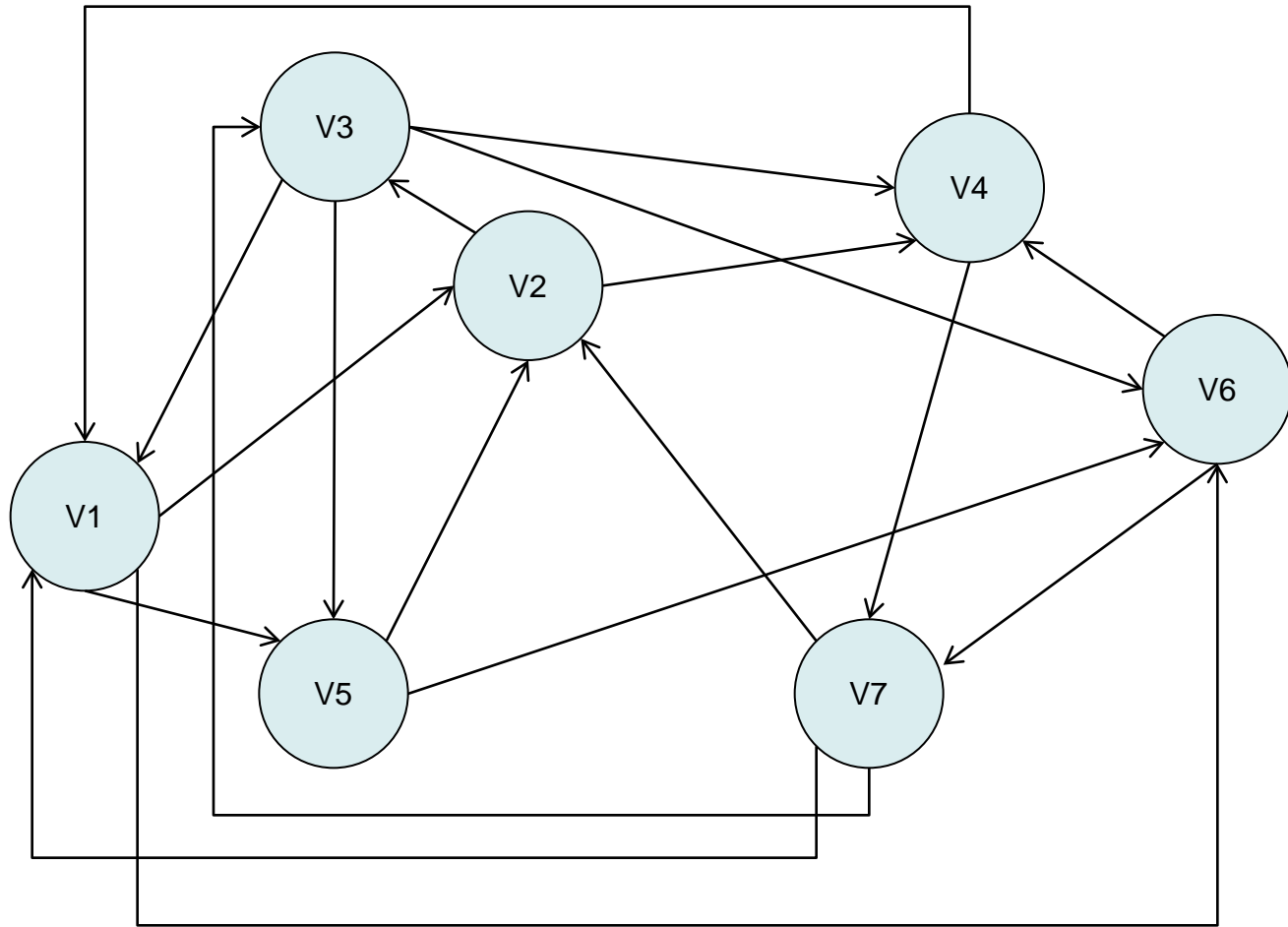# Übung zur Vorlesung
Informationsvisualisierung

