

Tripreport E.W.Dijkstra, U.S.A. and U.K., 8 June - 10 July 1976.

It was a long trip: eighteen flights, seven different places and ten different beds. But the length of my trip was more or less dictated by the dates of my commitments in Los Alamos and in Belfast, and by combining it all I could arrange that the NSF would pay most of my air travel.

On Tuesday the 8th of June I flew from Amsterdam via Chicago to Albuquerque. It was on the whole a most successful trip, which took no more than sixteen hours. The KLM Boeing 747 in which I crossed the Atlantic Ocean was fully loaded and the meal was miserable. In O'Hare Airport I lost neither my luggage, nor my way, but I did get my share of the cultural shock: besides the Musac provided by the Airport Authorities, Continental had at its gate a television set operational! It was appalling and remained most distracting, even after I had encountered David Wheeler from Cambridge, U.K. who was also on his way to Los Alamos.

In Albuquerque we arranged our flights to Los Alamos and went to bed in a hotel. The next morning I passed with Stoughton Bell at the University. It was a pleasure to meet him again, and in the course of that morning I was reminded of the fact that the teaching of programming and the running of a university computing service are two entirely different jobs. It is a sad observation, but even on the campus most computer users are fairly education resistant. Early in the afternoon Ross Aviation took us to Los Alamos: it was my first flight in a Havilland Twin Otter, six others would follow during this trip.

From Thursday morning to Tuesday noon --with the exception of the Sunday-- we had at LASL the Research Conference on the History of Computing. For some of the older gentlemen it was a quite nostalgic gathering, in which a predictable amount of time and emotions was devoted to questions of priority. (The situation was aggravated by the circumstance that quite a number of people present had played a role in a recent lawsuit about patents between Univac and Honeywell.)

There are various ways in which this conference can be described. One is by explaining that the first day was devoted to the canonization of Saint Johnny, a next day to the beatification of Sankt Konrad and a third day to that of the Holy Alan. At several occasions we saw a curious mixture between national pride and the need for hero worship.... Apart from that I learned quite a lot. I did not know, for instance, that in the early days the availability of radar technology had played such an important role; I had also to correct my impression about the intensity of the military involvement, which turned out to have been much more heavy than I had suspected. I was, furthermore, amused to learn that the controversy that still divides circuit designers into two warring factions --viz. whether or not it is decent to rely on finite minimum switching times-- has been there right at the start.

Brian Randell's lecture was unique among all presentations in that he was the only one who could present absolutely unknown --and fascinating!-- new material. He could do so because during the last six months he had been able to lift somewhat the security lid that up till now had covered the British war effort at electronic code breaking. There was so much interest in it, that a special evening session was devoted to it, during which Brian was seconded by Dr.A.W.M.Coombs who had been personally involved and, of course, knew much more than he was allowed to say. Some of the questions put to him were very silly because everyone could foresee that he would not give an answer to them, e.g. all questions about the effectiveness of the British code breaking effort as measured in effect on World War II.

The question at the end of Konrad Zuse's talk whether his equipment had assisted the Nazis in carrying out "the final solution" was, of course, the most terrible of all. When I saw that that was going to happen, I escaped.... In defense of the man who raised that question I must mention that in an earlier conversation Zuse's comments on World War II had been provoking.

I myself added another mistake to the list of those for which most probably John von Neumann has to be blamed. Flowcharts and the idea that programs must be able to modify their own instructions --a sickening pun!-- were already on that list, the use of anthropomorphic terminology in computing science has now been added. I got more than once the distinct impression that that unfortunate use of language can be traced fairly directly to von Neumann's linguistic habits. I made this suggestion in my talk and no one denied it, on the contrary: afterwards I was even shown corroborating evidence. (See addendum page EWD572 - 6.)

