

Framing Space: UK Newspaper Reporting of the *Beagle 2* and *Cassini–Huygens* Space Missions

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Introduction

Although it has little practical bearing on most people's day-to-day lives, astronomy is one of the physical sciences that seems to attract a great deal of public interest (e.g. Eurobarometer 55.2). As such, it could be used as a practical 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. One could hypothesise that astronomy might 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. (2003), looking at ethical concerns about science, have claimed that the media portrayal of astronomy is “mostly outside of this concern”.

There have been relatively few studies of the way in which astronomical subjects are dealt with in the mass media. Gregory's (2005) recent biography of the British cosmologist Fred Hoyle 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 access to peer-reviewed outlets for his science. The use of large and important metaphors in popularising astronomy and space science is particularly prevalent (Christadou et al. 2004). Miller (1994) and Bucchi (1998) have both looked at the presentation of cosmology to the gen-

Summary

Relatively little scholarly work has been done on looking at the portrayal of astronomy and space science in the media. This short article examines the UK press coverage of two space missions: the *Beagle 2* mission to Mars and the *Cassini–Huygens* mission to Saturn and its moon Titan. In both cases, the leading scientists exerted a strong influence on what journalists reported, to the extent that some journalists appeared to be almost “embedded” in the mission. For the most part the coverage is positive in tone and the loss of the *Beagle 2* spacecraft does not reflect badly on the (later) *Cassini–Huygens* coverage. Most journalists only covered the actual mission events and, in the case of *Huygens*, did not follow up to cover the peer-reviewed scientific articles that appeared later. Off-the-cuff comments made by scientists at the time of the missions were widely reported. There appears to be an appreciation by journalists and (by inference) their readership that this was science in the making, and that allowances should be made if these comments later turned out to be inaccurate.

eral public, particularly in terms of the issues it raises *vis-à-vis* religion and the way 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 (2000) study of the Martian meteorite ALH84001. In that instance, presidential endorsement for Mars exploration on a massive scale was at stake. Although astronomical subjects are regularly covered in the media, Einseidel (1992), Bucchi and Mazzolin (2003) and Gopfert (1996) have each found that there is relatively little astronomy-related material in Canadian and Italian newspapers and on German television, respectively, when compared with other science and technology subjects, most notably medicine.

In this paper, we aim to address the relative paucity in media studies of the popularisation of astronomy with a largely qualitative investigation into the way that two space missions

were presented to the British public through their press. In doing this we have been greatly assisted by the cuttings service provided by the then Particle Physics and Astronomy Research Council (PPARC — now the Science and Technology Facilities Council), 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. This means that the mission scientists are often called on to make media-credible statements “on the hoof” about Solar System bodies of which they know little or nothing and certainly well prior to their ideas going through the peer-review process. So one question is: what extent do ideas put forward at the time of the mission events make it into subsequent scientific publications — what is the inter-influence between popular and scientific communications? Another, consequential, question follows from this and addresses the “well-known” finding of Nelkin (1987, 1995) that science journalists have often felt that their independence

is compromised, and that they have 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 headline conditions such as cancer, AIDS or Alzheimer’s?

The Two Missions

The two missions we have considered reached 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 (Figure 2), 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, *Mars Express* and a Mars-orbiting NASA mission to locate it had failed. In stark contrast, just over a year later, on 14 January 2005, the *Huygens* lander — part of the NASA/ESA/Italian Space Agency *Cassini-Huygens* mission to Saturn — touched down perfectly on the surface of Titan, the Solar System’s second largest moon, exceeding all expectations. The two missions — one a failure, the other a great success — make for several interesting comparisons and contrasts.

