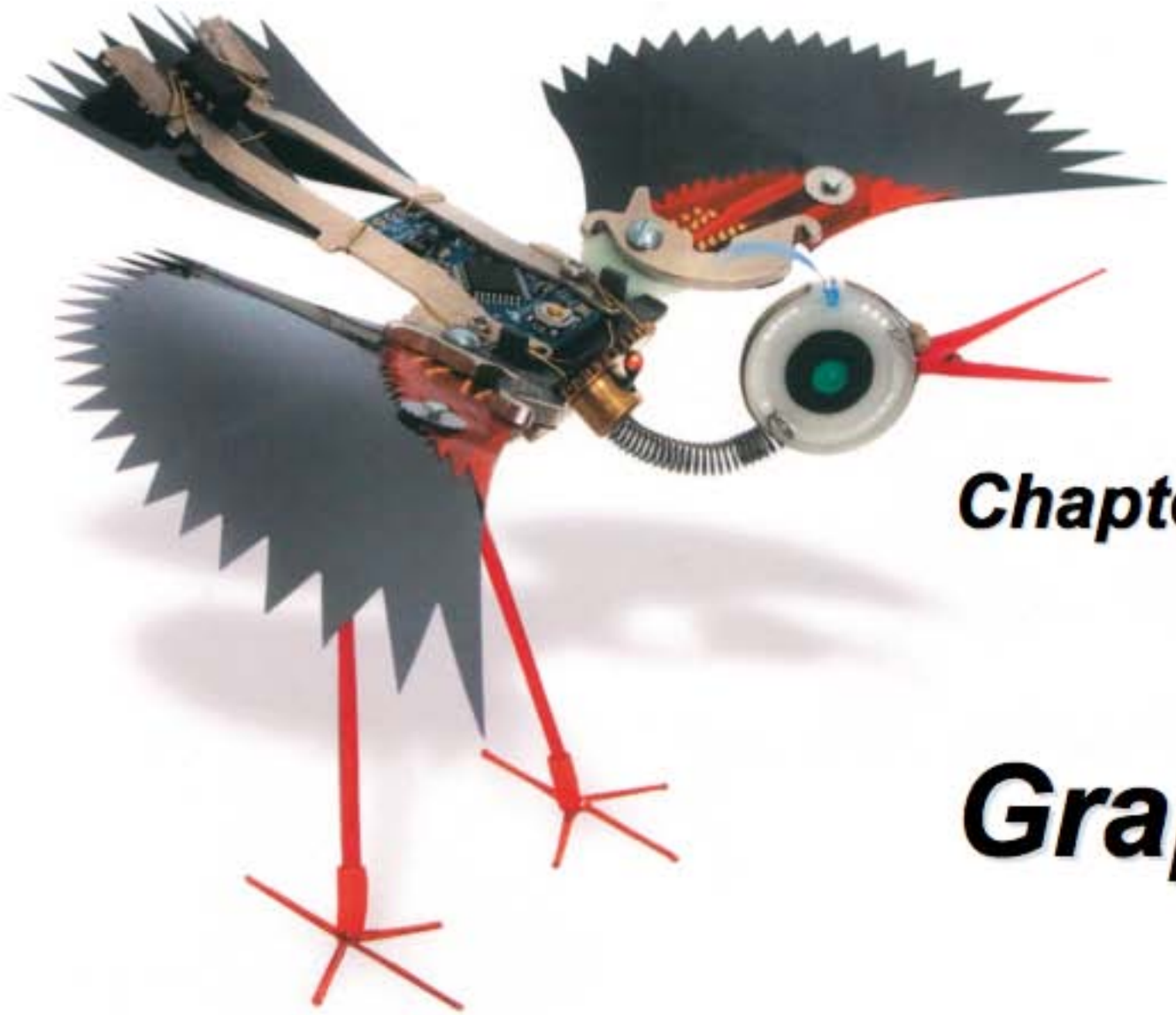


practical computing for biologists

HADDOCK • DUNN

Chapter 17

Graphical Concepts

Lydia Danglot

13th of april

Chapter 17

Graphical concepts

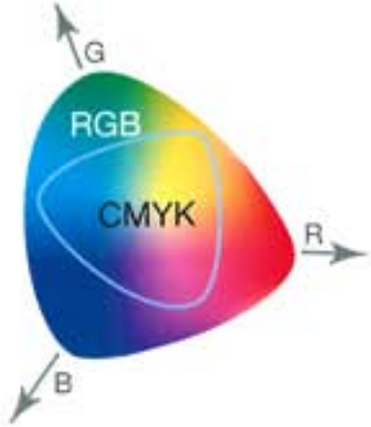
General image types

- Vector vs pixel
- Deciding when to use vector art, pixel art or both

Image resolution and dimensions

Image colors

- Color models and space
- Converting between color models
- Color profiles
- Color choices



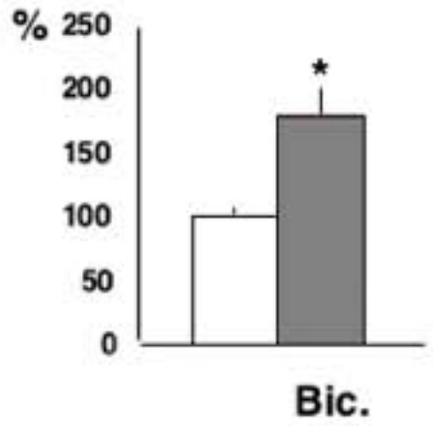
Layers

Why you should avoid powerpoint ?

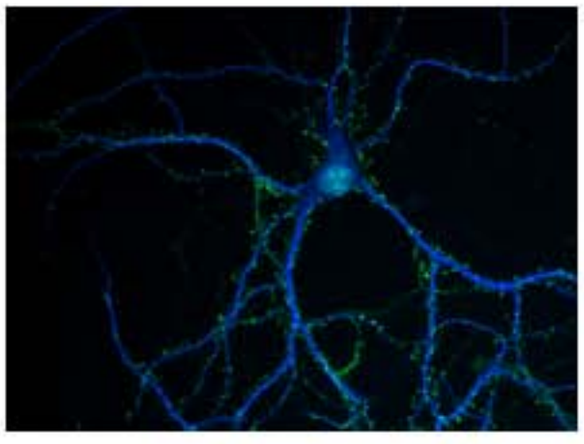
General Image Types

- ***Vector-based image :***

Made of editable lines, curves, and shape which are defined by a few key properties.



- ***Pixel-based image = bitmap = raster art :***



Made of uniform grid or colored dots, named the pixels.

Photos are typical pixel-based images.

