



# TRANSIT

The January 2013 Newsletter of



## **NEXT TWO MEETINGS at Wynyard Planetarium**

**Friday 11 January 2013, 7.15 for 7.30 pm**

**A Yorkie Down Under**

**Martin Whipp, York A.S.**

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**Friday 8 February 2013**

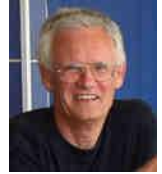
**Members' night – volunteers needed!**

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## Editorial

**Rod Cuff**



I hope everyone had a good and happy Christmas, and maybe even, like Keith (see page 6), escaped the mincepies and paper hats for long enough to do some astronomy. And if you can read Rob's 'Skylights' this month and not want to rush outside whenever there's a clear night, then you've got more self-control than I have.

The centrepiece this month is a lengthy article by Ray Worthy that is quite different from anything else in *Transit* in recent years, and I think is well worth your time to read and reflect on. It concerns why some people seem to find it so difficult to get to grips with astronomical (or even scientific) concepts and reasoning.

As the red box below says, Andy Fleming will be guest-editing February's issue, so please send your contributions to him (fleming5ln@btinternet.com). Make sure he has quality material to work with!

I wish everyone a personally and astronomically splendid 2013. May it prove a milestone year for each of you for all the right reasons.

Best wishes -- Rod

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I put out a plea a while back (and repeated it in December's issue) for someone to take over at the AGM in February as Communications & Information Secretary for CaDAS, or at least as editor of *Transit*, but no one has stepped forward yet. The current issue is my last as editor of a regular monthly *Transit*. Andy Fleming is guest-editing February's edition, as I'll be abroad on holiday during the time it will need to be put together.

Until a new permanent editor appears, I'll carry on editing *Transit* on a best-can-do basis – that won't be on a guaranteed monthly schedule, but only when I can spare the time to put an issue together. I would much rather someone offered to take the job on as the regular editor. **Perhaps that could be you?** If it helps, I'd be happy to keep supplying quizzes.



## Letter

### Comments on reactions to Sir Patrick's death

*from Neil Haggath*

Why is it that, as soon as a famous person dies, some people immediately feel the need to rubbish his memory? I said this four years ago, after the death of Sir Arthur C. Clarke, and it now applies equally to Sir Patrick Moore.



It seems that some choose to remember Sir Patrick for a handful of unfortunate comments in the media, as if these somehow undermine his lifetime of good work! Less than a day after his death, articles appeared on the internet that branded him 'an old English curmudgeon' and 'a racist, a homophobe and a misogynist'. Someone even commented, 'Was he the last guy on Earth to wear a monocle?', as if that in itself was a reason for ridicule! (The reason he wore a monocle was quite simple – because only one of his eyes had defective vision.)

It's true that he had some views that could charitably be described as anachronistic, and that are widely considered offensive in today's world; in particular, he made some comments about immigration, which led to him being labelled racist and/or xenophobic. But we have to remember that the man was born in 1923, and that his views were pretty much the norm in the era and culture in which he was brought up; my grandparents would certainly have agreed with them, as would most people of their generation.

He considered himself intensely patriotic – so much so that, early in the Second World War, he lied about his age in order to join the RAF before he was old enough to serve. If some choose to blur the distinction between patriotism and xenophobia, then so be it.

Some have also made a big deal of the fact that he disliked Germans. Well, this is surprising – why, exactly? Everyone in the UK who lived through the Second World War, let alone fought in it, was *taught* – you might even say indoctrinated – to hate the Germans; that's what happens during a war! Many may have got over that hatred after the war was over, but in Patrick's case there was a personal tragedy; his fiancée was killed in a bombing raid. (That's why he never married.) So it's hardly surprising that he wasn't enamoured of Germans, is it?

Having said that, he had a few German guests on *The Sky at Night* over the years – e.g. when reporting on ESA projects. And in recent years our very own German friend, Jürgen, was made welcome at Patrick's house, and his astrophotography has frequently been featured on the programme.

While I acknowledge that some of Sir Patrick's views were indeed out of place in the modern world, I really must take issue with the 'misogynist' label. This apparently arose from a comment he made about 'women running the BBC' – which was in fact more a complaint about the programming content, such as the over-abundance of cookery programmes. How exactly did commenting on the programming content make him a misogynist? My personal opinion is that 90% of programmes on the BBC today – and on all the other mainstream channels – are pointless drivel, but that opinion has precisely nothing to do with the gender of their producers! For the last decade, Patrick's own producer has been a woman, [Jane Fletcher](#) – with whom he apparently got on very well, and who has never had a bad word to say about him. He also entertained many distinguished female guests on the programme.

The BBC's tribute programme featured [Heather Couper](#), who has always said that Patrick was her role model in her own career as a writer, broadcaster and science populariser. Heather told the story of how she first wrote to Patrick when she was 10 years old; this was in 1960, a quarter of a century before 'political correctness' was ever heard of, and when even the concept of women's equality was in its infancy. She said she wanted to be an astronomer when she grew up, and asked whether 'being a girl would be a handicap'. Patrick replied – and Heather showed his actual letter, which she has kept for 52 years! – that it should be 'no handicap at all', and that he would do everything he could to help her achieve her goal.

That doesn't sound like a misogynist to me!