Both missions involved landing on a Solar System 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 such as light to cross it. Mars and Titan are also Solar System bodies that interest astronomers who are looking for signs of life off Earth. 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, fueling 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; and, although much more of an international team effort, *Huygens* was fronted by John Zarnecki, as far as the British and much of the European media were concerned. Both men are professors in the Planetary and Space Science Research Institute at the Open University, UK. But the similarities end there. *Beagle 2* was an opportunity-grabbing mission, put together on a relatively small budget. Exact figures are not available, but approximately £45 million has been quoted informally. Note that ESA’s *Mars Express* mission, on which *Beagle 2* was travelling, cost around 300 million EUR, according to its official website. In contrast, *Huygens* was a long-planned part of a major, high budget project, costing ~\$3 billion, depending on how the various international contributions are calculated. *Beagle 2* and *Mars Express* were “in competition” with NASA’s *Mars Odyssey* and its *Spirit* and *Opportunity* rovers. *Cassini-Huygens*, on the other hand, saw Europe (including the UK) cooperating with America.

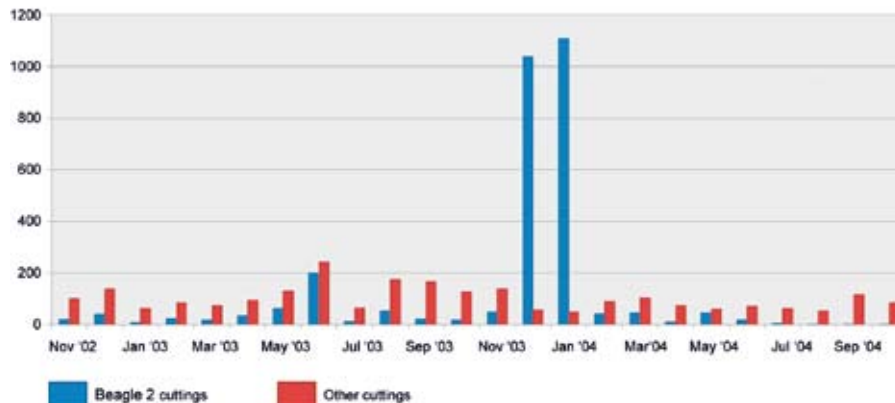


Figure 1. The number of *Beagle 2* press cuttings (blue) compared with the number of other PPARC cuttings (red). Credit: The authors.



Figure 2. The *Mars Express* spacecraft. Credit: ESA.

Both *Beagle 2* and *Cassini-Huygens* received considerable press coverage during the period from 2003 to 2005: the total number of British newspaper articles runs into the thousands for both missions. Given that the two missions were only separated by a short time, 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) 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 media analysis for several different short periods between November 2002 and December 2005.

UK Press Coverage of *Beagle 2*

The PPARC press cuttings service (see Figure 1) indicates that the *Beagle 2* space mission received continuous coverage on a monthly basis in the UK newspapers from November 2002 through to October 2004, and then on a less regular basis through to December 2005. The number of articles ranged from one or two per month to over 1000 in December 2003 and over 1100 January 2004, when the lander was supposed to be on the surface of Mars. The PPARC service culls articles from national, regional and local newspapers and from the BBC’s online news service. Another

— earlier — high point was the launch of *Mars Express* in June 2003, when there were about 200 individual cuttings included in the PPARC service. The number of articles published each month fell dramatically after it was realised that *Beagle 2* was not going to “phone home”. Nonetheless, for each month of 2004 and sporadically throughout 2005, *Beagle 2* was the subject of articles in the press.

Of the total number of articles, 105 were sampled for a more detailed qualitative analysis. Nearly 60% of the articles sampled made use of quotes, largely from scientists. Tone was an important indicator. Right up until the failure of *Beagle 2* to call home, the newspaper coverage was either uniformly positive, or it was positive, but expressing anxiety. January 2004 saw about one third of the articles taking a critical line, as the realisation grew that the mission had failed. In February 2004 none of the articles had a good word to say for *Beagle 2*. Following this abrupt reversal in media image, the rest of 2004 saw a much more ambiguous attitude towards the project. Half the articles in our sample were accompanied by pictures or graphics, with images of Colin Pillinger, complete with mutton-chop whiskers, and cradling a mock-up of his spacecraft, a perennial favourite.

