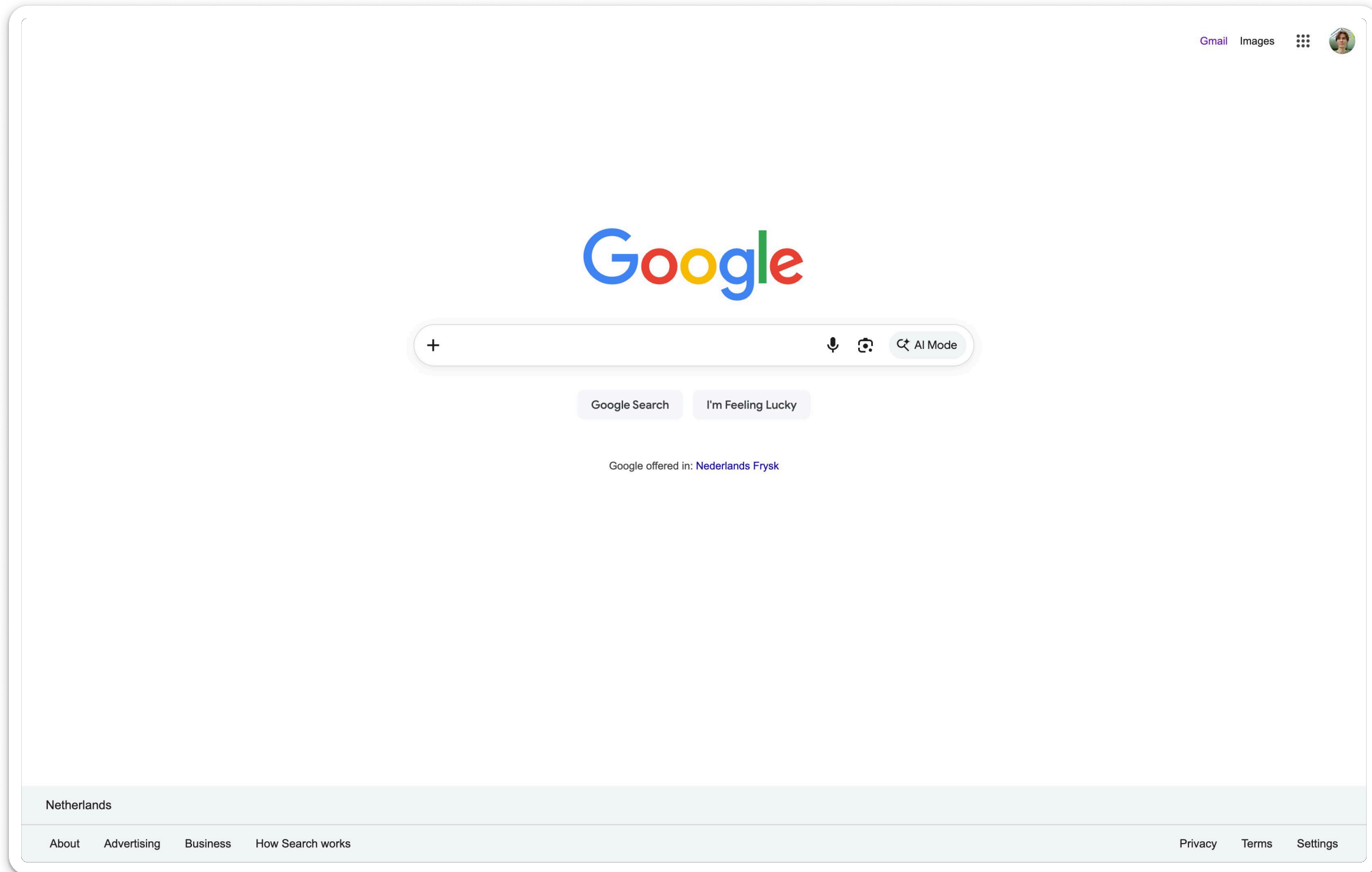
Examples of Internet Shaper's transformations



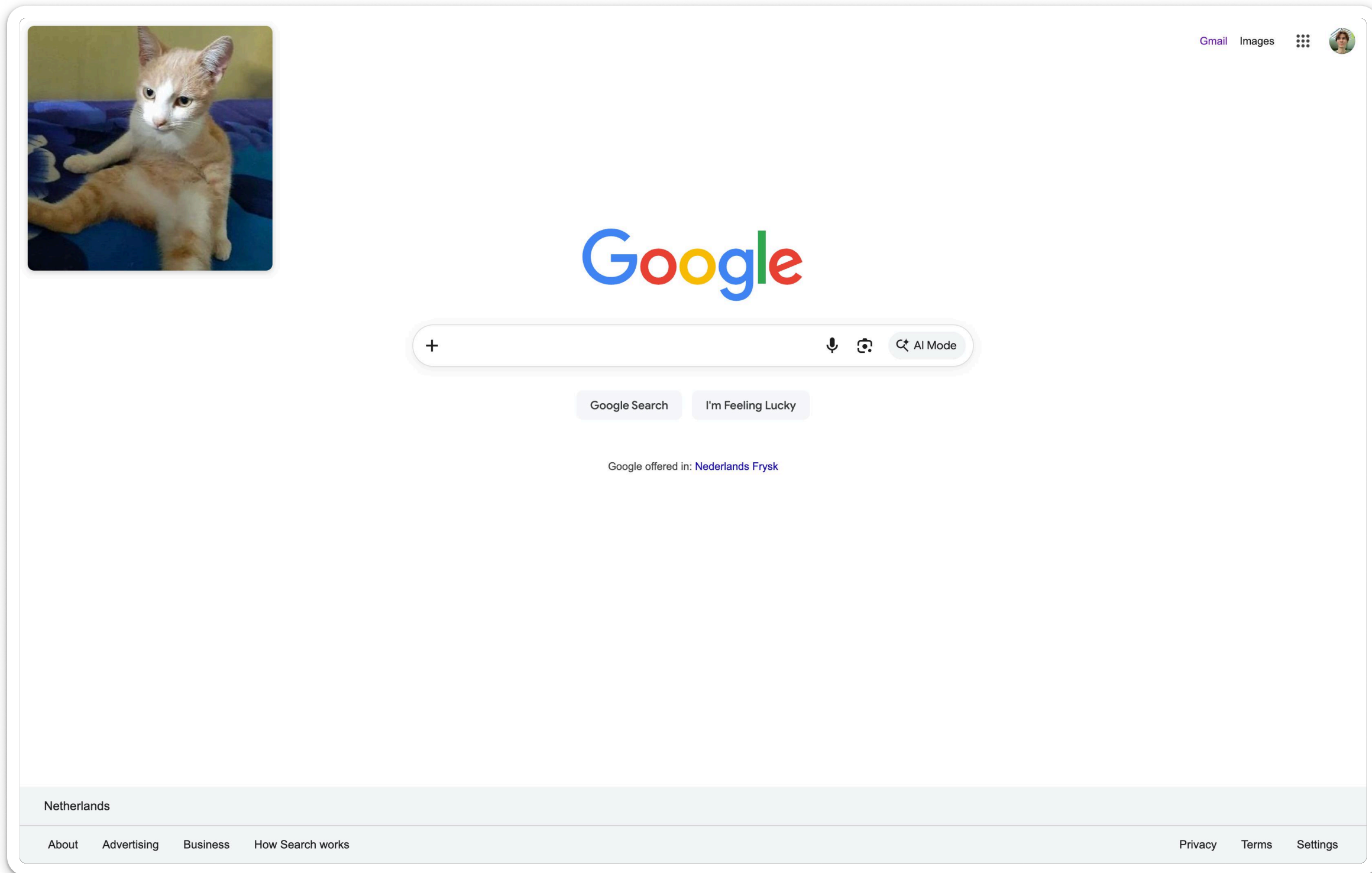
Prompt: remove all IMDbPro buttons and mentions



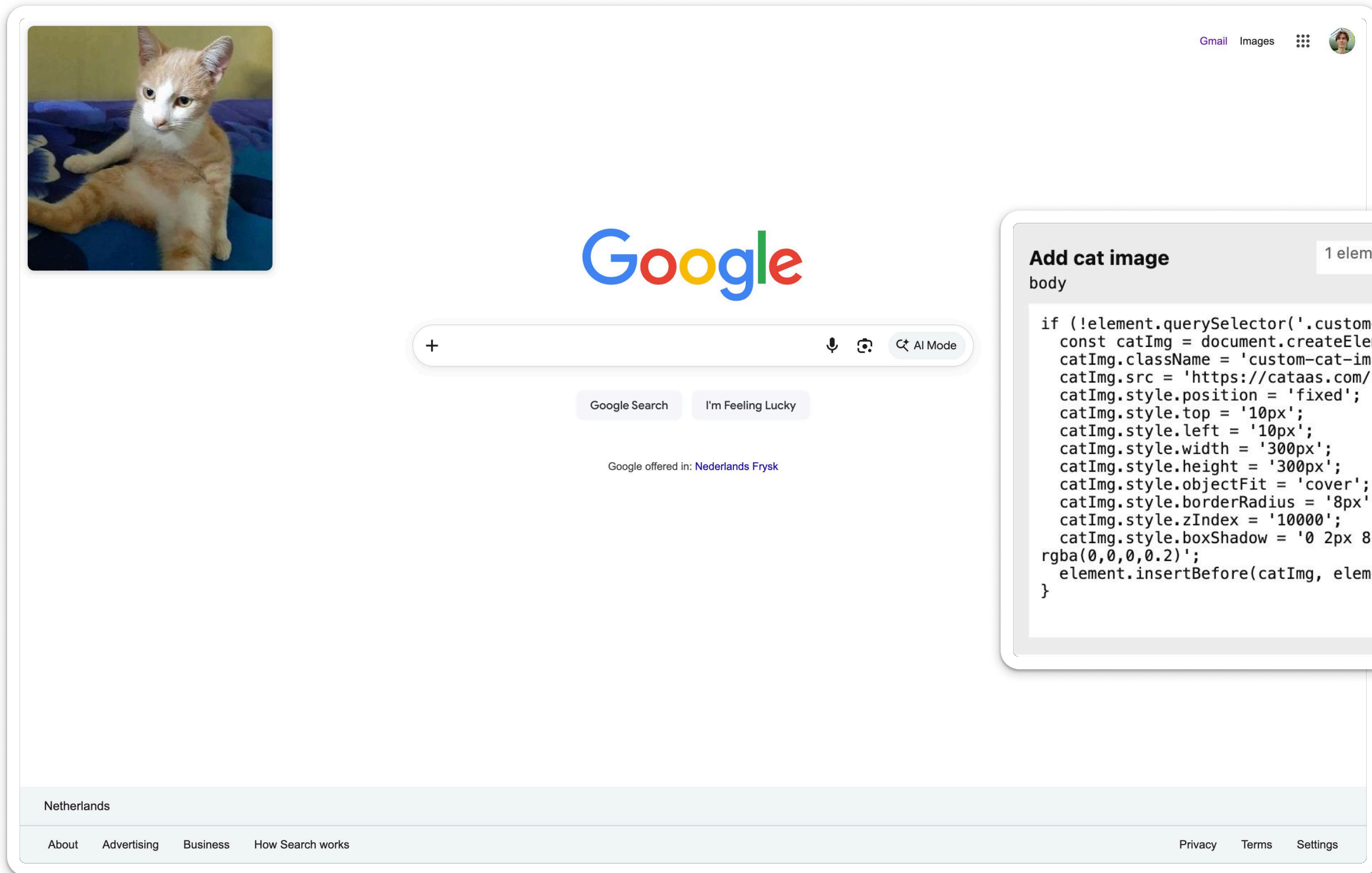
Prompt: remove all IMDbPro buttons and mentions



