Phase 6 – Project Paper

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SpinSpotter Prototype: https://wool-shred-49318596.figma.site/

The Problem

The rise of social media and digital news has made it easy for misinformation and biased reporting to spread widely. Existing rating systems (Ad Fontes Media's *Media Bias Chart* and AllSides' *Fact-Check Bias Chart*) map news outlets along axes of political lean and reliability but explicitly note that these ratings reflect perspective rather than factual information accuracysjsu.edu. NewsGuard's reliability service rates outlets on nine journalistic criteria, assigning them "Green" or "Red" labels and providing detailed "Nutrition Labels," yet it does so at the source levelnitrd.gov. None of these tools identifies biased or manipulative language within individual articles. **Spin**—the use of loaded language, hyperbole, and selective framing to influence perception; is especially insidious because it can distort factual reporting without violating factual accuracy. In our Phase 1A description, we defined this gap: most people cannot easily spot spin or understand how it shapes their interpretation of events. The absence of consumer-friendly tools that flag spin in real time leaves readers vulnerable to subtle persuasion.

Motivation.

Combating spin is critical to preserving an informed electorate and reducing polarization. Research guides from West Virginia University emphasize that media-literacy tools should "encourage critical thinking and source evaluation while reading news online"libguides.wvu.edu. Without transparency about spin, readers may unknowingly internalize biased narratives, undermining public trust and civic engagement. By empowering users to recognize spin at the article level and understand why certain wording is manipulative, we can foster healthier media consumption, improve civic discourse, and support the broader goal of combating misinformation. As our Phase 1A document noted, even accurate articles can contain framing bias; therefore, addressing spin complements existing fact-checking efforts rather than competing with them.

Proposed Solution

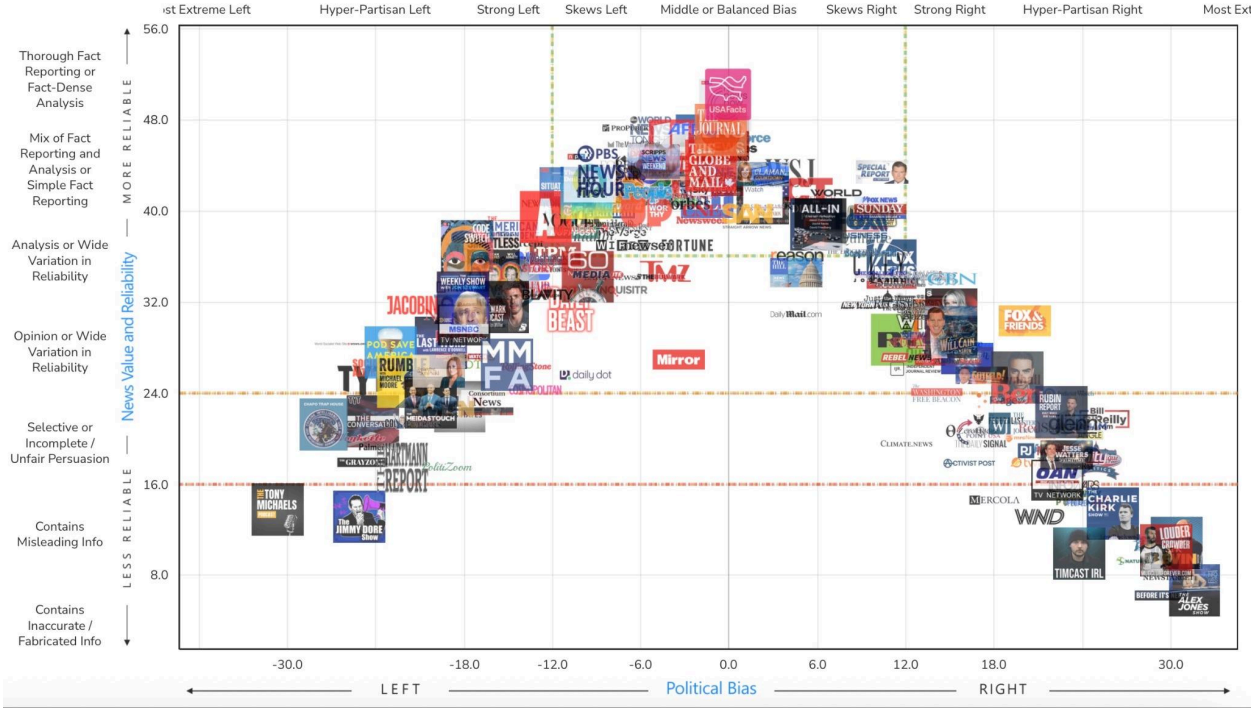
We propose **SpinSpotter**, a mobile application that leverages natural language processing (NLP) and explainable AI (XAI) to detect, explain, and neutralize spin in news articles. SpinSpotter is a **mobile application** designed to detect framing bias in news media and to empower users to develop critical media literacy skills. Decades of social science research show that trust in the media has eroded dramatically: Gallup's 2024 survey reports that only 31% of Americans have a great deal or fair amount of trust in the media, while 36% have none and another 33% have little confidence; this marks a drop from around 70% trust in the 1970s to about 30% today[1]. A 2025 Pew Research Center survey found that 58% of Americans believe most journalists are biased, with 74% of Republicans and 45% of Democrats sharing this view[2]. The Reuters Digital News Report highlights that only 22% of respondents prefer to start their