Two days before the June launch, the elite UK newspaper, *The Independent*, portrayed Pillinger as possessing “effusive enthusiasm, iron will and low cunning” and spoke of the care with which everything was being rehearsed for the eventual Mars landing (*The Independent*, 31 May 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



Figure 3. *Beagle 2* model. Credit: ESA.

never done this. We are breaking new ground in the public presentation of space science," Leicester University's Director of Space Research, Alan Wells, was quoted as saying.

Much was made of the "Britishness" of it all. The ultra-chauvinistic, middle-order *Sunday Express* (20 July 2003) flushed with pride as it quoted Pillinger: "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 the band Blur, who recorded the short tune that was to signal a successful landing, and BritArt guru Damien Hirst, whose sequence of painted dots would act as a colour calibrator for the *Beagle 2* cameras. With a certain amount of foreshadowing, there was also considerable emphasis on how little *Beagle 2* had cost. The elite *Guardian* (10 November 2003) described the mission as a "shoestring project".

The tone of the coverage became a little more tentative as the landing date approached. On 20 December 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 the "most critical stage of its cosmic journey". Ironically, it was to be NASA's *Mars Odyssey* that would first hear from *Beagle 2* if the landing were successful; ESA's orbiting *Mars Express* would not be in position immediately. On 26 December 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 antenna Mars-ward to listen for Blur's landing song, also to no avail. However, *The Herald* was still able to report that the book-makers had shortened the odds on life being discovered on Mars by the end of 2004 from 500-1 to 100-1². The next day, scientists were still being "hopeful" on regional agency wires.

But as the New Year (2004) dawned, hopes were fading. Pillinger was quoted in *The Times* (1 January 2004) as 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* (5 January 2004). Typically, the *Financial Times* (8 January 2004) made the (wise-after-the-event) point: "There is no point in sending cut-price missions to Mars" — and 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*

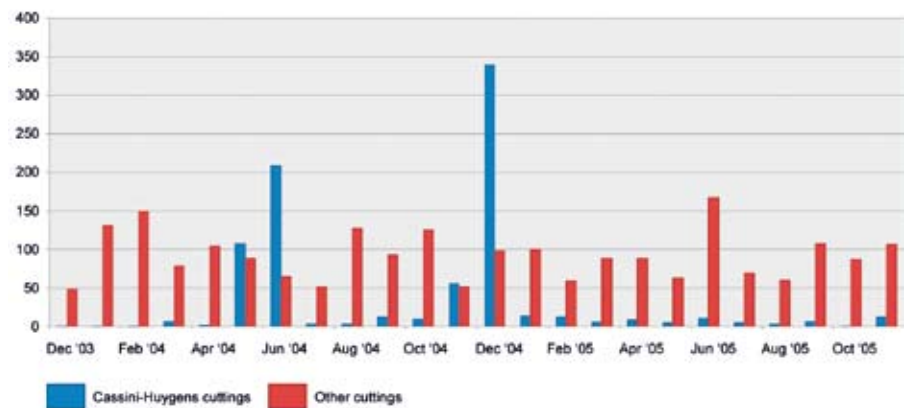


Figure 4. The number of Cassini-Huygens press cuttings (blue) compared with the number of other PPARC cuttings (red). Credit: The authors.

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 shoestring approach to space exploration. If not, a cut-price failure is still a total failure."

The same day's *Guardian* (January 8, 2004) 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 Premiership³. We'll go for a second voyage of *Beagle 2*." By the end of January 2004, hope had evaporated. An inquiry, 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 few of the inquiry's findings were made public. The *Weekly Telegraph* quoted scientists complaining of a cover-up: "Public still in the dark over *Beagle*," it said (2 June 2004).

