Another Fine Mess

Pablo's Armchair Treasure Hunt 2017

These are the results and setters' notes for the 2017 Armchair Treasure Hunt, set by the 'Bruce Hindsight' team. The Hunt began on 15 December 2017, and ended on 15 January 2018.

Prizes

Prize	Team	Captain
First to treasure: Pablo Memorial Trophy	The Psychologicals	TATHC
Best solution: Dave Harding Trophy	The Pathfinders	Matt Hulbert
Second to treasure	Alcoholus Lubricatum	Chris Andrews
Second best solution	Tweleve Pack	Noel Aitchison
Third to treasure	The Cachew Nuts	Richard Roper
Third best solution	Beef Leamington	Angus Walker
Best hunter's tale	No Management Potential	Steve Hames
Best virgin solution	The Rookies	Lauren Hillier
Nearest miss	Stragglers	Bart Bramley

Results table

T: treasure ticket number — S: score — V: ‘virgin’ team (no members with previous Armchair Treasure Hunt experience) — F: ‘virtual’ find.

#	Team	Captain	T	S
1	The Pathfinders	Matt Hulbert	14[F]	429
2	Tweleve Pack	Noel Aitchison	12	425
3	Beef Leamington[V]	Angus Walker	4	413
4	The Psychologicals	TATHC	1	411
5	Apopheniacs Anonymous	Mark Abbott	5	407
6	The Rookies[V]	Lauren Hillier	10	379
7	The OWLs	Jo Cooper	7	372
8	Strange Brotherhood	Simon Long	6	370
9	Alcoholus Lubricatum	Chris Andrews	2	369
10	The Cachew Nuts	Richard Roper	3	357
11	Daphne HQ[V]	Seb Bacon	16	345
12	Stragglers	Bart Bramley		336
13	Team Poirot	Anne Traynor		328
14	Les Messieurs	Andy Marr	13	324
15	Tim Tam Slammers[V]	Jan Schneider	15	323
16	Chiltern Fellowship	Jon Wallis		319
17	No Management Potential	Steve Hames	8	313
18	AftermATH	Graham Longbottom		304
19	Hendalls Hunters[V]	Holly Douglas		301
20	The Eh? Team	Tony Newman	9	291
21	Lady Strange and the Earl of Yarborough	Paul Barden		280
22	Cavell Family	Jane Cavell		264
23	Dave Kee Team	Dave Kee		254
24	Roboogle Riddlers[V]	Dan Lee		249
25	Team Norway	Tim North		247
26	The Puzzle Club[V]	Kathy Hylott	11	244
27	Not quite last again!	Gareth Hartwell		237
28	Famous Five	Brian Mills		237
29	f.ds	Wolfgang Leyrer		227
30	Johnny from Donny[V]	John Felton		217
31	The Mullitovers	Jason McKay		212
32	Team Crazy	Colin Lu		210
33	Quinta Essentia	Bernhild		204
34	Team Sociometry	Adrian Rose		202
35	Rainbows and Unicorns	Richard Ellis		202
36	The Bruce Medal for Mess	Liz Colclough		194
37	100pt Heading[V]	Tom Lynn		187
38	Unstable Geniuses[V]	Catherine		163
39	The Avengers[V]	Mark Greenhalgh		150
40	Forge Ahead[V]	James Cranch		142
41	Burghfield Burghers	Mike Wood		119
42	SWOT[V]	Jayne Samuel-Walker		115
43	Friends and not David Stein[V]	Jonah Nan		111
44	Ecclesall Eclairs[V]	Alan Cantrell		95
45	I'm Spartacus	Adam Butler		91
46	David Williams	Dave Williams		85
47	Raiders Up the Wrong Bark	Margaret Cooper		84
48	Wild East Heroes[V]	Chris Sparks		81
49	Levettiers[V]	Robert Levett		78
50	The Distributed[V]	Dominik Moritz		33
51	X Mas the Spot[V]	Sami Kyöstilä		24

Themes

Charles Messier seemed a promising subject for our Hunt, as 2017 was the bicentenary of his death, and the Messier objects were a convenient collection that could be put to various puzzle-related uses. But Messier himself was pretty dull, and the hunt only really came alive for us when we broadened the theme to 'mess'. We were lucky that Olivier Messiaen used so many puzzle-friendly ideas in his work, and the preposterous (and surely satirical) story about Lionel Messi's football play encoding an arms smuggling route was another gift.