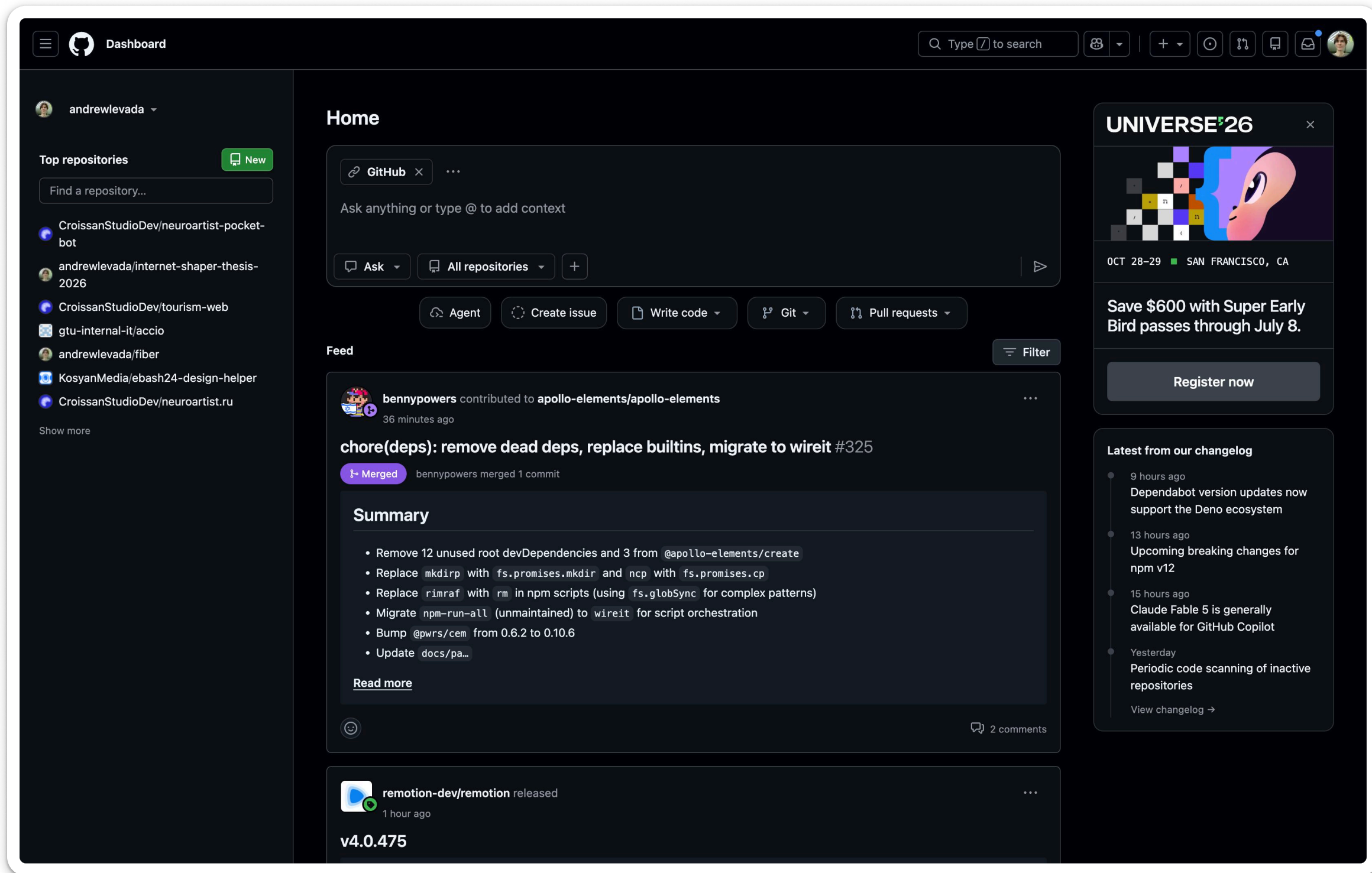
Prompt: add a cat image to the top left corner



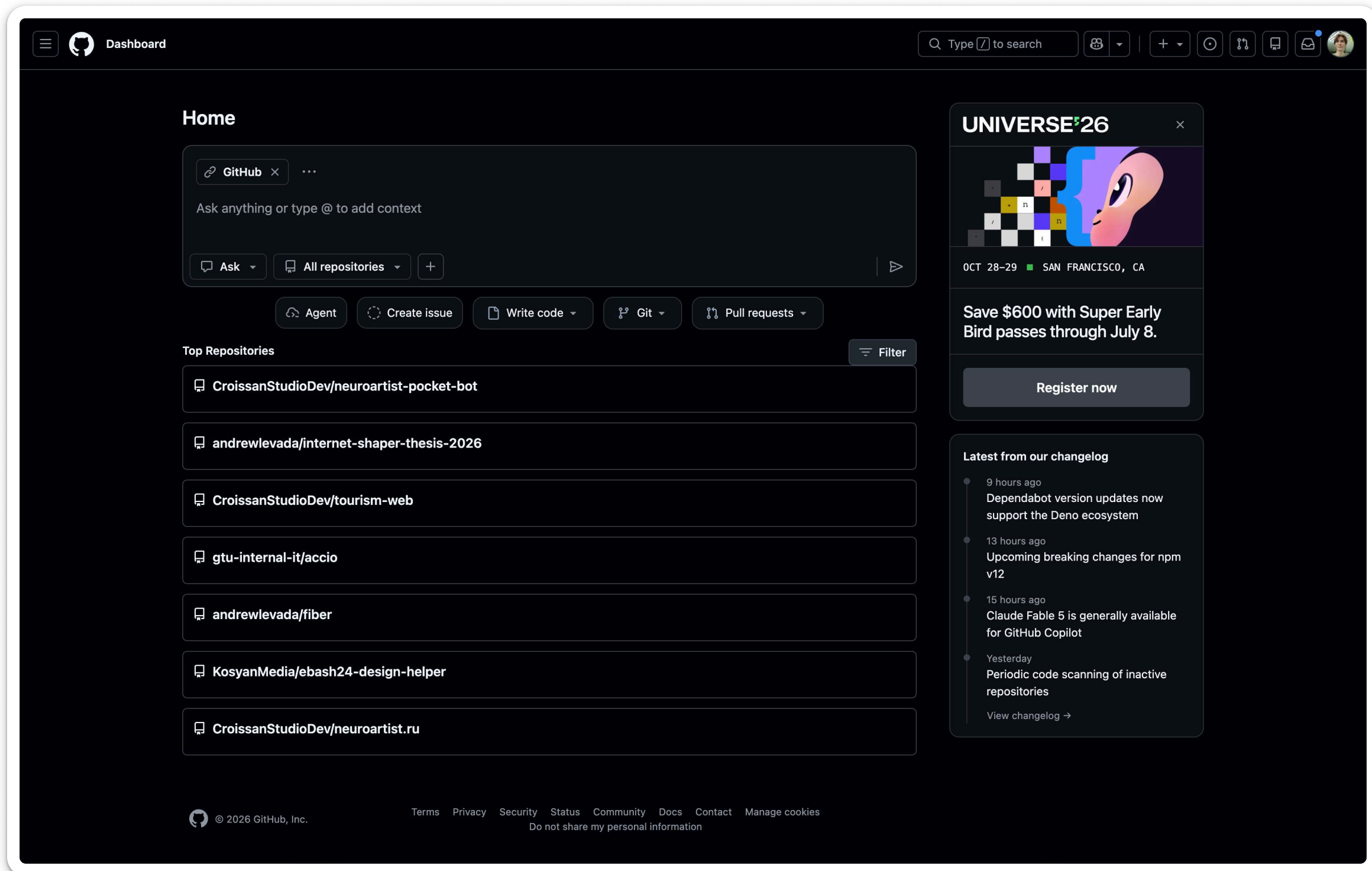
Prompt: add a cat image to the top left corner



Prompt: add a cat image to the top left corner



Prompt: replace the Home Feed with the list of top repositories as cards and remove the sidebar with Top repositories



Prompt: replace the Home Feed with the list of top repositories as cards and remove the sidebar with Top repositories