Emanuel von Zezschwitz

Ludwig-Maximilians-Universität München

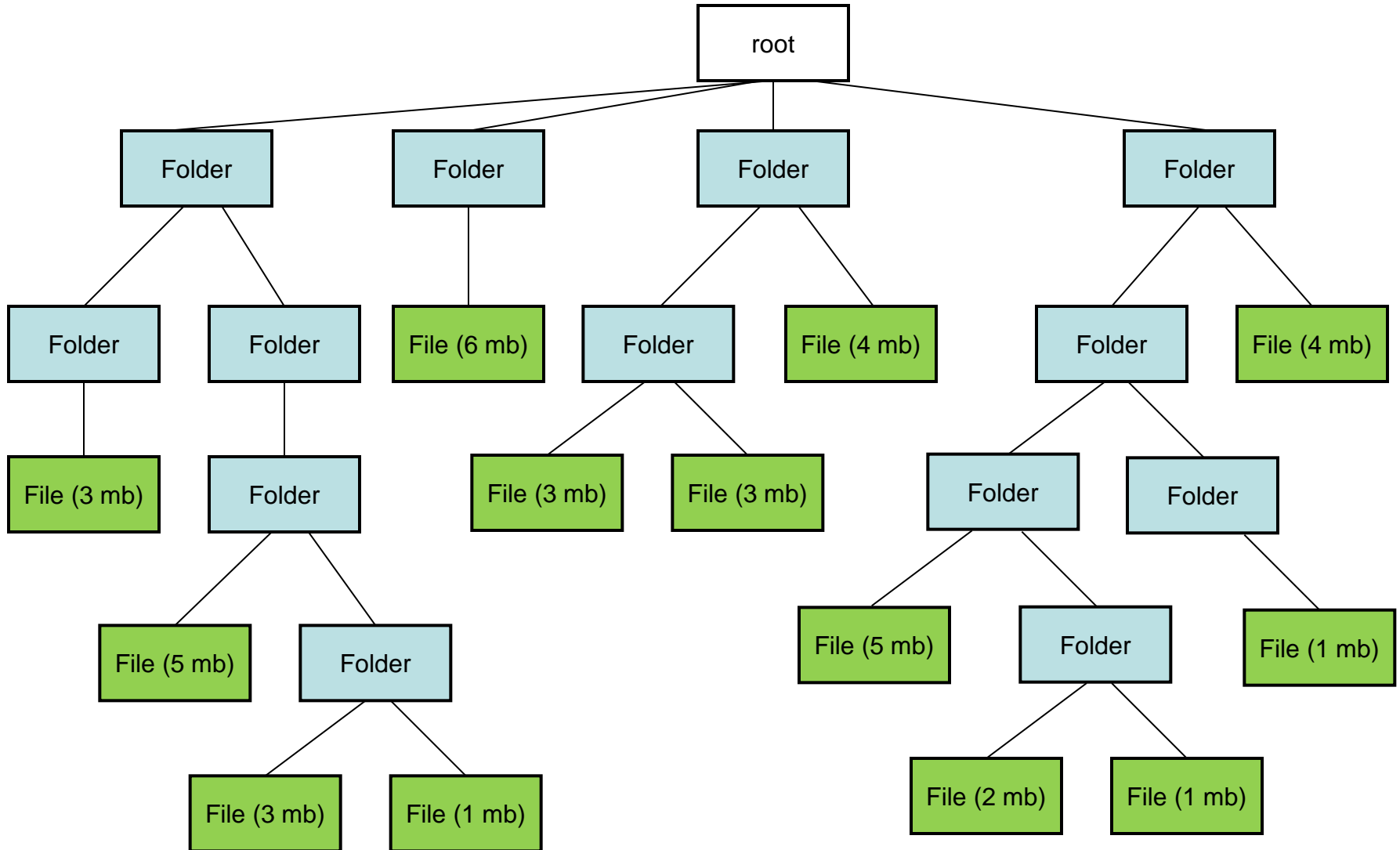Wintersemester 2012/2013

Solution
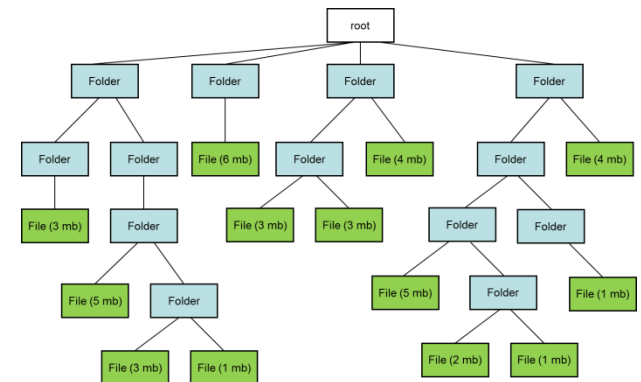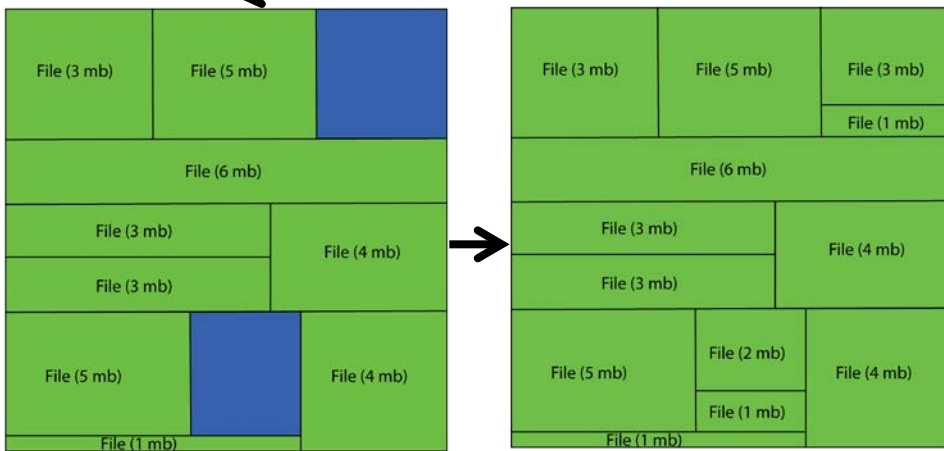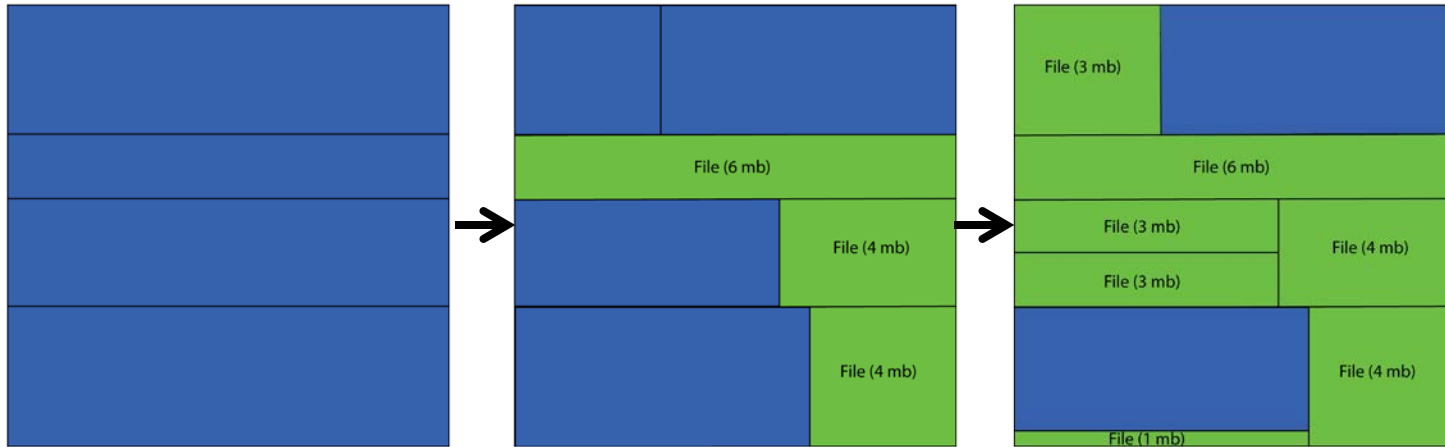# Exercise 6