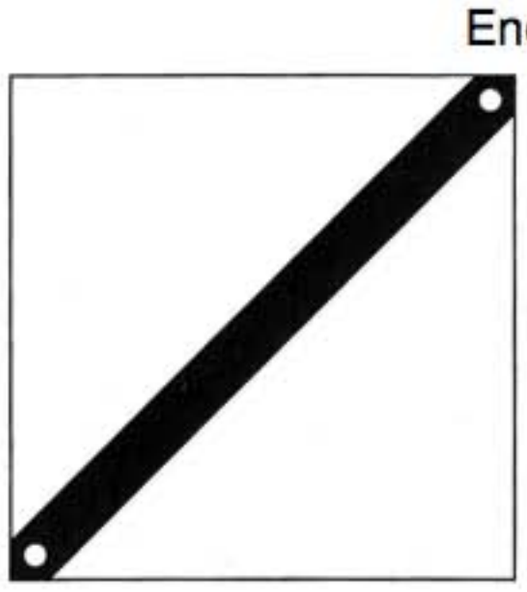
General Image Types

- ***Vector-based image :***

In vector art the line is defined by 2 points.

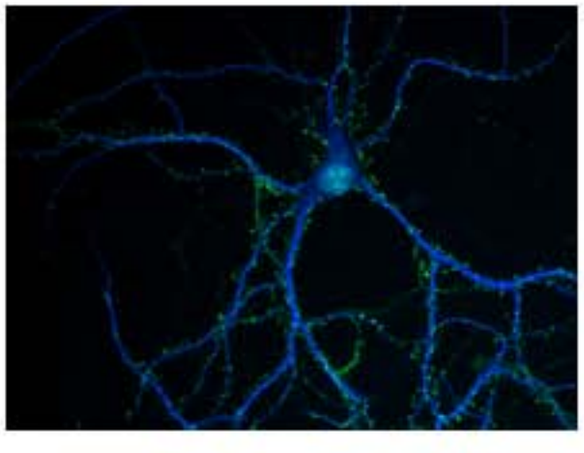
Storing info:

- X and Y of each point
- color of line, width



A 2 point vector line

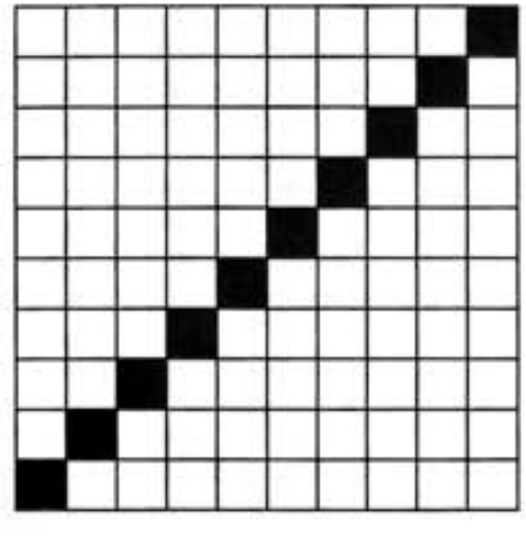
- ***Pixel-based image = bitmap = raster art :***



In pixel art the line consists of many points of a particular color.

Storing info:

- color of each point of the grid
- size of the image 10x10 or 100x100 ?
- this values increase with size



A 100-pixel (10x10) line

General Image Types

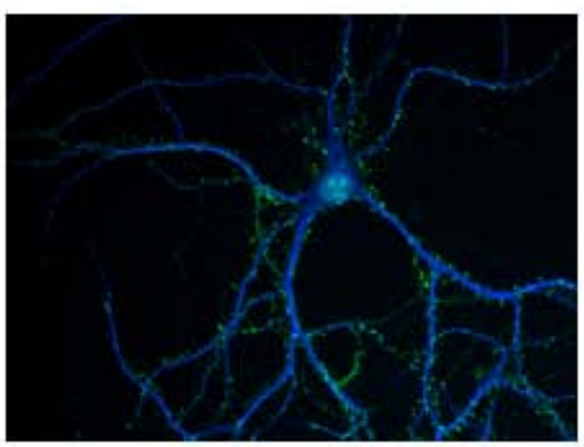
• Vector-based image :

In vector art the file format can be :

- pdf : portable document format (Adobe)
- eps : encapsulated post-cript format (Adobe)
- svg : scalable vector graphics (XML)
- AI: Adobe Illustrator

Vector art format

• Pixel-based image = bitmap = raster art :



In pixel art the file format can be :

- JPEG : Joint Photographic Expert Group (compressed)
- PNG : Portable Network Graphic (screen capture)
- TIFF : Tag Image File Format
- BMP: Bitmap (Microsoft, IBM)
- PSD : Adobe Photoshop