Experimental setup

Data & Samples

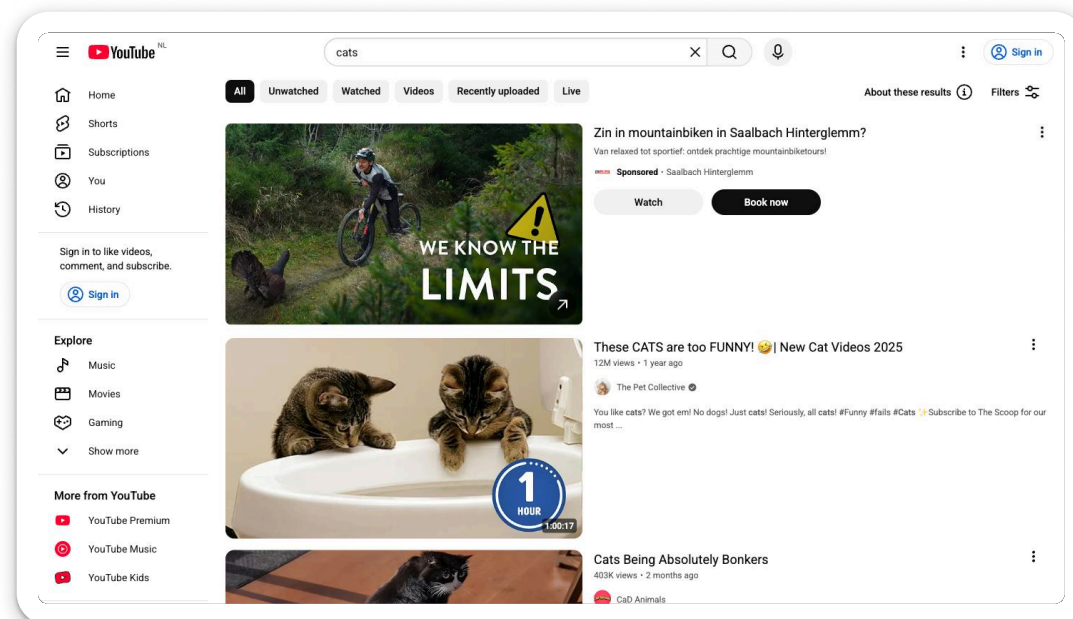
25 top-traffic websites from the Common Crawl dataset

→ 74 pages from these websites

→ 20 randomly sampled

→ 120 tasks synthesized (6 per page; using JTBD framework)

→ 68 tasks manually selected



"request-prompt":

"Add direct 'Subscribe' and 'Add to Playlist' action buttons directly on each video item's metadata area in the search results so I do not have to open the three-dot action menu."

Setup

For each of the 68 tasks we compare the original page to pages resulting from 5 pipelines' runs

Qwen 3.6 27B on Nvidia H100

1. Baseline
2. Baseline
+ Web Page Compression
3. Baseline
+ Rules Engine
4. Full

Anthropic's API

5. Full on Sonnet 4.6

Evaluation

Pairwise Preference on 3 axis (5-point scales):

- goal alignment — primary
- structural cohesion
- design alignment

2 runs on the same data:

**preliminary (included in the paper and slides)
and full pass (slides only)**

Articles in this section

[I want to change a wiki's name or URL](#)[I want to close a wiki](#)[I want to reopen a wiki](#)[I want a feature or extension turned on](#)[I want to set up an interlanguage link](#)[How can I add custom fonts to my wiki?](#)

I want a feature or extension turned on



Sannse

Updated 1 year ago

[Follow](#)

Some of Fandom's features can be enabled and disabled by local admins using **Admin Dashboard** on that wiki, such as:

- Requiring all contributors to log in
- **Message Wall**
- **Article Comments**
- **Blogs**

If you are an admin, click on "Admin" on your bottom toolbar to find this page.

To request an interlanguage link please see **this help desk article**.

For other features and extensions, such as the following, you may need assistance:

- Turning on **custom JavaScript** editing on for your wiki.
 - *Note: **ImportJS** does not require this to be enabled.*
- Enabling **achievements (aka badges)**.
- Other extensions **listed here**, such as DPL or Variables.

If your wiki has Fandom team contact assigned, please ask them for assistance. Otherwise, **click**

Task: Convert the 'Contact us' link in the top menu and the help desk submission link in the text into a prominent, styled call-to-action button placed right below the article title.

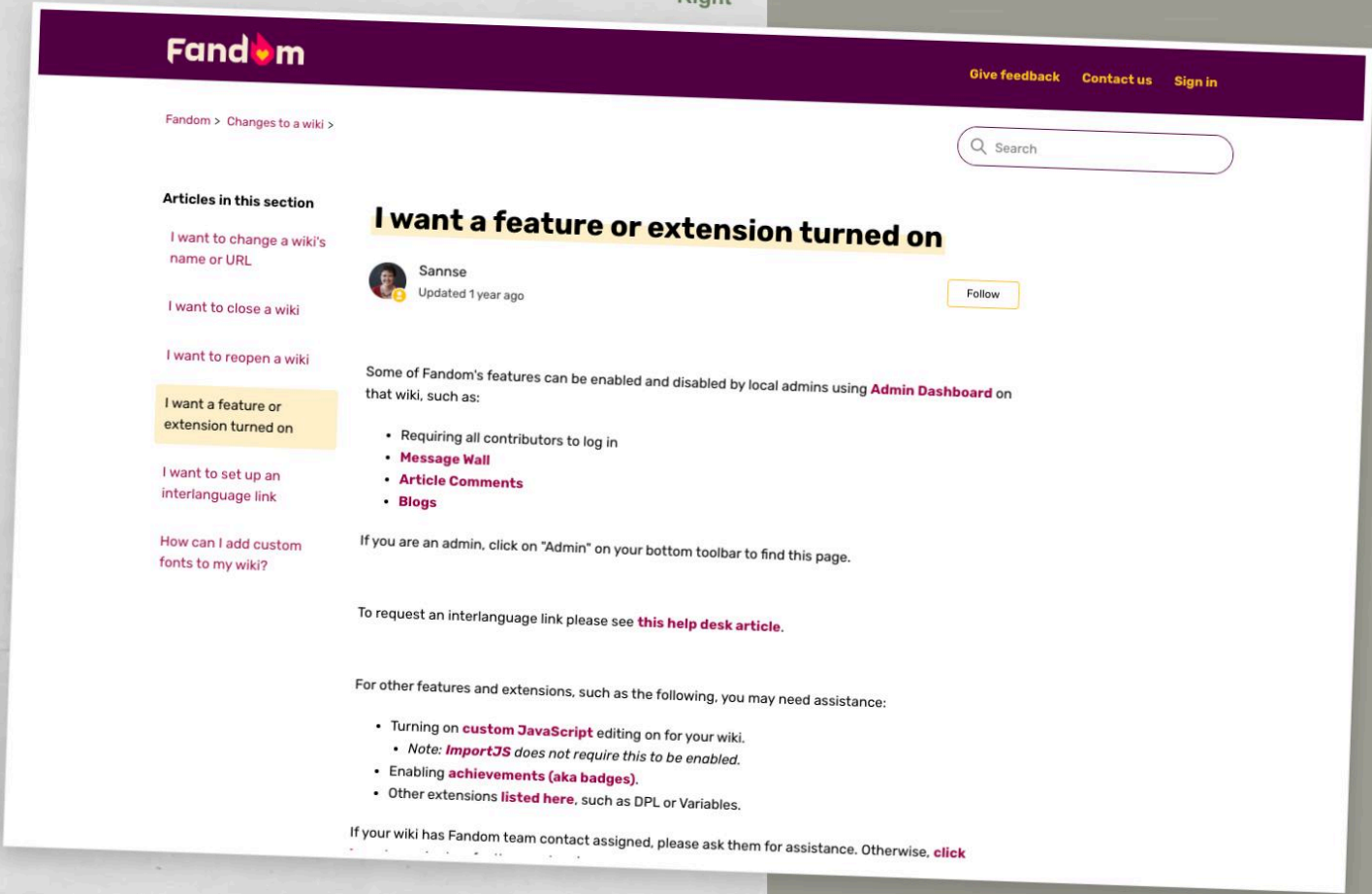
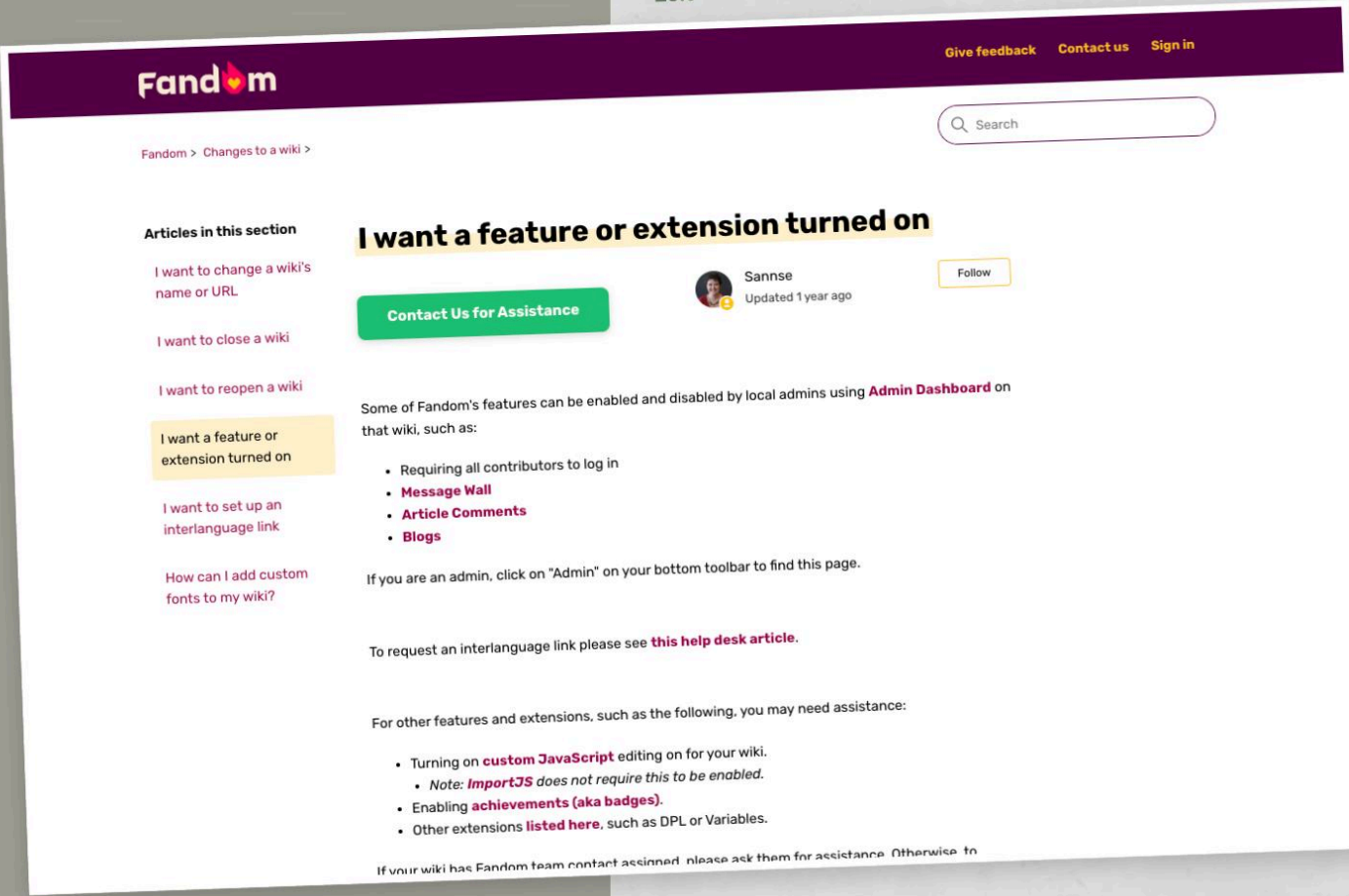
Goal: I prefer reaching out to customer support or system administrators directly to handle configuration changes and setup tasks for me.