*Best wishes -- Neil*

# OBSERVATION REPORTS AND PLANNING

## Skylights – January 2013

*Rob Peeling*



### Hours of darkness

<b>Astronomical twilight</b>	
1 January	18:12 to 06:15
31 January	18:53 to 05:55

### The Moon

	<b>Last Quarter</b>	<b>New Moon</b>	<b>First Quarter</b>	<b>Full Moon</b>
	5 January	11 January	18 January	27 January
<i>Rise</i>	00:40	07:36	10:36	17:37
<i>Set</i>	11:18	16:23	00:09 (19 <sup>th</sup> )	08:01 (28 <sup>th</sup> )

### The planets

Make sure you look at **Jupiter** in the early evening on 3 January, as **Io** and **Ganymede** put on a show. Ganymede completes its crossing of Jupiter's disc at 17:38 (not quite fully dark), with Io starting to cross a few minutes later. The shadows of both Io and Ganymede will be crossing the disc at the same time as Io does. To catch the event at its best, with Io and two shadows on the disc, you need to be watching between 19:15 and 19:45.

Here is a list of convenient transit times for the **Great Red Spot** this month. You will need steady seeing and high power.

<b>Date</b>	<b>Transit time</b>	<b>Date</b>	<b>Transit time</b>
1	20:17	17	23:28
3	21:56	18	19:20
5	23:34	20	20:58
6	19:25	22	22:37
8	21:03	23	18:28
10	22:42	25	20:07
11	18:33	27	21:45
13	20:12	29	23:24
15	21:50	30	19:15

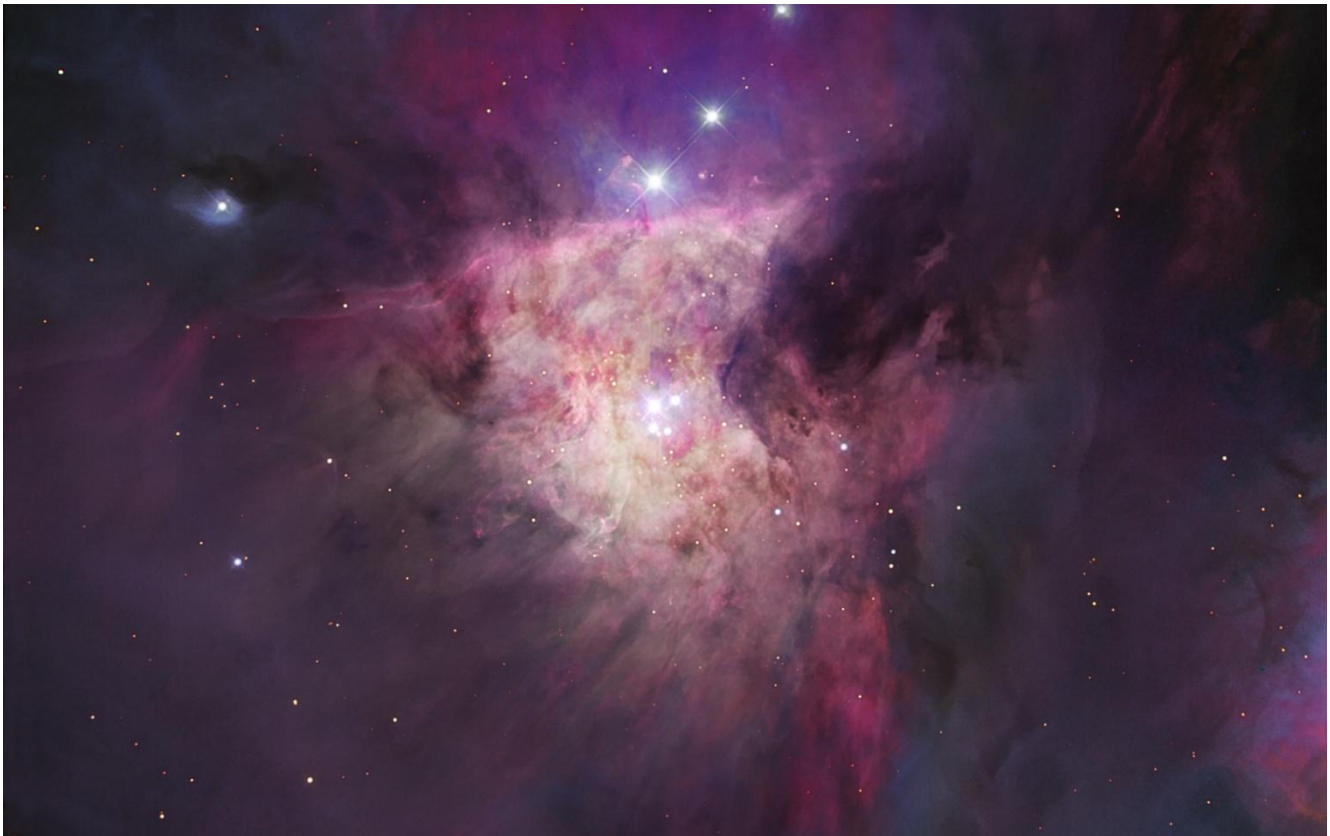
**Saturn** is returning, rising at 3 am at the start of the month and getting up earlier as the month progresses, to rise at 1 am at the end.

## Meteors

The **Quadrantids** are the principal shower for January, lasting from 28 December to 7 January, with the maximum on the 4<sup>th</sup>. According to David Levy, this shower yields 40–200 meteors per hour and they tend to be bluish. This year the old moon will tend to interfere somewhat. As we said in December's *Transit*, there's a chart showing the radiant at <http://snipurl.com/25t884q>.

## Deep space

There is almost too much to choose from at this time of year. While you look at **M42, the Great Orion Nebula**, and the **Trapezium** at its centre, give a thought to the recently published research that suggests that the movements of the Trapezium stars can best be explained by a 100-solar-mass black hole being somewhere in there. The authors think this helps to explain the 'runaway' stars AU Aurigae and  $\mu$  (mu) Columbae, which are thought to originate from the Orion Nebula, leaving  $\iota$  (iota) Orionis behind. Don't forget to check whether you can see the splodge of nebulosity slightly to the south of M42, which is **M43** or **de Mairan's Nebula**.



