

A TALE OF TWO MISSIONS: UK NEWSPAPER REPORTING OF THE BEAGLE 2 AND CASSINI/HUYGENS SPACE MISSIONS

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Abstract

Although astronomy and space science is quite well regarded by the public, and has a considerable presence in the mass media, there are not many academic studies of how it is portrayed. Here we present a preliminary study of the UK newspaper coverage of two space missions, one a failure and one successful – the Beagle 2 mission to Mars and the Huygens mission to Saturn’s largest moon Titan – which arrived at their destinations almost exactly a year apart. Press coverage of the Beagle 2 failure, in December 2003, overlapped that of the Huygens success in January 2005. There were reports of tension and concern, and the need for a success to make up for the failure. But by and large the tone was universally positive. We also look at how scientists involved with science as research and events have to make comments on the hoof, without waiting for peer review, and how then the media (and the public?) treat these. Our conclusion is that journalists and their readers have a more sophisticated understanding of science-in-the-making than is often supposed.

Keywords: Astronomy, mass media, newspapers

1. Introduction

Although it has little practical bearing on most people’s day-to-day lives (unless one is astrologically minded), astronomy is one of the physical sciences that seems to attract a great deal of public interest, e.g. [1], [2]. As such, it could be used as a useful comparison for media studies of topics such as medicine, clearly of immediate interest and applicability, biotechnology, of immediate concern and possible applicability, and nanotechnology, of possible future concern and potential. Given a thorough understanding of how astronomical issues are dealt with in the media, one might hypothesise that it would escape the increasingly critical stance that journalists and broadcasters, and perhaps the public at large, are adopting towards other branches of science and technology. For example, Weingart et al. [3], looking at ethical concerns about science, have claimed that media portrayal of astronomy is “mostly outside of this concern”; so it might make a “neutral” comparator for studies of issues where ethical considerations are important.

But there have been relatively few studies of the way in which astronomical subjects are dealt with in mass media. Gregory’s recent biography of the British cosmologist Fred Hoyle [4] traces the way in which he made use of all of the popular media to float ideas, ahead of publication in the scientific literature or when he was prevented from accessing peer-reviewed outlets for his science. The use of large and important metaphors in popularising astronomy and space science is particularly prevalent [5]. Miller [6] and Bucchi [7] have both looked at the presentation of cosmology to the general public, particularly in terms of the issues it raises vis-à-vis religion, and the in which religious metaphors (“knowing the mind/seeing the face of God”) are often invoked. They also looked at the way embargoes work – or rather do not work – when big claims are at stake and many individual scientists are involved, an issue addressed in more detail in Kiernan’s study of the martian meteorite, ALH84001 [8]. In that instance, a presidential endorsement for Mars exploration on a massive scale was at stake. That said, Einseidel [9], Bucchi and Mazzolini [10] and Gopfert [11] have both found that there is relatively little astronomy-related material in [Canadian and Italian] newspapers and [German] TV. respectively.

In this short paper, we aim to address the relative paucity in media studies of the popularisation of astronomy with – at this stage – a qualitative investigation into the way that two space missions were presented to the British public through newspapers. In doing this we have been greatly assisted by the cuttings service that used to be provided by the Particle Physics and Astronomy Research Council (PPARC), the UK policy and funding body responsible for astronomy and space science. We are particularly interested in space missions since they are both events and research projects in and of themselves. That means that the mission scientists are often called on to make media-credible statements about bodies of which they know little to nothing “on the hoof” and certainly well prior to their ideas going through the peer-review process. So one question is to what extent do ideas put forward at the time of the mission events make it into subsequent scientific publications – the inter-influence between popular and scientific communications. Another, consequential, question follows from this, and addresses the “well-known” finding of Nelkin [12] that science journalists often felt that their independence

was compromised and that they had been co-opted “onto the team”: is the production of “on the hoof” science a collaboration in which journalists are prepared to allow space scientists to be much less rigorous than they would medical researchers announcing a breakthrough discovery in the fight against cancer/AIDS/Alzheimer’s? Here we do not answer these questions but point to ways in which we are trying to answer them. That is to say that we offer a work-in-progress document, which does have some conclusions, but which invites comments.

