

IMO 2014 - Deputy Leader Report

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Abstract

This report describes the events of the 55th International Mathematical Olympiad, held in Cape Town, South Africa, June 29 - July 13, from the point of view of the UK team. This report originally appeared in four instalments, with pictures, on the author's blog¹.

Sunday 29th June

This year's IMO delegation gathers at Heathrow Terminal 5. Freddie and I have booked a cab from Oxford, for ease of moving the boxes of team uniform, this year all lovingly adorned with the logo of our new sponsors, Oxford Asset Management. In any case, the M40 is unprecedentedly rapid and we are embarrassingly early. Fortunately, everyone else has also erred on the side of caution and we are able to saunter through security with plenty of time. My bag is pulled aside to be searched. I am asked to demonstrate the use of a tuning fork. I don't know how this item ended up there, but I perform the task with relish. It's been a long day, so opt for 220 rather than 440Hz. Worcester College Choir, starting a recording of contemporary Christmas carols today, will I'm sure vouch that this is preferable for the general public's aural welfare. We learn that though some of the team lack virtuosic chopstick skills, they are unfussy, and able to make it to gate B35 without the slightest danger of passport loss. All bodes well for an excellent trip.

Monday 30th June

The flight proceeds smoothly. For complicated reasons I am registered on a different booking so am sitting slightly apart from Geoff, Jill and the team, so am not involved in the discussion of past IMO shortlist problems and unusual sleeping positions. Everyone seems fairly refreshed as we negotiate customs and are met by a small group with smiles and IMO 2014 welcome boards. Our journey through town affords glimpses of the contrast in wealth across Cape Town, but our guesthouse in Rondebosch is extremely pleasant,

¹<http://eventuallyalmosteverywhere.wordpress.com>

both for the inviting beds and its picturesque setting at the foot of Table Mountain. The Australians have arrived just before us; old friendships are renewed and new introductions made.

The Hussar Bistro at the corner of the street promises the best steaks in Cape Town (awarded in 2012), and the party of 22 dines for less than £70. Everything is indeed excellent, and comes with unprecedented volumes of creamed spinach. Feeling the need for exercise, the teams climb the 160-odd steps to the maths department at the University of Cape Town, past what is probably the most attractive campus facade in the world, before heading further uphill to the memorial to Cecil Rhodes, which in its neo-Grecian extravagance bears a noticeable resemblance to Rhodes House in Oxford. Undoubtedly a man who still divides opinion, but the views through the columns down towards the city, the distant mountains, and two oceans are stunning.

Dinner at a nearby Thai restaurant offers similarly remarkable value. My penance for joining an adults table is to be referred to as ‘the young man’ by all the staff. I regret asking for my Pad Thai to be hot. I can barely feel my lips. Lesson learned.

Tuesday 1st July

Yesterday’s balmy 23C conditions had lulled us into a false sense of security. It is very much winter here, evinced by our walk through the darkness to start our first training exam at 8am up at the maths department. No-one takes advantage of the chance to ask silly questions. Perhaps they are saving it for the IMO proper?

The UK team have made a promising start. The first question exposes their inexperience with undergraduate-level analysis, but there’s some particularly good stuff from Joe and Freddie on the hard second and third questions. We had planned a trip up Table Mountain, but the weather has turned, and with the prospect of gales and zero visibility, unsurprisingly the cable cars are not running. Instead Geoff and I wait at an imaginary bus stop, later transferring to the real version across the road, before getting down to some serious marking.

A debrief with the team follows, where outstanding arguments are praised, and questionable logic is ridiculed beside the pool. While it is easy to jest about such matters, at the actual IMO, the coordinators will not have much time to look at each script, so it is very much to the candidate’s advantage to make it as intelligible as possible. Later, perhaps in homage to Euler, the team develop a very strong attachment to Switzerland, and are thus gutted when Argentina score with 3 minutes left in extra time. They vow to reserve their energies for affairs of the mind.