Anagrams

Our inspiration for the long anagrams was the story of Galileo's discovery of (what we now know to be) the rings of Saturn. In 1610 he saw "ears" on either side of the planet, and in order to claim priority for this discovery without revealing it, he sent the anagram

smaismrmilmepoetaleumibunenugttauiras

to Johannes Kepler, intending the solution

altissimum planetam tergeminum observavi

(*u*=*v* in Latin) meaning "I have observed the highest planet to be triple". Kepler, however, constructed an alternative solution

salve umbistineum geminatum Martia proles

meaning something like, "hail, twin knob, children of Mars", and concluded that Galileo had seen two moons of Mars. Kepler had already hypothesized this on numerological grounds: Earth has one moon, and Galileo had discovered four of Jupiter's, so if Mars had two then that would make a geometric sequence 1, 2, 4. However, to find confirming evidence in Galileo's message, Kepler had to invent the word *umbistineum*, by which he presumably hoped Galileo had meant something like a little *umbo* (the boss or knob on a shield). Evidently not all astronomers who read Kepler's solution were convinced by it: one, Thomas Harriot, made over 50 attempts of his own to re-solve the anagram, and collected attempts by others, including

montibus et silva variis Martem mage plenum

by Nathaniel Torporley, meaning something like, "Mars is increasingly full of various mountains and woods". One astronomer managed to rearrange the letters to make obscene remarks about Galileo himself, perhaps indicating a level of frustration with the puzzle that we hope ATH solvers did not share.[1]

This gave us the idea of constructing a set of letters that would make an innocuous message (as in the String puzzle) and also a significant message (as in the Astronomy puzzle). The innocuous message would enable solvers to nail down the letter corresponding to each picture, which would otherwise be ambiguous in many cases. We also found it possible to make instructions for the Heraldry puzzle out of the letters of its solutions.

That a piece of text should have many anagrams is not surprising. The longer a text, the more its letter frequencies tend to the average, and so the more it is an approximate anagram of every other text of the same length in the same language. However, this observation does not mean that constructing *exact* anagrams with *particular meanings*, as required by these puzzles, is easy! We hope that we were able to avoid anything as awkward as Kepler's *umbistineum*.

