

A Breadth-First Approach for Teaching Computer Graphics

Overview

Breadth-First

SIMBA

C & T

Evaluation

Summary

Gitta Domik

Frank Goetz, Monika Schröder

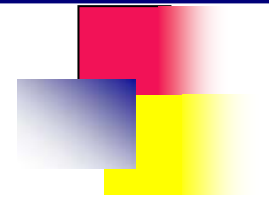
University of Paderborn

Germany



1/23

Overview



Overview

Breadth-First

SIMBA

C & T

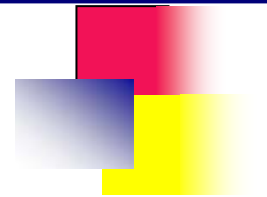
Evaluation

Summary

- Teaching Breadth-First
- SIMBA – An educational tool
- Courses “Creativity & Technology”
- Evaluation of course
- Summary



Teaching Breadth-First



Overview

Breadth-First

SIMBA

C & T

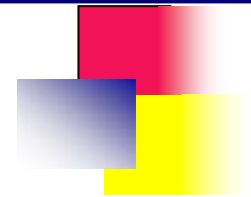
Evaluation

Summary

- CS Computing Curricula 2001
 - Start with holistic view
 - Use broad approach
 - Undermine with application
 - Then use depth
- Advantages
 - Interdisciplinary teaching, women & men, CS students



Interdisciplinary Teaching in CG



Overview

Breadth-First

SIMBA

C & T

Evaluation

Summary

- Computer Graphics for CS and Media Studies
- Computer Graphics for CS and Engineering
-
- Computer Graphics for CS and Arts
-
- „Creativity and Technology“
 - CS: 2 semester project course (2L+2Se+2Lab + 6Proj)
 - Media Studies: 1 semester (2L+1Lab)
 - Teaching tool: SIMBA




Universität Paderborn - AG Domik - SIMBA - Microsoft Internet Explorer

Datei Bearbeiten Ansicht Favoriten Extras ?

BMBF Verbundprojekt

Schlüsselkonzepte der **I**nformatik in **m**ultimedialen **Ba**usteinen

Key Concepts of Computer Science in Multi Media Based Modules



Teilprojekt
Computerbilder

[Überblick](#)
[Motivation](#)

Hinweise für
[Studierende](#)
[Lehrende](#)
[Voraussetzungen](#)

[Medienobjekte](#)

[Publikationen](#)
[zu Simba](#)
[Kontakt](#)
[Das Team](#)
[Impressum](#)


SIMBA

Module for Project
Computer-generated Images

- [Computer-generated Color](#)
- [Digital Image Processing](#)
- [Computer-generated Visualization](#)


- [Computergenerierte Farbe \(alt\)](#)
- [Digitale Bildverarbeitung \(alt\)](#)


- [Flyer](#)



UNIVERSITÄT
PADERBORN

Prof. Dr. Gitta Domik
Visualisierung
Computergrafik
Bildverarbeitung



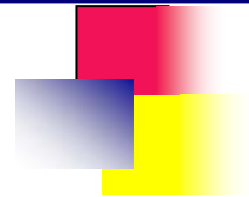


Bundesministerium
für Bildung
und Forschung

Das Bundesministerium für Bildung und Forschung (bmb+f) ist nicht für den Inhalt dieser Webseite verantwortlich.