2. The Two Missions

The two missions we are offering for investigation had their climaxes (or nadir, in one case) almost exactly a year apart. The UK Beagle 2 lander, which hitched a ride on the European Space Agency’s (ESA) successful Mars Express spacecraft, should have touched down on the surface of Mars on Christmas Day, 2003. By mid-January, 2004, it had not called home and attempts to use Earth-based receivers and Mars Express and a Mars-orbiting NASA mission to locate it had failed. (A passing note: we feel confident that readers will recognise the initials of the US space agency; ESA, on the other hand, is almost unrecognised by the vast majority of Europeans, let alone the citizens of other countries, and we felt obliged to spell it out.) In stark contrast, on January 14, 2005, the Huygens lander – part of the NASA/ESA/Italian Space Agency Cassini-Huygens mission to Saturn – touched down on the surface of Titan, the Solar System’s second largest moon perfectly, exceeding all expectations. The two missions – one a failure the other a great success – make for interesting comparisons and contrasts in a number of ways.

They both involved landing on a body a great distance from Earth – in the case of Titan, 1.5 billion kilometres from Earth, a distance that requires over 80 minutes for electromagnetic signals to cross it. Mars and Titan are also bodies that astronomers looking for signs of life outside of Earth are interested in. Mars may have had life in the past; it may even be present now. The atmosphere of Titan is often said to resemble that of the early Earth, fuelling speculation that life might one day evolve independently there. From the standpoint of the UK, both missions had charismatic British leaders: Beagle 2 was identified inseparably with its champion Colin Pillinger; whilst much more of an international team effort, Huygens was fronted by John Zarnecki, as far as the British and much European media was concerned. Both men are professors in the Planetary and Space Science Research Institute at the Open University. But similarities end there. Beagle 2 was an opportunity-grabbing mission, put together on a relatively small budget (exact figures are not available, but ~£45 million (\$70 million) has been quoted informally). In contrast, Huygens was a long-planned part of a major, high budget project, costing ~\$3 billion, depending how the various international contributions are calculated. Beagle 2 and Mars Express were “in competition” with NASA’s Mars Odyssey and its own Spirit and Enterprise landers. Cassini-Huygens, on the other hand, saw Europe (including the UK) co-operating with America.

Both Beagle 2 and Cassini-Huygens received considerable press coverage during the period from 2003 to 2005: British newspaper articles run into thousands for both. Given that one mission preceded the other on a relatively short timescale, it is interesting to ask how the print media treated the two of them: did attitudes to (the failure of) Beagle 2 have a bearing on the coverage of the landing of Huygens? How were expectations maintained or tempered? Much coverage of astronomy is of the “amazing facts and discoveries” kind. Would the “new mood for dialogue” identified by the UK House of Lords (2000), however, lead to heated discussions about the wisdom of committing (reasonably) large sums of money to the task of throwing finely engineered pieces of metal at distant worlds? To investigate those questions, we now present a preliminary media analysis for the period from November 2002 to January 2005.

3. UK Press Coverage of Beagle 2

The PPARC press cuttings service indicate that the Beagle 2 space mission received continuous coverage in the UK newspapers from November 2002 through to October 2004, with the number of articles ranging from one or two per month to over 1000 in both December 2003 and January 2004, when the lander was supposed to be on the surface of Mars. Another – earlier - high point was the launch of Mars Express in June 2003, when there were ~200 individual cuttings included in the PPARC service. Of the total number of articles, 105 were sampled for a more detailed qualitative analysis. Tone was an important indicator. Right up until the failure of Beagle 2 to call home, newspaper coverage was uniformly positive. Two days before the June launch, the elite Independent portrayed Pillinger as possessing “effusive enthusiasm, iron will and low cunning”, and spoke of the care with which everything for the eventual Mars landing was being rehearsed (May 31, 2003). Much was made of the decision that Beagle 2 would be operated from the National Space Centre in Leicester, in full view of the public. “NASA has never done this. We are breaking new ground in the public presentation of space science,” Leicester University’s director of space research was quoted as saying.

