Newspaper and Online News Reporting of Major Accidents: Concorde AFR 4590 in The Times, The Sun and BBC Online

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Abstract

Many complaints have recently been made against the media reporting of major accidents (Johnson, 2003). It has been argued that undue emphasis is placed on identifying the immediate causes of any failure, including human error or technical failure, in the hours following an adverse event. In consequence, the public can be misinformed about the complex nature of many technological failures. The following pages present what is arguably the first detailed review of media coverage of a major accident. In particular, we consider the way in which a tabloid newspaper, a broadsheet and an Internet news service covered the loss of Concorde flight AFR4590 in July 2000. Our analysis yields some surprising results. The broadsheet speculates most about the causes of the incident, the tabloid publishes the least. The journalists and editorial staff on these new sources present very few direct hypotheses about the potential causes of this accident. In contrast, the majority of the speculation in the media is presented in the form of direct quotations from experts many of whom criticise undue speculation in the aftermath of such adverse events. This provides at least a partial explanation for the relative amount of speculative material in each of the publications that were studied. Experts may have been more inclined to speculate for the more prestigious broadsheet than they were for the mass-market tabloid publication. Alternatively, it can be argued that the editorial staff on the tabloid focussed their analysis more directly on the facts that were available in the aftermath of this accident.

Introduction

Investigatory authorities often have an ambivalent attitude towards the role of the media in the reporting of major accidents. Intense public interest in the course of any investigation must be balanced against the need to prevent undue or premature disclosure. This ambivalence is illustrated by the impact on the US National Transportation Safety Board of Section 515 of the Treasury and General Government Appropriations Act for 2001 (Public Law 106-554; H.R. 5658). This issued government-wide guidelines for maximizing the quality, objectivity, utility and integrity of information disseminated by Federal agencies. The NTSB (2002) acknowledged that; "The primary purpose of the NTSB is to promote safety improvements in the operations or oversight of public and private organizations, resulting in a safer transportation system in the United States. The primary audience of Safety Board products is persons, groups, or organizations that can bring about changes in transportation safety through action on the Board's safety recommendations. The Congress, industry, media, and public, who can influence the actions of the recommendation recipients, are also important audiences. The type of audience and the technical knowledge of the audience vary greatly, depending on the document's subject and the safety issues presented. The Safety Board does not intend its reports and recommendations to be read only by technicians and specialists in the transportation industry". This wider role of the media in improving public safety forms a strong contrast with guidelines that govern the disclosure of information to the media in the immediate aftermath of an accident. The standard instructions from the senior investigator are that "The Safety Board will disseminate to the public all information regarding the accident [investigation], either through our Board Member, public affairs officer or me. We will hold regular briefings to the press. Please refrain from discussing the accident [investigation] in public, or giving information about it to the press. Any violation of

this request will be considered a serious infraction of Board rules". The NTSB (2000) argue that "This rule protects everyone. Typically, the NTSB conducts press briefings during the day and at night following the progress meeting. Only factual information -- that all the parties have heard -- is released. The NTSB does not speculate or give out unverified information. With all parties deferring to the Board to release information on the investigation, the team speaks in a coordinated, consistent and orderly manner. Through this procedure, competition for "spin" is thus minimized, and the maximum opportunity for coordination and cooperation among the parties is maintained".

Journalists often express a duty to inform the public about the causes of major accidents. This is eloquently expressed in the opening chapters of Downie and Kaiser's (2002) recent survey of 'American Journalism in Peril'. They argue that 'Communities are improved by aggressive, thorough coverage of important, if everyday, subjects like education, transportation, housing, work and recreation, government services and public safety'. For example, KHOU a local Houston television station played an important role in publicising a number of accidents involving Ford Explorers equipped with certain kinds of Firestone tires. The news coverage and federal investigations in 2000 led to the recall of millions of tires, "undoubtedly saving many lives". . The investigative role of the media is not restricted to KHOU. For example, both Le Parisien and the Times of London carried articles criticising the composition of the French Transport Ministry's investigation team into the loss of Concorde Flight AFR4590. Key individuals had investigated the crash of a French Air Inter Airbus in Alsace in 1992. Their report focused on the inexperience of the pilots, however, a subsequent court case identified the failure of cockpit instruments as a primary cause in this previous accident. Downie and Kaiser (2002) also point to the dangers of ill-informed coverage. They cite the example of journalists who were too eager to attribute the explosion of TWA Flight 800 to Islamic terrorists. They also argue that editorial policy can undermine good journalism; "If it bleeds, it leads is a self-mocking slogan among local television journalists, but also an accurate description of the reflex of television news directors…" Curtis' (1995) analysis of the New York Times' coverage of major airline accidents between 1978 and 1994 provides evidence to support this criticism of editorial policy. He used the Times' annual index of stories to argue that fatal events were also more likely to be reported as the number of fatalities increased. In particular, he argued that disproportionate coverage was devoted to 25 fatal airline events involving hijacks sabotage or military action. These events averaged 53 references each. The remaining 160 other fatal events averaged 7.2 references. The New York Times focused on events that occurred in the U.S. or that involved U.S. carriers.

<u>The Case Study: Concorde AFR 4590:</u> Curtis' review focussed on the coverage of many different incidents within a single newspaper. In contrast, the following pages focus on the reporting of a single incident. In particular, we focus on the articles that appeared in the aftermath of the Air France Concorde crash, flight AFR 4590. This decision is justified because the loss of AFR 4590 typifies the high-profile accidents that elicit considerable interest from the media. The official enquiry into this accident found that the front right tire of the left landing gear ran over a strip of metal shortly before rotation during takeoff from Charles de Gaulle Airport (BEA, 2002). The strip had fallen from another aircraft. Damage to the tire created debris that was thrown against the wing. The debris ruptured a fuel tank and a major fire broke out under the left wing. Problems appeared on engine 2 and for a brief period on engine 1 but the aircraft took off. The crew shut down engine 2, following an engine fire alarm. They noticed that the landing gear would not retract. The aircraft flew for around a minute but was unable to gain height or speed beyond 200 knots and 200 feet. Engine 1 lost thrust, the aircraft's angle of attack and bank increased sharply. The thrust on engines 3 and 4 fell suddenly and the aircraft crashed onto a hotel.

The Times, The Sun and BBC Online: The following pages analyse the coverage of the accident in two very different newspapers: The Times of London and The Sun. The Times is published in the large page area format associated with 'broadsheets'. It presents an authoritative, 'in-depth' analysis of news and current affairs and has a daily circulation of around 630,000 in August 2002. The Sun appears in the smaller 'tabloid' format. It presents news items but with a greater proportion of celebrity coverage and current affairs that The Times. The Sun enjoys daily sales of approximately 3,600,000. It is important to recognise, however, that newspapers are only one of several sources of news about incidents and accidents. In particular, there is a growing range of Internet based new services operated by organisations ranging from AOL-Time Warner, to the BBC and News International. At the time of the Concorde accident, most of these services were in their infancy. The BBC-online news service was in its second full year of operation. However, it was already the "most visited Internet content site in Europe" with the aim "to provide UK content in a market dominated by US material, and to act as a 'trusted guide'". The site aimed to cover more than 300 news items per day from around the globe. In the year before the Concorde accident BBC News Online attracted an average in excess of 3,000,000 hits per day, this resulted in an initial record of 120,600,000 million hits in March 2001. Although there are superficial similarities between newspapers, such as The Sun and The Times, and Internet news services, such as BBC Online, there are also numerous differences. For example, Internet services are not driven by publication and distribution deadlines. Stories can be edited on-line as more information becomes available 24-hours a day. Such differences complicate any comparative analysis between these news sources. For example, it is relatively easy to use newspapers to trace competing hypotheses about the causes of an accident by the careful reading of each successive edition. Things are less straightforward with Internet-based news services where any analysis must rely upon the timestamps associated with archives on particular servers. These times may only provide an indication of the last moment at which a story was edited and not the time when the document first appeared on a host website.

