

Addendum to Schilling Linguistic Analysis of American Airlines Flight 11 and United Airlines 93 Audio from September 11, 2001

The following presents additional linguistic analysis of a whispered utterance at the end of an approximately 40-second voicemail left by United Airlines 93 flight attendant CeeCee Lyles to her husband on September 11, 2001. The utterance is unclear due to background noise, long-distance transmission, and whispering. In addition, it is not clear whether the speaker is Lyles or another individual, as whispering makes speaker identification extremely difficult (which is why it is often used as a voice disguise).

The current report supplements Section E of a report which I prepared for the International Center for 9/11 Justice, dated 22 April 2026 and titled “Linguistic Analysis of American Airlines Flight 11 Transmissions Purported to be Made by Mohamed Atta on 11 September 2001.” The initial report includes analysis of transmissions purported to be made from United Airlines Flight 93 on that day, including brief analysis of the utterance at the end of the Lyles call.

The analysis in the prior report and this addendum is grounded in my education, training, experience, and expertise in linguistics, the scientific study of human language, and forensic linguistics, the application of linguistic science to language evidence. The examination of the language evidence in this case includes both auditory analysis, close listening by a trained linguist, and acoustic phonetic analysis – examination of the sound waves of speech.

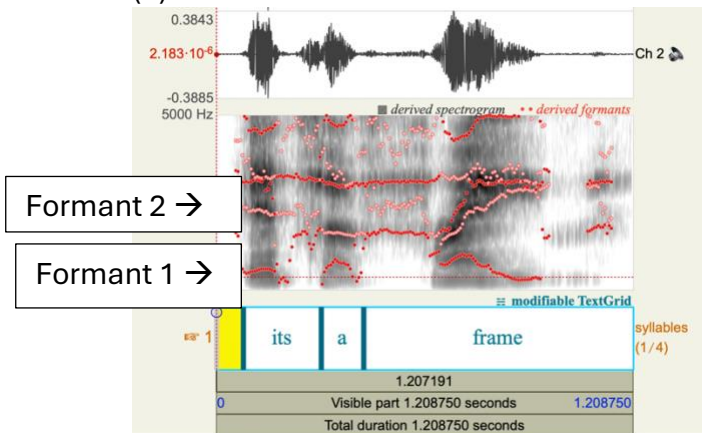
1. Original analysis: “It’s a frame” vs. “You did great”:

For the earlier analysis, I considered whether the whispered utterance at the end of the Lyles call was linguistically consistent with two possible interpretations: “It’s a frame” and “You did great.” My conclusion, based on auditory and acoustic analysis, was that the utterance is consistent with “It’s a frame” but less so with “You did great.” It is also not clear whether the utterance was whispered by Lyles or another speaker.

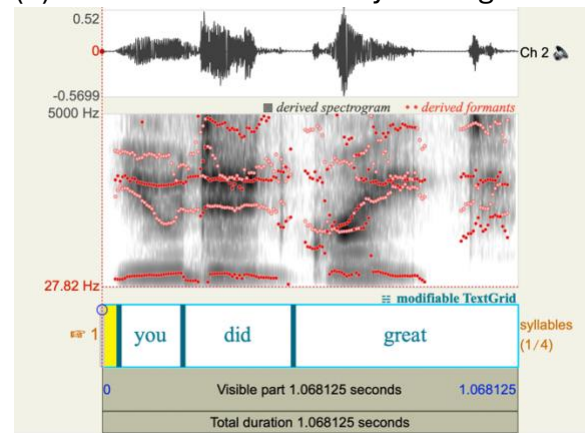
For the acoustic analysis, I examined SPECTROGRAMS – graphs of sound waves in which resonant frequencies appear as dark bands. Such graphs aid in deciphering unclear utterances, as different vowel sounds have distinctive resonances, called FORMANTS, while different consonants shape vowel resonances in different ways. Thus, each different utterance produces a different spectrographic pattern, a sort of ‘linguistic fingerprint’.

