



educational engineering lab

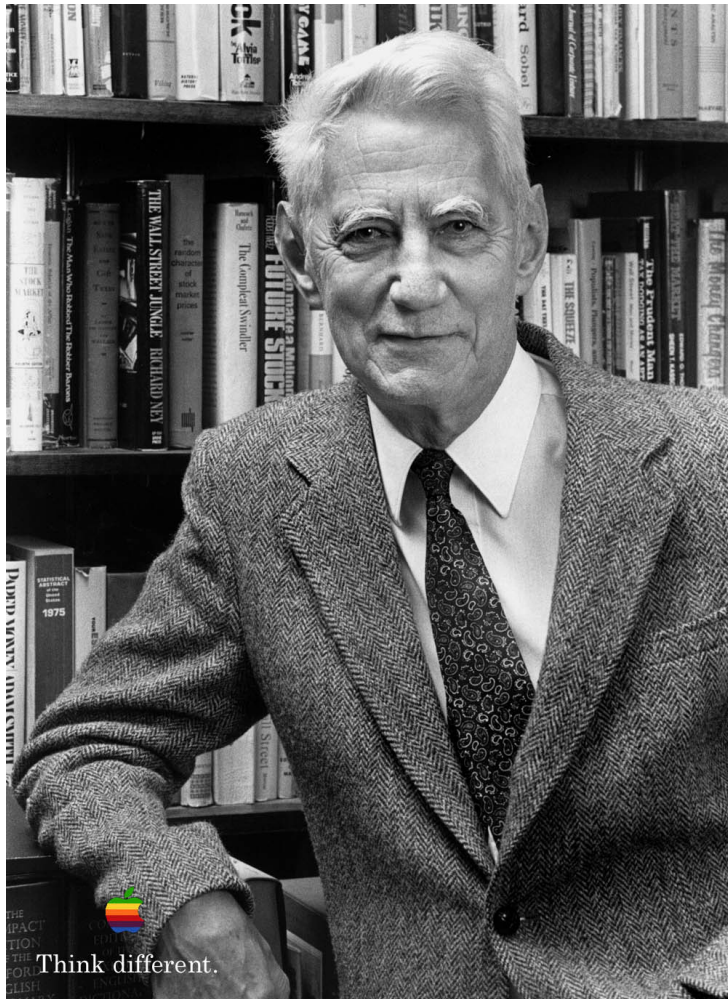
Department for Information Technology
University of Zurich

Formale Grundlagen der Informatik I HS 2008

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Informationstheorie

Claude Shannon 1916-2001

Mittlerer Informationsgehalt $H = \sum p_i \log_2 1/p_i$ [bit]

Mittlere Wortlänge $L = \sum p_i l_i$ [bit]

Redundanz $R = L - H$ [bit]

Informationsgehalt eines Wortes
(10 Millionen Wörter
mit unterschiedlichen Wahrscheinlichkeiten)

Mittlerer Informationsgehalt $H \sim 11.8$ bit
Mittlere Wortlänge $L = 5.7$ Buchstaben

