In [1]:
```
!pip -q install --upgrade transformers accelerate sentencepiece wordcloud langdetect tqdm
```

```
     ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 981.5/981.5 kB 18.9 M
B/s eta 0:00:00
  Preparing metadata (setup.py) ... done
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 9.5/9.5 MB 63.9 MB/
s eta 0:00:00
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 42.8/42.8 MB 14.1 M
B/s eta 0:00:00
  Building wheel for langdetect (setup.py) ... done
ERROR: pip's dependency resolver does not currently take into account all the packages tha
t are installed. This behaviour is the source of the following dependency conflicts.
pylibcudf-cu12 25.6.0 requires pyarrow<20.0.0a0,>=14.0.0; platform_machine == "x86_64", bu
t you have pyarrow 21.0.0 which is incompatible.
cudf-cu12 25.6.0 requires pyarrow<20.0.0a0,>=14.0.0; platform_machine == "x86_64", but you
 have pyarrow 21.0.0 which is incompatible.
```

In [2]:
```
import os, math, gc, re, json, random
from datetime import datetime

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

from tqdm import tqdm
import torch

from transformers import pipeline
from wordcloud import WordCloud
from langdetect import detect as lang_detect
from sklearn.feature_extraction.text import CountVectorizer

# Matplotlib defaults
plt.rcParams["figure.dpi"] = 120
plt.rcParams["axes.grid"] = False
```

Environment, Drive, Paths, Reproducibility

In [3]:
```
from google.colab import drive
drive.mount('/content/drive')

# Persist HF cache so models don't re-download each session
os.environ["HF_HOME"] = "/content/drive/MyDrive/hf_cache"

# Project directories
BASE_DIR = "/content/drive/MyDrive/Final Project"
DATA_PATH = os.path.join(BASE_DIR, "news.tsv")            # MIND-small
RUN_DIR   = os.path.join(BASE_DIR, "run_outputs")         # chunk outputs + full results
EXPORTS   = os.path.join(BASE_DIR, "exports")             # CSV/PNG exports for sharing
os.makedirs(RUN_DIR, exist_ok=True)
os.makedirs(EXPORTS, exist_ok=True)

# Device
DEVICE = 0 if torch.cuda.is_available() else -1
print("✅ Using GPU" if DEVICE == 0 else "⚠️ Using CPU")

# Reproducibility
SEED = 42
random.seed(SEED); np.random.seed(SEED); torch.manual_seed(SEED)

# (Optional) Set this True only if you want to wipe previous run outputs.
```

```
CLEAN_START = False
if CLEAN_START:
    for p in os.listdir(RUN_DIR):
        try:
            os.remove(os.path.join(RUN_DIR, p))
        except:
            pass
    print("Cleaned previous RUN_DIR files.")
```

```
Mounted at /content/drive
⚠ Using CPU
```

Config (batch sizes, truncation, chunking, weights)

In [ ]:

```
CONFIG = {
    "max_length": 384,  # 256-384 is enough for abstracts
    "batch_sizes": {
        "sentiment": 32 if DEVICE == 0 else 8,
        "emotion":   24 if DEVICE == 0 else 8,
        "cred":      24 if DEVICE == 0 else 8,
        "bias":       6 if DEVICE == 0 else 2,   # zero-shot (heavy)
    },
    "chunk_size": 5000,          # process in 5k-row chunks (resume-safe)
    "use_processed_text": True,  # True = use processed_text for inference
    "weights": {"sent": 0.20, "emot": 0.20, "bias": 0.25, "cred": 0.35}
}
CONFIG
```

Out[ ]:

```
{'max_length': 384,
 'batch_sizes': {'sentiment': 32, 'emotion': 24, 'cred': 24, 'bias': 6},
 'chunk_size': 5000,
 'use_processed_text': True,
 'weights': {'sent': 0.2, 'emot': 0.2, 'bias': 0.25, 'cred': 0.35}}
```

Load MIND-small

In [ ]:

```
cols = ["news_id","category","subcategory","title","abstract","url","title_entities","abst
data = pd.read_csv(DATA_PATH, sep="\t", header=None, names=cols)
print(f"Loaded: {data.shape[0]:,} rows")

data["title"] = data["title"].fillna("").astype(str)
data["abstract"] = data["abstract"].fillna("").astype(str)
data["combined_text"] = (data["title"] + " " + data["abstract"]).str.strip()

display(data.head(3))
```

```
Loaded: 51,282 rows
```

	news_id	category	subcategory	title	abstract	url	title_entitie
0	N55528	lifestyle	lifestyleroyals	The Brands Queen Elizabeth, Prince Charles, an...	Shop the notebooks, jackets, and more that the...	https://assets.msn.com/labs/mind/AAGH0ET.html	[{"Label" "Prince Philip, Duke o Edinburgh",..

	news_id	category	subcategory	title	abstract	url	title_entitie
1	N19639	health	weightloss	50 Worst Habits For Belly Fat	These seemingly harmless habits are holding yo...	https://assets.msn.com/labs/mind/AAB19MK.html	[{"Label" "Adipose tissue" "Type": "C" "Wik..
2	N61837	news	newsworld	The Cost of Trump's Aid Freeze in the Trenches...	Lt. Ivan Molchanets peeked over a parapet of s...	https://assets.msn.com/labs/mind/AAJgNsz.html	[

Basic EDA: nulls, lengths, language, categories

In [ ]:

```
# Nulls
print("Null counts:\n", data.isna().sum().sort_values(ascending=False))

# Lengths
data["len_chars"] = data["combined_text"].str.len()
data["len_words"] = data["combined_text"].str.split().apply(len)
print("\nLength stats (chars):\n", data["len_chars"].describe())
print("\nLength stats (words):\n", data["len_words"].describe())

# Category overview
print("\nTop categories:\n", data["category"].value_counts().head(10))
print("\nTop subcategories:\n", data["subcategory"].value_counts().head(10))

# Language spot check (100 items)
def safe_lang(s):
    s = (s or "").strip()
    if len(s) < 5: return "unk"
    try: return lang_detect(s[:400])
    except: return "unk"

lang_counts = data["combined_text"].sample(100, random_state=SEED).apply(safe_lang).value_
print("\nLanguage detection on sample(100):\n", lang_counts)
```

```
Null counts:
 abstract_entities    4
title_entities       3
news_id              0
category             0
subcategory          0
abstract             0
title                0
url                  0
combined_text        0
dtype: int64

Length stats (chars):
 count    51282.000000
mean       272.051071
std        160.229185
min         18.000000
25%        155.000000
50%        217.000000
75%        452.000000
```

```
max       2672.000000
Name: len_chars, dtype: float64

Length stats (words):
 count    51282.000000
mean        45.047736
std         26.843489
min          2.000000
25%         25.000000
50%         36.000000
75%         73.000000
max        485.000000
Name: len_words, dtype: float64

Top categories:
 category
news            15774
sports          14510
finance          3107
foodanddrink     2551
lifestyle        2479
travel           2350
video            2068
weather          2048
health           1885
autos            1639
Name: count, dtype: int64

Top subcategories:
 subcategory
newsus                      6564
football_nfl                5420
newspolitics                2826
newscrime                   2254
weathertopstories           2047
newsworld                   1720
football_ncaa               1665
baseball_mlb                1661
basketball_nba              1555
newsscienceandtechnology    1210
Name: count, dtype: int64

Language detection on sample(100):
 combined_text
en    100
Name: count, dtype: int64
```

Preprocessing

In [ ]:

```
import nltk
from nltk.corpus import stopwords
from nltk.tokenize import word_tokenize, sent_tokenize, PunktSentenceTokenizer
from nltk.stem import WordNetLemmatizer

# Downloads (idempotent)
nltk.download('punkt'); nltk.download('stopwords'); nltk.download('wordnet')
try:
    nltk.download('punkt_tab')   # present in some Colab builds
except:
    pass

stop_words = set(stopwords.words('english'))
lemmatizer = WordNetLemmatizer()
_ = PunktSentenceTokenizer()
```

```
def preprocess(text: str) -> str:
    text = str(text)
    text = re.sub(r'\s+', ' ', text)
    text = re.sub(r'[^\w\s]', '', text)
    text = text.lower()
    sentences = sent_tokenize(text)
    tokens = []
    for sent in sentences:
        tokens.extend(word_tokenize(sent))
    tokens = [lemmatizer.lemmatize(w) for w in tokens if w not in stop_words]
    return ' '.join(tokens)

PROC_PATH = os.path.join(RUN_DIR, "processed_text.parquet")
FORCE_REPROCESS = False   # set True if you want to recompute

if os.path.exists(PROC_PATH) and not FORCE_REPROCESS:
    print("Loading cached processed_text ...")
    proc_df = pd.read_parquet(PROC_PATH)
    data["processed_text"] = proc_df["processed_text"]
else:
    print("Preprocessing text ...")
    data["processed_text"] = data["combined_text"].fillna("").astype(str).apply(preprocess
    data[["processed_text"]].to_parquet(PROC_PATH, index=False)
    print("Saved:", PROC_PATH)

display(data[["combined_text","processed_text"]].head(3))
```

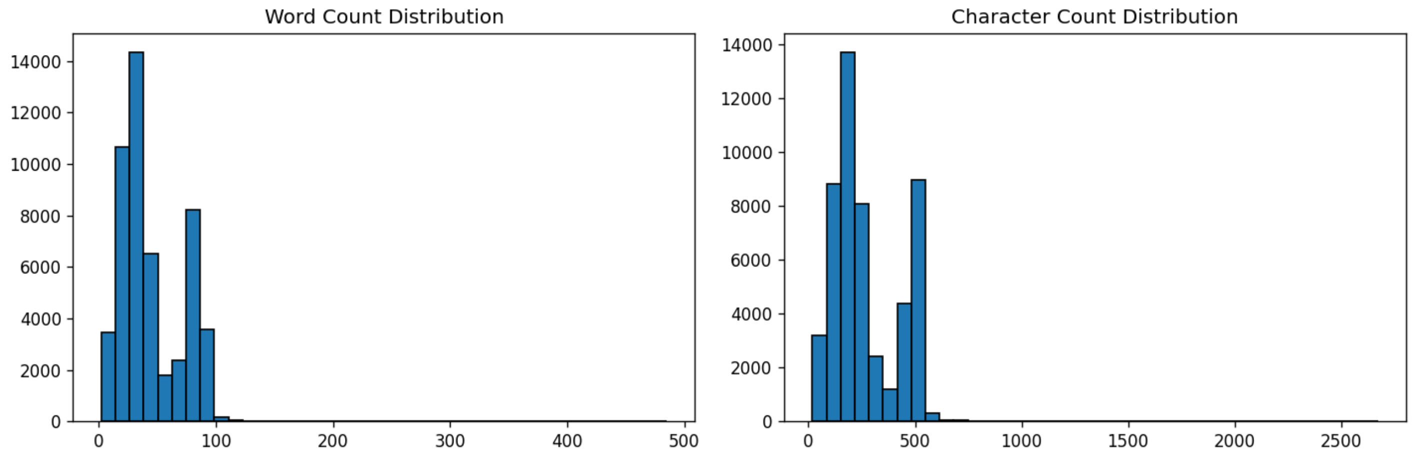
```
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt.zip.
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Unzipping corpora/stopwords.zip.
[nltk_data] Downloading package wordnet to /root/nltk_data...
[nltk_data] Downloading package punkt_tab to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt_tab.zip.
Preprocessing text ...
Saved: /content/drive/MyDrive/Final Project/run_outputs/processed_text.parquet
```

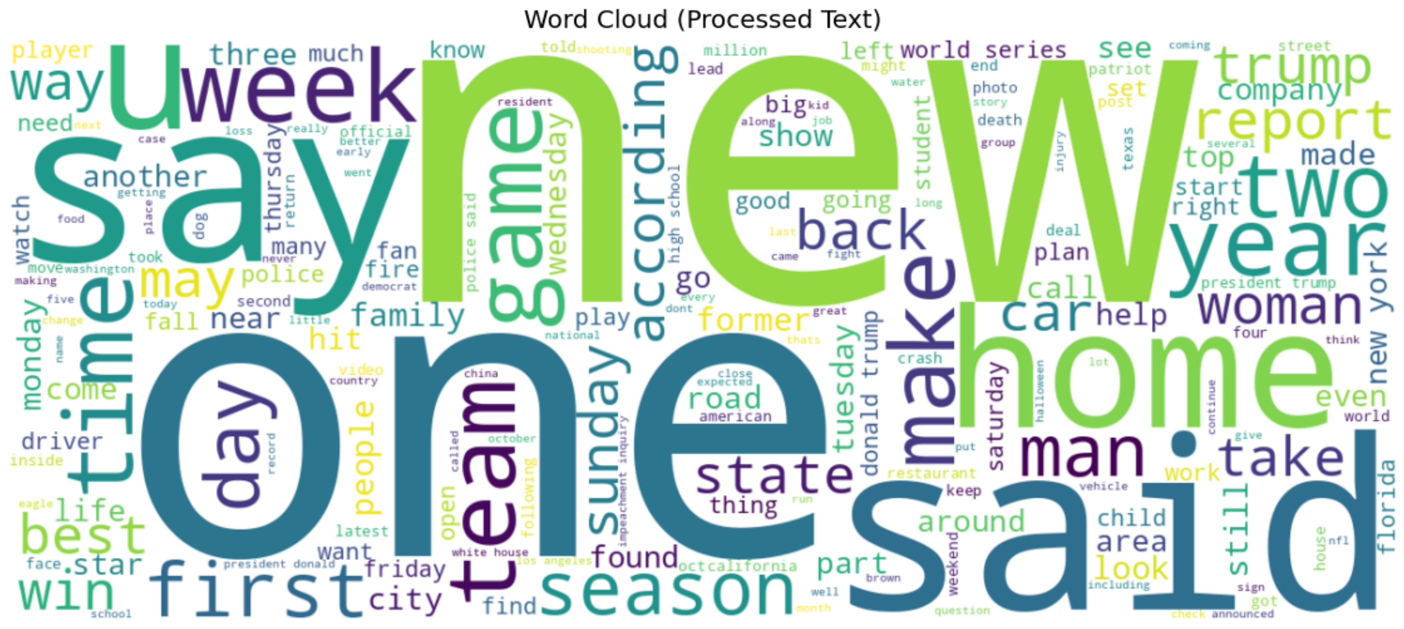
	combined_text	processed_text
0	The Brands Queen Elizabeth, Prince Charles, an...	brand queen elizabeth prince charles prince ph...
1	50 Worst Habits For Belly Fat These seemingly ...	50 worst habit belly fat seemingly harmless ha...
2	The Cost of Trump's Aid Freeze in the Trenches...	cost trump aid freeze trench ukraine war lt iv...

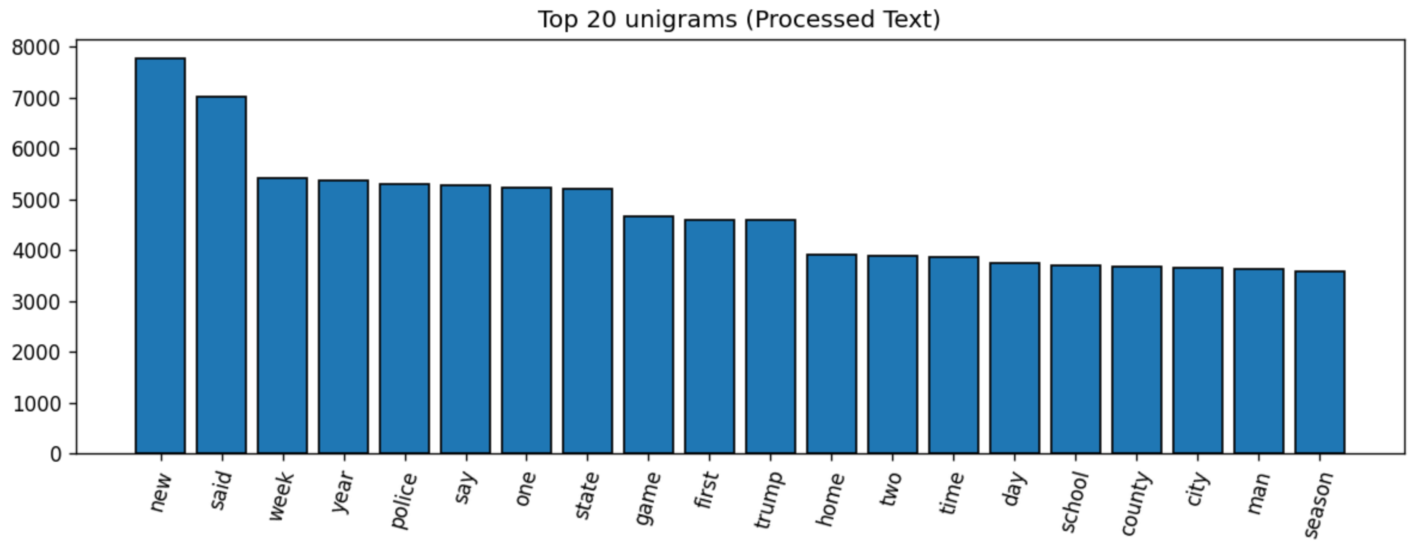
Quick EDA Visuals (lengths, word cloud, top n-grams)

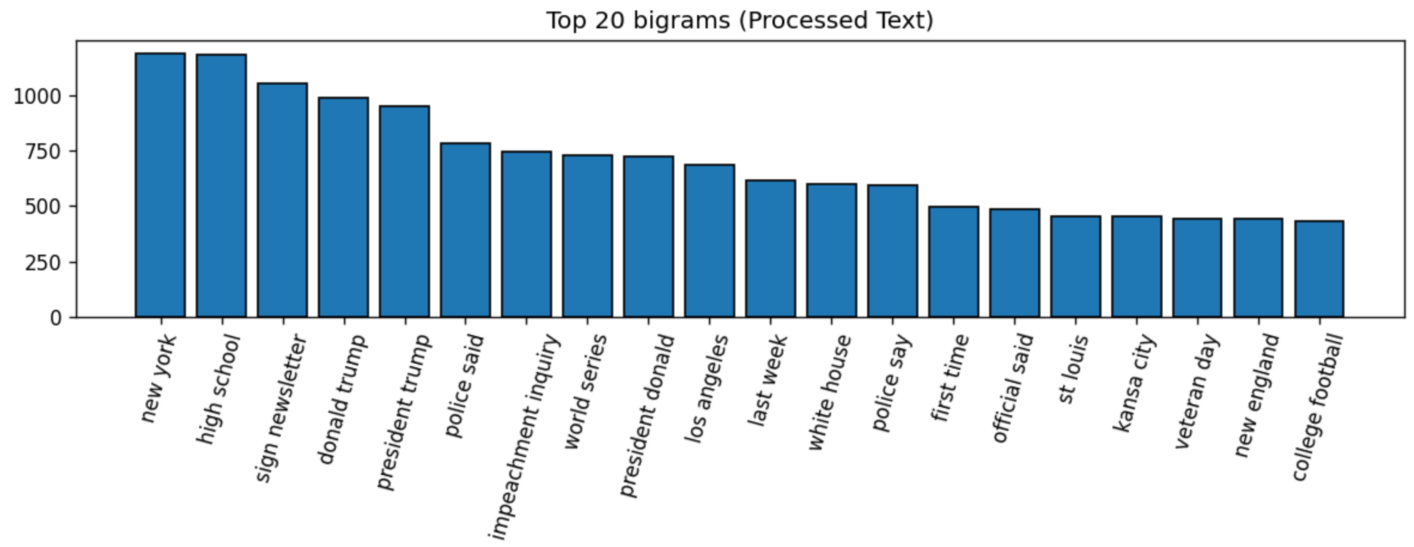
In [ ]:

```
# Length histograms
fig, axes = plt.subplots(1,2, figsize=(12,4))
axes[0].hist(data["len_words"], bins=40, edgecolor="black"); axes[0].set_title("Word Count
axes[1].hist(data["len_chars"], bins=40, edgecolor="black"); axes[1].set_title("Character
plt.tight_layout(); plt.savefig(os.path.join(EXPORTS, "eda_lengths.png")); plt.show()

# Word Cloud (subset for speed)
wc = WordCloud(width=1200, height=500, background_color="white").generate(" ".join(data["p
plt.figure(figsize=(12,5)); plt.imshow(wc, interpolation="bilinear"); plt.axis("off"); plt
plt.savefig(os.path.join(EXPORTS, "wordcloud_processed.png")); plt.show()

# Top unigrams / bigrams
for n in [1,2]:
    vec = CountVectorizer(ngram_range=(n,n), max_features=30, min_df=5)
    X = vec.fit_transform(data["processed_text"])
    freqs = np.array(X.sum(axis=0)).ravel()
    vocab = np.array(vec.get_feature_names_out())
    order = np.argsort(-freqs)
    top_vocab = vocab[order][:20]; top_freqs = freqs[order][:20]
    plt.figure(figsize=(10,4))
    plt.bar(range(len(top_vocab)), top_freqs, edgecolor="black")
    plt.xticks(range(len(top_vocab)), top_vocab, rotation=75)
    plt.title(f"Top {20} {'uni' if n==1 else 'bi'}grams (Processed Text)")
    fname = f"top_{'uni' if n==1 else 'bi'}grams.png"
    plt.tight_layout(); plt.savefig(os.path.join(EXPORTS, fname)); plt.show()
```









Utilities (safe text, chunking, batching, helpers)

In [ ]:
```
def safe_text(s: str) -> str:
    s = ("" if s is None else str(s)).strip()
    return s if len(s) >= 5 else ""

def chunks_of(df: pd.DataFrame, chunk_size: int):
    for start in range(0, len(df), chunk_size):
        yield start // chunk_size, df.iloc[start:start+chunk_size].copy()

def batched(lst, batch_size):
    for i in range(0, len(lst), batch_size):
        yield lst[i:i+batch_size]

def compute_unified(df, weights):
    w = np.array([weights["sent"], weights["emot"], weights["bias"], weights["cred"]], dty
    w = w / w.sum()
    M = df[["sent_norm","emot_norm","bias_norm","cred_norm"]].to_numpy(dtype=float)
    return (M @ w).astype(float)
```

Pipelines

In [ ]:
```
# Global pipelines (loaded on first use)
_sentiment_pipe = None
_emotion_pipe = None
_cred_pipe = None
_bias_pipe = None

def get_sentiment_pipe():
    """
    Use the '-latest' model for human-readable labels + robust mapping (we also handle LAB
    """
    global _sentiment_pipe
    if _sentiment_pipe is None:
        _sentiment_pipe = pipeline(
            "text-classification",
            model="cardiffnlp/twitter-roberta-base-sentiment-latest",
            tokenizer="cardiffnlp/twitter-roberta-base-sentiment-latest",
            return_all_scores=True,
            truncation=True,
            max_length=CONFIG["max_length"],
            device=DEVICE
        )
    return _sentiment_pipe

def get_emotion_pipe():
    global _emotion_pipe
    if _emotion_pipe is None:
        _emotion_pipe = pipeline(
            "text-classification",
            model="j-hartmann/emotion-english-distilroberta-base",
            return_all_scores=True,
            truncation=True,
            max_length=CONFIG["max_length"],
            device=DEVICE
        )
    return _emotion_pipe

def get_cred_pipe():
    global _cred_pipe
    if _cred_pipe is None:
        _cred_pipe = pipeline(
            "text-classification",
            model="jy46604790/Fake-News-Bert-Detect",
            tokenizer="jy46604790/Fake-News-Bert-Detect",
            return_all_scores=True,
            truncation=True,
            max_length=CONFIG["max_length"],
            device=DEVICE
        )
    return _cred_pipe

def get_bias_pipe():
    global _bias_pipe
    if _bias_pipe is None:
        _bias_pipe = pipeline(
            "zero-shot-classification",
            model="facebook/bart-large-mnli",
            device=DEVICE
        )
    return _bias_pipe
```