My talk presented me with a serious problem. I had prepared a "nice" talk covering the activities at the Mathematical Centre up to 1960. It contained names of people, names of machines, dates, some technical characteristics of the machines and their influence on our programming, all nicely glued together with anecdotes. But I quickly discovered that my prepared text was utterly useless, for I had been scheduled as the last speaker --the "kicker" or "cleanup hitter"-- and most talks consisted of ... names of people, names of machines, dates and some technical data, all nicely glued together with anecdotes. It was perfectly clear that I had to do something completely different. I have shamelessly used all the tricks and my closing address was a great success. (Nearly all speakers had stood behind the rostrum at the left-hand side of the podium, so I placed myself bare-handed at the podium's centre; and to speak more slowly than all the other speakers, well that did not require any additional effort from my side!) I had my final lunch in the company of Joe Traub from Carnegie-Mellon University and his wife Pamela McCorduck, a novelist who was engaged in the writing of a book on the early history of Artificial Intelligence. (She herself seemed to possess enough of the natural variety!) It was fun to see how she observed this crowd and her comments were illuminating; I am looking forward to her book, also on account of her T-shirt of which the front side displayed the surprising text "Artificial Intelligence" and the back side the text "NIL".

After lunch I took the first flight back to Albuquerque, from where I had to fly to Phoenix. The plane had engine trouble and, therefore, was delayed. I was terribly annoyed by this, because Dr.D.M.Dahm from Burroughs had arranged to pick me up in Phoenix, from where the two of us should travel together via Flagstaff to Sedona in Arizona. Suddenly another passenger who was in a hurry announced that there was still one place left in a charter flight to Phoenix. I decided to join, retrieved my luggage from the plane, and only then I heard that the charter flight would be with a small single-engine plane. My enthusiasm waned; it then transpired that one of the four charter passengers was a sixteen year old girl who had never flown before, and the others thought that it might be too rough for her. While we were still hesitating, the repair crew committed itself to having the plane in flying condition within half an hour and the charter flight was cancelled. Even in a four-engine jet the flight from Albuquerque to Phoenix was rough and bumpy; I had had a narrow escape! The only difference was now that I had all the luggage with me in the cabin: was I lucky, for then I discovered that my suitcase had been booked through to Flagstaff, but via the wrong flight! So the whole escapade in Albuquerque saved me the trouble of retrieving my luggage in Phoenix. Dr.Dahm was waiting for me in Phoenix at the gate, we flew to Flagstaff and from there drove down to Sedona.

It was a beautiful trip. We really drove "down" to Sedona, for Flagstaff is really high up in the Arizona mountains. Also Sedona is still "high" according to my standards, and I am sure that the thin air would have bothered me the next days --during which I performed quite regularly-- were it not for the happy circumstance that during that week in Los Alamos I had had the opportunity to get adjusted to it. While Dr. Dahm did the driving I enjoyed the sight of the setting sun shining on the red rocks, and early in the evening we arrived in Sedona in the motel where we would have a meeting for the next three days. Having spoken that morning in Los Alamos, I was still dressed in my white shirt and tie, I wore even a complete suit with jacket and all: the contrast between me and the people from Burroughs that we found upon arrival sitting next to the swimming pool could hardly have been greater. I quickly changed.

The next three days were devoted to a mutual exposure between me and a number of Burroughs hardware designers. It was a very fruitful session, the difficulties in understanding each other were much less than I had feared. I knew that Jack Mazola would be present and had derived some comfort from the consideration that in case of mutual misunderstanding he could probably act as interpreter, but I don't remember that he ever needed to act in that capacity. The general theme of the conference was "correctness", I have spoken about fifty percent of the time, in the other half people from the different plants described what measures they had taken.

Looking back at that conference the next weekend I suddenly saw a profound difference between most hardware designers and most programmers. In programming we are afraid of two kinds of errors. On the one hand there is the "punching error": the silly clerical mistake that can create havoc as long as it is not discovered yet, but is trivial to repair as soon as it is found. Guarding against them is a constant concern, but it is well known how to do that. (In the case of the ALGOL 60 translator Jaap Zonneveld and I were sitting opposite to each other and we claimed to produce to identical booklets. When we were finished, both booklets were independently punched and the results were compared mechanically. We found in that way twenty discrepancies: trivial but very valuable discoveries that have greatly assisted us in getting the thing operational.) On the other hand the programmer fears "the flaw in his reasoning": it is the kind of bug that, when found, forces you to redo your thinking. It is the latter type of bug that is fought by correctness proofs. Reviewing the different sorts of precautions my hardware friends showed me in Sedona, my conclusion is that they were primarily directed against the hardware analogue of the punching error. The reasons are clear: with modern production technology such a silly mistake is less easily mended, for you cannot add a missing wire to the interior of a chip. Secondly, hardware design presents fewer conceptual problems than programming. Thirdly there is a difference between the professional life of the average programmer and that of the average hardware designer: while the programmer designs many different engines making use of the same technology, the hardware designer often redesigns essentially the same engine, but each time using a different technology.