Task: Convert the 'Contact us' link in the top menu and the help desk submission link in the text into a prominent, styled call-to-action button placed right below the article title.

Goal: I prefer reaching out to customer support or system administrators directly to handle configuration changes and setup tasks for me.

Left

Right



Goal alignment

- Left better
- Left slightly better
- Similar
- Right slightly better
- Right better

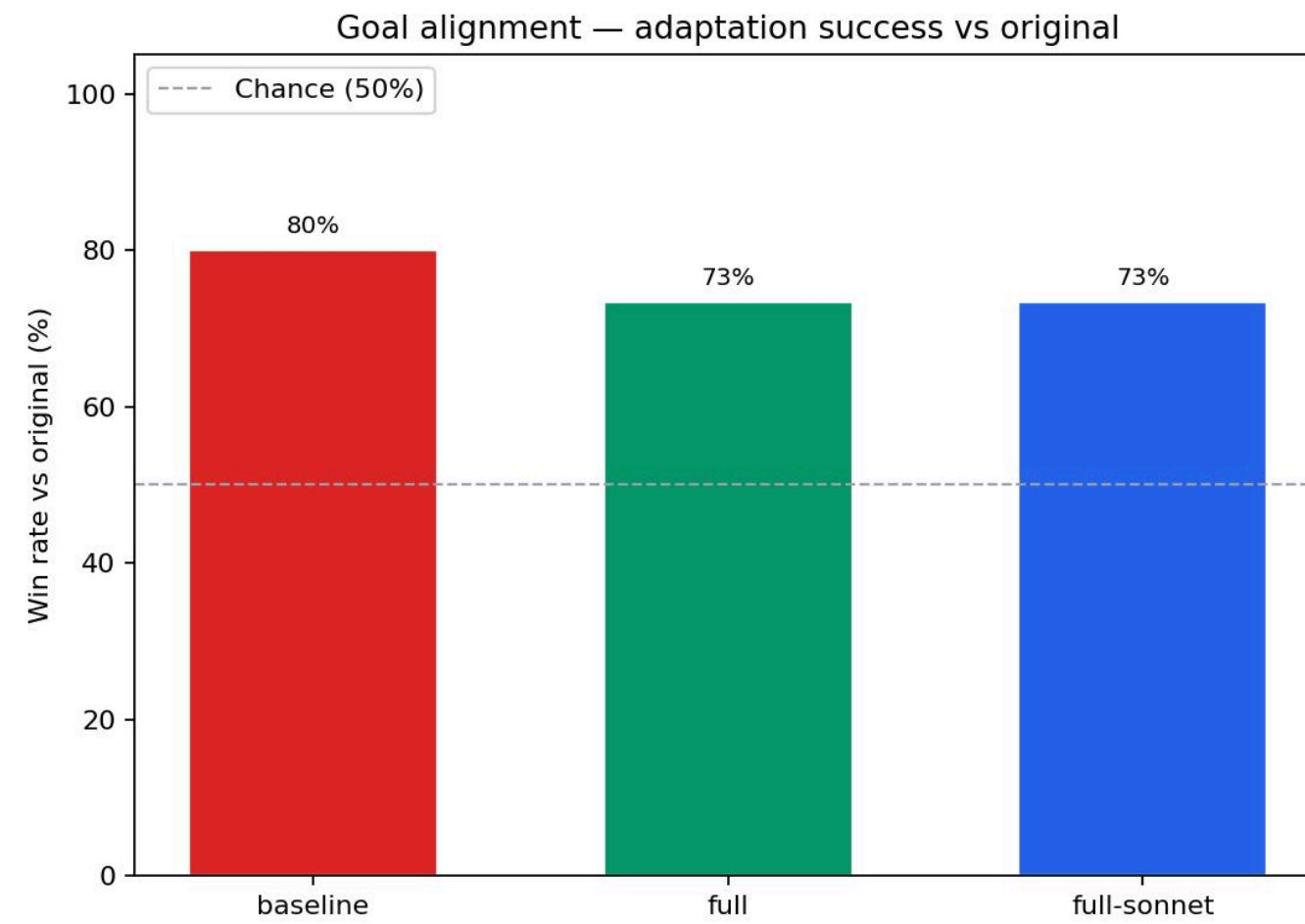
Structural cohesion

- Left better
- Left slightly better
- Similar
- Right slightly better
- Right better

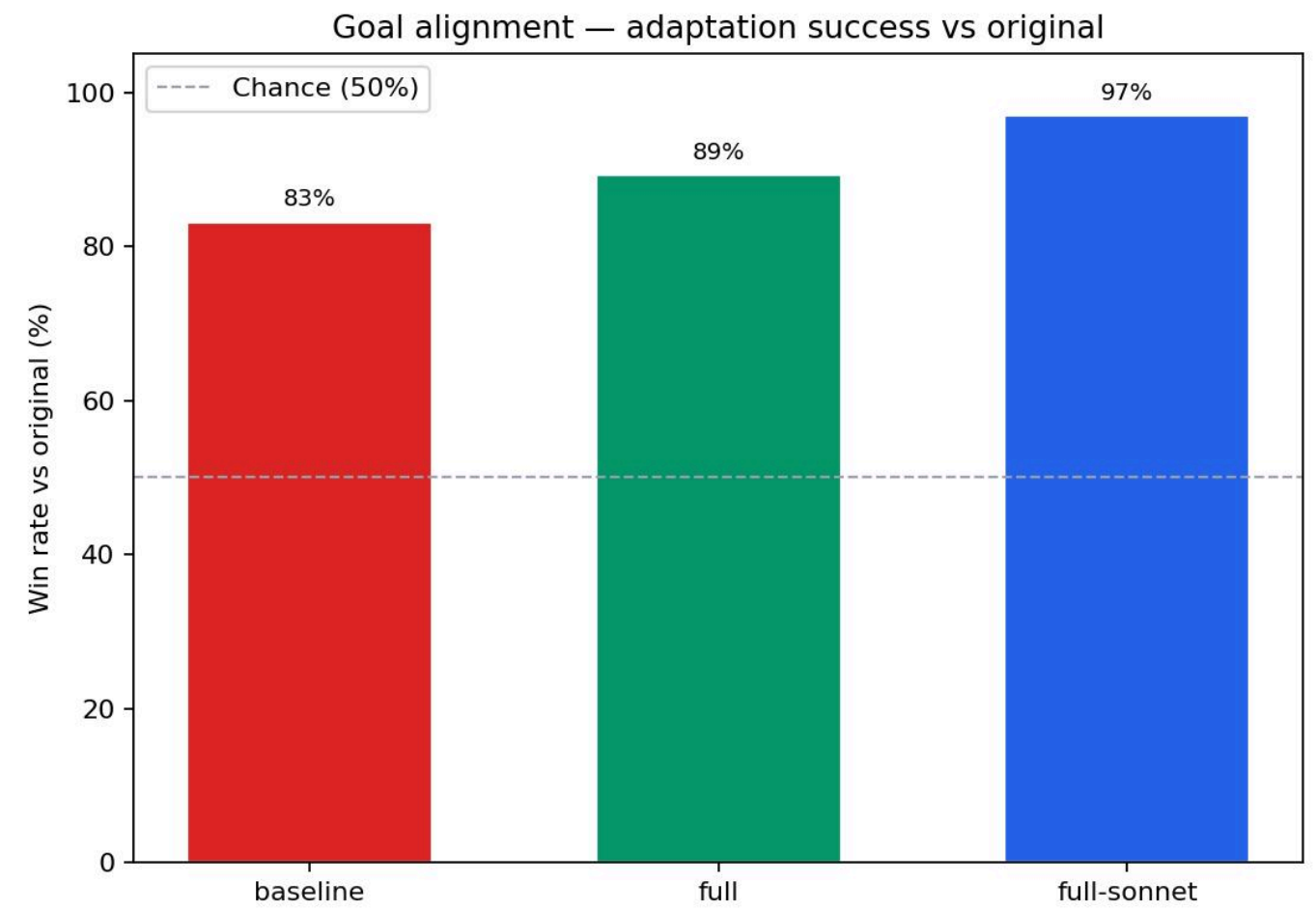
Design alignment

- Left better
- Left slightly better
- Similar
- Right slightly better
- Right better