Wednesday 2nd July

An early start for our second exam morning. Geoff says goodbye before he is whisked off to a mystery location to join the other leaders and start the important task of selecting from the shortlist of problems. This leaves time to transfer across the city to Tafelberg Road, and the cable car station serving Table Mountain. Even during this short and uneventful journey - standards of taxi driving are evidently much higher here than last year in Colombia - the weather turns, and the wires disappear shortly above the base into the thick cloud, known for obvious reasons as the 'tablecloth'. As a result, the view from the summit is rather disappointing, reminiscent more of Victorian London than the glorious vista promised by the postcards.

At least there is a option of a bracing walk around the plateau. While it certainly isn't precipitous, anyone expecting a pancake-flat summit is in for a surprise. The fetching and distinctive rugby shirts are useful for identifying the UK group wending their way between the rocks through the mist. The team discuss how close to the edge is too close to the edge. There is, after all, no injury that a pocket first aid kit cannot fix. Even on a cloudy day, there might still be a chance to see the 'dassies' - essentially glorified rats (and slightly more suitable for representation as stuffed toys) that live on the plateau. Mike Clapper announces the implausible fact that they are most closely related to the African elephant and various eyes are rolled. Shortly afterwards we see several information boards announcing this same fact and the eyes are unrolled, though we do not in fact see any dassies today.

In fact today's South African wildlife experience is entirely gastronomic, as in the middle of an evening/night marking session I get a chance to try Kudu. Leaving aside my short-lived embarrassment at having inadvertently asked for Kobo, this is excellent, with the game quality of venison but the rich tenderness of beef. Marking even Harvey's elegant but mysteriously multi-coloured solution to the twisty Q2 is much more tolerable afterwards, and when I finish at 10.30pm the team demand an instant debrief and discussion of the problems they want to set the Australians. I just hope this enthusiasm is not entirely a function of the rest day in Brazil...

Thursday 3rd July

Now that there is less compulsion to be rushing away, we decide to start the exam at the more civilised hour of 8.30am. Angelo, the Australian leader, decides it will be minimally confusing to set the giant clock in our exam room to start at 9am, as it would in the IMO proper. The UK team have spent some time over the past few days discussing when and whether various functions attain their minima, and I feel this may not be a good example. Q1 is found rather easy, Q2 is found very difficult, and only Gabriel has the courage to

cut his losses and move on, and provides a beautiful proof of the combinatorial Q3. The prize for most effortless solution to the inequality goes to Frank. Warren wins the prize for geometry rough work closest to getting a pity mark, but does not in fact win a pity mark.

At least it makes grading rather straightforward, leaving time to accompany some of the UK and Australian team on a walk beyond the university up the side of Devil's Peak. Jethro, the hotel's German Shepherd, described in the guidebook as 'a teddy bear with boundary issues' has taken a strong liking to Joe, and seems reluctant to allow him to leave and roam loose on the mean streets of Rondebosch. Once we've negotiated this amusing (to everyone else) hurdle, all goes smoothly, and the glowing pink sunset on the trek down is more than worth the energy expended. I make arrangements so that the team can watch France-Germany over dinner, and in fairness they are unfailingly polite in letting me know that the match is not in fact until tomorrow. I feel I am ill-qualified to choose toppings for a set of twelve takeaway pizzas, but am reassured by everyone that the decision to avoid bacon and banana is a wise one.

Friday 4th July

To introduce some novelty into the daily routine, today the UK team has chosen three questions for the Australians to attempt, and vice versa. They will then have to mark the solutions, and co-ordinate these marks with Andrew, the Australian deputy, and myself. The first round is straightforward enough, once we have found a room for the task that is not playing host to an angle grinder. The Brits have chosen questions which will be easy to mark, so perhaps they do not get as much out of the exercise as they might have done, but it is nonetheless useful to see how other people like to write up ideas, and also to feel what level of rigour is easiest to follow critically. There are more difficulties with the reciprocal arrangement, as the questions are more fiddly, or at least have more cases, and some of our students seem to have relished the opportunity to add elements of mystery to their solutions wherever possible.

Meanwhile it has been pouring with rain outside all afternoon. It is nice to learn from the ITV commentators that not only is it 35C in Rio but that the weather is also lovely all across Northern Europe. All is well though: we have tea.

