

# Behavioral and Psychological Analyses of Amelia Earhart's Final Flight

by J. Guthrie Ford, Bob Brandenburg, Ric Gillespie, and John Leach

On July 2, 1937, Amelia Earhart and her navigator Fred Noonan departed Lae, New Guinea, bound for Howland Island, the first stop on the Pacific leg of Earhart's around-the-world flight. The plan was to fly from Howland to Hawaii, and then on to Oakland, the starting point of the flight. The completion of this highly publicized aerial journey – first woman pilot to circumnavigate and first person to do so close to the equator – would open new life vistas for both flyers.

All things changed when Earhart's silver and orange trimmed Lockheed Electra failed to land on the specially installed Howland Island runway. Indeed, this flight has been examined in some depth: Randall Jacobson compiled a four-part study,<sup>1</sup> and Ric Gillespie devoted almost a quarter of his *Finding Amelia* book<sup>2</sup> to the flight's apparent duration of about twenty-two hours—per TIGHAR's Niku Hypothesis<sup>3</sup> that the plane landed on Gardner Island, now known as Nikumaroro. This paper continues scholarship on the Howland flight by examining records of Earhart's behavior – her language – that she transmitted by voice radio during the flight. The authors also offer psychological hypotheses for some of Earhart's language and some of the decisions she made before and during the flight.

This paper is presented in sections that reflect the progression of the Howland flight. “Before the Flight” considers developments that occurred during the Lae layover. “Lae to Howland” addresses Earhart's radio transmissions after takeoff and up to her first transmissions to the Coast Guard cutter *Itasca*, standing off Howland to assist Earhart in finding the island. And the “Howland Island” section focuses on the crucial transmissions from Earhart to *Itasca*.

## Before the Flight

The flyers left Miami on June 1, 1937, and on the 29th they landed in Lae, New Guinea. Earhart intended to leave for Howland Island the next day, but that did not happen. In a cable explaining the delay to her husband George Putnam, Earhart indicated that one reason involved “personnel unfitness.” What did that mean? A discussion, including the negative slant that Noonan was drinking in excess, is provided in “Delay in Lae,” a treatment in *Ameliapedia*.<sup>4</sup> The authors endorse Gillespie's straightforward reasoning that Earhart apparently used “personnel” in reference to her and Noonan, and “unfitness” to the fact that “the previous day's [the 29th] eight-hour flight ... had capped a week of early mornings and frustrating delays.” And so, as Gillespie added, it was “hardly surprising that Earhart and Noonan did not feel up to immediately setting off on a journey that was expected to take a minimum of eighteen hours” (*Finding Amelia*, p. 69).

Had there ever been any unfitness or disturbance in the relationship between Earhart and Noonan? There is nothing in the records that even hints that. When the *Electra* lifted off from Lae

---

1 Randall Jacobson, “[The Final Flight](#),” (accessed 11 December 2015).

2 Ric Gillespie, *Finding Amelia: The True Story of the Earhart Disappearance* (Annapolis, MD: Naval Institute Press, 2006).

3 “[The Niku Hypothesis](#),” (accessed 11 December 2015).

4 Staff, “[Delay in Lae](#),” (accessed 11 December 2015).

on July 2<sup>nd</sup>, Amelia and Fred had been flying together almost daily for over a month. They probably knew each other's rhythms and nuances pretty well, plus there is not a shred of evidence that the time the flyers spent together was strained or untoward in any way whatsoever.

Was Earhart possibly distracted by financial issues? It appears that the world flight's finances were strained, but it is doubtful that that would have caused Earhart any significant stress; she was used to hard times, and besides, Putnam handled the finances. A film of Earhart and Noonan boarding the Electra for the Lae takeoff shows two smiling and apparently fully functioning people.<sup>5</sup>

The significant preflight events involved the radio. During a general test flight on July 1, the day before departure, Earhart attempted to direction find—get a minimum on—the Lae landing field.<sup>6</sup> She failed to do so. Because direction finding was an integral navigational tool for locating Howland Island, working the problem and making another test flight were, at least in theory, a wise course of action. That flight did not happen. Practically speaking, it is understandable that Earhart did not make that test flight – the departure from Lae had already been delayed. If there is a psychological tab to this part of the flight it might be Earhart rationalizing away the need for another test flight by overestimating her knowledge – the stuff of hubris – about the direction-finding procedure. The consequence of such hubris would cost Earhart direction-finding information when she desperately needed it.