Results

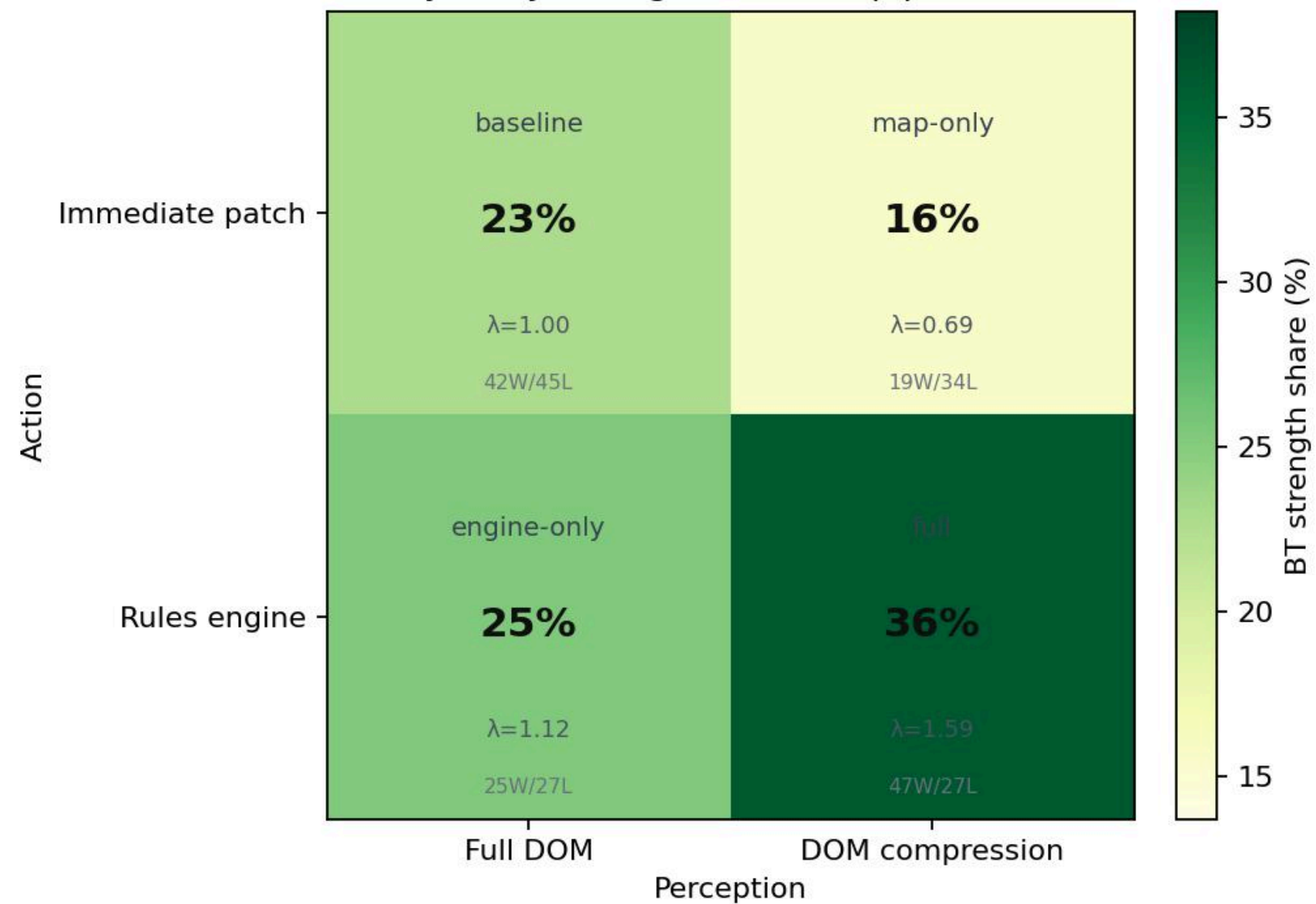


preliminary run: N=15

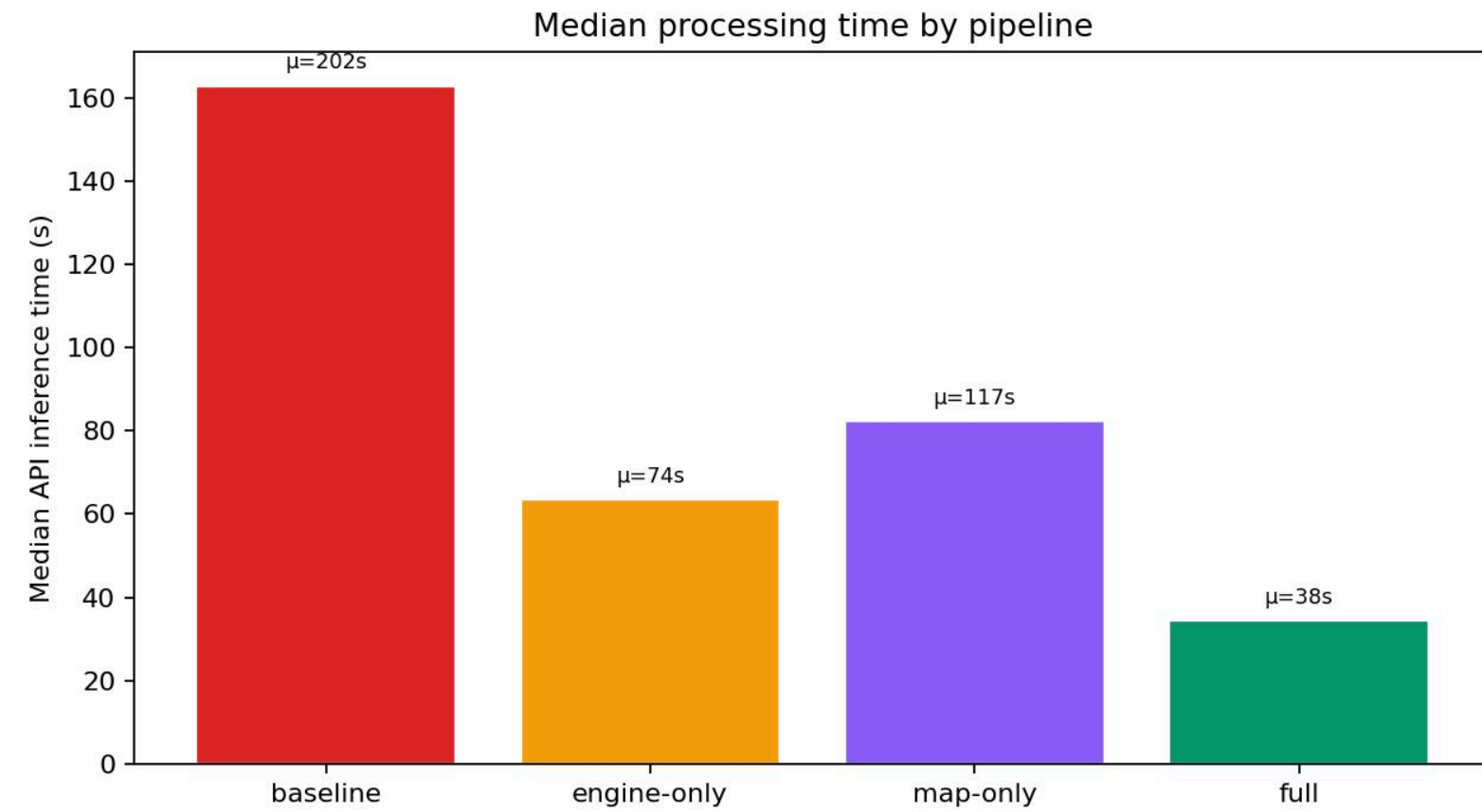


main run: N=50

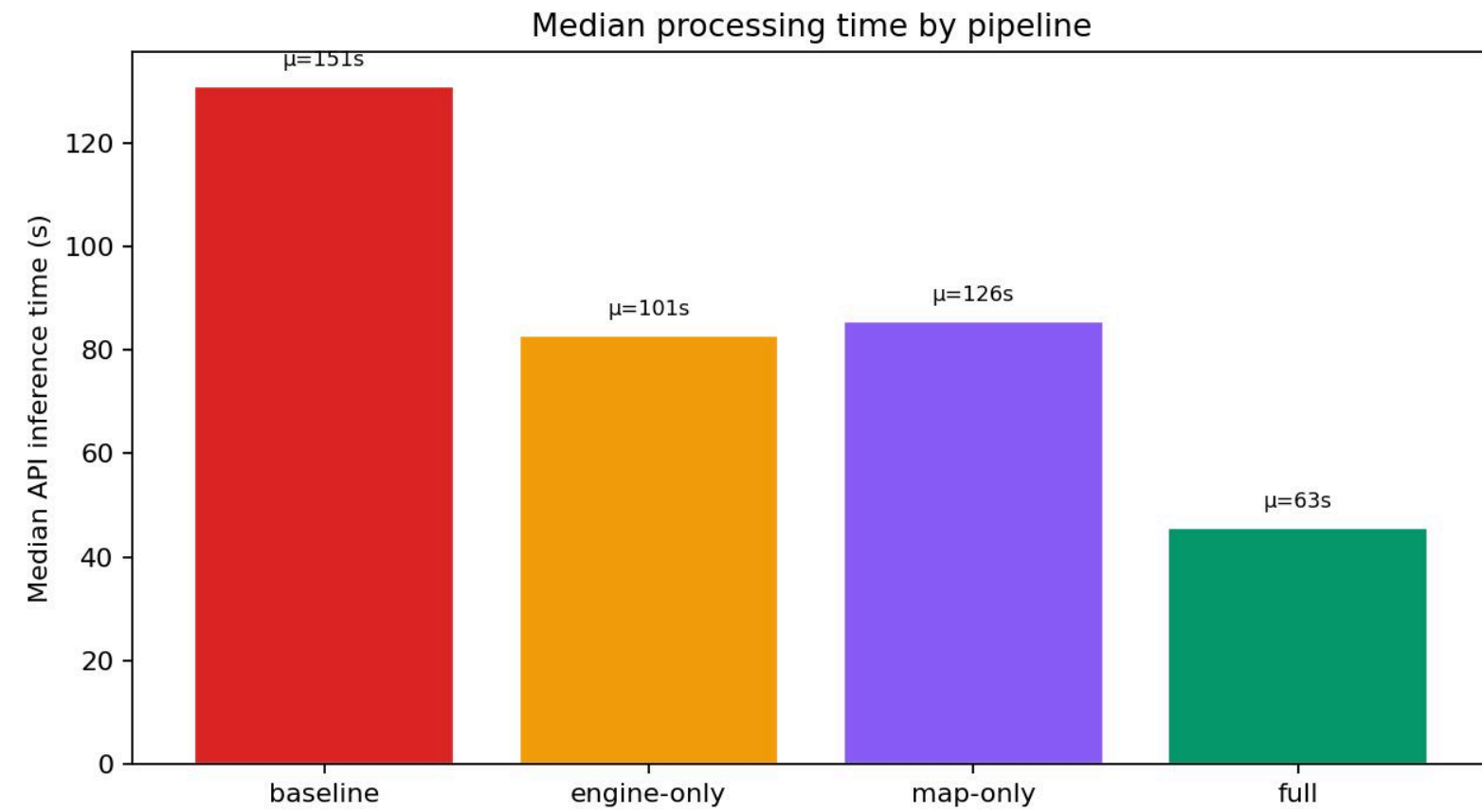
Goal alignment — ablation matrix
Bradley-Terry strength share (4-pipeline subset)