news journey with a dedicated news website or app and that trust in news averages around 40%[3]. Social media misinformation compounds the problem: a 2024 study found that 66% of U.S. consumers believe most news on social media is biased and 60% of global respondents say news organizations regularly report false stories[4]. In response to these trends, researchers are developing AI-based tools to analyze media bias; for example, the Media Bias Detector from the University of Pennsylvania categorizes articles, detects events, and examines tone and partisan lean to help readers compare coverage across outlets[5].

Related Works

While these findings illustrate why empowering readers to recognize framing bias is essential, they also highlight a gap in existing media-literacy tools. Current solutions primarily evaluate bias at the source or outlet level rather than analyzing spin within the article itself. Building on this prior work, our proposed system shifts the focus to phrase-level detection and explanation, addressing an unmet need in the misinformation-mitigation landscape.

Media Bias Chart (Ad Fontes Media)
A two-axis chart that plots news outlets by **political bias (Left–Center–Right)** on the horizontal axis and **reliability (Low–High)** on the vertical axis. Adapted from Ad Fontes Media's *Media Bias Chart, Version 8.0*. This figure illustrates the source-level approach to bias and reliability, providing context for SpinSpotter's focus on article-level spin detection.



AllSides Fact-Check Bias Chart

A comparative chart rating major fact-checking organizations by perspective. AllSides clarifies that these ratings reflect *perspective only, not factual accuracy*. This underscores the limitation of existing tools and the need for SpinSpotter's phrase-level spin analysis.

