Trip report E.W.Dijkstra, Los Angeles, Austin (Texas), and Portland, 6-28 August 1980.

With the exception of a half-day visit to prof. Misra and prof. Chandy of The University of Texas at Austin, this was entirely an industrial trip.

On Wednesday 6 August 1980 I flew from Amsterdam to Los Angeles to visit Hughes Aircraft Company.

On Friday 8 August I flew in the evening from Los Angeles to Austin, Texas, where I visited for two weeks the Burroughs Engineering Technology Center.

I left Austin on Saturday 23 August (very early in the morning) for Portland, to pay a visit to Tektronix and to address the local chapter of the IEEE.

On Wednesday 27 August I started my journey home (via Chicago). The next morning, while I was waiting for Immigration, the man that stood behind me in the queue saw in my passport that we lived in the same village; a Philips taxi was waiting for him at the airport and he offered me a lift, which was gratefully accepted. At 11:00 I was home. I brushed my teeth, and after two cups of coffee and a glass of sherry I went to bed. As far as air transport was concerned I had travelled without problems: I had not been booked on non-existent flights and I had caught all my connections.

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I had accepted the invitation from Hughes because my last contacts with the aircraft manufacturing in-

dustry were more than 25 years old. I came to satisfy my curiosity, and it was a definite disappointment when I learned upon arrival that, despite its name, Hughes Aircraft Company did not manufacture aircrafts. In other ways, however, the visit was sufficiently instructive not to regret it.

C.L. Nelson and J.M. Thompson from Hughes were at the Airport, recognized me without hesitation, and took me to my hotel, where I was offered dinner. I was, however, too tired and too much dried out to eat and had a few glasses of highly diluted whiskey while we discussed the next days' (heavy) schedule. And then: off to bed!

The next morning I had breakfast at 6:30 and was picked up at 7:15. As a guest of their "Communications and Data Processing Professional Development Seminar" I was supposed to give the same talk "Programming as a Battle against Unmastered Complexity" twice that day: at Fullerton from 9:00 till 11:00 (for an audience of 200) and at Culver City from 13:00 till 15:00 (for an audience of 225). At both sites the promised wall-to-wall blackboards were conspicuously absent. At Fullerton I had some 20 minutes to redesign my lecture, adjusting it to the constraints of the miserable overhead projector I had to make do with. The talk at Fullerton was an unadulterated disaster. Without

any regard for acoustics, the organizers had chosen the largest room available: the cafeteria! Besides that they couldn't get the throat microphone working! In a very literal sense I reached at most one quarter of my audience. Reactions and questions from the floor were cruelly revealing: I was almost accused of unprofessional conduct because I had used identifiers of more than six letters, and I was asked whether I was "for or against the use of flowcharts". I felt subjected to the "time machine". In Culver City at least the throat microphone worked. The day ended with "Cocktails and Dinner with Key Hughes Computer Executives" in Marina del Rey. The food was good and the man sitting to my right was interesting.

The next day was spent discussing with the (newly formed!) "Hughes Corporate Software Engineering Committee". This was very illuminating: clearly several of its members hadn't the foggiest notion what programming was about and exactly one member displayed symptoms of a scientific attitude. The exposure offered a new explanation for the elaborate security measures.

In the course of the afternoon J. M. Thompson saw me to the airport. By the time that it was clear that he would rather discuss pet dogs than the future of his company, I suggested that he leave me to my fate (which was at the moment in the hands of Continental Airways).

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The two weeks in Austin I was the guest of Dr. Hamilton Richards and his wife, and that was much nicer than staying in a hotel. I drove a Toyota Tercel (which I had been able to rent from Hertz without paying a deposit!): "a nimble car", though thanks to automatic gearshift and airconditioning almost without acceleration. The worst of the heatwave was over, but it was still warm enough (40°C. in the shade). The first weekend we were expecting the hurricane Allen, but only a tornado, spawned by it, reached Austin.

