

Case Observations: Sub-Audible ELF Signatures in *Meet The Teletubbies* Correlating Chart Energy Below 50 Hz and 20 Hz with On-Screen Imagery

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Abstract

This study extends prior preliminary observations on sub-audible Extremely Low Frequency (ELF) content in television audio [1] to a full-length commercial children’s program, *Meet The Teletubbies* (duration 01:01:43). An ELF spectrogram chart covering 0–100 Hz was generated from the program soundtrack with time-aligned video filmstrip stills. Magnitude signatures **below 50 Hz** and **below 20 Hz**—the infrasonic / sub-audible band emphasized in the earlier work—were examined for temporal peaks and correlated with on-screen imagery captured at those times. The program exhibits intermittent, sometimes dense, dark magnitude bands that extend through the 50 Hz marker and into the sub-20 Hz region, consistent with the Example B/C typology previously reported for commercial television samples. The strongest sustained sub-20 Hz cluster occurs near minutes 51–54 during insert and outdoor-video segments. These findings are observational: they do not by themselves establish intent or neurological effect, but they document a concrete children’s-media case for Phase 1 signal detection under the ESUI program and motivate controlled follow-up (including EEG) as outlined in the preliminary study.

Contents

1	Background and motivation	2
1.1	Prior study	2
1.2	Why this title	3
1.3	Scope of this report	3
2	Materials and methods	4
2.1	Source media	4
2.2	ELF chart generation	4
2.3	Band energy quantification	4
2.4	Reading convention	5

3	Observations on the full-program ELF chart	5
3.1	Global appearance	5
3.2	Quantitative peaks	6
3.3	Typology relative to Examples A–D	6
4	Image correlation at infrasonic / sub-50 Hz peaks	7
4.1	Late-program peak cluster (minutes 51–54) — strongest sub-20 Hz	7
4.2	Mid-program peak (~20:48) — Tinky Winky sequence	8
4.3	Early group activity (~7:30)	9
4.4	Noo-Noo / interior cluster (~44:41)	10
4.5	Frame montage of peak epochs	11
5	Discussion	12
5.1	Consistency with the preliminary study	12
5.2	Imagery pairing — what co-occurs	12
5.3	Alternative explanations (required caveats)	13
5.4	Children’s media as a priority demographic	13
6	Conclusions	13
7	Reproducibility notes	14

1 Background and motivation

1.1 Prior study

The earlier report, *Preliminary Observations on the Effects of Sub-Audible Frequencies in Television on the Human Nervous System* [1], investigated whether commercial television audio may carry sub-audible ELF modulations in the approximate range **0.5–20 Hz**, purportedly associated in historical patents with induced emotional states (passivity, anger, relaxation, sleepiness, and related responses). That study emphasized:

- **Detection** of anomalous energy below 100 Hz and especially below 20 Hz using FFT spectrograms and dB-vs-Hz scopes on short television samples;
- **Contrast** between commercial content (signals present) and public-access material (signals absent in the reported samples);
- **Imagery coupling**: the hypothesis is not ELF alone, but ELF *paired with* on-screen imagery;
- **Future EEG phase**: controlled comparison of programming with vs. without documented ELF while monitoring frontal activity.

Figure 1 reproduces the reference typology (Examples A–D) from that study: panel A shows little sub-100 Hz activity; panel B energy reaching ~20 Hz with structure below 20 Hz; panel C distinct structure

both below 100 Hz and below 20 Hz; panel D energy below 100 Hz without a clear sub-20 Hz extension. Those categories frame the reading of the Teletubbies chart below.

- **Example D:** Signals below 100 Hz but absent below 20 Hz.