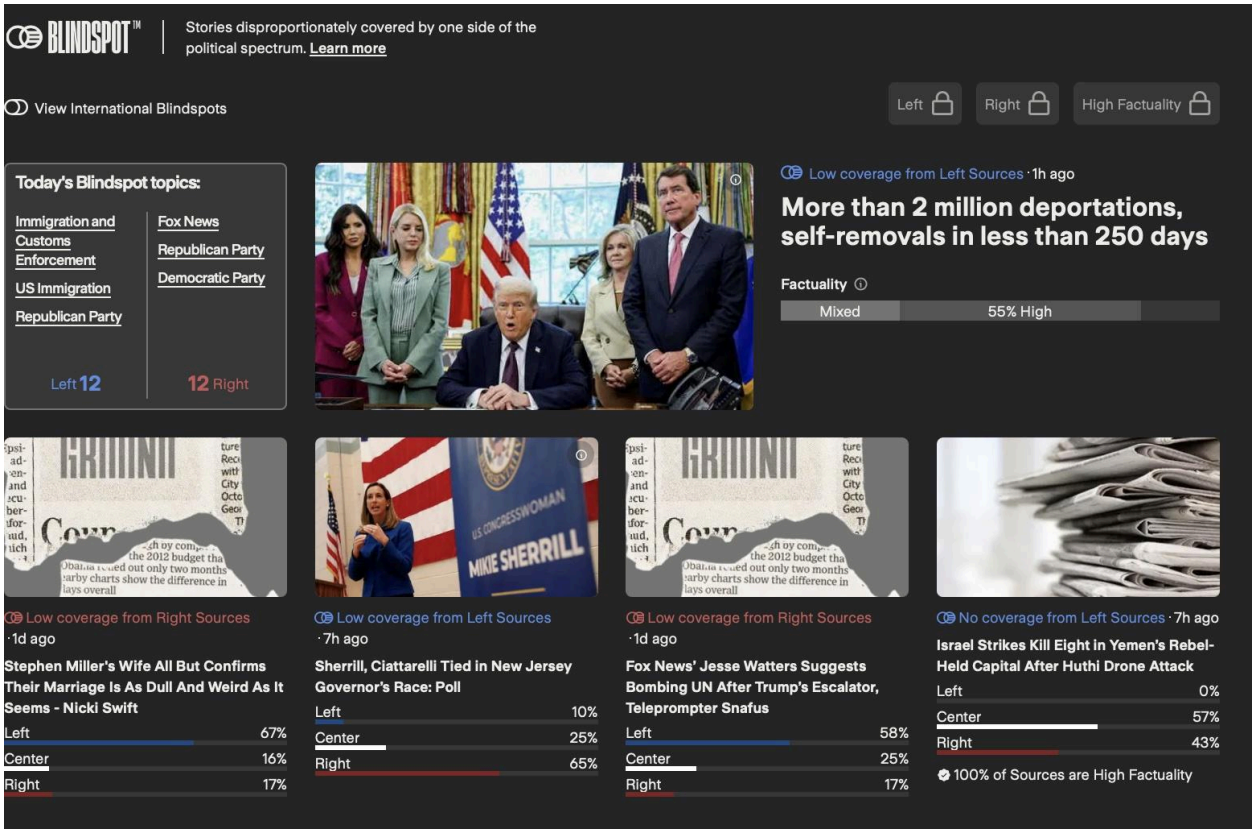
AllSides Media Bias Ratings™

Below is a full list of Fact Check sources that we have rated. AllSides has rated the media bias of over 2,400 sources, fact checkers and writers.

See the full list of AllSides Media Bias Ratings™

News Source	AllSides Bias Rating	What do you think?	Community feedback ⓘ
AFP Fact Check	L L C R R	✓ agree ✗ disagree	1997/1426 Community somewhat agrees.
BBC Fact Check	L L C R R	✓ agree ✗ disagree	2323/2067 Community somewhat agrees.
Breitbart Fact Check	L L C R R	✓ agree ✗ disagree	3060/1276 Community strongly agrees.
Check Your Fact	L L C R R	✓ agree ✗ disagree	881/929 Community somewhat disagrees.
CNN Fact Check	L L C R R	✓ agree ✗ disagree	4008/1544 Community strongly agrees.
Fact Check Review (RealClearPolitics)	L L C R R	✓ agree ✗ disagree	1051/1289 Community somewhat disagrees.
FactCheck.org	L L C R R	✓ agree ✗ disagree	9687/9525 Community somewhat agrees.
Free Beacon Fact Check	L L C R R	✓ agree ✗ disagree	577/476 Community somewhat agrees.
Lead Stories	L L C R R	✓ agree ✗ disagree	607/991 Community disagrees.
National Review Fact Check	L L C R R	✓ agree ✗ disagree	1069/819 Community somewhat agrees.
New York Times Fact Check	L L C R R	✓ agree ✗ disagree	1256/1703 Community somewhat disagrees.
Newsweek Fact Check	L L C R R	✓ agree ✗ disagree	754/1489 Community disagrees.
NPR Fact Check	L L C R R	✓ agree ✗ disagree	1283/1854 Community somewhat disagrees.
PolitiFact	L L C R R	✓ agree ✗ disagree	9431/7074 Community somewhat agrees.