Quantitative Comparisons

This section presents a quantitative analysis of coverage about the crash of AFR 4590. It is quantitative in the sense that values are provided for the number of pages devoted to the subject in the days following the incident. Figures are also provided for the relative use of images, text and headlines in each of the three sources. The following sections provide a more subjective assessment of the different types of causal arguments that are used in the media as more evidence became available about the events leading to the accident.

Page Distributions for Coverage of the Accident: Figure 1 provides an overview of the coverage in The Sun, The Times and on BBC Online in the immediate aftermath of the loss of AFR 4590. It presents the total number of individual pages that contained references to the accident. This calculation is more complex than it might appear. As mentioned, previously, the analysis of the on-line resource depends upon access to an archive server. The total number of pages given in Figure 1 is the result of a query against the BBC archive using the term 'Concorde' restricted to the dates illustrated in the graph. The accuracy of the diagram, therefore, depends both on the precision and recall of the archive search engine. A second stage of analysis exhaustively analysed the returned documents to determine that only relevant articles were included. We did not, however, perform an exhaustive analysis of the several million pages that were excluded by the initial filtering process. Further complexity stems from the dynamic nature of on-line media. For example, several news items published on the 25th July were entitled 'Concorde Crashes in Paris'. The accident occurred shortly before 15:00GMT. The first of these pages was time stamped at 15:14 GMT and stated that "A Concorde jet flying to New York has crashed near

Paris Charles de Gaulle airport. The BBC correspondent in Paris say French TV is reporting that the aircraft crashed into a hotel shortly after take-off". A second page under the same title was time stamped at 15:42 and included an eye-witness account that the hotel was "totally in flames…I saw the Concorde go by with its left side engine on fire and crash a bit further away, about two minutes after taking off" (http://news.bbc.co.uk/1/hi/world/Europe/85093.stm). The initial story was revised five times over the day until the same headline was used on a more sustained piece that was finally published at 18:45. Figure 1 treats these pages as different news items even though it can be argued that one was a direct development of the other.

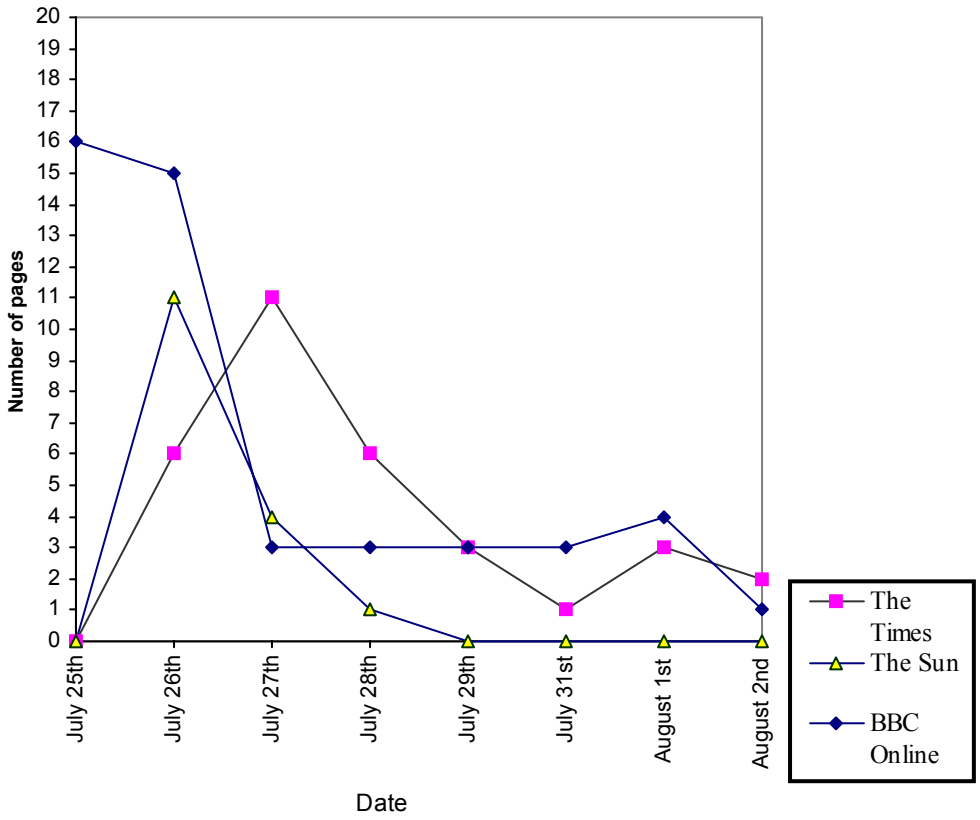

Figure 1 – Page Coverage of AFR 4590 by Date

A number of further issues complicate the development and interpretation of Figure 1. The Times and The Sun are both distributed across the UK. However, flexible production and distribution techniques were introduced across the newspaper industry during the 1980's and 1990's. One consequence of this has been that there are regional variations of national titles. These variations carry advertising and local news items that relate to the area in which the paper will be distributed. Figure 1 is based on a detailed analysis of the editions that were sold in Glasgow, Scotland in July and August 2000. The main news pages should be common across the distribution. It is possible, however, that some regional variations may affect our findings. This diagram excludes page totals from Sunday editions of The Times and The Sun. These papers are produced using different editorial teams, they have additional pages for more extended coverage and often repeat material that is published in the daily newspapers. The BBC Online

pages are collected from both the European and UK correspondents' contributions to the news service.

Some problems that frustrate the development of Figure 1 are common to both the newspapers and the web site. In particular, it can often be difficult to determine what exactly should be considered as 'news' and therefore be included within the page counts. BBC Online included several different categories of information. In particular, news coverage was distinguished from information about television programmes. By extending the scope of our search, it would be possible to increase the page count to include information about the BBC's wider broadcast coverage of this incident. This was not done and Figure 1 presents only the totals for pages that were produced by the BBC news staff. The Times includes a similar series of supplements, such as Times 2. In the aftermath of the Concorde accident these supplements included articles that considered media coverage by other European papers. Figure 1 includes these pages in the totals. This decision added 4 pages to The Times on July 27th, 2 pages on July 28th and a single page of coverage from a travel supplement on the 29th July.