main run: N=50

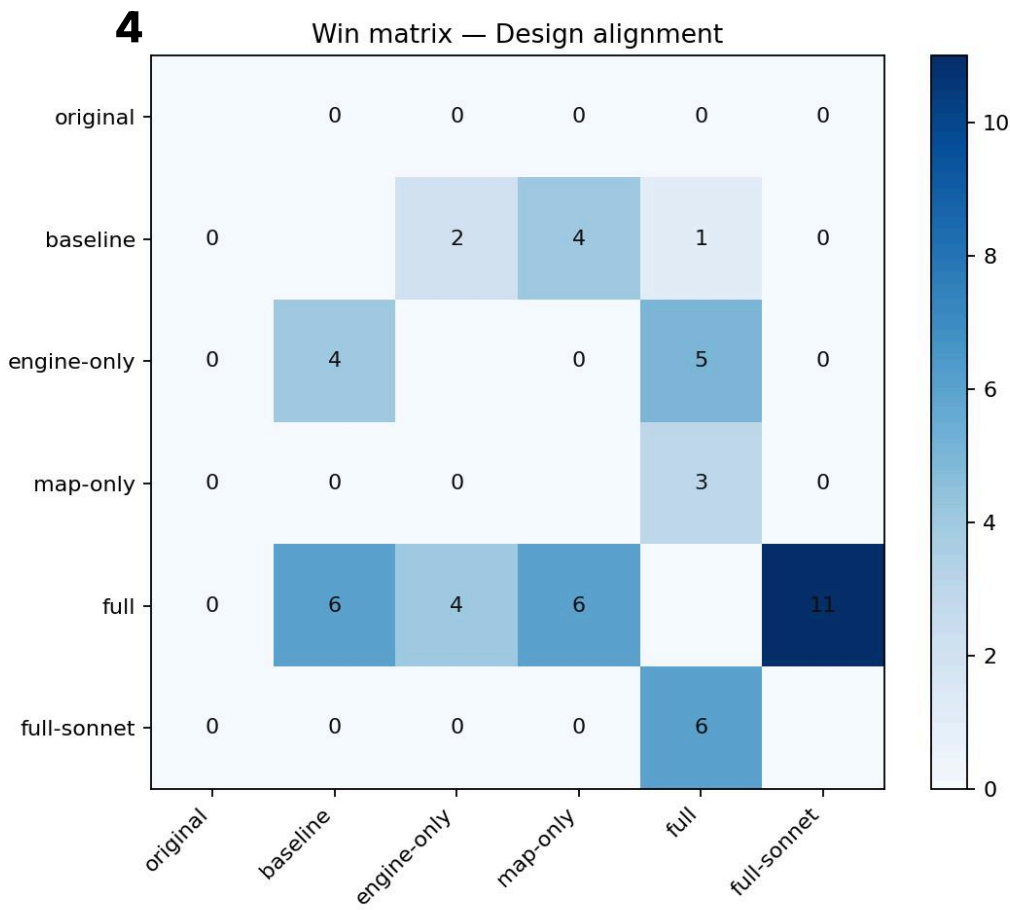
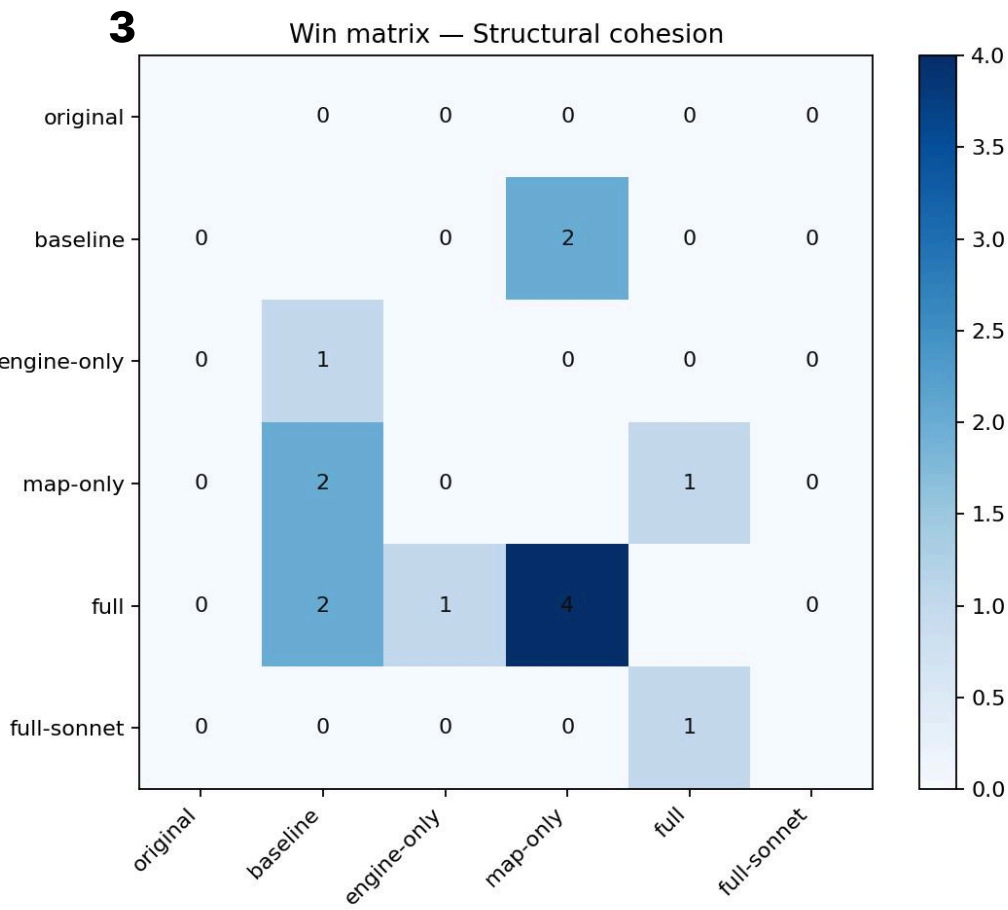
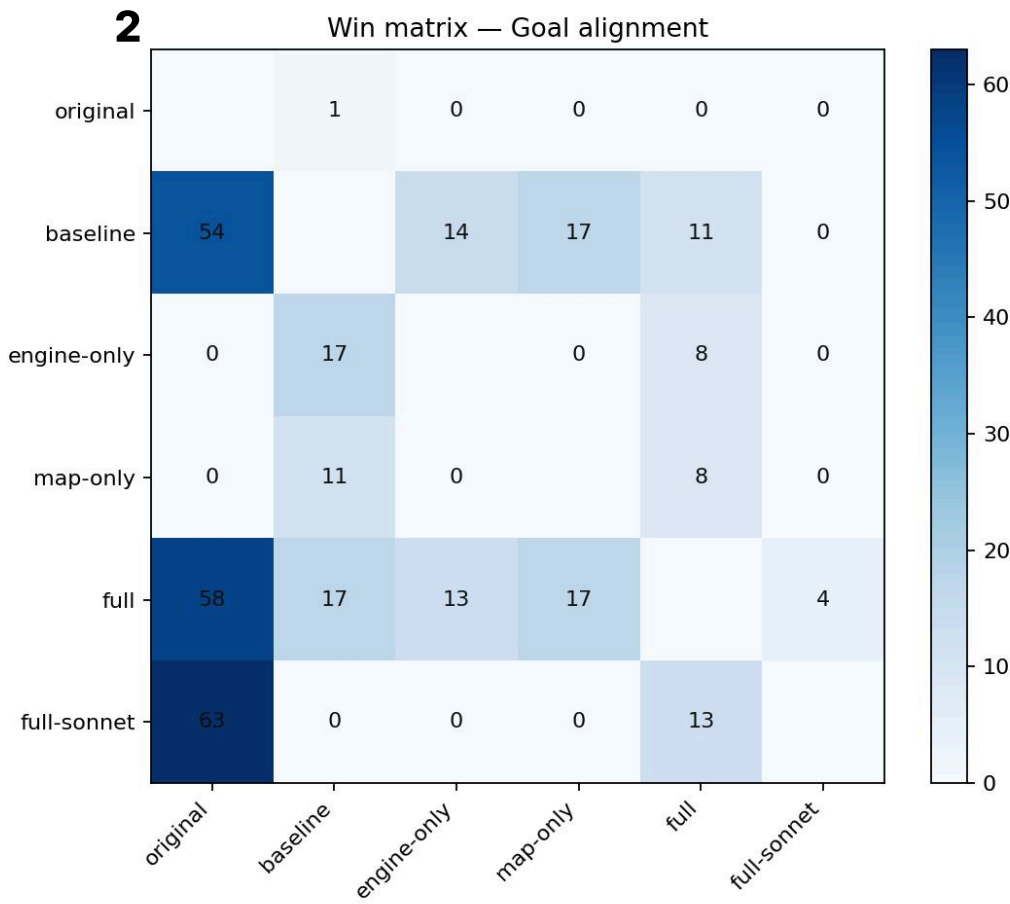
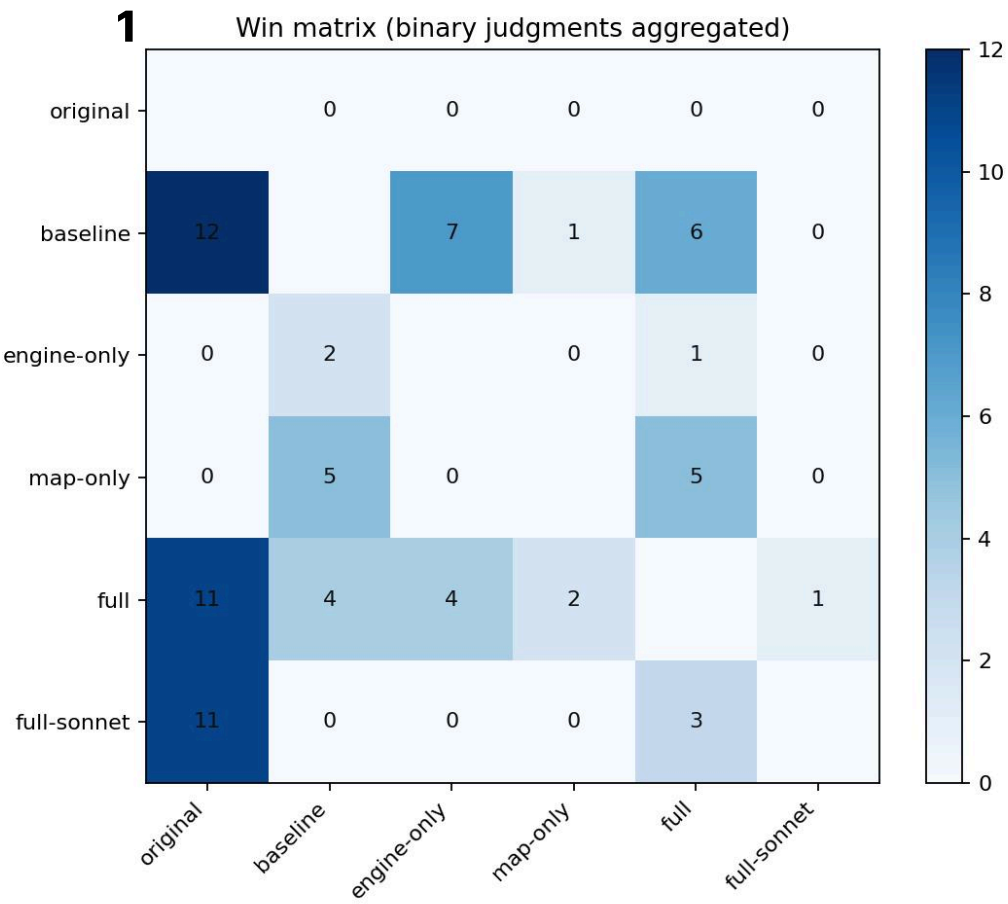


