

# Optimization

Reading Club: Biomimicry „Bionics“ WS 13/14

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# Optimization

The term "optimization" is a relative term. Is not optimized "in itself", but always for certain situations, for certain criteria, subject to certain requirements.

Example of optimization criteria:

- weight
- stress
- displacement
- natural frequency
- ...

## Main sources:

Oertel/Grunwald, Potenziale und Anwendungsperspektiven der Bionik;  
Arbeitsbericht Nr. 108, Page: 34, TAB Deutscher Bundestag, 2006

Harzheim Lothar, Strukturoptimierung Grundlagen und Anwendung;  
Verlag Harri Deutsch / Europa, 2008

**C. Mattheck, Teacher tree: The evolution of notch shape optimization  
from complex to simple; Engineering Fracture Mechanics, pages 1732-  
1742, Elsevier 2006**

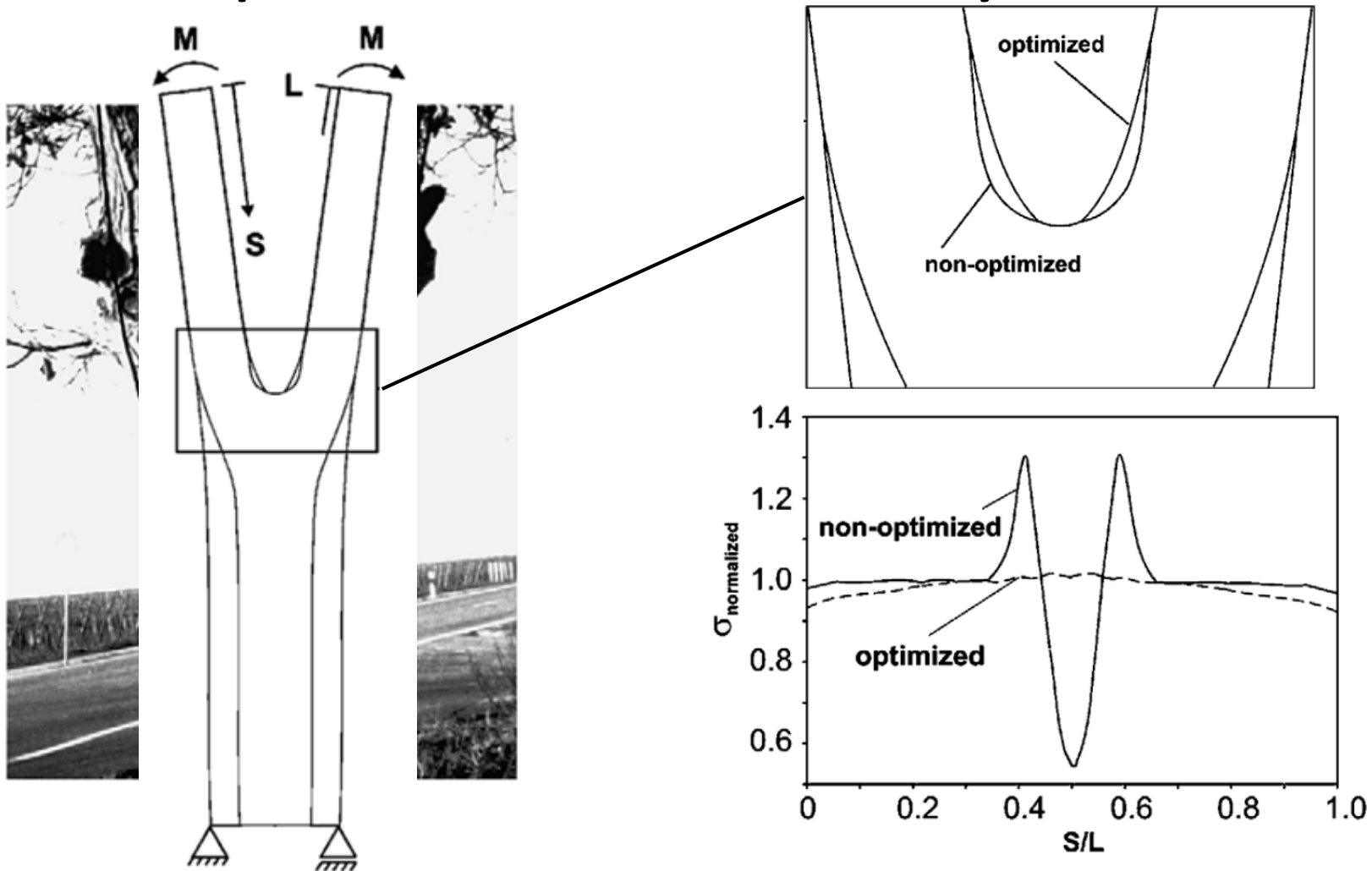
# The way to the optimal design

- As we know, the nature has had enormous time to develop the most adequate structures for particular loadcases
  - theory of evolution