The other radio-related event involved the wire antenna strung along the bottom of the Electra fuselage—the antenna brought signals to the radio receiver. During takeoff, this antenna was damaged<sup>7</sup> rendering it, for the vast majority of the flight, nonfunctional. That means that when America's aviatrix headed home on July 2<sup>nd</sup>, at 10 a.m. (0000 GMT), she was unaware that to a great extent she was cut off from the earth.

## Lae to Howland Island

Earhart made the plan with Lae that 18 minutes after the hour she would transmit her position and flight conditions, and then Lae would give her the latest weather information. This is the record of Earhart's language (in quotations) that she broadcast to Lae.<sup>8</sup> The time is Lae local; Earhart and Noonan kept Greenwich Mean Time (the Z suffix). Earhart's words are in quotation marks.

- 14:18, 04:18Z. "Height 7000 feet, speed 140 knots." Then a remark concerning "Lae," and an apparent sign-off with "everything okay."
- 15:19, 05:19Z. "Height 10000 feet, position 150.7 east 7.3 south; cumulus clouds; everything okay."
- 17:18, 07:18Z. "Position 4.33 south 159.7 east; height 8000 feet over cumulus clouds; wind 23 knots." (Last transmission heard at Lae.)

The transmissions were made on schedule, and Earhart's language shows no sign of stress or any other irregularity—"everything okay" is taken at face value. What is psychologically notable about the broadcasts is that Earhart was careless about providing flight information: at 14:18, she did not state whether her 140 knots were airspeed or ground speed; at 15:19, she did not give her position relative to the clouds (i.e., in, atop, or below); and at 17:18, the wind direction was not specified.

On the receiving side of the communication coin—remember the receiving antenna had been damaged – the evidence suggests that Earhart heard only one of the numerous broadcasts that Lae made to her.

---

5 ["The Last Takeoff,"](#) Earhart Project (accessed 11 December 2015).

6 ["Direction Finding,"](#) Ameliapedia (accessed 11 December 2015).

7 Earhart Project, ["The Lost Antenna,"](#) (accessed 11 December 2015).

8 Eric Chater, manager of an aerial service in Lae, got to know Earhart during her layover. On July 25, 1937, Chater composed a detailed report about Earhart's stay and the post-departure radio messages that Earhart transmitted to the Lae radio operator. ["The Chater Report,"](#) (accessed 11 December 2015).

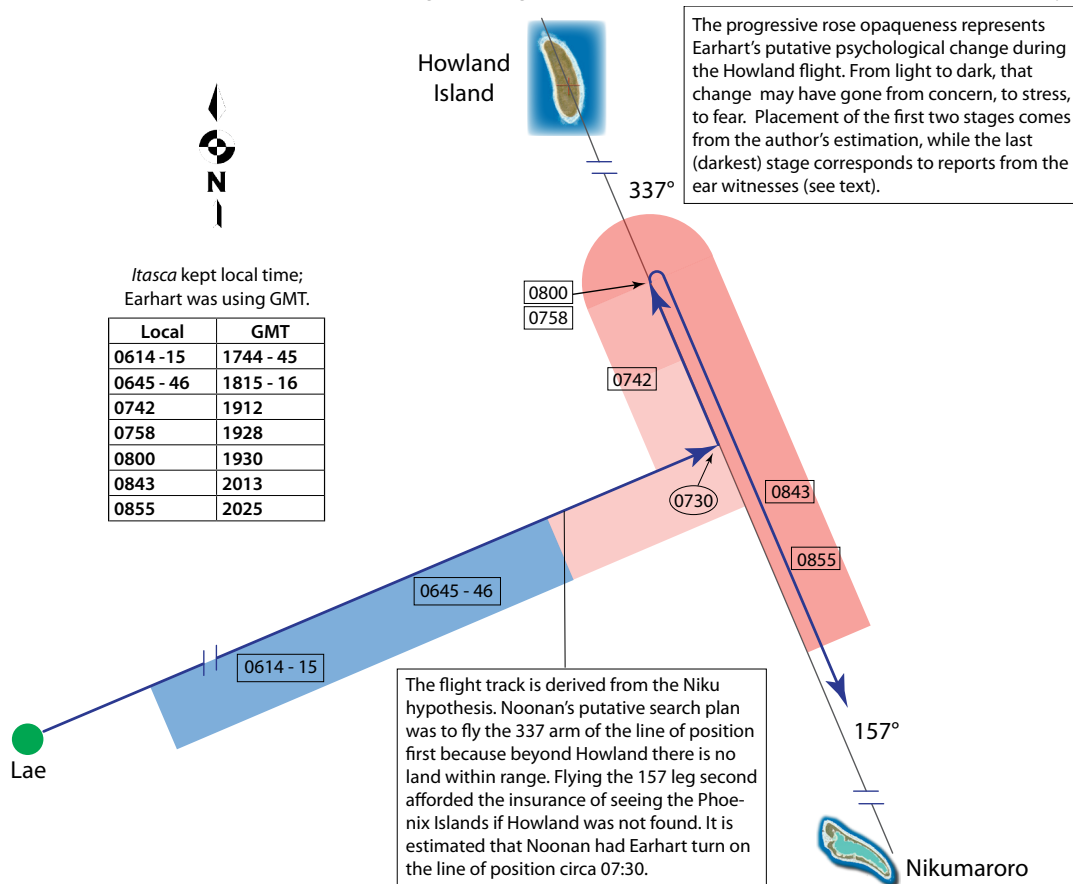
Other than exchanging information with Lae, Earhart had also planned a direction-finding, DF, exercise with the Navy seagoing tug USS *Ontario* during this phase of the flight. *Ontario* was stationed about half way between Lae and Howland Island. At a specified time, *Ontario* was to transmit a Morse code signal that Earhart would use to get a minimum, and hence a bearing, on the ship. It is very doubtful that Earhart heard that DF signal.<sup>9</sup>