Saturday 5th July

If this were the Ashes proper, the swing bowlers would be licking their lips in anticipation of starting soon after an early lunch. In the Mathematical Ashes, no such quarter is given to the weather, and both Australian and UK teams brave the pouring rain up the hill to start our final training exam on time. Of course, this exam has extra bite, as the results

will be published on Joseph Myers' website and to the winner will be the spoils. In this case, it's a brass urn filled with the charred remains of some geometry circa 2008 from my second IMO in Madrid. As a sign of colonial arrogance, or perhaps because BA has an upper bound on baggage mass, we haven't brought the trophy this year from UKMT towers in Leeds, so the team have the added pressure of avoiding an embarrassing and expensive (in postage terms) turnaround.

I've decided to rewrite Q2, which features a 'crazy scientist' investigating something which looks almost exactly in everything except name like a finite simple graph. It seems simpler to call it a finite simple graph, and give a name to the crazy scientist. In any case, I have to mark this question, and it turns out to be the deal-breaker, with beautiful solutions from Joe, Warren and Harvey taking the UK to 59 points to Australia's 50, despite an outstanding 21/21 from AUS1 Alex Gunning. A small wager once again rides on how long will elapse between emailing Joseph Myers, and the result appearing on the BMOS website. Standards are slipping clearly, as the interval is greater than five minutes this year, though substantially less than ten. Rather than basking in their success, the UK team are keen to spend more time discussing esoteric Euclidean geometry. The hotel's blackboard proclaims the proverb of the day as "Wanting to be someone else is a waste of the person you are," but it seems that the over-arching thought for the day here is "no famous triangle centre lives on the inner Soddy circle." Famous last words.

Sunday 6th July

The UK IMO delegation has a rich history of incompetence regarding accommodation, and it is reassuring to learn this morning that these traditions continue to flourish. Harvey and Frank learn the hard way that 15 minutes before check-out time is the maximally inconvenient time to lose your room key. I await with keen anticipation the email from reception telling us they found it down the back of someone else's sofa. Today we are moving from our guesthouse to the IMO itself, a 400m walk down Rondebosch Main Road. A patch of pavement along the way described by Geoff as 'literally impossible for suitcases' turns out to be literally possible for suitcases, but otherwise this is an uneventful final leg of our journey, at least relative to the dozens of teams flying into Cape Town from all over the world this morning.

Once at UCT's residence towers everyone receives a goodie bag of programmes, umbrellas and IMO stationery, and a room. Apart from Frank, who merely gets a goodie bag. In the end everyone gets a bed on which to relax and examine their loot. I've got the sub-warden's room, which appears to mean nothing apart from having a kitchen sink rather than a bathroom version, and having a view inwards rather than towards the mountain like the students on the other side of the building, which, incidentally, is shaped rather like the emblem of the Isle of Man.

It also becomes clear that this is going to be the week of the thousand sleeveless sweaters, which given the temperature in the rooms may be getting more use than planned. We see the signs reminding resident undergraduates to bring a heater and laugh coldly. Our guide appears to be indisposed, so senior guide Julian offers to take us for a short tour through part of central Cape Town. Highlights include the exotic trees and attention-seeking squirrels in the Company Gardens, and a market mainly featuring African curios, selling more exorcist masks than you could shake a stick at.

I go for a run round the campus, and fall down a very small flight of steps after being distracted by a flock of ibis and Egyptian geese. They continue to cackle at my misfortune, but I nonetheless return in time for the essential tour of the dining area. Frank and Gabriel seem highly enthused by the volumes of mayonnaise available. No other enthusiasm is visible except for the end of the Wimbledon final, and the possibility for several rounds of bridge, alternating with attacks on past shortlist problems. Gabriel's and my bidding patterns might charitably be described as unconventional, but seem to work surprisingly well together. More relevant intellectual challenges await though, so it is an early night all round.