Ground News “Blind Spot” Tool
A screenshot (or diagram) demonstrating how Ground News shows the same story covered by left-, center-, and right-leaning outlets libguides.wvu.edu. This figure highlights SpinSpotter’s integration of perspective links—helping users contextualize individual articles across the political spectrum.



Methodology

SpinSpotter’s design is grounded in real user needs through rigorous user research
A mixed-methods user research approach was used to investigate how individuals perceive and respond to bias in digital news articles. The study combined qualitative interviews with quantitative survey data to capture both personal experiences and broader trends in user behavior. Participants: Twenty-seven participants completed an online survey, and two additional participants took part in semi-structured interviews conducted. The semi-structured interview explored users’ awareness of spin, confidence in identifying bias, and reactions to sample articles. The online survey quantified perceptions of spin prevalence, trust in news sources, and willingness to use a detection tool. Likert scales measured baseline media-literacy and perceived need for the app.

Participants represented a range of age groups (18–55+), occupations, and levels of media literacy. The majority (approximately 85%) identified as working professionals who consume news daily or several times per week. Data Collection: The survey gathered data on demographic factors, news consumption frequency, confidence in detecting bias, fact-checking habits, and willingness to use a bias-detection tool. The interviews provided richer insights into how users

recognize bias, what tools they currently use to verify information, and what barriers they encounter when assessing credibility. Each session lasted approximately 10-15 minutes and was transcribed for further analysis.

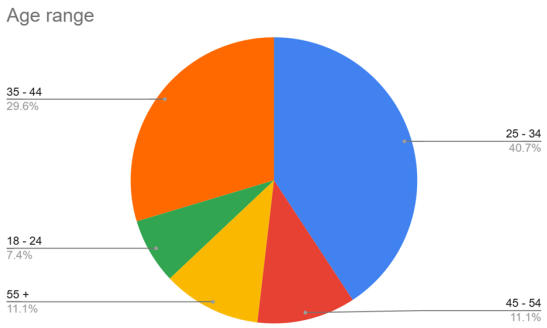
Survey Questions

1. What is your age range?
2. What is your occupation or role?
3. How often do you get news via social media?
4. How confident are you in identifying bias in news articles?
5. Describe a time you realized an article or post was biased.
6. How often do you fact‑check or cross‑reference news stories?
7. Would you use a tool that highlights potentially biased language?
8. Which features interest you most?
9. What concerns would you have about using such a tool?
10. Have you ever shared an article you later discovered was misleading?
11. What resources do you currently use to assess news credibility?
12. Would you like to participate in a follow‑up interview?

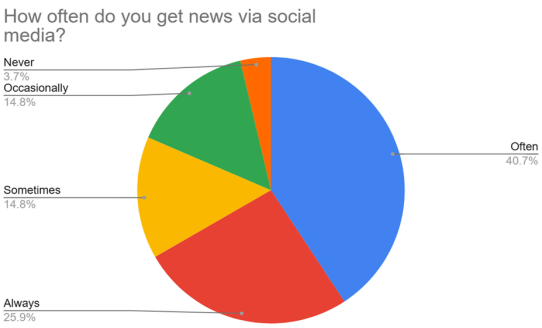
Important Finding

Twenty-seven participants completed the survey, primarily professionals aged 25–44. Most receive news via social media and regularly fact-check. While confidence in identifying bias is high, many remain unsure about having shared misleading content. Participants primarily recognized political bias, particularly one-sided framing and lack of counterarguments. They desired transparency, speed, and educational feedback rather than prescriptive labeling. Key user needs include support for independent verification, clear explanations, and privacy-first operation. The greatest barriers are trust and usability—concerns about algorithmic bias, data collection, and cluttered interfaces. Therefore, success depends on explainable detection, visible transparency, and minimal disruption to reading flow. In summary, the findings emphasize that users seek automation with accountability, preferring a supportive and transparent design that reinforces media literacy and critical engagement**.**