All in all, Earhart probably heard only one or two of a half dozen broadcasts that she expected to hear after departing from Lae. (The number of expected signals is derived from the Lae radio log; see footnote 8.) Had Earhart thought her radio was malfunctioning, and that she should abort the flight, that thought and action would likely have been nullified by Earhart’s mind rationalizing (excusing) the absence of signals to atmospheric interference and *Ontario* somehow fouling up its assignment to send the DF signal. If rationalization was the psychological centerpiece at this stage of the flight, it was soon replaced by extreme fear.

### Howland Island (USCG *Itasca*)

The situation at Howland was that the Coast Guard cutter *Itasca* was stationed just offshore to assist Earhart locating the island. Earhart’s lack of reception of signals persisted, in that it appears she heard only one of *Itasca*’s broadcasts to her.

Other than informing *Itasca* that she would transmit on the quarter and three-quarter hour marks and listen on the hour and half-hour marks, Earhart made broadcasts pertinent to direction finding (navigating using radio signals) and broadcasts describing her flight status and location. The schematic figure shows the local *Itasca* times of these transmissions along the flight track, which is derived from the Niku hypothesis.



9 *Ontario* had apparently been misinformed about when to transmit the DF code, and so the code was not transmitted when Earhart thought it would be. Earhart, however, was unaware of the scheduling glitch, and so to her the failure receive the *Ontario* signal was yet another incident of not hearing a signal that she expected to hear.

These are the transmissions related to direction finding. The first is a radioman's paraphrase while the remainder are Earhart's words. The broadcasts analyzed in this section are from the smoothed Itasca radio logs.<sup>10</sup>

- 06:14-15. Wants bearing on 3105 kcs on the hour; will whistle into mic. About 200 miles out, approximately. Whistling now.
- 06:45-46. "Please take bearing on us and report on the half hour. I will make noise in mic."
- 07:58. "We are listening but cannot hear you. Go ahead on 7500 [kcs] with a long count, either now or on the scheduled time on half hour."
- 08:00. "We received your signals but were unable to get a minimum. Please take a bearing on us and answer on 3105 with voice. *Itasca* from KHAQQ, long dashes on 3105."

None of those requests provided Earhart the navigational information (a course bearing) she sought. The will-make-noise signals that Earhart broadcast at 06:14-15, 06:45-46, and 08:00 were useless for *Itasca* getting a minimum, the purpose of direction finding. Earhart would have needed to broadcast a constant signal (like code or number counting) for at least five minutes. But even had that been done, *Itasca* could not direction find any signal sent above 1500 kcs (Earhart was transmitting on 3105). The only *Itasca* transmission that Earhart apparently heard was the 7500 kcs signal that she requested *Itasca* to send her (see the 07:58 and 08:00 transmissions). The 7500 kcs signal was useless; to get a minimum, Earhart's direction-finding system required a signal in the 200-1500 kcs range.

These failed attempts at direction finding point to Earhart's lack of knowledge about both the direction-finding process and the technical nature of her own direction-finding equipment.