**Figure 1. The Trapezium in M42 (Image: ESO)**

Staying within Orion, look for the emission nebula **M78**. Look about a quarter of the way along the line from Alnitak (the leftmost star in Orion's belt) and Betelgeuse. M78 lies about



1° (roughly a field-width with low power) to the east of this imaginary line. It is not particularly bright, but can be found with a small telescope from a moderately light-polluted site. It is the pair of stars like eyes in the nebula that makes it distinctive.

To find **M1, the Crab Nebula**, locate the star ζ (zeta) Tauri in your finder and sweep north about half a field's width with a low-power eyepiece. M1 is surprisingly faint, given its fame, and any haze in the sky will probably prevent you from seeing it. The Crab is the expanding cloud from when the original star exploded as a supernova in 1056 AD and was recorded by Chinese imperial astronomers. The pulsar at the centre rotates 30 times per second.

Use Sirius and β (beta) Canis Majoris to its right as pointers to sweep eastwards (left) with binoculars or your finder to find first **M47** and then **M46** lying within 2° of each other in the constellation of Puppis. Both are open clusters. M46 is a personal favourite, because lying within the cluster is a planetary nebula, **NGC 2438**. Since the cluster is low in the sky from Teesside, you will almost certainly need a nebular or OIII filter to find this planetary nebula for the first time. It is probably *not* associated with M46 itself, but it is not yet clear whether it lies in front of or behind M46. The problem is the lack of an accurate method of measuring the distance to a planetary nebula.



Figure 2. M46 and the embedded planetary nebula NGC 2438



## A Christmas Jupiter

If you popped outside on the evening of Christmas Day, you'll have noticed a bright star-like object very close to the Moon. It wasn't a star at all, but the planet Jupiter. I decided to check the jet-stream forecast and the conditions were looking good, so, even though it was Christmas evening, I had to have a look and then capture some AVIs.

**Keith Johnson**



Here's the result of one of the capture sessions together with the capture details. I'm hoping for similar conditions at the 2013 BBC Stargazing Live event.



### **Date and time**

25 December 2012, 19:04:02 U.T.

### **Equipment**

Celestron C9.25" Carbon-fibre Schmidt–Cassegrain telescope

Skywatcher EQ6 Pro. telescope mount

USB2 DFK 21AU618.AS camera

4x ImageMate

### **Process**

Three 90-second AVIs cropped in Castrator, each aligned and stacked in AutoStakkert II. Wavelets applied to all three results using Registax v6, which were then de-rotated in WinJUPOS.

### When teaching astronomy, keep your feet on the ground

Ray Worthy

*[In early September, Ray attended the annual meeting of the [British Association of Planetaria](#), held at the National Space Centre in Leicester. He gave a 25-minute talk about the agents that militate against certain people learning astronomical concepts. Here's an edited version, full of Ray's usual insights and good anecdotes. Feel free to pepper the next issue's Letters page with reactions! – Ed.]*



When you reach a certain age, you tend to beware of a friend who sports a wallet full of pictures of grandchildren. That could be a whole evening gone; so when, some four summers ago, a friend announced that he was going to bring a favourite child to perform on our piano, I resigned myself to spending an afternoon framing polite phrases of appreciation while we listened to 'Bluebells of Scotland'. Was I in for a surprise!

#### Peter

A boy of ten appeared and sat down at the keyboard. A hush descended upon the company. What followed was a bravura performance of sonatas by Beethoven, Schubert, Mozart and Chopin such as would have graced any concert hall. Young Peter<sup>1</sup> was a veritable prodigy who exhibited his talent with an overriding innocence.

I was in awe of this young lad, and when he approached me after tea, I paid him full attention.

'Granddad tells me you teach astronomy,' he began.

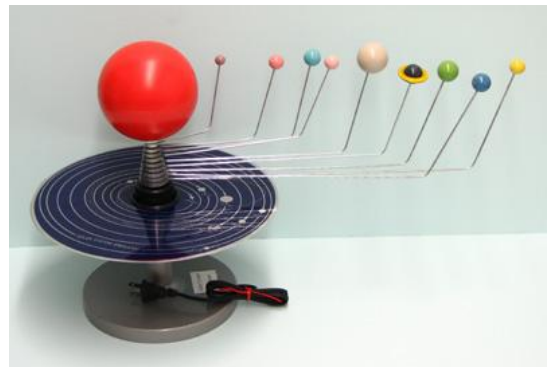
'That's right,' I answered. 'Are you interested?'

'I certainly am,' he said. 'Could I come round tomorrow afternoon for a session?' Ten years old and he talked like an adult. I assured him that I would be available and would be ready at two o'clock.

'Good!' he said quite formally. 'I look forward to it.'

I record my meeting with young Peter in this detail because it paints the background to what followed the next afternoon. It turned out to be the most remarkable and rewarding teaching session that I have ever experienced.