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 "swing bys" of Venus (twice) and the Earth (once). Two key periods are important for this study (see Figure 4): June–July 2004, when the composite spacecraft finally went into orbit around Saturn after its epic journey; December 2004–January 2005, when the *Huygens* probe first separated from the mother ship and then landed on Titan. In June–July 2004 there were 317 articles across the spectrum of the UK press. For the period December 2004 to January 2005 the number was similar, 396. One thing to note

is the growing importance of online publishing — roughly one third of the total collected by PPARC.

Once more, this output was sampled, with 50 articles taken from June–July 2004 and 50 for December 2004–January 2005. In this case, the general tone of the articles was 100% positive; the *Huygens* landing was successful, unlike *Beagle 2*, so no dramatic reversal of image was occasioned. Of the articles sampled, 68% employed quotations from scientists, with some quoting as many as five different researchers. Three quarters of the articles gave scientific details about Saturn and Titan and technical information about the mission. One change — compared with much coverage of other space missions — was that the European Space Agency (ESA) was regularly recognised, along with British scientists, as making a significant contribution. Roughly two thirds of the articles cited ESA along with the US space agency NASA; the complaint by many European scientists that they were barely recognised in comparison with their American counterparts during joint missions did not hold in this case. Although the general tone was positive, costs came up in about 34% of the articles, while 17% mentioned the riskiness of the mission — a cause for anxiety, particularly in the run up to the *Huygens* landing.

The press used a number of rhetorical devices and metaphors to explain the significance of the mission and its targets. Comparisons of Titan with the Earth were made in over a quarter of our sample, with Saturn's moon described as being on the "eve of life" in 18% of those articles. The timing of the mission meant that Christmas-related metaphors came into the press in about 20% of our sample. Nearly two out of three articles spoke of the secrets on the "alien world" and surprises that were in store for mission scientists. Our media samples were taken from articles that preceded any analysis of the scientific data from *Huygens* and hence any peer-reviewed scientific papers. So it is interesting to see to what extent the media and scientific discourses reflected one another.

Just like *Beagle 2*, the *Cassini-Huygens* mission 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 on board, particularly during the swing-by of the Earth. Newspaper coverage of the *Cassini-Huygens* mission carried on sporadically 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. But this happened in very few articles — just 8% of the sample. And three quarters of those articles were published after the successful landing, comparing *Huygens* positively to *Beagle 2*.

One key point at which a pessimistic comparison with *Beagle 2* could have been made was in the run-up to early July 2004, just two months after the secretive ESA-BNSC *Beagle 2* inquiry. *Cassini-Huygens* would commence orbiting Saturn on 1 July, going into Saturn Orbit Insertion, a tricky manoeuvre that involved flying through a 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 3 June, 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 print 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 17 June — reminding them that the local Leicester University scientists were involved with the spacecraft.

Newspapers reported on 1 July 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 120 536 km (impressive accuracy considering the planet does not have solid surface but is a giant ball of gas) and a more reasonable size for Titan at 5150 km. Many newspapers (19% of articles analysed)

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 put to one side. 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 the press focused its attention on the event, the scientific community fed them a diet of startling results, which were often gobbled up almost untransformed. On 20 December 2004, five newspapers, the *Daily Express*, *The Scotsman*, the *Western Daily Mail*, *The Press and Journal* [Aberdeen], *The Irish News* (Belfast), ran stories with (almost) the same opening sentence: “Finding yourself in a thunderstorm on Saturn would be a truly shocking experience, scientists have found.” *The Guardian* foreshadowed the *Cassini-Huygens* separation: “In its two and a half 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 *The 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.” (4 January 2005) And the *Daily Telegraph* even claimed “Aliens ‘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.” (10 January 2005)

Huygens was due to enter the atmosphere of Titan at 06:50 GMT on the morning of 14 January 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. *Huygens*’ descent through Titan’s atmosphere was a complete success, and it touched down gently on the surface undamaged. 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 Sun* tabloid (15 January 2005) waxed poetic: “Excitin’ sightin’ of Titan”, shrieked its triple-decker headline. 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*, 15 January 2005)

Science “On the Hoof” and “Normal” Science

In the run-up to the *Huygens* landing, there had been great speculation about 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 the atmosphere 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 2 July 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 to feature in the live and reported coverage of the landing itself on 14 January 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. One question that arises from this, is why should normally sceptical journalists allow scientists to speculate in this unchallenged fashion?