Figure 1: FFT Spectrograms of Television Audio Samples

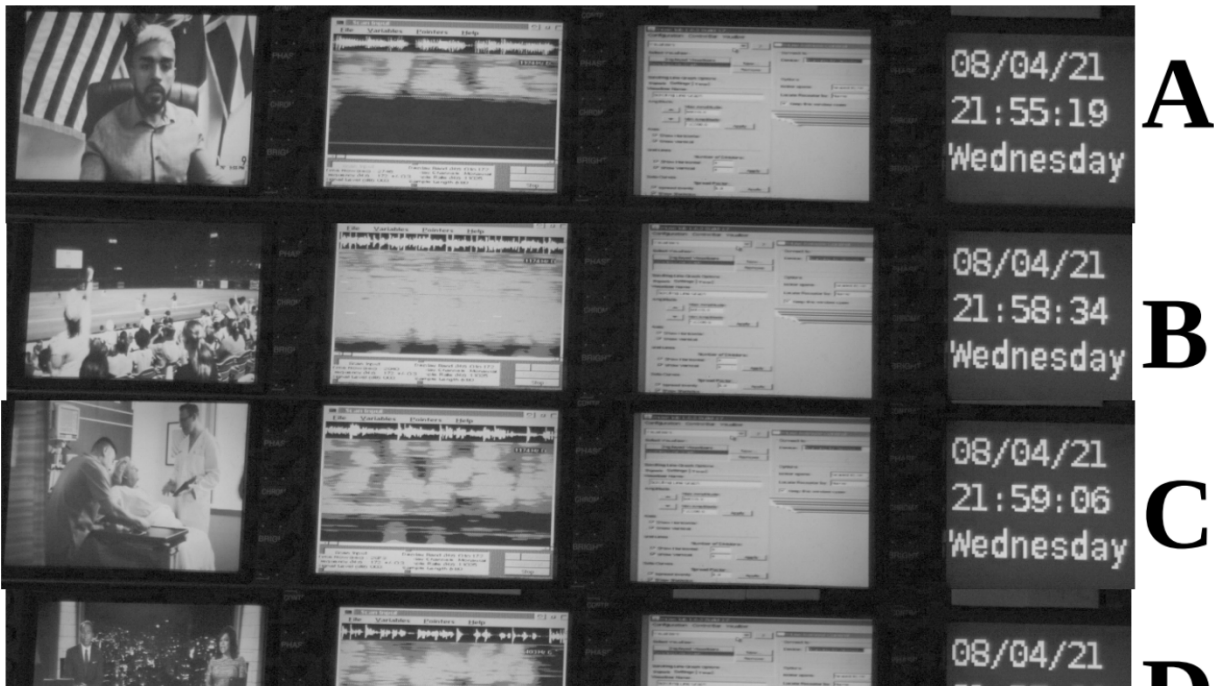


Figure 1: Figure 1 from the preliminary study [1]: FFT spectrogram / scope captures labeled A–D, used here as a qualitative typology for sub-100 Hz and sub-20 Hz signatures in television audio. Source: <https://esui.cc/detail.php?slug=preliminary-observations-sub-audible-frequencies-television>.

1.2 Why this title

Children’s programming is singled out in the preliminary study’s public-health discussion (developing nervous systems; limited informed consent). *Meet The Teletubbies* is a long-form commercial children’s title with repetitive musical motifs, insert videos, and high-contrast visual sequences—a natural full-program stress test of the Phase 1 (signal detection) methods: long continuous spectrogram, explicit 50 Hz and 20 Hz reference lines, and time-locked picture.

1.3 Scope of this report

This document is limited to **signal observation and image correlation**:

1. Generate and inspect an ELF chart (0–100 Hz emphasis, markers at 50 Hz and 20 Hz).

2. Quantify relative magnitude energy in the bands 0–50 Hz and 0–20 Hz over the full runtime.
3. Identify peak epochs and extract video frames at those times.
4. Classify observed structure against the A–D examples of [1] and note limitations (encoding, resampling, intentionality).

No EEG, no causal claim about viewer state, and no assertion of deliberate “embedding” are made here; those remain objectives of the larger program [1].

2 Materials and methods

2.1 Source media

Property	Value
Title	<i>Meet The Teletubbies</i>
Container (working copy)	MP4 (converted from M4V; H.264 + AAC)
Duration	01:01:43.84 (≈ 3704 s)
Video	H.264 Main/High, 716×576 , 25 fps, progressive
Audio	AAC LC, 48 kHz, stereo $\rightarrow$ mono for analysis
Chapters	13 chapter markers present in container

2.2 ELF chart generation

Chart generation followed the local ESUI pipeline (`elfchart.sh`):

1. Extract mono PCM audio with `ffmpeg`.
2. Resample to 1 kHz and low-pass at 100 Hz with SoX (Nyquist 500 Hz; display interest 0–100 Hz).
3. Render a monochrome spectrogram (black = higher magnitude, white = lower) with horizontal time axis and vertical frequency axis.
4. Overlay dashed reference lines and labels at **50 Hz** and **20 Hz**.
5. Append a time-aligned filmstrip of video stills under the spectrogram ($\approx$ one still per chart column interval).

Output file: `Meet The Teletubbies_elf_chart.png` (8000×1122 px; spectrogram height 1080 px). Effective horizontal scale after width cap: ≈ 2.16 px/s for the full hour.

2.3 Band energy quantification

From the monochrome chart pixels, relative magnitude was taken as $E = 255 - G$ (inverted gray level). Rows corresponding to frequency f used the same mapping as the chart script (including the documented 10 Hz alignment offset). Mean energy was computed along time for:

- Band **B50**: 0–50 Hz,
- Band **B20**: 0–20 Hz,
- Band **B10**: 0–10 Hz (deep infrasonic emphasis).

Peaks were located after light temporal smoothing; minute-binned means ranked high-activity segments. Video frames were grabbed at peak times with `ffmpeg` for correlation panels.

2.4 Reading convention

On the chart:

- **Horizontal**: time, left = program start, right = end.
- **Vertical**: frequency; 50 Hz and 20 Hz lines are drawn near the bottom of the 0–500 Hz spectrogram field (low frequencies sit low on the image).
- **Black vertical streaks**: higher energy at that time across the frequencies they span. Streaks that cross below the 50 Hz line and especially below the 20 Hz line are the signatures of primary interest, matching the focus on sub-audible structure in [1].