## Howland, We Have a Problem

That adaption from NASA's troubled Apollo 13 mission figuratively has the following place in the Howland flight. 07:42: "We must be on you but cannot see you, but gas is running low. We have been unable to reach you by radio. We are flying at 1000 feet." The emphatic "must be on you" words denote Earhart's strong expectancy of seeing the ship. Not doing so may have reduced, if not altogether capped, Earhart's confidence in Noonan's navigational skills; and Earhart's disappointment of not seeing Howland fell in the context of her failed direction-finding attempts at 06:14 and 06:45. "Been unable to reach you by radio," meant that Earhart was deprived of information as well as the morale booster of just hearing a human voice – she and Noonan most likely communicated by notepad. Lastly, Earhart was grimly aware that her most pressing problem was a gasoline supply that was constantly diminishing.

The appearance of the rose-colored flight track in the figure suggests that 07:42 is when Earhart may have started feeling stressed about not finding Howland Island and hence the thought of crashing and dying. There is evidence to support that proposition. For one thing, Earhart changed her broadcast schedule. The 07:42 broadcast was made ahead of the scheduled 07:45 transmission, and then the 07:58 and 08:00 broadcasts were made well before the scheduled 08:15 mark. In fact, hyperactivity can be a sign of stress (Leach, endnote 13).

When Earhart's fourth attempt to direction-find the *Itasca* failed at 08:00, there is evidence that she was now outright fearful about the life-threatening situation. The evidence is from ear witnesses who heard Earhart over a public speaker in the radio shack. The *Itasca* captain<sup>11</sup> observed, "From the time she apparently had reached the end of her dead reckoning run until she finally ceased transmitting her voice rose constantly in pitch and quite evident tension. Up to the last hour she seemed to be very cool and her voice was well modulated and apparently normal, but towards the end I could distinctly notice an inflection of

<sup>10</sup> "[Radio Logs of the USCG \*Itasca\*](#)," Earhart Project (accessed 11 December 2015).

<sup>11</sup> [Warner Thompson](#), Earhart Project, (accessed 11 December 2015).

tension coming into it and a decided increase in the pitch as though she was talking under a great deal of stress or emotion.” Correspondingly, the ship’s executive officer<sup>12</sup> wrote, “I heard her last broadcasts myself. She realized too late that she was in trouble, then she went to pieces. Her voice plainly indicated that fact, by the desperate note in her transmissions.”

Earhart being fearful during her search for Howland Island is not news; the ear witness reports are well known on the TIGHAR forum. What the authors wanted to explore is a specific way that fear may have affected Earhart’s language and even possibly the outcome of the Howland flight. That brings us to the final two broadcasts.

### A Possible Consequence of Earhart’s Fear

These are the broadcasts wherein the witnesses heard a high degree of fear in Earhart’s voice. 08:43: “We are on the line 157° / 337°. We will repeat this message. We will repeat this on 6210. Wait.” And 08:55: “We are running on the line north and south.” (The line is the 157° / 337° line of position that Noonan ostensibly established for finding Howland Island.)

Before examining the fear factor, the authors point to how those broadcasts differ from previous ones. Earhart’s 08:43 and 08:55 broadcasts were not requesting information from *Itasca* for the purpose of her finding the ship (island). Indeed, the broadcasts appear to be Earhart telling the Coast Guard where to find her. From that perspective, the 08:43 and 08:55 transmissions were apparently pertinent to rescue and survival; figuratively, Earhart may have been saying, “if we do not show up there, I am telling you where to look for us.” Given that interpretation, then why did Earhart speak such inadequate words at 08:55? Her saying “we are running on the line north and south” was imprecise. Not only were the actual directions northwest and southeast, but it is of course impossible to proceed in two different directions simultaneously (i.e., Earhart said north and south).

What more precise and informative “rescue” message might Earhart have broadcasted at 08:55? The following hypothetical words would have told *Itasca* what it needed to know to begin searching for Amelia Earhart: *We ran 357 degrees until 08:00. Now running 157 degrees until see Howland or exhaust our fuel.*<sup>13</sup> Those words might well have saved Earhart and Noonan’s lives, and so why did Earhart not speak them? Author John Leach provides an answer from his Dysexecutive Survivor Syndrome Theory.<sup>14</sup>

This theory maintains that the fear in life-threatening situations—Earhart’s was crashing and dying—impairs what Leach calls the supervisory system. The supervisory system makes the mind capable of thinking and reasoning at its highest level. Therefore, when Earhart’s supervisory system became impaired—taken out by fear, her mind was not capable of reasoning through what needed to be said about her flight on the line of position. In lay terms, Earhart’s mind was so seized by fear that it was literally incapable of producing anything like the informative 157 message shown in italics in the previous paragraph.