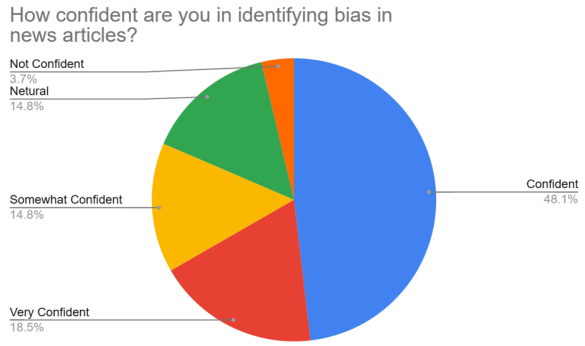
Age Distribution



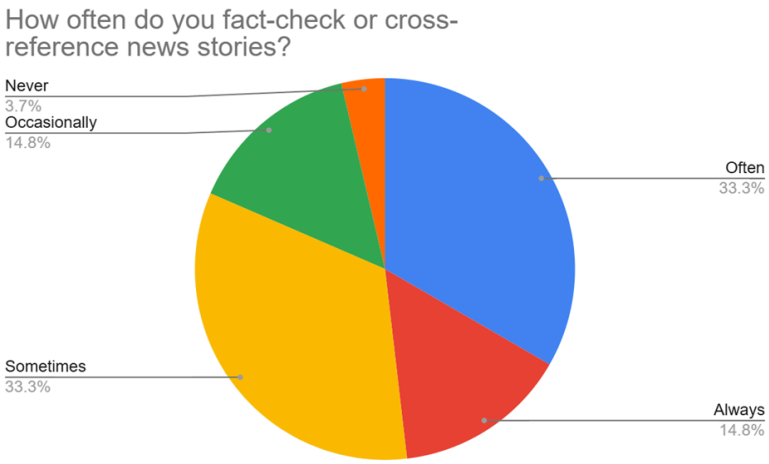
News via Social Media Frequency



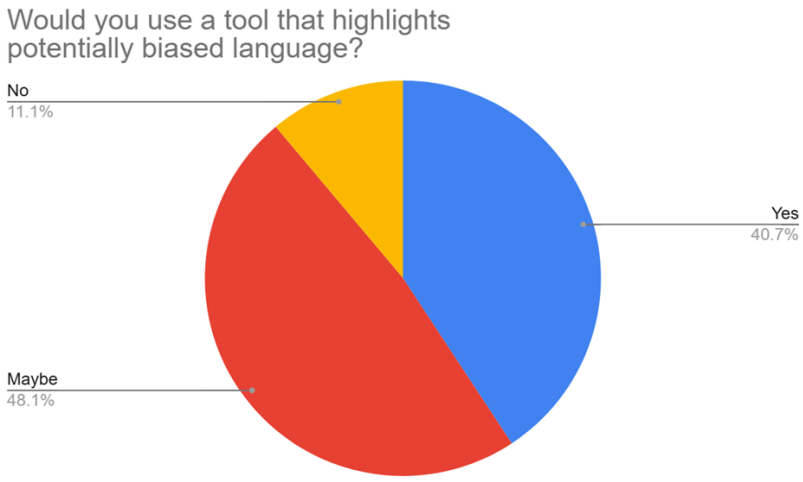
Confidence in Detecting Bias



Fact-Checking Frequency



Willingness to Use the Tool



Design Requirements

The user research and affinity diagram revealed five key user needs: transparency, accuracy, privacy, ease of use, and education. Personas represent three segments—Analytical

Professionals, Retired Realists, and Curious Students—whose goals overlap in desiring reliable, low-bias information but differ in technical comfort and motivation. Based on these insights, the following requirements are organized into four priority system requirements.

(a) Absolutely Must Include

1. Real-Time Bias Highlighting
    - Automatically detects and visually flags biased or emotionally loaded language within an article.
    - Must function smoothly on both desktop and mobile without noticeable lag.
2. Explanations of Bias Type
    - Each highlighted phrase displays a short explanation (e.g., appeal to emotion, one-sided framing).
    - Users need concise educational feedback to build trust and understanding.
3. Transparency & Data Protection
    - The tool clearly communicates how analysis occurs (model card, last updated, and no sale of data).
    - Local processing is preferred; if remote processing is used, user consent is required.
4. Links to Alternative or Primary Sources
    - One-click access to supporting, neutral, or opposing articles.
    - Encourages fact-checking without leaving the platform.
5. Accessible and Minimal Interface
    - Highlight overlays or underlines only; hover/tap reveals details.
    - Fully screen-reader and keyboard accessible.