3 Observations on the full-program ELF chart

3.1 Global appearance

Figure 2 shows the full-program chart (overview). Energy is *not* continuous white (quiet) below 50 Hz; rather, the hour is punctuated by recurring dark vertical structures. Many of these structures are strongest above the 50 Hz line (bass-range musical content and effects) but a substantial subset **penetrates the 50 Hz line** and a smaller, intermittent subset **remains dark below 20 Hz**.

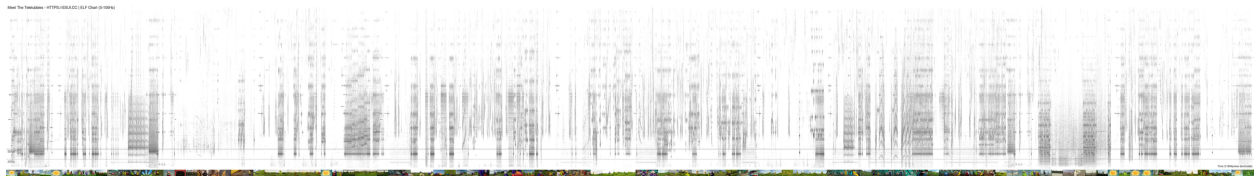


Figure 2: Full-program ELF chart overview for *Meet The Teletubbies* (0–100 Hz region of interest with 50 Hz / 20 Hz markers and filmstrip). Black indicates higher magnitude. Source file: `Meet The Teletubbies_elf_chart.png`.

Figure 3 stretches the 0–100 Hz region vertically so sub-50 Hz and sub-20 Hz behavior is easier to inspect across the whole runtime.

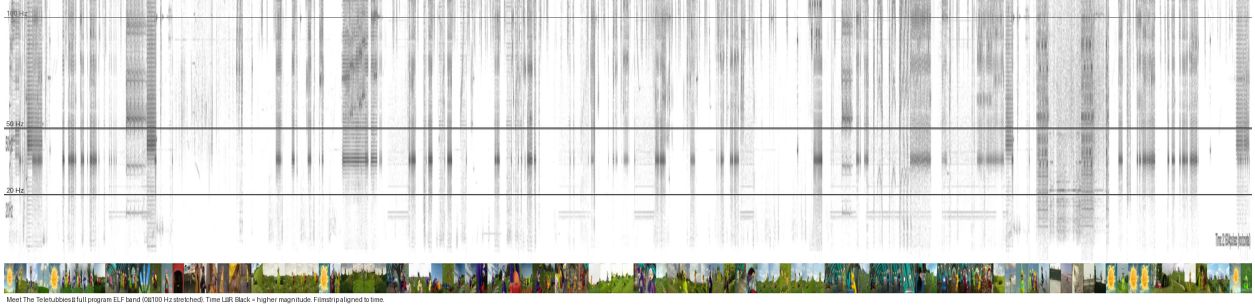


Figure 3: Vertically stretched 0–100 Hz band for the full program, with 100 / 50 / 20 Hz guides and time-aligned filmstrip. Use this figure to scan for segments where dark energy continues below the 50 Hz and 20 Hz lines.

3.2 Quantitative peaks

Mean inverted-magnitude energy over the full runtime was approximately:

Band	Mean E	Peak E (local)
0–50 Hz (B50)	≈ 20.4	≈ 86
0–20 Hz (B20)	≈ 12.0	≈ 71
0–10 Hz (B10)	≈ 8.5	≈ 64

The **highest sustained sub-20 Hz activity** clustered in **minutes 51–54** (program times ~ 3060 – 3240 s), with minute 53–54 ranking first in mean B20 energy (≈ 50 vs. full-program mean ≈ 12). Additional notable B20 elevations include early program structure (~ 1 min, ~ 7 min), a mid-program event near **20.8 min** (~ 1248 s), and a cluster near **44.7 min** (~ 2681 s) with strong B10 contribution.

Table 1 lists representative peak windows used for image correlation.

Table 1: Selected high-energy windows in sub-50 Hz / sub-20 Hz bands (relative chart energy). Times are approximate centers.

Time (s)	mm:ss	Dominant band note	On-screen (frame)
59	00:59	Early B20 / B50 activity	Opening / theme phase
450	07:30	B50 with sub-20 extension	Group of Teletubbies on grass
1248	20:48	Strong B20 mid-program peak	Tinky Winky with red bag
2681	44:41	Elevated B10 / B20	Noo-Noo / interior ceiling lights
3145	52:25	Late cluster onset	Insert video transition
3192	53:12	Near-max B20 / B10	White dog on beach (insert)
3228	53:48	Late cluster continuation	Insert / outdoor video

3.3 Typology relative to Examples A–D

Qualitatively, large portions of the Teletubbies chart resemble **Example B or C**: energy clearly present below 100 Hz, often bridging the 50 Hz line, with **distinct intervals of structure below 20 Hz**. Quieter stretches

(near-white below 50 Hz) more closely resemble **Example A**. Segments with bass energy that stops near or above 20 Hz without deep extension are closer to **Example D**. The late-program insert cluster is the clearest multi-minute **C-like** episode in this title.