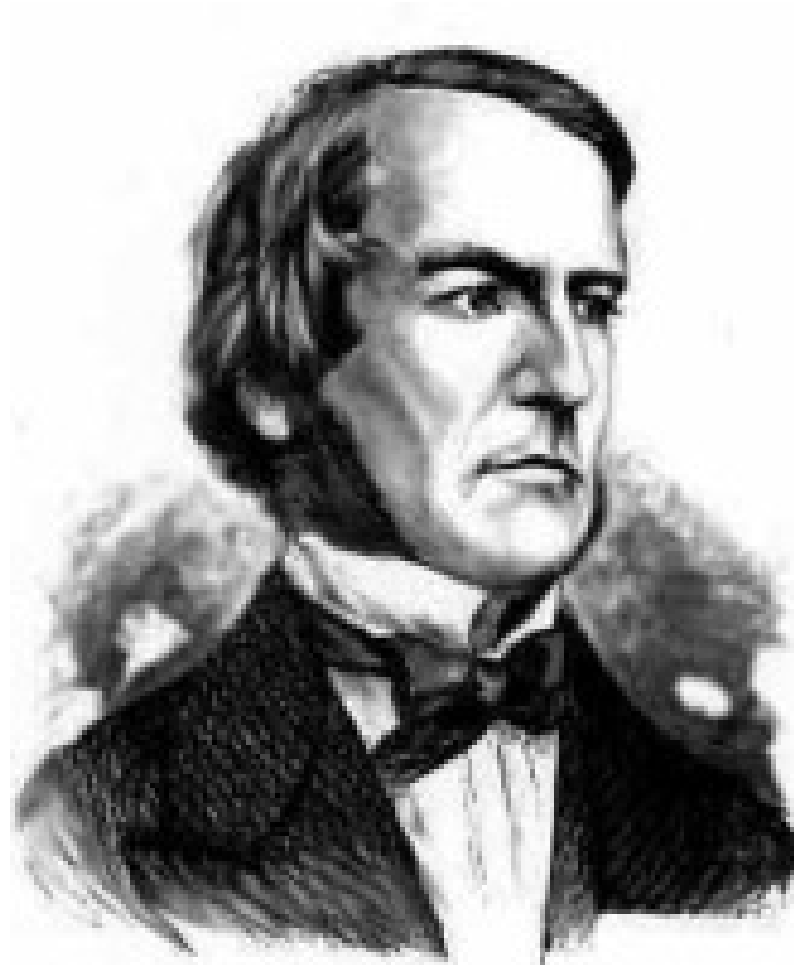
Informationsfluss beim Lesen

**25 Buchstaben pro Sekunde
entspricht 50 bit/s**

**(In 60 Jahren kann ein Mensch etwa $3 \cdot 10^{10}$ bit
aufnehmen)**

Speicherkapazität des Gehirns $\sim 10^{12}$ bit

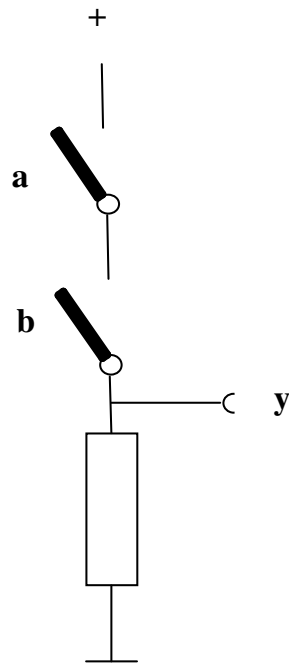
Erbinformation $\sim 10^{10}$ bit



Boole'sche Algebra

George Boole 1815 - 1864

Konjunktion (and)



Serienschaltung

$$y = a \wedge b$$

a	b	y
0	0	0
0	1	0
1	0	0
1	1	1

$$0 \wedge 0 = 0$$

$$0 \wedge 1 = 0$$

$$1 \wedge 0 = 0$$

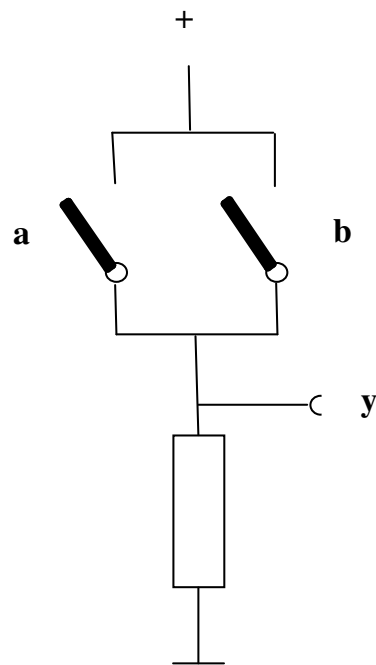
$$1 \wedge 1 = 1$$

$$x \wedge 0 = 0$$

$$x \wedge 1 = x \text{ (neutrales Element 1)}$$

$$x \wedge x = x \text{ (Idempotenz)}$$

Disjunktion (or)



Parallelschaltung

$$y = a \vee b$$

a	b	y
0	0	0
0	1	1
1	0	1
1	1	1

$$0 \vee 0 = 0$$

$$0 \vee 1 = 1$$

$$1 \vee 0 = 1$$

$$1 \vee 1 = 1$$

$$x \vee 0 = x \text{ (neutrales Element 0)}$$

$$x \vee 1 = 1$$

$$x \vee x = x \text{ (Idempotenz)}$$

Prädikatenlogik

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Gottlob Frege 1848-1925

All-Quantor

$(i): B(i): Z(i)$

All $i: B(i): Z(i)$

Z(i) gilt für alle i aus dem Bereich B(i)