More specialist publications were more cautious. Reporting on the first *Cassini* flyby of Titan in its July 2004 edition, 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 [that] 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 (*The Independent on Sunday*, 16 January 2005) if the images from *Huygens*' descent revealed waves in an "oily sea". To date, however, the only reports of waves, oily or otherwise, have been in the media. None of the peer-reviewed articles in the special editions of *Science* (25 February 2005; 13 May 2005) covering the mission, up to the end of 2005, claimed unimpeachable evidence for seas on Titan. That said, many Earth-like water features, such as drainage channels were reported both in the mass media (e.g. the Newcastle *Sunday Sun*, 16 January 2005) and in the peer-reviewed literature (e.g. Elachi et al. 2005). Eighteen months were to elapse before any real evidence of liquid hydrocarbons on Titan was to emerge. Not seas, but more modest lakes are now thought to exist.

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 and that of the BBC's online news service (15 January 2005), as well as into the pages of *The Guardian* (15 January 2005). Yahoo! News also picked this up (16 January 2005). Zarnecki's own description of the surface was more prosaic — "wet sand or clay" (*Wall Street Journal Europe*, 17 January 2005). At a meeting of the Royal Astronomical Society (RAS) in London on 11 March 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.

Nature Special Issue on Huygens and Titan, 8 December 2005

In most Science Journalism 101 courses there is a discussion of the extent to which scientists should or should not wait until peer review has been completed before going public. Similarly, the discussion involves the extent to which science journalists and broadcasters should trust anything that has not been subject to peer review. So one of the purposes of this paper is to compare the comments made by space scientists during the events associated with their missions with what they have to say in the peer-reviewed literature, after careful data analysis and mature reflection. For scientists trying to publish in the high impact journals *Science* and *Nature* these issues are complicated by the rules of those two journals that say that they will not publish articles that have already received publicity elsewhere. Both journals

send out their own weekly press releases, but with strict embargoes that ensure that a wider media coverage coincides with their own availability on the newsstands.

The first major publication of results from the *Huygens* probe came with a special issue of *Nature*, published on 8 December 2005, nearly one year after the landing. In *Nature*'s own commentary article, Mark Peplow (2005) reminded readers of the inevitable delay: "It is easy to forget that just over a year ago Titan was one of the most mysterious objects in our Solar System... But since the *Cassini-Huygens* mission arrived at the ringed planet last year, scientists have been clearing up Titan's mysteries at a tremendous pace." For NASA's Hasso Nieman, the surface of Titan was "a big surprise, it was totally new information" (Nieman 2005). Zarnecki's team also had an article in the special edition (Zarnecki et al. 2005). There was no mention of *crème brûlée*. Instead the surface of Titan was likened to "wet clay, lightly packed snow and wet or dry sand" — similar to the descriptions given at the March RAS meeting. Titan's surface was elsewhere described as "neither hard, like solid ice nor very compressible (like a blanket of fluffy aerosol)". An article by Marti Tomasko of the Lunar and Planetary Laboratory in Arizona (Tomasko et al. 2005) contrasted expectations of "methane lakes" with what was actually observed. "Although these images [taken from the Descent Probe Imager] do not show liquid hydrocarbon pools on the surface, they do reveal the traces of once flowing liquid. Surprisingly like Earth, the brighter highland regions show complex systems draining into flat, dark lowlands. Images taken after landing are of a dry riverbed." Other articles supported this view (e.g. Fulchignoni et al. 2005).