Exercise 6 - 1 a)

Exercise 6 – 1 b) and c)

- b) Zahlen > 1 stehen für gewichtete Kanten
- c) Der Graph ist gerichtet. Beispiel: eine 1 bei V1 zu V5 aber nicht anders herum

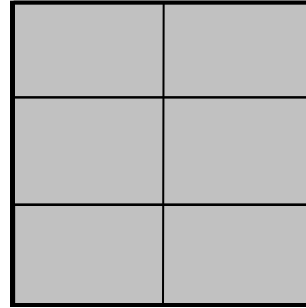|	V1	V2	V3	V4	V5	V6	V7
V1	0	1	0	0	1	1	0
V2	0	0	1	1	0	0	0
V3	1	0	0	1	1	1	0
V4	1	0	0	0	0	0	1
V5	0	1	0	0	0	1	0
V6	0	0	0	1	0	0	1
V7	1	1	1	0	0	0	0

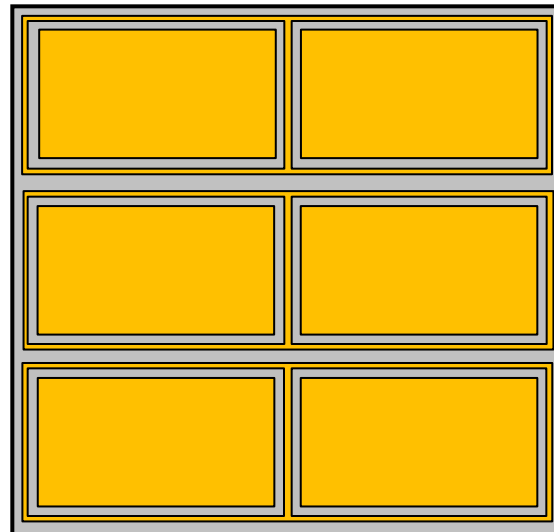# Exercise 6 - 2 a)

Exercise 6 - 2 b)

Exercise 6 - 2 c)

- Vorteile:
  - Reihenfolge geht nicht verloren => serielle Suche möglich (readability)
  - Einfach
  - Geringe Änderung der Treemap bei Änderung an Knoten (change)
- Nachteile
  - Seitenverhältnisse können extrem werden wodurch verschiedene Elemente in ihrer Größe schwer zu unterscheiden sind (ratio)
  - Beschriftung kann dadurch schwer werden

Exercise 6 - 3 a)

- Die Information der zweiten Ebene Verzeichnisse geht komplett verloren. Lösung: nested treemaps, die auch noch die Vorgänger anzeigen.
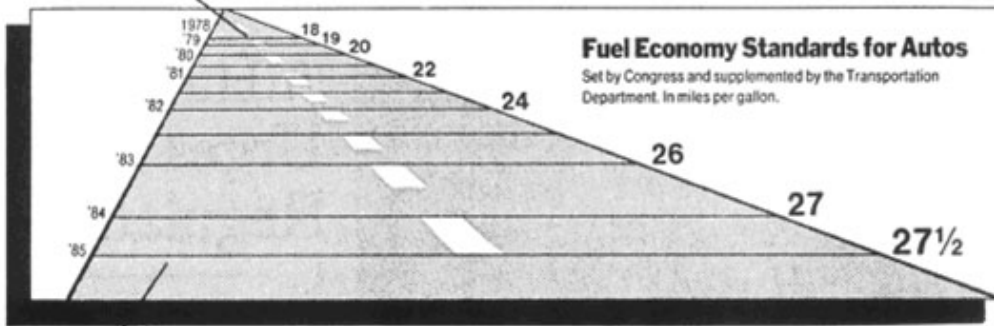
Recapitulation of 2012

Chart Theories

Lie Factor

"The representation of numbers, as physically measured on the surface of the graphic itself, should be directly proportional to the quantities represented." [1]

Data-Ink Ratio

"A large share of ink on a graphic should present data-information, the ink changing as the data change. Data-ink is the non-erasable core of a graphic, the non-redundant ink arranged in response to variation in the numbers represented." [1]

Lie Factor or Chart Junk?

This line, representing 18 miles per gallon in 1978, is 0.6 inches long.

Fuel Economy Standards for Autos
Set by Congress and supplemented by the Transportation Department. In miles per gallon.

1978 '79 '80 '81 '82 '83 '84 '85
18 19 20 22 24 26 27 27½

This line, representing 27.5 miles per gallon in 1985, is 5.3 inches long.

