When Misinformation Speaks and Converses: Rethinking Fact-Checking in Audio Platforms

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Abstract

Audio platforms have evolved beyond entertainment. They have become central to public discourse, from podcasts and radio to WhatsApp voice notes and live streams. With millions of shows and hundreds of millions of listeners, audio platforms are now a major channel for misinformation. Yet existing fact-checking pipelines are mostly designed for written claims, overlooking the unique properties of spoken media. We argue that audio misinformation is not merely textual content with transcripts: it is structurally different because it is both *spoken*—carrying persuasive force through prosody, pacing, and emotion—and *conversational*—unfolding across turns, speakers, and episodes. These dual properties introduce verification difficulties that traditional methods rarely face. This *position paper* synthesizes evidence across modalities and platforms, examines datasets and methods, and highlights why existing pipelines fail on audio. We argue that advancing fact-checking requires rethinking verification pipelines around the spoken and conversational realities of audio.

1 Introduction

Spoken media have become a dominant channel for news and commentary. From WhatsApp voice notes and live-streamed talk shows to podcasts, audio platforms now command hours of daily attention, shaping public discourse at scale. Podcasts alone now exceed 4.3 million distinct shows, reaching an estimated 500 million listeners globally, with average consumption of about seven hours per listener each week.[1] Podcast listenership has grown steadily year over year, reflecting how audio has shifted from a niche medium to a mainstream source of information and opinion.[2] Yet while audience adoption accelerates, research on fact-checking methods has not kept pace. Automated fact-checking remains text-centric (Yao et al., 2023), leaving the spoken and conversational dimensions of misinformation underexplored.

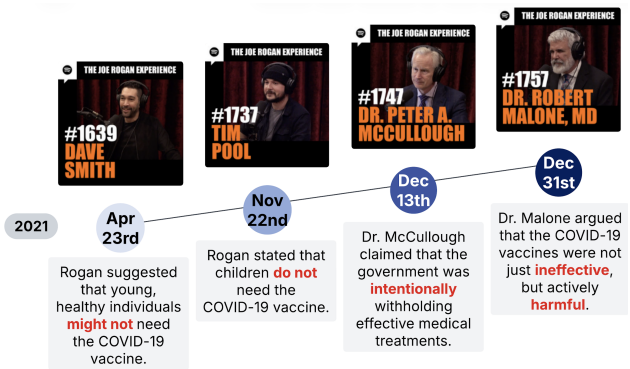

Figure 1: Timeline of cross-episode misinformation on COVID-19. These episodes illustrate how persistent and unchallenged misinformation can accumulate over time. Red text highlights false claims in audio content. Image credit: Spotify

The consequences are clear: when false claims circulate in podcasts, radio shows, or private group chats, they spread without the anchoring mechanisms available in text (hyperlinks, citations, overlays). Delivery through tone and pacing lends credibility (Guyer et al., 2021), while repetition across turns and episodes reinforces false narratives (see Figure 1). A single falsehood voiced by a familiar speaker can gain persistence and authority that written text rarely achieves.

What makes audio platforms distinctive and challenging is that they are both *spoken* and *conversational*. As spoken media, they carry persuasive force through prosody, pacing, and emotion, often making content sound compelling regardless of veracity. As conversational media, they distribute meaning across dialogue history, with context-dependent reference, stance shifts, and cumulative repetition that complicate verification. These dual properties introduce verification demands absent

[1] https://www.demandsage.com/podcast-statistics/

[2] https://podcastatistics.com/

from other modalities, underscoring why audio cannot be treated as *just another transcript*.

Fact-checking began as a language-centered problem: systems identified claims in text, retrieved evidence from encyclopedic sources, assessed veracity, and increasingly produced textual rationales (Aly et al., 2021; Jiang et al., 2020; Thorne et al., 2018; Atanasova et al., 2020). With audio platforms now mainstream, we extend the established approach to spoken dialogue. We (1) show why audio platforms matter and how they differ from other media, (2) survey datasets spanning audio, dialogue, and factuality, highlighting their coverage and limitations, and (3) analyze why existing pipelines fall short and review emerging efforts toward audio-based fact-checking. Taken together, these contributions aim to reposition audio platforms not as a blind spot but as the next frontier for fact-checking research.

2 Why Audio Platforms Matter

Audio platforms reshape how misinformation spreads and how fact-checking must operate. Unlike standalone text, spoken dialogue carries meaning in delivery and interaction. As a *spoken* medium, prosody, pacing, and vocal cues alter perception; as a *conversational* medium, meaning unfolds across turns, speakers, and episodes. These properties simultaneously amplify persuasion and complicate verification, requiring methods that listen to delivery and track dialogue.