Table 1 - BBC Online Coverage of AFR 4590 25th July 2000

Time Issued (GMT)	Title
01:18	The Cracks in Concorde
15:14	Concorde Crashes Near Paris (1)
15:42	Concorde Crashes Near Paris (2)
15:43	Q&A: Cracks in Concorde
15:50	Concorde Crashes Near Paris (3)
15:53	113 Killed in Concorde crash
15:55	Concorde facts and Figures
16:16	Concorde Crashes Near Paris (4)
16:25	Concorde Paris Crash Kills 113
16:33	Ageing Luxury Jet
17:02	Concorde: Loved by the Rich and Famous
17:15	Concorde 'Still the Safest'
17:56	Witnesses Describe Concorde 'Fireball'
18:45	Concorde Crashes Near Paris (5)
19:50	Concorde Kills 113 (2)
21:42	BA Suspends Concorde Flights
22:05	Germany Stunned by Concorde Crash

In spite of these caveats, a number of comments can be made about the media coverage based on Figure 1. An initial peak of interest can be observed in all three publications. This quickly declines over the following week. The way in which the coverage rises and then falls is different in each case. Both The Times and The Sun begin their coverage on the day after the accident. First reports were received on the afternoon of the 25th. The first national newspaper articles appeared on the morning of the 26th. The Sun devoted eleven pages of coverage on the 26th including many images from the scene of the crash and shortly before the accident occurred. The Times, in contrast, devoted most attention to the loss of AFR4590 on the 27th. It can be argued that this reflects an editorial policy of delaying publication until more facts are known in order to provide authoritative coverage. In contrast, BBC Online had the advantages of continuous publication over the Internet. As can be seen from Figure 1, most pages were devoted to this incident in the hours after the crash occurred. Table 1 provides further details of the headlines

that appeared for pages on the BBC Internet site in then hours after the crash. The steady accumulation of facts about the crash can be observed in these on-line archives in a manner that is not possible using daily newspaper publications where each edition summarises the information gleaned in the previous twenty-four hours. As mentioned, Figure 1 also illustrates the apparent decline in coverage across all three publications. This is most apparent in The Sun, which concentrated maximum coverage in the first edition after the crash. However, it is important to stress that much of the continuing coverage in The Times stemmed from readers' responses to previous articles rather than to stories produced by the papers' news staff. These letters account for a single page of coverage in The Times on August 1st and 2nd.

Figure 1 shows that BBC Online provided more sustained coverage than either newspaper. This is symptomatic of further differences between these forms of media. The Times' and The Sun's editors and journalists were faced with competing demands from other news stories for their finite column space. BBC Online did not face the same pressure of page limits as their more conventional counterparts. As a result, they continued to publish stories several weeks after the initial crash as, for example, Claude Gayssot the French Transport Minister coordinated the official response to the accident.

Relative Proportions of Text, Images and Headlines: Figure 1 arguably provides a false impression of the newspaper coverage in the aftermath of the Concorde accident. Although the BBC on-line pages were exclusively devoted to this topic, some of the newspaper pages contained very little information about the accident. As the week went on, full-page spreads were reduced to smaller articles. For example, page 13 was the only one to contain information about the accident in The Sun published on the 28th July. The total area of text devoted on that page was approximately 157 $cm^{2.}$ Figure 1 treats this in the same way as page 7 of The Times, which on the same day contained approximately 524 cm^2 of text at a smaller point size. Figure 2 presents a more detailed breakdown of media coverage following this accident. As mentioned before, BBC Online was able to publish its first articles within an hour of the crash. The newspaper response was delayed by publication schedules until the morning of the 26th. The additional detail in Figure 2 also illustrates important differences in the presentation of this incident. Both newspapers were able to use the delay before publication to acquire a large number of photographs taken during the last moments of the flight and in the subsequent operations to safeguard the crash site. The Sun's extensive use of these images, arguably, reflects the papers' format. However, it is important not to over simplify. Figure 2 also shows that The Times made extensive use of this photographic material. However, the proportion of images in The Times falls from 60% on the 26th to 45% on the 27th while the proportion of text devoted to the incident increases from 30% on the 26th. In contrast, BBC Online made less use of photographic images and correspondingly greater emphasis was placed on text-based reports. It could be argued that these photographs were not widely available at the time when BBC staff were beginning to assemble their first reports. However, the relatively high ratio of text to images is sustained into the 26th and beyond. This apparent difference between on-line and conventional press reporting can be explained by several important properties of the new Internet-based services. Firstly, many sites provide thumb-nail images that are embedded into the text of the new story. Readers can then choose to view higher-resolution images by selecting these thumb-nails. Hence, the ratio of text to images is, typically, quite different between screen space and the printed page. Secondly, there are well known differences in the readability of on-line versus printed text (Licorish). Most people will avoid reading long documents on CRT displays. Instead, they will either skim the prose, print it to read on paper or ignore it. In consequence, many of the on-line news provides impose guidelines on their journalists and editors so that few articles exceed 100-200 lines of prose. There is a conscious attempt to avoid unnecessary scrolling and reduce the demands imposed by on-line text.

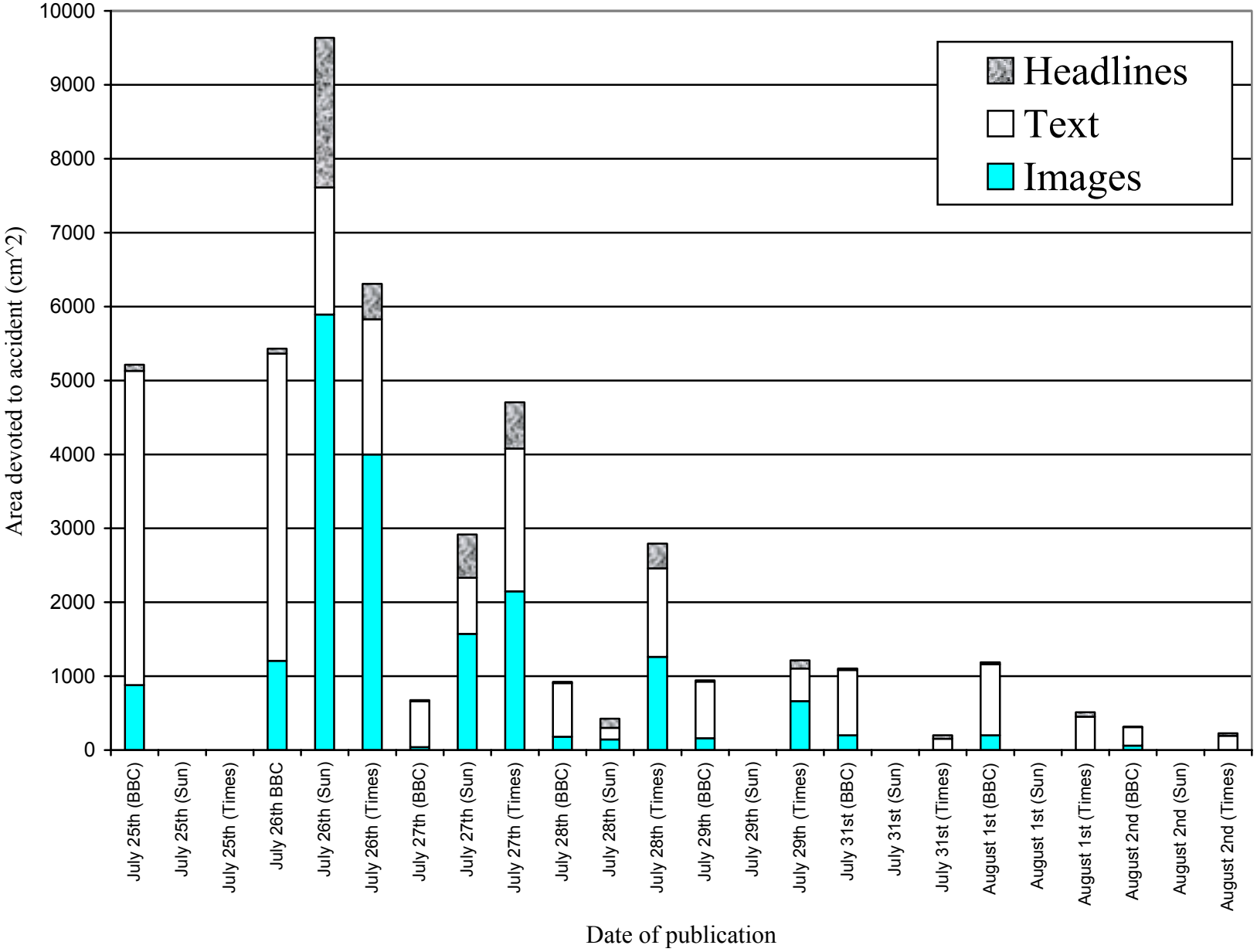

Figure 2 – Area of Text, Images and Headlines Devoted to AFR 4590 by Date

Table 2 - Area Devoted to AFR 4590 Excluding Supplements (cm^2)