Pixel art format

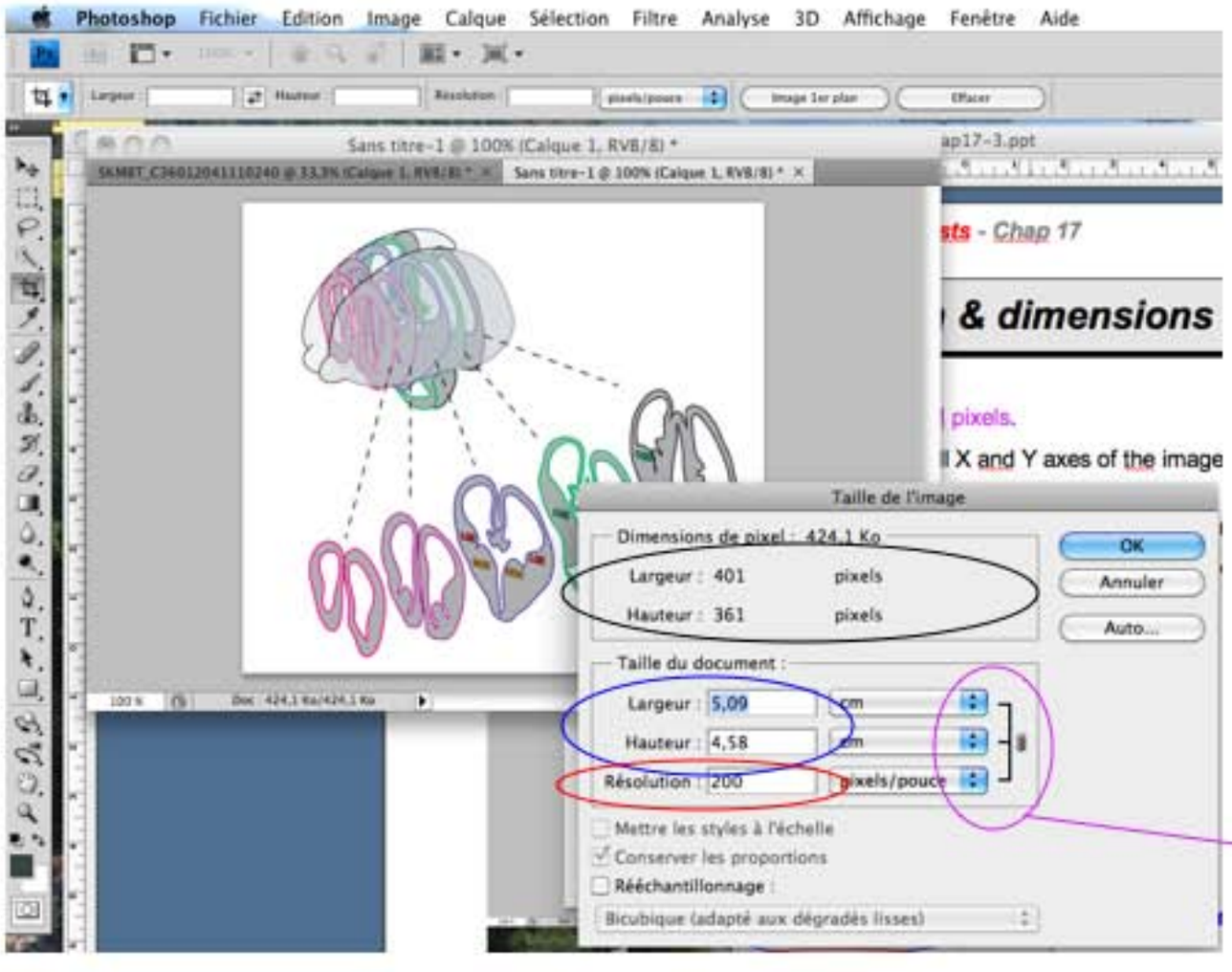
Image resolution & dimensions

In pixel art images are made up by a grid of colored pixels.

Pixel dimension: the number of pixels along the full X and Y axes of the image, for example 800 x 600 pixels.

Physical size: the size that the image appears on a printed page, such as 89 mm x 66 mm.

Resolution: the size of each pixel, expressed as the number of pixels per unit of physical dimension, usually called dots per inch (DPI) or pixel per inch (PPI).



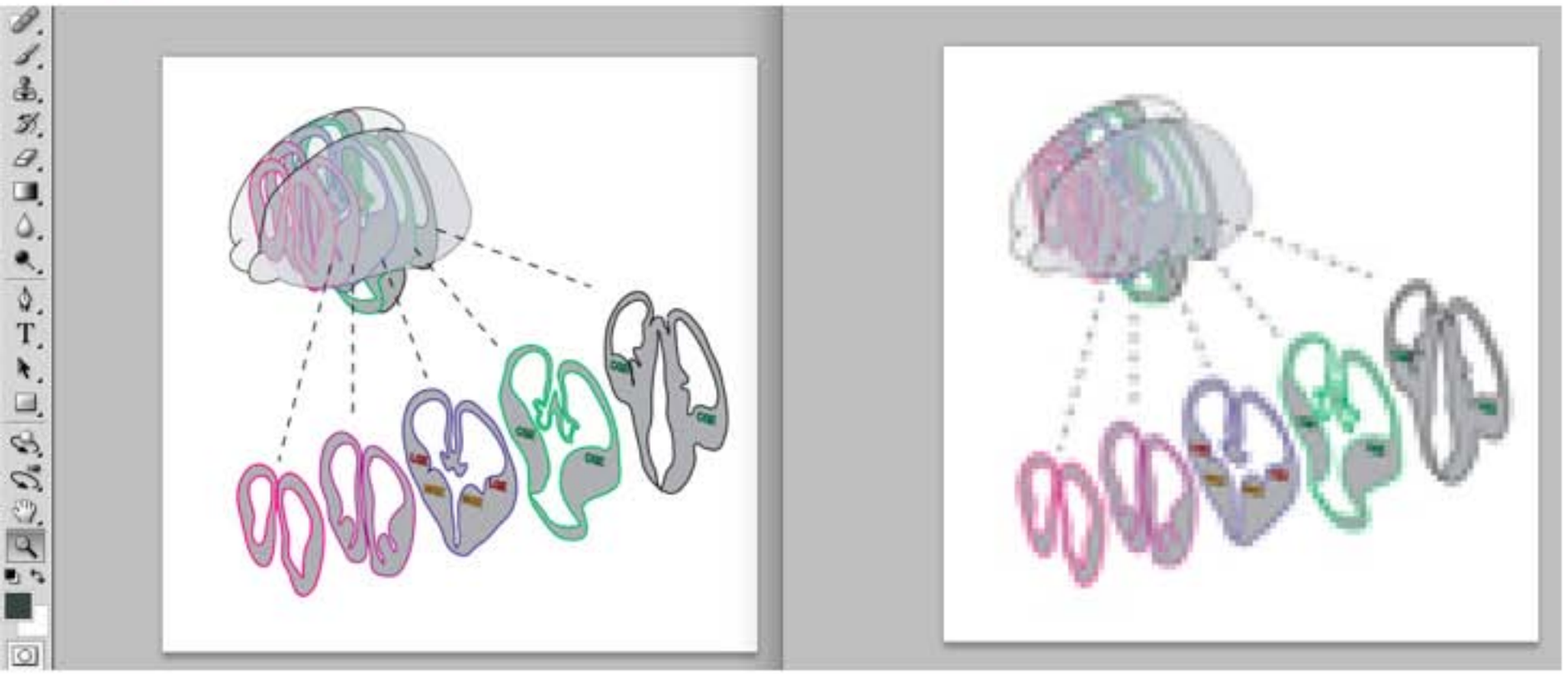
Pixel size

Physical size

Resolution

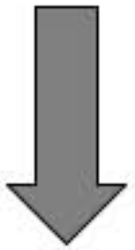
The 3 parameters are linked.