The formant patterns for the phrase “It’s a frame” (which has the vowels ‘ih’, ‘uh’ and ‘ey’) are different from those for “You did great” (which has ‘oo’, ‘ih’, and ‘ey’). The spectrograms below, from clear, non-whispered utterances produced for analysis purposes, illustrate:

(a) Clear utterance of 'it's a frame':



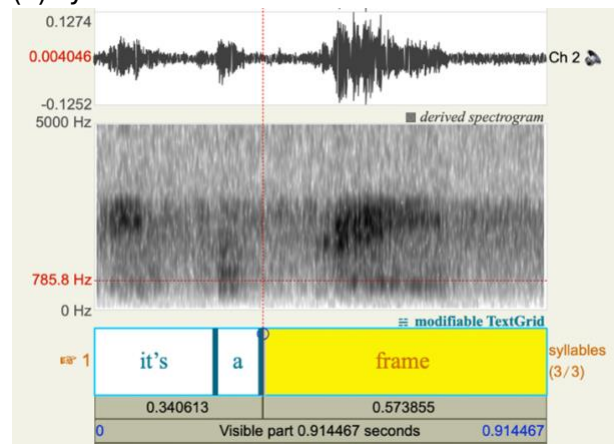
(b) Clear utterance of 'you did great':



In the spectrogram in (a), it can be seen that the vowel in the word 'it's' has a higher Formant 2 and lower Formant 1 than the vowel in the word 'a'; in contrast, in (b), the first vowel, 'oo', has a lower Formant 2 (after the initial high Formant 2 of the 'y' in 'you') than the following vowel, the 'ih' in 'did', while Formant 1 remains fairly steady.

The energy bands in the whispered utterance on the Lyles call (hereafter, 'Lyles utterance') are not as clear, due to background noise, the fact that the audio is transmitted long-distance from air to ground, and the fact that the utterance is whispered (which removes some audio signal). Despite these limitations, it can still be seen that the formant patterns in the Lyles utterance, shown in (c) below, are more consistent with (a) above than (b), since we see a drop in Formant 2 between the first and second words, as we do for 'it's a', not a rise, as with 'you did':

(c) Lyles utterance:



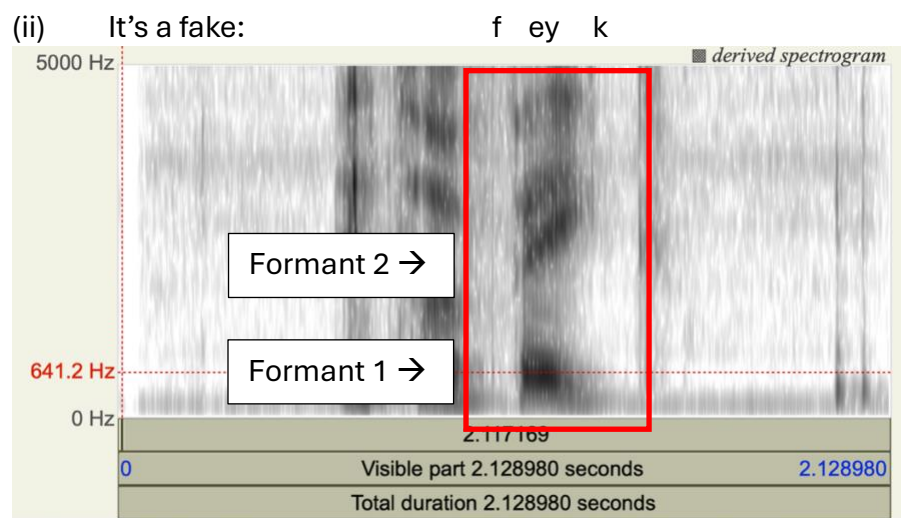
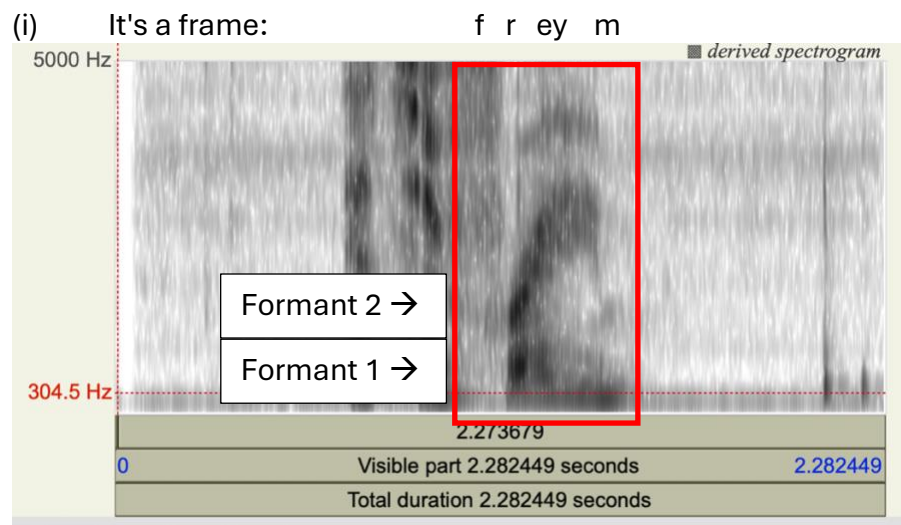
2. Additional analyses:

Building on this earlier analysis, I considered several additional possible interpretations: "It's a fake," "It's a shame," and "He's afraid," each of which has some linguistic similarities with "It's a frame."

For analysis purposes, I produced spectrograms of these various utterances, both whispered and in a regular voice, and in addition made spectrograms of the nonsense phrase “It’s a fame,” to contrast how words with and without ‘r’ after ‘f’ will appear on a spectrogram. After considering these various possibilities, my conclusion stands that “It’s a frame” is the most likely interpretation of the Lyles utterances, based on both auditory and acoustic analysis.

a. “It’s a frame” vs. “It’s a fake”:

The contrast between “It’s a frame” and “It’s a fake” can be seen in the spectrograms below (both of non-whispered utterances, so that the contrasts show clearly). The red boxes highlight the sound waves for ‘frame’ and ‘fake’; the words ‘frame’ and ‘fake’ are indicated in rough phonetics above the sound waves corresponding to the word:



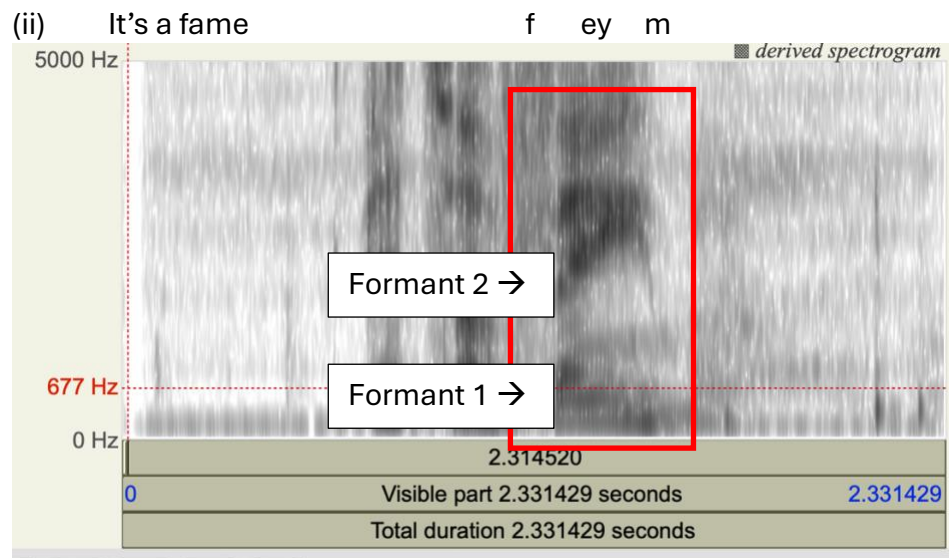
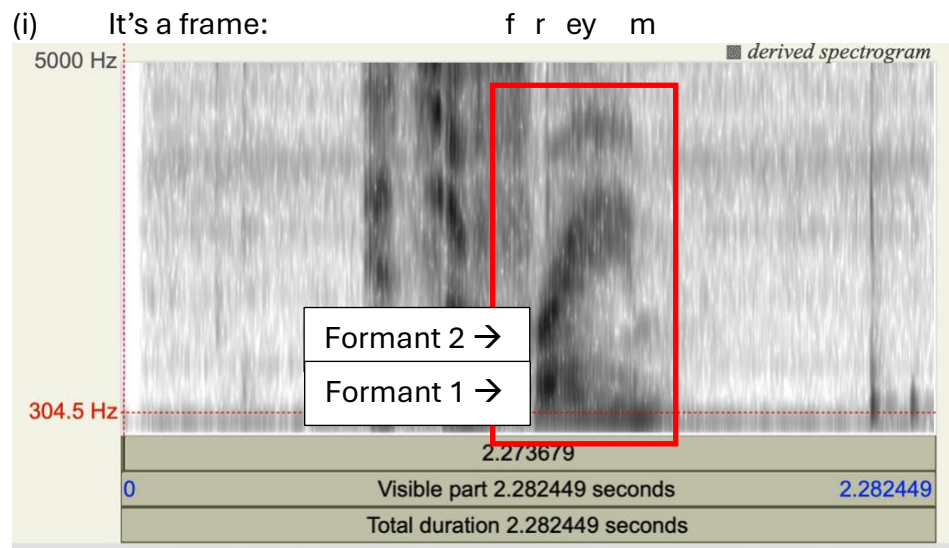
The two look similar, but there are different patterns for ‘fr’ at the beginning of the word vs. ‘f’ (without ‘r’). For ‘frame’, the two lowest dark bands (the characteristic frequencies of the ‘ey’ vowel, Formants 1 and 2) start nearly together and then widen out; for ‘fake’, Formants 1 and 2 start farther apart. This is because the ‘ey’ vowel in ‘frame’ is shaped by the ‘r’