Monday 7th July

It's the day of the opening ceremony, and there seems not to be much going on for the students around the accommodation sites, so rather than sit around feeling nervous, we decide to tackle another mountain. I remain unconvinced that the so-called Lion's Head looks like its name, no matter how much further the analogy is taken by references to Signal Hill, home of the famous midday cannon blast, as the flank and tail and so on. Led by Joe and his freshly acquired Duke of Edinburgh Bronze award skills, this climb is extremely pleasant. The panoramic views from the top over the peninsula, the bays on both sides and Robben Island more than reward our final rocky exertions and make up for the disappointment of the cloudy visit to Table Mountain last week.

Reinvigorated, it's time for sitting around and listening to speeches as we are transported en masse to the upper campus for the opening ceremony. While no-one could accuse the Minister for Education of including insufficient detail in her address, and a bit less amplification for the drum troupe and the operatic tenor singing the national anthem might have improved both, this was excellent by comparison with the norm. The decision to hire a professional compere was a wise one, as he riffed effortlessly through what might have otherwise been awkward moments, including the heckling of the vice-chancellor's speech from the chandeliers by a small flock of starlings.

Also novel was the plan to dispatch the procession of teams based on the order in which they first competed at the IMO. For once this meant the UK got the chance to catch the

eye early in proceedings. As the first team to throw gifts² into the audience along with Gabriel's second year in a row of successfully bearing another team member round the stage on his shoulders, this was a triumph in every regard. Breaking up the procession at the halfway mark with a circus performance also worked very well, though one could feel the visceral clenching of 1200 buttocks when it became clear the mime artist was indeed going to choose a pair of contestants for audience participation. Geoff gives the team a cheerful wave from the upper balcony. This is initially misinterpreted as a triangle, leading to confusion about whether this is a Masonic greeting or merely a hint for the geometry component of the exam.

Tuesday 8th July

The team avoid the nervous chaos of a mass bus ride, and instead opt to walk up the hill to the sports hall which will be the site of the exams. Spirits seem high and there is evidently no need for a rousing team talk. After all, if you're not feeling up for the IMO at the start of the first paper, at least you have 4.5 hours to increase your enthusiasm. Other countries seem to be having grave difficulties finding their desks but the UNKs are giving off confident signals by passing this first task, even though Warren and Frank's desks are not labelled. As a pleasant novelty, the guides and deputy leaders are allowed to sit in the tiered spectator seating and observe the lead-up to the start of the exam. As a less pleasant novelty, they are allowed to stay there even after the start of the exam, though some people are openly chatting within a few metres of the contestants. Eventually the call to act like adults and leave in silence is made, and the serious business can begin.

It becomes apparent that the deputy leaders are not going to be given copies of the paper. Some take this opportunity to become extremely angry indeed, but it seems like less effort to go for a run up the mountain to the King's Blockhouse, an old armoury and cannon installation towards the top of Devil's Peak. On the way back, I pass by the exam hall again and count at least three unlocked side doors into the gallery. Of course this is being patrolled intermittently by invigilators so poses no real security risk, but I can nonetheless see some of the UK team, and they are indeed wearing all the layers which Jill and I had previously nagged them to bring.

Afterwards, I have the luxury of a 30 second glance at Freddie's paper³ before starting our informal debriefs. Everyone reports the same outcome: a) it was really cold and b) they thought Questions 1 and 2 were really easy and couldn't make progress on Q3. There is discussion of whether a floor symbol in the wrong place⁴ is likely to be heavily penalised. I reassure them that it obviously will not.

²Surplus IMOK 2013 keyrings, before you ask.

³Questions can be found in several places, including <http://bmoc.maths.org>.

⁴For example: $k = \lfloor \sqrt{n-1} \rfloor$.

Rather than soak up the purgatorial air of the student residence all afternoon, we head off to the nearby Kirstenbosch Botanical Gardens. Highlights include the Protea plantation, a roosting pair of lesser spotted owls, and the canopy walkway, though Jill's enthusiasm visibly dampens when a group of American tourists match step and kickstart some interesting resonance phenomena. 18 year old Gabriel particularly enjoys the sign banning children from chasing the guinea fowl. Three guys try to commandeer our taxi home, and awkwardness follows when it becomes apparent that they are coordinators, whom we definitely should not be meeting until after the exams. In any case, we keep our taxi and arrive back in time for a lengthy discussion predicting the composition of tomorrow's second paper. The team suggest that every IMO must include a functional equation, but the stronger statement that every set must include a functional equation remains open.

