## The stage or the screen?

An observation made at a conference earlier today made my wonder; am I unusually incapable of multi-tasking, or is a depressingly large fraction of contemporary conference delegates deluded?

The conference in question was Synthetic Biology UK (2019) which is, as its name implies, a largely national gathering of people involved in synthetic biology, with some guests from overseas, mainly continental Europe. SBUK is hosted by the main centres of British synthetic biology in turn and, this year, the meeting was at the University of Warwick, renowned for engineering and mathematics and, increasingly, for biotechnology. The conference was excellent and well worth the journey, even though my 315-mile journey was, for complicated reasons, made through storm Atiyah in a Land Rover close to half a century old, for which 60mph is not a limit but an ambition.

In conferences held in lecture theatres, I normally sit in the front row, where there is plenty of leg-room. This is not as selfish as it sounds – for some reason, the front row of conferences is almost always vacant, except for a few speakers waiting to talk and, if other people wanted the leg room too, there would be plenty of vacant seats for them. The only drawback of a typical front row is that there is nowhere to rest a book or laptop. This time, though, I was one of the last to enter the room and, rather than clatter down the long stairs to the front, I elected to remain at the back. The view from there was educational, in more ways than intended.

It has long been common to see lecture audiences typing on laptops or looking at smart-phones. From my usual seat at the front looking back (for example at someone asking a question), or from the view I get when giving a lecture, I had always assumed that the laptops were for note-taking or possibly for looking up unusual terms the speaker failed to explain. The phones were perhaps also for looking-up, or ‘tweeting’ about particularly exciting research. But the view from behind showed me how naive this assumption had been. Of the several dozen screens I could see well enough to recognize the broad type of content, only two seemed to contain a document that was being filled with notes. More than half clearly showed the Microsoft Outlook web interface, and the users of these computers were clearly writing e-mails. Several showed the screens of Facebook, again with their owners clicking and typing.  To be clear, I am not talking about events in an interval – this was all when speakers were actually giving their research talks (and describing interesting research in a very interesting way, too). And this behaviour was shown by all ages – in fact, the older people

seemed to be disproportionately the worst offenders with e-mail.

Most incredibly, two screens just a couple of rows in front of me seemed to show journal manuscripts for review, with their owners apparently conducting a manuscript review there and then. This was a double-discourtesy; to the speaker in front of them, and also to the authors of those manuscripts, who have every right to expect that the reviewers do their job with undivided attention. I once received a review for a manuscript that contained the criticism that my statistical analysis of a microarray was naive and inadequate. This came as a surprise, as our manuscript had never even mentioned a microarray! The journal editor was as baffled about the criticism as we were, and told us to ignore it when making revisions to address some other, sensible comments. Having just seen people reviewing manuscripts when theoretically listening to a talk at a conference, I now wonder whether our reviewer was in fact reviewing our manuscript while half-listening to a conference talk on a microarray analysis, presumably not a good one.

Leaving aside the discourtesy (no, let's be plain – the outright rudeness) to the conference speakers, this behaviour puzzles me because the perpetrators must have gone to considerable effort and trouble to travel to the conference in the first place, and either their own pockets or their research grants will be several hundred pounds depleted by the costs of accommodation and travel. What's the point of going, if one is not going to listen? I'm not trying to be priggish about this – if one is not interested in a conference, there is nothing wrong with simply not bothering to register and travel. Or is the message from the people doing e-mails and the like that other people's talks are not interesting enough to listen to, but of course their own talk is so fabulous it is worth their coming to give it?

Maybe these people were listening all along: am I doing them an injustice in assuming they cannot do two things at the same time?

I know that *I* cannot attend to two similar things (eg spoken and written language) at once, but maybe I am very bad at multitasking. Even when driving, I often have to apologize to a passenger that I can neither talk nor attend properly to their speech when I have to concentrate on heavy traffic or a complex junction, and I am amazed at the ability of others to continue mobile phone conversations behind the wheel. Some years ago, I had a startling lesson in my limited ability to multi-task, when Katie was asking me for help with a cryptic crossword clue on a motorway drive.