Mapping Helpers

In [ ]:

```
# --- Sentiment mapping (robust to 'negative/neutral/positive' and 'LABEL_0/1/2') ---
def map_sentiment(scores_list):
    tmp = []
    for d in scores_list:
        raw = d["label"].strip().lower()
        p = float(d["score"])
        if raw in {"label_0","0","neg","negative"}:
            norm = "negative"
        elif raw in {"label_1","1","neu","neutral"}:
            norm = "neutral"
        elif raw in {"label_2","2","pos","positive"}:
            norm = "positive"
        else:
            if "neg" in raw: norm = "negative"
            elif "neu" in raw: norm = "neutral"
            elif "pos" in raw: norm = "positive"
            else: norm = raw
        tmp.append((norm, p))
    lbl2p = {}
    for lab, p in tmp:
        if lab in {"negative","neutral","positive"}:
            lbl2p[lab] = max(lbl2p.get(lab, 0.0), p)
    p_neg = lbl2p.get("negative",0.0)
    p_neu = lbl2p.get("neutral",0.0)
    p_pos = lbl2p.get("positive",0.0)
    raw_label, conf = max([("Positive",p_pos),("Neutral",p_neu),("Negative",p_neg)], key=l

    if raw_label == "Positive": sent_norm = conf
    elif raw_label == "Neutral": sent_norm = 0.5
    else: sent_norm = 1.0 - conf
    return raw_label, conf, sent_norm

# --- Emotion grouping (GoEmotions → Joy/Sadness/Anger/Fear/Neutral) ---
EMO_GROUPS = {"Joy":{"joy"}, "Sadness":{"sadness"}, "Anger":{"anger","disgust"}, "Fear":{'

def map_emotion(scores_list):
    lbl2p = {d["label"].strip().lower(): float(d["score"]) for d in scores_list}
    known = set(lbl2p.keys())
    grouped = {"Joy":0.0,"Sadness":0.0,"Anger":0.0,"Fear":0.0,"Neutral":0.0}
    for lab in EMO_GROUPS["Joy"]:
        if lab in known: grouped["Joy"] += lbl2p[lab]
    for lab in EMO_GROUPS["Sadness"]:
        if lab in known: grouped["Sadness"] += lbl2p[lab]
    for lab in EMO_GROUPS["Anger"]:
        if lab in known: grouped["Anger"] += lbl2p[lab]
    for lab in EMO_GROUPS["Fear"]:
        if lab in known: grouped["Fear"] += lbl2p[lab]
    explicit = set().union(*EMO_GROUPS.values())
    for lab in known - explicit:
        grouped["Neutral"] += lbl2p[lab]
    emot_label, emot_conf = max(grouped.items(), key=lambda x:x[1])
    if emot_label == "Joy": emot_norm = emot_conf
    elif emot_label == "Neutral": emot_norm = 0.6
    else: emot_norm = 1.0 - emot_conf
    return emot_label, emot_conf, emot_norm

# --- Bias (zero-shot: Left/Center/Right → Biased/Neutral) ---
BIAS_LABELS = ["Left","Center","Right"]
HYPOTHESIS = "This text is written with a {} political leaning."

def map_bias(zs_output):
    lbl2p = {lab: float(score) for lab, score in zip(zs_output["labels"], zs_output["score
    p_left = lbl2p.get("Left",0.0); p_center = lbl2p.get("Center",0.0); p_right = lbl2p.ge
    raw_label = max([("Left",p_left),("Right",p_right),("Center",p_center)], key=lambda x:
    if raw_label in {"Left","Right"}:
        simp_label = "Biased"; simp_conf = max(p_left,p_right); bias_norm = 1.0 - simp_co
    else:
        simp_label = "Neutral"; simp_conf = p_center; bias_norm = simp_conf
    return simp_label, simp_conf, bias_norm

# --- Credibility (Fake/Real → Low/High) ---
def map_cred(scores_list):
    lbl2p = {d["label"].strip().upper(): float(d["score"]) for d in scores_list}
    p_fake = max(lbl2p.get("FAKE",0.0), lbl2p.get("LABEL_0",0.0))
    p_real = max(lbl2p.get("REAL",0.0), lbl2p.get("LABEL_1",0.0))
    if p_real >= p_fake:
        label, conf, cred_norm = "High Credibility", p_real, p_real
    else:
        label, conf, cred_norm = "Low Credibility", p_fake, 1.0 - p_fake
    return label, conf, cred_norm
```

Inference on One Chunk (batched, all four models)

```
In [ ]: def run_models_on_chunk(df_chunk: pd.DataFrame, idx: int) -> pd.DataFrame:
    texts_raw = df_chunk["combined_text"].tolist()
    texts_proc = df_chunk["processed_text"].tolist()
    texts = texts_proc if CONFIG["use_processed_text"] else texts_raw
    texts = [safe_text(t) for t in texts]

    # --- Sentiment ---
    sent_labels, sent_confs, sent_norms = [], [], []
    spipe = get_sentiment_pipe()
    for batch in tqdm(list(batched(texts, CONFIG["batch_sizes"]["sentiment"])), desc=f"[Ch
        outs = spipe(batch)   # list[list[dict]]
        for scores_list in outs:
            lab, conf, norm = map_sentiment(scores_list)
            sent_labels.append(lab); sent_confs.append(conf); sent_norms.append(norm)

    # --- Emotion ---
    emot_labels, emot_confs, emot_norms = [], [], []
    epipe = get_emotion_pipe()
    for batch in tqdm(list(batched(texts, CONFIG["batch_sizes"]["emotion"])), desc=f"[Chun
        outs = epipe(batch)
        for scores_list in outs:
            lab, conf, norm = map_emotion(scores_list)
            emot_labels.append(lab); emot_confs.append(conf); emot_norms.append(norm)

    # --- Bias (zero-shot) ---
    bias_labels, bias_confs, bias_norms = [], [], []
    bpipe = get_bias_pipe()
    for batch in tqdm(list(batched(texts, CONFIG["batch_sizes"]["bias"])), desc=f"[Chunk
        zs_out = bpipe(batch, candidate_labels=BIAS_LABELS, hypothesis_template=HYPOTHESIS
        for out in zs_out:
            lab, conf, norm = map_bias(out)
            bias_labels.append(lab); bias_confs.append(conf); bias_norms.append(norm)

    # --- Credibility ---
    cred_labels, cred_confs, cred_norms = [], [], []
    cpipe = get_cred_pipe()
    for batch in tqdm(list(batched(texts, CONFIG["batch_sizes"]["cred"])), desc=f"[Chunk
        outs = cpipe(batch)
        for scores_list in outs:
            lab, conf, norm = map_cred(scores_list)
            cred_labels.append(lab); cred_confs.append(conf); cred_norms.append(norm)

    out = df_chunk.copy()
    out["sent_label"] = sent_labels; out["sent_conf"] = sent_confs; out["sent_norm"] = ser
    out["emot_label"] = emot_labels; out["emot_conf"] = emot_confs; out["emot_norm"] = emc
    out["bias_label"] = bias_labels; out["bias_conf"] = bias_confs; out["bias_norm"] = bia
    out["cred_label"] = cred_labels; out["cred_conf"] = cred_confs; out["cred_norm"] = cre
    return out
```

Run All Chunks (resume-safe, saves per-chunk)

In [ ]:

```
CHUNK_SIZE = CONFIG["chunk_size"]
N = len(data); num_chunks = math.ceil(N / CHUNK_SIZE)
print(f"Total rows: {N:,} | Chunks: {num_chunks} | Chunk size: {CHUNK_SIZE}")

for idx, df_chunk in chunks_of(data, CHUNK_SIZE):
    part_path = os.path.join(RUN_DIR, f"scores_part_{idx:02d}.parquet")
    if os.path.exists(part_path):
        print(f"Skipping chunk {idx} (already exists).")
        continue
    print(f"Processing chunk {idx} ({len(df_chunk)} rows) ...")
    out_df = run_models_on_chunk(df_chunk, idx)
    out_df.to_parquet(part_path, index=False)
    print("Saved:", part_path)
    del out_df; gc.collect()
```

```
Total rows: 51,282 | Chunks: 11 | Chunk size: 5000
Processing chunk 0 (5000 rows) ...
/usr/local/lib/python3.12/dist-packages/huggingface_hub/utils/_auth.py:94: UserWarning:
The secret `HF_TOKEN` does not exist in your Colab secrets.
To authenticate with the Hugging Face Hub, create a token in your settings tab (https://hu
ggingface.co/settings/tokens), set it as secret in your Google Colab and restart your sess
ion.
You will be able to reuse this secret in all of your notebooks.
Please note that authentication is recommended but still optional to access public models
or datasets.
  warnings.warn(


Some weights of the model checkpoint at cardiffnlp/twitter-roberta-base-sentiment-latest w
ere not used when initializing RobertaForSequenceClassification: ['roberta.pooler.dense.bi
as', 'roberta.pooler.dense.weight']
- This IS expected if you are initializing RobertaForSequenceClassification from the check
point of a model trained on another task or with another architecture (e.g. initializing a
BertForSequenceClassification model from a BertForPreTraining model).
- This IS NOT expected if you are initializing RobertaForSequenceClassification from the c
heckpoint of a model that you expect to be exactly identical (initializing a BertForSequen
ceClassification model from a BertForSequenceClassification model).




Device set to use cuda:0
/usr/local/lib/python3.12/dist-packages/transformers/pipelines/text_classification.py:111:
UserWarning: `return_all_scores` is now deprecated,  if want a similar functionality use `
top_k=None` instead of `return_all_scores=True` or `top_k=1` instead of `return_all_scores
=False`.
  warnings.warn(

[Chunk 0] Sentiment:   0%|          | 0/157 [00:00<?, ?it/s]
[Chunk 0] Sentiment:   1%|          | 1/157 [00:03<07:48,  3.01s/it]
[Chunk 0] Sentiment:   1%|▏         | 2/157 [00:04<06:01,  2.33s/it]
[Chunk 0] Sentiment:   2%|▏         | 3/157 [00:06<04:50,  1.88s/it]
[Chunk 0] Sentiment:   3%|▎         | 4/157 [00:07<03:57,  1.55s/it]
[Chunk 0] Sentiment:   3%|▎         | 5/157 [00:07<03:00,  1.19s/it]
[Chunk 0] Sentiment:   4%|▍         | 6/157 [00:08<02:12,  1.14it/s]
[Chunk 0] Sentiment:   4%|▍         | 7/157 [00:08<01:41,  1.48it/s]
[Chunk 0] Sentiment:   5%|▌         | 8/157 [00:08<01:21,  1.84it/s]
[Chunk 0] Sentiment:   6%|▌         | 9/157 [00:08<01:07,  2.18it/s]
[Chunk 0] Sentiment:   6%|▋         | 10/157 [00:09<00:59,  2.49it/s]You seem to be using
the pipelines sequentially on GPU. In order to maximize efficiency please use a dataset

[Chunk 0] Sentiment:   7%|▋         | 11/157 [00:09<00:53,  2.74it/s]
[Chunk 0] Sentiment:   8%|▊         | 12/157 [00:09<00:51,  2.81it/s]
[Chunk 0] Sentiment:   8%|▊         | 13/157 [00:10<00:53,  2.70it/s]
[Chunk 0] Sentiment:   9%|▉         | 14/157 [00:10<00:54,  2.64it/s]
[Chunk 0] Sentiment:  10%|▉         | 15/157 [00:10<00:50,  2.80it/s]
[Chunk 0] Sentiment:  10%|█         | 16/157 [00:11<00:46,  3.03it/s]
[Chunk 0] Sentiment:  11%|█         | 17/157 [00:11<00:46,  3.01it/s]
[Chunk 0] Sentiment:  11%|█▏        | 18/157 [00:11<00:45,  3.08it/s]
[Chunk 0] Sentiment:  12%|█▏        | 19/157 [00:12<00:46,  2.95it/s]
[Chunk 0] Sentiment:  13%|█▎        | 20/157 [00:12<00:46,  2.95it/s]
[Chunk 0] Sentiment:  13%|█▎        | 21/157 [00:12<00:48,  2.82it/s]
[Chunk 0] Sentiment:  14%|█▍        | 22/157 [00:13<00:55,  2.44it/s]
[Chunk 0] Sentiment:  15%|█▍        | 23/157 [00:13<00:56,  2.36it/s]
[Chunk 0] Sentiment:  15%|█▌        | 24/157 [00:14<00:52,  2.52it/s]
[Chunk 0] Sentiment:  16%|█▌        | 25/157 [00:14<00:47,  2.75it/s]
[Chunk 0] Sentiment:  17%|█▋        | 26/157 [00:14<00:51,  2.55it/s]
[Chunk 0] Sentiment:  17%|█▋        | 27/157 [00:15<00:48,  2.66it/s]
```

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[Chunk 0] Sentiment:  18%|█▊        | 28/157 [00:15<00:46,  2.75it/s]
[Chunk 0] Sentiment:  18%|█▊        | 29/157 [00:15<00:45,  2.80it/s]
[Chunk 0] Sentiment:  19%|█▉        | 30/157 [00:16<00:42,  2.98it/s]
[Chunk 0] Sentiment:  20%|█▉        | 31/157 [00:16<00:40,  3.10it/s]
[Chunk 0] Sentiment:  20%|██        | 32/157 [00:16<00:38,  3.28it/s]
[Chunk 0] Sentiment:  21%|██        | 33/157 [00:17<00:36,  3.39it/s]
[Chunk 0] Sentiment:  22%|██▏       | 34/157 [00:17<00:38,  3.15it/s]
[Chunk 0] Sentiment:  22%|██▏       | 35/157 [00:17<00:40,  3.04it/s]
[Chunk 0] Sentiment:  23%|██▎       | 36/157 [00:18<00:40,  3.00it/s]
[Chunk 0] Sentiment:  24%|██▎       | 37/157 [00:18<00:40,  2.99it/s]
[Chunk 0] Sentiment:  24%|██▍       | 38/157 [00:18<00:41,  2.90it/s]
[Chunk 0] Sentiment:  25%|██▍       | 39/157 [00:19<00:40,  2.91it/s]
[Chunk 0] Sentiment:  25%|██▌       | 40/157 [00:19<00:40,  2.90it/s]
[Chunk 0] Sentiment:  26%|██▌       | 41/157 [00:19<00:42,  2.74it/s]
[Chunk 0] Sentiment:  27%|██▋       | 42/157 [00:20<00:44,  2.59it/s]
[Chunk 0] Sentiment:  27%|██▋       | 43/157 [00:20<00:43,  2.63it/s]
[Chunk 0] Sentiment:  28%|██▊       | 44/157 [00:21<00:39,  2.85it/s]
[Chunk 0] Sentiment:  29%|██▊       | 45/157 [00:21<00:35,  3.12it/s]
[Chunk 0] Sentiment:  29%|██▉       | 46/157 [00:21<00:33,  3.34it/s]
[Chunk 0] Sentiment:  30%|██▉       | 47/157 [00:21<00:32,  3.38it/s]
[Chunk 0] Sentiment:  31%|███       | 48/157 [00:22<00:31,  3.50it/s]
[Chunk 0] Sentiment:  31%|███       | 49/157 [00:22<00:29,  3.63it/s]
[Chunk 0] Sentiment:  32%|███▏      | 50/157 [00:22<00:28,  3.72it/s]
[Chunk 0] Sentiment:  32%|███▏      | 51/157 [00:22<00:28,  3.68it/s]
[Chunk 0] Sentiment:  33%|███▎      | 52/157 [00:23<00:28,  3.66it/s]
[Chunk 0] Sentiment:  34%|███▍      | 53/157 [00:23<00:27,  3.74it/s]
[Chunk 0] Sentiment:  34%|███▍      | 54/157 [00:23<00:27,  3.77it/s]
[Chunk 0] Sentiment:  35%|███▌      | 55/157 [00:23<00:27,  3.68it/s]
[Chunk 0] Sentiment:  36%|███▌      | 56/157 [00:24<00:26,  3.75it/s]
[Chunk 0] Sentiment:  36%|███▋      | 57/157 [00:24<00:26,  3.82it/s]
[Chunk 0] Sentiment:  37%|███▋      | 58/157 [00:24<00:25,  3.83it/s]
[Chunk 0] Sentiment:  38%|███▊      | 59/157 [00:25<00:26,  3.70it/s]
[Chunk 0] Sentiment:  38%|███▊      | 60/157 [00:25<00:25,  3.77it/s]
[Chunk 0] Sentiment:  39%|███▉      | 61/157 [00:25<00:25,  3.80it/s]
[Chunk 0] Sentiment:  39%|███▉      | 62/157 [00:25<00:24,  3.81it/s]
[Chunk 0] Sentiment:  40%|████      | 63/157 [00:26<00:25,  3.70it/s]
[Chunk 0] Sentiment:  41%|████      | 64/157 [00:26<00:24,  3.77it/s]
[Chunk 0] Sentiment:  41%|████▏     | 65/157 [00:26<00:24,  3.79it/s]
[Chunk 0] Sentiment:  42%|████▏     | 66/157 [00:26<00:23,  3.81it/s]
[Chunk 0] Sentiment:  43%|████▎     | 67/157 [00:27<00:24,  3.73it/s]
[Chunk 0] Sentiment:  43%|████▎     | 68/157 [00:27<00:23,  3.75it/s]
[Chunk 0] Sentiment:  44%|████▍     | 69/157 [00:27<00:23,  3.76it/s]
[Chunk 0] Sentiment:  45%|████▍     | 70/157 [00:27<00:23,  3.71it/s]
[Chunk 0] Sentiment:  45%|████▌     | 71/157 [00:28<00:22,  3.74it/s]
[Chunk 0] Sentiment:  46%|████▌     | 72/157 [00:28<00:22,  3.79it/s]
[Chunk 0] Sentiment:  46%|████▋     | 73/157 [00:28<00:22,  3.78it/s]
[Chunk 0] Sentiment:  47%|████▋     | 74/157 [00:28<00:22,  3.71it/s]
[Chunk 0] Sentiment:  48%|████▊     | 75/157 [00:29<00:21,  3.74it/s]
[Chunk 0] Sentiment:  48%|████▊     | 76/157 [00:29<00:21,  3.78it/s]
[Chunk 0] Sentiment:  49%|████▉     | 77/157 [00:29<00:21,  3.79it/s]
[Chunk 0] Sentiment:  50%|████▉     | 78/157 [00:30<00:21,  3.70it/s]
[Chunk 0] Sentiment:  50%|█████     | 79/157 [00:30<00:20,  3.77it/s]
[Chunk 0] Sentiment:  51%|█████     | 80/157 [00:30<00:21,  3.53it/s]
[Chunk 0] Sentiment:  52%|█████▏    | 81/157 [00:31<00:23,  3.19it/s]
[Chunk 0] Sentiment:  52%|█████▏    | 82/157 [00:31<00:24,  3.04it/s]
[Chunk 0] Sentiment:  53%|█████▎    | 83/157 [00:31<00:24,  2.97it/s]
[Chunk 0] Sentiment:  54%|█████▎    | 84/157 [00:32<00:25,  2.90it/s]
[Chunk 0] Sentiment:  54%|█████▍    | 85/157 [00:32<00:25,  2.81it/s]
[Chunk 0] Sentiment:  55%|█████▍    | 86/157 [00:32<00:25,  2.79it/s]
[Chunk 0] Sentiment:  55%|█████▌    | 87/157 [00:33<00:26,  2.63it/s]
[Chunk 0] Sentiment:  56%|█████▌    | 88/157 [00:33<00:27,  2.51it/s]
[Chunk 0] Sentiment:  57%|█████▋    | 89/157 [00:34<00:25,  2.65it/s]
[Chunk 0] Sentiment:  57%|█████▋    | 90/157 [00:34<00:23,  2.87it/s]
[Chunk 0] Sentiment:  58%|█████▊    | 91/157 [00:34<00:21,  3.10it/s]
[Chunk 0] Sentiment:  59%|█████▊    | 92/157 [00:34<00:20,  3.21it/s]
[Chunk 0] Sentiment:  59%|█████▉    | 93/157 [00:35<00:19,  3.33it/s]
```

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[Chunk 0] Sentiment:  60%|█████▉    | 94/157 [00:35<00:18,  3.40it/s]
[Chunk 0] Sentiment:  61%|██████    | 95/157 [00:35<00:17,  3.50it/s]
[Chunk 0] Sentiment:  61%|██████    | 96/157 [00:35<00:17,  3.54it/s]
[Chunk 0] Sentiment:  62%|██████▏   | 97/157 [00:36<00:16,  3.60it/s]
[Chunk 0] Sentiment:  62%|██████▏   | 98/157 [00:36<00:16,  3.58it/s]
[Chunk 0] Sentiment:  63%|██████▎   | 99/157 [00:36<00:16,  3.57it/s]
[Chunk 0] Sentiment:  64%|██████▎   | 100/157 [00:37<00:15,  3.59it/s]
[Chunk 0] Sentiment:  64%|██████▍   | 101/157 [00:37<00:15,  3.64it/s]
[Chunk 0] Sentiment:  65%|██████▍   | 102/157 [00:37<00:15,  3.58it/s]
[Chunk 0] Sentiment:  66%|██████▌   | 103/157 [00:37<00:14,  3.64it/s]
[Chunk 0] Sentiment:  66%|██████▌   | 104/157 [00:38<00:14,  3.67it/s]
[Chunk 0] Sentiment:  67%|██████▋   | 105/157 [00:38<00:14,  3.70it/s]
[Chunk 0] Sentiment:  68%|██████▊   | 106/157 [00:38<00:13,  3.65it/s]
[Chunk 0] Sentiment:  68%|██████▊   | 107/157 [00:38<00:13,  3.69it/s]
[Chunk 0] Sentiment:  69%|██████▉   | 108/157 [00:39<00:13,  3.71it/s]
[Chunk 0] Sentiment:  69%|██████▉   | 109/157 [00:39<00:13,  3.68it/s]
[Chunk 0] Sentiment:  70%|███████   | 110/157 [00:39<00:12,  3.68it/s]
[Chunk 0] Sentiment:  71%|███████   | 111/157 [00:40<00:12,  3.71it/s]
[Chunk 0] Sentiment:  71%|███████▏  | 112/157 [00:40<00:12,  3.73it/s]
[Chunk 0] Sentiment:  72%|███████▏  | 113/157 [00:40<00:11,  3.68it/s]
[Chunk 0] Sentiment:  73%|███████▎  | 114/157 [00:40<00:11,  3.66it/s]
[Chunk 0] Sentiment:  73%|███████▎  | 115/157 [00:41<00:11,  3.62it/s]
[Chunk 0] Sentiment:  74%|███████▍  | 116/157 [00:41<00:11,  3.68it/s]
[Chunk 0] Sentiment:  75%|███████▍  | 117/157 [00:41<00:10,  3.65it/s]
[Chunk 0] Sentiment:  75%|███████▌  | 118/157 [00:41<00:10,  3.69it/s]
[Chunk 0] Sentiment:  76%|███████▌  | 119/157 [00:42<00:10,  3.64it/s]
[Chunk 0] Sentiment:  76%|███████▋  | 120/157 [00:42<00:10,  3.63it/s]
[Chunk 0] Sentiment:  77%|███████▋  | 121/157 [00:42<00:10,  3.57it/s]
[Chunk 0] Sentiment:  78%|███████▊  | 122/157 [00:43<00:09,  3.63it/s]
[Chunk 0] Sentiment:  78%|███████▊  | 123/157 [00:43<00:09,  3.70it/s]
[Chunk 0] Sentiment:  79%|███████▉  | 124/157 [00:43<00:08,  3.73it/s]
[Chunk 0] Sentiment:  80%|███████▉  | 125/157 [00:43<00:08,  3.57it/s]
[Chunk 0] Sentiment:  80%|████████  | 126/157 [00:44<00:09,  3.22it/s]
[Chunk 0] Sentiment:  81%|████████  | 127/157 [00:44<00:09,  3.09it/s]
[Chunk 0] Sentiment:  82%|████████▏ | 128/157 [00:45<00:09,  2.95it/s]
[Chunk 0] Sentiment:  82%|████████▏ | 129/157 [00:45<00:09,  2.92it/s]
[Chunk 0] Sentiment:  83%|████████▎ | 130/157 [00:45<00:09,  2.88it/s]
[Chunk 0] Sentiment:  83%|████████▎ | 131/157 [00:46<00:09,  2.83it/s]
[Chunk 0] Sentiment:  84%|████████▍ | 132/157 [00:46<00:09,  2.68it/s]
[Chunk 0] Sentiment:  85%|████████▍ | 133/157 [00:46<00:09,  2.59it/s]
[Chunk 0] Sentiment:  85%|████████▌ | 134/157 [00:47<00:08,  2.63it/s]
[Chunk 0] Sentiment:  86%|████████▌ | 135/157 [00:47<00:07,  2.83it/s]
[Chunk 0] Sentiment:  87%|████████▋ | 136/157 [00:47<00:06,  3.06it/s]
[Chunk 0] Sentiment:  87%|████████▋ | 137/157 [00:48<00:06,  3.18it/s]
[Chunk 0] Sentiment:  88%|████████▊ | 138/157 [00:48<00:05,  3.35it/s]
[Chunk 0] Sentiment:  89%|████████▊ | 139/157 [00:48<00:05,  3.45it/s]
[Chunk 0] Sentiment:  89%|████████▉ | 140/157 [00:48<00:04,  3.51it/s]
[Chunk 0] Sentiment:  90%|████████▉ | 141/157 [00:49<00:04,  3.50it/s]
[Chunk 0] Sentiment:  90%|█████████ | 142/157 [00:49<00:04,  3.55it/s]
[Chunk 0] Sentiment:  91%|█████████ | 143/157 [00:49<00:03,  3.60it/s]
[Chunk 0] Sentiment:  92%|█████████▏| 144/157 [00:50<00:03,  3.57it/s]
[Chunk 0] Sentiment:  92%|█████████▏| 145/157 [00:50<00:03,  3.66it/s]
[Chunk 0] Sentiment:  93%|█████████▎| 146/157 [00:50<00:02,  3.70it/s]
[Chunk 0] Sentiment:  94%|█████████▎| 147/157 [00:50<00:02,  3.61it/s]
[Chunk 0] Sentiment:  94%|█████████▍| 148/157 [00:51<00:02,  3.61it/s]
[Chunk 0] Sentiment:  95%|█████████▍| 149/157 [00:51<00:02,  3.72it/s]
[Chunk 0] Sentiment:  96%|█████████▌| 150/157 [00:51<00:01,  3.78it/s]
[Chunk 0] Sentiment:  96%|█████████▌| 151/157 [00:51<00:01,  3.81it/s]
[Chunk 0] Sentiment:  97%|█████████▋| 152/157 [00:52<00:01,  3.76it/s]
[Chunk 0] Sentiment:  97%|█████████▋| 153/157 [00:52<00:01,  3.81it/s]
[Chunk 0] Sentiment:  98%|█████████▊| 154/157 [00:52<00:00,  3.81it/s]
[Chunk 0] Sentiment:  99%|█████████▊| 155/157 [00:52<00:00,  3.84it/s]
[Chunk 0] Sentiment: 100%|██████████| 157/157 [00:53<00:00,  2.94it/s]
```