4 Image correlation at infrasonic / sub-50 Hz peaks

The preliminary study stresses association of ELF structure with **visual content** [1]. Below, each high-energy epoch is paired with a chart zoom (frequency focus $\sim 0\text{--}150$ Hz plus filmstrip) and the frame captured at the energy peak.

4.1 Late-program peak cluster (minutes 51–54) — strongest sub-20 Hz

Figure 4 isolates roughly ± 100 s around $t \approx 3180$ s. Dense black structure crosses 50 Hz and remains dark well below 20 Hz for extended vertical (frequency) and horizontal (time) extents—the most intense B20/B10 episode in the hour.

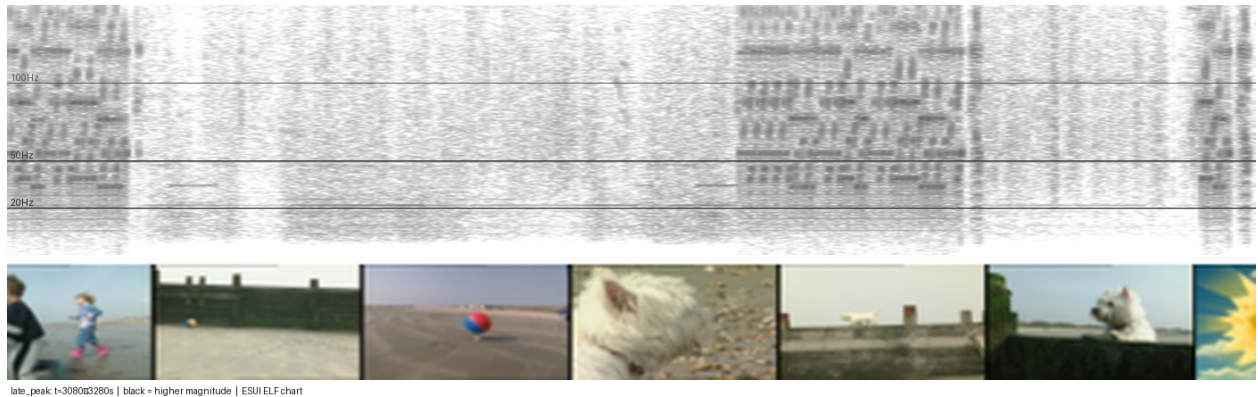


Figure 4: Chart zoom: late-program peak cluster ($\sim 51\text{--}54$ min). Note continuous dark magnitude through the 50 Hz line and into the sub-20 Hz band. Filmstrip shows transition into insert / outdoor video material.

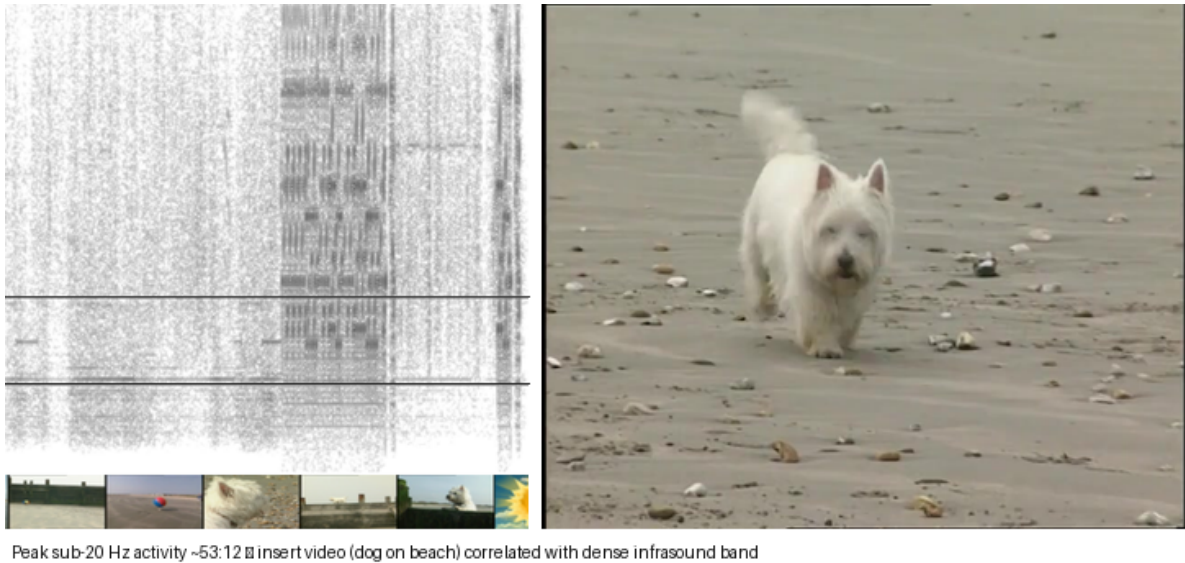


Figure 5: Correlation panel at $t \approx 3192$ s (53:12): spectrogram strip (left) vs. video frame (right). Peak infrasonic-band energy coincides with an insert shot of a white dog running on a beach—not Teletubby set dressing. This is a candidate “ELF + imagery” pairing for Phase 1 documentation [1].