(b) Should Include

1. Neutral Rephrasing Option
    - Suggests how a sentence could be rewritten in more neutral terms.
    - Supports student and learner personas.
2. Confidence or Evidence Meter
    - Displays a “bias certainty” score (e.g., Low, Moderate, High) based on detection strength.
3. Adjustable Sensitivity Settings
    - Slider allows users to choose how strictly the tool flags bias (e.g., minimal vs. detailed).
4. User Feedback Mechanism
    - “Agree / Disagree / Misclassified” options to refine model accuracy over time.
5. Quick Article Summary
    - Provides a high-level overview showing the number and types of bias detected.

(c) Could Include

1. Customizable Bias Categories
    - Users can enable or disable certain bias types (political, sensational, logical fallacies).
2. Learning Mode
    - Interactive quizzes or examples to teach media literacy, especially for students.
3. Collaboration Features
    - Shared notes or annotation mode for teams, classrooms, or professional groups.
4. Timeline Context
    - Shows how a topic has evolved across time to visualize media patterns.

(d) Exclude (Out of Scope)
1. Personalized Political Scoring – May reinforce bias instead of reducing it.
2. Advertising-Supported Model – Undermines trust and privacy.
3. Automated User Profiling or Tracking – Violates the "privacy first" requirement.
4. Opinion Recommendation Feed – Conflicts with neutrality goals.

The proposed system prioritizes accuracy, transparency, and user trust while avoiding design choices that could compromise neutrality. Early versions should focus on Professionals, Retirees, and Students, ensuring reliability and usability, then gradually expand to broader public audiences.

Prototype Description

Building on the limitations identified in existing media-bias tools and the user needs uncovered through our mixed-methods research, we translated these insights into a concrete product vision. While prior systems focus on outlet-level ratings or broad classifications, our findings reveal a strong demand for fine-grained, phrase-level explanations that help users understand how spin shapes meaning as they read. The following section introduces the SpinSpotter prototype, outlining how its core features operationalize these needs into an accessible, educational, and transparent user experience.

- Spin Detection and Highlighting. SpinSpotter will scan article text and highlight phrases containing loaded language, hyperbole, or other spin devices. It builds on research like the Dbias pipeline, which processes text through sequential phases of bias detection, recognition, masking, and de‑biasing.

- Explainable Feedback. For each flagged phrase, the app will provide concise tooltips explaining why it was flagged (e.g., "This phrase uses emotionally charged wording that frames the policy negatively"). Such transparency aligns with NewsGuard's goal of providing clear "Nutrition Labels" and builds user trust in the AI's decisionsnitrd.gov.

- Neutral Rewriting. Users can view suggested neutral rewrites of biased phrases, inspired by the de‑biasing stage in the bias pipeline. For example, "blatant giveaway to billionaires" might be reframed as "policy benefiting donors."

- Perspective Links. The app will link to alternative coverage from sources across the political spectrum (using tools like Ground News) to provide context and broaden understanding. Ground News' media‑literacy guide suggests that comparing reporting across perspectives encourages critical thinkinglibguides.wvu.edu.

- User Controls. Users can adjust sensitivity levels (e.g., focus on overt spin vs. subtle phrasing) and provide feedback on the accuracy of flags to improve model performance over time.

Prototype 1.0: Explain & Compare– User-friendly interface that highlights biased words directly in articles and provides short explanations of bias types (e.g.,"appeal to emotion"). It also includes comparative metrics showing bias levels across multiple sources.

Prototype 1.1: Learn & Identify– A learning-centered interface that presents brief, interactive lessons on different types of bias. Users engage with short examples to reinforce understanding and recognition skills.

Prototype 1.2: Conversational Companion– A dialogue-based interface that promotes accessibility and engagement through conversational-style interactions. Includes adjustable controls for learning preferences, accessibility needs, and sensitivity settings.