preliminary run: N=15

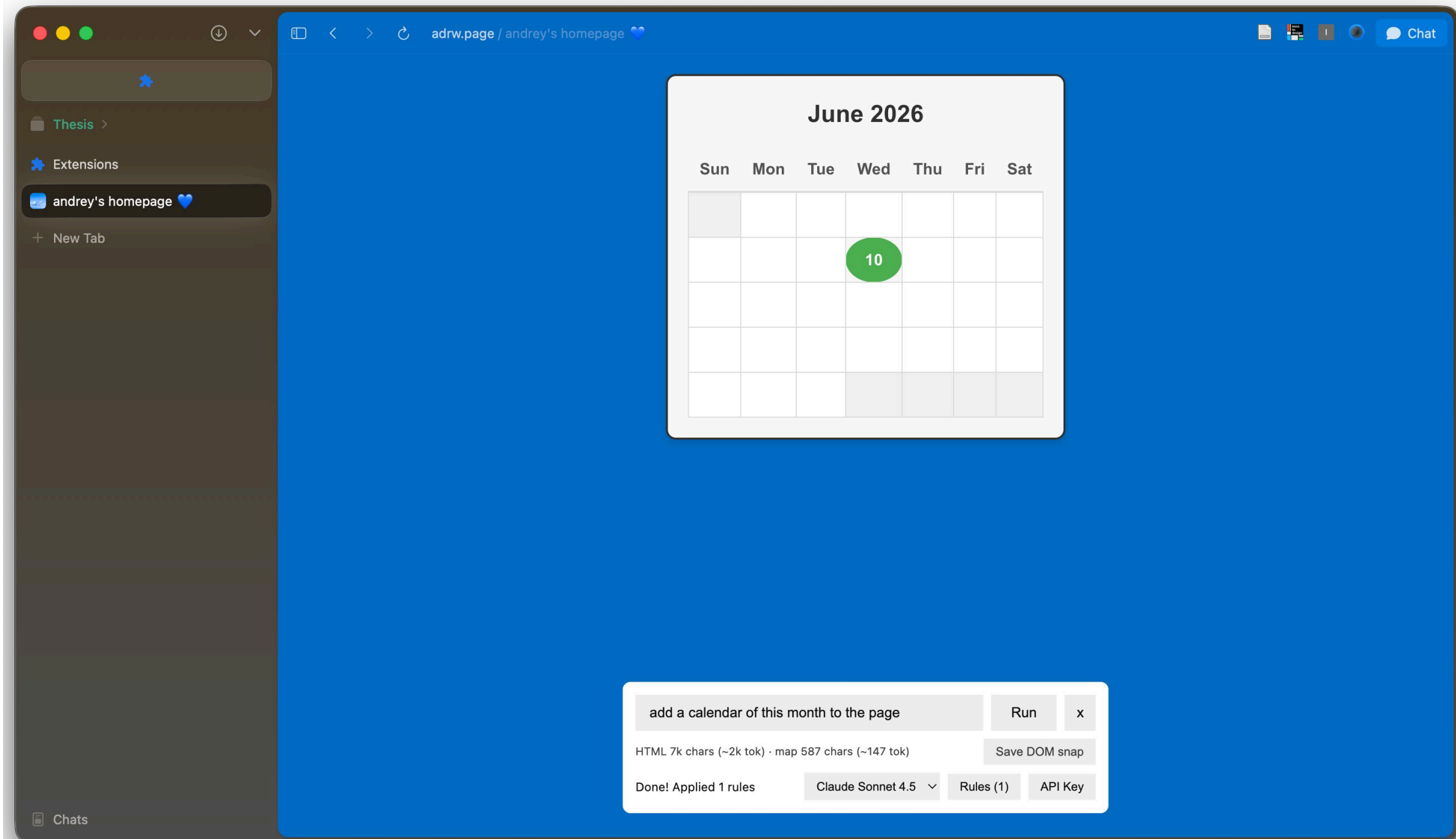


main run: N=50

1 — preliminary run:
N=15
2, 3, 4 — main run:
N=50



Internet Shaper as a browser extension

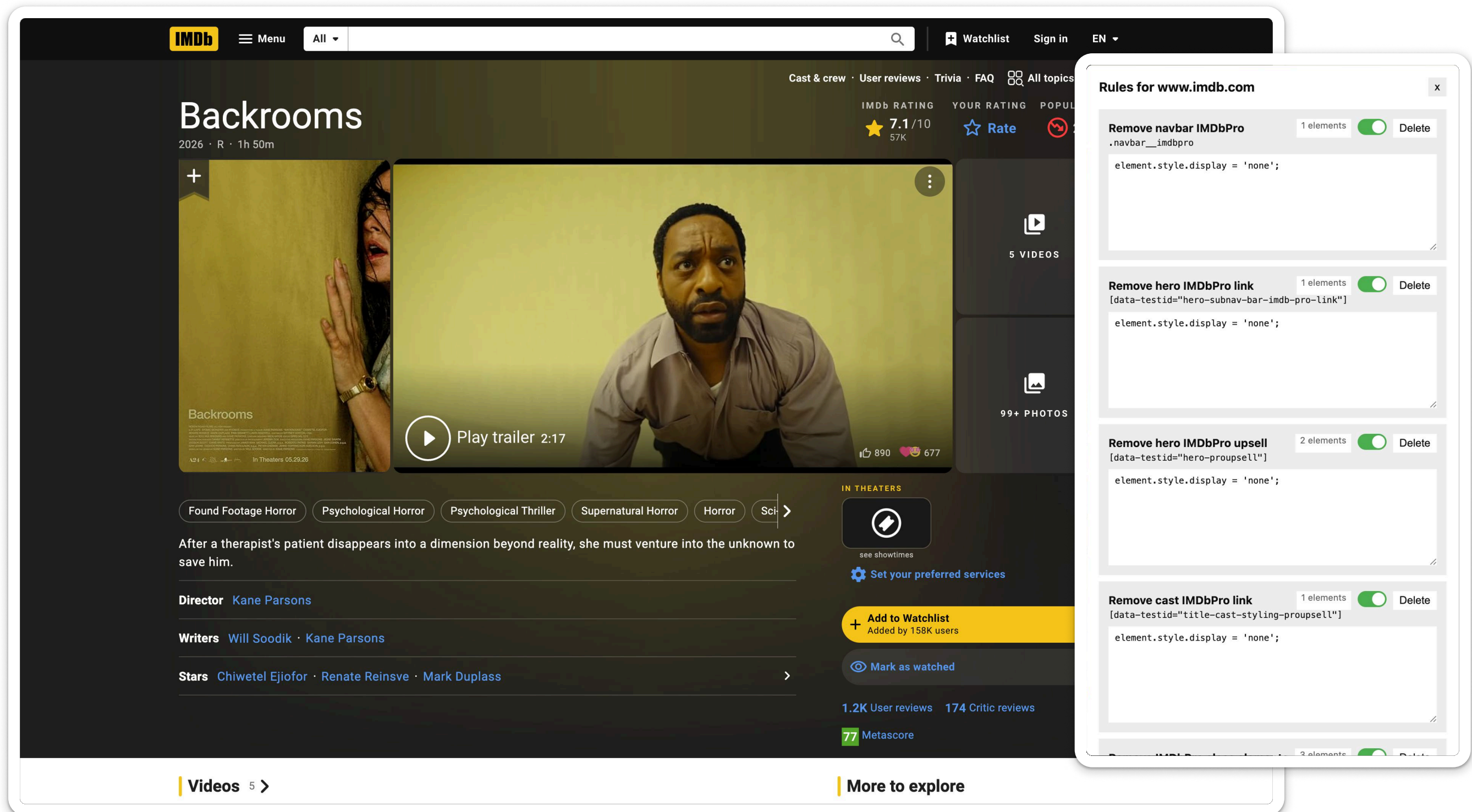


Thank you!