2.1 Spoken Misinformation

Audio persuades differently from text. Even with identical words, prosody (pitch, intensity, timing), pacing, and emotion shift judgments of confidence, credibility, and intent. Listeners infer trustworthiness from vocal delivery (Guyer et al., 2021); deception studies show that speech rate, intensity, pitch variation, and hesitations influence truthfulness judgments (Jaiswal et al., 2016; Bahaa et al., 2024); and even eyewitness testimony accuracy has been linked to vocal cues, indicating that delivery can act as a heuristic shortcut (Gustafsson et al., 2023). At scale, analyses of 88,000 podcast episodes show that vocal qualities (e.g., energy, seriousness) predict engagement, with adversarial acoustic features outperforming common baselines (Yang et al., 2019). These persuasion effects interact with interpretation. Irony perception depends on prosody; without auditory cues, sarcasm is often taken literally (Matsui et al., 2016; Farabi et al., 2024; Li et al., 2025b). On audio platforms, sarcastic and ironic intent relies on delivery (Rao et al., 2022; Li et al., 2025a), which can tilt credibility judgments and downstream decisions. Together, these results place prosodic and other paralinguistic features at the center of how people absorb, interpret, and evaluate information.

Meaning in audio unfolds as a continuous signal. Claims often span prosodic units rather than tidy sentence boundaries. Hesitations, elongations, and timing cues can split the relevant proposition across adjacent acoustic spans, even within a single speaker's turn. Speakers slow down and insert disfluencies before more surprising words, effectively 'buying time,' and speech rate adapts to information content (Bergey and DeDeo, 2024). Podcast discourse further complicates scope: episodes are long, digressive, and conversational, with ads and side-tracks that introduce long-range dependencies and noisy content—making chapterization/segmentation a prerequisite for downstream tasks like retrieval (Abdessamed et al., 2024; Ghazimatin et al., 2024).

Incidental sounds (laughter, music, effects) and overlapped speech (interruptions, backchannels, crosstalk) can obscure boundaries and degrade segmentation/diarization, motivating explicit overlap detection (Bredin and Laurent, 2021; Sun et al., 2025). Serialized listening sustains narratives over time; surveys report about 80% of listeners finish most episodes they start (Caramancion, 2022). Case studies show the same dynamics across platforms: WhatsApp voice notes in Portugal circulated urgent COVID-19 rumors and policy critiques (Cardoso et al., 2022), while an analysis of leading U.S. political podcasts documented frequent false or unsubstantiated claims reaching large audiences (Wirtschafter, 2023). Unlike text feeds where visual labels sit on posts, podcasts and streams are consumed in-flow, so the persuasive payload reaches listeners during listening itself (Pathiyan Cherumanal et al., 2024).

The same cues that make audio persuasive also enable detection. Because voices carry stance and identity cues—intonation, stress, disfluencies—acoustic evidence can supplement or even surpass transcripts for certain phenomena. In political debates, adding acoustic features significantly improves identification of check-worthy claims, and in some conditions audio-only models outperform text-only systems (Ivanov et al., 2024).

Metric	Setting	Past 15 sec	Full dialogue
F1	Base	0.6799	0.7140
	Shuffled	0.6590	0.7041
AUC	Base	0.7408	0.7924
	Shuffled	0.7203	0.7780

Table 1: F1 and AUC (Area Under the Curve) for text-only claim verification on FOO (dataset name anonymized for review) (Anonymous, 2025) across two context regimes. Rows compare *Base* (original chronological order) against *Shuffled* (randomized turn order). Shuffling reduces performance in both settings, implying that chronological turn order carries predictive signal beyond lexical content.

Multimodal sarcasm corpora likewise find prosody outperforms text for irony and emotion (Li et al., 2025a). More broadly, multimodal misinformation frameworks find that acoustic encoders capture semantic-level cues that transcripts miss, yielding gains when fused with other modalities (Liu et al., 2024); and while standalone deception cues can be noisy, features like jitter, pauses, and pitch instability become informative when integrated with lexical and visual signals (Jaiswal et al., 2016; Bahaa et al., 2024). These observations motivate audio-aware fact-checking that listens to delivery and sequence, not only to words.

2.2 Conversational Misinformation

Conversation changes what a "claim" is. In dialogue, propositions are negotiated through adjacency, uptake, repairs, hedges, and challenges; a first mention is rarely the final form. Claims are also distributed and compositional—parts contributed at different turns and by different speakers that only add up to a verifiable unit when considered together (Chamoun et al., 2023; Deng et al., 2024). Chronology further shapes judgment: primacy and recency biases anchor interpretation, and repeated callbacks increase availability and felt plausibility (Kiesel et al., 2021); podcast episodes often include narrative content and recurring formats, which can sustain storylines over time (Abdessamed et al., 2024). Social roles and bonds intensify these effects: hosts and recurring guests shape expectations and perceived credibility; repeated agreement can signal consensus, and parasocial trust makes familiar voices feel credible (Yorganci and McMurtry, 2024; Vilceanu, 2025). In short, conversational structure itself—how things are said, when they are said, and by whom—drives persuasion independent of the words alone.