sound that precedes it (a phenomenon that linguists call R-COLORING), while in ‘fake’, which has no ‘r’, the vowel is produced as a more pure ‘ey’.

There are also differences to be observed at the end of ‘frame’ vs. ‘fake’. At the end of the word ‘frame’, some dark bands continue after the ‘ey’ vowel ends, which indicates that a sound follows ‘ey’ that has continuing resonance, such as ‘m’. In contrast, in the word ‘fake’, there is a sudden stoppage of all dark bands after the ‘ey’ vowel, indicating the complete closure of the ‘k’ sound. (Resonant sounds like ‘m’ can be held out or hummed, as in ‘Mmmmm’; sounds with complete stoppage of air like ‘k’ cannot.)

b. “It’s a frame” vs. “It’s a fame”

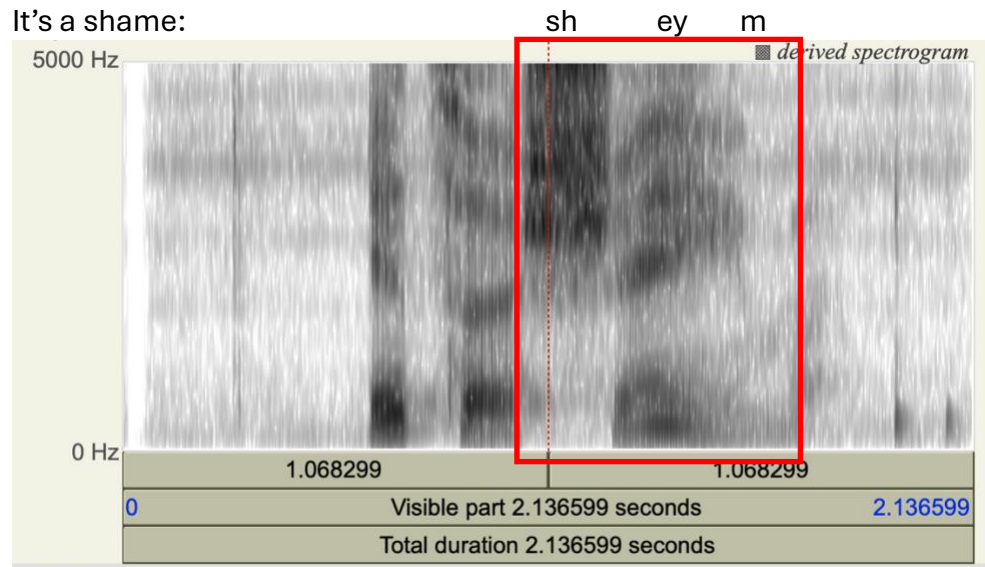
The difference between ‘fr’ and ‘f’ at the beginning of a word can also be seen by comparing “It’s a frame” with the nonsense sentence “It’s a fame,” where all the sounds are the same except for ‘fr’ vs. ‘f’:



Again, Formants 1 and 2 start nearly touching for ‘frame’ but begin farther apart for ‘fame’. The ends of the words are the same, with the ‘m’ sound continuing past the vowel sound, with no sudden stoppage of airflow.

c. “It’s a shame”:

I also considered the possibility that the sentence could be “It’s a shame”. Following is a spectrogram of the latter sentence spoken in a normal voice:

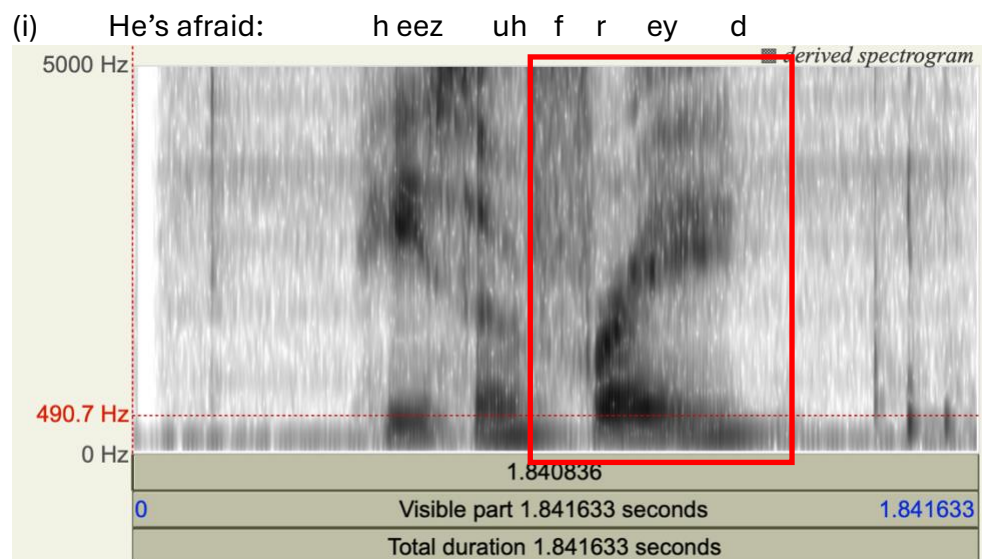


The ‘sh’ sound (at the beginning of ‘shame’) is often quite distinctive on spectrograms, since there is a lot of high-energy noise at a high frequency (the hissing sound that ‘sh’ makes); this shows up as the very dark area at the top of the graph at the left edge of the box. This same concentration of loud, high-frequency energy is not present with ‘fr’ and ‘f’ (above in (b.i) and (b.ii)), though ‘f’ does have hissing noise that is of lower volume and frequency than ‘sh’.

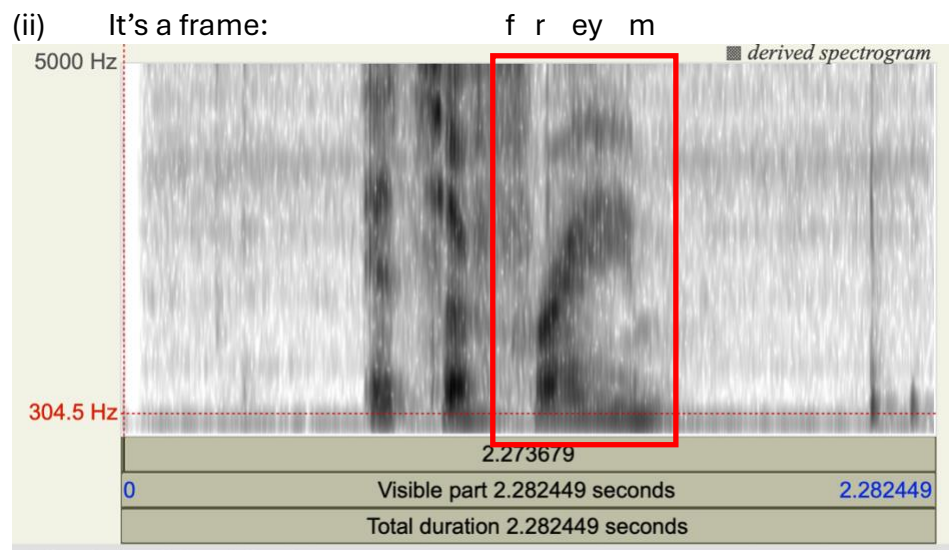
d. “He’s afraid”

