# Intervention Framework Against Visualization Recontextualization

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## Introduction

- A factual chart can be used to mislead readers.
- A fallacious caption, curated comparison, or other reasoning errors can turn a factual visualization into supporting an unsupported claim.

**OBJECTIVE**

- Develop an design space for interventions across major visual and reasoning-based misleaders.
- Implement a prototype AI system for automated intervention generation based on the design space.

## What can go wrong?


Visual Trickery


Cherry-picking


Setting an Arbitrary Threshold


Causal Inference


Data Validity Issue

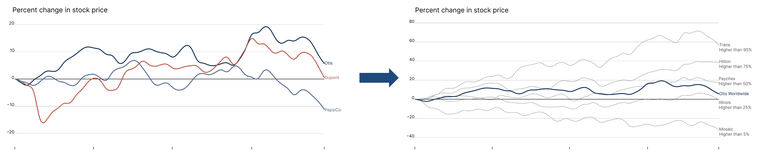

Missing Statistical Nuance


Misrepresentation of Scientific Studies


Incorrect Chart Reading

Visual and reasoning misleaders from Lisnic et al. (2023)

## Our Prior Work




**Curated Comparators** **Context Embedded**

- We addressed comparator-based cherry-picking with contextual guardrails, which are additional context embedded directly into the chart.
- This motivates extending the intervention approach to other visual and reasoning errors.

## AI System Motivation

- Recent works on misleading visualizations and VLM benchmarks report stronger detection of visual design violations than reasoning errors.

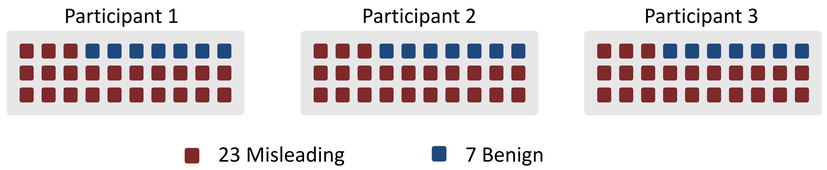
Our plan: combines chart + caption claim assessment + external evidence.

## Methods

We collected a corpus of 100 misleading and 21 benign posts for our design exercise.

### Design Exercise

Three researchers, each receive 30 cases: 23 misleading and 7 benign.



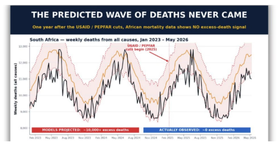

- Identify what, if anything, is misleading.
- Propose the preferred intervention and sketch it.
- Describe the evidence needed and a fallback if the data is unavailable.

### Visual Repair




Misleading Case Corrected Chart

### Chart Preserved, Claim Addressed




Misleading post

All-cause deaths cannot by themselves establish an effect on a specific cause or service. Furthermore, Studies show that USAID fund cuts are causing widespread service disruptions.

Interpretive Annotation

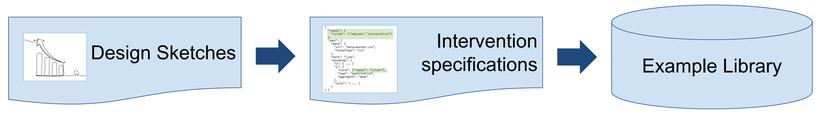
### Building the Intervention Framework

Sketches → Open Coding → Intervention Framework

- We will code designs and peer reviews to identify recurring visual repairs, chart fixes, text roles, evidence requirements and fallback strategies
- Synthesize these patterns into a framework.

## AI Intervention Agent

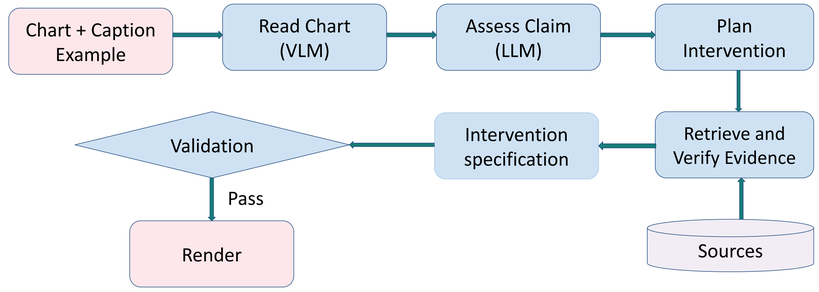
- Our goal is to build a proof-of-concept AI system that can identify misleading chart-caption pairs and generate appropriate interventions.
- We will create intervention specifications in the form of visualization specs from the design sketches alongside data requirements and rationale.




### Approaches to Guide the Agent

Zero-shot Prompting | Few-shot Prompting | RAG | Fine-tuning

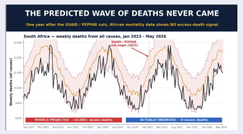
### Agent Workflow




- The agent diagnoses the post, plans an intervention, checks evidence, and generates a visualization specification for rendering and review.

## Reader-side Intervention Prototype

**BROWSER OVERLAY**




**What this chart shows**
This plot shows total deaths. It does not separate outcome by cause.

## Conclusion

What this work delivers:

- **Design framework:** What intervention fits which kind of misleader?
- **Actionable knowledge:** Turn expert designs into intervention specifications.
- **Automation:** Generate and evaluate interventions for both technical quality and reader effectiveness.