MONSTROUS COSTS
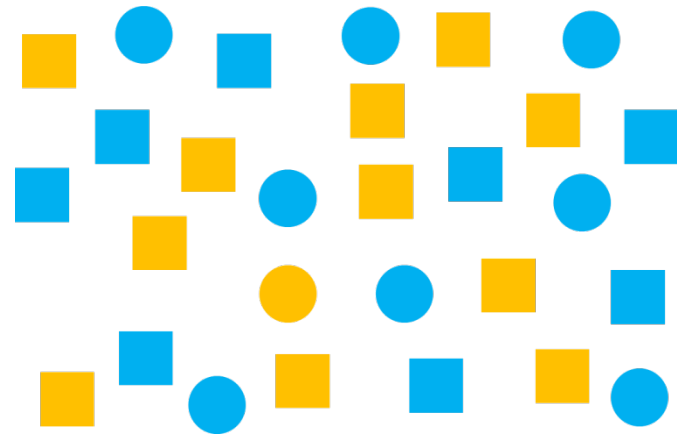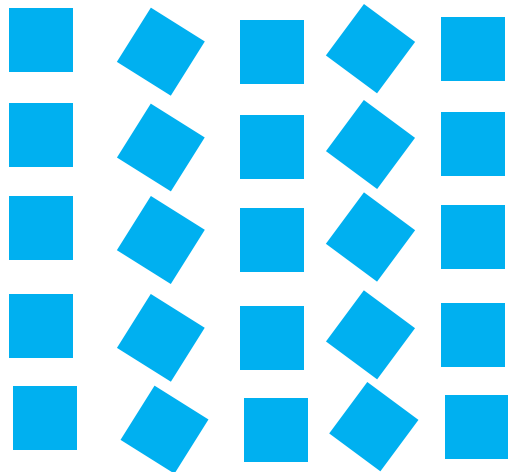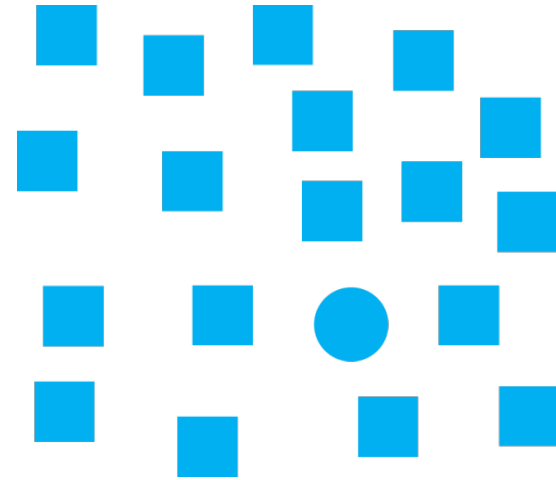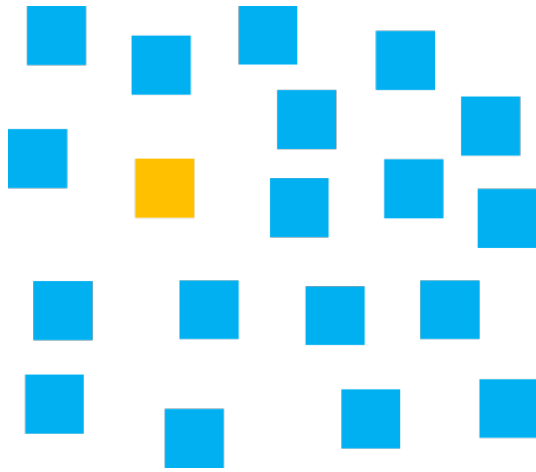Total House and Senate campaign expenditures, in millions

$300 250 200 150 100 50
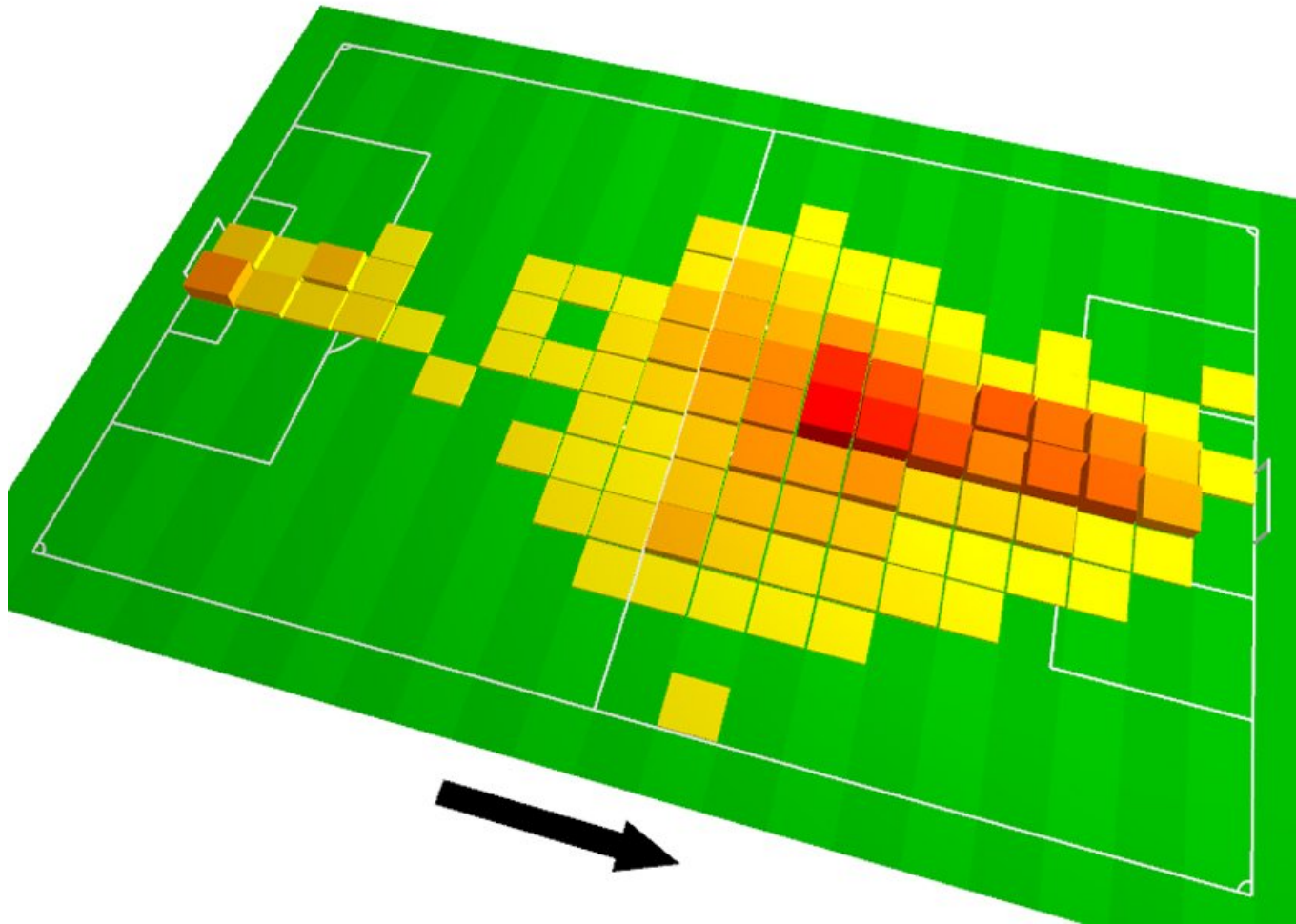
1972 '74 '76 '78 '80 '82 est.