Image resolution & dimensions



Same physical size

Less pixels



Lower resolution

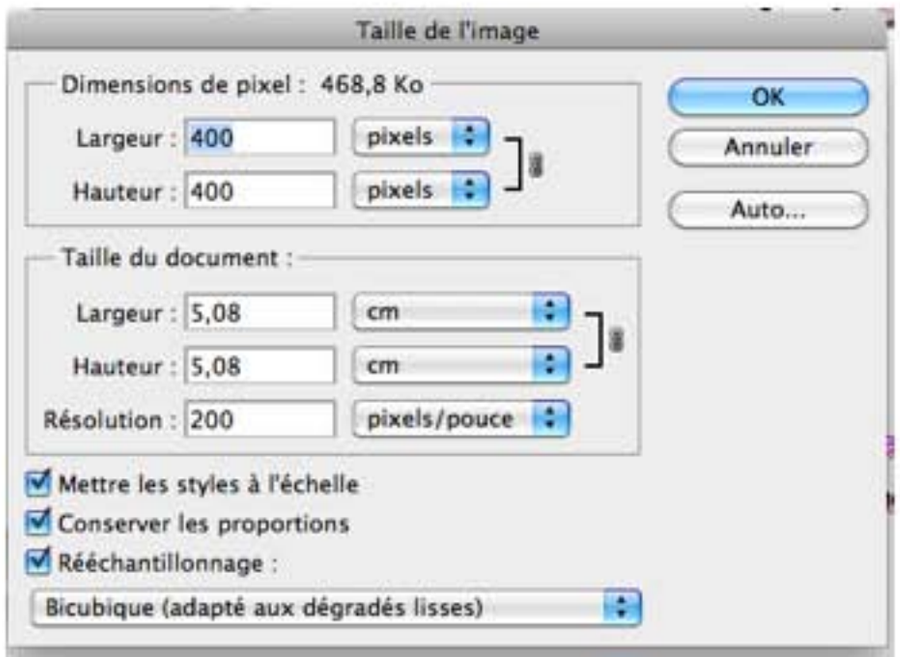
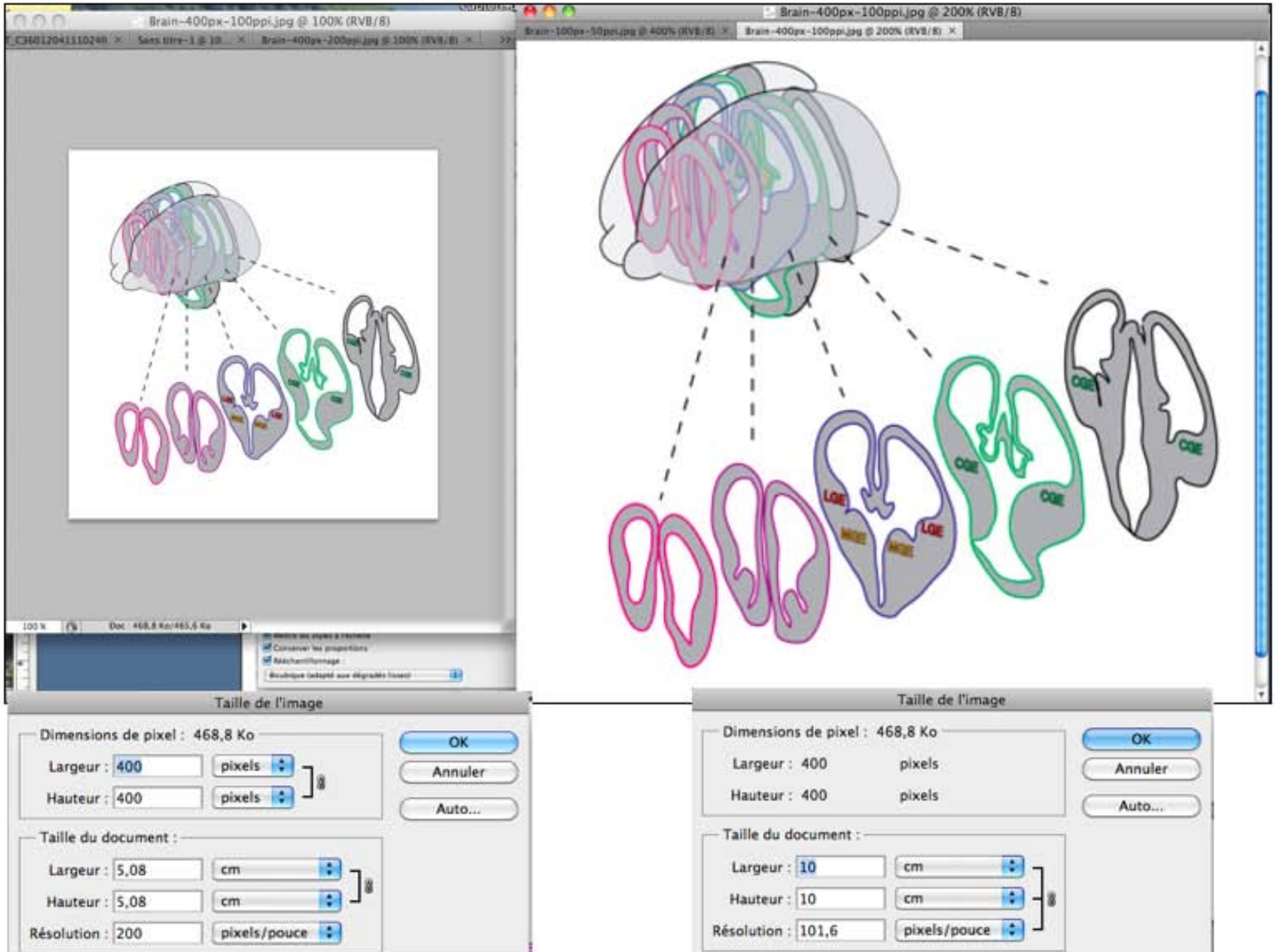


Image resolution & dimensions



Bigger physical size

same pixels

Lower resolution

Deciding between vector & pixels

• Vector-based image :

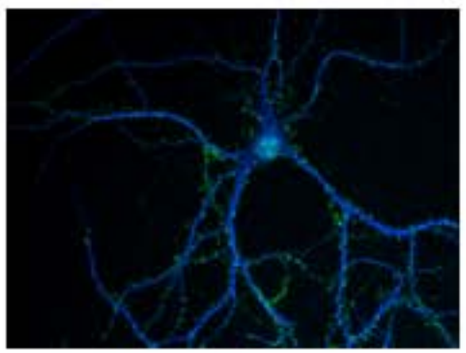
- you can zoom and enlarge drawing without pixelization (open AI and PS)
- Text is searchable
- Everything is easily editable (annotations, arrows, color)
- You can convert vector to pixel art, (difficult in the other way)

→ *Graphical elements should be created with vector art*

Vector art format

Ex: Adobe Illustrator

• Pixel-based image = bitmap = raster art :