It was a beautiful summer's day, so I set up shop outside on the patio seated at a large, round garden table. Not knowing quite what to expect, I provided myself with props such as balls of various sizes and plenty of sheets of paper. At this particular date, my eyesight was rather poor so I could not offer photos



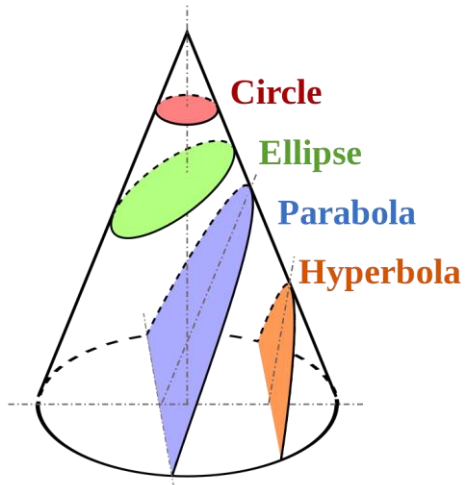
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<sup>1</sup> [All children's names in Ray's article have been changed. – Ed.]



in books. I planned to start with basic concepts and see how far we progressed.

I would have to be guided by his responses. There were times when that circular table stood in for the Earth, the Sun or the Earth's orbit, and I deployed various balls to represent planets.



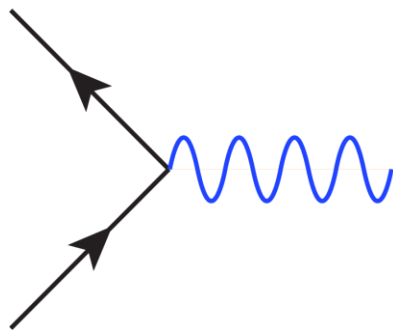
I kept having to remind myself that this boy was only ten. I stayed away from mathematics, but we raided the workshop in my garage in which I kept some long cylinders of polystyrene. These were sawn up and sliced at various angles and Peter soon got a grasp of the relationship between circles and ellipses. Concept after concept he swallowed up without batting an eyelid. Peter seemed to have no notion of how precocious he was. He brought a powerful concentration to bear on the topics I presented to him.

It was not long before we moved away from the Solar System and out to the stars, the Milky Way and the galaxies. I realised that he had no idea of what light was, so I started on the atom and its constituent parts. Once

again, he took in all the ideas I presented to him. The discovery of the moons of Jupiter, [how the timetable of their occultations led to the discovery of the speed of light](#) – Newton's ideas were meat and drink to this amazing boy.

One thing that stood out in my memory was when I was explaining how the electrons moving from one energy level to another within an atom gave rise to the emission of quanta of light at particular frequencies. Nobody had told Peter that this was advanced stuff, so he just listened and absorbed it. When I showed him the dark lines that [Fraunhofer](#) discovered in the spectrum of a star, this amazing boy suggested the correct explanation, that between us and the star was a cloud of cold gas containing atoms whose electrons were ready to shoot up to

their previous high-energy orbits, and that this absorbed the light at that particular frequency. Peter just saw it as the reverse of that pattern of nature, and nothing special. I had to pinch myself as I introduced him to the ideas behind some simple [Feynman diagrams](#) (see left).



THIS BOY WAS TEN. At this rate, I would soon exhaust my own repertoire, so I amused him by telling him stories about the most intelligent man on Earth when he was alive, [Richard Feynman](#). We were still laughing over some of Feynman's anecdotes when his granddad came to collect him.

## [Martin](#)

The example I have shown with young Peter presents to us something that rarely falls to us as teachers of astronomy or lecturers in planetariums. Let me show you something from the other end of the spectrum, something that more usually falls to our lot.

Thirteen-year-old Martin was a member of a class in the school where I taught for thirty years. The Headmaster had seen the success of my newly built [inflatable planetarium](#). Indeed, he had been in it and had witnessed the enthusiasm of the pupils as they surveyed the stars going slowly about the heavens. In his wisdom, he asked if I would incorporate the

use of the planetarium into the Science syllabus for the Third Year. In particular, he wished to encourage the more laggardly streams by increasing their stimulation. That was the theory, anyway.

Martin's class was full of pupils whom the scientific world seemed to have passed by. They were to be taught in nine-week modules because it was thought that their brains would not retain much if they had to wait until the end of the school year. Martin had studied a course that included the works of Copernicus, Galileo, Newton and others. He had been in the planetarium at least four times.

His test paper had asked him to

*Name three famous astronomers and write a few lines showing why they were famous.*

Martin's answer read, and I quote verbatim,

*The only famous astronomer that I know is Mr. Raymond Worthy. He knows EVERYTHING!!! [and this word took up the space of three lines] about Astronomy.*

*He has even got his own crematorium.*

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What creates the difference between Peter and Martin?

The most obvious answer to this question is the disparity in their IQs, in their general intelligence levels, but in fact there is much, much more to the puzzle than might be at first supposed.

## Bobby

In 1962, I was a mature student at a teacher training college in Weymouth, Dorset. In one of my classes in a local school, I made the acquaintance of a boy called Bobby. Rather, I should say that Bobby made acquaintance with me because, once he had discovered that I was interested in astronomy, he followed me around. He was passionate about the subject and talked about it on all occasions when we met. One Saturday afternoon, he saw me walking along the promenade and made a beeline for me. We walked on the prom and I took him down to where the beach was wetted by the tide. There, with a stick, we used the beach like a blackboard, discussing the orbits of the Solar System. The trouble was that he could not get his ideas down on paper. His was one of the worst cases of dyslexia that I have ever seen. I remember one of his written answers to a history paper asking what had killed Alexander the Great. Bobby had written



*He did of a moytotwow.*

Even in his science paper dealing with astronomy, his score was almost zero.

I approached the headmaster and asked why Bobby could not have an [amanuensis](#). His reply was that Dorset was an agricultural, rural county and had no funds. They could not afford to acknowledge a boy with dyslexia.