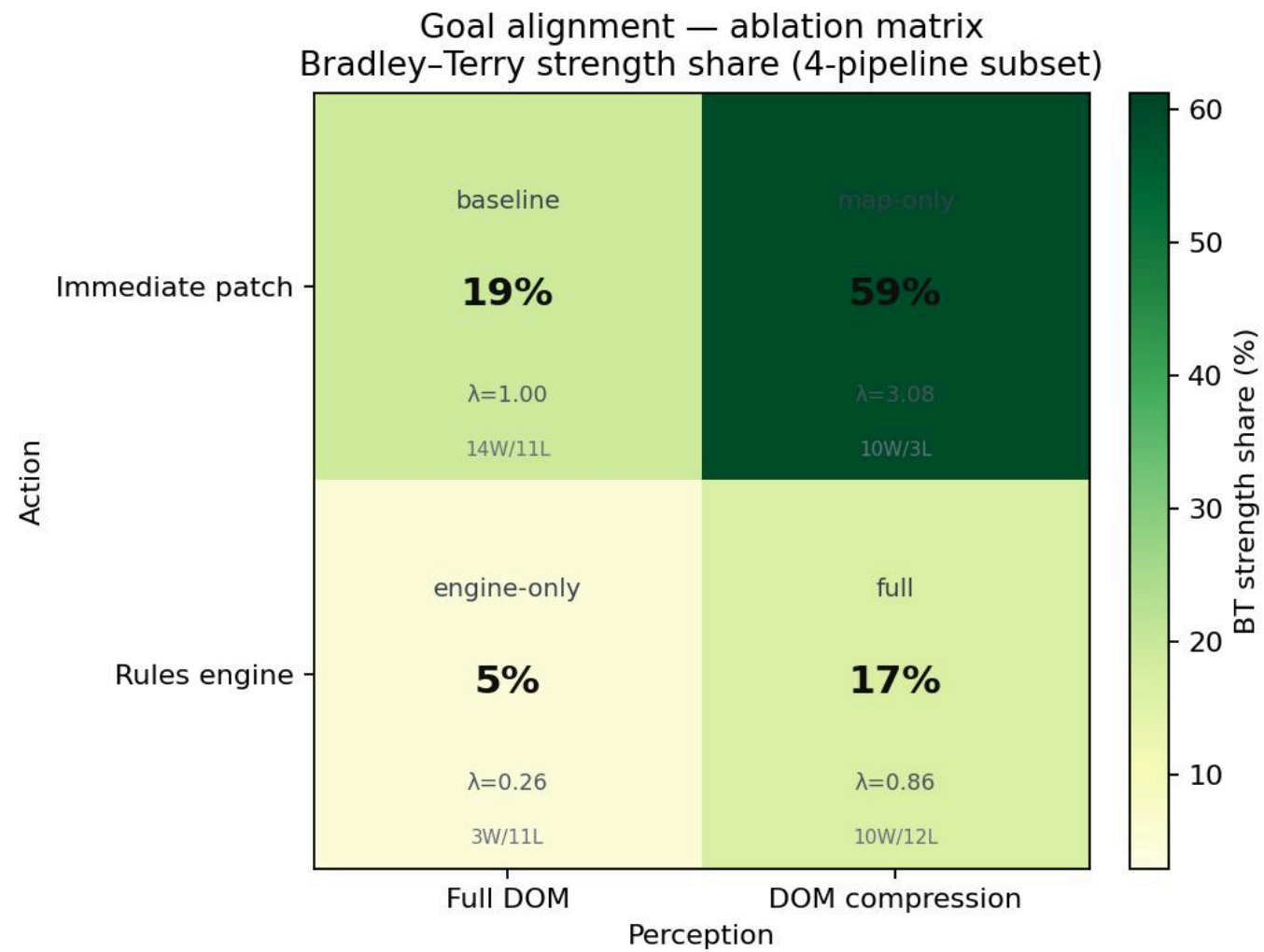
Appendix

```
{
  "request-prompt": "Add direct 'Subscribe' and 'Add to Playlist' action buttons directly on each video item's metadata area in the search results so I do not have to open the three-dot action menu.",
  "goal": "I always sign in so I can actively engage with content creators by subscribing, liking, and saving videos to personal playlists.",
  ],
  "preference-pair-index": 3,
  "preference-side": "a",
  "preference": "I always sign in so I can actively engage with content creators by subscribing, liking, and saving videos to personal playlists.",
  "source-snapshot": "004",
  "model": "google/gemini-3.5-flash",
  "url": "https://youtube.com/results?search_query=cats",
  "final-url": "https://www.youtube.com/results?search_query=cats",
  "protected_at": 1780344967650,
  "finalized_at": 1780352297256
}
```

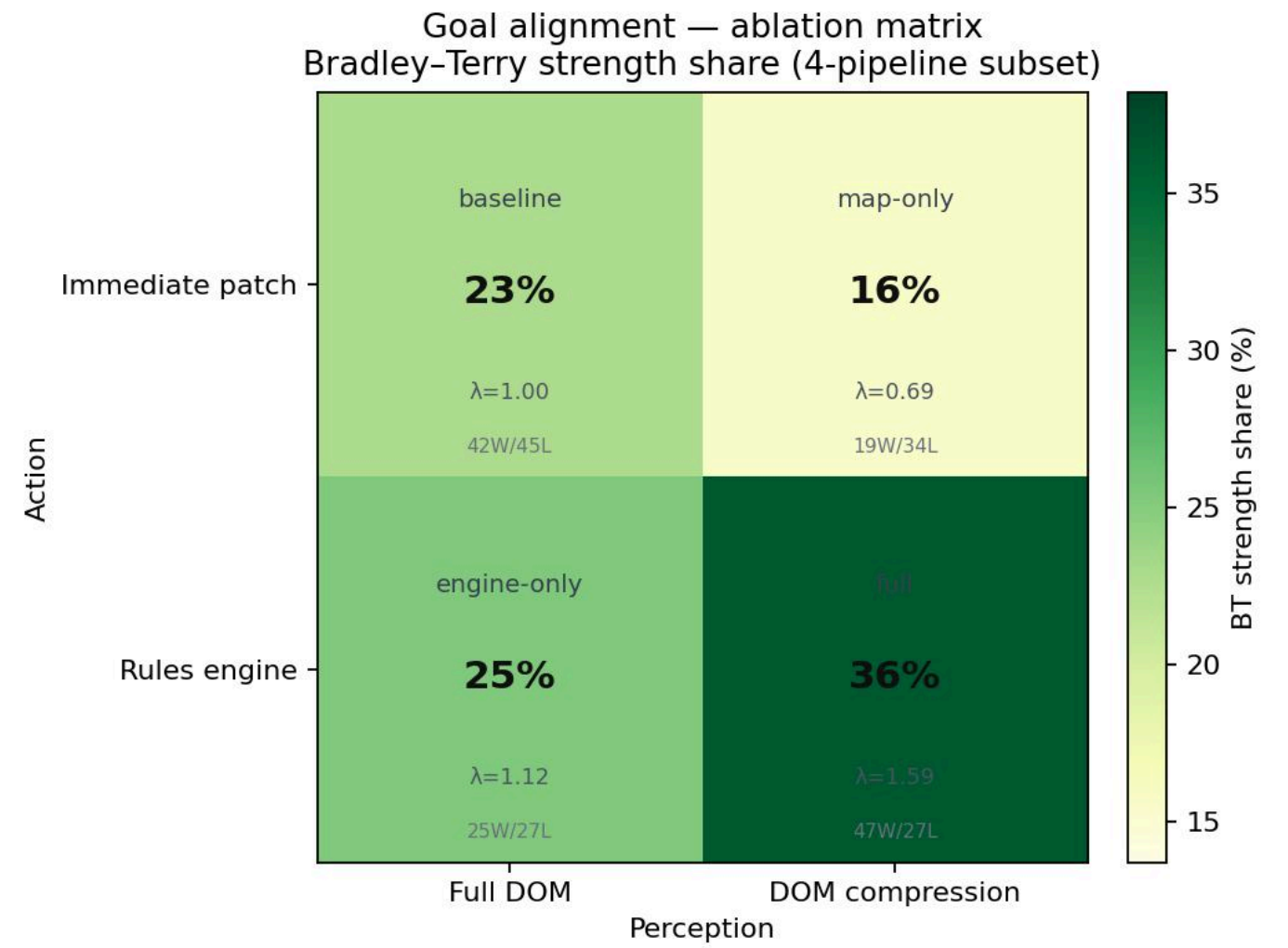
```
{
  "jobs": [
    "I want to watch long-form funny cat compilations to entertain myself.",
    "I want to watch quick, bite-sized cat clips (Shorts) for rapid entertainment.",
    "I want to filter my search results to only show unwatched or recently uploaded cat videos.",
    "I want to refine my search to look for specific cat breeds, such as Siamese or Persian cats, using the suggested search terms.",
    "I want to sign in to my account so that I can subscribe to cat-centric channels, save videos to my playlists, and leave comments.",
    "I want to find other popular animal videos (like dog or horse videos) suggested in the related search section."
  ],
  "preference-pairs": [
    {
      "a": "I prefer short, quick, highly-engaging video formats (like Shorts) that I can swipe through rapidly for quick entertainment.",
      "b": "I prefer long-form, comprehensive videos (like full-length compilations or documentaries) that I can sit back and watch for a long time."
    },
    {
      "a": "I rely heavily on search filters and precise categorization to find exactly the type of video content I am in the mood for.",
      "b": "I prefer to passively browse the default search
```

Prompt: remove all IMDbPro buttons and mentions



preliminary run: N=15



main run: N=50