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Device set to use cuda:0

[Chunk 0] Emotion:   0%|          | 0/209 [00:00<?, ?it/s]
[Chunk 0] Emotion:   0%|          | 1/209 [00:00<02:38,  1.32it/s]
[Chunk 0] Emotion:   1%|          | 2/209 [00:01<02:45,  1.25it/s]
[Chunk 0] Emotion:   1%|▏         | 3/209 [00:02<02:58,  1.15it/s]
[Chunk 0] Emotion:   2%|▏         | 4/209 [00:03<03:02,  1.12it/s]
[Chunk 0] Emotion:   2%|▏         | 5/209 [00:03<02:07,  1.60it/s]
[Chunk 0] Emotion:   3%|▎         | 6/209 [00:03<01:32,  2.19it/s]
[Chunk 0] Emotion:   3%|▎         | 7/209 [00:03<01:10,  2.87it/s]
[Chunk 0] Emotion:   4%|▍         | 8/209 [00:04<00:56,  3.54it/s]
[Chunk 0] Emotion:   4%|▍         | 9/209 [00:04<00:48,  4.13it/s]
[Chunk 0] Emotion:   5%|▍         | 10/209 [00:04<00:41,  4.83it/s]
[Chunk 0] Emotion:   5%|▌         | 11/209 [00:04<00:37,  5.22it/s]
[Chunk 0] Emotion:   6%|▌         | 12/209 [00:04<00:36,  5.39it/s]
[Chunk 0] Emotion:   6%|▌         | 13/209 [00:04<00:35,  5.47it/s]
[Chunk 0] Emotion:   7%|▋         | 14/209 [00:04<00:35,  5.57it/s]
[Chunk 0] Emotion:   7%|▋         | 15/209 [00:05<00:34,  5.55it/s]
[Chunk 0] Emotion:   8%|▊         | 16/209 [00:05<00:34,  5.67it/s]
[Chunk 0] Emotion:   8%|▊         | 17/209 [00:05<00:32,  5.83it/s]
[Chunk 0] Emotion:   9%|▊         | 18/209 [00:05<00:42,  4.54it/s]
[Chunk 0] Emotion:   9%|▉         | 19/209 [00:06<00:52,  3.62it/s]
[Chunk 0] Emotion:  10%|▉         | 20/209 [00:06<01:01,  3.08it/s]
[Chunk 0] Emotion:  10%|█         | 21/209 [00:06<00:57,  3.29it/s]
[Chunk 0] Emotion:  11%|█         | 22/209 [00:07<00:48,  3.85it/s]
[Chunk 0] Emotion:  11%|█         | 23/209 [00:07<00:43,  4.24it/s]
[Chunk 0] Emotion:  11%|█▏        | 24/209 [00:07<00:41,  4.49it/s]
[Chunk 0] Emotion:  12%|█▏        | 25/209 [00:07<00:38,  4.77it/s]
[Chunk 0] Emotion:  12%|█▏        | 26/209 [00:07<00:36,  5.01it/s]
[Chunk 0] Emotion:  13%|█▎        | 27/209 [00:07<00:36,  5.03it/s]
[Chunk 0] Emotion:  13%|█▎        | 28/209 [00:08<00:35,  5.10it/s]
[Chunk 0] Emotion:  14%|█▍        | 29/209 [00:08<00:33,  5.40it/s]
[Chunk 0] Emotion:  14%|█▍        | 30/209 [00:08<00:29,  6.05it/s]
[Chunk 0] Emotion:  15%|█▍        | 31/209 [00:08<00:31,  5.65it/s]
[Chunk 0] Emotion:  15%|█▌        | 32/209 [00:08<00:32,  5.37it/s]
[Chunk 0] Emotion:  16%|█▌        | 33/209 [00:09<00:29,  5.97it/s]
[Chunk 0] Emotion:  16%|█▋        | 34/209 [00:09<00:27,  6.46it/s]
[Chunk 0] Emotion:  17%|█▋        | 35/209 [00:09<00:25,  6.96it/s]
[Chunk 0] Emotion:  17%|█▋        | 36/209 [00:09<00:24,  7.09it/s]
[Chunk 0] Emotion:  18%|█▊        | 37/209 [00:09<00:25,  6.88it/s]
[Chunk 0] Emotion:  18%|█▊        | 38/209 [00:09<00:30,  5.64it/s]
[Chunk 0] Emotion:  19%|█▊        | 39/209 [00:09<00:28,  5.97it/s]
[Chunk 0] Emotion:  19%|█▉        | 40/209 [00:10<00:29,  5.82it/s]
[Chunk 0] Emotion:  20%|█▉        | 41/209 [00:10<00:33,  5.01it/s]
[Chunk 0] Emotion:  20%|██        | 42/209 [00:10<00:29,  5.61it/s]
[Chunk 0] Emotion:  21%|██        | 43/209 [00:10<00:26,  6.26it/s]
[Chunk 0] Emotion:  21%|██        | 44/209 [00:10<00:26,  6.20it/s]
[Chunk 0] Emotion:  22%|██▏       | 45/209 [00:10<00:25,  6.37it/s]
[Chunk 0] Emotion:  22%|██▏       | 46/209 [00:11<00:23,  6.86it/s]
[Chunk 0] Emotion:  22%|██▏       | 47/209 [00:11<00:23,  7.02it/s]
[Chunk 0] Emotion:  23%|██▎       | 48/209 [00:11<00:23,  6.83it/s]
[Chunk 0] Emotion:  23%|██▎       | 49/209 [00:11<00:25,  6.19it/s]
[Chunk 0] Emotion:  24%|██▍       | 50/209 [00:11<00:29,  5.34it/s]
[Chunk 0] Emotion:  24%|██▍       | 51/209 [00:11<00:29,  5.40it/s]
[Chunk 0] Emotion:  25%|██▍       | 52/209 [00:12<00:29,  5.31it/s]
[Chunk 0] Emotion:  25%|██▌       | 53/209 [00:12<00:27,  5.58it/s]
[Chunk 0] Emotion:  26%|██▌       | 54/209 [00:12<00:26,  5.96it/s]
[Chunk 0] Emotion:  26%|██▋       | 55/209 [00:12<00:23,  6.51it/s]
[Chunk 0] Emotion:  27%|██▋       | 56/209 [00:12<00:21,  7.00it/s]
[Chunk 0] Emotion:  27%|██▋       | 57/209 [00:12<00:20,  7.30it/s]
[Chunk 0] Emotion:  28%|██▊       | 58/209 [00:12<00:19,  7.63it/s]
[Chunk 0] Emotion:  28%|██▊       | 59/209 [00:13<00:19,  7.59it/s]
```

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[Chunk 0] Emotion:  29%|██▊       | 60/209 [00:13<00:21,  6.81it/s]
[Chunk 0] Emotion:  29%|██▉       | 61/209 [00:13<00:20,  7.06it/s]
[Chunk 0] Emotion:  30%|██▉       | 62/209 [00:13<00:20,  7.04it/s]
[Chunk 0] Emotion:  30%|███       | 63/209 [00:13<00:24,  5.85it/s]
[Chunk 0] Emotion:  31%|███       | 64/209 [00:13<00:24,  5.84it/s]
[Chunk 0] Emotion:  31%|███       | 65/209 [00:14<00:22,  6.27it/s]
[Chunk 0] Emotion:  32%|███▏      | 66/209 [00:14<00:21,  6.76it/s]
[Chunk 0] Emotion:  32%|███▏      | 67/209 [00:14<00:19,  7.24it/s]
[Chunk 0] Emotion:  33%|███▎      | 68/209 [00:14<00:18,  7.51it/s]
[Chunk 0] Emotion:  33%|███▎      | 69/209 [00:14<00:18,  7.55it/s]
[Chunk 0] Emotion:  33%|███▎      | 70/209 [00:14<00:17,  7.85it/s]
[Chunk 0] Emotion:  34%|███▍      | 71/209 [00:14<00:17,  7.96it/s]
[Chunk 0] Emotion:  34%|███▍      | 72/209 [00:14<00:16,  8.12it/s]
[Chunk 0] Emotion:  35%|███▍      | 73/209 [00:15<00:16,  8.20it/s]
[Chunk 0] Emotion:  35%|███▌      | 74/209 [00:15<00:16,  8.17it/s]
[Chunk 0] Emotion:  36%|███▌      | 75/209 [00:15<00:16,  8.22it/s]
[Chunk 0] Emotion:  36%|███▋      | 76/209 [00:15<00:16,  8.25it/s]
[Chunk 0] Emotion:  37%|███▋      | 77/209 [00:15<00:15,  8.27it/s]
[Chunk 0] Emotion:  37%|███▋      | 78/209 [00:15<00:16,  7.98it/s]
[Chunk 0] Emotion:  38%|███▊      | 79/209 [00:15<00:16,  8.03it/s]
[Chunk 0] Emotion:  38%|███▊      | 80/209 [00:15<00:16,  7.69it/s]
[Chunk 0] Emotion:  39%|███▉      | 81/209 [00:16<00:17,  7.43it/s]
[Chunk 0] Emotion:  39%|███▉      | 82/209 [00:16<00:16,  7.67it/s]
[Chunk 0] Emotion:  40%|███▉      | 83/209 [00:16<00:15,  7.88it/s]
[Chunk 0] Emotion:  40%|████      | 84/209 [00:16<00:15,  8.02it/s]
[Chunk 0] Emotion:  41%|████      | 85/209 [00:16<00:15,  8.18it/s]
[Chunk 0] Emotion:  41%|████      | 86/209 [00:16<00:15,  7.89it/s]
[Chunk 0] Emotion:  42%|████▏     | 87/209 [00:16<00:15,  7.86it/s]
[Chunk 0] Emotion:  42%|████▏     | 88/209 [00:16<00:15,  7.86it/s]
[Chunk 0] Emotion:  43%|████▎     | 89/209 [00:17<00:15,  7.88it/s]
[Chunk 0] Emotion:  43%|████▎     | 90/209 [00:17<00:14,  7.95it/s]
[Chunk 0] Emotion:  44%|████▎     | 91/209 [00:17<00:14,  8.05it/s]
[Chunk 0] Emotion:  44%|████▍     | 92/209 [00:17<00:14,  8.04it/s]
[Chunk 0] Emotion:  44%|████▍     | 93/209 [00:17<00:14,  8.07it/s]
[Chunk 0] Emotion:  45%|████▍     | 94/209 [00:17<00:14,  7.81it/s]
[Chunk 0] Emotion:  45%|████▌     | 95/209 [00:17<00:14,  7.91it/s]
[Chunk 0] Emotion:  46%|████▌     | 96/209 [00:17<00:14,  8.01it/s]
[Chunk 0] Emotion:  46%|████▋     | 97/209 [00:18<00:13,  8.01it/s]
[Chunk 0] Emotion:  47%|████▋     | 98/209 [00:18<00:13,  7.97it/s]
[Chunk 0] Emotion:  47%|████▋     | 99/209 [00:18<00:14,  7.45it/s]
[Chunk 0] Emotion:  48%|████▊     | 100/209 [00:18<00:15,  6.83it/s]
[Chunk 0] Emotion:  48%|████▊     | 101/209 [00:18<00:16,  6.53it/s]
[Chunk 0] Emotion:  49%|████▉     | 102/209 [00:18<00:16,  6.32it/s]
[Chunk 0] Emotion:  49%|████▉     | 103/209 [00:19<00:16,  6.35it/s]
[Chunk 0] Emotion:  50%|████▉     | 104/209 [00:19<00:16,  6.35it/s]
[Chunk 0] Emotion:  50%|█████     | 105/209 [00:19<00:16,  6.36it/s]
[Chunk 0] Emotion:  51%|█████     | 106/209 [00:19<00:15,  6.44it/s]
[Chunk 0] Emotion:  51%|█████     | 107/209 [00:19<00:15,  6.52it/s]
[Chunk 0] Emotion:  52%|█████▏    | 108/209 [00:19<00:16,  6.26it/s]
[Chunk 0] Emotion:  52%|█████▏    | 109/209 [00:19<00:16,  6.12it/s]
[Chunk 0] Emotion:  53%|█████▎    | 110/209 [00:20<00:15,  6.20it/s]
[Chunk 0] Emotion:  53%|█████▎    | 111/209 [00:20<00:15,  6.18it/s]
[Chunk 0] Emotion:  54%|█████▎    | 112/209 [00:20<00:15,  6.30it/s]
[Chunk 0] Emotion:  54%|█████▍    | 113/209 [00:20<00:14,  6.41it/s]
[Chunk 0] Emotion:  55%|█████▍    | 114/209 [00:20<00:15,  6.05it/s]
[Chunk 0] Emotion:  55%|█████▌    | 115/209 [00:20<00:16,  5.61it/s]
[Chunk 0] Emotion:  56%|█████▌    | 116/209 [00:21<00:16,  5.63it/s]
[Chunk 0] Emotion:  56%|█████▌    | 117/209 [00:21<00:16,  5.52it/s]
[Chunk 0] Emotion:  56%|█████▋    | 118/209 [00:21<00:16,  5.46it/s]
[Chunk 0] Emotion:  57%|█████▋    | 119/209 [00:21<00:16,  5.59it/s]
[Chunk 0] Emotion:  57%|█████▋    | 120/209 [00:21<00:14,  6.19it/s]
[Chunk 0] Emotion:  58%|█████▊    | 121/209 [00:21<00:13,  6.58it/s]
[Chunk 0] Emotion:  58%|█████▊    | 122/209 [00:22<00:12,  7.05it/s]
[Chunk 0] Emotion:  59%|█████▉    | 123/209 [00:22<00:11,  7.39it/s]
[Chunk 0] Emotion:  59%|█████▉    | 124/209 [00:22<00:11,  7.65it/s]
[Chunk 0] Emotion:  60%|█████▉    | 125/209 [00:22<00:10,  7.86it/s]
```

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[Chunk 0] Emotion:  60%|██████    | 126/209 [00:22<00:10,  8.12it/s]
[Chunk 0] Emotion:  61%|██████    | 127/209 [00:22<00:09,  8.26it/s]
[Chunk 0] Emotion:  61%|██████    | 128/209 [00:22<00:09,  8.24it/s]
[Chunk 0] Emotion:  62%|██████▏   | 129/209 [00:22<00:09,  8.01it/s]
[Chunk 0] Emotion:  62%|██████▏   | 130/209 [00:23<00:09,  8.10it/s]
[Chunk 0] Emotion:  63%|██████▎   | 131/209 [00:23<00:09,  8.16it/s]
[Chunk 0] Emotion:  63%|██████▎   | 132/209 [00:23<00:09,  8.25it/s]
[Chunk 0] Emotion:  64%|██████▎   | 133/209 [00:23<00:09,  8.23it/s]
[Chunk 0] Emotion:  64%|██████▍   | 134/209 [00:23<00:09,  8.26it/s]
[Chunk 0] Emotion:  65%|██████▍   | 135/209 [00:23<00:09,  8.13it/s]
[Chunk 0] Emotion:  65%|██████▌   | 136/209 [00:23<00:09,  8.06it/s]
[Chunk 0] Emotion:  66%|██████▌   | 137/209 [00:23<00:08,  8.22it/s]
[Chunk 0] Emotion:  66%|██████▌   | 138/209 [00:24<00:08,  7.92it/s]
[Chunk 0] Emotion:  67%|██████▋   | 139/209 [00:24<00:08,  8.05it/s]
[Chunk 0] Emotion:  67%|██████▋   | 140/209 [00:24<00:08,  8.19it/s]
[Chunk 0] Emotion:  67%|██████▋   | 141/209 [00:24<00:08,  8.25it/s]
[Chunk 0] Emotion:  68%|██████▊   | 142/209 [00:24<00:08,  8.29it/s]
[Chunk 0] Emotion:  68%|██████▊   | 143/209 [00:24<00:07,  8.45it/s]
[Chunk 0] Emotion:  69%|██████▉   | 144/209 [00:24<00:07,  8.40it/s]
[Chunk 0] Emotion:  69%|██████▉   | 145/209 [00:24<00:07,  8.33it/s]
[Chunk 0] Emotion:  70%|██████▉   | 146/209 [00:24<00:07,  8.04it/s]
[Chunk 0] Emotion:  70%|███████   | 147/209 [00:25<00:07,  8.07it/s]
[Chunk 0] Emotion:  71%|███████   | 148/209 [00:25<00:07,  8.17it/s]
[Chunk 0] Emotion:  71%|███████▏  | 149/209 [00:25<00:07,  8.21it/s]
[Chunk 0] Emotion:  72%|███████▏  | 150/209 [00:25<00:07,  8.26it/s]
[Chunk 0] Emotion:  72%|███████▏  | 151/209 [00:25<00:06,  8.30it/s]
[Chunk 0] Emotion:  73%|███████▎  | 152/209 [00:25<00:06,  8.32it/s]
[Chunk 0] Emotion:  73%|███████▎  | 153/209 [00:25<00:06,  8.18it/s]
[Chunk 0] Emotion:  74%|███████▎  | 154/209 [00:25<00:06,  7.93it/s]
[Chunk 0] Emotion:  74%|███████▍  | 155/209 [00:26<00:07,  7.48it/s]
[Chunk 0] Emotion:  75%|███████▍  | 156/209 [00:26<00:07,  7.52it/s]
[Chunk 0] Emotion:  75%|███████▌  | 157/209 [00:26<00:11,  4.37it/s]
[Chunk 0] Emotion:  76%|███████▌  | 158/209 [00:27<00:15,  3.30it/s]
[Chunk 0] Emotion:  76%|███████▌  | 159/209 [00:27<00:18,  2.77it/s]
[Chunk 0] Emotion:  77%|███████▋  | 160/209 [00:28<00:19,  2.58it/s]
[Chunk 0] Emotion:  77%|███████▋  | 161/209 [00:28<00:19,  2.50it/s]
[Chunk 0] Emotion:  78%|███████▊  | 162/209 [00:28<00:17,  2.67it/s]
[Chunk 0] Emotion:  78%|███████▊  | 163/209 [00:29<00:18,  2.43it/s]
[Chunk 0] Emotion:  78%|███████▊  | 164/209 [00:29<00:18,  2.40it/s]
[Chunk 0] Emotion:  79%|███████▉  | 165/209 [00:30<00:20,  2.16it/s]
[Chunk 0] Emotion:  79%|███████▉  | 166/209 [00:30<00:20,  2.13it/s]
[Chunk 0] Emotion:  80%|███████▉  | 167/209 [00:31<00:18,  2.22it/s]
[Chunk 0] Emotion:  80%|████████  | 168/209 [00:31<00:17,  2.37it/s]
[Chunk 0] Emotion:  81%|████████  | 169/209 [00:32<00:23,  1.72it/s]
[Chunk 0] Emotion:  81%|████████▏ | 170/209 [00:33<00:25,  1.53it/s]
[Chunk 0] Emotion:  82%|████████▏ | 171/209 [00:34<00:26,  1.44it/s]
[Chunk 0] Emotion:  82%|████████▏ | 172/209 [00:34<00:19,  1.87it/s]
[Chunk 0] Emotion:  83%|████████▎ | 173/209 [00:34<00:15,  2.33it/s]
[Chunk 0] Emotion:  83%|████████▎ | 174/209 [00:35<00:18,  1.91it/s]
[Chunk 0] Emotion:  84%|████████▎ | 175/209 [00:36<00:20,  1.70it/s]
[Chunk 0] Emotion:  84%|████████▍ | 176/209 [00:36<00:18,  1.75it/s]
[Chunk 0] Emotion:  85%|████████▍ | 177/209 [00:37<00:17,  1.80it/s]
[Chunk 0] Emotion:  85%|████████▌ | 178/209 [00:37<00:16,  1.90it/s]
[Chunk 0] Emotion:  86%|████████▌ | 179/209 [00:37<00:14,  2.10it/s]
[Chunk 0] Emotion:  86%|████████▌ | 180/209 [00:38<00:13,  2.13it/s]
[Chunk 0] Emotion:  87%|████████▋ | 181/209 [00:38<00:11,  2.38it/s]
[Chunk 0] Emotion:  87%|████████▋ | 182/209 [00:38<00:09,  2.94it/s]
[Chunk 0] Emotion:  88%|████████▊ | 183/209 [00:38<00:07,  3.60it/s]
[Chunk 0] Emotion:  88%|████████▊ | 184/209 [00:39<00:05,  4.28it/s]
[Chunk 0] Emotion:  89%|████████▊ | 185/209 [00:39<00:04,  4.99it/s]
[Chunk 0] Emotion:  89%|████████▉ | 186/209 [00:39<00:04,  5.67it/s]
[Chunk 0] Emotion:  89%|████████▉ | 187/209 [00:39<00:03,  6.25it/s]
[Chunk 0] Emotion:  90%|████████▉ | 188/209 [00:39<00:03,  6.79it/s]
[Chunk 0] Emotion:  90%|█████████ | 189/209 [00:39<00:02,  7.22it/s]
[Chunk 0] Emotion:  91%|█████████ | 190/209 [00:39<00:02,  7.40it/s]
[Chunk 0] Emotion:  91%|█████████▏| 191/209 [00:39<00:02,  7.39it/s]
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[Chunk 0] Emotion:  92%|█████████▏ | 192/209 [00:40<00:02,  7.64it/s]
[Chunk 0] Emotion:  92%|█████████▏ | 193/209 [00:40<00:02,  7.75it/s]
[Chunk 0] Emotion:  93%|█████████▎ | 194/209 [00:40<00:01,  7.96it/s]
[Chunk 0] Emotion:  93%|█████████▎ | 195/209 [00:40<00:01,  8.04it/s]
[Chunk 0] Emotion:  94%|█████████▍ | 196/209 [00:40<00:01,  8.18it/s]
[Chunk 0] Emotion:  94%|█████████▍ | 197/209 [00:40<00:01,  8.21it/s]
[Chunk 0] Emotion:  95%|█████████▍ | 198/209 [00:40<00:01,  8.20it/s]
[Chunk 0] Emotion:  95%|█████████▌| 199/209 [00:40<00:01,  7.83it/s]
[Chunk 0] Emotion:  96%|█████████▌| 200/209 [00:41<00:01,  7.86it/s]
[Chunk 0] Emotion:  96%|█████████▌| 201/209 [00:41<00:01,  7.96it/s]
[Chunk 0] Emotion:  97%|█████████▋| 202/209 [00:41<00:00,  8.07it/s]
[Chunk 0] Emotion:  97%|█████████▋| 203/209 [00:41<00:00,  8.10it/s]
[Chunk 0] Emotion:  98%|█████████▊| 204/209 [00:41<00:00,  8.08it/s]
[Chunk 0] Emotion:  98%|█████████▊| 205/209 [00:41<00:00,  8.12it/s]
[Chunk 0] Emotion:  99%|█████████▊| 206/209 [00:41<00:00,  7.99it/s]
[Chunk 0] Emotion:  99%|█████████▉| 207/209 [00:41<00:00,  7.91it/s]
[Chunk 0] Emotion: 100%|██████████| 209/209 [00:42<00:00,  4.97it/s]