For the engineering:

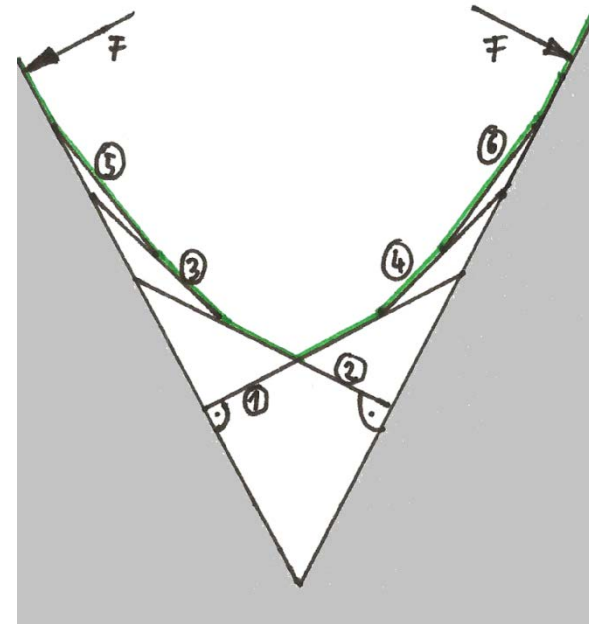
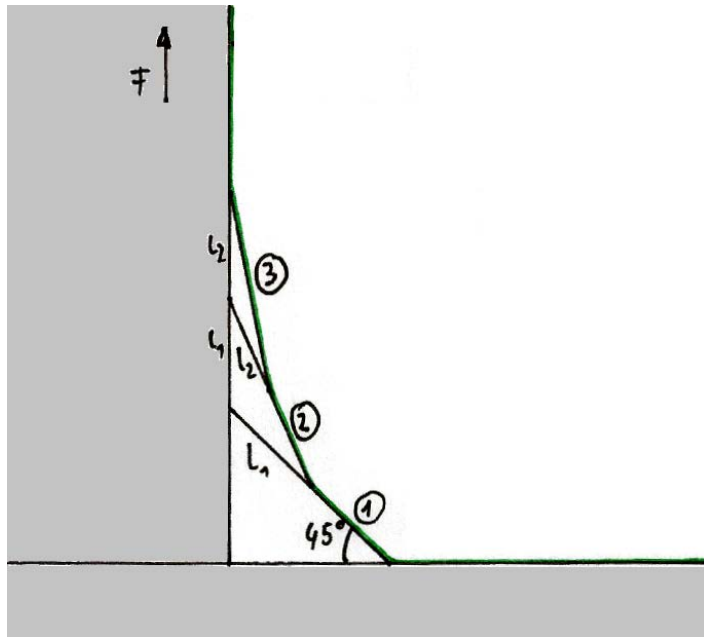
- Bionical Rule of growth
- Computer Aided Optimization (CAO) and Soft Kill Option (SKO)
- Topology Optimization

# An optimized structure by the nature



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Engineering Fracture Mechanics, pages 1732-1742, Elsevier 2006

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# Optimization - procedures

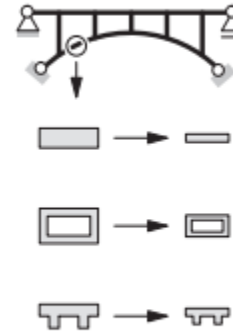
Topology Optimization



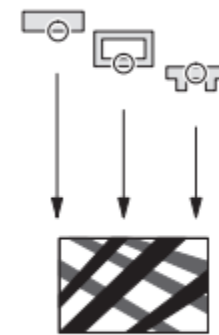
Shape Optimization



Design Optimization



Material Design



pixel method: [topopt](#)

reference: Verbesserter Materialeinsatz innovativer Werkstoffe durch die Topologieoptimierung; Page: 39, **Verlag fehlt, Jahreszahl**

## Anmerkungen Prof. Niedermeier:

- **Gliederung fehlt**
  - **„Conclusions“ fehlen**
  - **Detailangaben zur Literatur fehlen zum Teil**
- => besser: „richtiger Zitierstil“ mit Literaturverzeichnis**