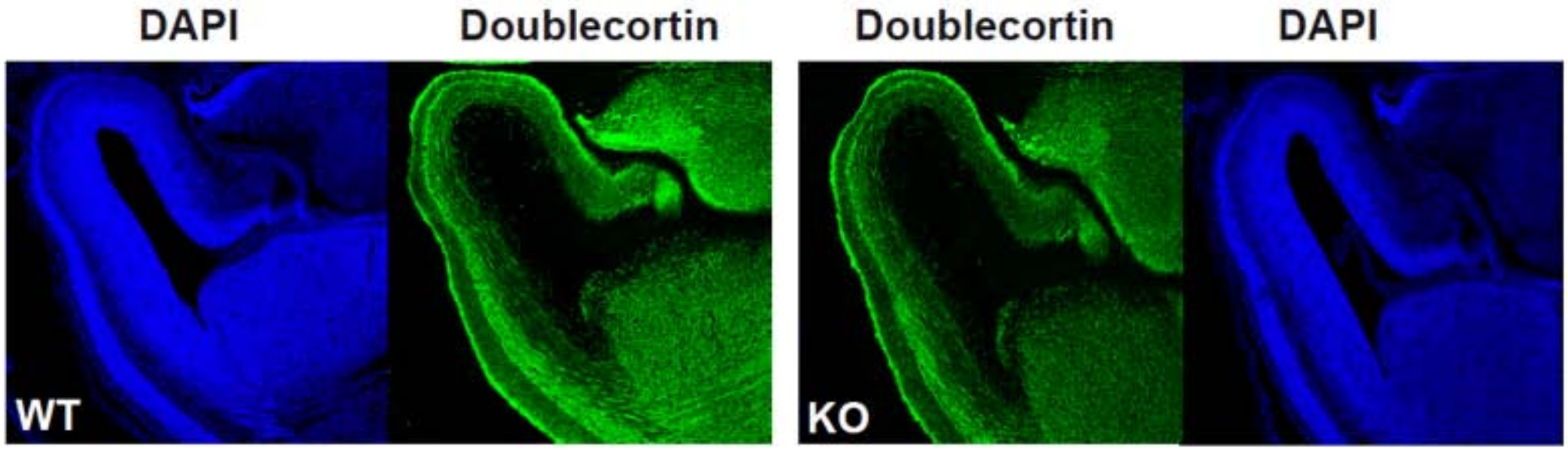


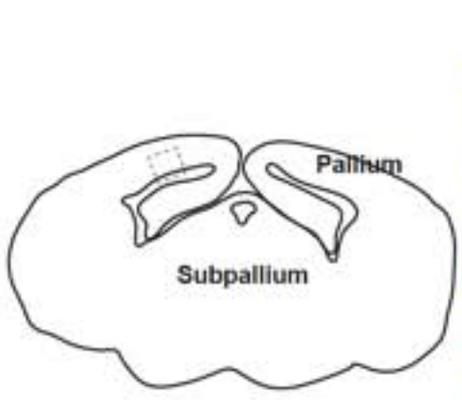
- The pixellization rendering depends on resolution
- Requires thousands times more memory
- Pixel text is not searchable
- Pixel text can not be easily copied and pasted
- But Contained complex info sometimes hard to represent line-by-line (photo, gels)
- For plots with thousands of data points, vector objects become cumbersome.