4.2 Mid-program peak (~20:48) — Tinky Winky sequence

Figure 6 and Figure 7 show elevated B20 energy during a Teletubbyland sequence with Tinky Winky and the red bag. The chart shows dark columns spanning from higher bass frequencies down through 50 Hz with clear penetration below 20 Hz, though less sustained than the late cluster.

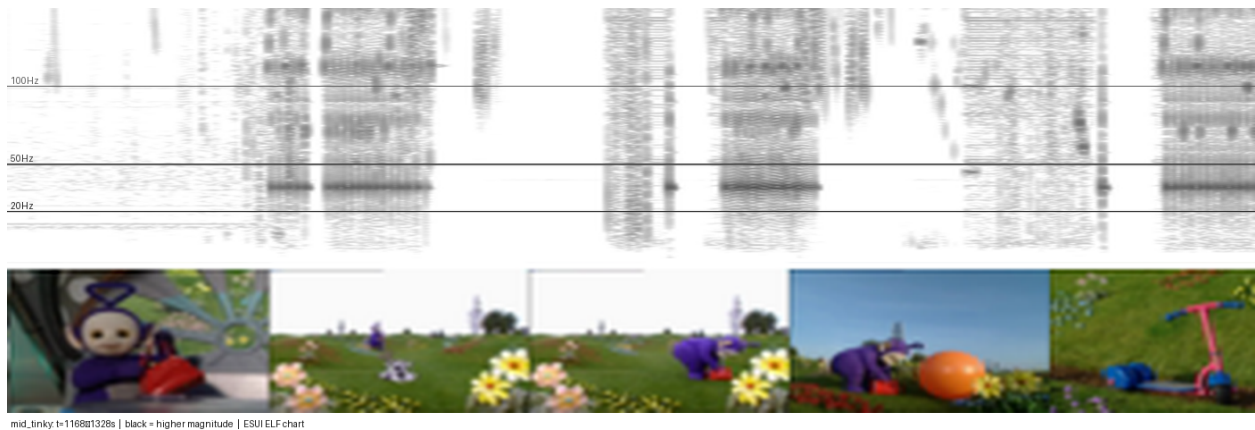


Figure 6: Chart zoom around $t \approx 1248$ s (20:48): mid-program B20 peak.

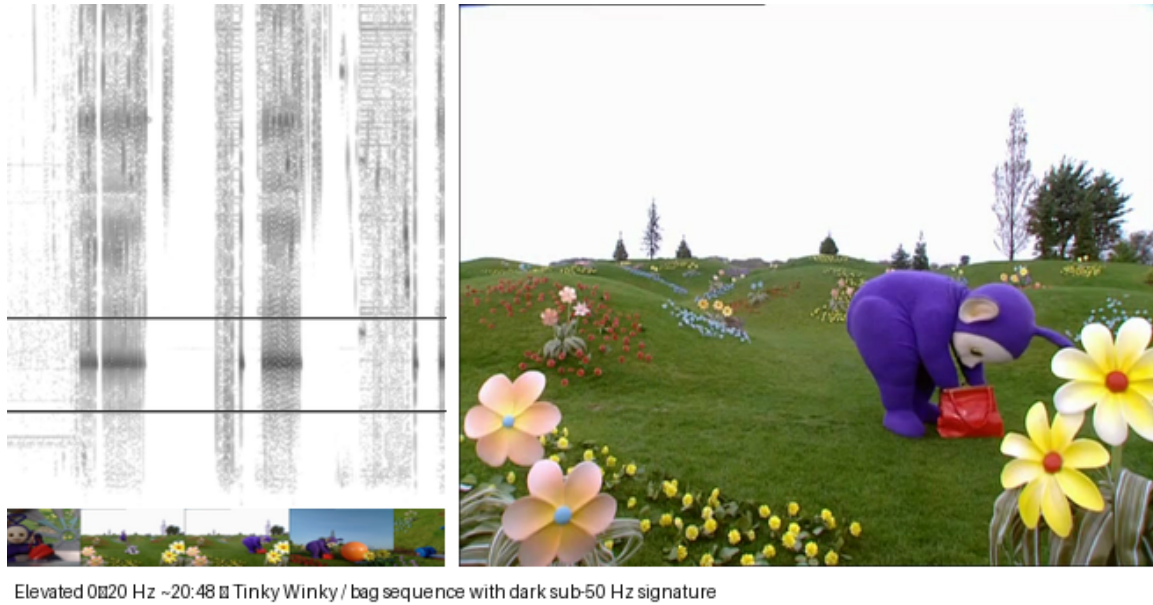


Figure 7: Correlation at $t \approx 1248$ s: Tinky Winky bending over a red handbag on the green hills. Sub-50 Hz and sub-20 Hz energy is elevated relative to adjacent quieter seconds.