Even more was made of the “British-ness” of it all. The ultra-chauvinistic, middle-order Sunday Express flushed with pride as it quoted Pillinger to the effect: “This is a British space project – make no doubt about it. The Beagle 2 lander may be hitching a ride with the [ESA] Mars Express but the design and the ingenuity comes primarily from the UK.” And there was praise for the way Pillinger had raised support from Brit-pop band Blur, who recorded the 9-note tune that was to signal a successful landing, and Brit-art guru Damien Hirst, whose sequence of painted dots would act as a colour calibrator for the Beagle 2 cameras (July 20, 2003). With a certain amount of foreshadowing of what was to come later, there was also considerable emphasis on how little Beagle 2 had cost. The elite Guardian described the mission as a “shoestring project” (November 10, 2003).

The tone of the coverage became a little more tentative as landing approached. On December 20, 2003, The Times hinted at concerns, as Beagle 2 separated from Mars Express to begin its descent. “It’s been a very tense morning,” ESA Director of Science David Southwood was quoted as saying. The same day, the Glasgow Herald, an influential Scottish regional daily, spoke of the spacecraft passing “most critical stage of cosmic journey”. In an ironic twist of fate, it was to be NASA’s Mars Odyssey that would first hear from Beagle 2 if the landing were successful; the ESA orbiting Mars Express would not immediately be in position. On December 26, 2003, the Glasgow Herald headlined: “Silent night as Beagle loses its voice”; NASA’s spacecraft had not heard from the lander. Jodrell Bank, the veteran radio astronomy centre, swung its giant antennae Mars-ward to listen for Blur’s landing song, also to no avail. That said, the newspaper was still able to report that the bookmakers had shortened the odds on life being discovered on Mars by the end of 2004 from 500-1 to 100-1. (NB the bookmakers have done well out of those willing to take either set of odds.) The next day, scientists were still being “hopeful” on regional agency wires.

But as the New Year (2004) dawned, hopes were being put aside. Pillinger was quoted in The Times saying: “We’d have been incredibly accurate and incredibly unlucky to go right down this crater” as he speculated on where his lost lander might be. Matters were made to look worse by the successful landing of NASA’s Spirit rover. “Dear NASA, if you spot our Beagle please call”, jibed the tabloid Daily Star (January 5, 2004). Typically the Financial Times made the (wise-after-the-event) point: “There is no point in sending cut-price missions to Mars” – what had previously been a great source of British pride, became a cause for criticism. The paper went on: “With a curious lack of financial transparency the Beagle team and its chief backer, the UK government, have consistently refused to say just what the mission cost. Estimates are about £45 million, less than a tenth of the amount NASA spent on Spirit and its twin rover Opportunity. Of course, if Beagle comes unexpectedly to life it will be seen as a triumph of the gallant shoe-string approach to space exploration. If not, a cut-price failure is still a total failure.” (January 8, 2004).

The same day’s Guardian had a more upbeat, footballing approach: “We must play to the final whistle. It only takes a fraction of a second to score a final goal. The Beagle project has demonstrated without doubt that we are playing in the Premiership [the top UK football division]. We’ll go for a second voyage of Beagle 2.” By the end of January 2004, all hope had evaporated, however. An enquiry, to be held jointly by ESA and the (even more unknown to the public) British National Space Corporation (BNSC), was announced. Blame was to be apportioned. When it reported in May 2004, there were 19 recommendations on how to do things better next time. But little of the enquiry’s findings were made public. The Weekly Telegraph quoted scientists complaining of a cover-up: “Public still in the dark over Beagle,” it said (June 2, 2004).