Misinformation leverages these dynamics. On messaging platforms, misleading WhatsApp voice notes follow repeatable rhetorical templates—greeting, insider/expert positioning, emotional appeals, a central false assertion, and a call-to-action (Cardoso et al., 2022; El-Masri et al., 2022). Long-form podcasts exploit repetition and serialized exposure: narratives are seeded, revisited, and strengthened across episodes. For example, *The Joe Rogan Experience*, one of the world's most influential podcasts (Figure 1), advanced false COVID-19 vaccine narratives across multiple episodes. In April, he suggested young, healthy people might not need vaccinations (Geddes, 2022); by November, he argued against vaccinating children (Paterson, 2021); and in December, with guests Dr. Peter A. McCullough and Dr. Robert Malone, he claimed vaccines were ineffective or harmful (Team, 2022; Teoh, 2021). This cross-episode repetition amplified misinformation through cumulative exposure. In January 2022, over 270 U.S. health professionals issued an open letter urging platform action (Yang, 2022). These dynamics scale beyond a single program. U.S. podcast studies describe "toxic conversation chains"—emotionally charged exchanges that sustain harmful narratives within episodes—and document that such toxicity recurs across many episodes (Rizwan et al., 2025).

These dynamics complicate verification as well as persuasion. Empirically, systems perform markedly better when given dialogue context rather than isolated utterances (Anonymous, 2025), and human annotators likewise use surrounding context to judge check-worthiness (Gadiraju et al., 2024). To isolate the role of order, we compare a base model to a shuffled-turns variant that randomizes utterance order while keeping content fixed on FOO (Anonymous, 2025) - an anonymized two-speaker, English, dialogue benchmark. Shuffling degrades performance in both context regimes (Table 1): under a past 15 sec regime (only the 15 seconds preceding the claim), the shuffled variant drops to F1 = 0.66 and AUC = 0.72, whereas the base model scores higher; with full-dialogue context (entire relevant dialogue around the claim), the base reaches F1 = 0.73 and AUC = 0.82, and shuffling again lowers both metrics. This aligns with findings that temporal order and pacing carry information beyond lexical content; shuffling removes these cues (Bergey and DeDeo, 2024). Together, these observations show that conversational order and accumu-

lation shape what verifiers and annotators perceive as check-worthy and true.

3 Datasets

Research into fact-checking for audio platforms remains relatively nascent. As summarized in Table 2, most corpora address only subsets of these dimensions and rarely combine all four dimensions—audio, dialogue, transcripts, and factuality.

Large-scale speech corpora exist but target automatic speech recognition (ASR) or representation learning, not verification. Read audiobooks (LibriSpeech (Panayotov et al., 2015), LibriHeavy (Kang et al., 2024)), multilingual parliamentary speeches (VoxPopuli (Wang et al., 2021)), and English ASR collections (People's Speech (Galvez et al., 2021)) offer thousands to hundreds of thousands of hours, yet lack claim units, timestamped rationales, and veracity labels. These corpora improve speech modeling, not veracity evaluation.

Dialogue benchmarks have expanded but remain text-only. Early datasets (Ubuntu (Lowe et al., 2015), DailyDialog (Li et al., 2017), Persona-Chat (Zhang et al., 2018)) advanced turn-taking, persona, and emotion, while later work emphasized empathy, knowledge grounding, or summarization (e.g., Topical-Chat (Gopalakrishnan et al., 2019), Wizard of Wikipedia (Dinan et al., 2019), SAMSum (Gliwa et al., 2019)). These corpora are invaluable for conversational modeling, but they lack audio and do not provide veracity labels.

A separate line of work scales spoken dialogue without factuality. These corpora combine audio, diarization, and transcripts—supporting prosody, overlap, and long-context modeling—but they do not label whether claims are true. Representative examples span emotion/video-grounded conversations (MELD (Poria et al., 2019); AVSD (Alamri et al., 2019)), multiparty household talk captured with distant microphones (CHiME-6 (Watanabe et al., 2020)), and multi-speaker earnings-call speech (SPGISpeech (O'Neill et al., 2021)); large long-form conversational releases broaden duration and domains (e.g., Spotify Podcasts (Clifton et al., 2020); CANDOR (Reece et al., 2023)). Together, they are essential for modeling how something is said, not for assessing whether it is true.

Where factuality is present, coverage is often partial or limited to a single modality. Some datasets provide check-worthiness only—flagging what to fact-check but not whether it is true (PHEME (Zubiaga et al., 2015); ClaimBuster (Hassan et al., 2017); ViClaim (Giedemann et al., 2025)). Others include veracity but miss key modalities: CT-FCC-18 (Kopev et al., 2019) aligns short debate audio to fact-checked claims without full dialogue context, while DialFact (Gupta et al., 2022) verifies claims in textual dialogues with no audio. Related work benchmarks consistency rather than truth (Qin et al., 2021), and WhatsApp 2019 (Resende et al., 2019) adds veracity assessments to media shared in chats but does not capture audio. Across these resources, the common gaps include variable claim granularity, limited timestamping, narrow domains, and weak multi-evidence support.