VOTE

[2]

MONSTROUS COSTS
Total House and Senate campaign expenditures, in millions
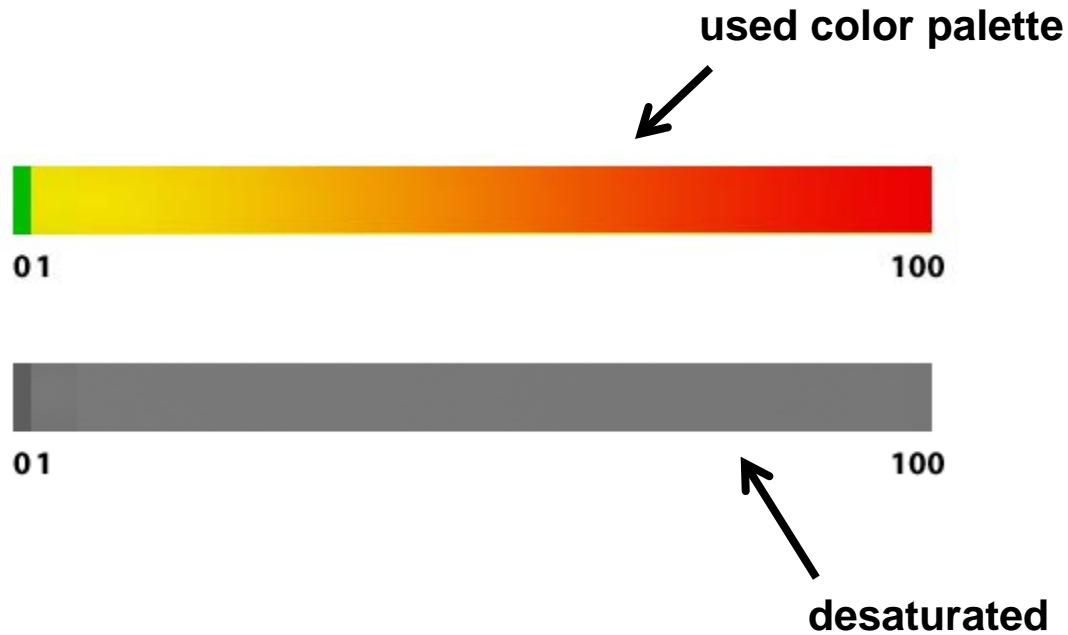
Perception and Visualization
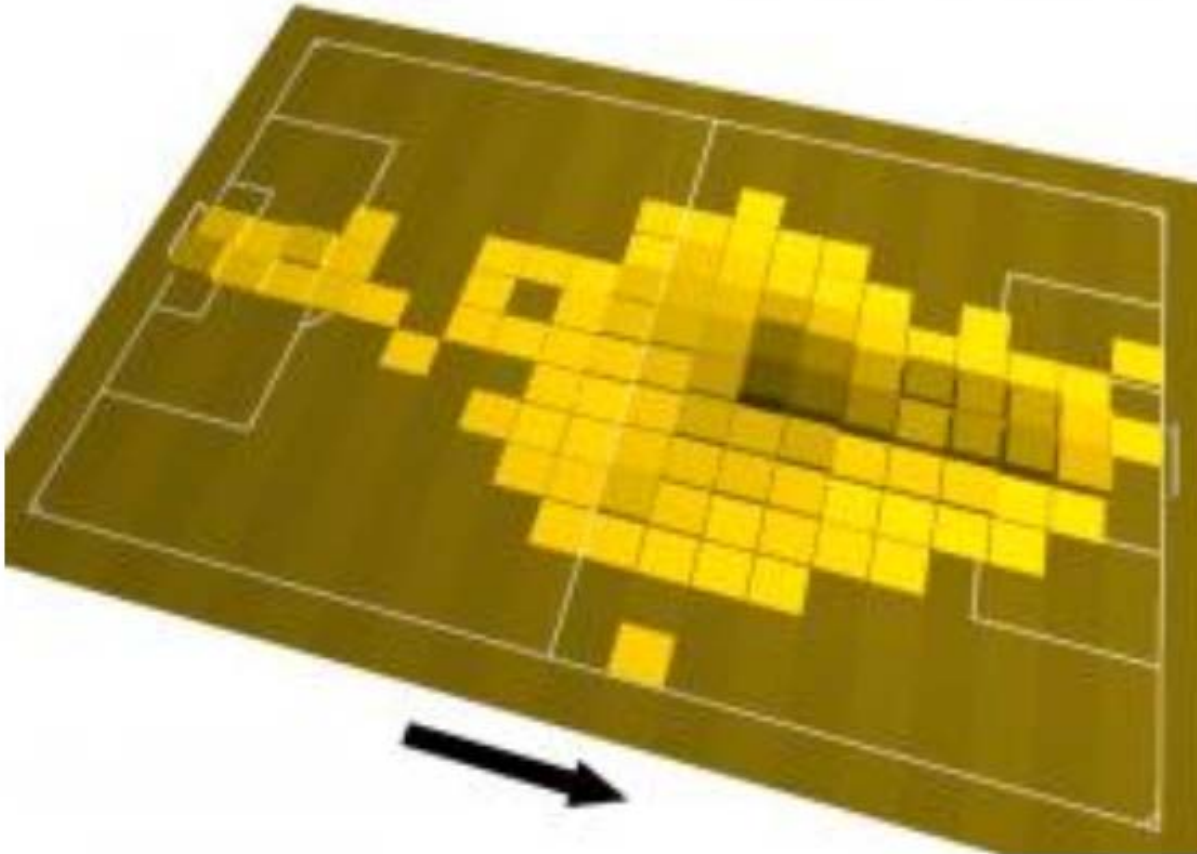
Preattentive Perception