Webmaster: graphik@upb.de | Letzte Änderung: 15.01.2004

Internet



Overview

Breadth-First

SIMBA

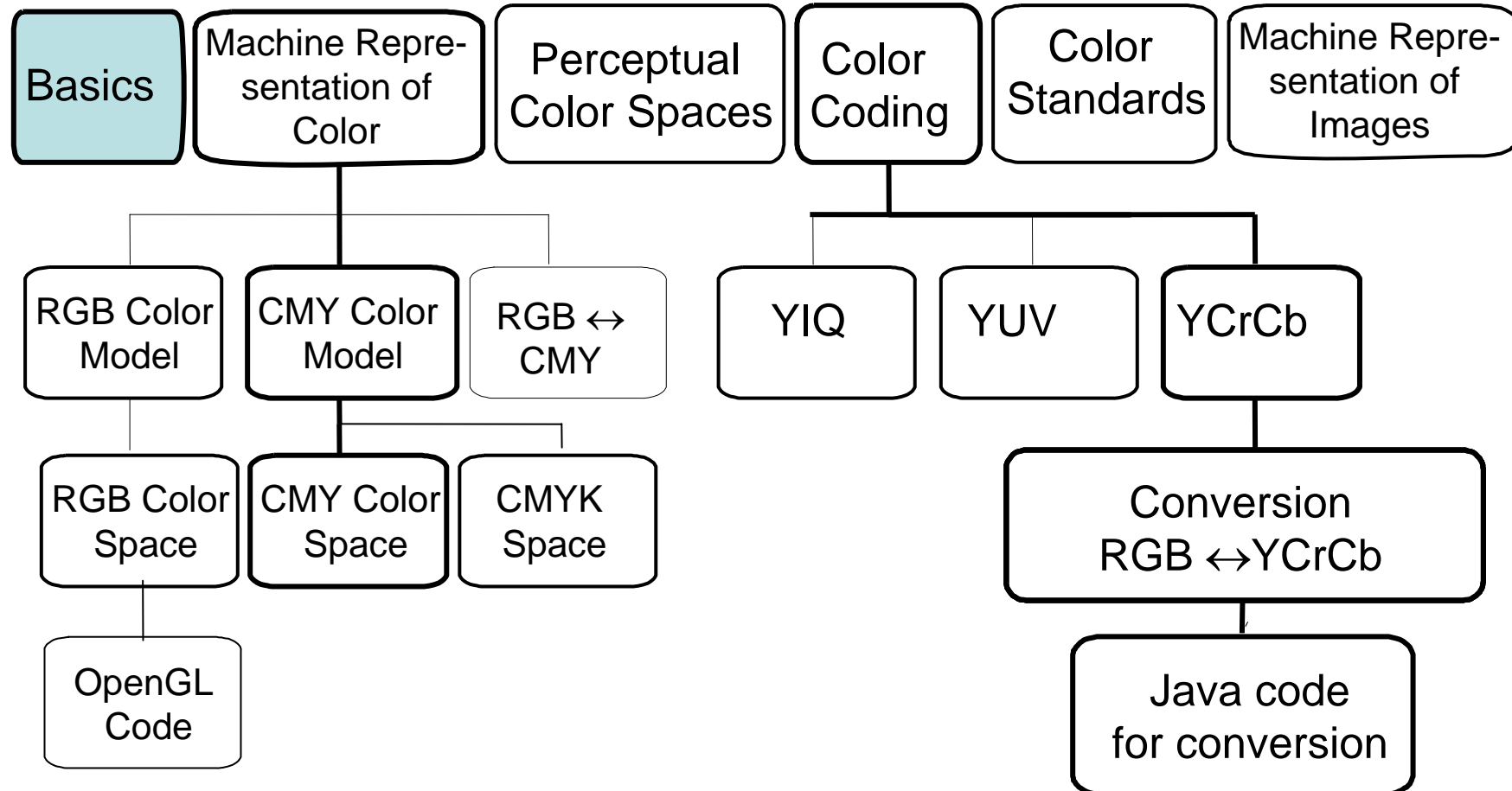
C & T

Evaluation

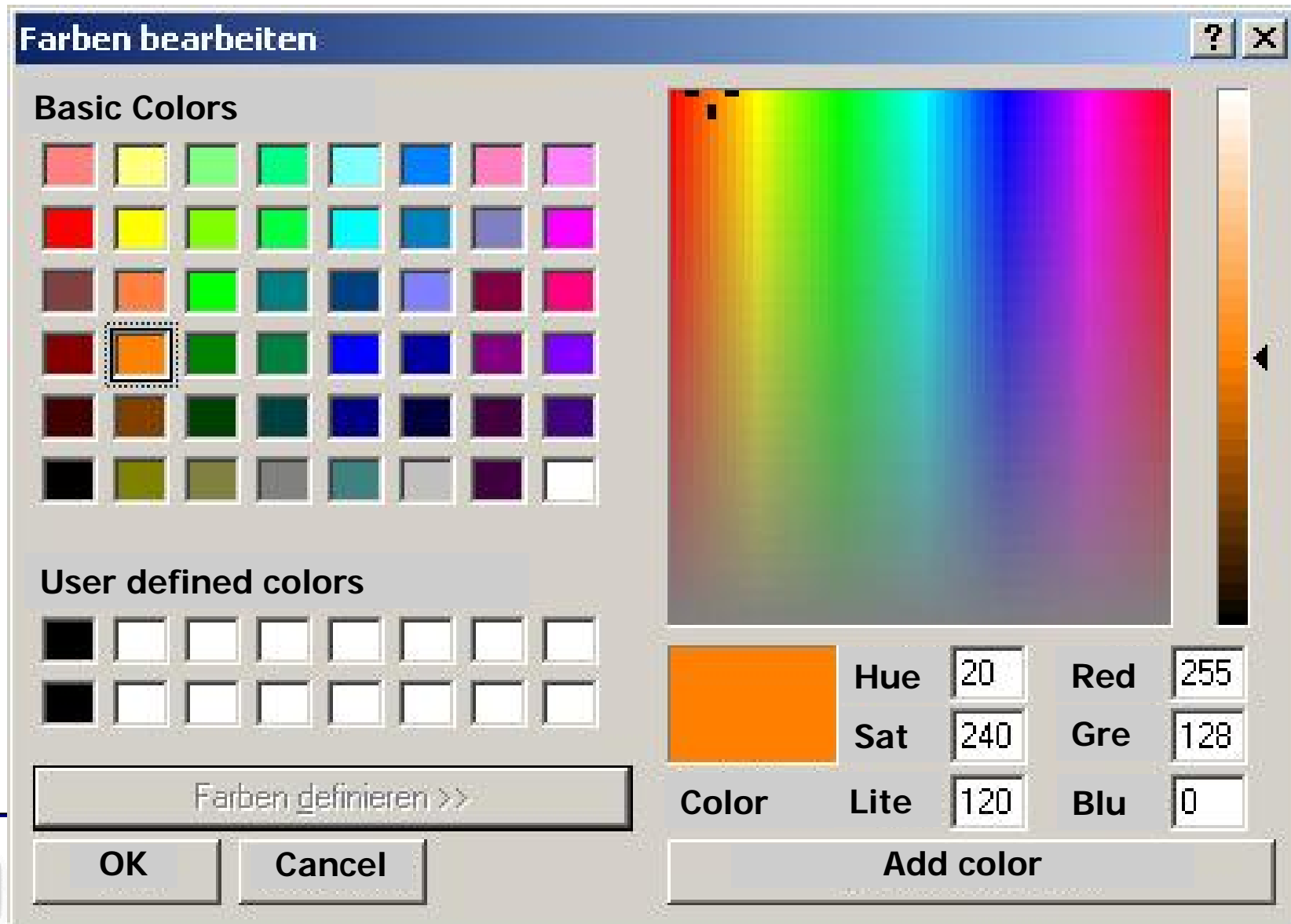
Summary



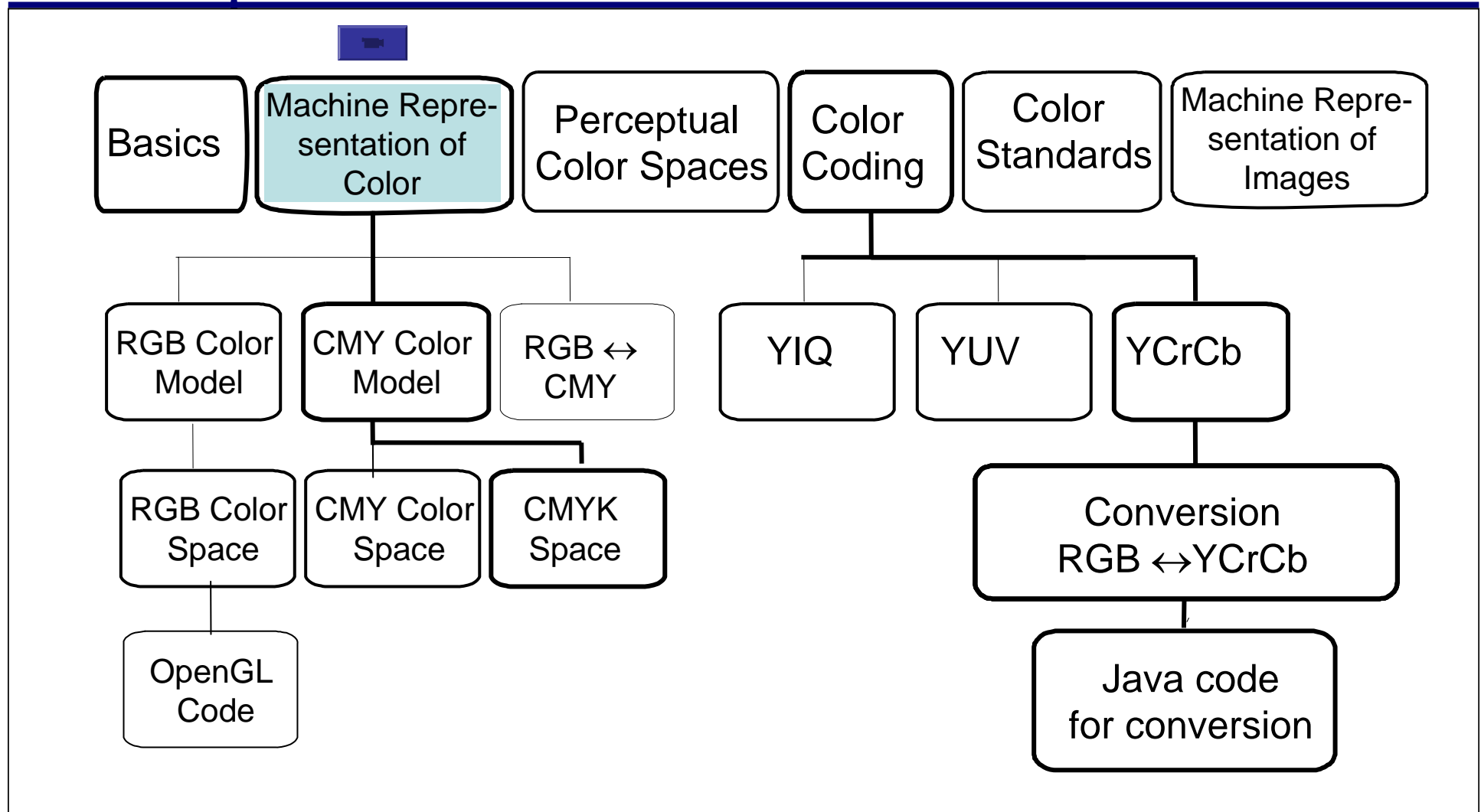
Computer-generated Color



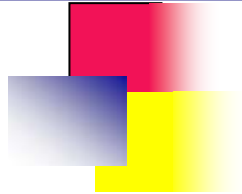
Basics



Computer-generated Color



Machine Representation of Color



- ❖ Experiment by Mathematician Hermann Grassmann, 1853
- ❖ Color $\sim a \cdot R + b \cdot G + c \cdot B$ (additive color system)
- ❖ R, G, B ... primary colors
- ❖ a, b, c, ... tristimulus values