4. Press Coverage of the Huygens Landing

While Mars Express (as its name suggests) carried Beagle 2 to Mars in just over six months, the Cassini-Huygens mission to Saturn and its moons was a much more drawn out affair, taking seven years and involving gravity-assist “swing bys” of Venus (1) and the Earth (2). It had not been without its problems: its shuttle launch had been cancelled after the Challenger shuttle disaster; it had been “descoped” to fit a rocket launch; and it had run into some controversy as a result of the radio-isotope thermal generator it carried onboard, particularly during the swing-bys of the Earth. Newspaper coverage of the Cassini-Huygens mission carried on throughout the seven-year journey, such that it bracketed and overlapped that of Beagle 2. One might have expected press attitudes to the Mars failure to colour reporting of the Saturn-bound mission.

One key point that could have happened was in the run up to early July 2004, just two months after the secretive ESA-BNSC Beagle 2 enquiry. July 1 was the date that Cassini-Huygens would commence orbiting Saturn, going into Saturn Orbit Insertion. This was a tricky manoeuvre that involved flying through the so-called Cassini Division in the planet’s extensive and spectacular rings, avoiding the larger rocks and icy stones that could inflict fatal injuries on the spacecraft. On June 3, the BBC’s online News UK ran an extended article on the mission under the heading “Probe keeps UK space hopes alive”. It quoted Huygens mission scientist John Zarnecki – who had also been on Pillinger’s Beagle 2 team - commenting

wryly: "I wish I could say that Huygens will be the second piece of UK hardware to land on a cosmic body, clearly that is now not the case." And he warned that Huygens could suffer a fate similar to that of Beagle 2: "Its survival on the surface [of Titan] is not guaranteed." In the printed media, less was made of the comparison with Beagle 2, but the warnings were there. Cassini-Huygens received a media boost later in June, after its encounter with Saturn's distant moon Phoebe. "Stunning new images have been beamed back," the Leicester Mercury told its readers on June 17 – reminding them that the local Leicester University had scientists involved with the spacecraft.

Newspapers reported on July 1 that Cassini-Huygens had successfully gone into orbit around Saturn with a blaze of congratulations, expectations for the future and national and local pride. "Oxfordshire scientists were glued to satellite screens as a US spacecraft went into orbit around the giant planet Saturn," squealed the Oxford Mail over a picture of local space researcher Manuel Grande. Readers of The Scotsman were treated to an extensive primer on Saturn, together with such facts and figures as the diameter of the planet being 120,536km (impressive accuracy considering the planet does not have solid surface, but is a giant ball of gas, wracked by high winds and giant storms) and a more reasonable size for Titan at 5150km. Many newspapers carried the information that the spacecraft itself was the size of a bus/schoolbus/30-passenger bus, leaving readers to wonder if it were a single-decker bus, a double-decker, or one of the new 18-metre "bendy buses" that were making their appearance on the streets of London. For the moment, the disappointment of Beagle 2 was forgotten. The Leicester Mercury gushed: "The Cassini project – which could reveal the origins of life – is being heralded as the new space project for Britain to cheer one after the failure of the Beagle 2 Mars mission."

The Huygens probe was due to separate from the Cassini orbiter on Christmas Day, 2004, just one year after Beagle 2's ill-fated Mars landing. As press attention gathered, more startling information was fed out to them, to be gobbled up almost untransformed. On December 20, 2004, five newspapers ran stories with (almost) the same opening sentence: "Finding yourself in a thunderstorm on Saturn would be a truly shocking experience, scientists have found." (Daily Express, The Scotsman, Western Daily Mail, The [Aberdeen] Press and Journal, The Irish News (Belfast)). The Guardian foreshadowed the Cassini – Huygens separation: "In its 2 1/2 hour descent, [Huygens] will measure everything it can about the Titanic world ... Everything about the ride will be a nerve-wracking test of plans and technology fashioned a decade ago." Glasgow's Sunday Herald drew the parallel with Christmas 2003: "Last December and January [British researchers] were waiting for news of their ill-fated Martian lander, Beagle 2, which was eventually declared lost ..." Other writers invoked religious images. As Huygens approached Titan, the Northern Echo had it "Looking down on creation", adding: "By going to Titan we're studying the Earth's early history. It's like the Earth's early atmosphere, but stuck in a deep freeze." (January 4, 2005). And the Daily Telegraph even claimed "Alien's 'could exist on Saturn's moon'", quoting American scientist Steven Benner: "This makes inescapable the conclusion that if life is an intrinsic property of chemical reactivity, life should exist on Titan." (January 10, 2005).