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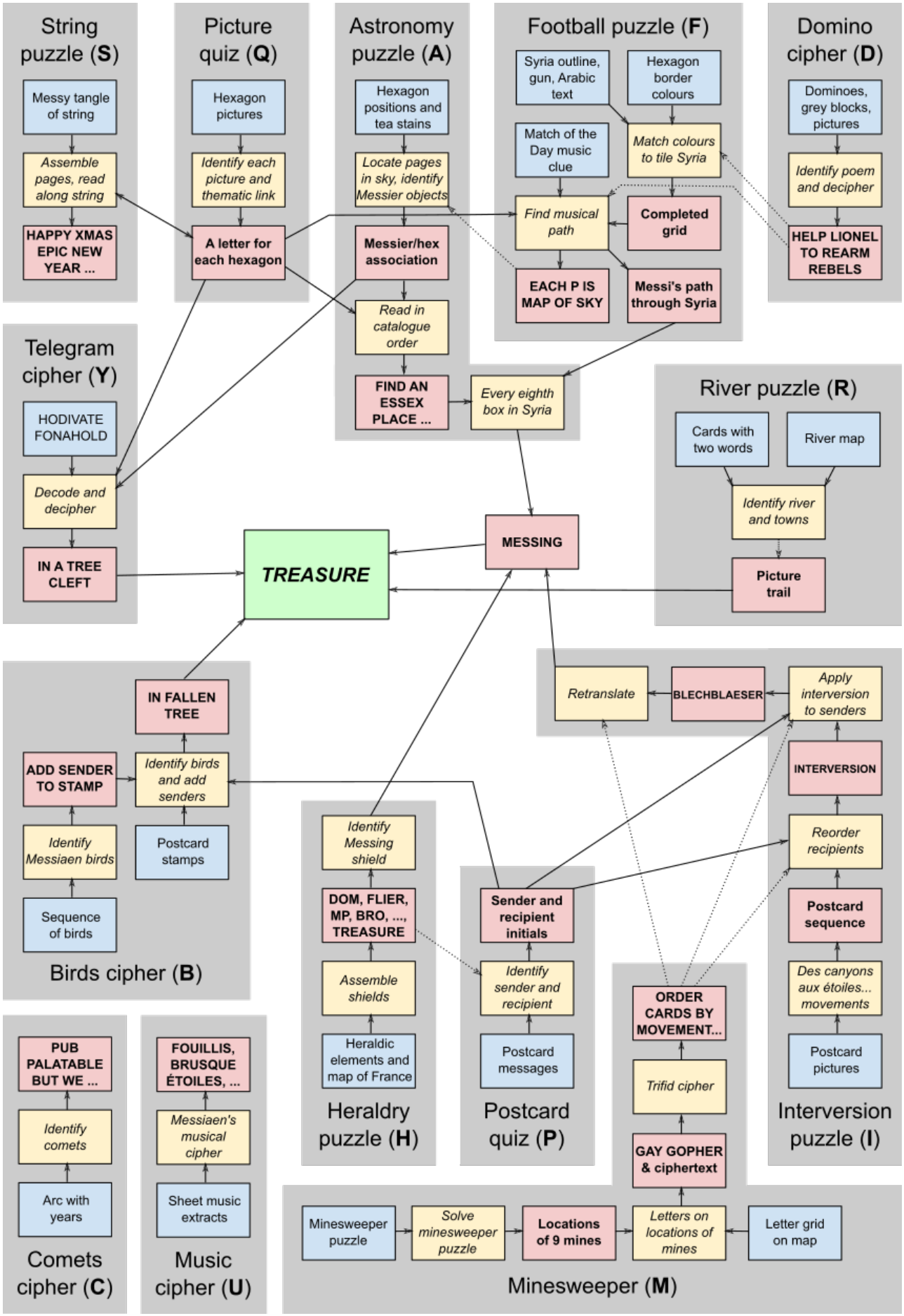
[1] This account is based on John D. North (1989), *The Universal Frame*, London: Hambledon, p. 119.


String puzzle (S)
Messy tangle of string
Assemble pages, read along string
HAPPY XMAS EPIC NEW YEAR ...
Picture quiz (Q)
Hexagon pictures
Identify each picture and thematic link
A letter for each hexagon
Astronomy puzzle (A)
Hexagon positions and tea stains
Locate pages in sky, identify Messier objects
Messier/hex association
Read in catalogue order
FIND AN ESSEX PLACE ...
Every eighth box in Syria
Football puzzle (F)
Syria outline, gun, Arabic text
Hexagon border colours
Match of the Day music clue
Match colours to tile Syria
Find musical path
Completed grid
EACH P IS MAP OF SKY
Messi's path through Syria
Domino cipher (D)
Dominoes, grey blocks, pictures
Identify poem and decipher
HELP LIONEL TO REARM REBELS
Telegram cipher (Y)
HODIVATE FONAHOLD
Decode and decipher
IN A TREE CLEFT
River puzzle (R)
Cards with two words
River map
Identify river and towns
Picture trail
TREASURE
MESSING
Birds cipher (B)
IN FALLEN TREE
ADD SENDER TO STAMP
Identify birds and add senders
Identify Messiaen birds
Postcard stamps
Sequence of birds
Retranslate
BLECHBLAESER
Apply interversion to senders
INTERVERSION
Reorder recipients
Postcard sequence
Des canyons aux étoiles... movements
Postcard pictures
Interversion puzzle (I)
Identify Messing shield
DOM, FLIER, MP, BRO, ..., TREASURE
Assemble shields
Heraldic elements and map of France
Heraldry puzzle (H)
Sender and recipient initials
Identify sender and recipient
Postcard messages
Postcard quiz (P)
ORDER CARDS BY MOVEMENT...
Trifid cipher
GAY GOPHER & ciphertext
Comets cipher (C)
PUB PALATABLE BUT WE ...
Identify comets
Arc with years
Music cipher (U)
FOUILLIS, BRUSQUE ÉTOILES, ...
Messiaen's musical cipher
Sheet music extracts
Minesweeper puzzle
Solve minesweeper puzzle
Locations of 9 mines
Letters on locations of mines
Letter grid on map
Minesweeper (M)