- ❖ metamers
- ❖ secondary colors, e.g. Y, M, C

Overview

Breadth-First

SIMBA

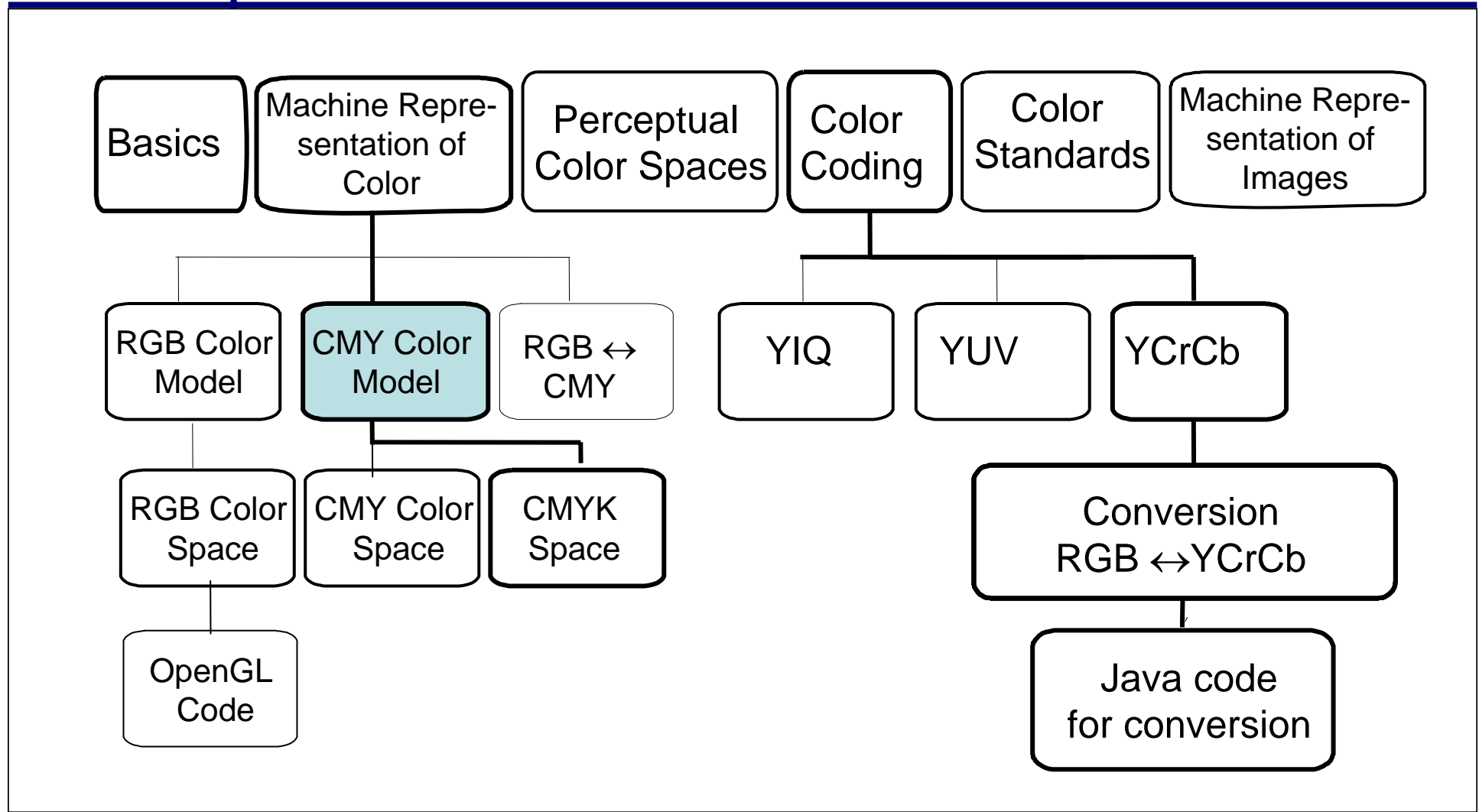
C & T

Evaluation

Summary

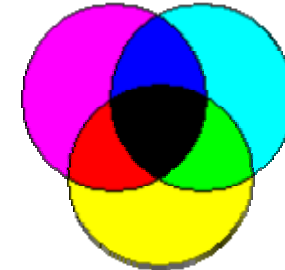


Computer-generated Color



CMY Color Model

- ❖ describes reflection of color, as with color printers
- ❖ primary colors: Cyan, Magenta, Yellow
- ❖ subtraction of primary colors from white
- ❖ A note about pigments:
 - ❖ e.g. water colors contain pigments
 - ❖ pigments absorb and reflect color
 - ❖ e.g. blue water color absorbs long and medium λ , reflects only short λ .
- ❖ Absorbing process:



Overview

Breadth-First

SIMBA

C & T

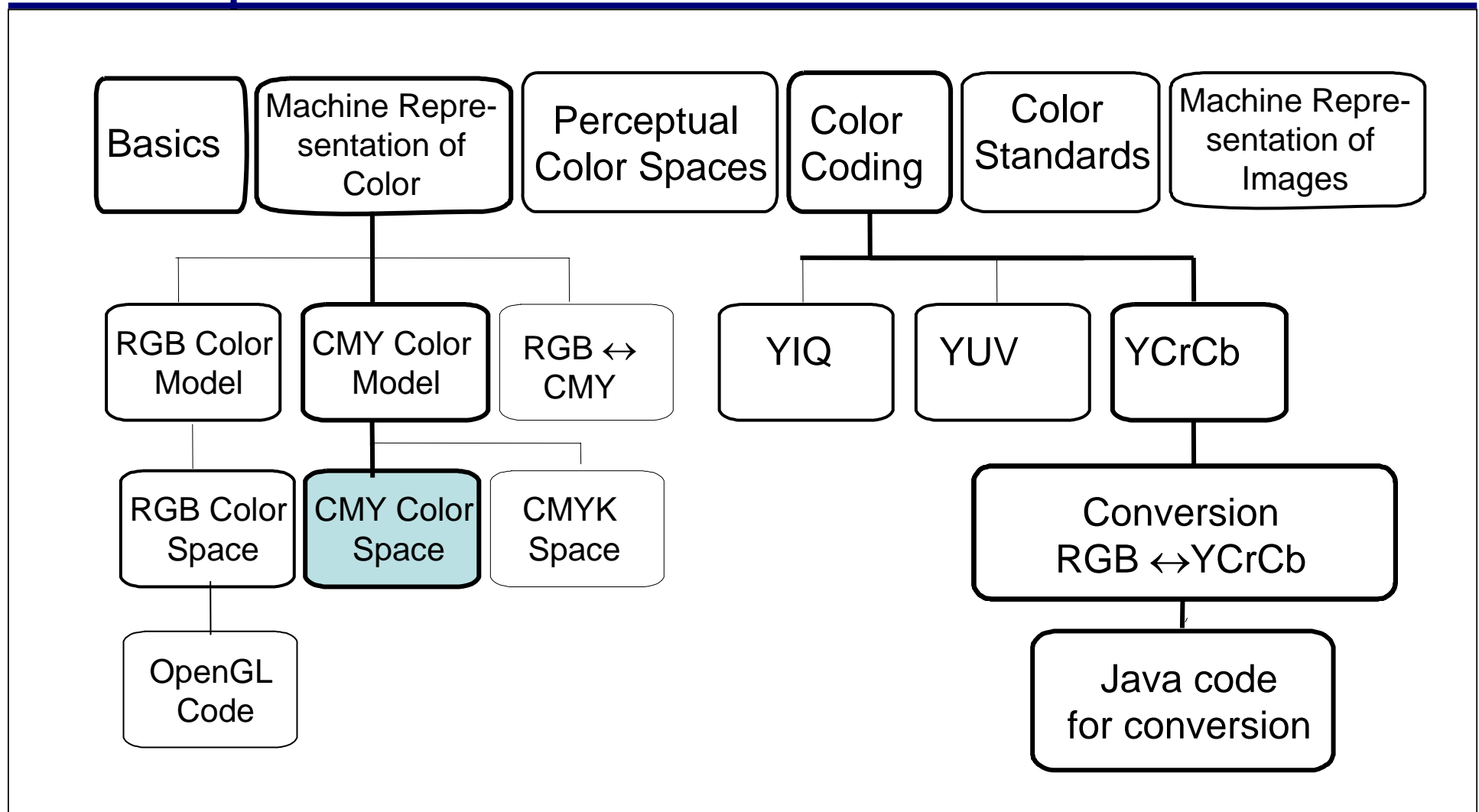
Evaluation

Summary

CMY Color	Absorbing λ
Black	all
Cyan	long
Magenta	medium
Yellow	short

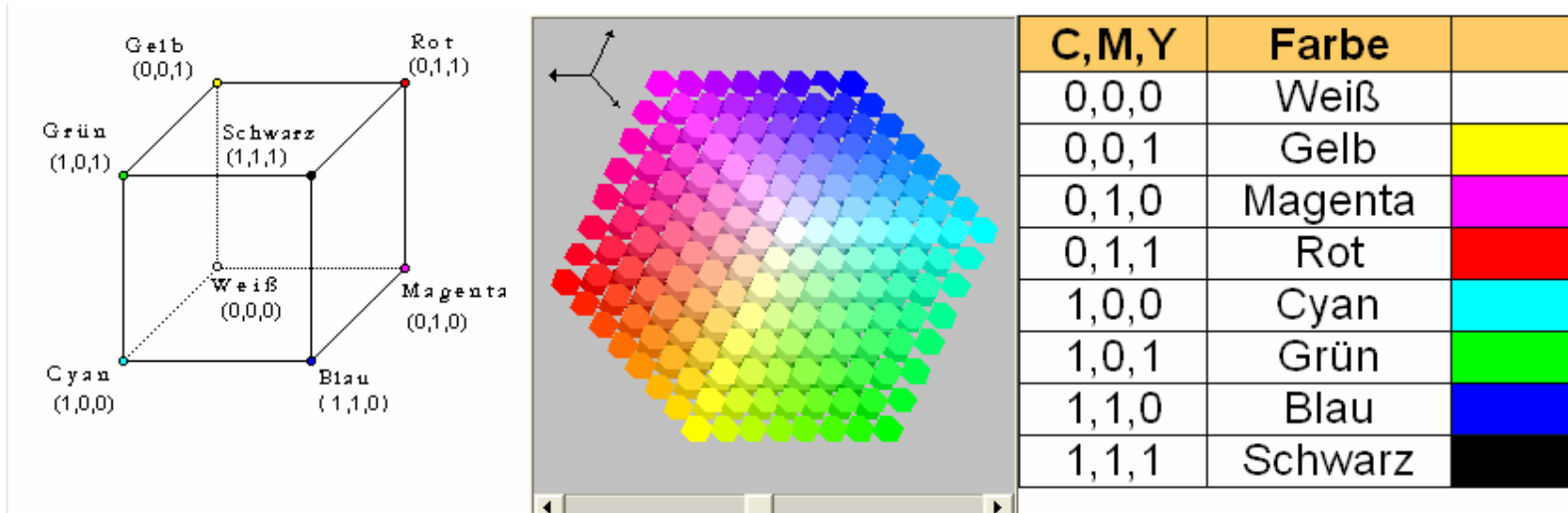


Computer-generated Color

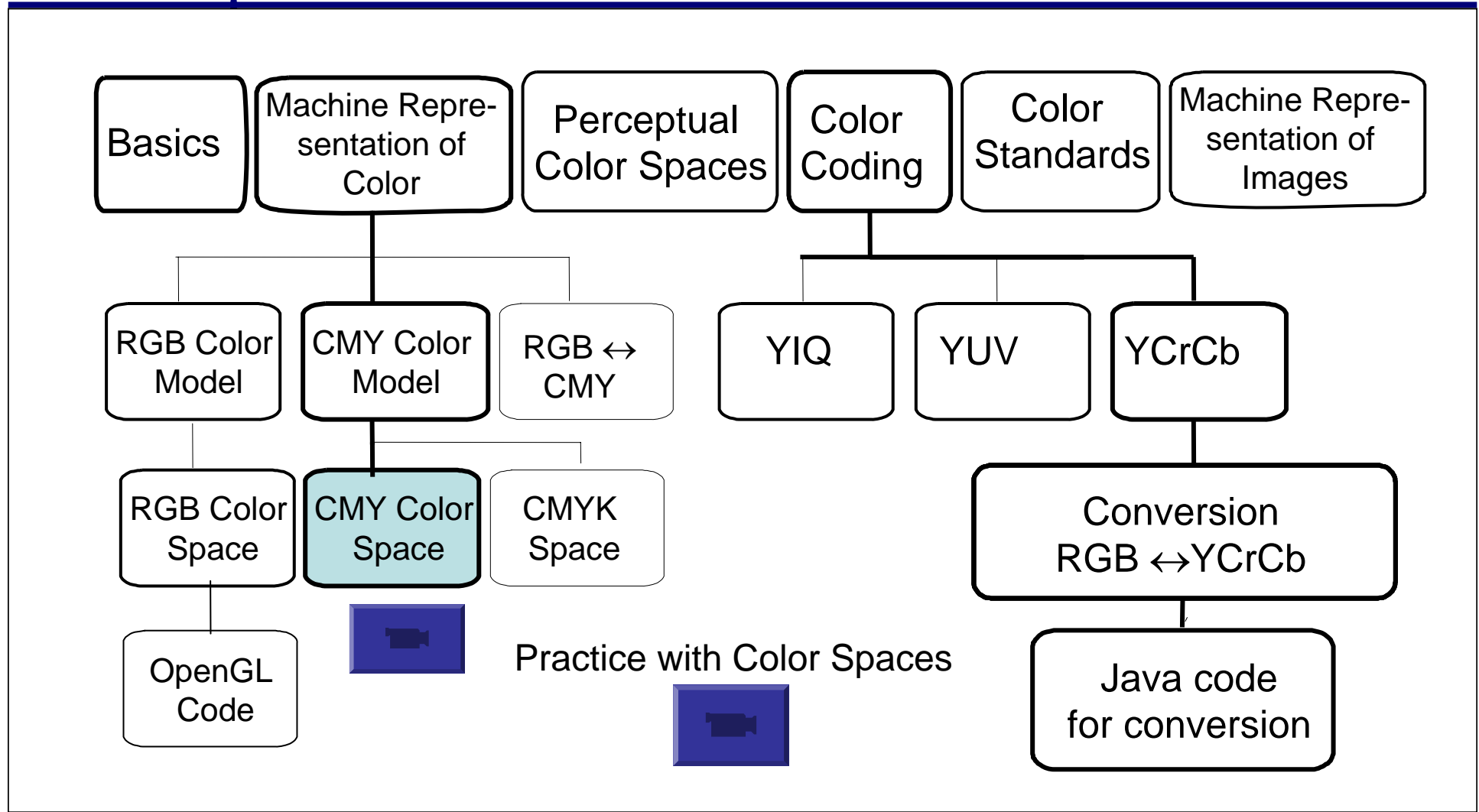


CMY Color Space

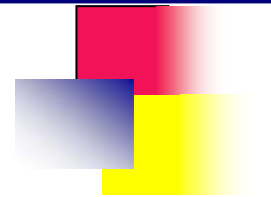