Device set to use cuda:0
[Chunk 0] Bias ZS: 100%|██████████| 834/834 [05:59<00:00,  2.32it/s]




Device set to use cuda:0

[Chunk 0] Cred:   0%|          | 0/209 [00:00<?, ?it/s]
[Chunk 0] Cred:   0%|          | 1/209 [00:00<02:43,  1.27it/s]
[Chunk 0] Cred:   1%|          | 2/209 [00:02<03:38,  1.06s/it]
[Chunk 0] Cred:   1%|▏         | 3/209 [00:03<03:48,  1.11s/it]
[Chunk 0] Cred:   2%|▏         | 4/209 [00:04<03:53,  1.14s/it]
[Chunk 0] Cred:   2%|▏         | 5/209 [00:05<03:17,  1.04it/s]
[Chunk 0] Cred:   3%|▎         | 6/209 [00:05<02:26,  1.39it/s]
[Chunk 0] Cred:   3%|▎         | 7/209 [00:05<01:52,  1.79it/s]
[Chunk 0] Cred:   4%|▍         | 8/209 [00:05<01:31,  2.21it/s]
[Chunk 0] Cred:   4%|▍         | 9/209 [00:05<01:17,  2.58it/s]
[Chunk 0] Cred:   5%|▍         | 10/209 [00:06<01:06,  2.99it/s]
[Chunk 0] Cred:   5%|▌         | 11/209 [00:06<00:58,  3.37it/s]
[Chunk 0] Cred:   6%|▌         | 12/209 [00:06<00:53,  3.67it/s]
[Chunk 0] Cred:   6%|▌         | 13/209 [00:06<00:49,  3.97it/s]
[Chunk 0] Cred:   7%|▋         | 14/209 [00:07<00:47,  4.12it/s]
[Chunk 0] Cred:   7%|▋         | 15/209 [00:07<00:45,  4.26it/s]
[Chunk 0] Cred:   8%|▊         | 16/209 [00:07<00:44,  4.29it/s]
[Chunk 0] Cred:   8%|▊         | 17/209 [00:07<00:44,  4.34it/s]
[Chunk 0] Cred:   9%|▊         | 18/209 [00:07<00:43,  4.42it/s]
[Chunk 0] Cred:   9%|▉         | 19/209 [00:08<00:42,  4.47it/s]
[Chunk 0] Cred:  10%|▉         | 20/209 [00:08<00:41,  4.59it/s]
[Chunk 0] Cred:  10%|█         | 21/209 [00:08<00:40,  4.59it/s]
[Chunk 0] Cred:  11%|█         | 22/209 [00:08<00:40,  4.63it/s]
[Chunk 0] Cred:  11%|█         | 23/209 [00:09<00:59,  3.14it/s]
[Chunk 0] Cred:  11%|█▏        | 24/209 [00:09<00:55,  3.33it/s]
[Chunk 0] Cred:  12%|█▏        | 25/209 [00:09<00:51,  3.60it/s]
[Chunk 0] Cred:  12%|█▏        | 26/209 [00:10<00:47,  3.89it/s]
[Chunk 0] Cred:  13%|█▎        | 27/209 [00:10<00:44,  4.06it/s]
[Chunk 0] Cred:  13%|█▎        | 28/209 [00:10<00:42,  4.25it/s]
[Chunk 0] Cred:  14%|█▍        | 29/209 [00:10<00:41,  4.38it/s]
[Chunk 0] Cred:  14%|█▍        | 30/209 [00:10<00:39,  4.49it/s]
[Chunk 0] Cred:  15%|█▍        | 31/209 [00:11<00:38,  4.64it/s]
[Chunk 0] Cred:  15%|█▌        | 32/209 [00:11<00:38,  4.62it/s]
[Chunk 0] Cred:  16%|█▌        | 33/209 [00:11<00:37,  4.70it/s]
```

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[Chunk 0] Cred:  16%|█▋        | 34/209 [00:11<00:37,  4.71it/s]
[Chunk 0] Cred:  17%|█▋        | 35/209 [00:11<00:36,  4.72it/s]
[Chunk 0] Cred:  17%|█▋        | 36/209 [00:12<00:36,  4.75it/s]
[Chunk 0] Cred:  18%|█▊        | 37/209 [00:12<00:37,  4.64it/s]
[Chunk 0] Cred:  18%|█▊        | 38/209 [00:12<00:36,  4.63it/s]
[Chunk 0] Cred:  19%|█▊        | 39/209 [00:12<00:36,  4.68it/s]
[Chunk 0] Cred:  19%|█▉        | 40/209 [00:13<00:35,  4.72it/s]
[Chunk 0] Cred:  20%|█▉        | 41/209 [00:13<00:35,  4.67it/s]
[Chunk 0] Cred:  20%|██        | 42/209 [00:13<00:36,  4.57it/s]
[Chunk 0] Cred:  21%|██        | 43/209 [00:13<00:35,  4.62it/s]
[Chunk 0] Cred:  21%|██        | 44/209 [00:13<00:36,  4.52it/s]
[Chunk 0] Cred:  22%|██▏       | 45/209 [00:14<00:36,  4.52it/s]
[Chunk 0] Cred:  22%|██▏       | 46/209 [00:14<00:37,  4.39it/s]
[Chunk 0] Cred:  22%|██▏       | 47/209 [00:14<00:38,  4.20it/s]
[Chunk 0] Cred:  23%|██▎       | 48/209 [00:14<00:40,  3.93it/s]
[Chunk 0] Cred:  23%|██▎       | 49/209 [00:15<01:03,  2.50it/s]
[Chunk 0] Cred:  24%|██▍       | 50/209 [00:16<01:37,  1.63it/s]
[Chunk 0] Cred:  24%|██▍       | 51/209 [00:17<02:00,  1.32it/s]
[Chunk 0] Cred:  25%|██▍       | 52/209 [00:18<01:41,  1.55it/s]
[Chunk 0] Cred:  25%|██▌       | 53/209 [00:18<01:28,  1.77it/s]
[Chunk 0] Cred:  26%|██▌       | 54/209 [00:18<01:17,  1.99it/s]
[Chunk 0] Cred:  26%|██▋       | 55/209 [00:19<01:05,  2.36it/s]
[Chunk 0] Cred:  27%|██▋       | 56/209 [00:19<00:55,  2.77it/s]
[Chunk 0] Cred:  27%|██▋       | 57/209 [00:19<00:49,  3.06it/s]
[Chunk 0] Cred:  28%|██▊       | 58/209 [00:19<00:45,  3.35it/s]
[Chunk 0] Cred:  28%|██▊       | 59/209 [00:20<00:41,  3.63it/s]
[Chunk 0] Cred:  29%|██▊       | 60/209 [00:20<00:38,  3.92it/s]
[Chunk 0] Cred:  29%|██▉       | 61/209 [00:20<00:35,  4.15it/s]
[Chunk 0] Cred:  30%|██▉       | 62/209 [00:20<00:34,  4.31it/s]
[Chunk 0] Cred:  30%|███       | 63/209 [00:20<00:33,  4.37it/s]
[Chunk 0] Cred:  31%|███       | 64/209 [00:21<00:32,  4.50it/s]
[Chunk 0] Cred:  31%|███       | 65/209 [00:21<00:31,  4.63it/s]
[Chunk 0] Cred:  32%|███▏      | 66/209 [00:21<00:30,  4.68it/s]
[Chunk 0] Cred:  32%|███▏      | 67/209 [00:21<00:30,  4.72it/s]
[Chunk 0] Cred:  33%|███▎      | 68/209 [00:22<00:29,  4.70it/s]
[Chunk 0] Cred:  33%|███▎      | 69/209 [00:22<00:29,  4.80it/s]
[Chunk 0] Cred:  33%|███▎      | 70/209 [00:22<00:28,  4.84it/s]
[Chunk 0] Cred:  34%|███▍      | 71/209 [00:22<00:28,  4.82it/s]
[Chunk 0] Cred:  34%|███▍      | 72/209 [00:22<00:29,  4.62it/s]
[Chunk 0] Cred:  35%|███▍      | 73/209 [00:23<00:30,  4.51it/s]
[Chunk 0] Cred:  35%|███▌      | 74/209 [00:23<00:45,  2.97it/s]
[Chunk 0] Cred:  36%|███▌      | 75/209 [00:24<00:48,  2.74it/s]
[Chunk 0] Cred:  36%|███▋      | 76/209 [00:24<00:45,  2.94it/s]
[Chunk 0] Cred:  37%|███▋      | 77/209 [00:24<00:39,  3.33it/s]
[Chunk 0] Cred:  37%|███▋      | 78/209 [00:24<00:35,  3.66it/s]
[Chunk 0] Cred:  38%|███▊      | 79/209 [00:25<00:39,  3.29it/s]
[Chunk 0] Cred:  38%|███▊      | 80/209 [00:25<00:42,  3.07it/s]
[Chunk 0] Cred:  39%|███▉      | 81/209 [00:25<00:43,  2.96it/s]
[Chunk 0] Cred:  39%|███▉      | 82/209 [00:26<00:46,  2.72it/s]
[Chunk 0] Cred:  40%|███▉      | 83/209 [00:26<00:44,  2.84it/s]
[Chunk 0] Cred:  40%|████      | 84/209 [00:26<00:37,  3.30it/s]
[Chunk 0] Cred:  41%|████      | 85/209 [00:27<00:34,  3.64it/s]
[Chunk 0] Cred:  41%|████      | 86/209 [00:27<00:31,  3.95it/s]
[Chunk 0] Cred:  42%|████▏     | 87/209 [00:27<00:29,  4.13it/s]
[Chunk 0] Cred:  42%|████▏     | 88/209 [00:27<00:27,  4.34it/s]
[Chunk 0] Cred:  43%|████▎     | 89/209 [00:27<00:26,  4.45it/s]
[Chunk 0] Cred:  43%|████▎     | 90/209 [00:28<00:26,  4.47it/s]
[Chunk 0] Cred:  44%|████▎     | 91/209 [00:28<00:25,  4.61it/s]
[Chunk 0] Cred:  44%|████▍     | 92/209 [00:28<00:24,  4.71it/s]
[Chunk 0] Cred:  44%|████▍     | 93/209 [00:28<00:24,  4.76it/s]
[Chunk 0] Cred:  45%|████▍     | 94/209 [00:29<00:32,  3.55it/s]
[Chunk 0] Cred:  45%|████▌     | 95/209 [00:29<00:34,  3.33it/s]
[Chunk 0] Cred:  46%|████▌     | 96/209 [00:29<00:37,  2.99it/s]
[Chunk 0] Cred:  46%|████▋     | 97/209 [00:30<00:34,  3.21it/s]
[Chunk 0] Cred:  47%|████▋     | 98/209 [00:30<00:33,  3.28it/s]
[Chunk 0] Cred:  47%|████▋     | 99/209 [00:30<00:32,  3.41it/s]
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[Chunk 0] Cred:  48%|████▊     | 100/209 [00:31<00:30,  3.57it/s]
[Chunk 0] Cred:  48%|████▊     | 101/209 [00:31<00:28,  3.73it/s]
[Chunk 0] Cred:  49%|████▉     | 102/209 [00:31<00:29,  3.60it/s]
[Chunk 0] Cred:  49%|████▉     | 103/209 [00:31<00:30,  3.52it/s]
[Chunk 0] Cred:  50%|████▉     | 104/209 [00:32<00:30,  3.40it/s]
[Chunk 0] Cred:  50%|█████     | 105/209 [00:32<00:32,  3.20it/s]
[Chunk 0] Cred:  51%|█████     | 106/209 [00:32<00:29,  3.55it/s]
[Chunk 0] Cred:  51%|█████     | 107/209 [00:32<00:26,  3.92it/s]
[Chunk 0] Cred:  52%|█████▏    | 108/209 [00:33<00:23,  4.23it/s]
[Chunk 0] Cred:  52%|█████▏    | 109/209 [00:33<00:22,  4.50it/s]
[Chunk 0] Cred:  53%|█████▎    | 110/209 [00:33<00:21,  4.51it/s]
[Chunk 0] Cred:  53%|█████▎    | 111/209 [00:33<00:21,  4.58it/s]
[Chunk 0] Cred:  54%|█████▎    | 112/209 [00:33<00:20,  4.69it/s]
[Chunk 0] Cred:  54%|█████▍    | 113/209 [00:34<00:19,  4.85it/s]
[Chunk 0] Cred:  55%|█████▍    | 114/209 [00:34<00:20,  4.63it/s]
[Chunk 0] Cred:  55%|█████▌    | 115/209 [00:34<00:20,  4.63it/s]
[Chunk 0] Cred:  56%|█████▌    | 116/209 [00:34<00:19,  4.74it/s]
[Chunk 0] Cred:  56%|█████▌    | 117/209 [00:35<00:18,  4.88it/s]
[Chunk 0] Cred:  56%|█████▋    | 118/209 [00:35<00:18,  4.90it/s]
[Chunk 0] Cred:  57%|█████▋    | 119/209 [00:35<00:18,  4.99it/s]
[Chunk 0] Cred:  57%|█████▋    | 120/209 [00:35<00:18,  4.87it/s]
[Chunk 0] Cred:  58%|█████▊    | 121/209 [00:35<00:17,  4.90it/s]
[Chunk 0] Cred:  58%|█████▊    | 122/209 [00:36<00:17,  4.99it/s]
[Chunk 0] Cred:  59%|█████▉    | 123/209 [00:36<00:18,  4.70it/s]
[Chunk 0] Cred:  59%|█████▉    | 124/209 [00:36<00:17,  4.84it/s]
[Chunk 0] Cred:  60%|█████▉    | 125/209 [00:36<00:17,  4.74it/s]
[Chunk 0] Cred:  60%|██████    | 126/209 [00:36<00:17,  4.87it/s]
[Chunk 0] Cred:  61%|██████    | 127/209 [00:37<00:16,  4.95it/s]
[Chunk 0] Cred:  61%|██████    | 128/209 [00:37<00:16,  5.03it/s]
[Chunk 0] Cred:  62%|██████▏   | 129/209 [00:37<00:15,  5.12it/s]
[Chunk 0] Cred:  62%|██████▏   | 130/209 [00:37<00:15,  4.96it/s]
[Chunk 0] Cred:  63%|██████▎   | 131/209 [00:37<00:15,  5.00it/s]
[Chunk 0] Cred:  63%|██████▎   | 132/209 [00:38<00:15,  5.08it/s]
[Chunk 0] Cred:  64%|██████▎   | 133/209 [00:38<00:14,  5.14it/s]
[Chunk 0] Cred:  64%|██████▍   | 134/209 [00:38<00:14,  5.18it/s]
[Chunk 0] Cred:  65%|██████▍   | 135/209 [00:38<00:14,  5.18it/s]
[Chunk 0] Cred:  65%|██████▌   | 136/209 [00:38<00:14,  5.05it/s]
[Chunk 0] Cred:  66%|██████▌   | 137/209 [00:39<00:14,  5.12it/s]
[Chunk 0] Cred:  66%|██████▌   | 138/209 [00:39<00:13,  5.09it/s]
[Chunk 0] Cred:  67%|██████▋   | 139/209 [00:39<00:13,  5.17it/s]
[Chunk 0] Cred:  67%|██████▋   | 140/209 [00:39<00:13,  5.15it/s]
[Chunk 0] Cred:  67%|██████▋   | 141/209 [00:39<00:13,  5.00it/s]
[Chunk 0] Cred:  68%|██████▊   | 142/209 [00:39<00:13,  5.07it/s]
[Chunk 0] Cred:  68%|██████▊   | 143/209 [00:40<00:12,  5.12it/s]
[Chunk 0] Cred:  69%|██████▉   | 144/209 [00:40<00:12,  5.15it/s]
[Chunk 0] Cred:  69%|██████▉   | 145/209 [00:40<00:12,  5.13it/s]
[Chunk 0] Cred:  70%|██████▉   | 146/209 [00:40<00:12,  4.98it/s]
[Chunk 0] Cred:  70%|███████   | 147/209 [00:40<00:12,  4.95it/s]
[Chunk 0] Cred:  71%|███████   | 148/209 [00:41<00:12,  5.03it/s]
[Chunk 0] Cred:  71%|███████▏  | 149/209 [00:41<00:11,  5.10it/s]
[Chunk 0] Cred:  72%|███████▏  | 150/209 [00:41<00:11,  5.10it/s]
[Chunk 0] Cred:  72%|███████▏  | 151/209 [00:41<00:11,  4.91it/s]
[Chunk 0] Cred:  73%|███████▎  | 152/209 [00:41<00:11,  5.04it/s]
[Chunk 0] Cred:  73%|███████▎  | 153/209 [00:42<00:10,  5.11it/s]
[Chunk 0] Cred:  74%|███████▎  | 154/209 [00:42<00:10,  5.11it/s]
[Chunk 0] Cred:  74%|███████▍  | 155/209 [00:42<00:10,  5.08it/s]
[Chunk 0] Cred:  75%|███████▍  | 156/209 [00:42<00:12,  4.39it/s]
[Chunk 0] Cred:  75%|███████▌  | 157/209 [00:43<00:12,  4.17it/s]
[Chunk 0] Cred:  76%|███████▌  | 158/209 [00:43<00:12,  4.07it/s]
[Chunk 0] Cred:  76%|███████▌  | 159/209 [00:43<00:12,  3.95it/s]
[Chunk 0] Cred:  77%|███████▋  | 160/209 [00:43<00:12,  3.92it/s]
[Chunk 0] Cred:  77%|███████▋  | 161/209 [00:44<00:12,  3.86it/s]
[Chunk 0] Cred:  78%|███████▊  | 162/209 [00:44<00:12,  3.90it/s]
[Chunk 0] Cred:  78%|███████▊  | 163/209 [00:44<00:11,  3.88it/s]
[Chunk 0] Cred:  78%|███████▊  | 164/209 [00:44<00:11,  3.78it/s]
[Chunk 0] Cred:  79%|███████▉  | 165/209 [00:45<00:12,  3.61it/s]
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[Chunk 0] Cred:  79%|███████▉  | 166/209 [00:45<00:12,  3.54it/s]
[Chunk 0] Cred:  80%|███████▉  | 167/209 [00:45<00:12,  3.36it/s]
[Chunk 0] Cred:  80%|████████  | 168/209 [00:46<00:11,  3.52it/s]
[Chunk 0] Cred:  81%|████████  | 169/209 [00:46<00:10,  3.89it/s]
[Chunk 0] Cred:  81%|████████▏ | 170/209 [00:46<00:09,  4.18it/s]
[Chunk 0] Cred:  82%|████████▏ | 171/209 [00:46<00:08,  4.40it/s]
[Chunk 0] Cred:  82%|████████▏ | 172/209 [00:46<00:08,  4.61it/s]
[Chunk 0] Cred:  83%|████████▎ | 173/209 [00:47<00:07,  4.65it/s]
[Chunk 0] Cred:  83%|████████▎ | 174/209 [00:47<00:07,  4.74it/s]
[Chunk 0] Cred:  84%|████████▎ | 175/209 [00:47<00:07,  4.80it/s]
[Chunk 0] Cred:  84%|████████▍ | 176/209 [00:47<00:06,  4.85it/s]
[Chunk 0] Cred:  85%|████████▍ | 177/209 [00:47<00:06,  4.98it/s]
[Chunk 0] Cred:  85%|████████▌ | 178/209 [00:48<00:06,  4.96it/s]
[Chunk 0] Cred:  86%|████████▌ | 179/209 [00:48<00:05,  5.02it/s]
[Chunk 0] Cred:  86%|████████▌ | 180/209 [00:48<00:05,  5.06it/s]
[Chunk 0] Cred:  87%|████████▋ | 181/209 [00:48<00:05,  5.07it/s]
[Chunk 0] Cred:  87%|████████▋ | 182/209 [00:48<00:05,  5.11it/s]
[Chunk 0] Cred:  88%|████████▊ | 183/209 [00:49<00:05,  5.00it/s]
[Chunk 0] Cred:  88%|████████▊ | 184/209 [00:49<00:04,  5.02it/s]
[Chunk 0] Cred:  89%|████████▊ | 185/209 [00:49<00:04,  5.01it/s]
[Chunk 0] Cred:  89%|████████▉ | 186/209 [00:49<00:04,  5.00it/s]
[Chunk 0] Cred:  89%|████████▉ | 187/209 [00:49<00:04,  5.05it/s]
[Chunk 0] Cred:  90%|████████▉ | 188/209 [00:50<00:04,  5.11it/s]
[Chunk 0] Cred:  90%|█████████ | 189/209 [00:50<00:04,  4.96it/s]
[Chunk 0] Cred:  91%|█████████ | 190/209 [00:50<00:03,  4.97it/s]
[Chunk 0] Cred:  91%|█████████▏| 191/209 [00:50<00:03,  5.00it/s]
[Chunk 0] Cred:  92%|█████████▏| 192/209 [00:50<00:03,  5.05it/s]
[Chunk 0] Cred:  92%|█████████▏| 193/209 [00:51<00:03,  5.05it/s]
[Chunk 0] Cred:  93%|█████████▎| 194/209 [00:51<00:03,  4.98it/s]
[Chunk 0] Cred:  93%|█████████▎| 195/209 [00:51<00:02,  4.90it/s]
[Chunk 0] Cred:  94%|█████████▍| 196/209 [00:51<00:02,  4.92it/s]
[Chunk 0] Cred:  94%|█████████▍| 197/209 [00:51<00:02,  5.02it/s]
[Chunk 0] Cred:  95%|█████████▍| 198/209 [00:52<00:02,  4.96it/s]
[Chunk 0] Cred:  95%|█████████▌| 199/209 [00:52<00:02,  4.87it/s]
[Chunk 0] Cred:  96%|█████████▌| 200/209 [00:52<00:01,  4.91it/s]
[Chunk 0] Cred:  96%|█████████▌| 201/209 [00:52<00:01,  4.96it/s]
[Chunk 0] Cred:  97%|█████████▋| 202/209 [00:52<00:01,  5.05it/s]
[Chunk 0] Cred:  97%|█████████▋| 203/209 [00:53<00:01,  5.07it/s]
[Chunk 0] Cred:  98%|█████████▊| 204/209 [00:53<00:00,  5.00it/s]
[Chunk 0] Cred:  98%|█████████▊| 205/209 [00:53<00:00,  4.98it/s]
[Chunk 0] Cred:  99%|█████████▊| 206/209 [00:53<00:00,  4.65it/s]
[Chunk 0] Cred:  99%|█████████▉| 207/209 [00:53<00:00,  4.83it/s]
[Chunk 0] Cred: 100%|██████████| 209/209 [00:54<00:00,  3.85it/s]
Saved: /content/drive/MyDrive/Final Project/run_outputs/scores_part_00.parquet
Processing chunk 1 (5000 rows) ...
[Chunk 1] Sentiment: 100%|██████████| 157/157 [00:44<00:00,  3.56it/s]
[Chunk 1] Emotion: 100%|██████████| 209/209 [00:25<00:00,  8.08it/s]
[Chunk 1] Bias ZS: 100%|██████████| 834/834 [05:55<00:00,  2.35it/s]
[Chunk 1] Cred: 100%|██████████| 209/209 [00:42<00:00,  4.87it/s]
Saved: /content/drive/MyDrive/Final Project/run_outputs/scores_part_01.parquet
Processing chunk 2 (5000 rows) ...
[Chunk 2] Sentiment: 100%|██████████| 157/157 [00:42<00:00,  3.68it/s]
[Chunk 2] Emotion: 100%|██████████| 209/209 [00:26<00:00,  8.03it/s]
[Chunk 2] Bias ZS: 100%|██████████| 834/834 [06:02<00:00,  2.30it/s]
[Chunk 2] Cred: 100%|██████████| 209/209 [00:42<00:00,  4.88it/s]
Saved: /content/drive/MyDrive/Final Project/run_outputs/scores_part_02.parquet
Processing chunk 3 (5000 rows) ...
[Chunk 3] Sentiment: 100%|██████████| 157/157 [00:43<00:00,  3.63it/s]
[Chunk 3] Emotion: 100%|██████████| 209/209 [00:25<00:00,  8.09it/s]
[Chunk 3] Bias ZS: 100%|██████████| 834/834 [05:59<00:00,  2.32it/s]
[Chunk 3] Cred: 100%|██████████| 209/209 [00:43<00:00,  4.77it/s]
Saved: /content/drive/MyDrive/Final Project/run_outputs/scores_part_03.parquet
Processing chunk 4 (5000 rows) ...
[Chunk 4] Sentiment: 100%|██████████| 157/157 [00:44<00:00,  3.52it/s]
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[Chunk 4] Emotion: 100%|██████████| 209/209 [00:26<00:00,  7.76it/s]
[Chunk 4] Bias ZS: 100%|██████████| 834/834 [06:03<00:00,  2.29it/s]
[Chunk 4] Cred: 100%|██████████| 209/209 [00:44<00:00,  4.68it/s]
Saved: /content/drive/MyDrive/Final Project/run_outputs/scores_part_04.parquet
Processing chunk 5 (5000 rows) ...
[Chunk 5] Sentiment: 100%|██████████| 157/157 [00:43<00:00,  3.61it/s]
[Chunk 5] Emotion: 100%|██████████| 209/209 [00:26<00:00,  7.82it/s]
[Chunk 5] Bias ZS: 100%|██████████| 834/834 [06:04<00:00,  2.29it/s]
[Chunk 5] Cred: 100%|██████████| 209/209 [00:43<00:00,  4.81it/s]
Saved: /content/drive/MyDrive/Final Project/run_outputs/scores_part_05.parquet
Processing chunk 6 (5000 rows) ...
[Chunk 6] Sentiment: 100%|██████████| 157/157 [00:44<00:00,  3.57it/s]
[Chunk 6] Emotion: 100%|██████████| 209/209 [00:26<00:00,  7.93it/s]
[Chunk 6] Bias ZS: 100%|██████████| 834/834 [06:04<00:00,  2.29it/s]
[Chunk 6] Cred: 100%|██████████| 209/209 [00:43<00:00,  4.82it/s]
Saved: /content/drive/MyDrive/Final Project/run_outputs/scores_part_06.parquet
Processing chunk 7 (5000 rows) ...
[Chunk 7] Sentiment: 100%|██████████| 157/157 [00:42<00:00,  3.66it/s]
[Chunk 7] Emotion: 100%|██████████| 209/209 [00:25<00:00,  8.09it/s]
[Chunk 7] Bias ZS: 100%|██████████| 834/834 [06:10<00:00,  2.25it/s]
[Chunk 7] Cred: 100%|██████████| 209/209 [00:43<00:00,  4.85it/s]
Saved: /content/drive/MyDrive/Final Project/run_outputs/scores_part_07.parquet
Processing chunk 8 (5000 rows) ...
[Chunk 8] Sentiment: 100%|██████████| 157/157 [00:43<00:00,  3.60it/s]
[Chunk 8] Emotion: 100%|██████████| 209/209 [00:26<00:00,  8.02it/s]
[Chunk 8] Bias ZS: 100%|██████████| 834/834 [06:13<00:00,  2.23it/s]
[Chunk 8] Cred: 100%|██████████| 209/209 [00:43<00:00,  4.77it/s]
Saved: /content/drive/MyDrive/Final Project/run_outputs/scores_part_08.parquet
Processing chunk 9 (5000 rows) ...
[Chunk 9] Sentiment: 100%|██████████| 157/157 [00:43<00:00,  3.58it/s]
[Chunk 9] Emotion: 100%|██████████| 209/209 [00:26<00:00,  7.95it/s]
[Chunk 9] Bias ZS: 100%|██████████| 834/834 [06:15<00:00,  2.22it/s]
[Chunk 9] Cred: 100%|██████████| 209/209 [00:43<00:00,  4.77it/s]
Saved: /content/drive/MyDrive/Final Project/run_outputs/scores_part_09.parquet
Processing chunk 10 (1282 rows) ...
[Chunk 10] Sentiment: 100%|██████████| 41/41 [00:11<00:00,  3.68it/s]
[Chunk 10] Emotion: 100%|██████████| 54/54 [00:06<00:00,  8.79it/s]
[Chunk 10] Bias ZS: 100%|██████████| 214/214 [01:35<00:00,  2.25it/s]
[Chunk 10] Cred: 100%|██████████| 54/54 [00:10<00:00,  4.99it/s]
Saved: /content/drive/MyDrive/Final Project/run_outputs/scores_part_10.parquet
```