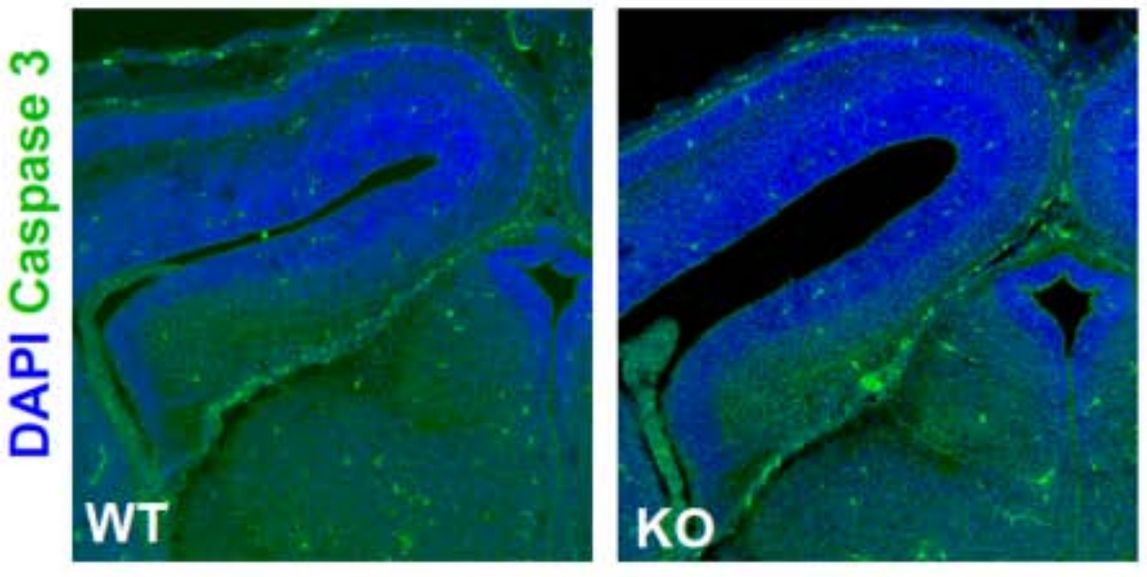
Pixel art format

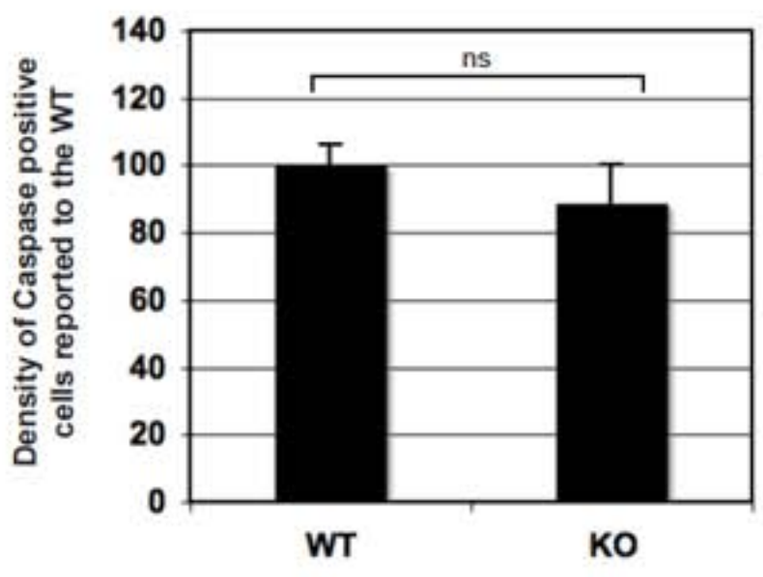
Adobe Photoshop

Combining vector & pixels





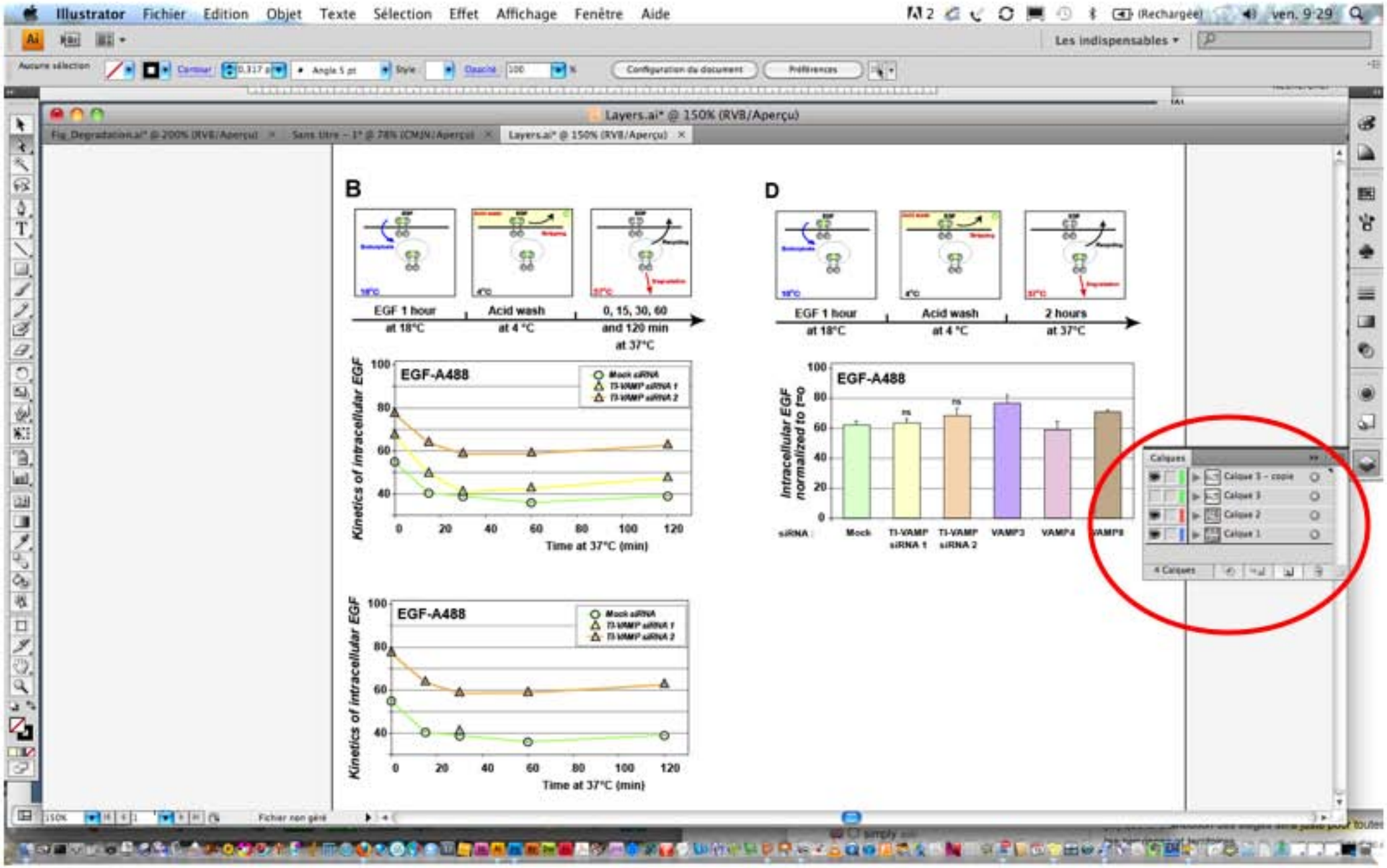




- Graphical elements and annotations should be kept with vector art (editable, scalable).
- Most vector file format (such as PDF) allow importation of photos, which will be embedded in file.

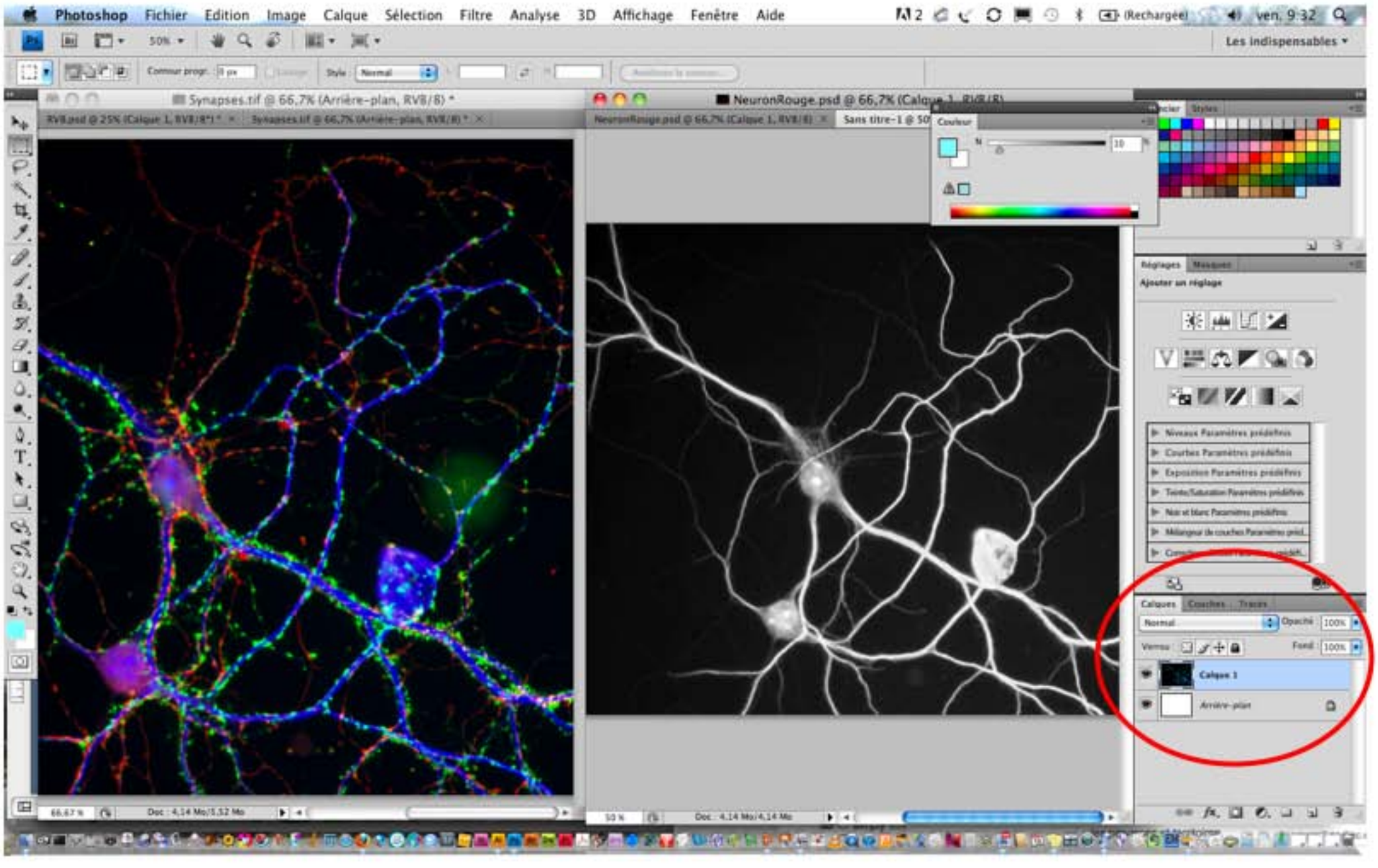
Using layers …

- **Vector-based image (on Illustrator) :**



Using layers …

- ***Pixel-based image (on Photoshop) :***



Postcript files & rasterization

Vector art format

Ex: Adobe Illustrator

Rasterization

Postcript file (EPS)

Conversion to pixel image

Imposed final size

(Print to file or Acrobat distiller)