The first week I was there together with Dr. David A. Turner of the University of Kent, who showed me unexpected possibilities of his programming language SASL. Besides collecting a few less trivial SASL programs - my first goal - I found a very nice example that should help me understand "progress" of such nonterminating nondeterministic computations - my second goal - . Finally - my third goal - I familiarized myself with the problem of garbage detection in SASL, but this was done with Dr. Richards during the second week, when Dr. Turner had left.

The first three days were spent in the conference room where our sessions were recorded on videotape, a "format" with which I was definitely unhappy. Thereafter we just worked and I felt much better. In retrospect I don't think it was the absence of the videotape that did it; more important was that we were with fewer people. A very important aspect of working together - and perhaps it is the most important one -

is that people help and force each other to express themselves as adequately as possible. With J.M. Morris, whom I met in Portland, I checked my estimation that during sessions of the Tuesday Afternoon Club about 80 percent of our mutual comments are in this sense "linguistic", and it is probably that high percentage that makes the Tuesday Afternoon Club so effective. But neither Turner nor the people at Austin were used to such scruting, and the larger the crowd, the greater the danger that someone felt offended. And it was often precisely such scrutiny that they seemed to need more than anything else. (Admittedly, they are not the only ones to blame, since the computing literature does not set a very good example either. In C.J. Date's "An Introduction to Database Systems" I found within five minutes browsing the following horrible sentence:

> "But if PHYSICAL is specified, the logical parent pointer in the prefix is conceptually redundant."

An area of human endeavour that produces such horrors is in bad shape indeed!)

During the second week Walt E. Feeser – the Austin manager and my "impressario" – had organized by way of experiment a two-and-a-half-day meeting where representatives from all over the company had been invited to present their greatest achievement and their greatest problem. It was a nice idea,

but the experiment was not the success we had hoped. A number of last minute cancellations made the coverage less wide than intended, and most of the speakers - John McClintock from Mission Viejo was a notable exception - were not of the level required to make the meeting scientifically exciting. It was rather instructive than interesting.

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When I arrived at Portland a four-men delegation met me at the gate: Don W. Terwilliger, Rick leFaivre, Bill Price and ..... Joe Morris, whom I still supposed in Dublin. Proud of their active vulcano, the gentlemen were eager to be flown round Mt. Saint Helens. So we went in a two-engine, six-person plane; the passenger most prone to airsickness got the seat next to the pilot. The views were most impressive.

On Sunday afternoon I attended at leFaivre's home an informal gathering, which I enjoyed after a long night's rest. It was the first long night of this trip, and it was a good thing I had it, for Terwilliger's schedule for the next two days was killing. (On Tuesday evening, my hosts were absolutely exhausted.)

The days started at 7:30 with a business-breakfast in my hotel. During the daytime I gave two talks and conducted three "open discussions" (with business-lunches in between). On Monday evening (from 20:00 until 22:30) I addressed the combined chapters of

the ACM and the IEEE, a happening for which 600 people had gathered in the auditorium of Sunset High School. (I heard that people had come from as far as Seattle.) Besides tired I was nervous because I have rarely worked with audiences of that size, but it went very smoothly and was a great success; as luck would have it I got very nice questions from the floor, which gave me all the opportunities I might have wished. It was an excellent show. (Tuesday afternoon ended with a reception at the University Club in Portland. Someone who had closely observed my lecturing techniques the previous evening summarized "After five minutes you could do with your audience whatever you wished." It's a pity I don't remember those first five minutes. But, of course, it is all on videotape.....)

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Being less familiar, Hughes and Tektronix have made the most vivid impressions, impressions that haven't been fully digested yet. Both companies will claim that they are profoundly different from each other. (At Hughes the hierarchy was highly noticeable: name tags were adorned with special buttons indicating the number of decades its bearer was with the company; at Tektronix all visible signs of seniority are anxiously—and almost religiously!—suppressed: open cubicles and Christian names on principle.) But they are very similar; their pro-

gramming is medieval. I quote from Joel J. Forman (Computer, Vol. 13, no. 6, June 1980) describing the state of a project at Hughes only a few years ago:

> "The people managing the software had hardware backgrounds and, for the most part, no real understanding of software. One of their programs was a perfect example of how software should not be managed. This program had (1) no written documentation of any kind, (2) not one comment in the source listings, (3) no test plans, and (4) no person remaining on staff who knew what was contained on the paper tapes."