Combine Parts, Compute Unified Score, Save Full Results

In [ ]:

```
# Combine
parts = sorted([p for p in os.listdir(RUN_DIR) if p.startswith("scores_part_") and p.endsw
assert parts, "No parts found. Run Cell 12 first."
full = pd.concat([pd.read_parquet(os.path.join(RUN_DIR, p)) for p in parts], axis=0, ignor
print("Combined shape:", full.shape)

# Unified score (using CONFIG weights)
req = ["sent_norm","emot_norm","bias_norm","cred_norm"]
if not all(c in full.columns for c in req):
    missing = [c for c in req if c not in full.columns]
    raise ValueError(f"Missing columns: {missing}")

full["unified_score"] = compute_unified(full, CONFIG["weights"])

# Save master files
FULL_PARQ = os.path.join(RUN_DIR, "full_scores.parquet")
FULL_CSV  = os.path.join(RUN_DIR, "full_scores.csv")
full.to_parquet(FULL_PARQ, index=False)
full.to_csv(FULL_CSV, index=False)
```

```
print("Saved:\n", FULL_PARQ, "\n", FULL_CSV)

display(full.head(3))
```

```
Combined shape: (51282, 24)
Saved:
 /content/drive/MyDrive/Final Project/run_outputs/full_scores.parquet
 /content/drive/MyDrive/Final Project/run_outputs/full_scores.csv
```

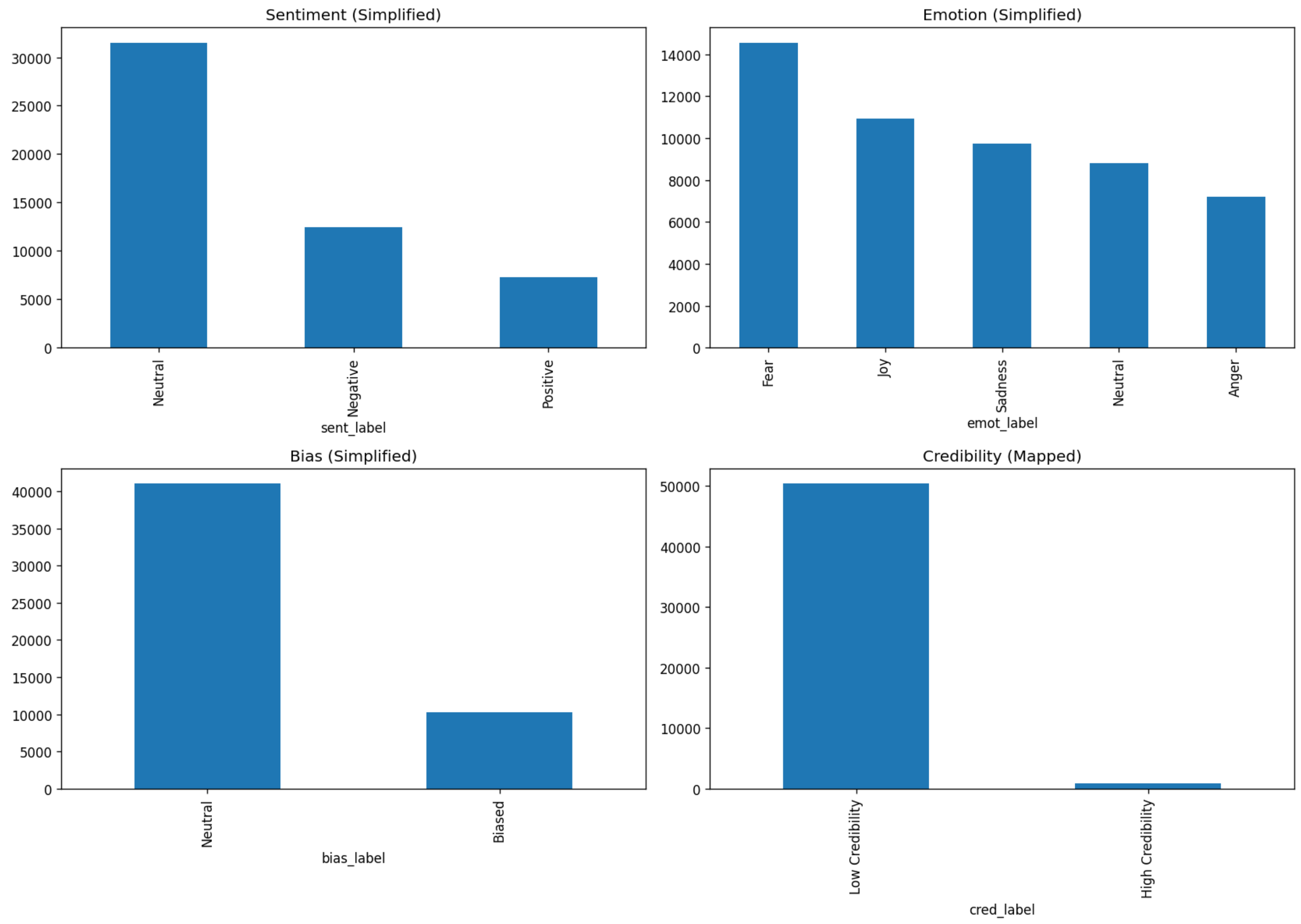
	news_id	category	subcategory	title	abstract	url	title_entitie
0	N55528	lifestyle	lifestyleroyals	The Brands Queen Elizabeth, Prince Charles, an...	Shop the notebooks, jackets, and more that the...	https://assets.msn.com/labs/mind/AAGH0ET.html	[{"Label" "Prince Philip, Duke o Edinburgh",..
1	N19639	health	weightloss	50 Worst Habits For Belly Fat	These seemingly harmless habits are holding yo...	https://assets.msn.com/labs/mind/AAB19MK.html	[{"Label" "Adipose tissue" "Type": "C" "Wik..
2	N61837	news	newsworld	The Cost of Trump's Aid Freeze in the Trenches...	Lt. Ivan Molchanets peeked over a parapet of s...	https://assets.msn.com/labs/mind/AAJgNsz.html	[

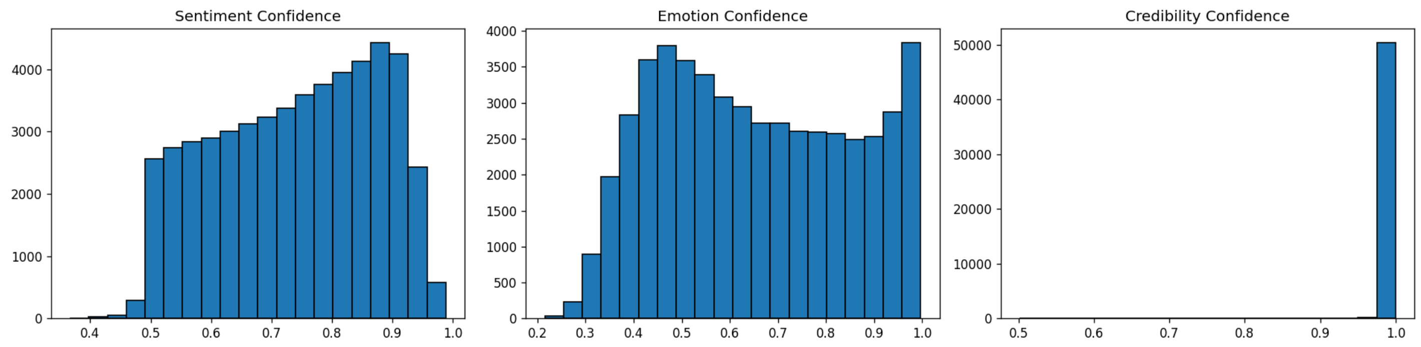
3 rows × 25 columns

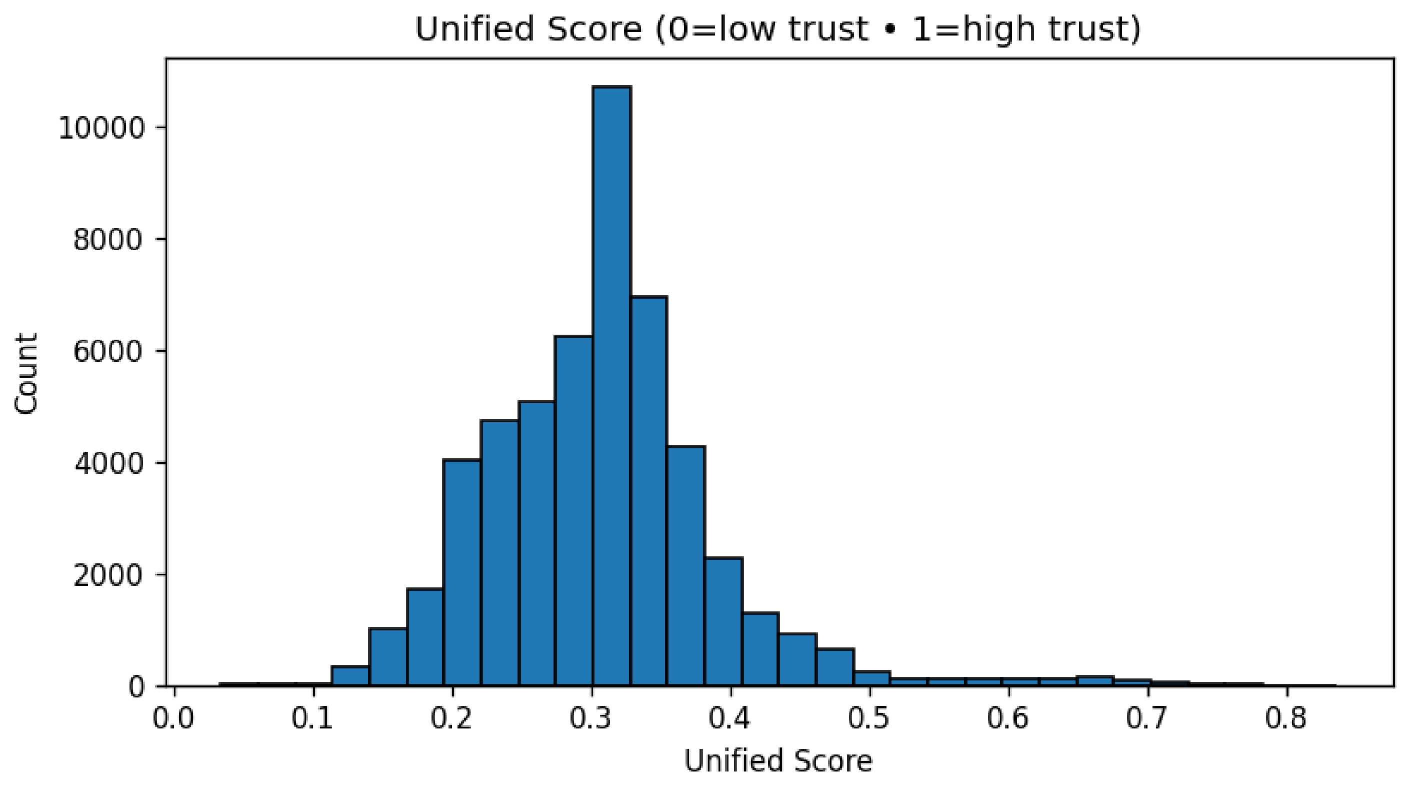
Core Visuals (and save PNGs)

In [ ]:

```
# Label distributions
fig, axes = plt.subplots(2, 2, figsize=(14,10))
full["sent_label"].value_counts().plot(kind="bar", ax=axes[0,0], title="Sentiment (Simplif
full["emot_label"].value_counts().plot(kind="bar", ax=axes[0,1], title="Emotion (Simplifie
full["bias_label"].value_counts().plot(kind="bar", ax=axes[1,0], title="Bias (Simplified)'
full["cred_label"].value_counts().plot(kind="bar", ax=axes[1,1], title="Credibility (Mappe
plt.tight_layout(); plt.savefig(os.path.join(EXPORTS, "label_distributions.png")); plt.sho

# Confidence histograms (selected)
fig, axes = plt.subplots(1, 3, figsize=(16,4))
axes[0].hist(full["sent_conf"], bins=20, edgecolor="black"); axes[0].set_title("Sentiment
axes[1].hist(full["emot_conf"], bins=20, edgecolor="black"); axes[1].set_title("Emotion Co
axes[2].hist(full["cred_conf"], bins=20, edgecolor="black"); axes[2].set_title("Credibilit
plt.tight_layout(); plt.savefig(os.path.join(EXPORTS, "confidence_histograms.png")); plt.s

# Unified score distribution
plt.figure(figsize=(7,4))
plt.hist(full["unified_score"], bins=30, edgecolor="black")
plt.title("Unified Score (0=low trust • 1=high trust)"); plt.xlabel("Unified Score"); plt.
plt.tight_layout(); plt.savefig(os.path.join(EXPORTS, "unified_score_hist.png")); plt.show
```


Sentiment (Simplified)
0
5000
10000
15000
20000
25000
30000
Neutral
Negative
Positive
sent_label
Emotion (Simplified)
0
2000
4000
6000
8000
10000
12000
14000
Fear
Joy
Sadness
Neutral
Anger
emot_label
Bias (Simplified)
0
5000
10000
15000
20000
25000
30000
35000
40000
Neutral
Biased
bias_label
Credibility (Mapped)
0
10000
20000
30000
40000
50000
Low Credibility
High Credibility
cred_label


Sentiment Confidence
0
1000
2000
3000
4000
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Emotion Confidence
0
500
1000
1500
2000
2500
3000
3500
4000
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
Credibility Confidence
0
10000
20000
30000
40000
50000
0.5
0.6
0.7
0.8
0.9
1.0



Category/Subcategory Summaries (CSV exports)

```
In [ ]:
# Category means
cat_summary = (full.groupby("category")[["sent_norm","emot_norm","bias_norm","cred_norm","
               .mean().sort_values("unified_score", ascending=False))
cat_csv = os.path.join(EXPORTS, "category_summary.csv")
cat_summary.to_csv(cat_csv)
print("Saved:", cat_csv)
display(cat_summary.head(10))

# Top 15 subcategories by count
top_subs = full["subcategory"].value_counts().head(15).index
sub_summary = (full[full["subcategory"].isin(top_subs)]
               .groupby("subcategory")[["sent_norm","emot_norm","bias_norm","cred_norm","u
               .mean().sort_values("unified_score", ascending=False))
sub_csv = os.path.join(EXPORTS, "subcategory_summary_top15.csv")
sub_summary.to_csv(sub_csv)
print("Saved:", sub_csv)
display(sub_summary)
```

```
Saved: /content/drive/MyDrive/Final Project/exports/category_summary.csv
```

	sent_norm	emot_norm	bias_norm	cred_norm	unified_score
category					
foodanddrink	0.610918	0.580051	0.447554	0.004132	0.351529
kids	0.554676	0.503146	0.468172	0.001513	0.329137
entertainment	0.557351	0.497956	0.461858	0.001317	0.326987
finance	0.475278	0.439043	0.449588	0.089452	0.326570
music	0.558524	0.488478	0.464248	0.001388	0.325948
lifestyle	0.560223	0.491305	0.457361	0.002691	0.325588
northamerica	0.500000	0.590727	0.422117	0.002220	0.324451

category	sent_norm	emot_norm	bias_norm	cred_norm	unified_score
movies	0.531163	0.479637	0.474050	0.001439	0.321176
travel	0.532540	0.477993	0.446933	0.007237	0.316373
tv	0.517527	0.455682	0.465546	0.004464	0.312590

```
Saved: /content/drive/MyDrive/Final Project/exports/subcategory_summary_top15.csv
```

subcategory	sent_norm	emot_norm	bias_norm	cred_norm	unified_score
newstrends	0.565786	0.559045	0.451804	0.006780	0.340290
newsworld	0.390765	0.346105	0.451052	0.168322	0.319050
travelarticle	0.530659	0.486187	0.449036	0.004028	0.317038
more_sports	0.499693	0.478535	0.462287	0.005798	0.313247
newsscienceandtechnology	0.514805	0.452372	0.445105	0.017948	0.310993
baseball_mlb	0.506294	0.471485	0.449054	0.008649	0.310846
basketball_nba	0.504526	0.450839	0.470213	0.003944	0.310007
football_nfl	0.492274	0.454184	0.461005	0.007591	0.307199
football_ncaa	0.501011	0.461086	0.449889	0.005370	0.306771
newspolitics	0.467045	0.405244	0.462744	0.038148	0.303496
news	0.453594	0.405643	0.460841	0.037703	0.300254
travelnews	0.479326	0.442219	0.447625	0.011407	0.300208
weathertopstories	0.464822	0.400976	0.433028	0.017994	0.287714
newsus	0.439447	0.368443	0.451715	0.008204	0.277378
newscrime	0.410617	0.319316	0.446787	0.002078	0.258411