Only recently have datasets appeared that cover audio, dialogue, transcripts, and veracity. Setty and Becker (2025) targets podcasts with transcripts plus check-worthiness and supports/refutes annotations. MAD (Chun et al., 2025) introduces multi-turn spoken dialogues with aligned audio and veracity labels. And, FOO (Anonymous, 2025) provides roughly 1,000 dialogues with thousands of check-worthy claims and word-level timestamps. Despite progress, current resources remain small-scale, English-dominant, and narrow in domain coverage—underscoring the urgent need for large-scale, multimodal audio fact-checking datasets.

4 Where Traditional Pipelines Fail

Most fact-checking systems follow a four-stage pipeline: Claim Detection (CD) identifies check-worthy statements; Evidence Retrieval (ER) queries trusted sources to gather passages relevant to the claim; Claim Verification (VER) compares the claim against the retrieved evidence to assign a verdict (supported, contradicted, or insufficient) and a confidence score; and Explanation Generation (GEN) produces a human-readable rationale that highlights the evidence and explains the verdict. Building on our earlier discussion of how audio platforms differ, we now examine where this pipeline breaks for spoken dialogue.

4.1 Claim Detection (CD) Task

Traditional CD treats one sentence as a single proposition, but conversational audio rarely obliges: claims spread across adjacent turns, carry hedges, or sit inside Q&A and anecdotes, so single-turn sentence classifiers miss the claim or mis-scope its span (Chamoun et al., 2023; Deng et al., 2024). Text-only detectors ignore how delivery moves