One further sentence I considered was “He’s afraid,” based on my auditory impression of a noise-reduced version of the Lyles utterance.¹ A spectrogram of “He’s afraid” produced for analysis, and uttered in a normal, non-whispered voice, is as follows:

¹ Noise reduction may help clarify indistinct audio, but it may also lead to misperception, as it may remove signal needed for accurate interpretation and cannot restore signal that was not originally present due to whispering, long-distance transmission, etc.)



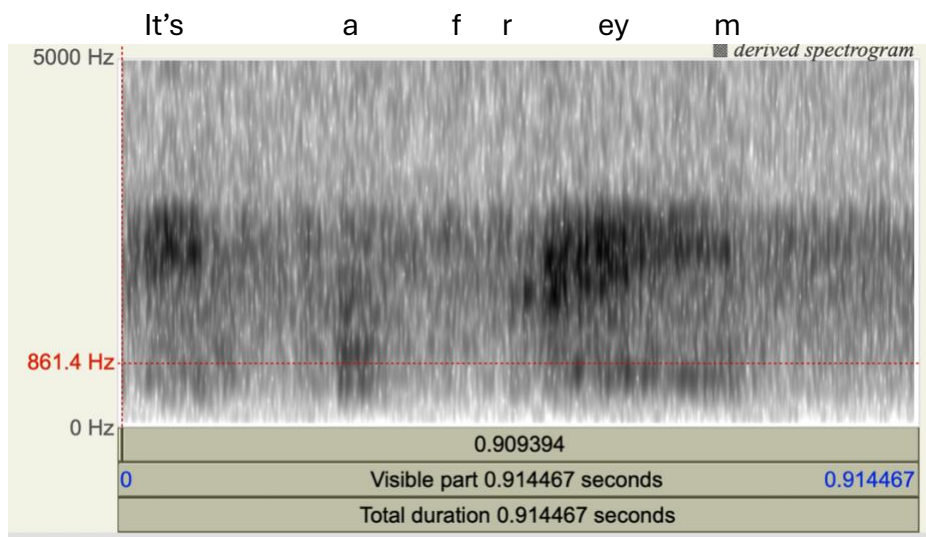
The final syllable of 'afraid', indicated with the red box, looks quite similar to the word 'frame' above; however, it lacks the continuing 'm' noise at the end and instead has an abrupt stoppage of airflow (stoppage of the dark bands indicating Formants 1 and 2) at the end of the 'ey' vowel. The spectrogram for "It's a frame" is repeated here for convenience:



e. The Lyles utterance revisited:

In light of the above analyses, the whispered utterance at the end of the CeeCee Lyles call can be revisited, and detailed comparison with the above possibilities can be made:

Lyles utterance:



The formants (dark bands) of the vowels in the first two words show frequencies (height on graph) more similar to 'it's' and 'a' than 'he's' and 'a' or 'you' and 'did', though the formants are faint and marred by noise. In addition, Formants 1 and 2 in the last word start out close together, as in the spectrogram of the clear utterance of 'frame' above; this contrasts with the formants at the beginning of 'frame', which start out farther apart due to lack of r-coloring on the following 'ey' vowel. The noise prevents a clear view of the end of the last word, but since we do not see an abrupt stoppage of air, this word is more consistent with one ending in a continuant consonant such as 'frame' than one ending in a stopped consonant like 'fake' or 'afraid'.

f. Contextual considerations in the interpretation of the Lyles utterance:

In addition to conducting auditory and acoustic analysis of the whispered utterance at the end of the Lyles call in an effort to ascertain the best interpretation of the unclear utterance, one can also assess which possible interpretations are more and less likely in context, including in the phone message itself and the wider context of the purported hijacking situation.