	25th July			26th July			27th July			28th July		
	BBC	Sun	Times	BBC	Sun	Times	BBC	Sun	Times	BBC	Sun	Times
Text	4252	0	0	4158	1718	1829	622	760	1934	725	157	1196
Images	878	0	0	1208	5893	4000	40	1571	2146	180	144	1262
Headlines	85	0	0	66	2026	480	12	586	637	16.5	123	334

	29th July			31st July			1st August			2nd August		
	BBC	Sun	Times	BBC	Sun	Times	BBC	Sun	Times	BBC	Sun	Times
Text	768	0	444	884	0	154	962	0	452	250	0	194
Images	160	0	661	200	0	0	200	0	0	60	0	0
Headlines	15	0	108	19	0	48	25	0	59	5	0	34

Table 2 summarises the page areas devoted to the accident. It should be noted that the approximate total area in The Times' broadsheet format is 1,855 cm^2 and 945 cm^2 for The Sun's tabloid format. BBC Online provides a printable version of their articles with a total printable area of 416cm^2. These printed versions were used as a point of comparison between the on-line and newspaper sources. Further problems complicate any direct comparisons in terms of the total amount of text devoted by each source because The Times, The Sun and BBC Online use different point sizes and fonts. Taking the smallest point size used in each publication, a 40cm^2 area of text yields approximately 70 words in the printed version of BBC Online articles, 135 words in the 4cm column format of The Times and 170 words in the 5cm column format of The Sun. Matters are further complicated because different fonts and point sizes are used *within the same publication.* For example, The Sun uses 'strap lines' that lead the reader from the headline into the content of a story. These use a point size that is approximately midway between that of the headline and the main text. In Table 2, we have not accounted for the different word frequencies that are possible in the same area of prose at these different point sizes.

The problems that complicate the interpretation of Table 2 might be reduced if we could derive a word count for the Concorde articles using relatively simple computer-based tools. We could not, however, obtain complete electronic versions of the two newspapers that were being analysed. Even with access to the BBC Online documents it was difficult to derive accurate word counts. The task is complicated by the embedding of formatting commands, the use of style sheets and of inclusions from other pages of prose using frames. The only remaining solution is to perform a manual word count across the different media sources. The logistics of such an operation prevented us from exploiting this alternative. In contrast, the following pages look beyond the high-level statistics of this section. The intention is to focus more directly on the arguments that were presented in the media about the causes and the consequences of the Concorde accident. In particular, the intention is to identify the different hypotheses that were put forward about why the accident might have happened in the days following the loss of AFR 4590.

Qualitative Comparisons

The Bureau d'Enquêtes et d'Analyses pour la Sécurité de l'Aviation Civile enquiry into the accident argued that "front right tyre (tyre No 2) of the left landing gear ran over a strip of metal, which had fallen from another aircraft, and was damaged. Debris was thrown against the wing structure leading to a rupture of tank 5. A major fire, fuelled by the leak, broke out almost immediately under the left wing" (BEA, 2002). This information was not, however,

available to journalists and editors during the evening of the 25th and the morning of the 26th July. Instead, the immediate attention of all three sources focussed on previous reports about cracks having been found in the wings of the Concorde fleet. On Monday 24th July, British Airways staff had confirmed that hairline cracks had been discovered in the wing of all seven of its Concorde fleet. By coincidence, The Sun and BBC Online carried a series of articles on these 'problems' on the day of the crash. For example, the BBC reported, "one aircraft was grounded after a crack was found to have lengthened. BA was keen to stress the aircraft's exemplary safety record and the fact that Concorde clocks up a fraction of the flying hours amassed by sub-sonic planes" (BBC 848775.stm). This was published at 01:18 GMT on the 25th July. By 16:42 they were reporting, "The crash is the first of the supersonic jet built by Britain and France. It comes a day after British Airways confirmed that hairline cracks had been discovered in the wings of all seven of its Concorde fleet. The Concorde has been considered amongst the world's safest planes" (BBC 850903.stm). However, their account was also prescient in observing "its only scare came in 1979, when a bad landing blew out a plane's tyres. The incident led to a design modification".

Causal Hypotheses Changing Over Time: In the hours that followed the crash, the media revised their accounts. Experts argued that the cracks were unlikely to have played a significant role in the causes of the accident. By 17:15 on the 25th July, BBC Online were citing a former Concorde pilot who said that the cracks were "unlikely to have caused the French disaster" and by 19:50 "the Head of Air France said Tuesday's crash was linked to an engine problem and apparently had nothing to do with the cracks". The 21:42 update, however, quoted an aviation analyst as stating that "it is too early to speculate whether the plane has crashed because of this [the cracks]. The crash could have happened for a raft of reasons" (851057.stm). Over the following days, a number of diverse causal hypotheses were presented to the public. These ranged from age-related issues, including the possibility of metal fatigue, through to fan-blade separation within the engine or problems involving the maintenance of a thrust reverser immediately prior to take off. Table 3 provides an overview of how these different hypotheses appeared in the week following the accident.

Table 3 was obtained by an exhaustive reading of all of the material presented about Concorde in the three publications for the dates that are recorded in the top row of the diagram. A series of categories were devised from an initial read through and these are listed in the first column. The initial categories were then used to identify the causal hypotheses mentioned in each publication. However, this two stage classification process was not as straightforward as might be expected. In particular, several similar hypotheses were put forward with varying levels of detail. For instance, BBC Online on July 26th mentioned the possibility of a foreign object entering the intake of one of Concorde's engines. The Times on July 28th specifically mentions speculation about a bird strike contributing to the engine failure. The initial read through created the category of 'foreign object enters engine'. However, the more detailed hypothesis was retained in Table 3 from the second stage of the analysis to reflect the particular focus of The Times' article. Similarly, The Times contains speculation about the impact that staffing changes may have had on Concorde's maintenance before the crash while BBC Online stresses the relatively short time that was available to replace a thrust reverser that was found to be faulty immediately prior to take-off.