Wednesday 9th July

We repeat yesterday's operation, sending the team up the hill with best wishes, but today I diverge for the deputy leaders' excursion to Cape Point, organised at the last-minute by our relentlessly energetic senior guides Robyn and Justin. Highlights of the trip include seeing a herd of eland and a baboon in the national park and the walk down to the lighthouse marking the southernmost point in Africa. Well, in fact it turns out that Cape Agulhas, about 50 miles away, holds that title but that doesn't diminish the experience. All the while, our guide Rhonda holds everyone's attention with the account of her family's life through recent South African history on the Cape Peninsula.

It becomes apparent that some of the other DLs do that share the constraint that we need to return in time for the end of the exam, as had been promised before departure. A battle of wills develops regarding whether to stop at the Cape of Good Hope for a photograph. My will wins. Nonetheless, by the time some members of the delegation have finished smoking and purchasing postcards, we are against time, and I end up having to catch up the UK team walking home across the rugby fields. They have enjoyed the geometry Q4, and have a mixed take on Q5. The range of speculative noises being offered suggests I may have a long night ahead.

Meanwhile, Geoff returns from the top secret leaders' hotel, the location of which was revealed merely three times this year. We exchange news then proceed to a preliminary glance at the scripts. Some things seem good, some things seem unconventional. After dinner, I brave the frozen wastelands of my room and start a more detailed analysis. Q2 is going to be a fight. I really need to talk to Harvey, and not just to let him know that there's no 'd' in 'Pigeonhole Principle'. Anyway, he and the rest of the team are stuck behind about 400 contestants watching the World Cup on a small TV, but I bide my time and catch the moment when Holland miss the first time to snake through and perform my interrogation. A few minutes later, we confirm that Harvey's coin has indeed been

wrong about the outcome of the past eleven matches. The Germans and Argentinians will be queueing up for a viewing faster than you can say ‘independent and identically distributed’.

Thursday 10th July

At last year’s IMO, a discussion arose concerning which of the seven members of the UK delegation at lunch was most likely to be the deputy leader. I placed rather low down the list. Despite the fresh-faced nature of the 2014 team, I’m taking no chances this year and now have a fairly full beard. However, today we have the first of our meetings with the coordinators to agree the UK team’s marks, and it may be necessary for Geoff and I to play good cop/bad cop. I prefer to play bad cop and feel this is a role best approached clean-shaven. In any case, there is a clash of timings so after signing for a vector of zeros on Q6, I end up playing solo cop on Q2.

We start with Frank, who has tried to prove something more general in one place, which is unfortunately false, but would be true in the special case. He then uses this in the second part of the problem, referencing the false bit, but using only the bit which is actually true. His habit of putting bold circles round sections he thinks are dubious is heart-warmingly honest, but I wonder whether it might have made more sense to use the time at the end of the exam to un-dubify them, rather than operating a series of nested postscripts? In any case, rather by an accident of the markscheme, we are offered 4, which is what I was hoping for, but definitely more than I was expecting. We agree a 7 on Warren’s solution, and after coordinator Robert dramatically waves a diagram of a common counterexample to Harvey’s final argument at me, we agree a 5 for him.

The others are more tricky. Joe has done both parts of the problem fundamentally correctly, but has written down the final answer incorrectly. Since this step is genuinely trivial, it seems harsh to dock it a mark. Especially since the coordinators didn’t notice until we pointed it out to them. Hopefully this should be squashed overnight, though ultimately it is likely that several students will have done this, so consistency is all one can ask for. In any case, I regret my cavalier assurance straight after the exam. Freddie is offered 7, but also has a tiny mistake that they have not noticed. In fairness to them, this is very hard to spot, with the construction of an extra point in an extremal argument failing only in the case $(2, 2)$ out of $[1, n] \times [1, n]$, but they insist it has to be a 6. Coordinator Santiago reminds me that a proof is not a proof if it contains a mistake. This is a true statement. We will reconvene tomorrow.