Usability Evaluation

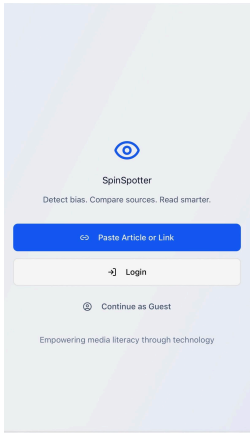
ID	Description of Problem	Prototype Screen(s)	Observed Cause	Recommended Fix / Action
U1	Users hesitated before tapping bias highlights; unclear they were interactive.	Screen 2 – Article View	Highlight color looked static; no hover/tap hint.	Add subtle animation or underline effect when user hovers/taps a bias phrase. Include microtext: 'Tap to learn why.'
U2	Confusion during feedback step; unclear difference between 'Fair' and 'Neutral.'	Screen 3 – Feedback / Reflection	Labels too similar; missing tooltip or short explanation.	Replace with 'Balanced' and 'Unsure.' Add short definition bubbles for clarity.
U3	Navigation loop unclear after submission; user didn't realize they could start a new analysis.	Screen 3 → Screen 1 transition	No restart prompt displayed clearly.	Add confirmation page or visible 'Analyze another article' button after submission.

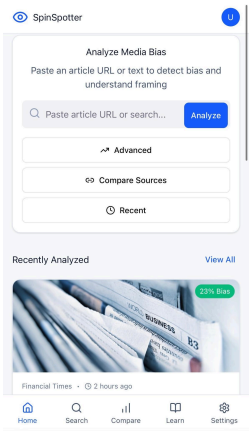
Evaluation Questions:
1. How easy was it to identify and interpret bias highlights?
   Very Easy / Easy / Neutral / Difficult / Very Difficult
2. Did the feedback/reflection screen make sense to you? Yes / Somewhat / No
3. How would you rate the navigation flow between screens? Excellent / Good / Fair / Poor
4. Were instructions clear throughout the process? Yes / Somewhat / No
5. Overall, how satisfied were you with your Spin Spotter experience?
   Very Satisfied / Satisfied / Neutral / Unsatisfied
6. Additional Comments:

Observations:
- Users quickly understood the app's purpose.
- Confusion arose between "Fair" and "Neutral" ratings.
- Restart feature was not clearly visible.

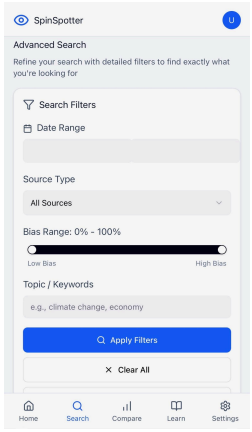
Recommendations:
- Clarify feedback labels (e.g., "Unsure" instead of "Neutral").
- Include a visible restart or confirmation option after feedback submission.

How to Run the Prototype
• Open the Figma prototype link in a browser.
• Use mouse clicks to simulate taps.
• No installation or additional libraries required.
Task List for Users

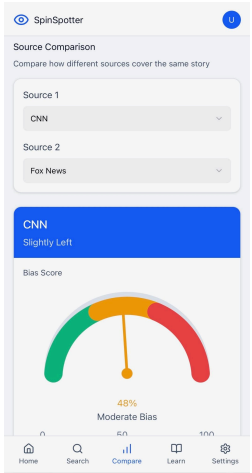




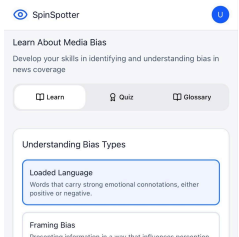
Task 1: Analyze an Article
1. Tap Paste Article or Link.
2. Enter text or URL.
3. Tap Analyze.
4. Review displayed mock bias results.

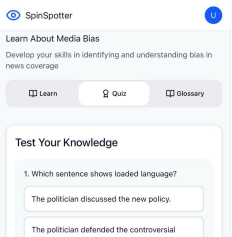


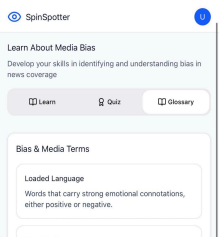
Task 2: Apply Search Filters
1. Tap Search in the bottom nav.
2. Set date range.
3. Adjust bias slider.
4. Enter “climate change.”
5. Tap Apply Filters.