- ❖ CMY Color space is geometric form of subtractive color model
- ❖ Grey values: diagonal white to black
- ❖ Unit cube defines color coordinates



Computer-generated Color



Breadth and Depth for Visualization



Overview

Breadth-First

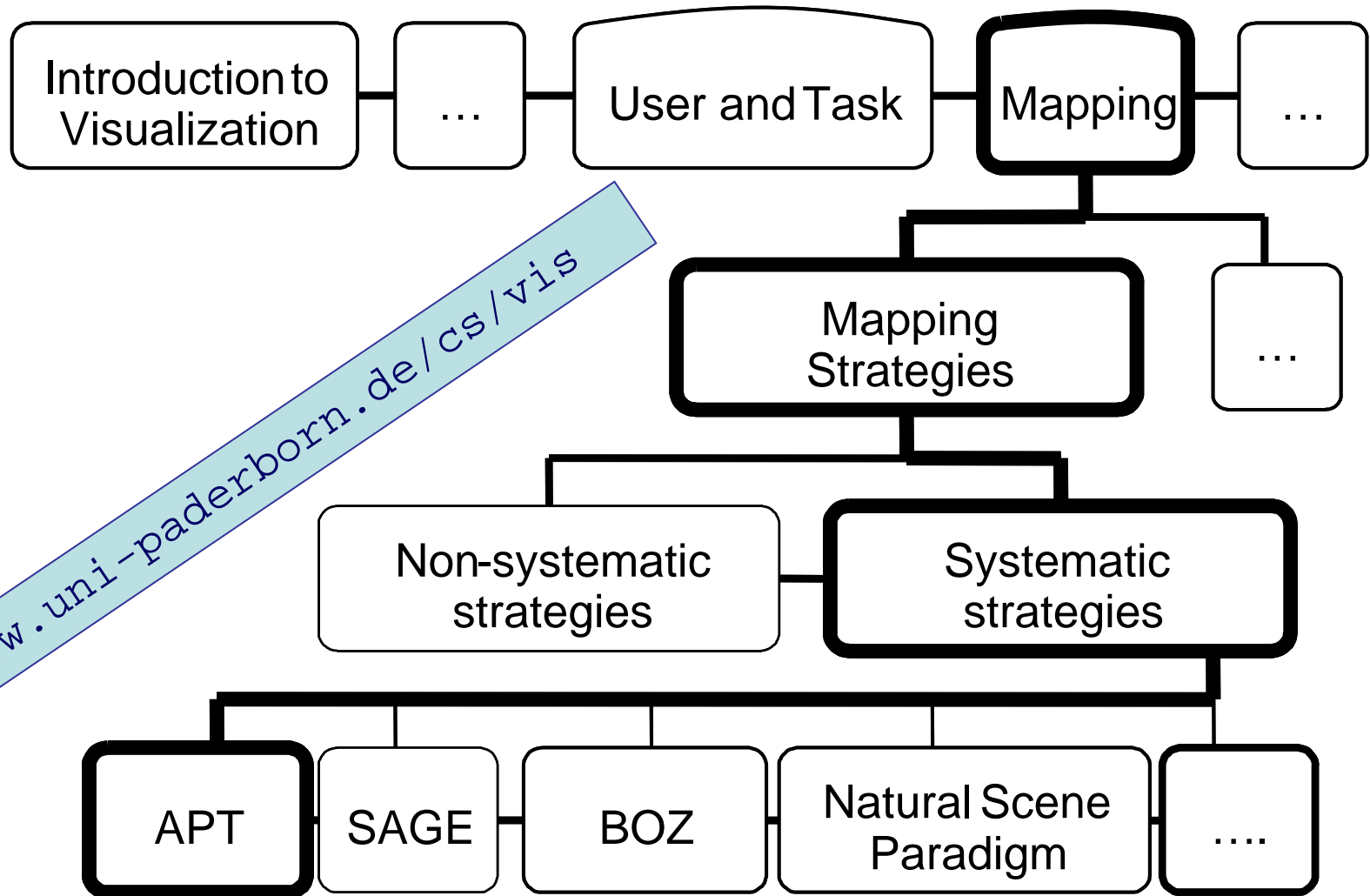
SIMBA

C & T

Evaluation

Summary

www.uni-paderborn.de/cs/vis



High-Risers in Valley?