Synaesthesia

The use of colours to represent musical notes was inspired by Messiaen's synaesthesia, which he described thus:

> I am … affected by a kind of synopsia, found more in my mind than in my body, which allows me, when I hear music, and equally when I read it, to see inwardly, in the mind's eye, colours which move with the music, and I sense these colours in an extremely vivid manner. … For me certain complexes of sound and certain sonorities are linked to complexes of color, and I use them in full knowledge of this.[2]

Messiaen's synaesthesia was not systematic, and so we were not able to use it as the basis of a puzzle. The correspondence that we used instead, between the colours of the rainbow and the notes of the major scale, is not a coincidence. The division of the rainbow into seven colours originates with Isaac Newton, who chose the number seven precisely so that the colours would correspond with musical notes. This required him to include orange and indigo in the spectrum, colours that we found tricky to make clearly distinguishable both when viewed on screen and when printed.

Structure

Something that we struggled with until very late in the development of the Hunt was the guessability of the treasure location. Any teams who looked in a gazetteer would have discovered, as we did, that the only places in England starting *Mess-* are Messing in Essex and Messingham in Lincolnshire, and the latter was ruled out by its distance from London. This meant that Messing was guessable from the theme alone, and several teams did guess it at the poster stage. A bold team that backed their hunch could have reached the small pond in Conyfield Wood having solved almost nothing.[3]

Eventually we decided to accept the inevitable and not try to make Messing the big secret, but instead to pack all the difficulty into the last two steps. As you can see from the diagram on page 4, it was a Hunt of two halves. The hexagon-related puzzles in the top half of the diagram, with thematic connections to Messi and Messier, led to IN A TREE CLEFT, while the postcard-related puzzles in the bottom half, with thematic connections to Messiaen and Messines, led to IN FALLEN TREE.[4] The idea was that teams who had only one of these clues could go to Messing and have a chance of finding the treasure, while teams that had both clues would be almost sure to find it.[5] We believed that IN FALLEN TREE was the more valuable of the two clues, so we gave it to what we thought was the harder half. But perhaps we were wrong about the relative difficulties: the Psychologicals were first to the treasure having solved the Postcard quiz but not yet the Football puzzle.

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[2] Quoted in Jonathan W. Bernard (1986), "Messiaen's Synaesthesia: The Correspondence between Color and Sound Structure in His Music", *Music Perception* 4:1 pp. 41–68.

[3] And in a very impressive feat, No Management Potential found the treasure despite having neither IN FALLEN TREE nor IN A TREE CLEFT. (They did have the help of a four-year-old child.)

[4] These two clues were designed to be changeable at the last minute, for example if the fallen tree had been broken up for firewood.

[5] One team visited the site with both clues, and still failed to find the treasure. They searched the right tree and must have been within a hair of touching the box, but perhaps the cleft was deeper and the box smaller than they were expecting. We awarded them a 'nearest miss' prize for their efforts.

Teams with only IN A TREE CLEFT were faced with the problem of searching many tree clefts near the pond, but several teams did find the treasure this way, including the Cachew Nuts, who put their geocaching expertise to good use and were third to the treasure. Other teams went away disappointed from their first expedition to Conyfield Wood, returning after an all-out assault on the Postcard quiz provided the missing clue.

Images

This was a Hunt that included a lot of images, and so we were concerned that it should not be trivial to solve using reverse image search. Among our first steps as solvers are using a tool like pdfimages to extract the individual image files from the Hunt PDF, and running them all through Google Image Search, so we assumed that other teams do something similar. We didn't mind a proportion of images being searchable, but we kept the proportion under control using a variety of techniques:

- making our own drawings (Ontario) and taking our own photographs (beehive);
- transforming images by rotation (*Allaeochelys*) or reflection (hornet);
- capturing frames from DVDs (Messalina) or online videos (Caterpillar);
- scanning books (Adolphine);
- editing the images (Rosario);
- using vector images (evil eye) as tools like pdfimages can't extract them.

We were glad to see this was appreciated. One team wrote, "We particularly liked (perhaps grudging admiration puts it better) the effort you put into making many of the images resistant to Google Reverse Image Search."

