Peter Naur's contribution to formal notations and beyond

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Seminar Turing Award Winners and Their Contributions
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Peter Naur

Figure: [3]

Peter Naur's contribution

"For fundamental contributions to programming language design and the definition of Algol 60, to compiler design, and to the art and practice of computer programming."

Formal notations in history

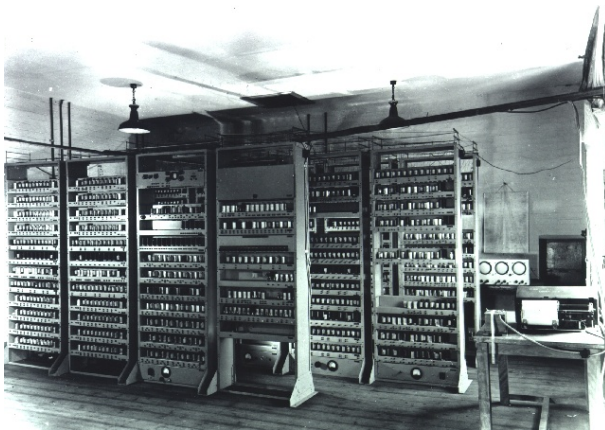**Figure:** [1]

New need for formal notations

Figure: [2]

Formal notations   Peter Naur's contribution   Computing vs. Human Thinking   Conclusion
oo   o   oo   ooo
o   o
o   ooo

Overview

Formal notations | Peter Naur's contribution | Computing vs. Human Thinking | Conclusion

Phrase structure grammars

Phrase structure definition

$$
\begin{aligned}
\sum &: \#Sentence\# \\
F &: \\
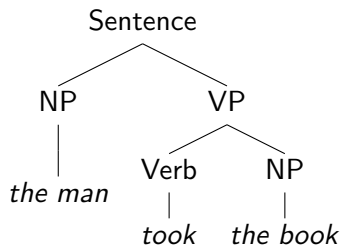Sentence &\rightarrow NP\_VP \\
VP &\rightarrow Verb\_NP \\
NP &\rightarrow \text{the man, the book} \\
Verb &\rightarrow \text{took}
\end{aligned}
\tag{1}
$$

Formal notations	Peter Naur's contribution	Computing vs. Human Thinking	Conclusion
○●	○	○○	○○○
○	○		
○	○○○		

Phrase structure grammars

Phrase structure in tree form

(2)

Formal notations	Peter Naur's contribution	Computing vs. Human Thinking	Conclusion
○○	○	○○	○○○
●	○		
○	○○○		

Backus Naur form

Backus Naur form

$$< sentence > ::= < NP > \ < VP >$$
$$< VP > ::= < Verb > \ < NP >$$
$$< NP > ::= \text{the man} \mid \text{the book}$$
$$< Verb > ::= \text{took}$$

(3)

Formal notations   Peter Naur's contribution   Computing vs. Human Thinking   Conclusion
oo   o   oo   ooo
o
●   ooo
Programming languages, natural languages and mathematical languages

Comparison of levels of formalization

- Natural languages
- Mathematical languages
- Programming languages

Formal notations · Peter Naur's contribution · Computing vs. Human Thinking · Conclusion

Definition of Algol 60

Table

Treatments	Response 1	Response 2
Treatment 1	0.0003262	0.562
Treatment 2	0.0015681	0.910
Treatment 3	0.0009271	0.296

Table: Table caption

Theorem

Theorem (Mass–energy equivalence)

$E = mc^2$

Formal notations   Peter Naur's contribution   Computing vs. Human Thinking   Conclusion
○○   ○   ○○   ○○○
○   ○
○   ●○○

Art and practice of computer programming

Verbatim

Example (Theorem Slide Code)

```
\begin{frame}
\frametitle{Theorem}
\begin{theorem}[Mass--energy equivalence]
$E = mc^2$
\end{theorem}
\end{frame}
```

Formal notations   Peter Naur's contribution   Computing vs. Human Thinking   Conclusion
○○   ○   ○○   ○○○
○   ○
○   ○●○

Art and practice of computer programming

Figure

Uncomment the code on this slide to include your own image from the same directory as the template .TeX file.

Formal notations	Peter Naur's contribution	Computing vs. Human Thinking	Conclusion
OO	O	OO	OOO
O	O		
O	OOO		

Art and practice of computer programming

Citation

An example of the \cite command to cite within the presentation:

This statement requires citation [1].

Computing Versus Human Thinking

- Description of computers
- Description of human thinking

Discussion

Do you think that human thinking will be formally describable?

Importance of formal notation

For achieving clarity any formal mode of expression should be used, not as a goal in itself, but wherever it appears to be helpful to authors and readers alike.

(Peter Naur)

Formal notations
○○
○
○

Peter Naur's contribution
○
○
○○○

Computing vs. Human Thinking
○○

Conclusion
○●○

The End

References

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— wikimedia commons, the free media repository, 2020.
[Online; accessed 8-November-2020].

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