All $i: \text{false}: Z(i) = \text{true}$

Existenz-Quantor

$\exists(i): B(i): Z(i)$

Ex i: B(i): Z(i)

Es existiert ein i im Bereich B(i) für das Z(i) gilt

Ex i: false: Z(i) = false

Programmentwicklung

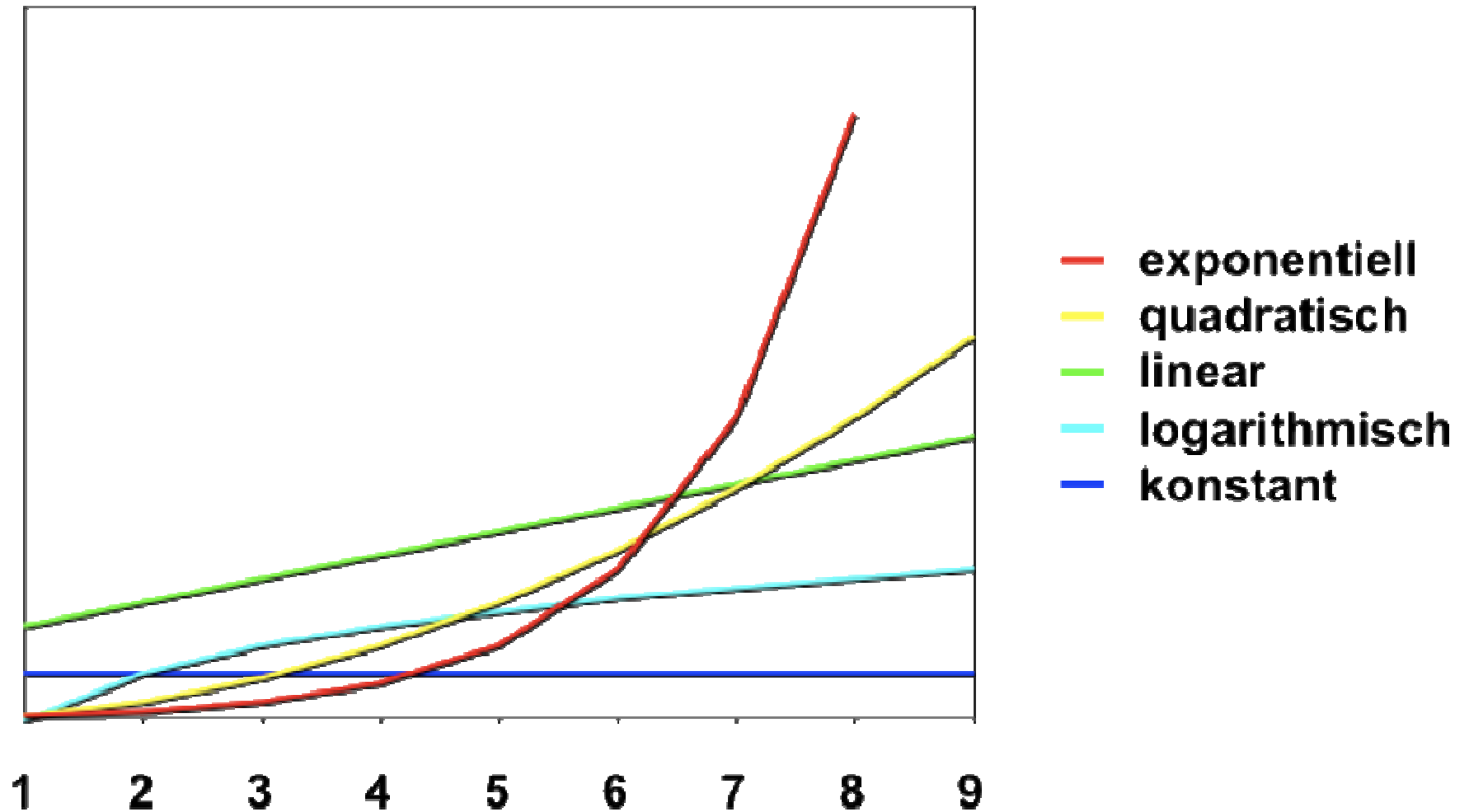


Edsger Wybe Dijkstra (1930-2002)