I was also surprised to learn that my hardware audience was such a mixed one: for some time we spoke about glitches, and while some of the people were very concerned about them, others were on the verge of bored. As one of them said "Glitches are certainly not our major concern." It was later explained to me that this difference in stress could be explained by the specific problems encountered lately in the different plants.

On the second day the hours of the sessions were shifted forwards --from eight o'clock in the morning until three in the afternoon, with only a small break in the middle-- because a number of the attendants would like to make a visit to

the nearby canyons. My Puritan make-up told me that, if they wanted to visit the canyons, they should have done so before or after the conference, and prevented me from joining the tour; I remained talking near the swimming pool, somewhat cross with those who had left.

On Friday afternoon I left with Jack Mazola and Ted Langlet by car for Phoenix. They should take me to Mission Viejo and had flight reservations for a flight to Santa Ana, while I had a ticket for Los Angeles International Airport for a flight one hour later. It was decided that I should try to get on the Santa Ana flight as well, but it was fully booked and I had to wait as stand-by passenger. Because the flight to Santa Ana was delayed, also the decision whether I would be able to join them was delayed as well. Just at the moment that we had decided that I should go to the other terminal in order to catch the Los Angeles flight, the first five stand-by passengers --of a long list!-- were called: I was the fourth and together we flew to Santa Ana. Jack Mazola had his car standing at the Airport and took me to the Hotel "Surf and Sand" in Laguna Beach.

On Saturday I wrote letters and was invited for dinner in the evening. On Sunday I joined the yearly Burroughs Picnic --near one of the lakes that had still water in it-- and won via a lottery a dinner for two that I consumed next Thursday evening with Tony Hoare who arrived that Sunday evening. After the picnic I joined John McClintock --as part of the "recognition equipment"-- on his trip to Los Angeles International Airport where we collected Tony.

On Monday we had a meeting in one of the conference rooms of the hotel so as to enable Tony --who, of course, still suffered from the time shift-- to go back to his hotel room and have a rest whenever he felt like it, the remaining days of that week were passed in the Mission Viejo Plant. Half the time the two of us talked about more general topics, half the time Tony did his specific consulting job while I was talking somewhere else. Usually I addressed small audiences; a number of these talks were really introductions to my recent book. And, because I wanted to know a few things, I managed to get myself a few "private tutorials" one on a hardware problem, and one on a software achievement. They were both most instructive and highly appreciated. (I felt like a good pupil, for in both cases we needed less time than anticipated!)

On Friday afternoon we both left. Tony was picked up by Ivan Sutherland who has been appointed as Professor of Computing Science at CalTech, and I for San Diego where I would spend the weekend with Don and Mary-Ann Lyle. Sutherland has been appointed recently and has done the most sensible thing one can do in such a position: he has written a few successful Heads of the Department asking for their advice and comments on his intentions. So he had written to Tony as well, and it was a sheer coincidence that, shortly after that correspondence, Tony was around. Two weeks later, when I spoke Tony in Belfast, he told me about that visit and he was favourably impressed to the extent that he remarked "It could be an interesting place for a next sabbatical....". It was quite clear that Sutherland did not wish to remain active primarily in the graphics area where he has made his name (otherwise Tony would not have made that remark).