The team have got back from their own excursion to Cape Point and seem to have enjoyed themselves, even the extended musical lunch. It would be nice to be able to give them more information about their marks, but they will have to bide their time. Perhaps in

preparation for IMO 2015 in Chiang Mai, we return for a fifth visit to the Thai Cafe in Rondebosch where both sides give a fuller exposition of their activities during the day. Afterwards, I see the team appropriating one of the giant Google cubes that have appeared round the site. They reassure me that they are still taking the kleptomania medication, and in fact intend to use it to distribute the UKMT playing cards as gifts to the other contestants.

Friday 11th July

Again I spend much of the night wading through slicks of combinatorial vomit, now including Q5, perhaps ambitiously described as number theory. After Geoff gets exactly what we want on Q1 and Q4, I'm raring to go for an early fourth session on Q2. The French leaders have a student in a similar position to Joe and have threatened to take his case to the jury. They get the extra mark, and in the spirit of Agincourt and Trafalgar I'm only too happy to coast in on their wave. Gabriel, from whom there were plans to drop two separate marks for the same mistake, gets his 6, and after successfully countering yesterday's counterexample, so does Harvey. Freddie's appears to be still under discussion, and I find myself saying "With respect..." several times, before it transpires that actually they are trying to offer 7, which of course we take. While it's easy to criticise, I should emphasise that this question a) was an absolute nightmare; b) had a harsh markscheme, but this was certainly consistently enforced; and c) ultimately if the students hadn't made mistakes none of this would have been relevant. Our coordinators knew the scripts well, were reasonable and fair, and I can only imagine how difficult it must be to do it all over again in Uzbek.

Question 5 proceeds much more smoothly, starting with our observation that Warren's script looks identical to the official solution, including the location of the page break. He and Harvey get 7s with no real debate, and after a brief examination of the Chinese characters in Frank's rough it turns out we are in agreement on the other four marks too. This was a very well-constructed markscheme for part marks. It is sensible to be both generous and sub-additive and it felt like there was not much room for ambiguity, though I'm glad we didn't have any almost-complete solutions.

We are finished rather earlier than expected, with a nice bunch of scores between 20 and 28, and a team score of 142 looking likely to place the UK in the high teens. This is a strong team performance. The 'easy' questions⁵ 1 and 4 have been dispatched and we have scored well compared to other similar countries on the medium questions. This is what we train for, and it is excellent to see it bringing rewards. Our younger students will have more practice and experience and will earn more marks on the hard questions in years to come. In any case, Geoff and I are very pleased. I am thus able to join the team for a second,

⁵Of course, this is relative.

sunnier attempt at Table Mountain. I arrive in time to see the end of the team's latest instalment of 'play a round of bridge in unusual places', and even get to see a group of dassies sunning themselves on the cliff edge. Some of the group are tired or nervous about medal boundaries, but the remainder head for a walk to Maclean's Beacon, the highest point on the summit. It goes without saying that the views were beyond comparison.

After seeing the eland on Wednesday, I feel obliged to branch out and try one of their steaks, but in fact the kudu was marginally nicer. Marginals are up for grabs after dinner, as it's time for the final jury meeting, featuring the confirmation of UK as host of IMO 2019, and the all-important medal boundaries. First there is discussion of various administrative matters, and thanking various people involved in the five official languages. There are long delays while the microphone is carried round the room. Geoff makes several speeches. For these the lack of microphone proves no problem. Eventually the flashy software brings up the crucial bar charts, and the boundaries are decided. A decision has to be made about whether to award medals to 47% or 53% of contestants. Either way, the boundaries are lower than I had expected, leaving us with 4 silvers and 2 bronzes. It is a shame for Frank and Freddie to miss out so narrowly, and perhaps a surprise for Warren that he ends up only one mark off a gold, but of course these things will happen, and it is no reason not to enjoy the festivities into the night.