Komplexitätstheorie



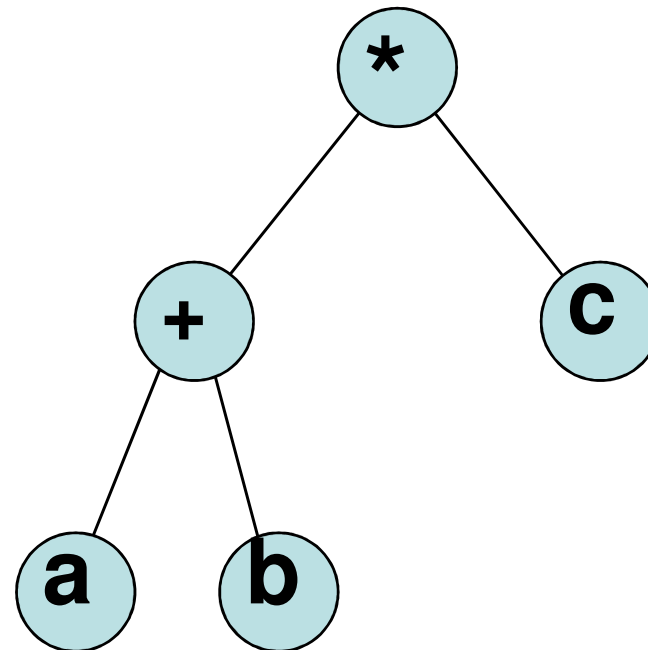
Typische Ordnungen von Funktionen





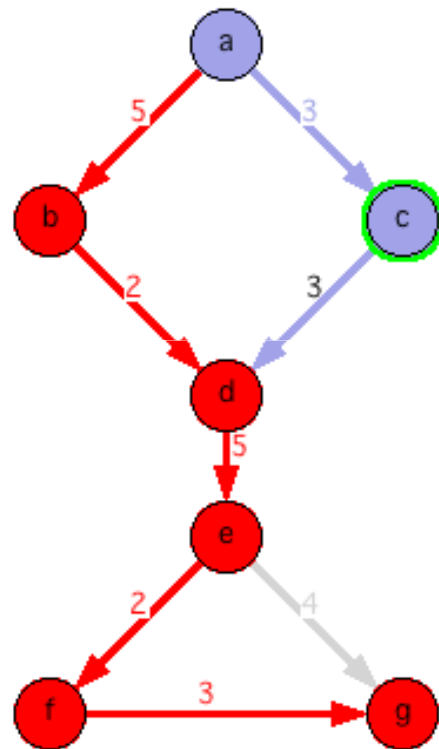
Baumstrukturen

Beispiel:
Arithmetischer Ausdruck $(a+b)*c$



preorder: $*+abc$
inorder: $(a+b)*c$
postorder: $ab+c^*$

Graphen




GraphWorkbench


graphs ◀ ▶ directed
 algorithms weighted
 options euclidean

- depth-first traverse
- breadth-first traverse
- critical nodes
- critical edges
- connected components
- biconnected components
- weak components
- strong components
- euler paths
- hamilton cycles
- travelling salesman
- min spanning tree (Dijkstra/Prim)
- min spanning tree (Kruskal)
- shortest paths (Dijkstra)
- shortest paths (Floyd)
- transitive closure (Warshall)
- topological sort
- network flow
- optimum matches