With the exceptions of the *crème brûlée* metaphor and the lack of "seas" to "splash down" into, there were considerable similarities of both content and language between the articles in the special *Nature* edition and the previous press reports. At one point or another, both referred to secrets and surprises (e.g. Bird et al. 2005; Tomasko et al. 2005; Lebreton et al. 2005). As with the newspaper articles, many of the scientific articles compared Titan with the Earth: "An extraordinary world, resembling Earth in many aspects." ESA's Jean-Pierre Lebreton (2005) talked about the *Huygens* data as offering: "A new view of Titan, which appears to have an extraordinarily Earth-like meteorology, geology and fluvial activity (in which methane would play the role of water on Earth)... Titan is an extraordinary world having Earth-like geophysical processes operating on exotic materials under very alien conditions." The allusion to "alien" was not a throwaway. "Titan could be a place of astrobiological interest ... a planetary-scale laboratory for studying pre-biotic chemistry, which confirms the astrobiological interest of Saturn's largest moon," the article concluded.

From the content of the *Nature* articles, it is clear that many of the on-the-hoof comments of scientists in January 2005 did stand up to the analysis of the *Huygens* data. In this instance, one might therefore argue that scientists had been vindicated in speaking out prior to peer review, and journalists had been right in believing and quoting them. At least, they had both "got away with it".

Press Coverage of the Nature Special Issue

There was none.

Other Space-Related Press Coverage in December 2005

It was not as if there was no coverage of space science in the British press during December 2005. But not even *New Scientist*, which is read by many people interested in science, as well as by scientists trying to keep up with all that is happening across the disciplines, carried a word about the *Nature* special issue. What the newspapers did cover included the threat from an asteroid that had been reported to be on collision course with the Earth, and likely to hit in 2036 (*Daily Express*, 8 December 2005; *The Guardian*, 16 December 2005), the cost of space missions (*The Independent*, 6 December 2005) and Mars. *The Sun* reported on 2 December that water on Mars gave a clue as to whether or not life could have flourished there. The cartoon accompanying its article depicted Martians worshipping at the wreckage of *Beagle 2*, while a NASA spacecraft flew overhead.

And then, on 20 December, the press reported that wreckage of the *Beagle 2* had been found in a crater on Mars (*Daily Express*, *Daily Mirror*, *Daily Record*, *Daily Telegraph*, *Financial Times*, *The Independent*, *The Sun*, *The Times*). NASA's *Mars Global Surveyor* had sent back some "grainy images" that looked as if there might be traces of where *Beagle 2* had first crashed down and even the remnants of its airbag. Speculation was that *Beagle 2* had hit the side of the crater it was aiming for, rather than landing safely on the bottom. Many of the papers quoted Colin Pillinger saying it was "a bit like hitting the side of the pocket in snooker". For the next few days a furious argument raged in the pages of *The Times*. On 21 December, its "Thunderer" column accused Pillinger of "radiating more enthusiasm than genius" and requested that he "shut up about *Beagle 2*". "We do not want to spend another Christmas thinking about such a dispiriting cock-up. By all means inform us about *Beagle 3*, but only after it has landed and made contact with mission control," the column finished.

Colin Pillinger and ESA's David Southwood both responded with letters defending *Beagle 2* against the "Thunderer". Southwood's support was somewhat double-edged: "I

deprecate most the attack on Colin Pillinger personally... it is a sad society where there is no role for the eccentric. Indeed, eccentrics can often inspire, almost always think laterally, and do not always fail." Reader Dan Green of Ewell was less supportive. "In the crater in which it is speculated that *Beagle 2* landed, it is also speculated that there is evidence of a 'possible gas bag'. It would be better to look here on Earth, where there is irrefutable evidence of the real thing," he wrote.

Models of Science Communication

Space missions are both scientific research programmes and potentially 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. So they are naturally concerned about how their efforts will come across to their fellow citizens. Hilgartner (1990) identified what he termed the "dominant model" of science communication: 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. In that way, the scientific community could retain control of what got into the public domain, Hilgartner explained. That model is clearly not applicable to either mission under discussion here: for obvious reasons, there were no peer-reviewed articles about the science beamed back from *Beagle 2*; for much less obvious reasons, there was no coverage of the special issue of *Nature* devoted to the *Huygens* landing. One of the news values often cited as enabling journalists to place their articles in their newspaper is that of co-option (e.g. Gregory and Miller 1998), the incremental development of an ongoing story. Maybe the gap between January 2005 and December 2005 was too long, but there seemed little co-option in evidence. On the other hand, the strong news value of negativity played its part in the continued fascination with *Beagle 2* nearly two years after it went AWOL.