It is a central tenet of linguistic pragmatics, the study of language meaning in context, that speakers will produce utterances relevant to context. If a seemingly irrelevant remark is made, it is typically with the intent of causing listeners to infer a connection to context that makes the remark relevant – that is, to cause listeners to 'read between the lines' and thereby convey an unspoken message.

i. "He's afraid"

In this case, "He's afraid" does not fit the context of the voicemail message if it was uttered by Lyles, nor can an appropriate context be inferred. Lyles' message is essentially a 'goodbye' message to her husband, in which she expresses her love for him and her children, states that the plane has been hijacked, and again expresses her love for her

husband. Just before the whispered utterance, she says the following, in a highly emotional tone (seemingly with crying):

“I hope to be able to see your face again, baby. I love you. Bye.”

During the course of the call, she refers to a number of people, using various nouns and pronouns: She refers to herself (using the first-person pronouns ‘I’ and ‘me’), her husband (using the second-person pronouns ‘you’ and ‘your’ and the address terms ‘babe’ and ‘baby’), her children (using third-person plural ‘my children’ and ‘them’), the purported hijackers (using third-person plural ‘three guys’, ‘they’), and the people on the plane, collectively (using first-person plural ‘we’). However, at no point does she mention anyone who might be referred to with the third-person singular male pronoun ‘he’, therefore making the phrase “He’s afraid” incongruous.

If the phrase were “I’m afraid” or “We’re afraid,” this would be more contextually appropriate (presuming it was Lyles who made the whispered utterance), as one would expect Lyles and the others on the plane to have been afraid; however, these possible interpretations are not supported by auditory perception or acoustic analysis.

If someone else other than Lyles made the utterance “He’s afraid,” this still is not relevant to the context, as someone commenting on Lyles’ voicemail message would use the third-person female pronoun, ‘she’s’ to refer to Lyles’ emotional state when she made the call.

It is possible that perhaps Lyles or another party making the utterance was referring to the purported chief hijacker, Ziad Jarrah, with ‘he’; again, though, this does not fit the discourse context very well, in which the hijackers are referred to in the collective, as ‘three guys’ and ‘they’.

ii. Other possible interpretations: “It’s a frame,” “It’s a fake,” “It’s a shame”

Of the other possible interpretations explored above, “It’s a fake” would fit the discourse and wider context if the person making the utterance, whether Lyles or another individual, is intending to convey to the recipient (Lyles’ husband) that the hijacking scenario she describes in her message is a falsified scenario. The sentence “It’s a frame” would similarly be contextually appropriate if the speaker is intending to convey that some person or persons (or entity such as an organization or nation) are being set up to be blamed for the events of 9/11 even though these persons/entities are not actually responsible. “It’s a shame” could be argued to fit the context of a ‘goodbye’ call in the face of an imminent airplane crash at the hands of hijackers. However, it is more likely that stronger wording would be used in such a situation, since the phrase “It’s a shame” is often used to express mild regret.

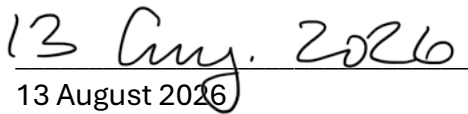
Regardless, the phrase that best fits the phonetics is “It’s a frame”. While overtly not directly relevant to the context of a ‘goodbye’ call from a wife to a husband, the sentence gains relevance when listeners infer an appropriate contextual meaning: Someone and/or some entity is being framed for something for which they are not responsible.

g. Summary:

In sum, when the Lyles utterance is considered in light of various possible interpretations, the conclusion I made in my prior report holds: The vowel formants of the three words, as well as the consonant patterns at the beginning and end of the last word, indicate consistency of the Lyles utterance with “It’s a frame.” The vowel and consonant patterns are less consistent with the other possible interpretations examined above: “It’s a fake,” “It’s a shame,” and “He’s afraid.” In addition, an appropriate context can be inferred that renders “It’s a frame” relevant and meaningful: Someone or some entity is being set up to take the fall for actions for which they are not responsible. In contrast, “It’s a shame” and especially “He’s afraid” are not contextually relevant and so are unlikely interpretations.

My conclusions should be considered with caution, as background noise, long-distance transmission, and whispered voice make definitive identification of the phrase difficult. Further, whispering makes speaker identification difficult as well, and it cannot be determined with certainty whether Lyles or another individual produced the whispered utterance.²


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² There are no obvious signs in the acoustic signal that the Lyles voice recording was tampered with (e.g. through inserting the whispered utterance into a pre-existing recording), though there are bursts of noise surrounding the whispered phrase.