To keep the Hunt fair, we made sure that there was a plausible (though not necessarily easy) route to identifying each image. For example, the picture of Jeanne Loriod shows her sitting next to an ondes Martenot; solvers might guess that she was known for playing that instrument, and find her via Wikipedia's list of notable players. On the picture of Peckham Rye, the phone number (0171 635 5867) of the adjacent shop is just legible; solvers might figure out that following the Big Number Change in 2000, this became 020 7635 5867, and search for that number and find the address (78 Rye Lane).[6]

The hardest image to identify was Lia Halloran (Q42), found by seven teams.

Software

This Hunt contains several codes and ciphers, and many other elements such as a large number of precisely-cropped pictures from various sources, all of which must be positioned precisely over many pages which must interlock in specific ways. Also it had to evolve through many collaborative changes. Furthermore we knew how important it was to be able to rapidly replace parts of the puzzle at short notice. We would joke, on each trip to Messing, that we would find Conyfield Wood turned into a car park, or our favourite fallen tree chopped up for firewood. How could we make a Hunt which we could rearrange at the last minute?

It was an easy decision for us (mostly software developers) that the Hunt should be software generated. We created a tree of source code in our favourite programming language, using a distributed version control system, hosted on a server we controlled. From very early on in this process any of us could type 'make' and produce the current draft of the Hunt for review

[6] The picture is recent (we took it ourselves), but the shop has not updated its frontage in a while.

or testing, and the final published Hunt was made with the same command on the morning of publication.

We were able to use public data sources for such things as the stars, the path of the River Mess, the locations of the communes in France. The system we developed allowed us to check at every stage that all the puzzles and ciphers still worked (for the most part ciphertexts—including sheet music—were generated from plaintexts by the code building the Hunt). We could ensure that all the images in the Hunt were stripped of any metadata (such as dates, filenames, and camera GPS coordinates). We devised a configuration file containing dozens of design parameters (including obvious things such as the postcard texts, but many others such as the exact colours used for every element, the width of the string, the position of every element on each page, the location of each page on the sky), so that we could readily fiddle with these to fine-tune the Hunt. Even “hand-drawn” elements such as the paths of the pink string or the dashed lines could be edited manually in a drawing program and then imported automatically.

The exact details of the systems we used are less important and may rapidly go out of date, but the central idea here may be helpful to any software-oriented future setters: think about the Hunt as a software project: write a program to output the Hunt.

Solving

A possible solving route might have proceeded as follows. It was easy to trace Mr Messy’s pink trail through the hexagons. Identifying the pictures and taking initial letters led to the ‘HAPPY XMAS …’ message that helped resolve ambiguities and difficulties. Meanwhile solvers fitted the hexagons into the Syria-shaped outline, respecting the colour-matching constraint. We were pleased that teams found a variety of ways to solve the jigsaw. Technically minded teams wrote computer solvers, while others solved by hand, having deduced the position of Messi and the goal.

Next, using the music clue to find Messi’s path through Syria to the goal led to the realisation that the stains represented stars, and thus to the Astronomy puzzle. This step was a sticking point for some teams—see below.

Having discovered that each page was a sky map, re-ordering the hexagons was simply a matter of finding the pages on a star chart and identifying the Messier objects. At this point, a team had MESSING; instructions to the start of the picture trail; and quite likely IN A TREE CLEFT via the Telegram cipher, and perhaps the order of pictures and instructions from the River Mess anagrams. Those who had also solved a fair number of postcards—perhaps with help from the Heraldry puzzle—could ADD SENDER TO STAMP, having identified the birds in Messiaen’s *Catalogue d’Oiseaux*, and find or guess the result IN FALLEN TREE. This led to the treasure.

There were various ways to short-cut parts of this process. Some teams spotted the star layouts before, or without, solving the Football puzzle, for example by spotting Aldebaran on the head of Taurus. Some guessed Messing (as discussed above). With or without short cuts, there was plenty to do. The first two teams to find the treasure both reached it on 19 December after four days of frenetic work on the hunt.

Sticking points

A major sticking point that we did not foresee was the Football puzzle. Most of the teams we were watching managed to solve the jigsaw one way or another, but that the path would use

the colour–note correspondence, via the notes of the ‘Match of the Day’ theme tune, was an idea missed (or found only very late) by many. We had hoped that most teams would have got the colour–note correspondence from the poster, and that Messi’s hearts, the xylophone linked to the Syria map, and the rainbow-coloured music coming from the television, would put others on the right track. Unfortunately, teams who missed all of these hints were quite likely to miss the Astronomy puzzle too—two of the major puzzles in the hunt.