Dataset	Audio	Dialogue	Transcript	Factuality	Size	Lang	Domain
LibriSpeech (Panayotov et al., 2015)	x	–	x	–	1k hrs	En	audiobooks
VoxPopuli (Wang et al., 2021)	x	–	x	–	400k hrs raw / 19.1k hrs labeled	Multi	parliamentary speeches
People's Speech (Galvez et al., 2021)	x	–	x	–	30k+ hrs	En	diverse speech
LibriHeavy (Kang et al., 2024)	x	–	x	–	50k hrs	En	audiobooks
SSSD (Sheikh et al., 2025)	x	x	–	–	700+ hrs	En	everyday conv.
Ubuntu Corpus (Lowe et al., 2015)	–	x	–	–	930k dialogs	En	tech support
DailyDialog (Li et al., 2017)	–	x	–	–	13.1k dialogs	En	daily chat
Persona-Chat (Zhang et al., 2018)	–	x	–	–	11k dialogs / 164k utt.	En	open-domain, persona
MultiWOZ (Budzianowski et al., 2018)	–	x	–	–	10k dialogs	En	task-oriented, multi-domain
GroundedConv (Zhou et al., 2018)	–	x	–	–	4.1k dialogs	En	Wikipedia-grounded movie chat
Topical-Chat (Gopalakrishnan et al., 2019)	–	x	–	–	11.3k dialogs	En	knowledge-grounded chat
Wizard of Wikipedia (Dinan et al., 2019)	–	x	–	–	22k dialogs / 202k utt.	En	knowledge-grounded chat
SAMSum (Gliwa et al., 2019)	–	x	–	–	16.4k dialogs	En	messenger chat, abstractive summarization
EmpatheticDialogues (Rashkin et al., 2019)	–	x	–	–	25k dialogs	En	emotion-grounded chat
BlendedSkillTalk (Smith et al., 2020)	–	x	–	–	6.8k dialogs	En	open-domain, blended skills
MultiWOZ 2.1 (Eric et al., 2020)	–	x	–	–	10k dialogs	En	task-oriented, multi-domain
MedDialog (Zeng et al., 2020)	–	x	–	–	0.26m / 3.4m dialogs	En/Zh	medical
WhatsApp 2021 (Maros et al., 2021)	–	x	–	–	298k msgs	Pt	political WhatsApp groups, link/media typology
MediaSum (Zhu et al., 2021)	–	x	x	–	463.6k dialogs, summaries	En	interviews (NPR/CNN)
CMCC (Huang et al., 2022)	–	x	x	–	100k dialogs (8.9k labeled)	Zh	customer service
Audio Dialogues (Goel et al., 2024)	–	x	–	–	163.8k dialogs	En	audio/music understanding
Liu2025 Bilingual Dialogue (Liu et al., 2025)	–	x	–	–	see repo	En/Zh	personality, emotion
MELD (Poria et al., 2019)	x	x	x	–	1.4k dialogs / 13k utt.	En	TV show (Friends), emotion recognition
AVSD (Alamri et al., 2019)	x	x	x	–	11.8k dialogs / 118k QA pairs	En	video-grounded daily activities
Spotify Podcasts (Clifton et al., 2020)	x	x	x	–	60k hrs / 100k+ eps	En	podcasts
CHiME-6 (Watanabe et al., 2020)	x	x	x	–	40+ hrs	En	dinner-party conversations, conversational ASR
DiPCo (Segbroeck et al., 2020)	x	x	x	–	5.3 hrs / 10 sessions	En	dinner-party conversations
SPGISpeech (O'Neill et al., 2021)	x	x	x	–	5k+ hrs	En	earnings calls
Earnings-21 (Del Rio et al., 2021)	x	x	x	–	39 hrs	En	earnings calls
MD3 (Eisenstein et al., 2023)	x	x	x	–	20 hrs	En	information-sharing tasks
CANDOR (Reece et al., 2023)	x	x	x	–	850 hrs / 1,656 dialogs	En	everyday conv. (video chat)
DailyTalk (Lee et al., 2023)	x	x	x	–	20 hrs / 2,541 dialogs	En	conversational TTS
SPoRC (Litterer et al., 2024)	x	x	x	–	1.1m eps	En	podcasts
MultiDialog (Park et al., 2024)	x	x	x	–	340 hrs / 9k dialogs	En	open-domain, audiovisual
SPGISpeech2 (Grossman et al., 2025)	x	x	x	–	3.78k hrs	En	earnings calls
CASPER (Xiao et al., 2025)	x	x	x	–	3 hrs	En	spontaneous conv.
DeepDialog (Koudounas et al., 2025)	x	x	x	–	488 hrs / 40.2k dialogs	En	41 domains, 20 emotions
PHEME (Zubiaga et al., 2015)	–	x	–	*	1,185 threads	En	Twitter rumors
ClaimBuster (Hassan et al., 2017)	–	x	x	*	23k sentences	En	political debates
Audio Check-Worthiness (Ivanov et al., 2024)	x	x	x	*	48 hrs / 34.5k sents	En	political debates, speeches, interviews
ViClaim (Giedemann et al., 2025)	–	–	x	*	1.8k videos / 17.1k sents	En/De/Es	YouTube short videos, claim detection
CT-FCC-18 (Kopev et al., 2019)	x	–	x	x	33 min / 286 claims	En	political debates
WhatsApp 2019 (Resende et al., 2019)	–	x	–	x	912k msgs	Pt	WhatsApp political groups
CI-ToD (Qin et al., 2021)	–	x	–	x	3,190 dialogs	En	task-oriented, consistency labels (HI/QI/KBI)
DialFact (Gupta et al., 2022)	–	x	–	x	22.2k claims	En	fact-checking in dialogue
Fact-Checking Podcasts (Setty and Becker, 2025)	x	x	x	x	531 eps / 2.0k utt. (annot.)	En/No/De	podcasts (news, health)
MAD (Chun et al., 2025)	x	x	x	x	600 dialogs / 4.9k sents	En	spoken dialogue
FOO (Anonymous, 2025)	x	x	x	x	1k dialogs / 8.2k sents	En	spoken dialogue

Table 2: Representative datasets across audio, dialogue, transcript, and factuality dimensions.
*: check-worthiness only (no veracity labels).

meaning: sarcasm, emphasis, emotion, and intent live in prosody—pitch, timing, and intensity—so models that ignore nonverbal speech cues misread intent (Biron et al., 2025; Ananthakrishnan and Narayanan, 2008). Familiar hosts, recurring guests, and conversational role structure (e.g., host/guest/caller) shape interaction patterns and perceived salience, so CD should encode who is speaking and how they interact, not just what they say (Qamar et al., 2023; Pick et al., 2022; Mahr and Csibra, 2021). Treating turns independently discards uptake, repairs, and repetition trajectories that strengthen or revise a proposition over time (Qamar et al., 2023). Empirically, order carries signal: shuffling turns weakens downstream prediction and, on FOO, degrades accuracy (Table 1) (Bergey and DeDeo, 2024; Anonymous, 2025). Relatedly, argument-aware summarization and key-point analysis aggregate across turns to surface conversation-level claims not stated in any single sentence (Fabbri et al., 2021).

Beyond local phrasing, conversational claims depend on dialogue history: meaning is often incomplete without preceding turns, and delivery can amplify perceived salience independent of truth. For instance, misleading WhatsApp voice notes often follow a repeatable arc—opening with a personal greeting, asserting source credibility (insider/expert/eyewitness), leveraging negative emotional tone (panic, fear, or anger), delivering the claim, and—in about one-third of cases—urging recipients to forward it (El-Masri et al., 2022). When flattened to text, these cues disappear, and models mistake rhetorical mobilization for factual salience—a recurring source of false positives and missed context.