Table 3 - Potential Causal Factors by Date Discussed

	July 25th	July 26th	July 27th	July 28th	July 29th	July 31st	Aug. 1st	Aug. 2nd
The Sun								
Cracks in the wings	✓	✓	✓					
Age related issues (Including Metal fatigue)		✓						
Fan/turbine blade separation		✓		✓				
Uncontrolled release of fuel		✓		✓				
Thrust reverser			✓					
The Times								
Cracks in the wings	✓	✓						
Engine fire		✓						
Fan/turbine blade separation		✓	✓					
Failure in engine fire control system		✓						
Fractured fuel tank		✓	✓			✓	✓	✓
Hydraulic control failure		✓						
Terrorism		✓						
Human error		✓						
Tyre blow-out		✓		✓		✓	✓	✓
Age-related issues (Including Metal fatigue)		✓	✓	✓				
Thrust reverser			✓	✓				
Bird strike				✓				
Fuel line failure				✓		✓		
Maintenance staffing issues				✓				
Runway surveillance (foreign objects)						✓	✓	
After-burner ignition of fuel							✓	
BBC Online								
Cracks in the wings	✓	✓						
Engine fire	✓	✓		✓				
Other cause exacerbated by fuel load		✓						
Tire fragments damage engine				✓	✓	✓		
Tyre blow-out	✓	✓		✓	✓	✓	✓	
Thrust reverser		✓	✓		✓			
Foreign object enters engine		✓						
Fuel leak						✓	✓	
Lack of time for reverser maintenance			✓	✓				

Distribution of Different Forms of Causal Argument: The development of Table 3 was further complicated by the ambiguous manner in which causal hypotheses are often stated in the media. This was a particularly salient feature of the accounts of the Concorde crash. The Times, The Sun and BBC Online journalists rarely provided any direct speculation on the potential causes. When they did speculate, they were careful to stress the tentative nature of their suppositions. For example, The Times on the 26th July argued, "One possibility is that the fire control system in

the damaged engine failed to contain the problem, the fire damaged fuel lines, and power was lost in a second engine as the fire spread. A more remote possibility is that a fragment from a failed engine penetrated the aircraft's fuel tanks in the wing, causing a fire." (The Times, 26th July, p.5). Such direct speculation is, however, relatively rare. In contrast, the articles referred to previous problems, such as the cracks or tire bursts on landing, without making an explicit direct connection to the accident they were reporting. However, the reader is left to make an implicit connection between these previous incidents and potential causes of the loss of AFR4590. Similarly, potential causes are often raised and then immediately contradicted by other arguments. The Times on the 26th July also described how "the possibility of terrorism will be investigated, although Paris Charles de Gaulle has tightened up airport security in the last five years in the face of increased threats." (The Times, 26th July, p.5) and how "the most common single cause of major air accidents is human error, and the investigation teams will check on-board flight recorders and conversations between the pilot and air traffic controllers to find if there was any confusion in the last moments." (The Times, 26th July, p.5). Further rhetorical devices are used to avoid direct speculation. Arguably the most common is to rely upon experts to propose causal hypotheses. Again on the 26th, The Times describes how "Alan Smith, a former Concorde test pilot, said the most likely cause of the accident was a "catastrophic failure" of one of the plane's four engines. "It is possible that a turbine spun out from one engine and impacted upon the one next to it," he said.". (The Times, 26th July, p.1). There are further examples in the same edition, "John Guntripp, a former air crash investigator, said: "Even with two engines lost, the remaining two engines should have had more than sufficient power capable of taking the engine into a climb so what occurred was a very serious disruption of the aircraft's flying control. Conversations between the pilot and air traffic control will be recorded on one of the black boxes. The on-flight technical record will be checked to make sure that plane had been correctly serviced." (The Times, 26th July, p.3). Table 4 provides an overview of the distribution of these different forms of causal argument in The Times over the week following the accident. This was constructed by taking those sections of the articles that were identified as containing causal arguments in the first stage of developing Table 3. These paragraphs were then analysed to determine whether the causal argument was made 'directly' by the journalist as a claim about the loss of AFR4590. Each paragraph was also analysed to see whether it contradicted a possible causes, whether it contained direct expert testimony about a potential cause or whether it used indirect arguments about the causes of previous similar incidents. A single paragraph might be categorised under more than one of the rows in Table 4. For example, the following excerpt from The Sun would be classified as containing expert testimony contradicting a possible cause "BA's chief Concorde pilot, Mike Bannister said…"*These cracks, which the manufacturers have told us are non-safety related cause me no concern*. I have been aware of them for a little while and I have complete faith in BA's engineering and in the prudent steps they are taking to address a very small increase in the length of one of the cracks…" (26 July, p8). As can be seen in Table 4, quotations from experts provide most of the speculation about the causes of this accident. There is remarkably little direct speculation on the part of the journalists. It is important also to note the relatively large proportion of indirect arguments made in the hours following the crash by the Internet news service. This is unsurprising. Given the lack of any direct analysis, the journalists were forced to go back to report on the causes of previous incidents. The fourteen indirect causal factors mentioned on the 25th all related either to the microscopic wing cracks or to the tire burst on landing, mentioned above. The contradictions all relate to the wing cracks and none to the tire burst hypothesis. The direct causal hypotheses of the 28th and 29th July were substantially those confirmed in the BEA report, "The Concorde flight had been delayed for repairs to a thrust reverser, sparking early speculation that faulty work could have contributed to the disaster. But the investigators switched their focus to the burst tyre theory after shredded remains were found on the runway" (BBC 856606.stm).

Table 4 - Broad Overview of Causal Arguments in The Times

	July 25th	July 26th	July 27th	July 28th	July 29th	July 31st	Aug. 1st	Aug. 2nd
The Times								
Direct causal argument (X is a possible cause…)	0	2	5	1	0	1	0	0
Contradictions or caveats (X is unlikely as a cause…)	0	4	1	2	0	0	0	0
Indirect causal argument (X was a cause in the past…)	0	7	8	6	0	3	1	1
Expert quoted on cause (Y said X is possible cause…)	0	17	10	6	0	3	1	2
The Sun								
Direct causal argument (X is a possible cause…)	0	2	1	1	0	0	0	0
Contradictions or caveats (X is unlikely as a cause…)	0	2	0	1	0	0	0	0
Indirect causal argument (X was a cause in the past…)	0	6	4	0	0	0	0	0
Expert quoted on cause (Y said X is possible cause…)	0	10	7	3	0	0	0	0
BBC Online								
Direct causal argument (X is a possible cause…)	0	0	0	1	1	1	3	0
Contradictions or caveats (X is unlikely as a cause…)	4	5	0	1	0	1	2	0
Indirect causal argument (X was a cause in the past…)	14	7	2	3	5	4	3	0
Expert quoted on cause (Y said X is possible cause…)	13	10	0	5	9	2	4	0

The variety of causal arguments illustrated by Table 4 created particular problems in the construction of Table 3. It is often uncertain whether journalists and editors actually favour particular causal hypotheses when these different rhetorical devices are used. Any potential causes are usually introduced through expert quotations or are hedged by caveats and contradictory arguments. As a result, a tick in a cell of Table 3 denotes that a potential cause was mentioned in the pages of the associated publication on that date even if that cause may also have been questioned within the same article. This approach could be refined by introducing a system of ticks and crosses to indicate arguments for and against particular causal hypotheses. It can, however, be difficult to make definitive judgements about whether or not an argument supports or contradicts a potential cause. For example, The Sun on the 26th July quotes one expert as stating that "The stream of fire coming from the back of the plane is almost certainly burning fuel. Pilots who saw the burning plane said the flames spread to the second engine causing damage to that too. The explosion must have caused so much damage the fuel tanks cracked open and the flammable fuel spilled out…Concorde can fly with three engines no problem. But with just two there is real danger. At this point the plot must have lost control because the plane was moving too slowly to do anything. It is very likely the controls on the plane worked and the pilot was doing his best to avoid crashing into the hotel…" (26 July, p2). It is difficult to determine how many causal hypotheses are contained within such vernacular statements and whether one should

also assume that this account contains an implicit contradiction of previous hypotheses about the role of the cracks in the course of the accident.

