Y2OR AUGUST 2014

LOUISE MAYNARD-ATEM

Steve O'Donnell shares his early recollections with us this month from almost 30 years ago. I hope you will enjoy reading as much as I did; it is a great example of the wide-reaching scope of O.R. If you would like to provide a contribution to this series then please don't hesitate to get in touch with me – regardless of what stage you're at in your career, sharing your experiences is extremely valuable to fellow members and it is unlikely to do your own career any harm.

This month also sees the final problem in the 'Problem Page' series so for those of you who have sent into solutions to the four previous puzzles then you've reached the last hurdle, and for those of you who've yet to send through a solution then go ahead and give it a go before the solutions are published next month.

My First Project – Steve O'Donnell

My first project was a rather glamorous one. I started work for the Scientific Research and Development Branch of the Home Office in 1985 in a team which did projects for the police service. I found myself in an O.R. team working on a project evaluating the use of aircraft by the police. In those days only a handful of forces used aircraft. Never mind the O.R. techniques we used; the thing about this project was we obviously couldn't evaluate police aircraft without getting flights in them. I had several flights in a variety of helicopters. I have vivid memories of a low level flight along the Devon coastline (over nude sun-bathers). There was another flight over central London where I discovered I wasn't actually a terribly good flyer. Luckily Police helicopters come with sick bags, and lots of them.

And then tragedy struck. One of our trials involved an aircraft with a revolutionary design – The Edgely Optica – a fixed wing aircraft with the big bubble-fronted cockpit you see in some helicopters. This gave considerable all round visibility, far superior to what you normally have from the cockpit of a fixed wing aircraft. The Optica promised the visibility you get from a helicopter with the considerably cheaper costs associated with fixed wing aircraft. But on 15th May 1985 the Optica while flying on one of our trials crashed, killing the pilot, and his passenger. Suddenly the world of work started to seem serious; deadly serious.

Perhaps surprisingly our trials of police aircraft continued after the tragedy. To be O.R. technique-oriented, we were doing something vaguely resembling cost-benefit analysis and multi-criteria decision analysis. But the most useful contribution I think I made, was to work out how to compare the comparative search efficiency of police helicopters, fixed wing aircraft and foot-based ground-searchers. The idea was simplicity itself. Identify a sizeable area of land in a remote location: I settled on the New Forest and Cannock Chase. Tell the searchers (who might be in an aircraft or on foot) this was an exercise where an aircraft had exploded in mid-air scattering bodies over a wide area. Their job was to search a designated area of approximately a square mile, in which there was an unknown number of bodies, until they were satisfied they had discovered all the 'bodies' to be found. The bodies were in fact sheets of black plastic with white identifying code letters on them. I placed out the bodies in the remote locations at random co-ordinates. The searchers didn't know how many bodies were in the square so they had to search it as thoroughly as they could. I could time the searches and identify their approximate flight path from the order in which they found the bodies. The most striking of the searches was the foot search. I had the loan of a tactical unit for the day. This was a small group of officers who I gathered got to do the really tough, dirty duties, such as being in the front line controlling rioting crowds. As I watched them gallantly pushing through chest high gorse bushes searching for my bodies I understood their comments at the end of the trial that they'd rather do riot duty.

The helicopter and fixed-wing aircraft could search a square mile we established in less than 20 minutes. At the end of my day with my foot based ground searchers they had only managed to search about 1/5 of the area, but they had found a couple of bodies. By extrapolation I calculated it would take c450hrs for them to search the square mile. As I was only funded for a limited number of trials clearly I could provide no more than indicative figures of the comparative rate of searching. But prior to my limited trials we didn't even have that. I don't know what O.R. technique you would call this study; I think you could regard this as operational research, perhaps in its most literal sense. I always felt this was quite a nice piece of work. I left the Home Office in 1990. I did hear the results of this study quoted on the radio several years later, but until researching for this piece I had no idea that this work clearly proved quite influential in subsequent years. I was hugely gratified to find this link which is still sitting in the resources section of the Police Aviation News website today http://www.policeaviationnews.com/Acrobat/HOSearchL.pdf grandly titled 'The O'Donnell Theory' describing my 'landmark trial' as 'the oft-quoted yardstick for air support efficiency'. And I never even knew!

Problem Page

Thank you to all of those who've sent in responses to last month's problem page, and thank you for your continued feedback, it's as appreciated as ever. This is the last in the current series of problem pages, but given the great response I've had from people, I'll definitely be looking to make it into a regular feature. If you'd like to send in problems of your own then please feel free to do so; whether it's just a fun puzzle, or maybe a problem you might be dealing with at work and would like to crowd-source a solution, I would certainly love to hear from you.

I look forward to reading your answers this month – I think it's quite fitting to end with a variation on a classic travelling salesman problem. Let me know if you find it easier or more difficult than the others, and don't forget that next month I'll be publishing solutions to all five puzzles. As usual, answers in an email (LMaynardAtem@live.co.uk) with your workings included and best of luck!

Puzzle #5 - Traveling Spaceman Problem

Galaxy ID	coordinates x	y	z
1	70	11	33
2	61	12	44
L3	100	30	49
9	37	76	90
N5	12	86	59
Z8	96	72	35
7	66	65	72

Table 1

Table 1 shows a list of galaxies that you, as the traveling spaceman, wish to visit. The table shows the coordinates in three dimensional space where each galaxy exists in the universe.

Question: Starting and ending at one galaxy, in what order should you visit each galaxy to minimize the travelled distance? You must visit each galaxy and you cannot visit any galaxy more than once (other than your starting location).

<OR>