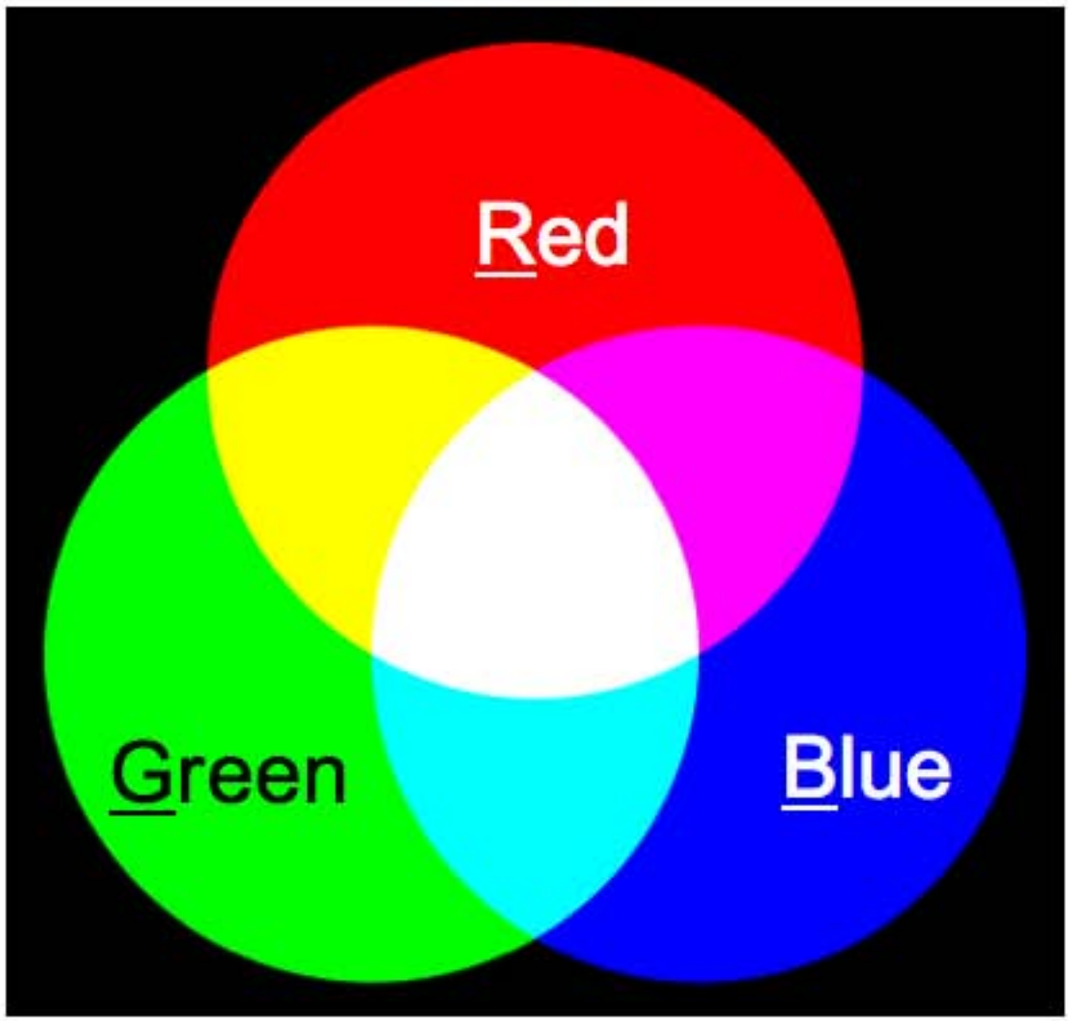
10 x 15cm or Poster ?

Color models & color space

Additive synthesis

Based on addition of light

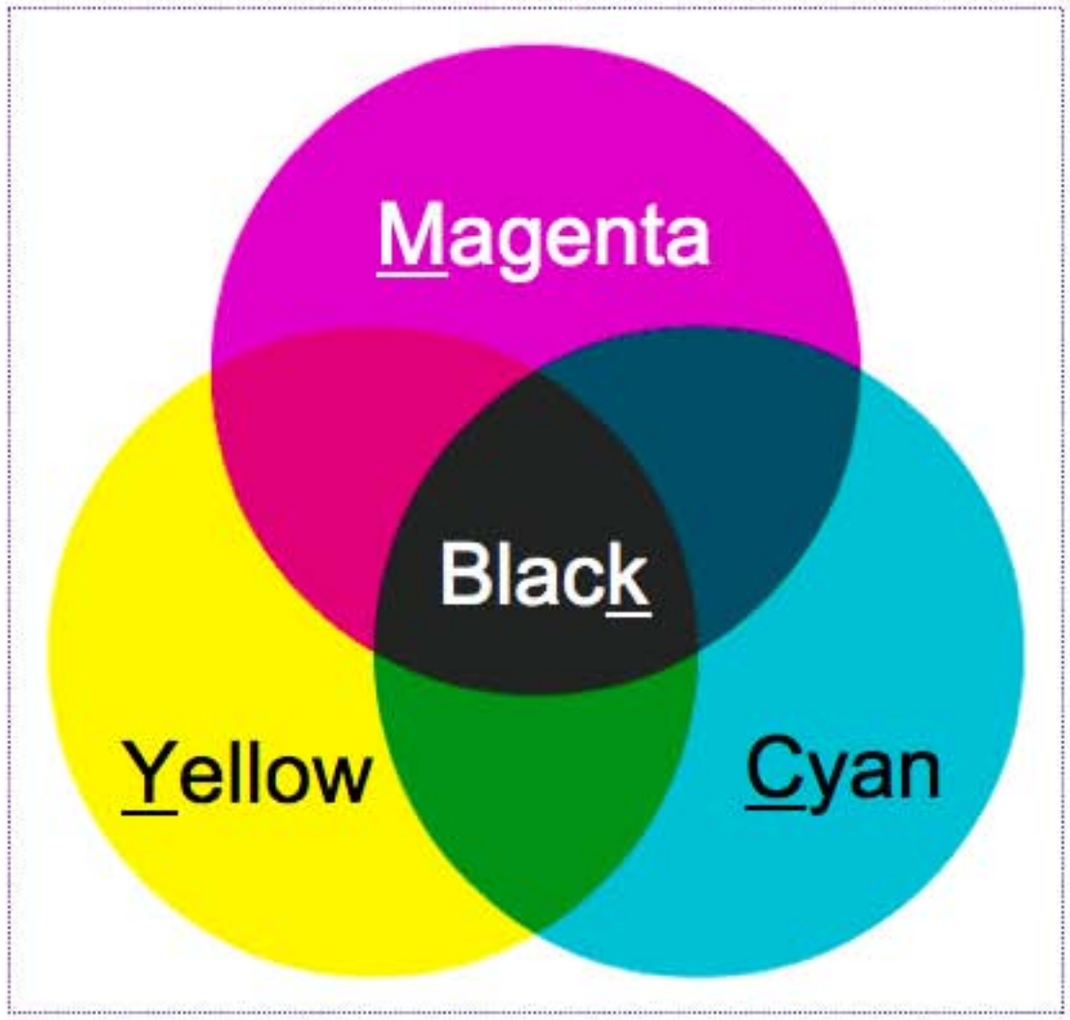
RGB



Substractive synthesis

Based on absorption of pigments

CMYK



- in RGB: increasing value correspond to brighter pixels thus lighter color (White in center)
- in CMYK: increasing values represent more ink, thus darker (black in the center)