This anecdote about Bobby serves to underline the statement that there is more to the solving of the puzzle than straightforward IQ levels. Bobby was intelligent but could not surmount his particular problem of expressing himself in writing. When examined verbally, he showed that he had no difficulty in constructing a hierarchy of scientific concepts. He was just unable to put his ideas down on paper.

### Language codes

In 1974 I attended Newcastle University, where I studied in the Education Department. My thesis was entitled 'Early cognition processes and the acquisition of scientific concepts'.

There, I got into very deep considerations indeed, but I remember rebelling against all the esoteric jargon that obscured so many articles. I shall cut this stuff out and give a concise account of what I remember.

Standing head and shoulders above the early pioneers studying the topic was [Lev Vygotsky](#) (see right), a Russian who did most of his work in the 1930s. Because of the political situation prevailing at that time, Vygotsky's work was not translated but, after the war, his papers became available to academics in the West. There were many disciples of his work, but unfortunately Vygotsky had died when still a young man.



He did many experiments that tried to establish the routes by which a young mind began to acquire concepts. His most famous tests involved a special set of sixteen blocks (see below) of varying shapes, sizes and colours. Under each block was one of four three-letter words, having no meaning in ordinary English. Only when the blocks are placed in their correct groups does the meaning of each word become apparent. During the attempts, the words are hidden by being underneath the blocks. After each attempt at placing the blocks in their appropriate groups, the tester turns over one block in each group to reveal the word underneath.<sup>2</sup>



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<sup>2</sup> [Another, more detailed, explanation of how the blocks are used can be found at <http://tinyurl.com/agepjfx>, starting on page 158. – Ed.]

A subject who possesses a logical mind can see the evidence, act accordingly and in a few attempts arrive at the logical conclusion and state the meaning of each word. Some people whom many would categorise as intelligent are seemingly completely unable to finish the task, no matter how often they try.

Believe me, I do understand that absorbing exactly what I have described is not easy, and I sympathise with you. What I advocate is that you get the instructions from the web or me and you make yourself a set of these blocks and carry out the exercise with some volunteers who have never done it before.

I made myself a set of these 'Vygotsky's blocks' and tested all and sundry. Only a certain proportion showed what we could call scientific logic in their adopted method. Some subjects (and I included many teachers in my victims), whilst to all intents and purposes appearing to be 'Intelligent', could not for the life of them use a logical process. This inability appeared to be deeply intrinsic in their character. I came across many surprises. Today, it is possible via Google to witness some of these tests being carried out.

Vygotsky investigated the reasons why many people could not follow a logical progression of concepts. The main thrust of his later papers was that he considered that the early use of a kind of limited language used in particular social groups was the cause. As Vygotsky put it,

*Higher mental processes in the individual have their origins in their social processes.*

Sometime around the year 1970 an East London social worker called [Basil Bernstein](#) (*see right*) developed a similar theme. He noticed that in a social clinic there was a distinct difference between the language of the staff and the language of the clients. In the language of his clients, there seemed to be what Bernstein described as 'an understanding within a mutual context'.



I have investigated this idea among the folks in the North-East, and I am sure that Bernstein's ideas had a basis in fact. Unfortunately, his choice of nomenclature does not help in clarifying the situation. He called the two language codes 'elaborated' and 'restricted'. Many people took this to mean upper or educated class and working class. This blurring did not help the situation. Political attitudes were triggered and tempers flew.

It was supposed that the classification of 'elaborated code' meant the kind of language and thought which was so explicit in the meaning of items and concepts that to move from a lower concept level to a higher one was relatively easy. The users of the so called 'restricted code', however, were operating within a section of society in which the points of reference within a community were not only shared but assumed to be the same, both in the speaker and in the listener.

If you Google for 'Basil Bernstein', you will find many examples of the use of the restricted code. It is in common use in my home town and indeed on Tyneside, and I have no doubt it is common elsewhere. I have heard many conversations ending in the sentence, 'You know what I mean' or variations on that theme. It is so common that the sentence is often reduced and shortened almost into one continuous sound.



This reduction of vocabulary, to the level where words have meaning only in context, is often taken to the extreme by including words that in other contexts are well-known swear words. Let me give you an extreme illustration.

The scene was a pine wood in northern Germany in 1951. There was an army exercise going on in which units of the British Army were pitted against units of the American Army. American armour was entering the wood at one end while, at the other, British infantry were hurriedly trying to vacate the place. We could hear the screech of the tank tracks becoming louder, but we were held up by our inability to extricate a truck towing an anti-tank gun from between the tightly packed tree trunks.

A sergeant driver was backing and filling his vehicle to no avail, until the axle of the gun became firmly fixed. There was no time to do any more as the American tanks drew closer. The Company Commander came running to find out the cause of the delay. In his bitter anger, frustration and utter humiliation, the sergeant came out with a shouted sentence that has long been engraved in my memory:

*Sir! The f---ing f---er's f---ed.*<sup>3</sup>

There you have it: the ultimate in Bernstein's restricted code. The sentence was full of meaning to those present, to those who shared the immediate context, but has no meaning at all to anyone outside that particular community.

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My Prof. and I in Newcastle reasoned that if someone was a member of a community in which the use of the restricted code was prevalent, he or she would be unable to see things from another's perspective and therefore would be unable to give satisfactory directions to a complete stranger to an area.

I tried this idea out on a pupil at my school in Billingham.

'Imagine', I said, 'that I am a visitor from a planet somewhere out in space.'

'OK, Sir!'

'Can you imagine that?' I asked him.

'Yes, Sir! No problem.'

'You're sure?'

'Yeah. Fine.'

'Right, then. Tell me how to get from the school gate to your house.'

