Peer Review: Backus Naur form and its influence on programming languages
Seminar: Turing Award Winners

University of Basel

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Summary

The paper step for step tells the story of the development of formal description for languages to the point of the notation uses in the Algol 60 report. Very important in that is the story and the connected work of computer scientist Peter Naur, the 2005 ACM Turin Award recipient.
Beginning in the 4th century before Christus the problem of formally describing a language already was something scientists already were thinking about, that shows the topic has a very long backstory, although the gap to the broader interest in modern science in the early 20th century was fairly large. The first very important part on the journey to the ALGOL 60 report was the introduction of phrase-structure grammar by Noam Chomsky in 1956 by using a finite-state Markov process to define the English grammar structure.
Furthermore after working on the programming language *International Algebraic Language*, another ACM Turing Award recipient in John Backus introduced a formula to describe programming languages. On that basis the Backus Naur Form was introduced in 1960 as part of the *Report on the algorithmic language ALGOL 60* as the defining basic reference guide for compiler builders and it was aimed to be widely understandable. The mentioned programming language ALGOL 60 was very important regarding the future development of known programming languages. The formal part of the ALGOL 60 was mainly what was the Backus Naur Form.
Peter Naur, the main character of this paper, was also widely involved in ALGOL and therefore also in ALGOL 60 and was heavily interested in form of description in ALGOL 60 and therefore he focused on that also a lot in his later work. One important point for Naur was that there was no over-formalization in the description of programming languages. Another important part of ALGOL is the Gier Algol Compiler and its error detection. There it was important for Naur that a Compiler stopped running if a error was detected. The Backus Naur form once again makes an appearance here because the framework of it was helpful here as well. Naur himself never really wanted to be connected to the notation itself but he had an significant impact on the ALGOL report. By further pursuing his philosophy of conveying theories instead of trying to

break in the door he influenced the further development of compilers and programming languages a lot.

Soundness

The paper is very well put together and the story line is very clear. The goal of describing how the way was paved to the ALGOL 60 report and the importance to everything that followed is very good. The details also are sufficient so that everything can be distinguished but also it is clear how all the parts are building up on each other. At the end the future connected work also has the fitting framework.
The thing that maybe is not allocated resources to is the person of Peter Naur himself. The work of Peter Naur and the impact of it is very well written down but I don't know if a subsection in the chapter about ALGOL 60 is enough for the purpose of that paper. In my opinion the idea is not only to present the achievement of the Turing Award recipient but furthermore also the connection of that person behind it to his work. The optimal scenario would be to know what influenced Naur in his way of thinking. I know it can be difficult to have enough information about the person and there is a lot more information about the actual work but maybe there is a little bit more out there that could help to add another perspective on Naur's legacy.

Clarity

The timeline is a important part of the report and very well fits as the structure regarding the development leading up to the ALGOL 60 report and the ALGOL Gier Compiler. But like I mentioned in Soundness putting the biography of Peter Naur in a little subsection devalues its importance. Giving the biography its own chapter probably is something worth thinking about. How it is now it kinda seems to be inserted right between the developments of John Backus.
The anecdotal writing style in some phrases is very good chosen especially with the cross references with other Turing Award recipients. For example how Donald Knuth renamed the "Backus Normal Form" into the "Backus Naur Form". This is something that is in good chosen parts of the paper.
Another of the few thing where probably is some room for improvements are the illustrations for the table for the "Sequence of Operand type checking" (Table 1, page 12). The illustrations for the language descriptions are all very clean and easy to understand. The table on page 12 takes a while to really see what really is going on. All the blank spaces make it harder to see what is on the same row and how someone should read the table.

Scholarship

The related work is sufficiently discussed, especially everything regarding the ALGOL 60 report. The citation is also formally very correct by mentioning the authors, title and

year in an adequate form. The Bibtex entries also are complete and properly entered to the given format.

Minor Comments

One minor but recurring thing I saw while reading the paper was some issues with repetition. A pretty good example is the use of the term "field of" in the first sentence of the Abstract. So repetitions is for sure something to look at in the paper while editing it.
Also a lot of sentences start with the names of the important characters, especially Naur. So maybe using some more linking words and expressions could help to lower the frequency of that.
Otherwise the lexical range is really good and the paper is overall already in a very good shape.