I had a nice and restful weekend in San Diego, well La Jolla as a matter of fact. On Saturday morning Mary-Ann helped me with the buying of little presents for my family --usually I don't do so but this was a special occasion-- and in the afternoon we went on my request to Sea World, which is indeed fascinating. Don gave me his copy of Weizenbaum's new book "Computer Power and Human Reason" which contains many quotable remarks and places Artificial Intelligence in what I regard as a more appropriate perspective. The Artificial Intelligentsia clearly don't like the book at all --vide McCarthy's recent attack in Datamation--, I can only regret that the quality of Weizenbaum's book is so uneven. He is either

an unexperienced author, or the book has been written in too great a hurry or possibly too much emotional stress. But in view of the force of some of the prevailing prejudices --and the money behind them!-- Weizenbaum's book is certainly a courageous one. Part of it I read during that weekend, the rest one week later on the flight from Los Angeles to London.

The next week I should have been in Brazil where I had accepted an invitation to give a six-hour tutorial. But shortly before my departure I received a conference program for the meeting in Rio de Janeiro and saw that the whole meeting was scheduled in terms of 15- and 30-minute presentations! I thought that it would be crazy to travel all that distance in order to speak for half an hour and to waste a week in Rio de Janeiro. So I had one more week in California. On Monday I have been at the Mission Viejo Plant for most of the day, at the end of the day I flew --via three flights in a Twin Otter-- to Santa Barbara. The reason was that at Sedona it had been observed that the people from the Santa Barbara Plant had responded very enthusiastically to what I had shown and it was felt a worthwhile effort to address a greater number of people from that plant.

My arrival in Santa Barbara was good for a new experience: I expected to be picked up, and after I had collected my luggage, there was no one there! With Burroughs this has never happened to me before, and, knowing the company, I expect that it will be a long time before it happens again. I left the terminal and looked around; then a car pulled up. It had been a mismatch of a few minutes. Later that evening I was rewarded for my anxiety by a truly excellent dinner.

The next day was fun. From nine onwards I addressed a group of about twenty people. It had been told to me that they had been selected carefully and I can believe that, for it was an ideal audience to address. And that was a good thing, for we did it in the conference room of the motel, a room that was not cooled. So, after one hour I was wet all over and remained so for the rest of the day. The meeting had been scheduled to last until three o'clock in the afternoon, and then a few people with other commitments left. I stopped at five o'clock and had a drink with some five or six of them (I had two large glasses of beer; in the evening I was still thirsty!). On Wednesday morning I flew back to Mission Viejo, where I remained for the rest of the week.

On Saturday morning Bob Merrell, who had to pick up some family at the Los Angeles Airport, took me to the airport. A nerve-racking morning. Originally we had arranged that he would pick me up at the hotel at 9.30, but eventually it was decided that 10.00 would be early enough. But it was the third of July and Los Angeles Airport was a madhouse. He had put his car at a very accessible parking lot from where a shuttle bus took you to the terminals, but even that shuttle bus got more or less stuck in the traffic jam. I just made it, and left the country, not regretting that I would not be present on its bicentennial Fourth of July. TWA served me an excellent meal: it was called lunch when they served it, it was called dinner when they cleared the tables. Next morning's breakfast, alas, was very disappointing, the main course existing of an egg that had been scrambled beyond recognition.

On an early Sunday morning I arrived at Heathrow Airport, London. I was back in Europe. It was very warm, and I had to walk long distances. The delay at immigration was longer than usual: it was so early that there were not very many immigration officers and simultaneously a large plane from the Middle East had arrived. But the TWA plane had been very well on time and I arrived well in time for the elaborate safety procedures for the flight to Belfast, where I arrived at nine o'clock on that Sunday morning.

Tony was at the airport. His flight from Los Angeles, one week earlier, had been less pleasant. The strike of the Canadian air traffic controllers had made a non-stop flight impossible and his plane had made an additional stop in New York. When his plane landed there the complete fire brigade of Kennedy Airport was placed along the runway because there was something wrong with one of the engines and he had been delayed there for another eighteen hours. With all that misery still fresh in his memory he was an excellent host for the weary traveller. In the morning I just sat in the sun in his garden, drinking a cup of coffee, in the early afternoon I slept for two hours, and in the evening I wrote two letters. I then had a semi-sleepless night. I had been away for more than three weeks and 24 hours was not enough to absorb the time shift.