Visualization and Perception

© Spiegel online

Visualization and Perception

used color palette

01   100

01   100

desaturated

Visualization and Perception

as perceived by a red-green color blind
(http://www.etre.com/tools/colourblindsimulator/)
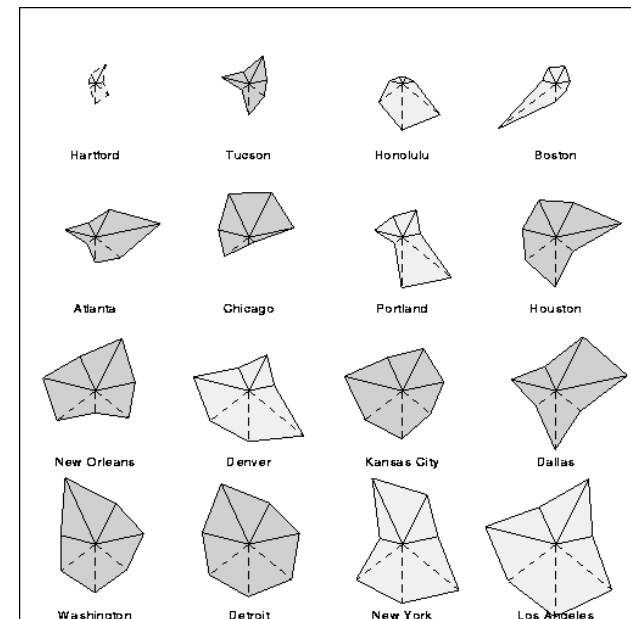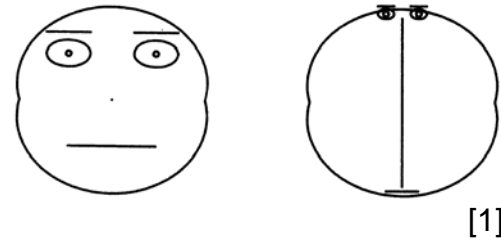
Change Blindness

Multivariate Data

Glyphs

- Small-sized visual symbols
- Variables are encoded as properties of glyph
- Each case is represented by a single glyph

- **Main Limitation**: Have to be learned
- Not suitable for large data sets.

- Example: Star Glyphs

Chernoff Faces

- Theory
  - Humans are able to recognize small changes in facial characteristics
  - Data is encoded by stylized faces using up to 18 characteristics

[1]

- Limitations
  - Extreme values negatively influence the impression of a face and the recognition of other values [1]
  - Experiments [2] reveal that recognition of Chernoff faces is a serial process and thus there is no significant advantage over other iconic visualization
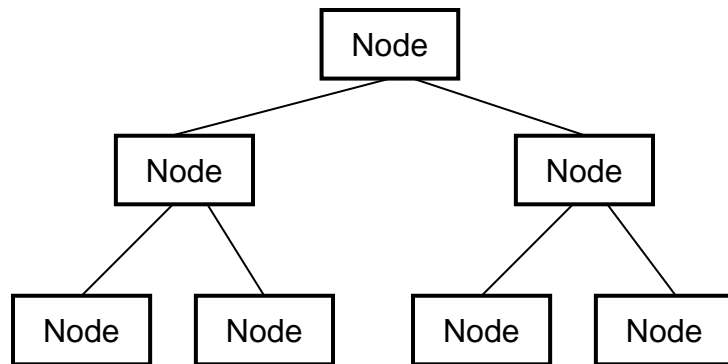
Interaction

Interaction

© https://maps.google.com/

Hierarchy and Trees

Node-Link vs. Enclosure

http://newsmap.jp/

- Immediate perception of relations
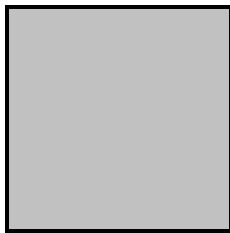- Waste of screen real estate