Task 3: Compare Sources
1. Tap Compare.
2. Choose Source 1: CNN.
3. Choose Source 2: Fox News.
4. Scroll to view bias gauge & headline.

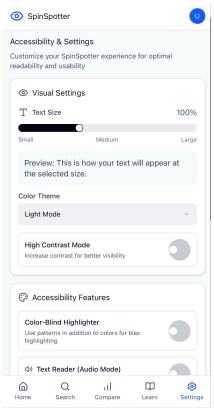






Task 4: Learn About Bias

1. Tap Learn.
2. Select a bias type (e.g., Loaded Language).
3. Review examples.
4. Tap Quiz and answer a question.



Task 5: Adjust Accessibility Settings

1. Tap Settings.
2. Increase text size.
3. Enable High Contrast Mode.

Features & User Flows

1. Analyze Media Bias

Paste article URL or text and tap Analyze to view mock bias results.

2. Use Search Filters

Filter by date range, source type, bias range, and keywords.

3. Compare Two Sources

Select two news outlets and view their bias labels and gauge scores.

4. Learn About Bias

View definitions, biased vs neutral examples, glossary entries, and quizzes.

5. Adjust Settings

Modify text size, theme mode, and high contrast options (visual only).

Discussion

While the findings outline what users did and how they interacted with the prototype, the discussion that follows considers what these behaviors mean for the system's design. Here, we interpret the implications of the heuristic feedback, highlight emerging design patterns, and identify opportunities for refinement.

Known Limitations

- Some screens scroll partially depending on frame height.
- Only labeled buttons are interactive.
- No dynamic data or calculations exist.

Heuristic Feedback

1. Back Button Doesn't Work
   - Using the browser's back button kicks users out of the prototype.
   - Fix: Allow normal back-navigation.
2. Advanced Search Is Hard to Find
   - The link is tiny, grey, and labeled "Search," so users overlook it.
   - Fix: Rename and restyle it so it's obvious.
3. Flagged Words Don't Auto-Scroll
   - When users click a highlighted phrase, the screen doesn't scroll to show the text.
   - Fix: Auto-scroll and highlight the location.
4. Bias Icon Looks Wrong
   - The icon looks like a "trending" symbol, not a bias meter.
   - Fix: Replace it with something clearer.
5. Filters Aren't Efficient
   - Topic/keyword filter requires full manual typing.
   - Fix: Add autofill or suggestions.
6. No Way to Return to Login
   - Once inside the app, users can't get back to the login screen.
   - Fix: Add a "Profile/Logout/Login" option.
7. Navigation Isn't Consistent
   - Some screens don't have a clear "Return to Dashboard" option.
   - Fix: Add consistent navigation.
8. Save Search Doesn't Do Anything
   - The button only changes color and doesn't actually save anything.
   - Fix: Make it save to Recent Searches or remove it.

Collectively, the issues raised during evaluation reveal critical design considerations, reinforcing the need for consistent, explainable, and user-centered interfaces. In the conclusion that follows, we reflect on these insights and discuss SpinSpotter's broader implications for media literacy and future work.

Future Work

This project demonstrates the feasibility and user need for a mobile bias-detection tool that promotes critical thinking and transparency in digital news consumption. Through extensive

research, prototyping, and initial evaluation, we identified pathways to improve media literacy by surfacing subtle forms of spin and offering user-friendly explanations.

The results of our research, design, and evaluation collectively demonstrate the potential for a user-centered spin-detection tool to enhance media literacy and transparency in digital news consumption.

Integrate real NLP models for preliminary bias classifiers.

- Conduct a larger-scale usability study with diverse demographics.
- Expand learning modules with adaptive difficulty.
- Explore partnerships with academic fact-checking labs or news-literacy nonprofits.
- Develop browser-extension compatibility for cross-platform use.
- SpinSpotter ultimately aims to empower readers to navigate today's polarized media environment with greater clarity, skepticism, and confidence.

References

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