Upstream artifacts further distort the "claim unit." ASR segmentation can split or merge spans; diarization errors swap speakers; and overlapped talk stresses voice activity detection (VAD) and

segmentation, where thresholding can clip turn onsets/offsets - each of which destabilizes CD in long-form talk (Wan et al., 2021; Bredin and Laurent, 2021; Bain et al., 2023; Sun et al., 2025). Real-world conditions magnify the problem: Whisper reports ∼2.5-2.7% word error rate (WER) on LibriSpeech test-clean (Radford et al., 2023), yet podcast corpora reach ∼18.1% WER and include non-speech/extraneous segments that must be filtered (Clifton et al., 2020; Abdessamed et al., 2024). Earlier end-to-end ASR and short-window decoders degrade under noise; in contrast, large-scale pretraining, timestamped decoding/VAD (e.g., Whisper), and forced alignment (WhisperX) improve robustness and alignment in noisy or low-resource settings (Radford et al., 2023; Bain et al., 2023). Dataset mirrors this: sentence-level check-worthiness often fails under ellipsis but improves with decontextualization (Chamoun et al., 2023); audio/disfluency cues can match or beat text-only baselines in multi-speaker setups (HuBERT (Hsu et al., 2021), wav2vec 2.0 (Baevski et al., 2020)) (Ivanov et al., 2024); yet speech-native CD datasets remain small (Ivanov et al., 2024).

Methodologically, CD research has moved from early feature-based systems (Hassan et al., 2017; Jaradat et al., 2018) to neural rankers and pre-trained language models (LM) (BERT, RoBERTa) (Devlin et al., 2019; Liu et al., 2019), with widespread adoption in recent CD work (Panchendrarajan and Zubiaga, 2024). Subsequent work explores claim-attribute modeling (Gangi Reddy et al., 2022) and impact-aware prioritization (Panchendrarajan and Zubiaga, 2024). Yet most work remains source- and modality-specific (Panchendrarajan and Zubiaga, 2024).

To close this gap, several strands of work are converging. *Conversation-first datasets* such as DialFact explicitly surface colloquialisms, ellipsis/coreference, and context dependence that challenge sentence-isolated detectors, enabling dialogue-aware baselines and evaluation (Gupta et al., 2022). *Claim-unit reconstruction* via decontextualization assembles a self-contained proposition before scoring and improves extraction quality and readiness for downstream components (Deng et al., 2024; Fan et al., 2025). *Prosody- and role-aware modeling* incorporates pitch/timing/intensity cues and speaker/interaction structure to better capture communicative function and salience (Biron et al., 2025; Qamar et al., 2023; Pick et al., 2022). Finally, live CD systems (e.g., LiveFC) bring streaming transcription and online diarization together with windowed claim detection/normalization, so detectors consume temporally ordered, speaker-attributed candidates rather than isolated sentences (Venktesh and Setty, 2025). In practice for CD: model dialogue acts and local context (Qamar et al., 2023); encode speaker roles and interaction structure (Qamar et al., 2023; Pick et al., 2022); condition on prosody (Ananthakrishnan and Narayanan, 2008; Biron et al., 2025); and aggregate adjacent turns into a standalone claim unit (Deng et al., 2024).

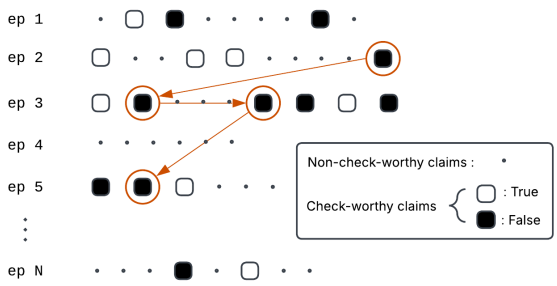

Figure 2: Illustration of claim detection and verification tasks in podcasts.

4.2 Evidence Retrieval (ER) Task

Traditional ER is built for clickable text: models assume sentence-level evidence (e.g., FEVER) that lexical retrieval can fetch as one or more sentence spans (Thorne et al., 2018). Spoken platforms break these assumptions. Audio is continuous and not clickable: meaning is distributed across turns, speakers, and episodes, so evidence must be located in time, not just on a page (Ghazimatin et al., 2024). As a result, single-turn lexical queries miss callbacks, cross-turn references, and off-mic context; colloquialisms, slang, and code-switching change the retrieval error profile (Clifton et al., 2020; Shapira et al., 2025); and pipelines that ignore chapter titles and episode-level metadata (titles/descriptions/RSS IDs (Really Simple Syndication)) leave strong production-metadata constraints unused (Ghazimatin et al., 2024; Shapira et al., 2025). Span-level claim extraction can also improve retrieval relative to full-post queries (Sundriyal et al., 2022). To keep verification auditable, ER therefore has to return time-anchored evidence—an episode identifier plus start/end seconds—so downstream components can attribute who said what, when, and support revisions when on-air corrections appear (Ghazimatin et al., 2024).