The next morning we went to the airport to collect Ria who had flown that morning from Eindhoven. She, too, had had a poor night, and that afternoon we slept together. On Tuesday Tony took us on a trip through Northern Ireland and we went to see The Giant's Causeway, a large basalt formation which I found most impressive --frightening even-- but Tony was disappointed, for low clouds destroyed the view. On Wednesday evening the four of us --i.e. Tony and I with our wives-- attended the Graduation Dinner in The Great Hall of the University and the next morning was the great ceremony in which I received the Honorary Degree of Doctor of Science, together with an English and an Irish colleague. Although I was told that the ceremony was no longer "what it used to be", I found the amount of academic pomp just what I had expected. Before my graduation I sat on a chair on the front row reserved for "Professor Dijkstra", after my graduation I was guided towards a chair on the podium, reserved for "Dr.Dijkstra". Afterwards we had lunch with the Vice-Chancellor, Sir Arthur Vick. I think that it was about three o'clock in the afternoon when we returned home, i.e. Tony's home, where I could spend some more time in the highly appreciated company of Rod Burstall who had come that day from Edinburgh to Belfast in honour of my Graduation. It was a pity that he had to return to Edinburgh that very afternoon. A Garden Party --with beautiful weather-- was the official end of the day. The next day there was a heavy rain. Ria was at that moment shopping with Tony's wife and they got very wet, I was giving a lecture at the Department of Computer Science.

In the late afternoon we returned home. We flew from Belfast to Gatwick, but in Gatwick the luggage handling took such a ridiculously long time that we missed our connection to Eindhoven. Thank goodness we were together! We stayed in a nearby hotel and early next morning we flew to Schiphol: we had no choice, as Eindhoven's little airport is closed during the weekend. We took a coach to Utrecht, from there the train to Eindhoven, and then a taxi to the Eindhoven airport, because there Ria had left the car in the parking lot when she left. I was glad to be home again.

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What makes people homesick? I don't know, but my guess is that it is a great number of small differences, many of them too small to be really noticed very consciously, but together bombing your input channels. I think that it is that constant stream of impressions that are not automatically ignored that makes travel so tiring. After two weeks of travel I had a sudden pang of homesickness, shortly after Tony's arrival: something he said, or perhaps a gesture gave me suddenly that feeling of familiarity that I had missed for two weeks and I was on the verge of addressing him in Dutch, when I checked myself, realizing that that would not work....

Some differences, of course, one cannot fail to notice, the noise level for instance. One day I walked Jack Mazola and someone else through a corridor

of the plant and a man came by with a trolley of which one of the wheels squeaked terribly. When I remarked that sometimes a small drop of oil could work miracles they looked at me with two puzzled faces. They did not know what I was talking about, neither of the two, it turned out, had noticed the squeak! But on our last flight from Gatwick to Schiphol I was grateful to British Caledonian for the absence of soft music during take off and landing.

I became aware of another difference between Europe and the U.S.A. In both cultures people are regarded as "a short summary of their past" but recent and distant past are given different weights in the two cultures. In Europe more weight is given to the more distant past, certainly your parents and sometimes even grandparents are included: my colleagues at the University certainly know me also as "my mother's son", they know where she has studied as they know to which University I have been. Here such knowledge about the background of one's fellowmen is naturally available. It was more or less by accident that I discovered that in California this is not the case: apparently it is there possible to know someone professionally quite well without being sure about his academic training. This makes a different world. Emigration must be very difficult.

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I knew that during my absence Europe had had a heat-wave and that the long period of drought had been serious. I was quite alarmed at what I saw: I do not remember having seen the green pastures turned yellow and brown. But this time they are yellow and brown. The first few days after my return it was still too hot to do anything at all --although everybody said "but it is much cooler than it has been"-- and, together with the holidays, life seemed to have come to a complete standstill. Since then we have had a few thunderstorms and it has rained. Now we have insects.

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Addendum (28th of July 1976).

This morning I received from Donald E.Knuth an excerpt from a Panel Discussion on Engineering and Scientific Applications, held at the "5th Annual Computer Applications Symposium" at Armour Research Foundation, October 1958. Here (page 149) the late C.B.Tompkins refers to "Von Neumann's idea of defining a machine in human terms." (End of addendum.)