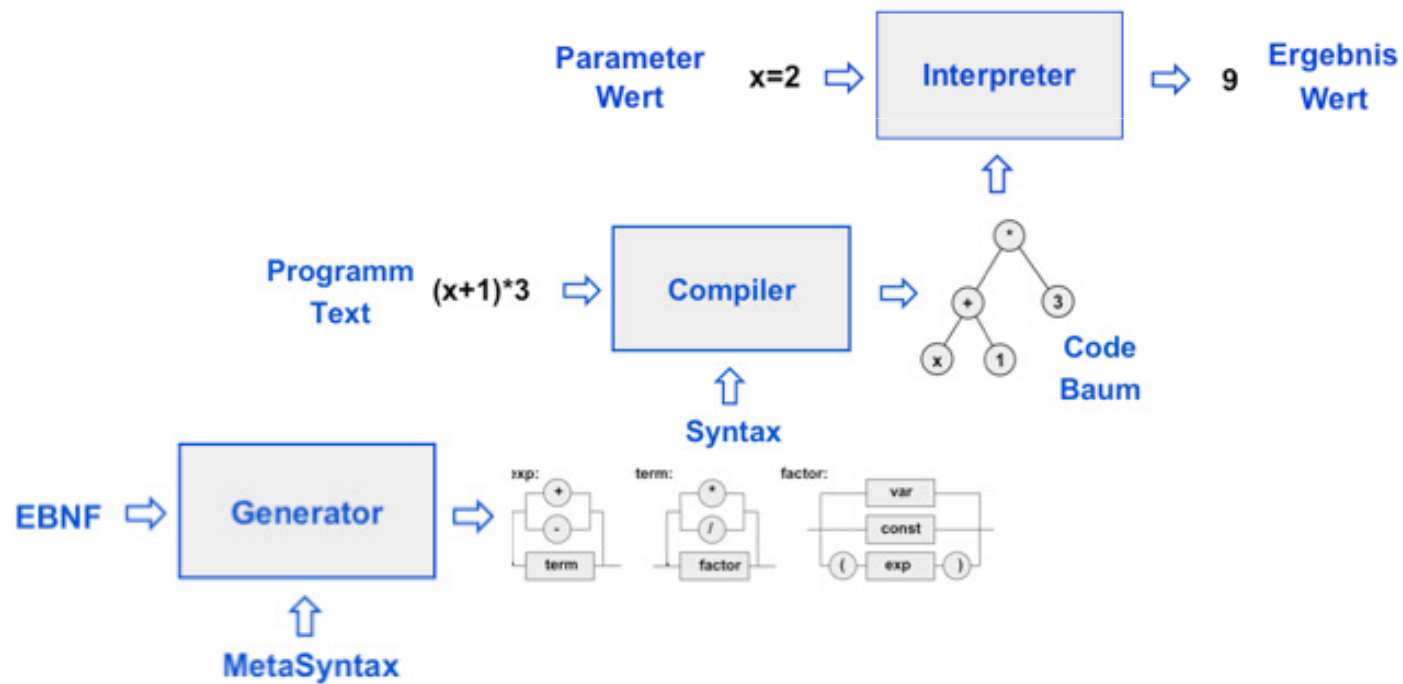
?

Pad-Bak-Bon-Gre-Wes-Wat (5)



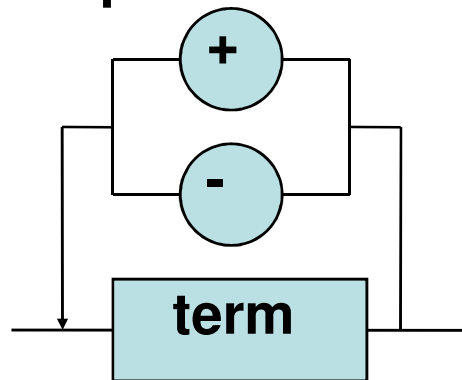


Syntaxanalyse

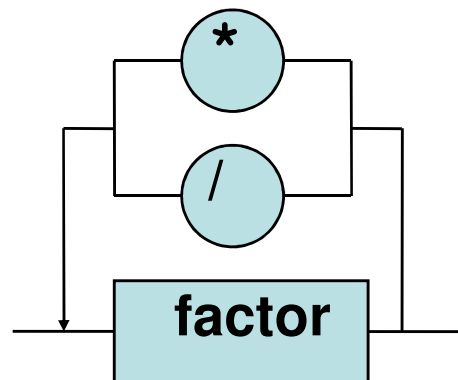


Beispiel: Syntaxdiagramme für arithmetische Ausdrücke

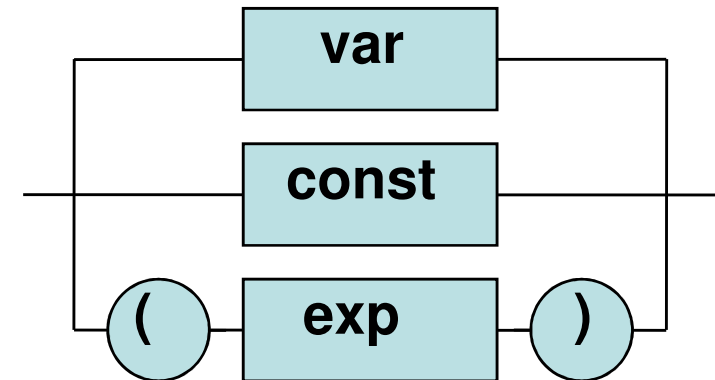
exp:



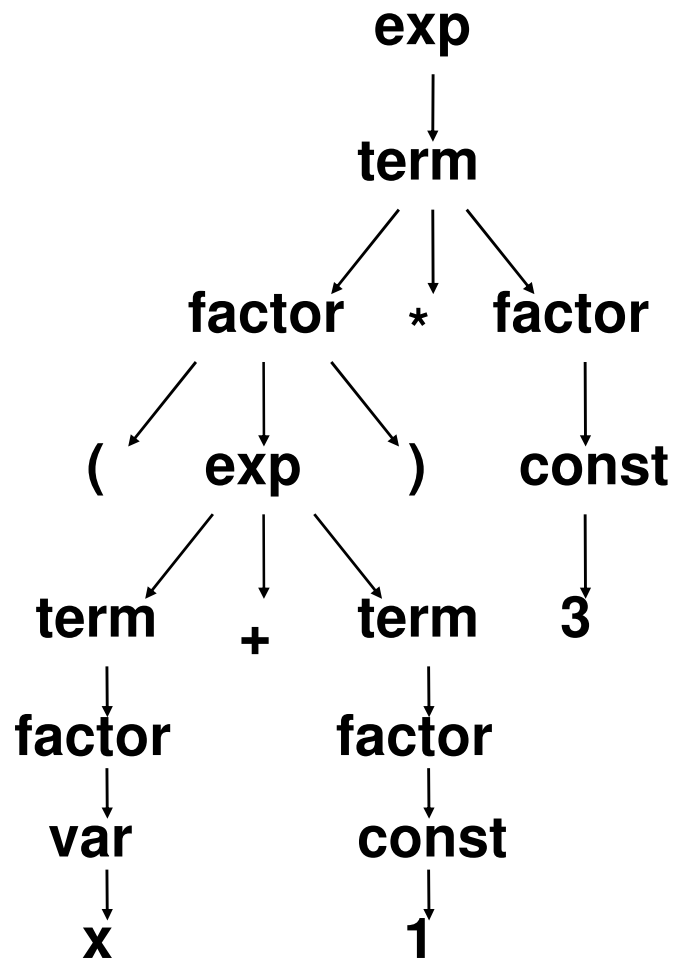
term:



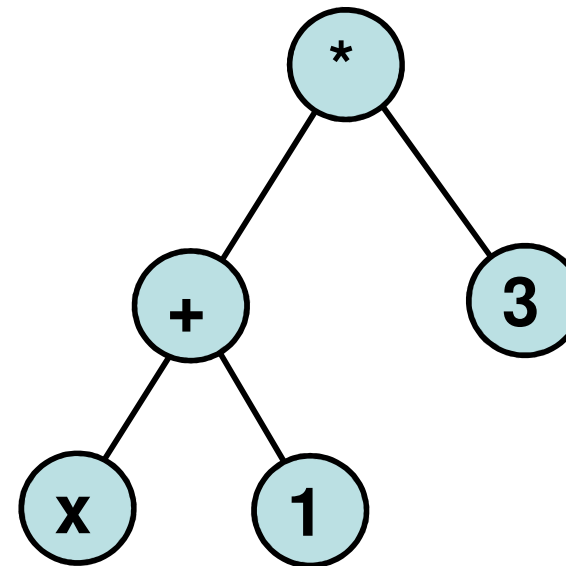
factor:



Beispiel: $(x+1)*3$



Parsebaum



Codebaum

Links



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Links



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Links

vorlesung www.ifi.uzh.ch/ee/teaching/hs08/form_grund/
übungen www.olat.uzh.ch
slides www.ifi.uzh.ch/ee/download/slides/
applets www.ifi.uzh.ch/ee/download/applets/

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slides www.ifi.uzh.ch/ee/download/slides/
applets www.ifi.uzh.ch/ee/download/applets/