- Space-filling
- Focus on leaf nodes
- Structure gets lost

Treemap Algorithms

Slice-and-Dice

- Algorithm:
  - Use parallel lines to divide a rectangle representing an item into smaller rectangles representing the item's children
  - Each child is allocated a size proportional to some property (additional encoding by color)
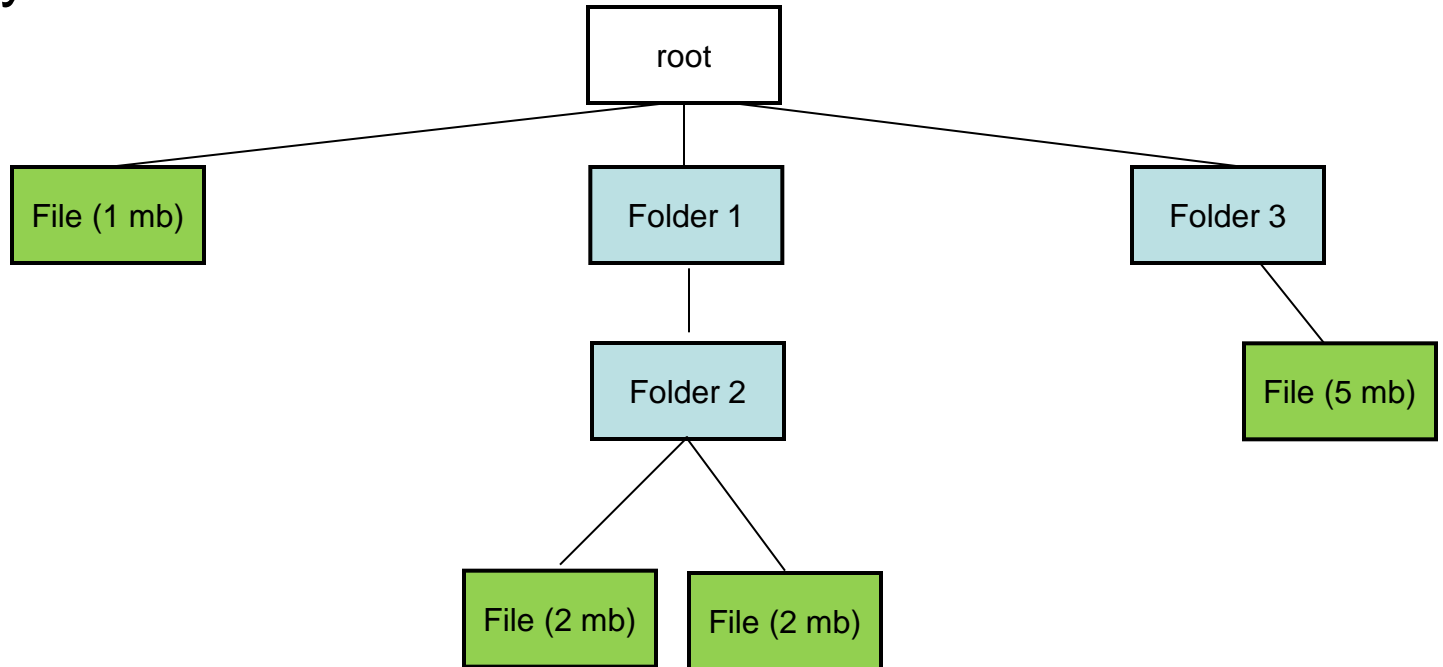 - At each level of the hierarchy switch the orientation of the lines (vertical vs. horizontal)

1.	2.	3.

Slice and Dice

- Filesystem:

Slice and Dice

- Solution:

Text and Documents

Thread Arcs

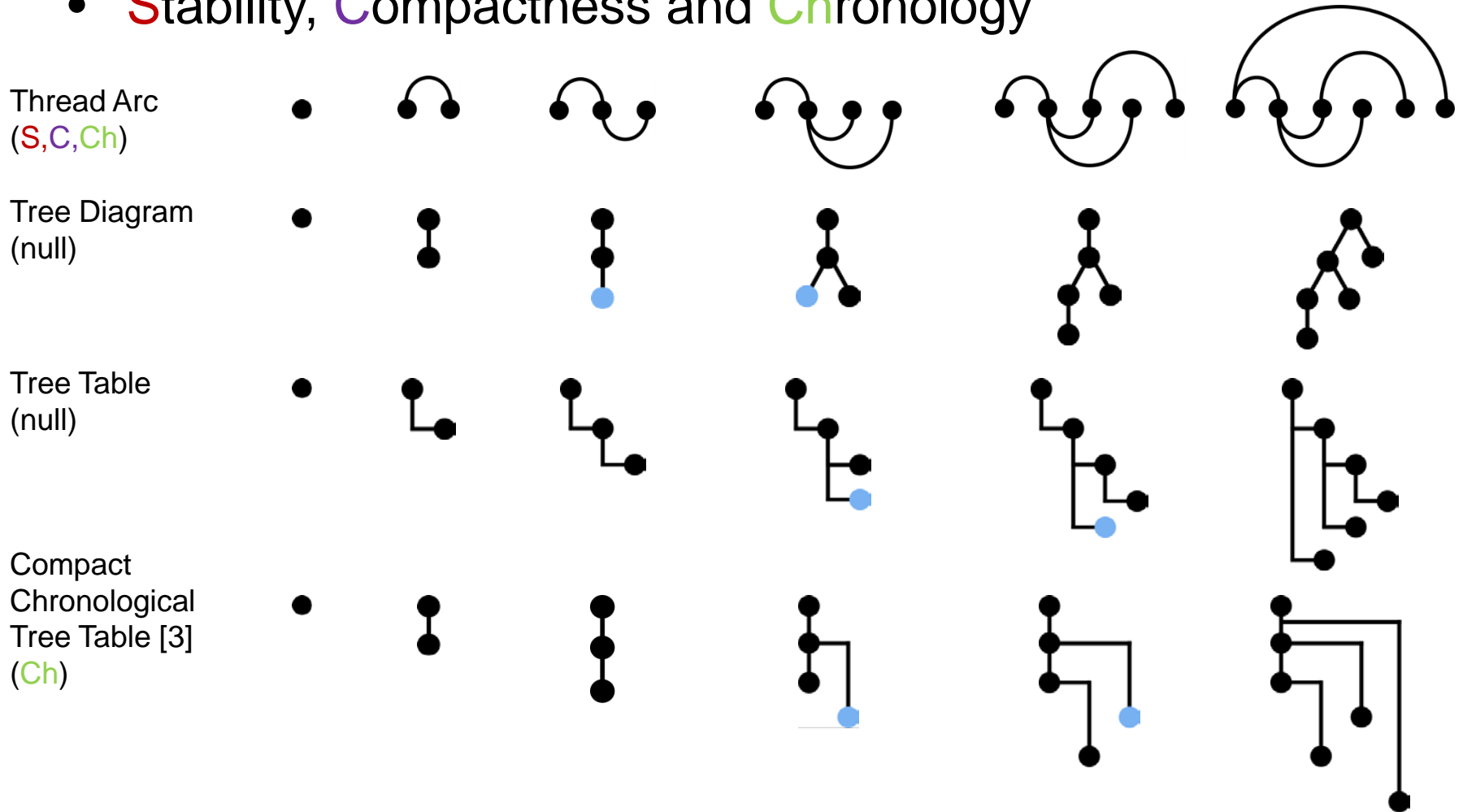- Stability, Compactness and Chronology

Thread Arc
(S,C,Ch)