Our use of the relatively simple 'ticks' in Table 3 is further justified by the need for independent validation of this subjective analysis. Another analyst should repeat the exercise and then some comparison should be made both between the causal categories and the identification of those categories in particular publications on a particular day. Unfortunately, it took 2-300 hours to complete the analysis that is summarised in Tables 3 and 4. This illustrates the need for greater research into the media reporting of major technological failures. In particular, we have previously described how software tools can in principle be used to automate much of this manual analysis using classification systems such as WordNet (Johnson, 2003). Having raised these caveats, it is possible to identify a number of tentative but potentially significant findings from this research.

A key finding from this research is that the tabloid Sun contains less speculation about the causes of the incident than the broadsheet Times. This is confirmed both in terms of the range of causal hypotheses that are considered, illustrated by Table 3, and by the number of paragraphs containing different forms of causal argument, illustrated by Table 4. A number of arguments can be put forward to explain this counter-intuitive observation. The official investigations provided little information in the immediate aftermath of the crash. The broadsheet was forced to speculate about alternate causes of the incident in order to sustain its analysis of the incident. It can also be argued that the higher profile and reputation of the broadsheet secured access to a larger range of experts who were more willing to be quoted in The Times than The Sun. It is difficult to find direct evidence to support this supposition. Table 4 does, however, illustrates that expert opinions form the major source of speculation for the broadsheet publication. The BBC Online site contains a wider range of causal hypotheses than The Sun but less than The Times. However, further analysis reveals that the Internet site devotes approximately 90 paragraphs to causal hypotheses while The Times provides just over 70. Hence BBC Online devoted greater space to a smaller range of causal arguments. This is not due to a greater level of detail in the Internet coverage. In contrast, it stems from the reiteration of the same hypotheses, as web pages are refined during a twenty-four hour period. For example, at 16:42 we find that "the crash is the first supersonic jet built by Britain and France. It comes a day after British Airways confirmed hairline cracks had been discovered in the wings of seven of the Concorde fleet." Exactly the same paragraph was included in the update issued at 16:53. The 17:16 page included the paragraph "A spokeswoman for Air France said all the passengers on board were Germans, on a special flight chartered by a German Tour operator. The crash comes a day after British Airways grounded one of its Concorde jets after small cracks were discovered in a number of the planes, although there's no suggestion the problem is linked to the crash".

Table 3 illustrates further differences between these media sources. The Sun focuses on fan-blade separation as a potential cause of the engine damage and fuel leak that led to the loss of AF 4590. In contrast, The Times and BBC Online consider a wider range of potential causes. However, both gradually converge on the possibility that a tire blowout may have fractured a fuel tank. This provides an important illustration of the way that information can be passed from the members of official investigations to the media. Even if this communication takes place through informal channels, it can effectively act to end the speculation that we see about alternate causes between the 26th and 29th July. It is also important to emphasise that individuals with appropriate skills and experience can also make prescient statements even if they are not part of an official investigation team. The Times identifies the afterburners as a potential ignition source in a letter from a fast-jet pilot in the RAF. Their comments pre-dated the BEA report that failed to

determine whether fuel ignition had occurred from a short-circuit in an electric harness close to the main landing gear or by fuel contact with hot sections of the engine reheating subsystem.

Mapping Causal Arguments Using Conclusion, Analysis, Evidence (CAE) Diagrams: Previous paragraphs have argued that there are important differences in the way that different section of the media handle the causal arguments that are made in the aftermath of major accidents. As we have seen, the broadsheet newspaper relies heavily on the use of expert opinion. The Online news service identifies fewer hypotheses but reiterates and refines them as stories are continually generated and updated. The tabloid has a more restricted palette of potential causes. Their coverage appears is not sustained in the same way that it is by the other news sources. One consequence of this is that most of their causal arguments rely on implicit references to the causes of previous incidents or existing safety concerns that may or may not have played a role in this particular incident. In all cases, there was remarkably little direct speculation about the events leading to the crash.

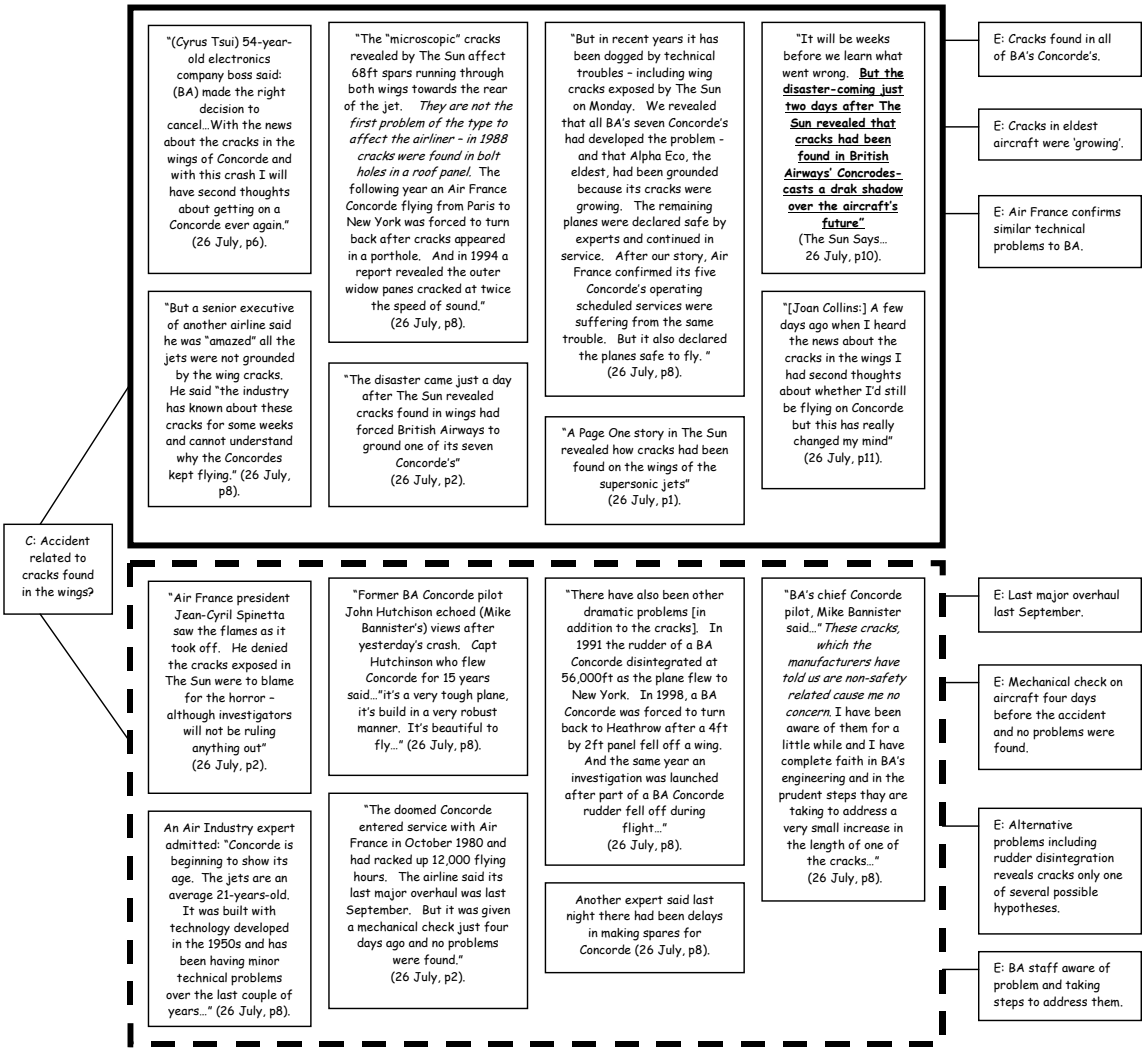

Figure 3 – Arguments Relating to the Presence of Cracks in the Wings, The Sun, July 26th