'OK! You turn left at the gate and go as far as the doctor's...'



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Back at the Uni it was decided that I should compile a card-indexed set of such interviews (this was long before computers came into our lives), including map references of similar request for directions. In each case, I was to try to ensure that the interviewee was a member of a particular local community. The idea was that, once we correlated the answers with particular areas, we might be able to give numerical substance to Bernstein's idea.

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<sup>3</sup> [Sorry to be a censor here – family magazine, and all that! – Ed.]



Nothing daunted, I entered into the spirit of the enterprise with gusto and even 'broke my arm' for the cause. In those days the ultimate in miniature tape recorders was a cassette machine the size of a cigar case, with a microphone about the size of a cigar. This equipment had to be concealed. The recorder was slung around my back whilst the microphone was hidden by a mock plaster cast. The whole assembly was hidden by a duffel coat.

With this get-up draped around me, I paraded around various well-defined areas of the North-East. It was astonishing how many people could not express themselves well enough to give explicit directions to a complete 'stranger'.

Bernstein gained followers in many other parts of the world – his ideas had currency in the Spanish language in South America; in Russia, of course; and in many other language areas.

## Religion

A friend of mine retired from the oil industry in the Persian Gulf. After many years there, he could speak Arabic fluently. He went back there to visit his son, still working in the area (Abu Dhabi, I think it was), and attended two sessions in a local planetarium. One session was in English to a class of Indian boys and their fathers. This was followed by a similar programme in Arabic, when the audience contained Arabic boys with some of their fathers.

My friend noticed that the English version included a section showing the dust on the lunar surface on which were the boot imprints of the American astronauts.

What mystified my friend was that the Arabic version did not include that section. After the show, he asked the presenter why this was omitted.

'Oh!' said the presenter. 'That's easy to explain. The first time I showed a picture of the American astronauts on the Moon, the father of one of the boys came up to me in the middle of the show and smashed me in the face. In the darkness, the father was standing over me saying, "Mohammed was the only man from Earth to visit the Moon and he went there on his flying white horse."'

In the days of Shakespeare and King James I, there was a Protestant Bishop of Armagh called Ussher who took immense trouble with the Old Testament histories to calculate the exact age of the Earth. He used all the series of who begat whom and added them up. His date of 'Creation' was calculated as 'The nightfall before the 23<sup>rd</sup> October, 4004 BC'.

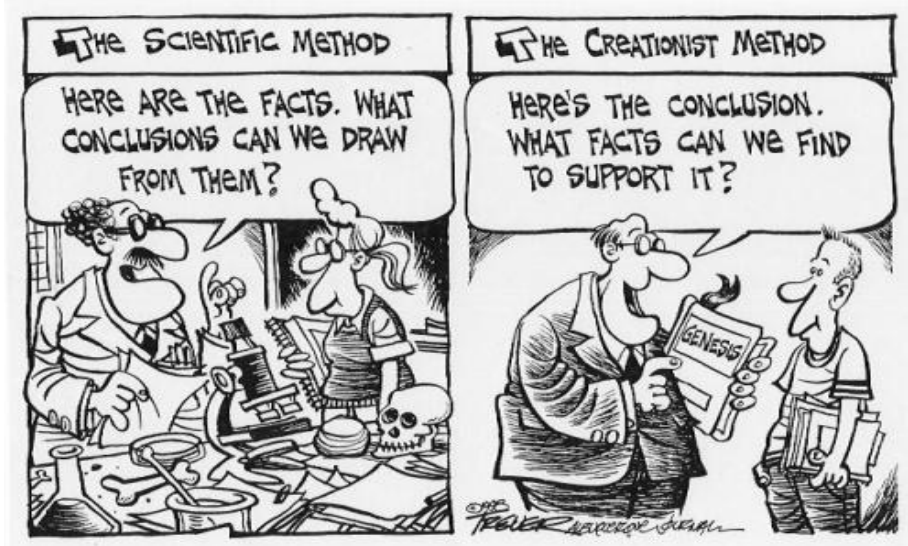
[This astonishing calculation](#) has caused reverberations through the ages. Ussher's dates were often included in editions of the King James Bible in English. They were even included in the '[Gideon Bible](#)', left in hotel rooms right up into the 1970s.

There is a very powerful movement of 'Creationism' all over the English-speaking world. In the USA its adherents are even framing laws that intend to allow Creationism to be taught in schools in direct opposition to scientific knowledge. This movement is gaining ground in Britain, and in the North-East there are several Academies in which Creationism is taught.

In a pub, I met a physics teacher from one such Academy. After quizzing him about what he taught, I took him to task.

'Listen!' he said. 'If they're willing to pay me extra money to teach this rubbish, then I'll do it.'

There was no answer to that.



## Fairy-tale science

One beautiful cloudless morning, I arrived with my dome at a primary school in a small West Yorkshire village. I set up the dome in the hall and opened a door to give a supply of fresh air to the air intake. There in obvious view was the Moon, sharply defined against the deep blue of the morning sky. When the dome was ready, I went to collect my first class, whose room adjoined the hall. The teacher met me with a welcoming smile and invited me to sit down for a couple of minutes whilst she finished her introductory quiz. There was some innocuous stuff, but what brought me up sharp was when she talked about the Moon.

'Now, children,' she asked, 'When do we see the Moon?'

'At night, Miss. The Moon comes out at night,' the children recited obediently, like a pack of zombies.

I reacted instantly and stood up.

'Would you excuse us, children, for a minute? I need to show your teacher something in the hall.'

Before she knew what it was all about, I got her out into the hall and immediately marched her over to that open door.

'Look up there!' I demanded. 'What do you see?'