Tree Diagram
(null)

Tree Table
(null)

Compact
Chronological
Tree Table [3]
(Ch)

[2]

Thread Arcs

Generation depth:

- ## Pseudo-code [2]:

sort all messages chronologically
find the generation depth of each message

for each message

    if the message is the root then

        place the node at the starting position and don't draw an arc

    else

        place the message to the right of the last message
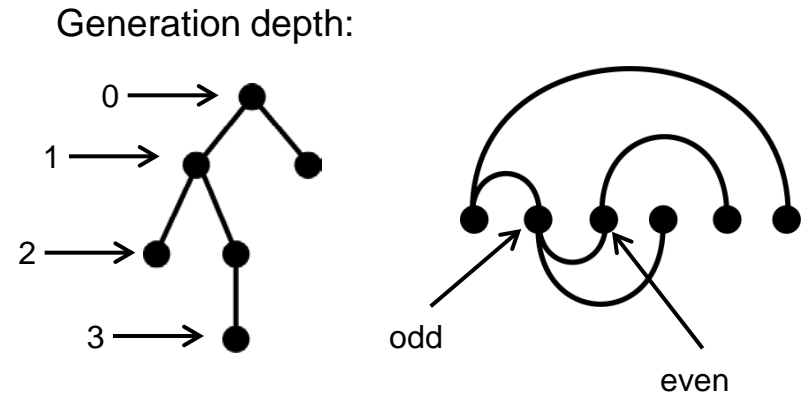
        if the message generation depth is odd then

            draw an arc above the line to the message's parent
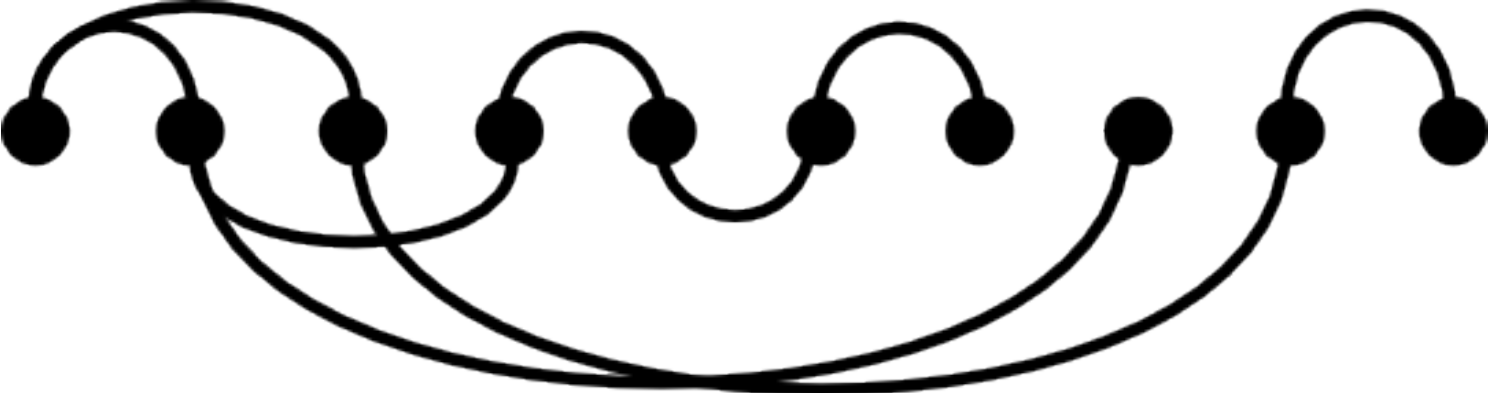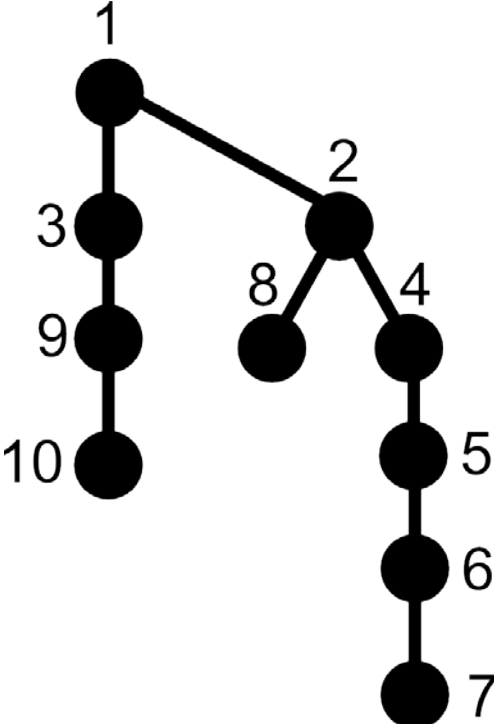
        else

            draw an arc below the line to the message's parent

next message

Create a thread arc for the following message structure (represented as a tree diagram).

The number represent the chronological order.

Klausur

- **12. Februar: 10:00-12:00 Uhr**
- **Anmeldung ab sofort möglich**
- **Abmeldung bis 10. Februar 23:59**
- **Closed Book**

- **Klausurvorbereitungen in den Übungen**

References

1. Edward Tufte. The Visual Display of Quantitative Information. Second Edition, Graphics Press, USA, 1991.

2. Nigel Holmes. Designer's Guide to Creating Charts and Diagrams, Watson-Guptill Publications, 1984.