Huygens was due to enter the atmosphere of Titan at 06:50 GMT on the morning of January 14, 2005. As well as intense newspaper interest, BBC television ran an all-night show live from the ESA tracking station in Darmstadt, Germany, featuring – among others – Zarnecki and ESA mission scientist Jean-Pierre Lebreton. This mission was a complete success. The next day's papers were full of pictures taken from the cameras on board Huygens, including an eerie beachscape shot as the probe rested peacefully on the moon's surface. The tabloid Sun waxed poetic: "Excitin' sightin' of Titan" its triple-decker headline shrieked. Pillinger was reported to be among those scientists waiting at the headquarters of the Royal Society in London: the contrast from the previous year hardly needed to be drawn. Nonetheless the Guardian pointed out to readers who had not been following the plot that Huygens "was Europe's first landing on another celestial body". Zarnecki spoke for many European scientists: "Fifteen years of pent-up emotion were released ... There is a tremendous mood of relief and anticipation." (The Times, January 15, 2005.)

5. Science "on the Hoof" and "Normal" Science

In the run up to the Huygens landing, there had been great speculation as to just what the lander would encounter. The atmosphere of Saturn's largest moon is a thick mixture of nitrogen and methane, with a lethal cocktail of minor constituents including hydrogen cyanide. That makes it highly impenetrable to visible light, and conditions on the moon's surface could only be modelled – or guessed at. The regional Yorkshire Post was typical in its coverage of the speculations. On July 2, 2004, it reported of Huygens: "The robot will think for itself as it parachutes down onto Titan. No-one knows what it will find, but scientists believe there is a good chance it will make a splash landing in a sea of liquid methane or ethane. "Two days later, the same paper had Huygens splashing "into a surreal sea of lighter fuel". Clearly these were ideas derived from scientists ahead of the landing, and they continued in the live and reported coverage of the landing itself on January 14,

2005. These were ideas derived from previous scientific studies, but in the next few weeks and months they were to be tested as never before. So why should normally sceptical journalists allow scientists to get away with such speculation?

More knowing publications were more cautious. Reporting on the first Cassini flyby of Titan in July 2004, the online Spaceflight Now magazine reported that scientists were getting a bit worried that they had not seen the glint of sunlight reflected off any sea, surreal or otherwise. Of course, Cassini had only had the opportunity to look at a small portion of Titan's surface. But the magazine quoted NASA mission scientist Kevin Baines to the effect: "If we go by 30 times and we haven't seen it [reflected sunlight], we're going to start getting worried." With increasing scepticism the article went on to quote another NASA scientist, Elizabeth Turtle on the images of Titan: "It's been hypothesised that the dark areas were regions where [hydrocarbons] had accumulated and that the bright areas might actually be cleaner water ice." But the article continued: "That was the theory until Friday night. Data from the infrared mapping spectrometer, Baines said, indicates "... the brighter areas have been contaminated in a sense with organics [hydrocarbons], the dark areas are more pure [i.e. "cleaner"] water ice." Stay tuned."

Those who did stay tuned saw Zarnecki wondering out-loud (Independent on Sunday, January 16, 2005) if the images from Huygens' descent revealed waves in "oily sea". To date, however, the only reports of waves, or seas, oily or otherwise, have been in the media. None of the peer-reviewed articles in the special editions of *Science* covering the mission have claimed unimpeachable evidence for liquids on Titan. That said, many Earth-like water features, such as drainage channels have been reported both in the mass media (e.g. Newcastle Sunday Sun, January 16, 2005) and in the peer-reviewed literature (e.g. Elachi et al. in *Science*, May 13, 2005).