Overview

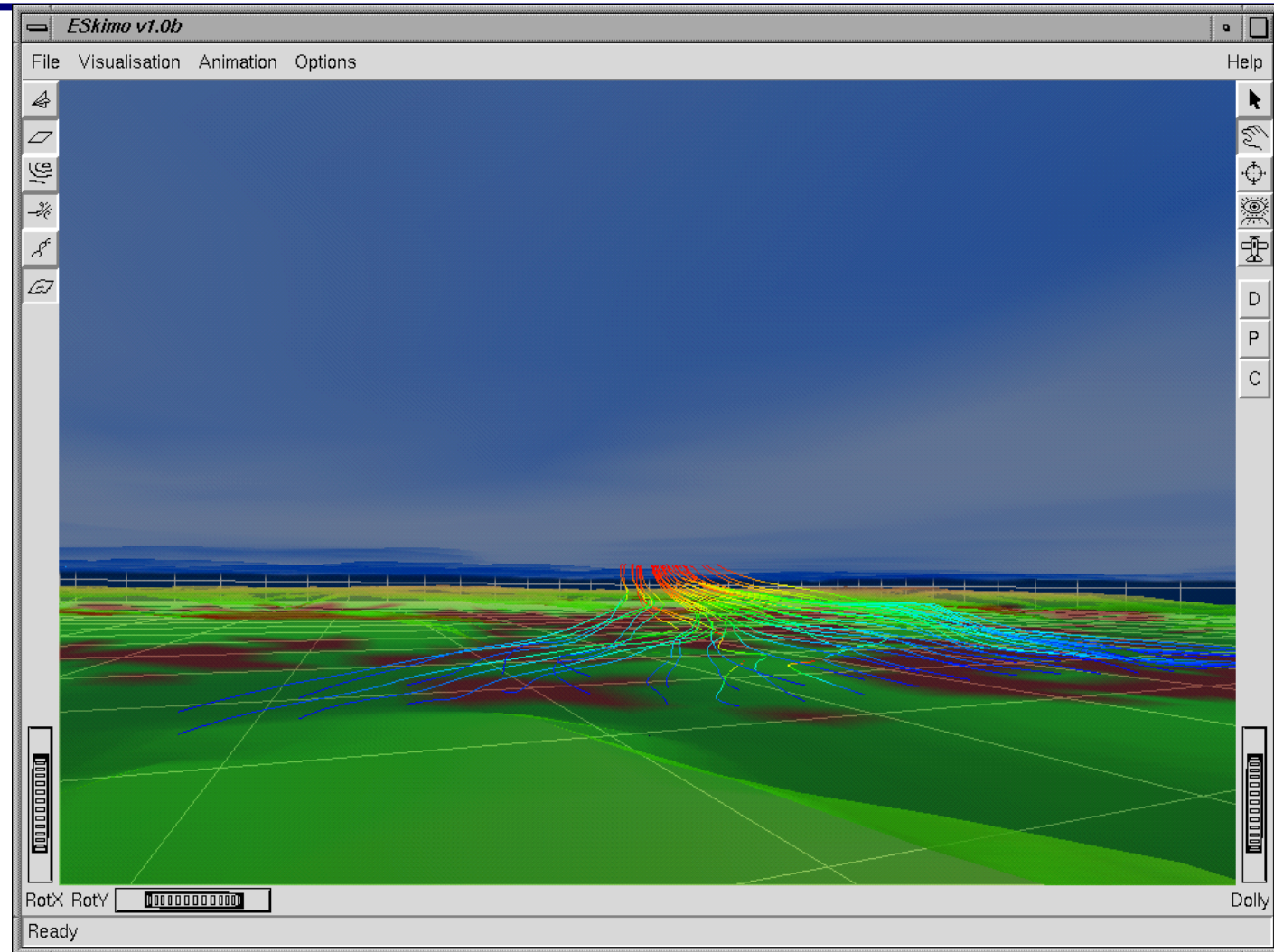
Breadth-First

SIMBA

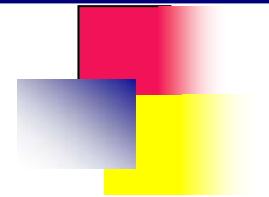
C & T

Evaluation

Summary



Teaching Creativity and Technology - Computer Science students side



Overview

Breadth-First

SIMBA

C & T

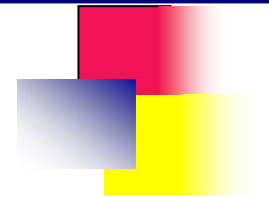
Evaluation

Summary

- Two semester project course
- Prerequisite: Two semesters CG
- First semester
 - Seminar “3D Web Technology”
 - Lectures on Visualization, C&T etc.
 - Project openVisaar (c-s based tool for vis/Java)
- Second semester
 - Project only, pair with media students



Teaching Creativity and Technology - Media Science students side



Overview

Breadth-First

SIMBA

C & T

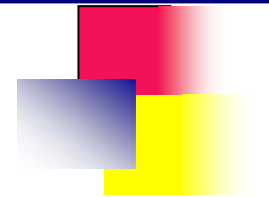
Evaluation

Summary

- One semester course
 - No prerequisites
 - Color
 - Visualization
 - Creativity and Technology
- Lab
 - Maya, Flash, Shockwave
 - Develop effective and expressive visualizations for complex data sets



Teaching Creativity and Technology - Computer Science AND Media students



Overview

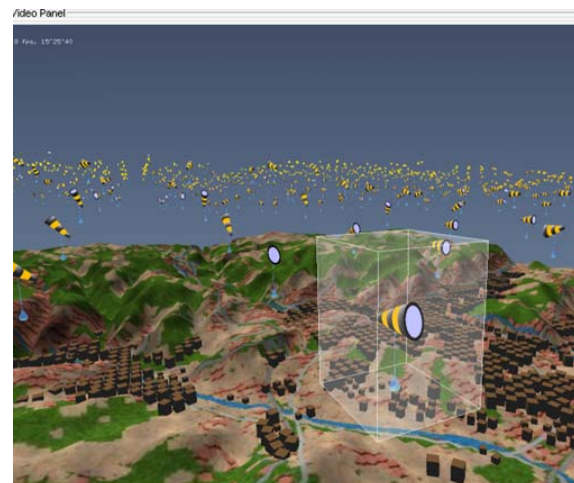
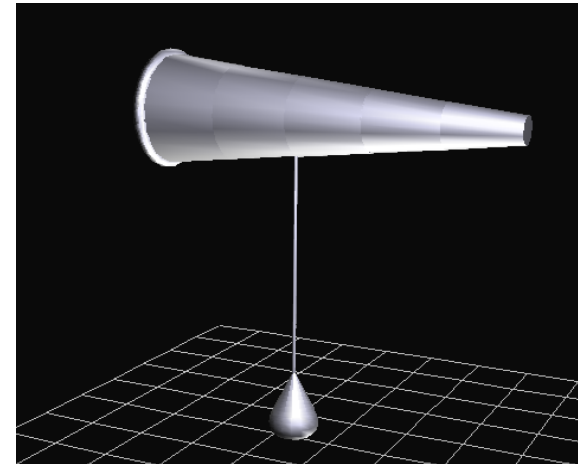
Breadth-First