'It's the Moon,' she replied, mystified by my attitude.

'But you've just told your pupils that it only comes out at night,' I said indignantly.

'Yes, but that's what they like to hear,' she explained.

I am afraid that I lost my temper with the lady, who happened to be the teacher in charge of Science in the school.

'Who wrote your Science text books,' I snarled, 'Enid Blyton?' I must have overdone it a bit because she looked shocked.

I calmed down a little and explained. 'Think of that boy who is sitting next to the window. He looks outside and sees the Moon and listens to you. You have just destroyed his notion of what Science is.'

## Conclusion

In our so called 'modern' society, we highly prize a mind that can apply analytical and forensic thought to a problem. We see this as a means by which our society or nation can compete in the modern world of technology. However, there are many amongst us who will never get their brains to take the necessary logical steps. I have listed some of the agencies that can cause this inability. If you know of others, please let me know.

With regard to teaching and learning about astronomy, formal education in mathematics is essential. However, before this can be accepted by the brain, it is essential that the person's social background must somehow have influenced a mindset that helps to develop a logical framework. There is a large section within our society that contains people whose brains (of demonstrable intelligence) can never accept what we like to call a scientific construction of concepts. As educators of astronomy, we have to keep our feet on the ground.

## Tailpiece

I belong to a club called the Hartlepool Retired Men's Forum. The membership is mostly made up of retired professionals, engineers, business men and similar people. I gave a short series of lectures there, each about an hour long, but, because my sight was limited, I offered no visual aids. The last one in the series was on the subject of light. As I moved along the historical framework, from the discovery of one concept to another, I presented all the logical steps, asking for questions along the way to clarify any particular point. Questions did not come, at least during the talk, but many followed when people got me in a corner later. I realised that nobody wanted to betray their lack of understanding in public. They were not children whose role in life is to ask questions. This audience included the like of former headmasters, doctors and so on. Some even arranged to visit my home and take up various points of discussion.

As I was being driven home, instead of being congratulated on the success of my talk, inside the car all was silence. My impatience won and I finally asked what the others thought about the talk. They were a bit embarrassed, but the consensus was that I had 'gone on a bit'. When the other passengers had finally been delivered home and I was left with the driver, the conversation turned to the fact that I had been suffering with cramp in my left leg.

'Oh!' he said. 'There's no need for you to suffer from cramp ever again.'

'Why is that?' I asked innocently.

'No,' he answered. 'All you have to do is sleep with a new bar of Palmolive soap under your pillow.'

He was absolutely serious.



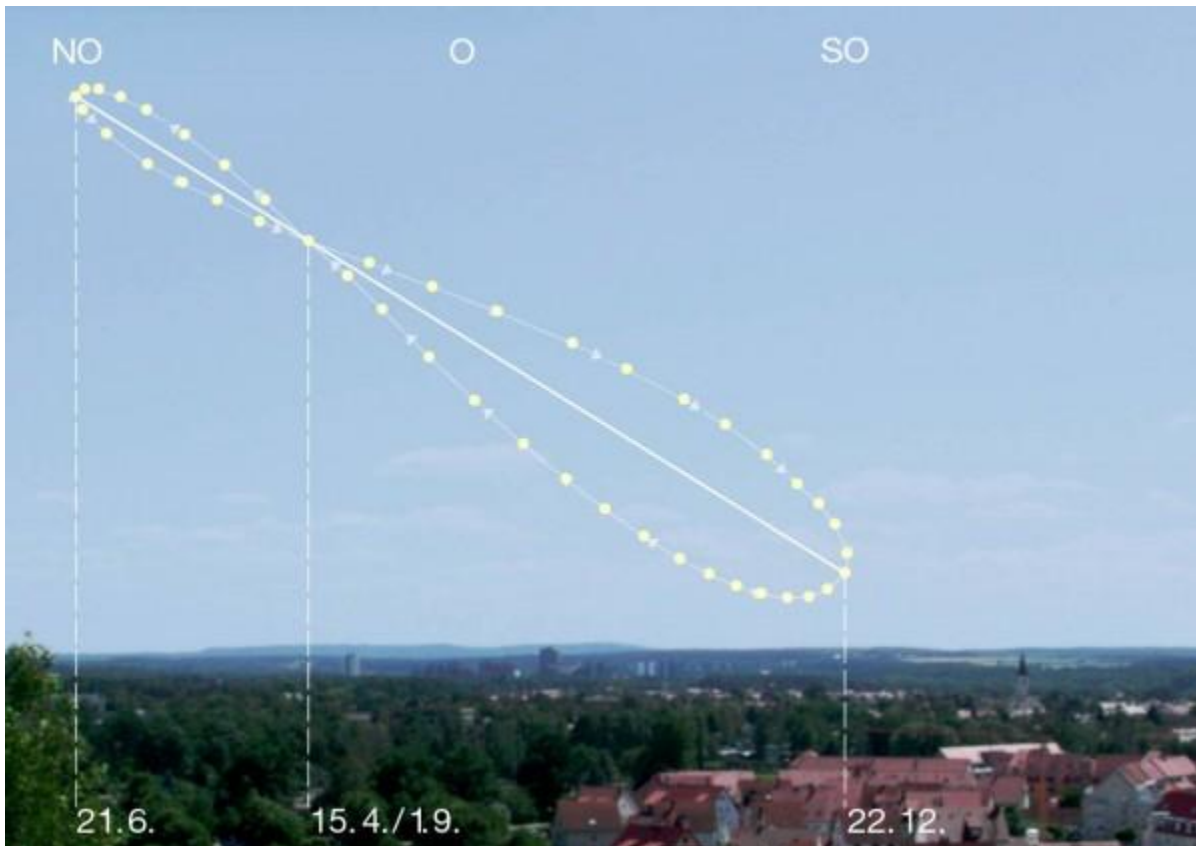
## Another analemma

John Crowther

The July 2007 issue of *Transit* had on its cover a coloured picture of an analemma over the Ukraine. (So yes, I do keep my old issues of *Transit* – well, some of them ...) Here's the explanation from inside that edition:



*If you took a picture of the Sun at the same time each day, would it remain in the same position? The answer is 'no', and the shape traced out by the Sun over the course of a year is called an **analemma**. The Sun's apparent shift is caused by the Earth's motion around the Sun when combined with the tilt of the Earth's rotation axis. The Sun will appear at its highest point of the analemma during summer, and at its least during winter. [Vasilij Rumyantsev – Crimean Astrophysical Observatory]*



Here is a further comment. To capture your own analemma seems simple, but it needs both patience and sunny days. The Sun has to be photographed at as many middays as possible, and its track as seen from the Earth (with its constant tilt of  $23.5^\circ$ ) can then be seen projected onto your sky.

In the Southern Hemisphere the analemma is (to us) reversed. So the year turns at midsummer-December and is at its lowest during the June solstice.

The Roman midwinter feast of the Unconquered Sun was transferred by the early Church to mark Christmas and the feast of the Unconquered Son. We can see that this would not have had the same resonance if Christianity had developed first in the countries of the Southern Hemisphere, for there the Sun begins to *descend* after Christmas.

## THE TRANSIT QUIZ

### Answers to December's quiz

*Every answer to the descriptions below starts with the letter 'A'.*

1. Beta Cygni, a beautiful orange/greenish-blue double star. **Albireo.**
2. Alpha Hydrae, which is in a region with no other bright stars nearby, hence its name, Arabic for 'The solitary one'. **Alphard.**
3. The point in a body's orbit around a star that is farthest from the star. **Apastron.**
4. Twentieth-century American astronomer best known for his catalogue of 2712 galaxy clusters. **George Ogden Abell (1927–83).**
5. A close approach in apparent position in the sky between two celestial bodies such that they appear just to touch. **Appulse.**
6. Modern name for what were once thought to be different phenomena: Seyfert galaxies, quasars and BL Lacertae objects. **Active galactic nuclei (AGNs).**
7. The English mathematician and astronomer who would have beaten Le Verrier to the discovery of Neptune, had he and the Astronomer Royal of the day (another 'A!') paid each other proper attention. **John Couch Adams (1819–92). The Astronomer Royal was George Biddell Airy (1801–92), who did very many excellent things, but not on this occasion...**
8. A joint undertaking of the SETI Institute and the University of California at Berkeley, and formerly known as the One-hectare Telescope. **AllenTelescope Array.**
9. A class of asteroids (one member is Toutatis, which passed only 0.046 AU from Earth on 12 December) with orbits that cross that of the Earth and with orbital periods longer than one year. **Apollo asteroids.**
10. A class of asteroids (Eros is a member) that approach but don't cross Earth's orbit but have a perihelion distance of no more than 1.3 AU. **Amor asteroids.**



## January's quiz

Every answer to the descriptions below starts with the letter 'B'. (You may dimly discern a pattern to recent quiz questions, starting with December's ...) The first five are objects in the sky; the second five are the names of astronomers (do you know more than their surnames?). Each sub-section is in rough order of increasing obscurity.

1. Another name for Praesepe (M44), the bright open cluster in the constellation of Cancer (see below)

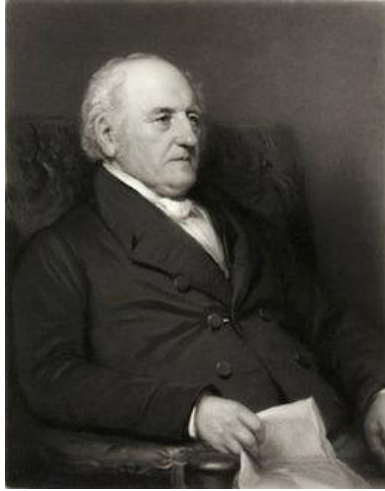


2. Another name for Gamma Orionis, derived from a Latin term for 'the female warrior'.
3. Another name for M64, a spiral galaxy in the constellation of Coma Berenices (see below, left).



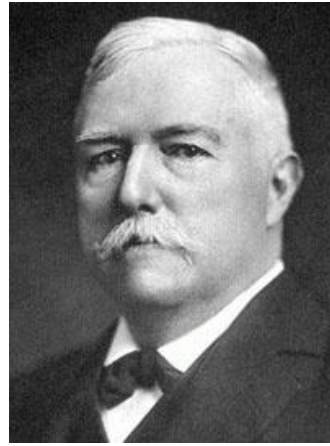
4. Another name for M6, an open cluster in the constellation of Scorpius (see above, right).
5. Another name for T Coronae Borealis, the brightest-known recurrent nova.

6. The inventor of a lens that many of us use in conjunction with a standard eyepiece to increase the magnification, usually by 2–4 times (*see below, left*).



7. The first person to measure stellar parallax (of the fast-moving star 61 Cygni). (*See above, right.*)

8. The first person to resolve stars in the Andromeda Galaxy, and to discover that there are two populations of Cepheid variables (*see below, left*).



9. The discoverer of the last planetary satellite to be found without the aid of photography, and who was also the discoverer of dark nebulae (*see above, right*).

10. The first person to photograph a star (Vega, in 1850) and the first to image a double star (Mizar, in 1857).