4.3 Early group activity (~7:30)

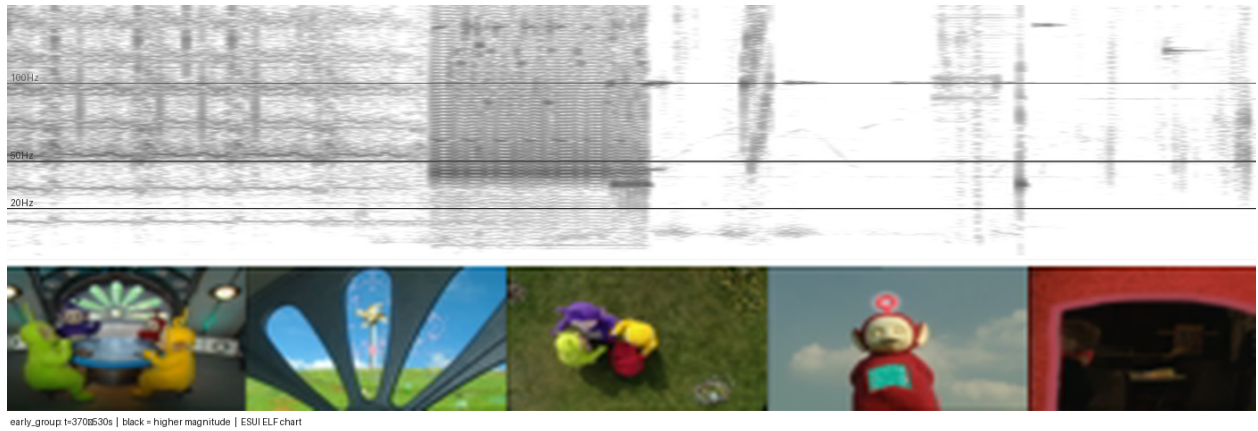


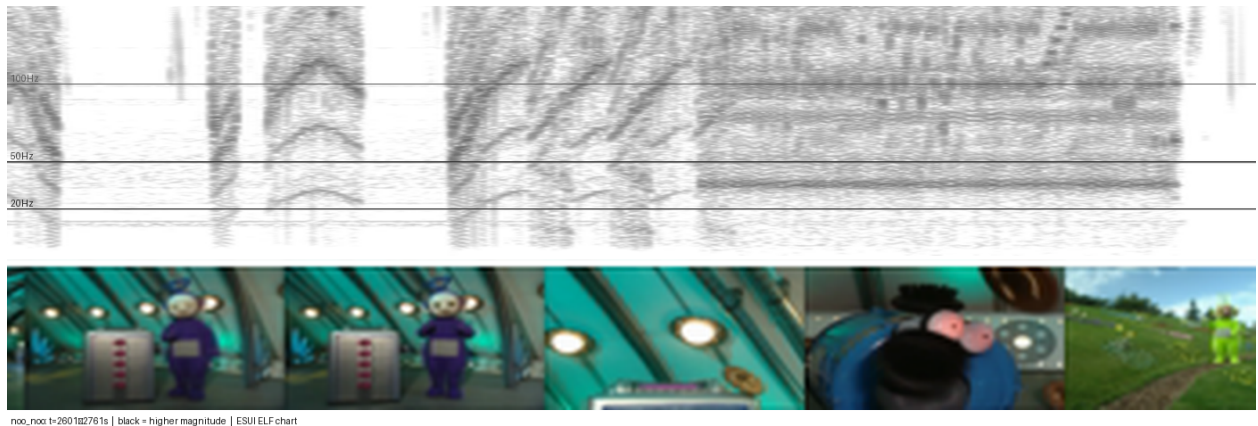
Figure 8: Chart zoom around $t \approx 450$ s (07:30): early elevated B50 with sub-20 Hz contribution.



Elevated energy ~7:30 group activity on green hill; energy extends below 50 Hz and into <20 Hz

Figure 9: Correlation at $t \approx 450$ s: overhead view of four Teletubbies clustered on the grass. Magnitude below 50 Hz is high; a portion continues below 20 Hz.

4.4 Noo-Noo / interior cluster (~44:41)



noo_noo t=2601to2761s | black = higher magnitude | ESUI ELF chart

Figure 10: Chart zoom around $t \approx 2681$ s (44:41): elevated deep-band (B10/B20) energy.