This was Hughes, but from what I heard I must conclude that to some people at Tektronix the above must sound familiar.

At both places I was struck by a profoundly unscientific attitude, that makes them ready victims of the Ed Yourdons, the Barry Boehms, and the Tom Gilbs of this world. They just lack the distinguishing palate that identifies junk and don't see (nor feel, nor sense) the difference between competent scientists and the quacks from the educational fringes of computing. They are like the tribes that observe that the ritual dances of their own witch-doctor are not very effective against the current epidemic and, therefore, welcome and solicit suggestions for more elaborate ritual steps.

They are absolutely unaware of the techniques of scientific thought. One of the consequences is that they equate "scientific" with "experimental", and as a result they are ridiculously "experimental". They don't attract one guru, they attract as many as they can. One group follows one guru, another groups follows another guru, and by "measuring" the performance of the various groups the management hopes to decide which ritual dances are the best.

Another consequence is the holyness of the breadboard, and of the subsequent cult of "iterative design". Verifying that "it works" is regarded as the summit of "scientific attitude". The mere suggestion that a competent programmer might not be interested in the "experiment" because he has designed his artefact in such a way that he understands why it must work is heresy.

A third consequence is an overwhelming inability to separate their concerns. They don't understand the vital rôle of functional specifications as "a logical firewall" between the (scientific) concern of correctness and the (commercial) concern of pleasantness. They don't separate the intrinsic problems of computing science from the additional problems engendered by the American educational system, etc. In short, their (untrained) thinking is just a mess.

I was definitely alarmed by the prevailing attitude towards education. At Hughes it was worse than at Tektronix, but also at the latter place the attitude was far from kosher. I am beginning to understand how so many American universities could degenerate into "graduate factories". It might help to know that for a Dutchman, who has in his own language only a single verb for "to hire" and "to rent", the expression "to hire someone" is of an incredible rudeness. I observed American industry regarding the graduate indeed as the university's "product", that you just "hire" whenever you need a specific competence!

Whenever I pointed out - as politely as I could - the dismal state of affairs, management had its defence ready: "But the graduates we can hire are no better." I am sure that I am "unrealistic" but I can only call that copping out (in particular when your company is "committed to excellence"!).

Hughes wasn't interested in the education of its employees at all. Education would only make them restless, and, besides that, education was not interesting because education is a long term process that only bears fruit after many, many years. (That is really how their objection to education was phrased! The consideration that the longer something takes to bear fruit, the more urgent that you

start with it as soon as possible was way beyond their vision.) Tektronix professed to be interested in the education of its employees, but I couldn't escape the uneasy feeling that it was little more than lip service. I quote from the Tektronix, Inc. Annual Report, 32nd Year, May 27, 1978: (pg. 31)

> "This avenue for self-development is available to everyone here. All Tek employees are allowed 40 minutes of company time each month, to use in whatever way they find most broadening and helpful."

My God! What is "40 minutes of company time (sic!) each month"? Ten minutes a week. The average human spends more in the restrooms.

Again with the best of intentions, Tektronix felt like sponsoring an "Oregon Graduate Center". But the only thing they could think of was organizing courses disseminating "knowledge"; I thought that the purpose of a university education was to teach people to <u>think</u> better than they would otherwise have done.

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When I came home I observed the outcome of a (highly scientific) experiment I have been taking over the last 100 days. I did not trust the permanency of Parker's Super(!) Quink Permanent Black and wrote two sentences on a piece of paper that I glued on my window. This spring being what it is, we had very

little sum, but clearly enough to demonstrate Parker's fraud. I cannot promise a true reproduction of the level of greyness; for those interested I shall keep the original.

This has been written with
Parker Quink Permanent Black
d.d. 16 May 1980.

This has been written with
Pelikan Fount India
d.d. 16 May 1980.

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31 August 1980
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little sum, but clearly enough to demonstrate Parker's fraud. I cannot promise a true reproduction of the level of greyness; for those interested I shall keep the original.

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This has been written with
Pelikan Fount India
d.d. 16 May 1980.

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