In real deployments, upstream artifacts complicate this. ASR segmentation can split or merge spans, diarization uncertainty blurs speaker identity, and overlapped talk stresses VAD/segmentation—each interacts with lexical retrieval and can hide the very moments VER needs (Bredin and Laurent, 2021; Shapira et al., 2025; Sun et al., 2025). Confidence-only filters are unreliable for detecting ASR errors (Kuhn et al., 2025). Crucially, error types (punctuation, proper nouns (Singla et al., 2022), code-switch points)—not just average WER—drive indexing and alignment errors (Shapira et al., 2025; Clifton et al., 2020). These conditions push ER beyond plain text toward the selective use of acoustic/phonetic cues and tighter use of production metadata.

Resources mirror the gap. Wizard-of-Wikipedia offers turn-level grounding but presumes explicit passages rather than timestamped audio (Dinan et al., 2019); ClaimBuster and DialFact add check-worthiness/verification labels yet are largely text-only (Hassan et al., 2017; Gupta et al., 2022). Speech-native efforts go further: Audio Check-Worthiness couples speech and claims, and the Fact-Checking Podcast dataset preserves ASR and diarization with podcast-native claims, check-worthiness, and rationales—though all remain small relative to text corpora (Ivanov et al., 2024; Setty and Becker, 2025). Together, these efforts point toward retrieval that treats audio as a continuous, produced medium.

Methodologically, a speech-native pipeline adopts: *timestamped spans* (transcript slice + episode ID + start/end seconds), indexed with *dual indices* (lexical + optional acoustic/phonetic), then *re-ranking by temporal proximity, speaker match, and meta-structure* (chapters/show notes/episode metadata) (Ghazimatin et al., 2024), while maintaining *long-horizon memory* so recurring assertions can be linked across episodes. In effect, ER outputs a compact bundle (episode, timestamp, transcript slice, speaker posterior, etc.) that VER can consume without re-resolving timing or speaker identity.

4.3 Claim Verification (VER) Task

Verification tuned on text typically frames each claim–passage pair as single-span natural language inference (NLI), but——as Figure 2 illustrates—podcast evidence is time-anchored, multi-turn, and often cross-episode, making FEVER-style single-sentence models brittle in practice (Thorne et al., 2018). Specifically, multi-turn entailment and temporal qualifiers ("last week", "earlier in the show") spill beyond a single span, and VER should support revision when on-air corrections appear. Small timing misalignments and diarization uncertainty further depress multimodal performance unless modeled explicitly (Allein et al., 2023; Bredin and Laurent, 2021; Sun et al., 2025). Empirically, FEVER-tuned models degrade in dialogue; DialFact reports sharp drops from cross-turn references and informality (Gupta et al., 2022); and CI-ToD surfaces contradictions arising from dialogue history itself (Qin et al., 2021). Throughput and latency compound the challenge: re-ranking thousands of candidates with large NLI models is costly on continuous, claim-dense streams, and on live platforms, timing determines whether interventions land in time (Venktesh and Setty, 2025; Deng et al., 2025).

In response, VER shifts to: *multi-span, time-aware reasoning* over sets of spans; explicit *who/when constraints* to resolve callbacks, coreference, and temporal qualifiers (Ma et al., 2024; Si et al., 2023; Allein et al., 2023); *alignment-robust fusion*—late/gated combination of audio encoders with text plus masking of diarization uncertainty—so mild desynchronization does not derail entailment (Shahriar et al., 2025; Bredin and Laurent, 2021; Sun et al., 2025; Park et al., 2022); and *WER-aware training*: mixing oracle and ASR transcripts with audio-only views and adding punctuation/noise perturbations, recognizing that error type—not just average WER—drives downstream failure (Allein et al., 2023; Shapira et al., 2025), with practices that carry over from noisy-transcript analyses (Shapira et al., 2025; Wan et al., 2021).

Efficiency-focused designs make deployment feasible. Lightweight verifiers such as MiniCheck approach GPT-4-level verification at $\sim$400$\times$ lower cost (Tang et al., 2024), while streaming systems like LiveFC run real-time transcription, online diarization, retrieve timestamped windows, and perform incremental detection/verification online (Venktesh and Setty, 2025). Complementary probes—Debate-to-Detect and DEFAME—stress debate structure and cross-modal cues in realistic, structured settings (Han et al., 2025; Braun et al., 2025). Finally, *attribution and recoverability* practices from modular retrieval-augmented generation (RAG)—self-reflective retrieval and recoverability audits—transfer naturally to timestamped audio bundles so cited moments can be re-found and audited end-to-end (Asai et al., 2024; Wallat et al.,

2025; Xing et al., 2025).