It is possible to probe beyond the high-level analyses presented in Tables 3 and 4. Conclusion, Analysis, Evidence (CAE) diagram provide means of mapping out the particular causal arguments that are presented about adverse events. Elsewhere we have used them to identify flaws in accident reports. For instance, inconsistencies can be identified where the same evidence is used both to support and weaken arguments about the cause of an accident. Similarly, an argument can be considered incomplete if it is not supported by links to the available evidence. Figure 3 provides an example of a CAE diagram applied to direct quotations from the Sun. In this case, it collates information about this potential cause that was presented on the day immediately following the accident. CAE diagrams provide a means of representing and reasoning about the arguments that are made in the aftermath of accidents and incidents (Johnson, 2003). The conclusion that cracks in the wing played a role in the accident is supported by a series of arguments that are represented by the large solid box on the top of Figure 3. For instance, the coverage on page 8 described how "'The microscopic' cracks revealed by The Sun affect 68ft spars running through both wings towards the rear of the jet. *They are not the first problem of the type to affect the airliner – in 1988 cracks were found in bolt holes in a roof panel.* The following year an Air France Concorde flying from Paris to New York was forced to turn back after cracks appeared in a porthole. And in 1994 a report revealed the outer widow panes cracked at twice the speed of sound." As can be seen, the arguments that support the involvement of the microscopic cracks are all indirect. The reader is left to infer that theis problem might have contributed to the loss of AFR4590 but this is not directly stated. In contrast, Figure 3 also illustrates arguments that weaken or contradict the involvement of these cracks. These arguments are represented in the dotted box in the lower part of the diagram. For example, page 8 describes how "There have also been other dramatic problems [in addition to the cracks]. In 1991 the rudder of a BA Concorde disintegrated at 56,000ft as the plane flew to New York. In 1998, a BA Concorde was forced to turn back to Heathrow after a 4ft by 2ft panel fell off a wing. And the same year an investigation was launched after part of a BA Concorde rudder fell off during flight…" The Sun also published more direct contradictions of this causal hypothesis, "Air France president Jean-Cyril Spinetta… denied the cracks exposed in The Sun were to blame for the horror – although investigators will not be ruling anything out". The evidence used in these different causal arguments is presented in the boxes on the far right of Figure 3.

Figure 4 extends the CAE analysis to illustrate the arguments that The Times made on the 26th July about the wing cracks. As can be seen, the CAE diagram immediately illustrates the more detailed analysis that is presented in the broadsheet. The same indirect forms of argument are used. For instance, on page five we read that "The investigation team...will be keen to know whether there is any connection between the crash and the recent discovery of small cracks in Concorde's wings. Both British Airways and Air France found the microscopic cracks within the last two months, but no aircraft was grounded until last week when the crack lengthened...both airlines insist that the cracks did not cause any safety fears." Figure 4 also illustrates the complexity of analysing the media coverage of causal arguments. The Times contains arguments that discount other causal hypotheses. For example, page 6 casts doubt on the potential terrorist threat to AFR 4590, "The possibility of terrorism will be investigated, although Paris Charles de Gaulle has tightened up airport security in the last five years in the face of increased threats." This argument has been included in the solid bounding box that supports the hypothesis about cracks in the wings. By attacking other causes, we can lend support to the remaining hypotheses.

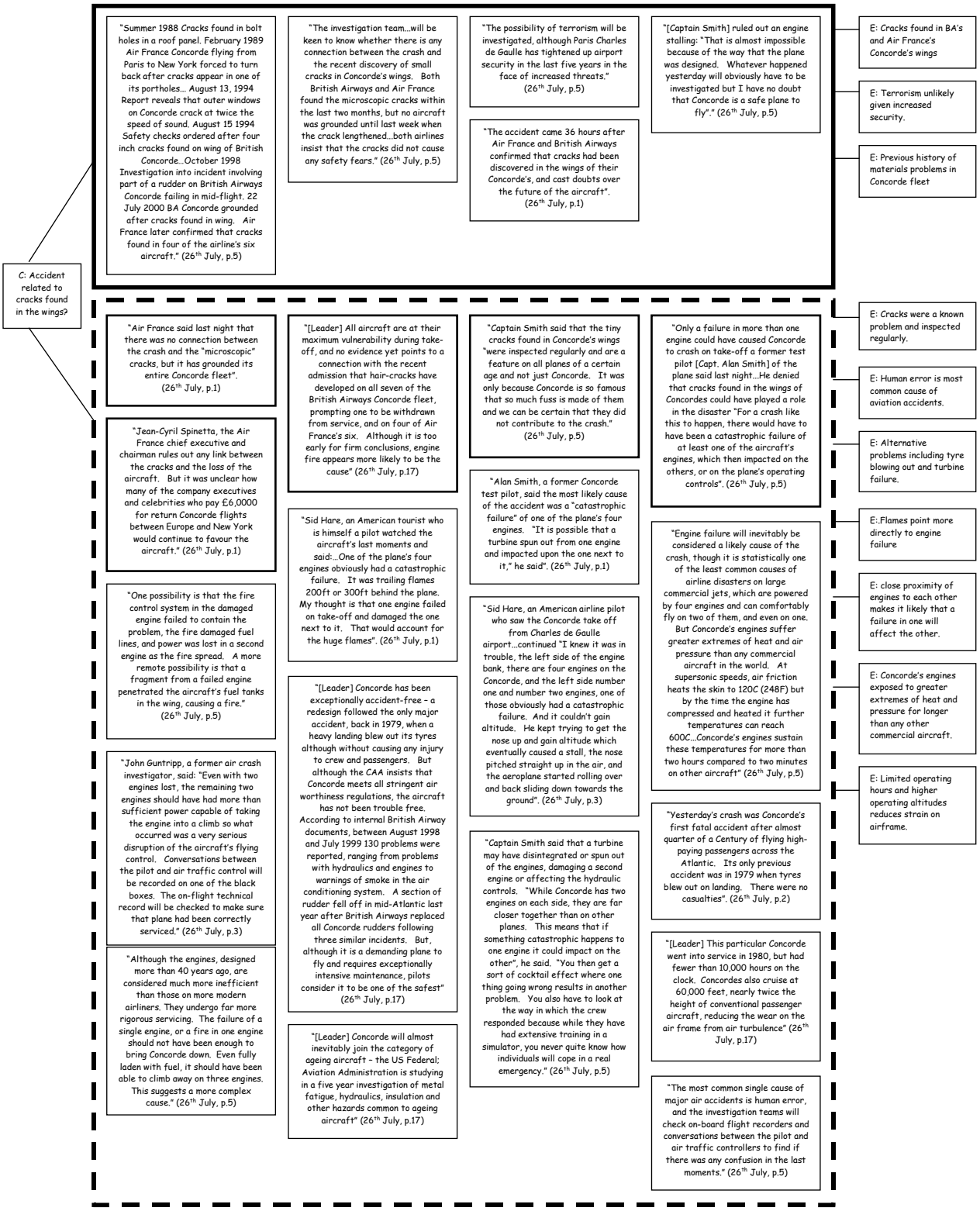

Figure 4 – Arguments Relating to the Presence of Cracks in the Wings, The Times, July 26th