The clue was clearly an anagram. As I thought about it, I was entering the mild chaos of the the M5/M6 motorway interchange, I was suddenly aware that, in my perception, the blue N was slowing down in front of me but I had to wait for the white A to overtake me before I could pull out into the space between it and the orange D about quarter of a mile behind. I had to forget the anagram at once and apologize, when we were back into normal flowing traffic on the M6, that I could not do anagrams when driving because my brain seems to have only one space for keeping a spatial model. Even when dancing, I find that, if my partner wants to talk, I can manage only rather dull 'vanilla'-style dance that pays little attention to the rich structure of the music, because I can process spoken language, or the 'language' of jazz musicians, but not both at the same time. Very rarely, my inability to concentrate properly on two tasks at the same time has been an asset. I once had a research problem involving calculating the accuracy with which loops of Henle grow towards the kidney's mid-point. The problem was defining 'mid-point' in some way better than a human saying 'here', which of course risked a circular argument as the 'here' may well have been influenced by the direction in which the loops were pointing. I was thinking about this idly, away from work, while balancing a flywheel on an ancient diesel engine. The answer was suddenly obvious – calculate the 'centre of mass' of a kidney and using that as an objective definition of a centre. Having two spatial problems sort-of colliding in a brain incapable of keeping them properly apart was, in this case, helpful.

So, am I atypical in being so hopeless at doing more than one thing at a time, or are the audience e-mailers deluding themselves about their own abilities?

It seemed inconceivable that this has not been researched in a lecture-theatre context so, at home, a few days after the conference had ended, I did a web search. There is indeed a reasonably large volume of literature on the topic, with an overwhelming message that people cannot concentrate on both a lecture and on unrelated content on their computers, even if they think they can. A typical paper is that of Sana and colleagues (see Links), who reported a carefully controlled experiment in which all members of a class had laptops. Some were told to use them only to take notes, others were instructed to perform a small number of non-relevant set tasks at any time of their choosing during the lecture. The behaviour was monitored to ensure that each person did as they were told. The seating arrangement was known, so that the experimenters could also monitor the effects of having a neighbour doing non-academic things. The lecture was on introductory meteorology, about which none of these students was expected to have prior knowledge. After the lecture, the students

sat a test, which had a variety of questions from trivial recall to complex. Multitasking resulted in a 10% ($p<0.01$) fall of test score. That would be a whole grade at Edinburgh. Strikingly, non-academic work also affected the scores of neighbours.

In another study, in Nebraska (for which I can find only a press release, not the full paper – see links), nearly 11 percent of surveyed students said they spent more than 50 percent of their class time using their phones and other digital devices for non-class purposes. The report goes on to say *students acknowledged the costs of monitoring digital devices instead of their professors: They admitted they don't pay attention, miss instruction, that their grades may suffer…. Yet most respondents indicated they can't or won't change their behavior.* But, having said that, 30% believed that their non-academic use of digital devices in the lecture had no impact on their learning, something not supported by actual studies. One of these studies (see Links) also introduced me to some new vocabulary; *Accessing the internet during class for such non-academic content, irrelevant to the learning objectives, is referred to as 'cyberslacking' or 'cyberloafing'.*

So, it seems that I am far from unusual in being unable to do two things at once.

Not everybody in the conference was allowing themselves to be distracted, of course – a fact made clear by the high quality of post-talk questions coming, I could not help but notice, from people whose view of the stage seemed unencumbered by any glowing screens.

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Links

- The Sana paper: https://www.sciencedirect.com/science/article/pii/S0360131512002254
- The McCoy Nebraska paper: https://news.unl.edu/newsrooms/today/article/study-digital-distraction-in-class-is-on-the-rise/
- The paper from which the 'cyberslacking' sentence was quoted; https://www.mdpi.com/2076-328X/9/12/123