SIMBA

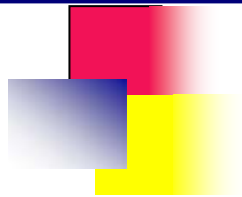
C & T

Evaluation

Summary



Evaluation of Tool SIMBA – (by UniDo)



Overview

Breadth-First

SIMBA

C & T

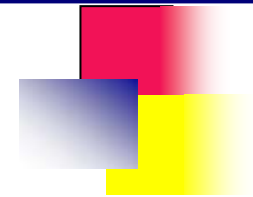
Evaluation

Summary

- 84 CS students (70 male, 12 female; 2 unknown)
- 70% approved strongly of the breadth and depth order in the menu
- > 90% : interactive elements helpful to enhance understanding
- 70% found the modules motivational
- 70% declared that application was helpful



Our own question: „What would motivate YOU to learn about color?“



Overview

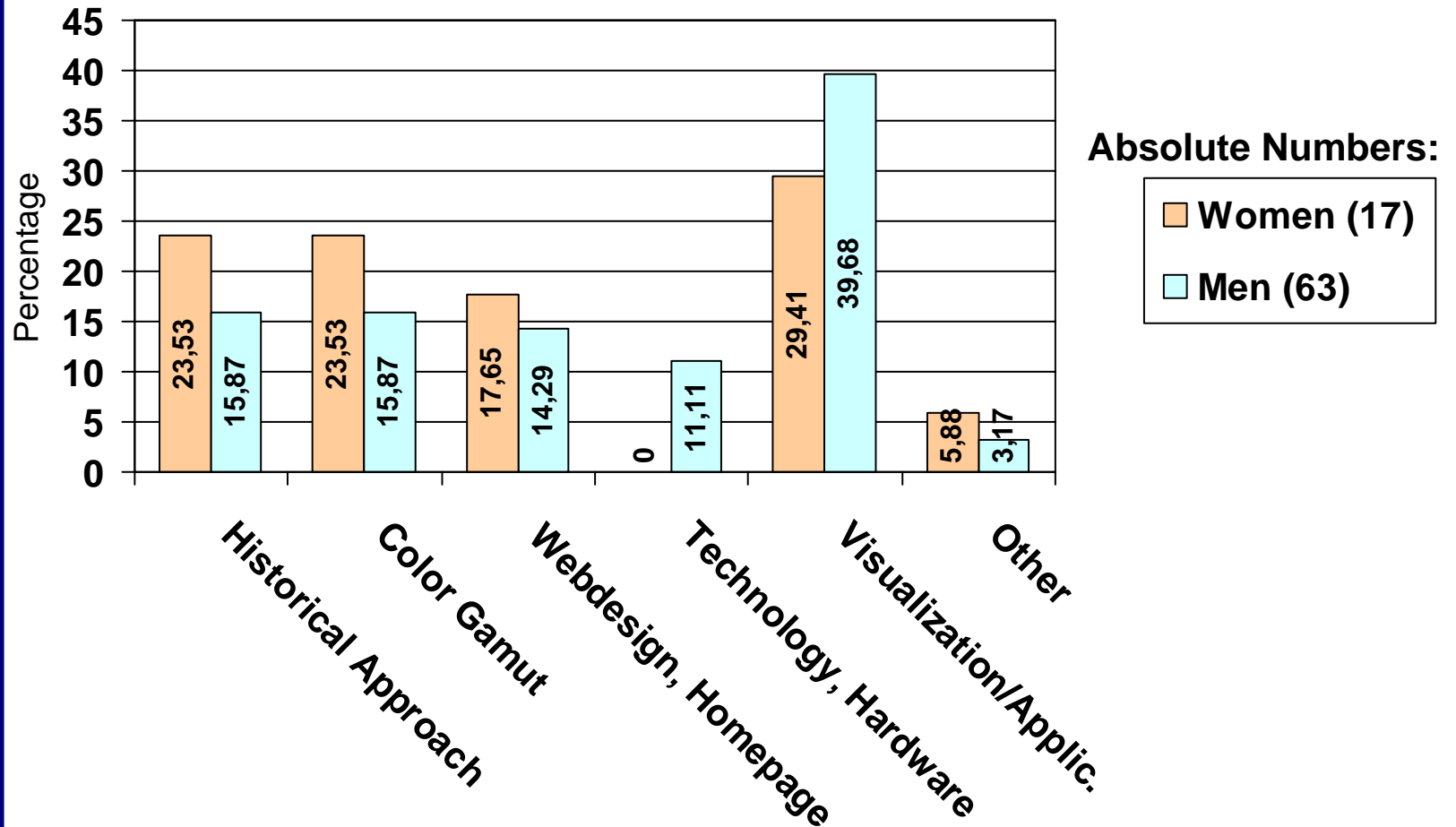
Breadth-First

SIMBA

C & T

Evaluation

Summary



Conclusions

Overview

Breadth-First

SIMBA

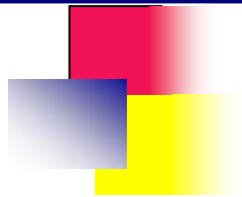
C & T

Evaluation

Summary

- Breadth-First approach found useful
- Not easy to develop such tools





Overview

Breadth-First

SIMBA

C & T

Evaluation

Summary

Thank you for your attention !