Top/Bottom Articles + Radar Plots (saved)

In [ ]:

```
cols_show = ["news_id","category","subcategory","title","abstract",
             "sent_label","emot_label","bias_label","cred_label",
             "sent_norm","emot_norm","bias_norm","cred_norm","unified_score"]

top10 = full.sort_values("unified_score", ascending=False).head(10)[cols_show]
bot10 = full.sort_values("unified_score", ascending=True).head(10)[cols_show]

top10_path = os.path.join(EXPORTS, "top10_unified.csv")
bot10_path = os.path.join(EXPORTS, "bottom10_unified.csv")
top10.to_csv(top10_path, index=False); bot10.to_csv(bot10_path, index=False)
print("Saved:\n", top10_path, "\n", bot10_path)
display(top10); display(bot10)

# Radar plot helper
def radar_plot(row, file_path):
    labels = ["Sentiment","Emotion","Neutrality","Credibility"]
    values = [row["sent_norm"], row["emot_norm"], row["bias_norm"], row["cred_norm"]]
    values = values + values[:1]
    angles = np.linspace(0, 2*np.pi, len(labels), endpoint=False).tolist()
    angles += angles[:1]

    fig = plt.figure(figsize=(5,5))
    ax = plt.subplot(111, polar=True)
    ax.plot(angles, values, linewidth=2)
    ax.fill(angles, values, alpha=0.25)
    ax.set_thetagrids(np.degrees(angles[:-1]), labels)
    ax.set_ylim(0, 1)
    ax.set_title(f"{row.get('news_id','')} • Unified={row['unified_score']:.2f}")
    plt.tight_layout(); plt.savefig(file_path); plt.close(fig)

# Save radar for top1 and bottom1
radar_plot(top10.iloc[0], os.path.join(EXPORTS, "radar_top1.png"))
radar_plot(bot10.iloc[0], os.path.join(EXPORTS, "radar_bottom1.png"))
print("Saved radar plots.")
```

```
Saved:
 /content/drive/MyDrive/Final Project/exports/top10_unified.csv
 /content/drive/MyDrive/Final Project/exports/bottom10_unified.csv
```

	news_id	category	subcategory	title	abstract	sent_label	emot_label	bias_label	cred_label	sent_r
20333	N35749	finance	markets	Stocks close at record highs on earnings, trad...	The Dow Jones Industrial Average reached a mil...	Positive	Joy	Neutral	High Credibility	0.87
30672	N26376	finance	markets	Stocks close higher on optimism over China tra...	Stocks ended at record highs Thursday after th...	Positive	Joy	Neutral	High Credibility	0.83
8004	N307	finance	finance-companies	Alcoa heads for biggest gain since 2016 on $1 ...	Alcoa Corp. shares headed for the biggest gain...	Positive	Joy	Neutral	High Credibility	0.90
21169	N42012	sports	golf	McIlroy looking to end a great year on a big note	SHANGHAI (AP) Already the FedEx Cup champion...	Positive	Joy	Neutral	High Credibility	0.94
10489	N20792	finance	finance-companies	Under Armour founder Kevin Plank to step down ...	Chief executive is stepping down at the sporti...	Positive	Joy	Biased	High Credibility	0.74
5219	N62124	finance	markets	US Fed cuts interest rates, signals it is on hold	We believe that monetary policy is in a good p...	Neutral	Joy	Neutral	High Credibility	0.50

	news_id	category	subcategory	title	abstract	sent_label	emot_label	bias_label	cred_label	sent_r
11305	N42342	finance	markets	Stocks rally to record close after strong Octo...	Stocks ended sharply higher Friday as investor...	Positive	Joy	Neutral	High Credibility	0.96
25361	N40969	sports	golf	'Motivated' McIlroy headlines loaded WGC field...	World number two Rory McIlroy said his stronge...	Positive	Joy	Neutral	High Credibility	0.66
3807	N59163	finance	markets	Banks reap $1 billion from US mortgage bond tr...	Global banks earned $1 billion from trading go...	Positive	Joy	Neutral	High Credibility	0.76
21985	N21544	finance	finance-top-stocks	Toyota announces $1.8 billion share buyback af...	Toyota Motor plans a $1.8 billion share buybac...	Positive	Joy	Neutral	High Credibility	0.83

	news_id	category	subcategory	title	abstract	sent_label	emot_label	bias_label	cred_label	ser
37798	N40702	news	newsopinion	Opinions | We've never needed Remembrance Day ...	The hateful ideologies that led to two terribl...	Negative	Fear	Biased	Low Credibility	0
45379	N3428	news	newsus	'People Are Going To Get Injured, Or Worse': A...	Authorities in western Wisconsin are investiga...	Negative	Anger	Biased	Low Credibility	0
26942	N3530	news	newspolitics	'I feel bad that I left': John Kelly warned Tr...	John Kelly warned President Trump that hiring ...	Negative	Sadness	Biased	Low Credibility	0
26316	N42517	news	newspolitics	Violent Video Was Product of Right-Wing Provoc...	The creator of a video that showed a fake Pres...	Negative	Anger	Biased	Low Credibility	0
19003	N5927	lifestyle	lifestylebuzz	Rockland NAACP leader 'astounded' by Bed Bath ...	Days after the appearance of blackface pumpkin...	Negative	Fear	Biased	Low Credibility	0

	news_id	category	subcategory	title	abstract	sent_label	emot_label	bias_label	cred_label	ser
47497	N4612	sports	baseball_mlb	MLB needs to step up on cheating allegations a...	Veteran righty Mike Fiers said that the Astros...	Negative	Sadness	Biased	Low Credibility	(
35884	N1204	news	newsworld	US: Drug trafficking up sharply under Venezuel...	Drug trafficking to and from Venezuela has sho...	Negative	Fear	Biased	Low Credibility	(
26921	N4539	news	newspolitics	At Democratic fundraiser, Gov. J.B. Pritzker s...	As hundreds of people sipped cocktails and sna...	Negative	Anger	Biased	Low Credibility	(
14932	N21433	news	newspolitics	A Halloween message from Gov. Jay Inslee: I'm ...	Gov. Jay Inslee is trolling for campaign donat...	Negative	Fear	Biased	Low Credibility	(
24930	N54212	finance	finance-video	Chick-fil-A cancels only UK shop after backlash	Chick-fil-A is being forced to abandon its fir...	Negative	Anger	Biased	Low Credibility	(

```
Saved radar plots.
```

Exports

In [ ]:

```
# Compact deliverable with all signals
deliver_cols = [
    "news_id","category","subcategory","title","abstract",
    "sent_label","sent_conf","sent_norm",
    "emot_label","emot_conf","emot_norm",
    "bias_label","bias_conf","bias_norm",
    "cred_label","cred_conf","cred_norm",
    "unified_score"
]
deliverable = full[deliver_cols]
DELIVER_CSV = os.path.join(EXPORTS, "deliverable_scores.csv")
deliverable.to_csv(DELIVER_CSV, index=False)
print("Saved:", DELIVER_CSV)
display(deliverable.head(5))

# Small samples for quick checking
data_sample_path = os.path.join(EXPORTS, "sample_processed_text.csv")
pd.DataFrame({
    "news_id": full["news_id"].head(20),
    "title": full["title"].head(20),
    "abstract": full["abstract"].head(20),
    "processed_text": full["processed_text"].head(20)
}).to_csv(data_sample_path, index=False)

pd.DataFrame({
    "news_id": full["news_id"].head(50),
    "processed_text": full["processed_text"].head(50),
    "sent_label": full["sent_label"].head(50),
    "sent_conf": full["sent_conf"].head(50),
    "sent_norm": full["sent_norm"].head(50)
}).to_csv(os.path.join(EXPORTS, "sentiment_results.csv"), index=False)

pd.DataFrame({
    "news_id": full["news_id"].head(50),
    "processed_text": full["processed_text"].head(50),
    "emot_label": full["emot_label"].head(50),
    "emot_conf": full["emot_conf"].head(50),
    "emot_norm": full["emot_norm"].head(50)
}).to_csv(os.path.join(EXPORTS, "emotion_results.csv"), index=False)

pd.DataFrame({
    "news_id": full["news_id"].head(50),
    "processed_text": full["processed_text"].head(50),
    "bias_label": full["bias_label"].head(50),
    "bias_conf": full["bias_conf"].head(50),
    "bias_norm": full["bias_norm"].head(50)
}).to_csv(os.path.join(EXPORTS, "bias_results.csv"), index=False)

pd.DataFrame({
    "news_id": full["news_id"].head(50),
    "processed_text": full["processed_text"].head(50),
    "cred_label": full["cred_label"].head(50),
    "cred_conf": full["cred_conf"].head(50),
    "cred_norm": full["cred_norm"].head(50)
}).to_csv(os.path.join(EXPORTS, "credibility_results.csv"), index=False)

pd.DataFrame({
    "news_id": full["news_id"].head(50),
    "sent_norm": full["sent_norm"].head(50),
    "emot_norm": full["emot_norm"].head(50),
    "bias_norm": full["bias_norm"].head(50),
    "cred_norm": full["cred_norm"].head(50),
    "unified_score": full["unified_score"].head(50)
}).to_csv(os.path.join(EXPORTS, "unified_score_results.csv"), index=False)

print("Saved sample CSVs to:", EXPORTS)
```

```
Saved: /content/drive/MyDrive/Final Project/exports/deliverable_scores.csv
```

	news_id	category	subcategory	title	abstract	sent_label	sent_conf	sent_norm	emot_label	emot_conf
0	N55528	lifestyle	lifestyleroyals	The Brands Queen Elizabeth, Prince Charles, an...	Shop the notebooks, jackets, and more that the...	Neutral	0.715360	0.500000	Sadness	0.450633
1	N19639	health	weightloss	50 Worst Habits For Belly Fat	These seemingly harmless habits are holding yo...	Negative	0.714155	0.285845	Anger	0.897234

	news_id	category	subcategory	title	abstract	sent_label	sent_conf	sent_norm	emot_label	emot_conf
2	N61837	news	newsworld	The Cost of Trump's Aid Freeze in the Trenches...	Lt. Ivan Molchanets peeked over a parapet of s...	Negative	0.630154	0.369846	Fear	0.269428
3	N53526	health	voices	I Was An NBA Wife. Here's How It Affected My M...	I felt like I was a fraud, and being an NBA wi...	Negative	0.920687	0.079313	Anger	0.491060
4	N38324	health	medical	How to Get Rid of Skin Tags, According to a De...	They seem harmless, but there's a very good re...	Neutral	0.637251	0.500000	Neutral	0.791274

```
Saved sample CSVs to: /content/drive/MyDrive/Final Project/exports
```

Manual-Label Template

In [ ]:

```python
# Random 200 for manual labeling
sample_for_labels = full.sample(200, random_state=SEED)[
    ["news_id","category","subcategory","title","abstract"]
].copy()

sample_for_labels["man_sentiment"]   = ""   # Positive / Neutral / Negative
sample_for_labels["man_emotion"]     = ""   # Joy / Sadness / Anger / Fear / Neutral
sample_for_labels["man_bias"]        = ""   # Biased / Neutral
sample_for_labels["man_credibility"] = ""   # High Credibility / Low Credibility

TEMPLATE_PATH = os.path.join(EXPORTS, "manual_label_template.csv")
sample_for_labels.to_csv(TEMPLATE_PATH, index=False)
print("Saved manual label template:", TEMPLATE_PATH)
display(sample_for_labels.head(3))
```

```
Saved manual label template: /content/drive/MyDrive/Final Project/exports/manual_label_tem
plate.csv
```

	news_id	category	subcategory	title	abstract	man_sentiment	man_emotion	man_bias	m
36810	N7433	news	newsus	The 3 best Greek spots in Aurora	Hoodline crunched the numbers to find the top ...				
24447	N43326	sports	more_sports	Officials investigating stabbing death of Alex...					
23187	N45745	finance	finance-top-stocks	SmileDirectClub tanks on California bill, brin...	Shares of SmileDirectClub sank to a new all-ti...				

In [ ]:

```python
import os, pandas as pd
```

```
BASE_DIR = "/content/drive/MyDrive/Final Project"
RUN_DIR  = os.path.join(BASE_DIR, "run_outputs")

print("Files in run_outputs:", sorted(os.listdir(RUN_DIR))[:10])

full_parq = os.path.join(RUN_DIR, "full_scores.parquet")
full_csv  = os.path.join(RUN_DIR, "full_scores.csv")
print("full_scores.parquet exists:", os.path.exists(full_parq))
print("full_scores.csv exists:", os.path.exists(full_csv))

# Load one of them to preview
# If you ever hit a pyarrow error, add: engine="fastparquet"
full = pd.read_parquet(full_parq)
full.head(3)
```

```
Files in run_outputs: ['full_scores.csv', 'full_scores.parquet', 'processed_text.parquet',
'scores_part_00.parquet', 'scores_part_01.parquet', 'scores_part_02.parquet', 'scores_part
_03.parquet', 'scores_part_04.parquet', 'scores_part_05.parquet', 'scores_part_06.parque
t']
full_scores.parquet exists: True
full_scores.csv exists: True
```

Out[ ]:

	news_id	category	subcategory	title	abstract	url	title_entitie
0	N55528	lifestyle	lifestyleroyals	The Brands Queen Elizabeth, Prince Charles, an...	Shop the notebooks, jackets, and more that the...	https://assets.msn.com/labs/mind/AAGH0ET.html	[{"Label" "Prince Philip, Duke o Edinburgh",..
1	N19639	health	weightloss	50 Worst Habits For Belly Fat	These seemingly harmless habits are holding yo...	https://assets.msn.com/labs/mind/AAB19MK.html	[{"Label" "Adipose tissue" "Type": "C" "Wik..
2	N61837	news	newsworld	The Cost of Trump's Aid Freeze in the Trenches...	Lt. Ivan Molchanets peeked over a parapet of s...	https://assets.msn.com/labs/mind/AAJgNsz.html	[

3 rows × 25 columns

In [ ]:

Create a stratified 100-row manual-label set

In [ ]:

```
# === Make a stratified random sample of 100 rows for manual labeling ===
import os, math
import pandas as pd
import numpy as np

BASE_DIR = "/content/drive/MyDrive/Final Project"
EXPORTS  = os.path.join(BASE_DIR, "exports")
```

```python
# Load the already-produced deliverable (has all text + model preds)
df = pd.read_csv(os.path.join(EXPORTS, "deliverable_scores.csv"))

SEED = 42
np.random.seed(SEED)

# target size
N_TARGET = 100

# Compute proportional allocation per category (at least 2 per category)
cat_counts = df["category"].value_counts()
cat_props  = cat_counts / cat_counts.sum()
alloc = (cat_props * N_TARGET).round().astype(int).clip(lower=2)

# adjust total to exactly 100
diff = N_TARGET - alloc.sum()
if diff > 0:
    # add 1 to the largest categories until we hit 100
    for cat in cat_counts.index:
        if diff == 0: break
        alloc[cat] += 1
        diff -= 1
elif diff < 0:
    # remove 1 from the largest categories until we hit 100 (but keep >=2)
    for cat in cat_counts.index:
        if diff == 0: break
        if alloc[cat] > 2:
            alloc[cat] -= 1
            diff += 1

# sample per category
parts = []
for cat, k in alloc.items():
    sub = df[df["category"] == cat]
    take = min(k, len(sub))
    parts.append(sub.sample(take, random_state=SEED))

man100 = pd.concat(parts, ignore_index=True)

# Keep only the columns needed for human judgment
keep_cols = ["news_id","category","subcategory","title","abstract"]
man100 = man100[keep_cols].drop_duplicates().reset_index(drop=True)

# Add empty manual label columns
man100["man_sentiment"]   = ""   # Positive / Neutral / Negative
man100["man_emotion"]     = ""   # Joy / Sadness / Anger / Fear / Neutral
man100["man_bias"]        = ""   # Biased / Neutral
man100["man_credibility"] = ""   # High Credibility / Low Credibility

out_path = os.path.join(EXPORTS, "manual_label_set_100.csv")
man100.to_csv(out_path, index=False)
print("Saved stratified manual set to:", out_path)
man100.head(5)
```

```
Saved stratified manual set to: /content/drive/MyDrive/Final Project/exports/manual_label_
set_100.csv
```

Out[ ]:

	news_id	category	subcategory	title	abstract	man_sentiment	man_emotion	man_bias	man_credil
0	N27324	news	newsworld	Contractor begins work in attempt to extinguis...	A fire that has been burning in a shallow coal...				

	news_id	category	subcategory	title	abstract	man_sentiment	man_emotion	man_bias	man_credil
1	N27874	news	newspolitics	Citing 'impeachment noise,' Republican candida...	CONCORD, NH: Former South Carolina Governor, U...				
2	N50332	news	newsus	Brandon Gonzales Charged With Capital Murder I...	Brandon Gonzales, 23, is charged with capital ...				
3	N54423	news	newsus	Multiple Juveniles Detained In Connection To L...	Dozens of students at Braswell High School in ...				
4	N42500	news	newsoffbeat	Kansas City car wash owner works with illegal ...	A Kansas City businessman has a big cleanup bi...				

Evaluation (manual label)

In [12]:
```
import pandas as pd
import numpy as np
import ast, json, re
from sklearn.metrics import classification_report, confusion_matrix, cohen_kappa_score, f1
from collections import Counter

# ========= CONFIG =========
MANUAL_PATH = "/content/drive/MyDrive/Final Project/manual_label_set_100_labeled.csv"
SCORED_PATH = "/content/drive/MyDrive/Final Project/run_outputs/full_scores.csv"
ID_COL = "news_id"

# ========= LOAD =========
man = pd.read_csv(MANUAL_PATH)
scored = pd.read_csv(SCORED_PATH)

# Sanity
needed_cols = {ID_COL, "man_sentiment", "man_emotion", "man_bias", "man_credibility"}
missing = [c for c in needed_cols if c not in man.columns]
if missing:
    raise ValueError(f"Manual file missing columns: {missing}")

df = man.merge(scored, on=ID_COL, how="left")
print(f"Merged rows: {len(df)} (manual={len(man)}, scored={len(scored)})")

# ========= NORMALIZATION HELPERS =========
def norm_label(x):
    if pd.isna(x): return None
    s = str(x).strip().lower()
    s = re.sub(r"\s+", " ", s)
    # unify common variants
    mapping = {
        "pos": "positive", "positive": "positive",
        "neg": "negative", "negative": "negative",
        "neu": "neutral", "neutral": "neutral",
        "joy": "joy", "sadness": "sadness", "anger": "anger", "fear": "fear",
        "surprise": "surprise", "neutral emotion": "neutral",
        "biased": "biased", "bias": "biased", "neutral bias": "neutral",
        "high credibility": "high credibility", "low credibility": "low credibility",
        "high": "high credibility", "low": "low credibility",
    }
    return mapping.get(s, s)

def find_col(candidates, cols):
    for c in candidates:
        if c in cols:
            return c
    return None

# Try to find prediction columns in scored file
cols = set(df.columns)

# Sentiment prediction column options
PRED_SENT_COL = find_col(
    ["sentiment_label","sent_label","pred_sentiment","sentiment_class","sentiment","pred_s
    cols
)

# Emotion prediction: either a single label or a top-list like "[(label, prob), ...]"
PRED_EMOT_COL = find_col(
    ["emot_label","emotion_label","emotion","pred_emotion","emotions_top","emotions"],
    cols
)

# Bias prediction (categorical)
PRED_BIAS_COL = find_col(
    ["bias_label","pred_bias","bias","bias_class"],
    cols
)

# Credibility prediction (categorical)
PRED_CRED_COL = find_col(
    ["cred_label","pred_credibility","credibility_label","credibility_class","credibility'
    cols
)

print("Detected prediction columns:")
print("  Sentiment  ->", PRED_SENT_COL)
print("  Emotion    ->", PRED_EMOT_COL)
print("  Bias       ->", PRED_BIAS_COL)
print("  Credibility->", PRED_CRED_COL)

# If emotions_top is a JSON-ish list, extract top-1 label
def get_emotion_top1(val):
    if pd.isna(val): return None
    s = str(val).strip()
    # Try parsing Python-list-like or JSON
    try:
        obj = ast.literal_eval(s)
    except Exception:
        try:
            obj = json.loads(s)
        except Exception:
            return norm_label(s)  # already a single label?
    # obj may look like [("joy", 0.87), ("admiration", 0.4), ...] or [{"label":"joy","scoi
    if isinstance(obj, list) and len(obj) > 0:
        first = obj[0]
        if isinstance(first, (list, tuple)) and len(first) >= 1:
            return norm_label(first[0])
        if isinstance(first, dict):
            # look for label key
            if "label" in first:
                return norm_label(first["label"])
            # could be {"joy":0.87}
            key = list(first.keys())[0]
            return norm_label(key)
    return None

def safe_series_top1(series):
    return series.apply(get_emotion_top1)

# Prepare ground-truth columns (normalized)
df["gt_sentiment"]   = df["man_sentiment"].apply(norm_label)
df["gt_emotion"]     = df["man_emotion"].apply(norm_label)
df["gt_bias"]        = df["man_bias"].apply(norm_label)
df["gt_credibility"] = df["man_credibility"].apply(norm_label)

# Prepare prediction columns (normalized)
if PRED_SENT_COL:
    df["pr_sentiment"] = df[PRED_SENT_COL].apply(norm_label)
if PRED_EMOT_COL:
    if "top" in PRED_EMOT_COL or df[PRED_EMOT_COL].astype(str).str.startswith("[").any():
        df["pr_emotion"] = safe_series_top1(df[PRED_EMOT_COL])
    else:
        df["pr_emotion"] = df[PRED_EMOT_COL].apply(norm_label)
if PRED_BIAS_COL:
    df["pr_bias"] = df[PRED_BIAS_COL].apply(norm_label)
if PRED_CRED_COL:
    df["pr_credibility"] = df[PRED_CRED_COL].apply(norm_label)

# Small peek
df[[ID_COL,"gt_sentiment","pr_sentiment","gt_emotion","pr_emotion","gt_bias","pr_bias","gt
```

```
Merged rows: 99 (manual=99, scored=51282)
Detected prediction columns:
  Sentiment  -> sent_label
  Emotion    -> emot_label
  Bias       -> bias_label
  Credibility-> cred_label
```