The Football puzzle was supposed to be further clued by the Domino cipher, which we had assumed would be straightforward. Some of the teams who kindly gave us access to their solving documents had notes like “to do: find the meaning of the Popes/Messiah picture”. All that was needed was to put ‘Popes’ and ‘Messiah’ together into a search engine.

The postcards represented **mess**ages from historical or fictional personages. These were therefore the (traditional) quiz questions in disguise, the implicit question being “Who might have said this, and to whom?” They are all messages whose actual sending or speaking in the form given has not been recorded by the sands of time, but must be imagined by the sensitive historian. A helpful start was provided by the link from Nebula to the postcard on page 7, which enabled most teams to discover Heracles and Iolaus. We hoped this would make clear the idea of the puzzle. Additional help was available from the heraldry puzzle, as most teams discovered.

The task sharply divided teams, some of whom answered most or all the postcards, while others found them difficult to get a purchase on. Finding the right answers required a mixture of inspiration, hard work, and willingness to reject imperfectly fitting candidates. Some postcards yielded to a web search for a judicious choice of words; for example, searching for “immolate myself sandals” leads to the story of Bharata and Rama. For others, solvers needed to be alert to what was implied rather than said. For example, on page 8, solvers could find the answer by deducing what question the recipient must have asked (“Where’s your goblin?”). On page 2, the writer, seemingly an aviation pioneer, is addressing a romantic interest (shown by the kisses) who has suggested a landing site in the Pacific. Many teams rightly guessed the sender was Amelia Earhart, but careful research was needed to find that the recipient was not her husband but her colleague and lover Gene Vidal (father of Gore Vidal).

Because the messages are imagined rather than real, they are naturally resistant to simple-minded searches. This makes them suitable for a Hunt: we commend the idea to future setters. Composing them is a lot of fun, though it takes care and preferably a long-suffering test solver. The challenge for the setter is to word the message so that it provides enough information to lead to the answer, and ensures there is only one exact fit. Solvers are sure to find plenty of near misses, and must trust the setters enough to reject any which don’t quite work. The difficulty level was high, and although in hindsight a couple of easier postcards might have helped to draw more teams into the puzzle, nonetheless several did get all twelve.

The postcards formed part of the even more difficult Interversion puzzle, which gave another route to Messing. Though we did not really expect that any team would first find Messing this way, this could in theory have allowed a team to find the treasure without identifying a single hexagonal picture.

Self-marking

The self-marking of scripts this year was a new departure. Many thanks to all teams for your help with this. Given the significant increase in the number of entries this year, we are especially glad we chose to use self-marking, as marking all of them would have been a mam-

moth task. The self-marking process seemed to work well, and no-one reported any particular problems.

Our aim in devising the marking process was to find a system which made it fairly easy to check the submitted marks, while not making the marking too onerous for teams. Asking for page numbers seemed to strike the right balance. This in turn was why we asked you to submit PDF files, which look the same on different systems and where everything is on a clearly defined page.

For every submitted set of marks we checked a random selection of the marks, and looked at all the queries raised about unclear cases. We answered all these queries and adjusted the marks accordingly. Apart from queries you raised, we didn't make many adjustments, since our checking showed that all teams had been at pains to mark themselves fairly and flag up anything they were unsure of.

Five teams at the head of the results table had scores very close together, so we took a different approach with these teams. To be certain of who should get the prizes, we marked their whole solution again from scratch. Then we checked the marks where our results differed from theirs. This greater scrutiny meant that most of them got adjusted by a few marks, but didn't change the order of the prizes.

Our main advice to any future setters opting for self-marking is to make the marking scheme as clear as possible about what does and does not count as having got the mark.

Model solutions

A mark scheme is not the same as a model solution. If you would like to see examples of model solutions, we recommend looking at the solutions by two teams who have both kindly allowed them to be published in the Hunt archive. They are quite different in style but they are both first-rate. The one from Tweleve Pack (who won second best solution) is particularly enjoyably written, well presented and logically arranged. The solution by Beef Leamington (third best solution), also very clearly presented, would have been the runaway winner of a 'concisest solution' prize, with their 414 marks gained in only fourteen pages.