Distinctions between indirect arguments suggesting that cracks might have been involved and arguments that cast doubt on other causes can be explicitly represented using more developed diagrammatical techniques. Figure 4 uses a heavier outline for arguments that directly contradict the role of the wing problems in the accident. Alternatively, the more complex argumentation diagrams developed by Toulmin (1999) might be used. In contrast, we retain the simpler CAE notation illustrated in Figures 3 and 4 partly because the solid and dotted bounding boxes provide an overview of the balance of arguments in the different publications. For instance, Figure 3 shows that the arguments in The Sun are almost equally divided for and against the role of the cracks in the accident. Figure 4 shows a greater degree of scepticism in The Times. This diagram also illustrates the prominent use of 'expert' opinion as a means of establishing causal hypotheses without journalists becoming drawn into more direct forms of speculation. For instance, on page 5 The Times cites the opinions of a former Concorde test pilot who "said that a turbine may have disintegrated or spun out of the engines, damaging a second engine or affecting the hydraulic controls. "While Concorde has two engines on each side, they are far closer together than on other planes. This means that if something catastrophic happens to one engine it could impact on the other", he said. "You then get a sort of cocktail effect where one thing going wrong results in another problem. You also have to look at the way in which the crew responded because while they have had extensive training in a simulator, you never quite know how individuals will cope in a real emergency." It is the opinions of these experts that cast the most doubt on the role of the cracks in the loss of AFR 4590. As mentioned previously, The Sun made less widespread use of such testimonies and this, in part, accounts for the greater emphasis that is placed on this causal hypothesis. The CAE diagrams in Figures 3 and 4 also illustrate further differences in the press coverage of this accident. The greater volume of prose and diversity of causal arguments in The Times do not rest on substantially more evidence than is presented in The Sun. This arguably underlines the dilemma facing broadsheet journalists. Their readers expect a more sustained analysis even though the staff must rely on information that is essentially similar to that available to their colleagues on mass-market titles.

Figure 5 shows how CAE diagrams can be extended to represent the competing causal hypotheses that emerged in the aftermath of the Concorde crash. In this case, the diagram represents arguments about the causes of the accident that appeared in articles on the BBC Online service between 25th and 29th July. This end date was chosen for convenience because it produced the largest CAE diagram that could be reproduced on a singe A4 page without paraphrasing the original arguments. As in previous diagrams, there is an element of subjectivity in the development of these figures. Only four causal hypotheses are mentioned. Other analysts might be able to identify other implicit arguments in the thousands of lines of prose that were published after this accident. The direct quotations in Figure 5 provide backing for the summary that is presented in Table 3. Initially attention focussed on the role played by the microscopic cracks in the wing. However, the BBC also referred to previous problems involving the tires on the day of the accident. The tire problems resurfaced some three days later when BEA investigators confirmed that debris had been found on the runway. The CAE diagram also illustrates the way in which some hypotheses were first raised and then dismissed. For instance, the repair to the thrust reversers was first mentioned on July 26th but was discredited by the 28th when 'investigators switched their focus to the burst tire theory".

Figure 5 – Causal Hypotheses in the BBC Online Coverage of the Concorde Crash, 25th-29th July

Figure 5 illustrates indirect causal arguments of the form '(the accident) comes a day after British Airways confirmed hairline cracks had been discovered in the wings of all seven of its Concorde fleet''. Contradictory arguments are illustrated by the observation that 'several aviation experts have said the cracks were a coincidence and could not be to blame for the crash, which appeared to be due to an engine failure.' As with the previous diagrams, however, there is little direct

speculation about the causes of the accident. Almost all of the hypotheses are put forward, or contradicted, by experts rather than be the journalists themselves. Although the media accounts speculate about the causes of the incident, they typically express the speculation in terms of direct quotes from safety professionals. They also offer alternative accounts that illustrate the uncertainty over these expert opinions. It is important to remember these insights when we condemn media speculation about the causes of accidents or incidents. They can best be thought of as a mirror that reflects the thoughts and opinions of the wider safety community.

Conclusions

This paper has analysed the reporting of the loss of Concorde AFR 4590 in three different news venues. We have compared articles published in a tabloid newspaper, The Sun, with a broadsheet, The Times of London and with an Internet based news service, BBC Online. Our study has focussed on coverage in the week following the accident. This decision was motivated by the sheer volume of material that was published in the aftermath of this adverse event. There have been very few previous studies of this type. Our results confirm some of the criticisms but challenge other assumptions that safety professionals have made about the media reporting of incidents and accidents (Johnson, 2003). In particular, we have noted the way in which an initial, high level of interest rapidly wanes as other new items compete for the finite column space of national newspapers. This effect is, however, less apparent in Internet news services that are free from some of the production and cost constraints that affect more traditional forms of publishing. There are other differences. Most notably, the Internet news service was able to start covering the accident almost within an hour of the crash occurring. The speed of response creates a dilemma for journalists who must provide copy about the adverse event at a time when little or nothing is known about what has taken place. We have also been able to identify important trends in the presentation of news coverage. Newspaper editors relied heavily on photographic images in their first editions following the accident. These images could provide an impression of what occurred without forcing journalists to provide detailed analysis of the potential causes. In the following days, readers were already familiar with these images and more information became available about the incident. In consequence, fewer images appeared and a greater proportion of the coverage was devoted to prose analysis of the potential causes.

The loss of AFR 4590 was deliberately chosen because it arguably represents the type of high-profile accident that would be most likely to encourage media speculation. This argument is strengthened by the way in which all of our news sources had covered the reported wing cracks on the morning of the 25th July. There is likely to have been an extremely strong temptation to directly link these warnings with the events that took place on the afternoon of the 25th. It is remarkable, therefore, that there was so little direct speculation in any of the sources that we examined. A further, paradoxical finding has been that the broadsheet account contains more speculation than the tabloid. We have argued that this is the result of a pressure to inform the readership about potential causes when little 'hard' information is available. Journalists seem to be aware of their dilemma and so speculation is, typically, presented in the form of direct quotes from experts and eyewitnesses.

A number of caveats must be made about this study. Firstly, we have only considered the media reaction in the week immediately following the accident. Further work is needed to analyse the subsequent reporting of the loss of AF 4590. Secondly, we focused on UK reaction. The nature of aviation accidents often creates media interest in several different countries. Most of the victims onboard AFR4590 were German. The aircraft was operated by a French company and crashed outside Paris. We are currently conducting a comparative study of the media reporting in these different countries. Thirdly, this paper has focused on two newspapers and an Internet

news service. More work is required to trace the causal analysis provided by broadcast services. Fortunately, the growth of publicly accessible digital archives has supported our work in this area. Having raised these caveats it is important to reiterate the central argument in this paper. Unless we understand the media reaction to major accidents then we will continue to repeat unjustified criticisms about their coverage of failures in safety-critical systems.

What does this study suggest for the regulatory and investigatory agencies that must address media concern in the aftermath of major accidents? This study has shown the importance of avoiding generalisation about the media's rush to speculate about the causes of an adverse event. The reliance on expert opinion suggests that greater attention might be paid to educating those safety professionals about the consequences of their speculation. The journalists already seem anxious to avoid direct speculation. Our study also revealed that speculation thrives in a vacuum. As soon as the BEA provided unofficial, indicative comments about the probable cause then all sources began to focus their coverage away from the more speculative comments. This is particularly apparent in the BBC Online coverage from the 29th July.

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