Franziska Spring (Adaptive Games)



spring@ifi.uzh.ch

www.mfft.ch

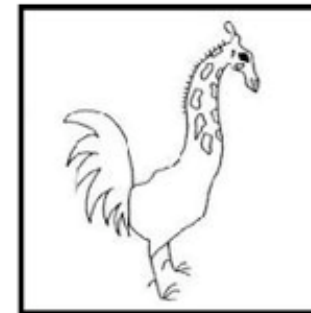
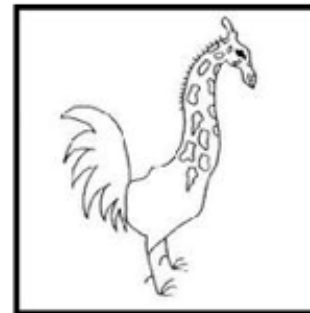
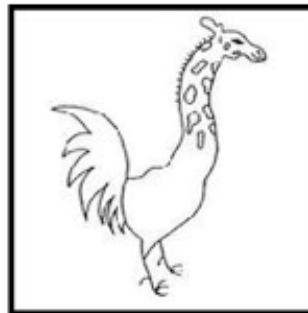
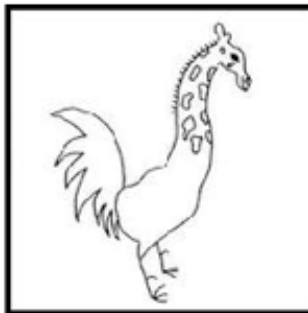
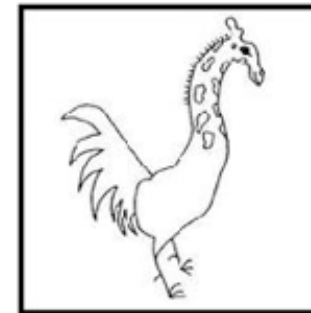
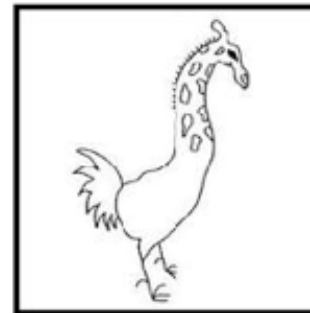
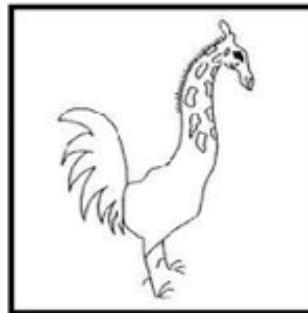
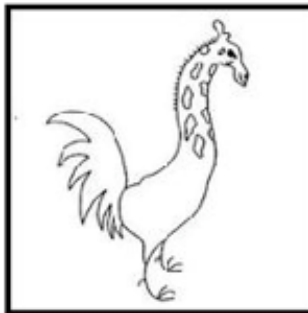
Matching Familiar Figures Test (MFFT20)

Click on the picture below that is identical to the main picture above.

If the screen flashes red, try again until you advance to the next display screen.



Picture No. 17



Hortus



The screenshot displays the Hortus game interface. At the top, a status bar shows a character icon, a life bar, 85\$, a house icon with "10 of 10 people are still sick.", and a "Next Potion:" icon with "0 / 5".

On the left, a vertical toolbar contains icons for a shovel, a watering can, a pair of scissors, a trowel, a bag of seeds, and a glass jar.

The main game area shows a diamond-shaped field with a character and a plant. A "Mission 1" window is open, titled "Brew mixture for curing 'Crampitis' Sickness". It shows a "Have/Need leaves" progress of "0 / 5" and a "brew potion" button. Below the mission window, a group of people icons is shown with the text "5 people healed per potion" and a "use potion" button. A "10 people are still sick." notification is also visible.

The "The herb seeds shop" window is open, displaying a grid of items for sale:

Item	Price	Quantity
Cukoas	5	0
Dormitus	5	0
Crampitis Noci	0	0
Sensibilus	5	0
Crampitis Nibalis	0	0
Dulcita	5	0
Crampitis son	0	0
glass	20	0

A "Total:" button is located at the bottom right of the shop window.

At the bottom, a navigation bar includes "Shop", "Inventory", "Brewery", "Books of Knowledge", "Menu", and a mood indicator with a "send" button.

Hortus

Das online Experiment besteht aus zwei Teilen:

1.

Tests und Fragebogen

Dauer: ca. 30min

Der MFFT sollte ohne Unterbruch gemacht werden, da sonst die Ergebnisse nicht evaluiert werden koennen.

2.

Spiel Hortus

Dauer: ca. 60-90min

Bitte versuchen, das Spiel nicht abubrechen. Falls das Spiel verloren ist, traegt das auch zur Datenerhebung bei, jedoch nicht ein Abbruch.

Wo:

<http://project-hortus.net/>