Weighting

In many previous hunts, marks have been weighted by 'difficulty', gauged by how many teams have failed to get a particular mark (plus one). For example, out of this year's 51 submissions, 41 realized that the hexagonal pictures should be tiled somehow into the grey outline. That means ten teams missed this, so it would have been worth eleven points.

We chose not to use this counting system this year for three reasons:

1. A weighting scheme cannot be applied until all marks are in. By using unweighted scores, teams could know their rough score as soon as their self-marking was finished and then compare with friends in other teams.
2. The weighting scheme described rewards teams for padding out their solution with many tenuous connections, in the hope that a few of them are in the mark scheme. If you do hit lucky with an obscure point, it is like hitting the jackpot, since most other teams won't have it and it will be worth a fistful of points.
3. If a team misses a particular point, they are let off lightly if the point was very obvious (since in that case the point wasn't worth much anyway). Arguably they should be penalized *more* instead for missing something obvious; or at any rate not less.

Needless to say these are matters of taste and we are sure that future setters will have their own ideas. We look forward to seeing what they are.

Statistics

The only mark gained by all 51 of the entries submitted was G4 (any mention of Lionel Messi). 42 teams spotted that the overall theme of the hunt was 'mess'. Only one team got D13 (Pope's 'Messiah' is seasonally appropriate for a hunt that happens at Christmas). To our surprise, only two teams solved the scoreboard puzzle. We thought this was easy!

Favourite write-in marks

We greatly enjoyed seeing the many *mess-* connections found by teams which we hadn't spotted and offered as write-in marks. Among our favourite write-ins:

- Metropolitan France, shown on page 5, is known as *l'Hexagone* (the hexagon), and hexagons are used to represent Messier objects in the Hunt.
- A vacuum cleaner (Q1) is used to clean up mess.
- *Coup du sombrero* (Q23) is the French name for the 'reverse flick-over', a football trick that Messi is particularly skilled at.
- Caroline Herschel (Q62) became known as a singer for Handel's *Messiah*.
- Dipstick (Q70) sounds like Messiaen's organ work *Diptyque*.
- Iannis Xenakis (Q108) wrote a piece titled *Pleïades*, which is a Messier object.
- William James Herschel pioneered the use of fingerprints (Q126) for identification; he was the grandson of the astronomer Frederick William Herschel, brother of Caroline Herschel (Q62), and who published a catalogue of nebulae, a successor to the Messier catalogue.
- The asterism shown on page 8 (part of the constellation Sagittarius) is known as the 'Teapot'; perhaps this is the source of the tea stains.
- The band Notwist recorded the album *Messier Objects*; a founding member of the band was Martin Messerschmid.
- The postcards are 'From …' and 'To …', like the Messiaen work associated with them (*From the canyons to the stars*).

Credits & thanks

We particularly thank **Ed Sludden** for his beautiful and striking poster design, and for his patience with our requests for fiddly changes to the puzzle elements.

The Hunt was much improved by the feedback from the play-testers, who gave generously of their time and effort: Richard Brooksby, Liz Cable, Francis Davey, El Greene, Michael Greene, David Lovemore, Timothy Luffingham, Emma McCaughan, Gareth McCaughan, Heather McCaughan & Abigail Wood.

We are grateful to the teams who let us snoop on their solving progress. We were cheering you on from the sidelines.

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Software used included Affinity Designer, GIMP, ImageMagick, Inkscape, LilyPond, NumPy, Pages, PDFtk, Pillow, PyEphem, Python 3, ReportLab, svglib, svgpathtools & svgwrite.

The Hunt was set by ‘Bruce Hindsight’: Nick Barnes, Colin Bell, Francis Davey, Gareth Rees, Richard Tucker & Mark Wainwright.

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Messines battlefield map	Field Survey Company, Royal Engineers	Public domain
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Salm-Salm	Sir Iain	Public domain
Sombrero	MAW	Used with permission
Swallow	DT	Used with permission
Swan	GDR	Used with permission
Tawny owl	John Gerrard Keulemans	Public domain
Telescope	Flaticon	Flaticon Basic License
Treasure chest	NB & ES	Used with permission
Vacuum cleaner	Openclipart library	Public domain
Woodlark	—	Public domain
Ypres	Australian official photographer	Public domain