Now, the authors are not claiming that Amelia Earhart had a weak mind in terms of it being impaired by the life-threatening situation of being lost. Indeed, Leach reports that the majority of people (about 85%) who are confronted by life-threatening disasters have their minds impaired by fear and end up behaving maladaptively. However, disaster preparation is a way to mitigate mental impairment (Leach, endnote 14). For instance, Earhart and Noonan could have created disaster scenarios and talked about appropriate response behaviors. In the “lost” scenario, that talk might have included the specific information to transmit when flying a line of position.

---

12 [Frank Kenner](#), Earhart Project (accessed 11 December 2015).

13 *Itasca* did not know if Earhart was northwest or southeast of it on the line of position. *Itasca* would have stayed in position up to the estimate of Earhart’s fuel exhaustion. If Earhart had not appeared from the northeast, the odds were excellent that she was flying 157 degrees.

14 John Leach, [“Maladaptive Behavior in Survivors: Dysexecutive Survivor Syndrome,”](#) (accessed 11 December 2015).



## Summary and Conclusions

It appears that psychology may enrich the understanding of Amelia Earhart's flight to Howland Island. The psychological feature early in the flight was rationalization. If Earhart was concerned about not hearing anticipated transmissions from Lae and USS *Ontario*, then she could have rationalized the absent signals to atmospheric conditions and a mistake by the *Ontario*. Such mental maneuvering masked the possibility of a broken radio and a reason to turn back.

A different and more complex psychological picture is found in the record of Earhart's transmissions to USS *Itasca* and the reports from the ear witnesses. The psychological theme of this phase of the flight is the escalation of Earhart's stress and fear (see the figure). An obvious source of stress for Earhart was the inability to hear transmissions from *Itasca*, and adding to that stress was not seeing Howland at the expected time. Earhart's stress apparently compounded to out-and-out fear after her fourth failed attempt to direction find (at 08:00). Being gripped by fear appears to have impaired Earhart's mind from composing a precise description of her flight plan (at 08:55) that would have been useful to *Itasca* in planning a search. Psychologically, the Howland Island flight can be understood in terms of Earhart's deficits in training and preparation coalescing into fear and mental impairment that may have prevented her rescue close to the time that she disappeared.

---

## About the Authors

**J. Guthrie Ford, Ph.D.**, was a teaching and research psychologist at Trinity University (San Antonio, TX) from 1972-99, when he retired as an emeritus professor. Ford's area of speciality is personality and social psychology, and methodologically, Ford developed a psychological test relevant to testing hypotheses from his Temperament/Actualization Theory. At the millennium, Ford began a second career as a historian specializing in life and times on the Texas coast in the the Port Aransas (Mustang Island) area. He was led to the present study by noting pattern similarities in Earhart's putative post-lost language and the post-lost language of crew members of other lost aircraft.

**Dr John Leach** has combined the career of a military officer with that of university professor. His military interests lie in combat survival and he is qualified as a SERE (survival, evasion, resistance & extraction [UK]) officer and instructor. His academic interests are in cognitive science and cognitive evolution and he was, for number of years, Director of Studies for cognitive psychology at the University of Lancaster (UK). Today he has combined both areas with the position of Senior Research Fellow in the Extreme Environmental Medicine & Science Group at the University of Portsmouth (UK). His main research interest is in theoretical modelling of cognitive dysfunction in survival situations, and his dysexecutive survivor syndrome model was published in 2012. Leach has had a standing amateur interest in the fate of Amelia Earhart and had just finished reading a report on the latest Niku expedition when he was contacted by psychologist Dr J. Guthrie Ford from TIGHAR – the rest, as they say...

**Bob Brandenburg, MS**, holds degrees in mathematics and operations research, and is a member of the Institute for Operations Research and Management Science (INFORMS). He is a retired naval officer with extensive operational experience in destroyers, including command. He also developed and taught antisubmarine warfare tactics, published papers in the Proceedings of the U.S. Naval Institute, and served on the staff of the Chief of Naval Operations. After retiring from active duty, he was a senior operations research analyst at a Navy R&D laboratory, leading a team developing computer simulation and modeling tools for analysis of command, control, and communications (C3) systems. He has been a TIGHAR member and researcher since 1999, and has published and co-authored papers on the TIGHAR website.