What does the crash of Federal Express (FedEx) Flight 1478 tell us about the role of defective colour vision in aviation?

Arthur Pape (MBBS)
Boris Crassini (BA[Hons], PhD)
Disclosure Information

84th Annual AsMA Scientific Meeting
Arthur M Pape & Boris Crassini

No financial interest of any kind to declare.

No discussion of off-label and/or investigational use.
What does the crash of (FedEx) Flight 1478 tell us about the role of defective colour vision in aviation?

Links an aviation accident with colour vision defect (CVD).
Used to justify more stringent colour vision testing.

Changes in the colour vision standard impact on many pilots with CVD.
Outline of presentation

Relevant information about crash, highlighting a puzzle.
The NTSB’s awareness of and explanation of the puzzle.
Propose an alternative explanation, with supporting evidence.
Two answers to the question in the title.
Flight 1478 approach path

July 26th, 2002

Time of impact 0537:20.7

0534:35 Time PAPI turned on

PAPI Lights Displayed

Runway 09 Elevation 81 feet

PAPI Light Box
Pictorial representation of the puzzle

<table>
<thead>
<tr>
<th>Distance from Runway 9</th>
<th>Theoretical PAPI appearance</th>
<th>Glide path ‘as if’ PAPI appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>~4.0 nm</td>
<td>⬠⬠⬠⬠⬠</td>
<td>⬠⬠⬠⬠⬠</td>
</tr>
<tr>
<td>~3.5 nm</td>
<td>⬠⬠⬠⬠⬠</td>
<td>⬠⬠⬠⬠⬠</td>
</tr>
<tr>
<td>~2.5 nm</td>
<td>⬠⬠⬠⬠⬠</td>
<td>⬠⬠⬠⬠⬠</td>
</tr>
</tbody>
</table>
Did the NTSB Report explain this puzzle?

NTSB Report indicates awareness of the puzzle.

Aircrew fatigue, failure to follow procedures implicit explanations of the puzzle.

Is there an alternative explanation of the puzzle?
Factors that influence appearance of PAPI lights

Clark & Gordon’s idea of “cross talk” with PAPI lights.

Internal causes of “cross talk” e.g., lens contamination.

External causes of “cross talk”, e.g., airborne factors.

Clark & Gordon’s idea of “fail unsafe”. 
Is “cross talk” of relevance in explaining the crash?

PAPI was “functioning”, but ...... No ecological validity.

Were internal causes of cross talk present? Yes.

Were external causes of cross talk present? Yes.

Did the PAPI on RWY 9 “fail unsafe”? Probable.
What does the crash of FedEx Flight 1478 tell us about the role of defective colour vision in aviation?

Not much!

Second question: “What does the crash of Flight 1478 tell us about the role of colour in aviation?”

Presentation of information in aviation based solely on colour is problematic and should be avoided.
Bibliography