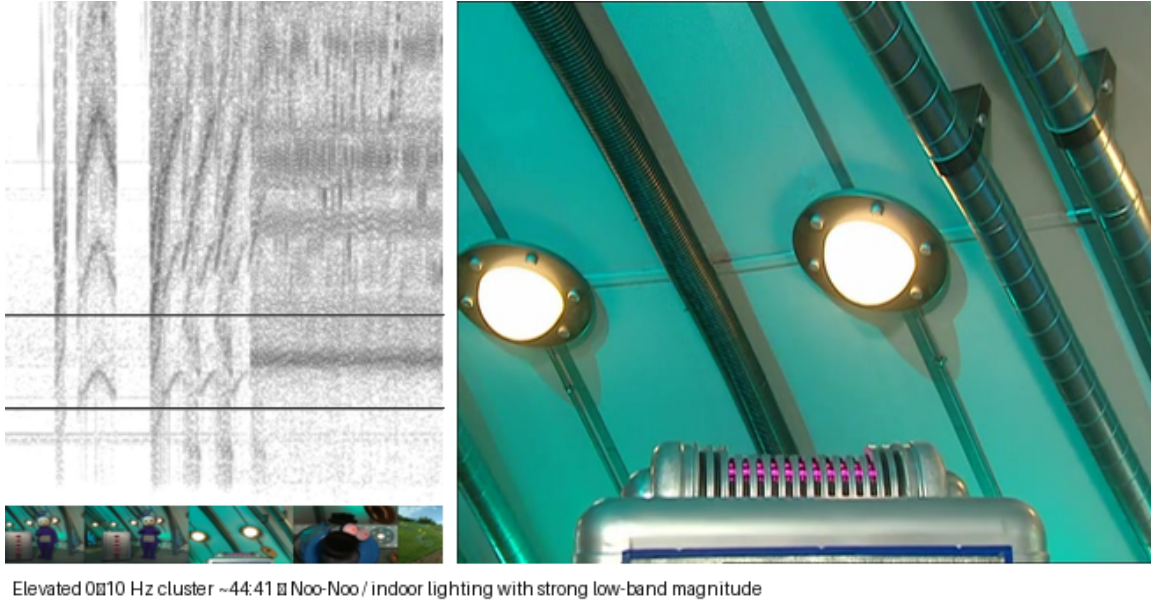


Figure 11: Correlation at $t \approx 2681$ s: interior low-angle shot (Noo-Noo / ceiling fixtures). B10 energy ranks among the higher deep-infrasonic minutes outside the late peak.

4.5 Frame montage of peak epochs

Figure 12 collects frames at six quantified peak times for side-by-side visual context (opening phase, early group, Tinky Winky, Noo-Noo, and two late-insert times).

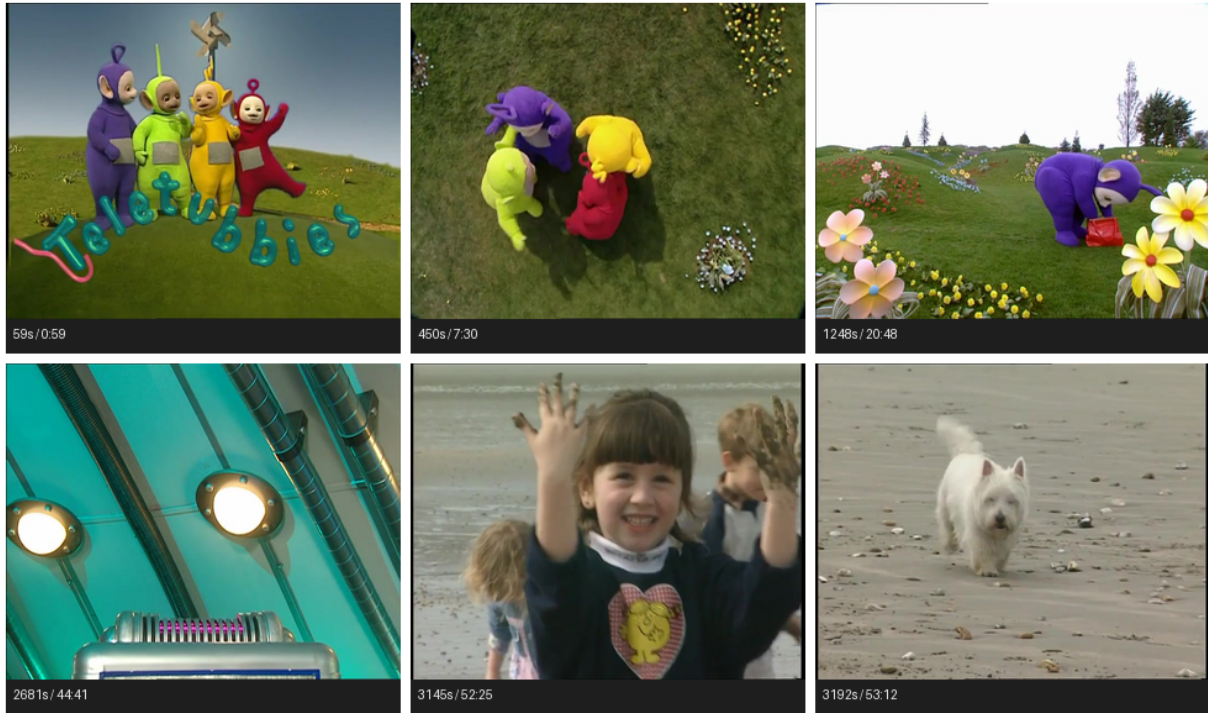


Figure 12: Video frames at selected high sub-20 Hz / sub-50 Hz energy times. Late frames (52:25, 53:12) fall inside the strongest infrasonic cluster and show insert-video imagery rather than the primary Teletubby set.