4.4 Explanation Generation (GEN) Task

GEN fails on audio when it treats explanations as text-only. Without audio, listeners cannot hear how delivery shapes interpretation (sarcasm, emphasis, hesitation). Without timestamps and speaker labels, rationales are hard to audit or replay. Explanations often ignore the conversational path - who challenged whom and when - so they cannot justify mid-stream verdict changes in multi-turn dialogue (Gupta et al., 2022). Multimodal fact-checking and deception-style probes show that adding non-text modalities improves robustness by capturing delivery-related cues (Bahaa et al., 2024). Meanwhile, the literature increasingly explores retrieval-augmented evidence pipelines and end-to-end systems that jointly produce verdicts and rationales (Atanasova et al., 2020; Allein et al., 2023), alongside modern LLM prompting frameworks for generation and detection (Lucas et al., 2023). For audio platforms, those strengths must be *audio-native, timestamped, and dialogue-aware* (Deng et al., 2025; Venktesh and Setty, 2025).

A practical design is to return evidence you can listen to. Each explanation should pair a readable transcript span with a short, click-to-hear clip (3-10s) and explicit speaker attribution. Optionally flag salient prosodic cues so users can judge delivery, and include a brief decontextualized gloss so the claim remains self-contained for readers without losing its audio anchor (Deng et al., 2024). Explanations should present a compact *timeline* - first assertion → challenge → repair - anchored by episode/turn indices, and bundle the timestamped audio/transcript with any external documents so the cited moment can be re-found and audited (Allein et al., 2023; Ghazimatin et al., 2024). Live systems already point the way: LiveFC surfaces speaker-attributed snippets with verdicts in real time, and modular/two-stage pipelines - where lightweight detectors gate heavier generators - can deliver rationales at acceptable latency in streaming contexts (Venktesh and Setty, 2025; Henrichsen and Krebs, 2025; Xiong et al., 2023). *Recoverability-based attribution* (mask the cited span and test whether the system can restore it) stabilizes explanations and transfers naturally to timestamped audio bundles (Xing et al., 2025). In short, when GEN embraces audio-native affordances and recoverability, it complements timestamped retrieval and time-aware verification rather than inheriting the blind spots of text-only explanations.

5 Future Directions

Moving the field forward requires a few pieces to work together. First come the foundations: build larger speech-native corpora with factuality or check-worthiness labels, aligned transcripts, and speaker/role metadata; augment them with targeted synthetic variants (accents, overlap, punctuation/noise). Then make the pipeline live: pair streaming ASR and online diarization with evidence retrieval that returns time-anchored spans (episode ID plus start/end seconds) via dual lexical–acoustic indices and windowed retrieval; verify with lightweight models that can keep up in live settings. Richer reasoning and accountability follow: use alignment-robust (late/gated) fusion that masks diarization uncertainty so prosody and timing inform decisions; model the conversational fabric—roles, hedges, stance, and uptake/repairs—to assemble the claim unit across turns; track narratives across episodes with simple graph or archival tools; and surface listenable evidence (a transcript snippet plus a short audio clip with speaker attribution), validated by recoverability tests. Finally, make the system trustworthy and equitable: replace confidence-only gates with calibrated, WER-aware verification that is sensitive to error types (punctuation, proper nouns, code-switch points), and mitigate accent/dialect and noise brittleness through dialect-aware pretraining, domain adaptation, and perturbation-based checks.

6 Conclusion

Audio platforms reshape misinformation by combining the persuasive force of spoken delivery with the dynamics of conversation. Prosody, pacing, and emotion shape how claims are received, while dialogue order, repetition, and cross-turn dependencies sustain narratives across speakers and episodes. These dual properties make audio platforms fundamentally different from text or images, revealing why pipelines built for written claims fail when applied to spoken dialogue. We argue that fact-checking must be reframed around these realities, addressing challenges in real-time detection, multimodal fusion, conversational modeling, temporal tracking, and fairness.

Limitations

External validity is restricted. Most examples and analyses center on English, long-form talk (podcasts) with a two-speaker structure and reasonably clean production metadata. We do not test generalization to multi-party debates, call-in shows, highly code-switched speech, or low-metadata settings (sparse chapters and show notes), so portability to those regimes remains unverified.

Our pipeline assumptions depend on upstream components that we do not fully characterize. We rely on off-the-shelf ASR, VAD/segmentation, and diarization, but we do not provide a systematic error analysis by error type—e.g., punctuation, proper nouns, code-switch boundaries—or by speaker or acoustic condition, and we do not compare alternative ASR, VAD, or diarization backbones. As a result, the end-to-end robustness of the proposed design under diverse recording conditions remains uncertain.

Finally, we acknowledge unmeasured risks. We do not quantify misattribution risk from diarization/alignment errors, possible demographic bias (accent, pitch range, speaking style) in prosody-aware features or ASR, or amplification harms from replaying salient misinformation clips. While we discuss safeguards (e.g., timestamped evidence and recoverability checks), the paper does not include bias audits or privacy analyses to demonstrate that these mitigations reduce harm in practice.

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