Out[12]:

	news_id	gt_sentiment	pr_sentiment	gt_emotion	pr_emotion	gt_bias	pr_bias	gt_credibility	pr_credibility
0	N27324	negative	neutral	fear	anger	neutral	neutral	high credibility	low credibility
1	N27874	negative	neutral	fear	anger	biased	neutral	high credibility	low credibility
2	N50332	negative	negative	fear	anger	biased	neutral	high credibility	low credibility
3	N54423	negative	neutral	fear	anger	neutral	biased	high credibility	low credibility
4	N42500	negative	negative	neutral	anger	neutral	neutral	high credibility	low credibility
5	N50720	negative	neutral	fear	fear	neutral	neutral	high credibility	low credibility
6	N42392	negative	negative	fear	fear	neutral	neutral	low credibility	low credibility
7	N39677	neutral	neutral	neutral	fear	neutral	neutral	high credibility	low credibility

In [13]:

```
from pprint import pprint

def eval_task(gt_col, pr_col, task_name, labels_order=None):
    print("\n" + "="*70)
    print(f"{task_name.upper()} — {gt_col} vs {pr_col}")
    sub = df[[gt_col, pr_col]].dropna()
    y_true = sub[gt_col].tolist()
    y_pred = sub[pr_col].tolist()
    if not y_true or not y_pred:
        print("No data to evaluate for this task.")
        return

    # If label order provided, ensure report follows it
    unique_labels = sorted(set(y_true) | set(y_pred)) if labels_order is None else labels_

    print("\nCounts:")
    print("  Ground truth:", Counter(y_true))
    print("  Predictions :", Counter(y_pred))

    print("\nClassification report (macro):")
    print(classification_report(y_true, y_pred, labels=unique_labels, zero_division=0, dig

    # Cohen's kappa (treat as nominal)
    try:
        kappa = cohen_kappa_score(y_true, y_pred)
        print(f"Cohen's κ: {kappa:.3f}")
    except Exception as e:
        print("Kappa error:", e)

    # Accuracy + macro F1
    acc = accuracy_score(y_true, y_pred)
    f1m = f1_score(y_true, y_pred, average="macro", zero_division=0)
    print(f"Accuracy: {acc:.3f} | Macro-F1: {f1m:.3f}")

    # Confusion matrix
    cm = confusion_matrix(y_true, y_pred, labels=unique_labels)
    print("\nLabels order:", unique_labels)
    print("Confusion matrix (rows=GT, cols=Pred):")
    print(cm)

# Run evaluations (only if those prediction cols exist)
if "pr_sentiment" in df.columns:
    eval_task("gt_sentiment", "pr_sentiment", "Sentiment", labels_order=["negative","neutr

if "pr_emotion" in df.columns:
    # Use a compact set; your GT set is typically one of these
    common_emotions = ["anger","fear","joy","sadness","surprise","neutral"]
    eval_task("gt_emotion", "pr_emotion", "Emotion", labels_order=common_emotions)

if "pr_bias" in df.columns:
    eval_task("gt_bias", "pr_bias", "Bias", labels_order=["neutral","biased"])

if "pr_credibility" in df.columns:
    eval_task("gt_credibility", "pr_credibility", "Credibility", labels_order=["low credib
```

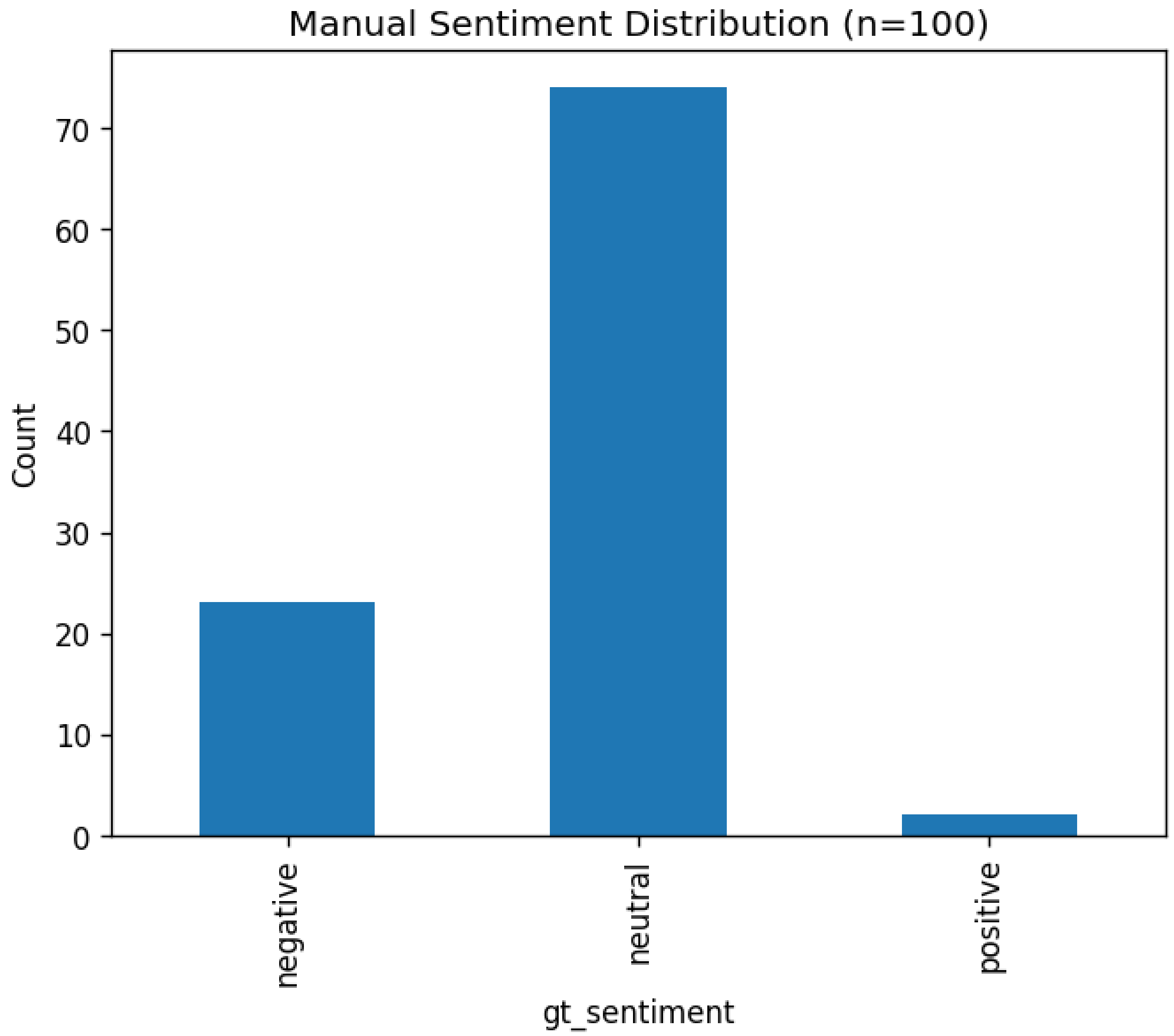
```
======================================================================
SENTIMENT — gt_sentiment vs pr_sentiment

Counts:
  Ground truth: Counter({'neutral': 74, 'negative': 23, 'positive': 2})
  Predictions : Counter({'neutral': 58, 'negative': 28, 'positive': 13})

Classification report (macro):
              precision    recall  f1-score   support

    negative      0.429     0.522     0.471        23
     neutral      0.793     0.622     0.697        74
    positive      0.077     0.500     0.133         2

    accuracy                          0.596        99
   macro avg      0.433     0.548     0.434        99
weighted avg      0.694     0.596     0.633        99
```

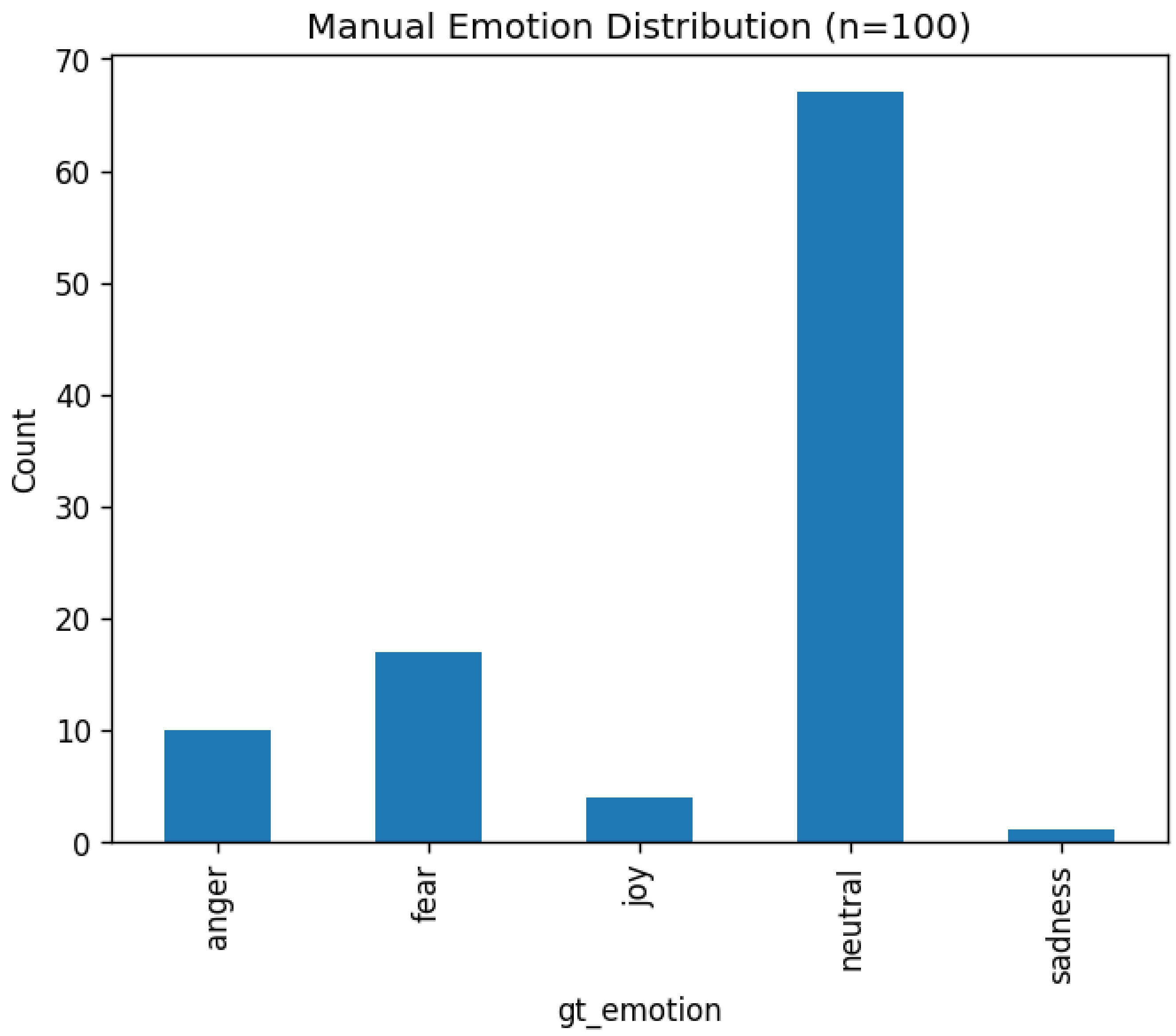
```
Cohen's κ: 0.182
Accuracy: 0.596 | Macro-F1: 0.434

Labels order: ['negative', 'neutral', 'positive']
Confusion matrix (rows=GT, cols=Pred):
[[12 11  0]
 [16 46 12]
 [ 0  1  1]]

======================================================================
EMOTION — gt_emotion vs pr_emotion

Counts:
  Ground truth: Counter({'neutral': 66, 'fear': 18, 'anger': 10, 'joy': 4, 'sadness': 1})
  Predictions : Counter({'fear': 22, 'joy': 21, 'neutral': 21, 'sadness': 18, 'anger': 1
7})

Classification report (macro):
              precision    recall  f1-score   support

       anger      0.235     0.400     0.296        10
        fear      0.273     0.333     0.300        18
         joy      0.143     0.750     0.240         4
     sadness      0.000     0.000     0.000         1
    surprise      0.000     0.000     0.000         0
     neutral      0.905     0.288     0.437        66

    accuracy                          0.323        99
   macro avg      0.259     0.295     0.212        99
weighted avg      0.682     0.323     0.385        99

Cohen's κ: 0.144
Accuracy: 0.323 | Macro-F1: 0.255

Labels order: ['anger', 'fear', 'joy', 'sadness', 'surprise', 'neutral']
Confusion matrix (rows=GT, cols=Pred):
[[ 4  2  2  2  0  0]
 [ 9  6  0  2  0  1]
 [ 0  0  3  0  0  1]
 [ 0  1  0  0  0  0]
 [ 0  0  0  0  0  0]
 [ 4 13 16 14  0 19]]

======================================================================
BIAS — gt_bias vs pr_bias

Counts:
  Ground truth: Counter({'neutral': 85, 'biased': 14})
  Predictions : Counter({'neutral': 75, 'biased': 24})

Classification report (macro):
              precision    recall  f1-score   support

     neutral      0.893     0.788     0.838        85
      biased      0.250     0.429     0.316        14

    accuracy                          0.737        99
   macro avg      0.572     0.608     0.577        99
weighted avg      0.802     0.737     0.764        99

Cohen's κ: 0.167
Accuracy: 0.737 | Macro-F1: 0.577

Labels order: ['neutral', 'biased']
Confusion matrix (rows=GT, cols=Pred):
[[67 18]
```

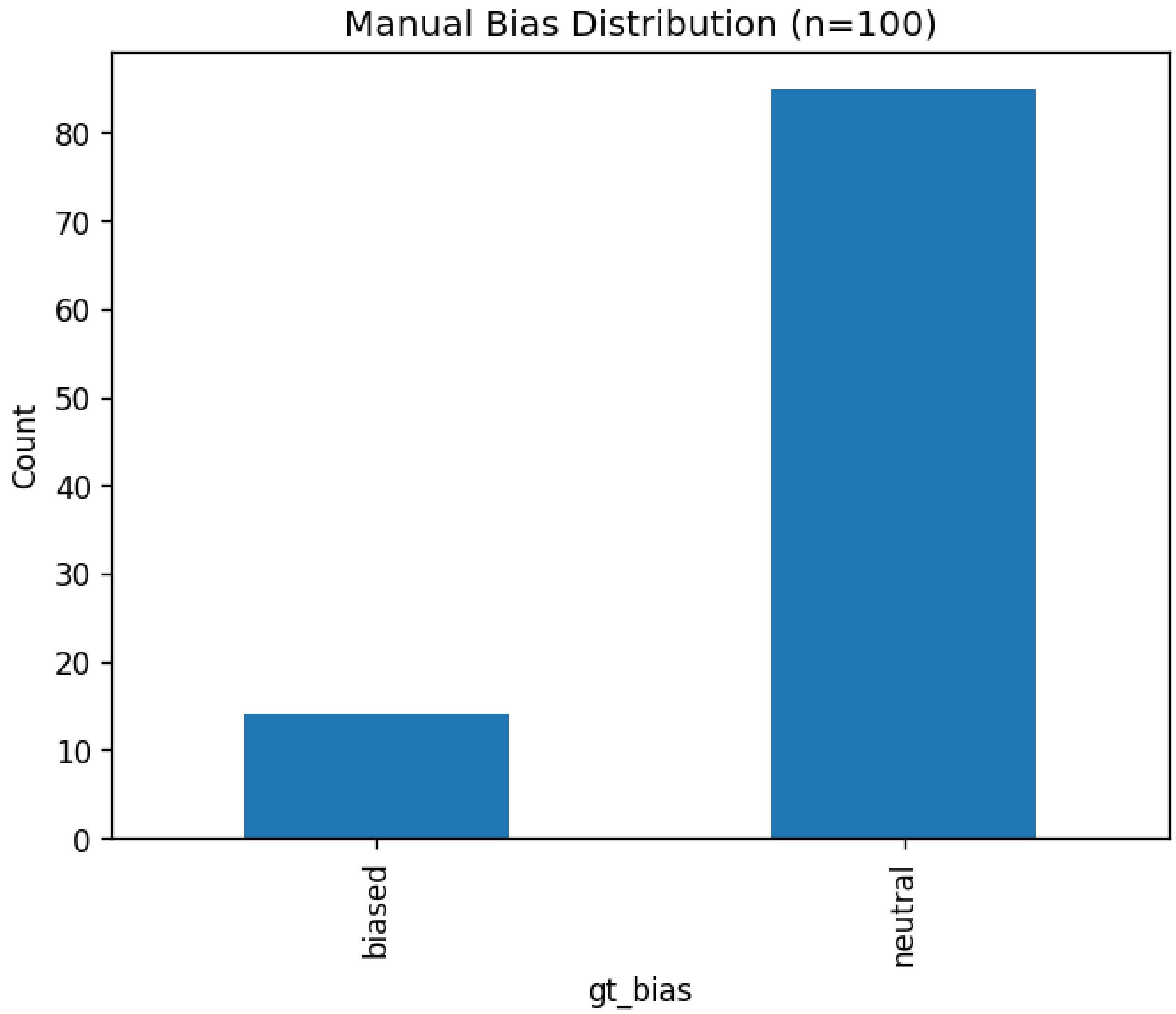
```
 [ 8  6]]

======================================================================
CREDIBILITY — gt_credibility vs pr_credibility

Counts:
  Ground truth: Counter({'high credibility': 96, 'low credibility': 3})
  Predictions : Counter({'low credibility': 95, 'high credibility': 4})

Classification report (macro):
                  precision    recall  f1-score   support

 low credibility      0.032     1.000     0.061         3
high credibility      1.000     0.042     0.080        96

        accuracy                          0.071        99
       macro avg      0.516     0.521     0.071        99
    weighted avg      0.971     0.071     0.079        99

Cohen's κ: 0.003
Accuracy: 0.071 | Macro-F1: 0.071

Labels order: ['low credibility', 'high credibility']
Confusion matrix (rows=GT, cols=Pred):
[[ 3  0]
 [92  4]]
```

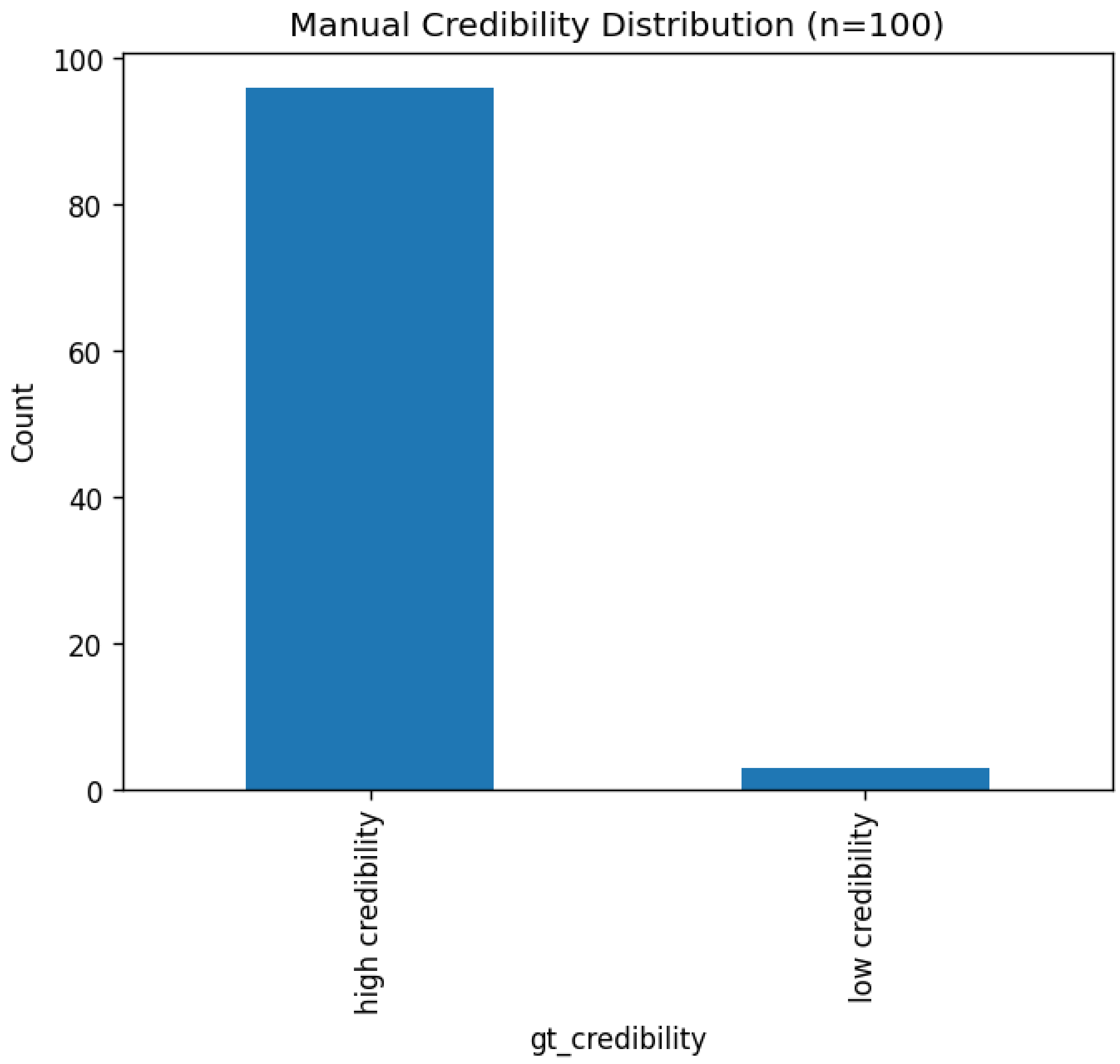
In [11]:

```
import matplotlib.pyplot as plt

def plot_dist(col, title):
    vc = df[col].value_counts().sort_index()
    vc.plot(kind="bar")
    plt.title(title)
    plt.xlabel(col)
    plt.ylabel("Count")
    plt.show()

# Distributions of your manual labels
plot_dist("gt_sentiment",   "Manual Sentiment Distribution (n=100)")
plot_dist("gt_emotion",     "Manual Emotion Distribution (n=100)")
plot_dist("gt_bias",        "Manual Bias Distribution (n=100)")
plot_dist("gt_credibility", "Manual Credibility Distribution (n=100)")
```


Manual Sentiment Distribution (n=100)
Count
0
10
20
30
40
50
60
70
negative
neutral
positive
gt_sentiment


Manual Emotion Distribution (n=100)
Count
0
10
20
30
40
50
60
70
anger
fear
joy
neutral
sadness
gt_emotion


Manual Bias Distribution (n=100)
Count
0
10
20
30
40
50
60
70
80
biased
neutral
gt_bias



Heuristic labeling (configure paths & thresholds once)