Saturday 12th July

While the previous night featured slicks of mathematical vomit, last night offered a digression onto genuine vomit. No hard feelings Joe. We're now even given that I hit him over the head with a punt paddle the first time we met. I have too many spotty socks anyway, and certainly couldn't have dealt with another night of combinatorics. While he sleeps off whatever it is he's caught, Jill and I get mildly stressed, and the team head off on an excursion to the Waterfront. Free entrance to the aquarium is by some margin the best feature, with a remarkable collection from both the oceans that converge on the Cape Peninsula. The team debate whether the Coriolis effect or some form of social self-reinforcement process is responsible for all the fish swimming clockwise⁶, while they play yet another round of bridge⁷ in front of the shark tank. Geoff makes the mistake of offering to wait for us while we obtain lunch, in a further demonstration that South Africa doesn't really understand the first word in the term 'fast food', while Gabriel wants me to verify that a watch he's planning to buy is genuine. I feel there do exist things which fall outside the deputy leader remit.

I'm definitely catching Joe's affliction, so I sleep while the team get ready for the closing ceremony. By the time I wake up, the Google cube is already dressed in the Union Jack,

⁶It's definitely not the Coriolis effect.

⁷Four clubs; one overtrick.

filled with the fetching playing cards, and providing everyone with a good core workout as they manoeuvre it onto the bus. I enjoy what I see of the closing ceremony, in particular the excellent and strident youth choir. No mewling Anglican tenors on show here. A traditional ‘praise singer’ comes onstage and shouts about maths for about three minutes, which is less impressive, but equally entertaining. Our master of ceremonies returns, wearing the exact chromatic inverse of his outfit at the opening ceremony, and guides the medal presenters and recipients through their steps. Initially this is tricky, as there are substantially more bronze medal presenters than room on the stage.

The UK team are consummate professionals of course, managing the task (found tricky by many of their competitors) of getting the medal in front of the flag, and orienting the latter correctly. Harvey positions himself well so gets his medal presented by Geoff. Gabriel does not position himself well, so disrupts the linear ordering to get his medal presented by Geoff. Photos are taken in huge quantities. The team’s plan to distribute the cards to contestants as they leave the stage is to my astonishment a) working and b) not hugely annoying the organisers.

I make a brief run down the mountain to check on our sleeping silver medallist. On returning it seems the organisers are grateful for his absence, as they ran out following the unexpected boundaries, evinced by Warren’s prize, which does indeed appear to be a spray-painted bronze. I have missed Geoff being presented with a vuvuzela in recognition of his maximally numerous contributions to the jury. Like a toddler on Christmas morning, I suspect his new toy may ‘get broken’ at some point fairly soon. This is more of a reception than the usual sit-down affair, and the remainder of our team seem to be happily mingling, so there is time to say all the requisite goodbyes, and reflect on an excellent competition. Gabriel chooses 12.45am as the moment to ask US leader Po-Shen the question about probabilistic combinatorics he’s been brewing all week. Let it never be said that social convention stood in the way of good mathematics.

Sunday 13th July

I need to be in France, and Frank needs to be in North-East China, so we are leaving earlier than the rest of the group. Joe appears to be operational again, and receives his silver medal in front of a small but adoring crowd at breakfast. Muffins are again served with grated cheese, goodbyes are said, the final Rand are changed back, and we are off.

My journey to Paris via Dubai was highly unpleasant, and my view of the Emirates was mainly through the bottom of a paper bag, so I won’t dwell on that at all.

Conclusion

What I should dwell on is what an enjoyable year and an excellent IMO we've experienced together. I understand why peers and colleagues might well ask why I choose to come to the olympiad rather than take a conventional holiday, but this was a great event to be a part of, and a great group of people to travel with. I hope I've given a flavour of the students' enthusiasm for problems in this report. It was entirely infectious, and we of course enjoyed all the other possibilities which two weeks in Cape Town offered us.

For me, there was a particularly pleasing cyclicity to lead a team at the IMO including Freddie and Gabriel, who were junior students at the first summer school I taught at. They and Frank have been entirely excellent people to know over the past few years, proving exemplary models to their younger colleagues both mathematically and generally. We will miss them as students, but equally look forward to working with them as colleagues in the future, should they wish. While we missed the starry heights of 2013, this was nonetheless an excellent team performance, and with young team members, young reserves, and plenty of talented and keen students getting involved at all levels, the future seems bright for UK mathematics. I hope that our activities through the year to come will be as enriching for everyone as it has been in 2014.