5 Discussion

5.1 Consistency with the preliminary study

The preliminary observations [1] reported anomalous sub-audible structure in commercial television samples and little or none in public-access samples, and proposed that similar vs. distinct patterns above/below 100 Hz and 20 Hz may matter for how content is experienced. The Teletubbies full-program chart supplies a **long-form commercial children’s example** in which:

1. Sub-100 Hz energy is common and often musically plausible (theme, effects, bass).
2. **Sub-50 Hz** dark structure is frequent and episodic rather than rare.
3. **Sub-20 Hz** structure is less frequent but **clearly present**, with a multi-minute climax near the end of the hour during insert footage.
4. Quiet intervals exist (A-like), so the chart is not uniformly “filled”—the pattern is **segmental**, which is what makes time–image correlation meaningful.

5.2 Imagery pairing — what co-occurs

In this title, the strongest infrasonic-band episode co-occurs with **live-action insert video** (beach dog), while other peaks co-occur with primary Teletubby characters and set pieces (group play, Tinky Winky/bag,

Noo-Noo interior). That diversity matters for future work: if Phase 2 EEG testing is pursued, stimuli should sample both insert and set segments with and without matched sub-20 Hz energy, as outlined previously [1].

5.3 Alternative explanations (required caveats)

Observational ELF charts from consumer audio can reflect many non-nefarious sources:

- **Musical bass and arrangement** in a children’s soundtrack (sustained pads, drums, low synth).
- **Sound-design rumble** and scene transitions.
- **Encoding / loudness / dynamics processing** (HandBrake/AAC history on this file; prior lossy encode can reshape low-frequency content).
- **Analysis pipeline limits:** 1 kHz resampling, spectrogram dynamic range ($-z \ 80$), and a 10 Hz chart alignment offset mean absolute frequency calibration should be treated as approximate; relative time structure is more robust than exact Hertz labels.
- **Speaker / reproduction:** consumer playback systems often roll off deeply sub-20 Hz; presence in the *file* is not identical to acoustic exposure in a living room.

These caveats do not erase the chart features; they constrain interpretation. The scientific next step remains controlled comparison and physiological measurement, not inference of intent from spectrograms alone.

5.4 Children’s media as a priority demographic

The preliminary study flags developing minds and consent [1]. A one-hour Teletubbies-style loop with intermittent sub-20 Hz structure is exactly the kind of chronic, repeated exposure vector listed under “longitudinal” and “demographic variability” recommendations in that paper. This case study is documentation for that docket, not a clinical finding.

6 Conclusions

1. The ESUI ELF chart for *Meet The Teletubbies* shows **recurrent magnitude signatures below 50 Hz** and **intermittent but unambiguous signatures below 20 Hz** across a one-hour commercial children’s program.
2. The **strongest sub-20 Hz cluster** occurs near **minutes 51–54**, concurrent with insert video imagery (e.g., dog on beach at $\sim 53:12$), providing a concrete ELF–image pairing for the Phase 1 archive.
3. Additional sub-20 Hz elevations co-occur with primary Teletubby set sequences (early group play $\sim 7:30$; Tinky Winky $\sim 20:48$; Noo-Noo interior $\sim 44:41$).
4. Relative to the A–D typology of the preliminary study [1], the program is best described as a mixture of A-like quiet intervals and B/C-like active intervals, with the late cluster closest to Example C.

5. Results support continuing Phase 1 cataloging of children's titles and motivate (but do not replace) Phase 2 EEG designs that hold imagery constant while varying sub-audible energy.

7 Reproducibility notes

- Chart script: `elfchart.sh` in the study directory (SoX spectrogram + 50 Hz/20 Hz overlays + filmstrip).
- Working media: `Meet The Teletubbies.mp4` (and source `.m4v`).
- Chart artifact: `Meet The Teletubbies_elf_chart.png`.
- Figure crops and frames: `figures/` (zooms, correlation panels, montage).
- Background study: <https://esui.cc/detail.php?slug=preliminary-observations-sub-audible-frequencies-television>.

References

- [1] Jason Page. Preliminary Observations on the Effects of Sub-Audible Frequencies in Television on the Human Nervous System. Exotic Spectrum Usage Identification Group (ESUI), August 2021; rewritten July 9, 2025. <https://esui.cc/detail.php?slug=preliminary-observations-sub-audible-frequencies-television>.
- [2] US Patent 6,238,333. (Cited in [1] regarding ELF-associated emotional response claims.)
- [3] US Patent 6,091,994.
- [4] US Patent 5,782,874.
- [5] US Patent 6,017,302.
- [6] US Patent 6,506,148.