In [21]:
```python
import pandas as pd
import numpy as np

# INPUT
FULL_SCORES = "/content/drive/MyDrive/Final Project/run_outputs/full_scores.csv"   # has 

# OUTPUT
OUT_HEUR = "full_scores_with_heuristics_TUNED.csv"

df = pd.read_csv(FULL_SCORES)

# --- Safety checks ---
req_cols = {"sent_norm","emot_label","emot_conf","bias_norm","cred_norm","news_id"}
missing = [c for c in req_cols if c not in df.columns]
if missing:
    raise ValueError(f"Missing columns in {FULL_SCORES}: {missing}")

# --- Sentiment heuristic ---
# If sent_norm appears in [0,1], use center=0.5 with neutral band 0.35-0.65.
# If it appears in [-1,1], use neutral band (-0.2 .. +0.2).
```

```
def heur_sentiment(x):
    if pd.isna(x):
        return None
    try:
        x = float(x)
    except:
        return None
    if 0.0 <= x <= 1.0:
        if x > 0.65: return "positive"
        if x < 0.35: return "negative"
        return "neutral"
    else:
        if x > 0.20: return "positive"
        if x < -0.20: return "negative"
        return "neutral"

df["heur_sent"] = df["sent_norm"].apply(heur_sentiment)

# --- Emotion heuristic ---
# Only accept non-neutral emotion if emot_conf > 0.60; otherwise mark Neutral
df["heur_emot"] = np.where(df["emot_conf"] > 0.60, df["emot_label"].str.lower(), "neutral"

# --- Bias heuristic ---
# Conservative: biased if bias_norm >= 0.66, else neutral
df["heur_bias"] = np.where(df["bias_norm"] >= 0.66, "biased", "neutral")

# --- Credibility heuristic ---
# Flip towards High if cred_norm >= 0.70, else Low
df["heur_cred"] = np.where(df["cred_norm"] >= 0.70, "high credibility", "low credibility")

# Save
df.to_csv(OUT_HEUR, index=False)
print(f"☑ Heuristic labels added → {OUT_HEUR}")
```

```
☑ Heuristic labels added → full_scores_with_heuristics_TUNED.csv
```

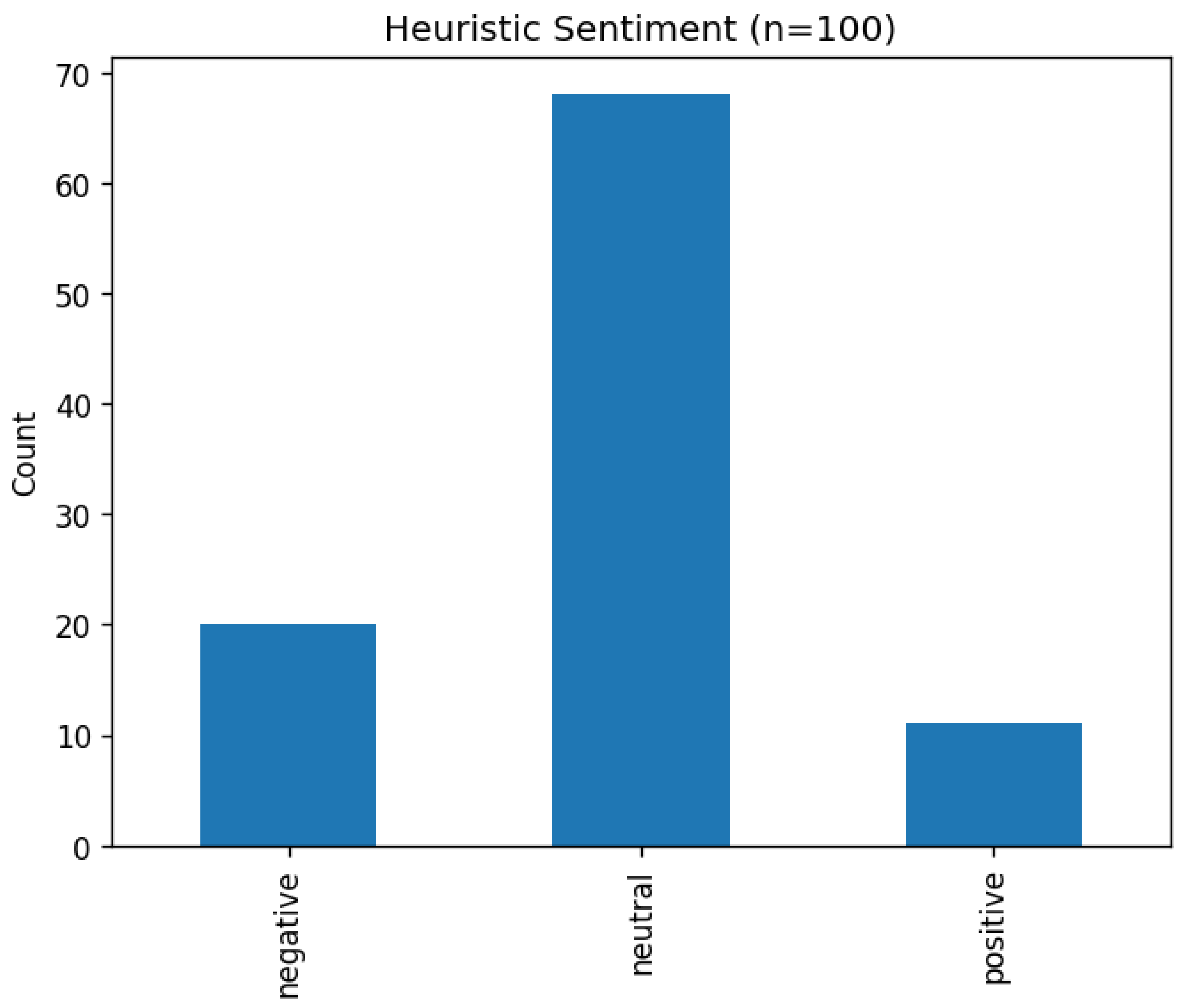
In [22]:

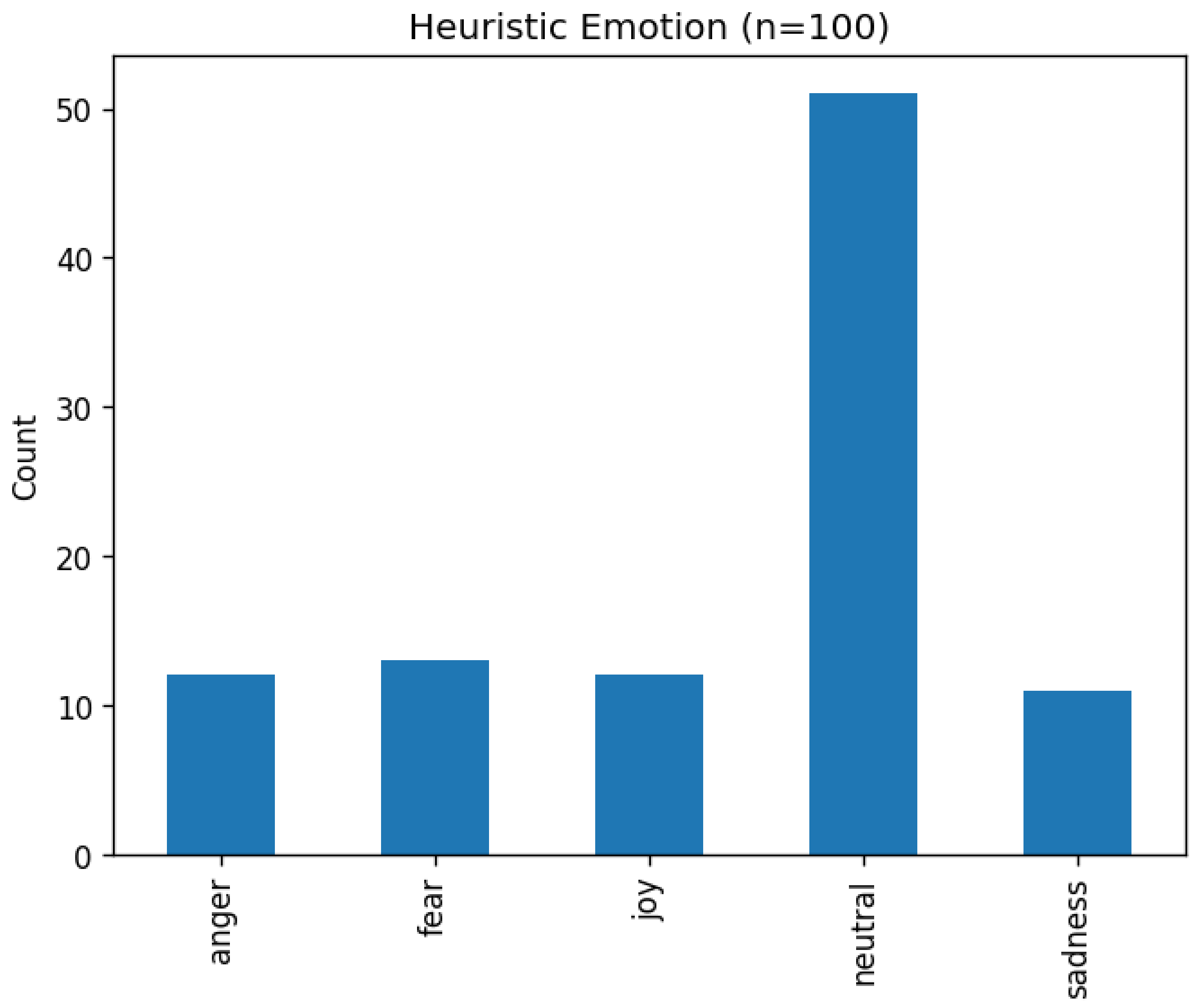
```
import pandas as pd
import numpy as np
import re
from collections import Counter
from sklearn.metrics import classification_report, confusion_matrix, cohen_kappa_score, ac

# INPUTS
MANUAL_100 = "/content/drive/MyDrive/Final Project/manual_label_set_100_labeled.csv"
HEUR_FULL  = "full_scores_with_heuristics_TUNED.csv" # produced by Cell 1

man = pd.read_csv(MANUAL_100)
heur = pd.read_csv(HEUR_FULL)

df = man.merge(heur[["news_id","heur_sent","heur_emot","heur_bias","heur_cred"]], on="news
print("Merged rows:", len(df))

def norm(x):
    if x is None or (isinstance(x, float) and np.isnan(x)): return None
    s = str(x).strip().lower()
    s = re.sub(r"\s+", " ", s)
    mapping = {
        "pos":"positive","neg":"negative","neu":"neutral",
        "high":"high credibility","low":"low credibility"
    }
    return mapping.get(s, s)

def eval_task(gt_col, pr_col, task_name, labels_order=None, digits=3):
    print("\n" + "="*70)
    print(f"{task_name.upper()} — {gt_col} (manual) vs {pr_col} (heuristic)")
    sub = df[[gt_col, pr_col]].dropna()
    if sub.empty:
        print("No rows to evaluate.");
        return
    y_true = sub[gt_col].map(norm).tolist()
    y_pred = sub[pr_col].map(norm).tolist()
    labels = labels_order or sorted(set(y_true) | set(y_pred))

    print("\nCounts:")
    print("  Ground truth:", Counter(y_true))
    print("  Predictions :", Counter(y_pred))

    print("\nClassification report (macro):")
    print(classification_report(y_true, y_pred, labels=labels, zero_division=0, digits=dig

    acc   = accuracy_score(y_true, y_pred)
    f1m   = f1_score(y_true, y_pred, average="macro", zero_division=0)
    kappa = cohen_kappa_score(y_true, y_pred)
    print(f"Cohen's κ: {kappa:.3f} | Accuracy: {acc:.3f} | Macro-F1: {f1m:.3f}")

    cm = confusion_matrix(y_true, y_pred, labels=labels)
    print("\nLabels order:", labels)
    print("Confusion matrix (rows=GT, cols=Pred):")
    print(cm)

# Run all four tasks
eval_task("man_sentiment",   "heur_sent",  "Sentiment",   labels_order=["negative","neutra
eval_task("man_emotion",     "heur_emot",  "Emotion",     labels_order=["anger","fear","jo
eval_task("man_bias",        "heur_bias",  "Bias",        labels_order=["neutral","biased"
eval_task("man_credibility", "heur_cred",  "Credibility", labels_order=["low credibility",
```

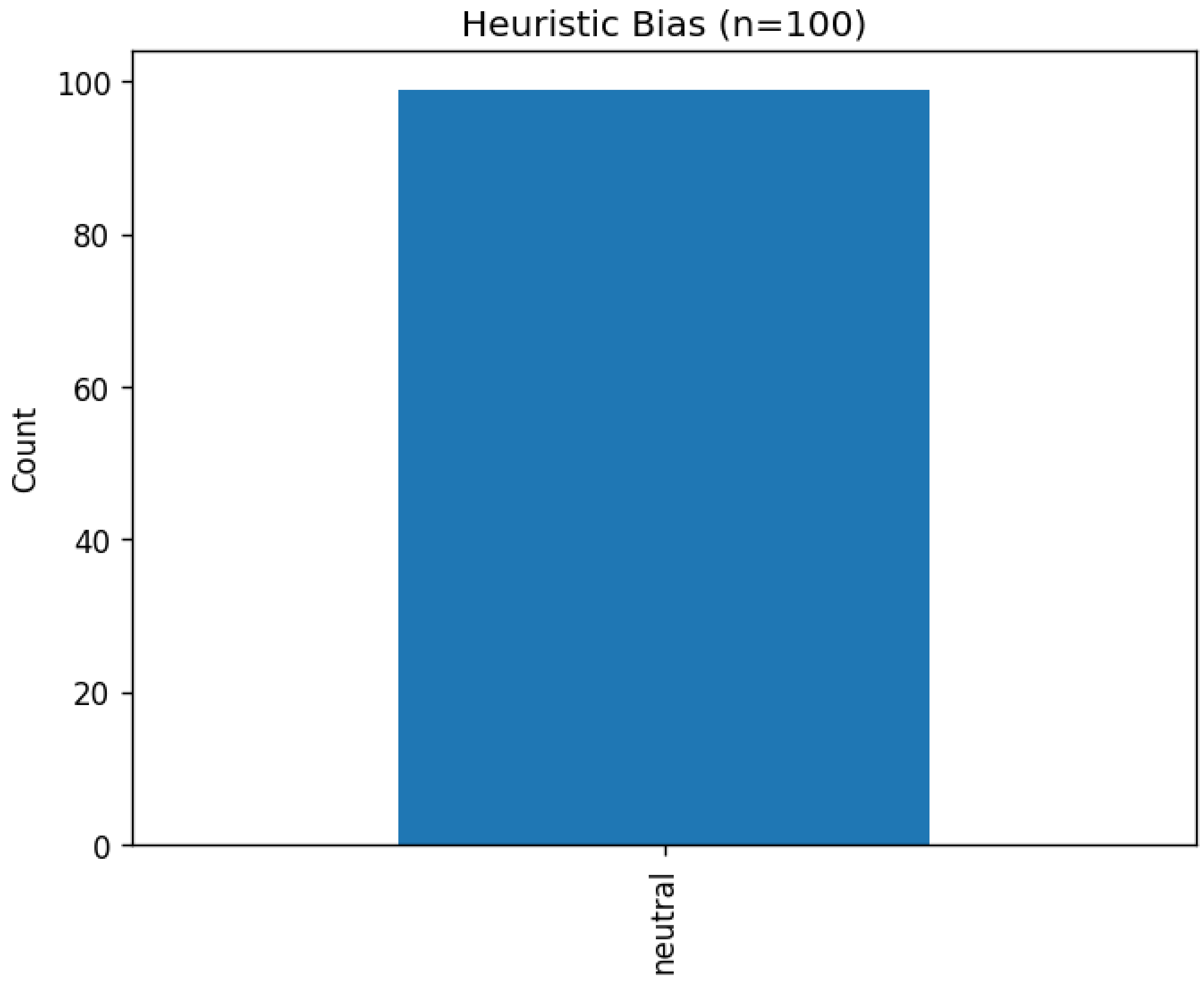
```
Merged rows: 99

======================================================================
SENTIMENT — man_sentiment (manual) vs heur_sent (heuristic)

Counts:
  Ground truth: Counter({'neutral': 74, 'negative': 23, 'positive': 2})
  Predictions : Counter({'neutral': 68, 'negative': 20, 'positive': 11})

Classification report (macro):
              precision    recall  f1-score   support

    negative      0.450     0.391     0.419        23
     neutral      0.779     0.716     0.746        74
    positive      0.091     0.500     0.154         2

    accuracy                          0.636        99
   macro avg      0.440     0.536     0.440        99
weighted avg      0.689     0.636     0.658        99

Cohen's κ: 0.169 | Accuracy: 0.636 | Macro-F1: 0.440

Labels order: ['negative', 'neutral', 'positive']
Confusion matrix (rows=GT, cols=Pred):
[[ 9 14  0]
 [11 53 10]
 [ 0  1  1]]

======================================================================
EMOTION — man_emotion (manual) vs heur_emot (heuristic)

Counts:
  Ground truth: Counter({'neutral': 66, 'fear': 18, 'anger': 10, 'joy': 4, 'sadness': 1})
  Predictions : Counter({'neutral': 51, 'fear': 13, 'anger': 12, 'joy': 12, 'sadness': 1
1})

Classification report (macro):
              precision    recall  f1-score   support

       anger      0.333     0.400     0.364        10
        fear      0.231     0.167     0.194        18
         joy      0.167     0.500     0.250         4
     sadness      0.000     0.000     0.000         1
    surprise      0.000     0.000     0.000         0
     neutral      0.725     0.561     0.632        66

    accuracy                          0.465        99
   macro avg      0.243     0.271     0.240        99
weighted avg      0.566     0.465     0.504        99

Cohen's κ: 0.129 | Accuracy: 0.465 | Macro-F1: 0.288

Labels order: ['anger', 'fear', 'joy', 'sadness', 'surprise', 'neutral']
Confusion matrix (rows=GT, cols=Pred):
[[ 4  2  0  0  0  4]
 [ 7  3  0  1  0  7]
 [ 0  0  2  0  0  2]
 [ 0  0  0  0  0  1]
 [ 0  0  0  0  0  0]
 [ 1  8 10 10  0 37]]

======================================================================
BIAS — man_bias (manual) vs heur_bias (heuristic)

Counts:
  Ground truth: Counter({'neutral': 85, 'biased': 14})
  Predictions : Counter({'neutral': 99})

Classification report (macro):
              precision    recall  f1-score   support

     neutral      0.859     1.000     0.924        85
      biased      0.000     0.000     0.000        14

    accuracy                          0.859        99
   macro avg      0.429     0.500     0.462        99
weighted avg      0.737     0.859     0.793        99

Cohen's κ: 0.000 | Accuracy: 0.859 | Macro-F1: 0.462

Labels order: ['neutral', 'biased']
Confusion matrix (rows=GT, cols=Pred):
[[85  0]
 [14  0]]

======================================================================
CREDIBILITY — man_credibility (manual) vs heur_cred (heuristic)

Counts:
  Ground truth: Counter({'high credibility': 96, 'low credibility': 3})
  Predictions : Counter({'low credibility': 96, 'high credibility': 3})

Classification report (macro):
                  precision    recall  f1-score   support

 low credibility      0.031     1.000     0.061         3
high credibility      1.000     0.031     0.061        96

        accuracy                          0.061        99
       macro avg      0.516     0.516     0.061        99
    weighted avg       0.971      0.061      0.061         99

Cohen's κ: 0.002 | Accuracy: 0.061 | Macro-F1: 0.061

Labels order: ['low credibility', 'high credibility']
Confusion matrix (rows=GT, cols=Pred):
[[ 3  0]
 [93  3]]
```

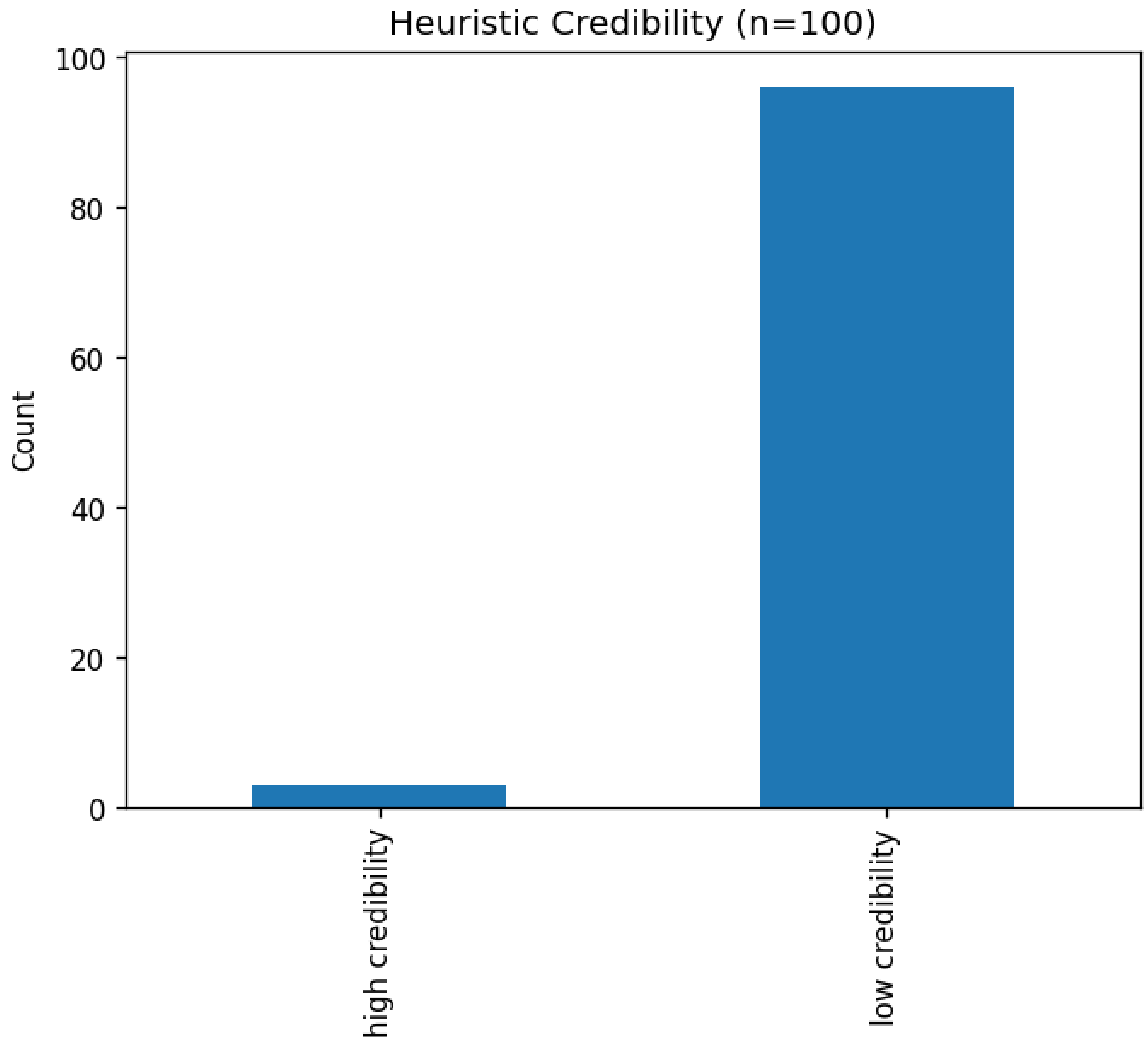
In [23]:

```python
import matplotlib.pyplot as plt

def plot_dist(series, title):
    s = series.dropna().map(lambda x: str(x).lower())
    s.value_counts().sort_index().plot(kind="bar")
    plt.title(title); plt.xlabel(""); plt.ylabel("Count"); plt.show()

plot_dist(df["heur_sent"], "Heuristic Sentiment (n=100)")
plot_dist(df["heur_emot"], "Heuristic Emotion (n=100)")
plot_dist(df["heur_bias"], "Heuristic Bias (n=100)")
plot_dist(df["heur_cred"], "Heuristic Credibility (n=100)")
```




Heuristic Emotion (n=100)
Count
0
10
20
30
40
50
anger
fear
joy
neutral
sadness


Heuristic Bias (n=100)
Count
100
80
60
40
20
0
neutral


Heuristic Credibility (n=100)
Count
0
20
40
60
80
100
high credibility
low credibility