Another of the "on-the-hoof" claims concerned the nature of the surface of Titan. The lander's penetrometer, a spring-loaded device designed to test surface strength, indicated an initial resistance that crumbled after a few milliseconds. At some point during the live television coverage, one of the team likened this to "crème brûlée", and the description made it both onto the official website of the UK's PPARC (pronounced "pea-park") and that of the BBC's online news service (January 15, 2005). Yahoo! News also picked this up (January 16, 2005). Zarnecki's own description of the surface was more prosaic – "wet sand or clay" (Wall Street Journal Europe, January 17, 2005). At a meeting of the Royal Astronomical Society in London on March 11, 2005, Zarnecki explained that his penetrometer results were indicative either of a surface crust ("wet sand or clay") or a breaking "ice-pebble": the images from Huygens on the surface of Titan could even be interpreted as showing a broken pebble next to the lander. As in the case of liquid seas, no reports of "crème brûlée" have appeared in the peer-reviewed literature.

6. Models of Science Communication

Space missions are both scientific research programmes and exciting media events: they are voyages of discovery, albeit often by robotic proxy; scientists gamble their careers on achieving millimetre accuracy over distances of a billion kilometres or more. One of the key features Stephen Hilgartner [13] identified in what he termed the "dominant model" of science communication was that it gave scientists control. Scientists did their research; it was published upstream after peer review, and it made it downstream to the public through the muddy channels of the mass media. When science is being made in real time, as it was for Cassini-Huygens, and might have been for Beagle 2, had it been successful, there is no time for peer-review. And so "control" goes out of the window, at least partly. In such circumstances, the Lewenstein [14] web model is much more applicable. This model was developed to explain how scientists got information about claims for cold fusion made by Stanley Pons and Martin Fleischman. In that instance, however, the science being claimed had been conducted behind the closed doors of a laboratory. Indeed, with the refusal of the scientists involved to publish their data, other scientists were forced to resort to videoing the TV. news and freeze-framing it to get their hands on any data [15]. So the web model, while useful, does not fully capture what happens in many space missions in terms of the communication processes and relations.

Once a scientist has made a public claim – seas, "crème brûlée" in this case – is there pressure to put this into the peer-reviewed literature? The evidence for Cassini Huygens is negative, to date. Either these two ideas had been put forward and rejected by referees for the scientific journals, or they had never been put forward. For the purposes of this article, we held informal discussions with Baines and Zarnecki. Neither of them said that they felt constrained by what they had said "on the hoof"; they did not feel under any pressure to repeat informally expressed opinions in the formal setting of the scientific journal, if later interpretations and information showed their informed guesses to be wrong. So how is the reader/viewer/listener to make sense of this, and what does it say about the scientist journalist relationship?

In none of the newspaper reports that we looked at was there a sign of a caveat. Space scientists – reacting on the hoof – were reported as scientists speaking about scientific results every bit as reliable as medical researchers reporting the results of a medicine that had been through animal trials and full clinical trials. Nowhere did the journalists express scepticism, although the example of the specialist Spaceflight Now and in one or two other articles scientists who were somewhat at odds with each other were presented. One conclusion that might be drawn from this is that scientists and journalists have come to an informal agreement that involves hoodwinking the general public; science journalists are “back on the team”, in Nelkin’s terminology. Possibly. Our interpretation is that both journalists and the general public have much more sophisticated understandings of science-in-the-making than they often given credit for. If Zarnecki, Pillinger or Baines is filmed or recorded making a (hopefully) intelligent interpretation of real time images or data, then maybe the media and their audience treat what is happening in the same way that they view or read about an outside broadcast of a live entertainment event. Those who despair of the level of public “scientific literacy” should take heart – your fellow citizens are more sophisticated than you thought!

8. Postscript

Among UK space scientists there was concern after the Beagle 2 failure that their area of research would be given short shrift by the government and its funding agencies. Huygens was thus seen as a real shot in the arm. But, somewhat behind the scenes, Pillinger continued to play an important role, making use of his public image as the plucky, shoe-string scientist who tried and went down fighting. Whoever wants to claim the credit, the UK government has now signed up as the second largest investor in ESA’s ambitious Aurora programme of Mars and lunar exploration. Failure sometimes succeeds.

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