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. In such circumstances, the Lewenstein (1995) 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 to which the media and interested scientists were denied access. Indeed, with the refusal of the scientists involved to publish their data, other scientists were forced to resort to videoing the television news and freeze-framing it to get their hands on any data (Close 1992). Lewenstein's analysis shows how boundaries between scientific and public communication become blurred

when such secrecy is involved. Both *Beagle 2* and *Cassini-Huygens* have been very open in terms of public access, and in terms of putting their data and analyses through the peer-review process. The web model, while useful, does not then fully capture what happens in many space missions in terms of the communication processes and relations.

So how are we to encapsulate what was going on? Once a scientist has made a public claim — methane seas or *crème brûlée* in this case — is there pressure to put this into the peer-reviewed literature? The evidence from the *Huygens* issue of *Nature* is negative. Either these two ideas had been put forward and rejected by referees for the scientific journals or they had never been put forward. So to follow up this finding 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 have been wrong.

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 the views of scientists that were somewhat at odds with each other were presented. So how is the reader/viewer/listener to make sense of this and what does it say about the scientist-journalist relationship?

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 "on the team" in Nelkin's terminology. Possibly. There certainly was strong scientific input direct into the media coverage: the — sometimes inappropriate — precision in numbers given to readers; the repetition of highly technical information about the mission; some of the densely annotated graphics. Journalists at mission headquarters during the *Huygens* landing or carrying out live interviews clearly shared the excitement of the scientists; they were almost "embedded" with the subjects of their articles in the same way as war correspondents were in Iraq or Afghanistan.

Our more charitable interpretation is that both journalists and the general public have a much more sophisticated understanding of science-in-the-making than they are 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 an outside broadcast of a live sports event. That is to say they understand that the post-match analysis, with the benefit of action replays taken with a battery of cameras, may show that the referee "got it wrong". Annoying though that may be for the supporters whose team was "robbed", it is "par for the course". If we are right, those who despair of the level of public "scientific literacy" should take heart — your fellow citizens are more sophisticated than you thought!

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, shoestring scientist who tried and went down fighting. Whoever wants to claim the credit, the UK government has signed up as the second-largest investor in ESA's ambitious Aurora programme of Mars and lunar exploration.

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Notes

1. We feel confident that readers will recognise the initials of the US space agency; ESA, on the other hand, is almost unrecognised by the majority of Europeans, let alone the citizens of other countries, and we felt obliged to spell it out.
2. The bookmakers will have done well out of those willing to take either set of odds.
3. The top UK football division.

Biographies

Blanka Jergovic lectures in journalism at the Universities of Zagreb and Dubrovnik in Croatia. She also works for Croatian Radio as a science journalist and programme editor. Her research interests are in science communication and media studies. She is a council member of the European Union of Science Journalist Associations.

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Building a Wall-Free Digital Tomorrow

Opinion

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Key Words

Collaboration
Web 2.0
New Technologies

I live a strange life. There is no way around it. I have contracts to work with universities and programmes in Sonoma (California), Swinburne (Australia), Washington DC and Edwardsville (Illinois) where I live.

This spread of employer locations wouldn't be possible if it weren't for this fabulous thing called the Internet. Across its high-wires and by-wires we shoot our lives across the world,

meeting for lunch across the desk from one another, with a video camera bringing our collaborators' multi-continental faces to us.

This is an alternate reality that doesn't belong to all of us. As I find myself symbiotically connected to the Matrix, doing Education and Public Outreach (EPO) via a cellular broadband card from random corners of