Color models & color space

Additive synthesis

Based on addition of light

RGB

screen / projectors

Light

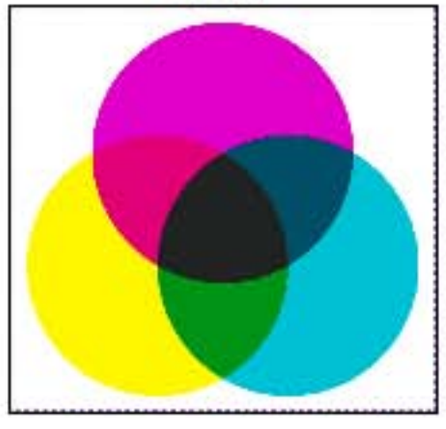
Substractive synthesis

Based on absorption of pigments

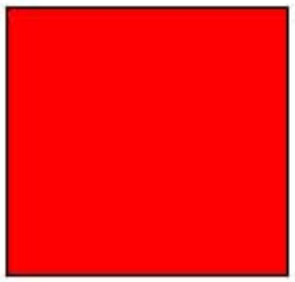
CMYK

Press - printers

Ink



Color models & color space



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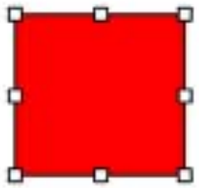
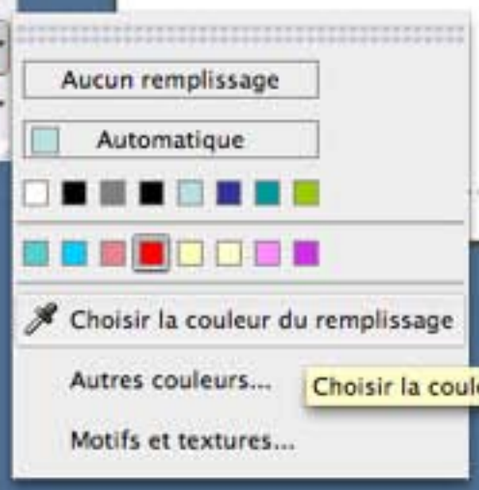
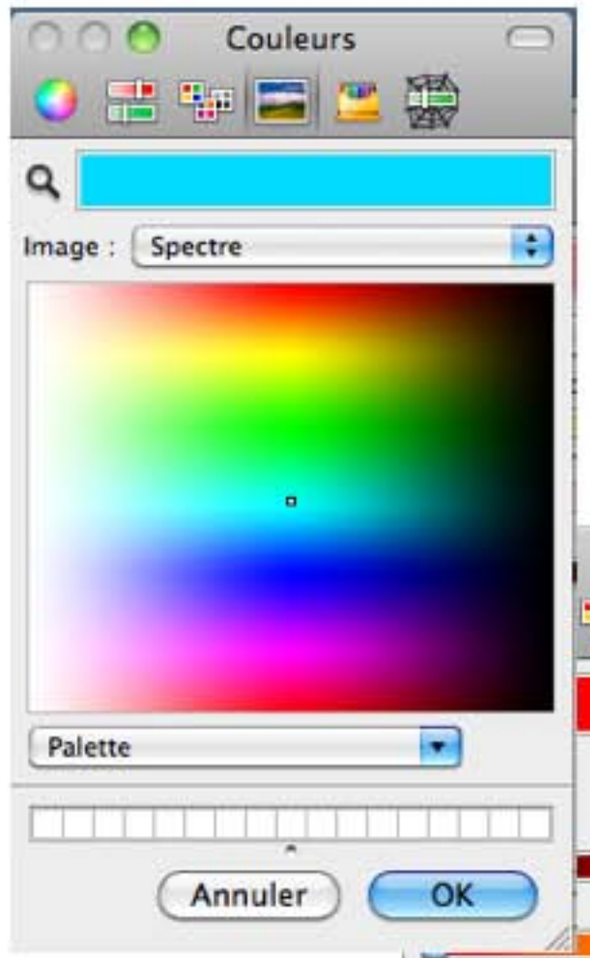
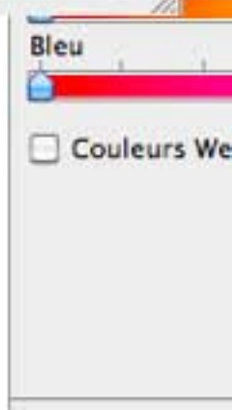
Color models & color space





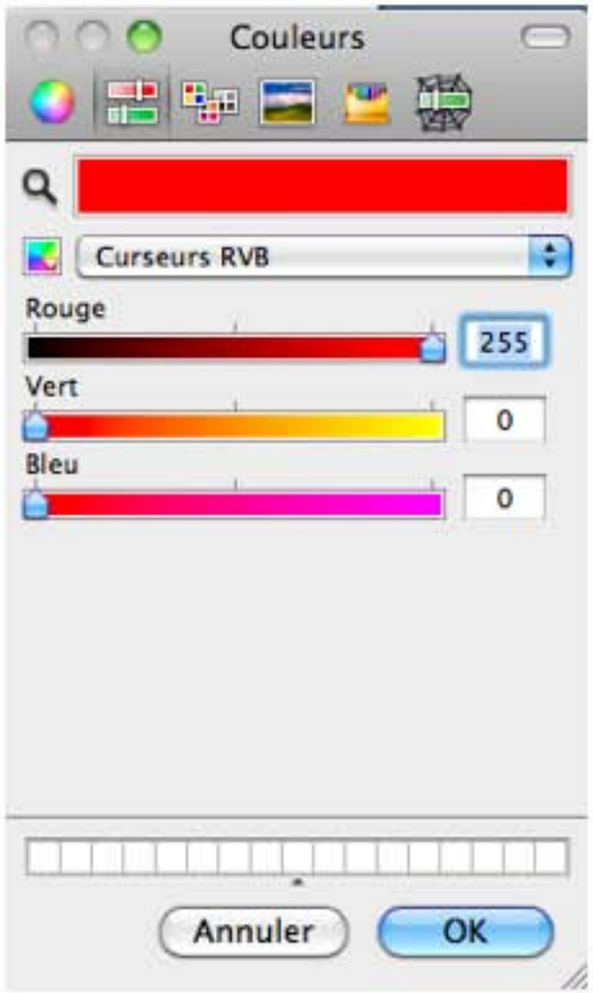
Color models & color space



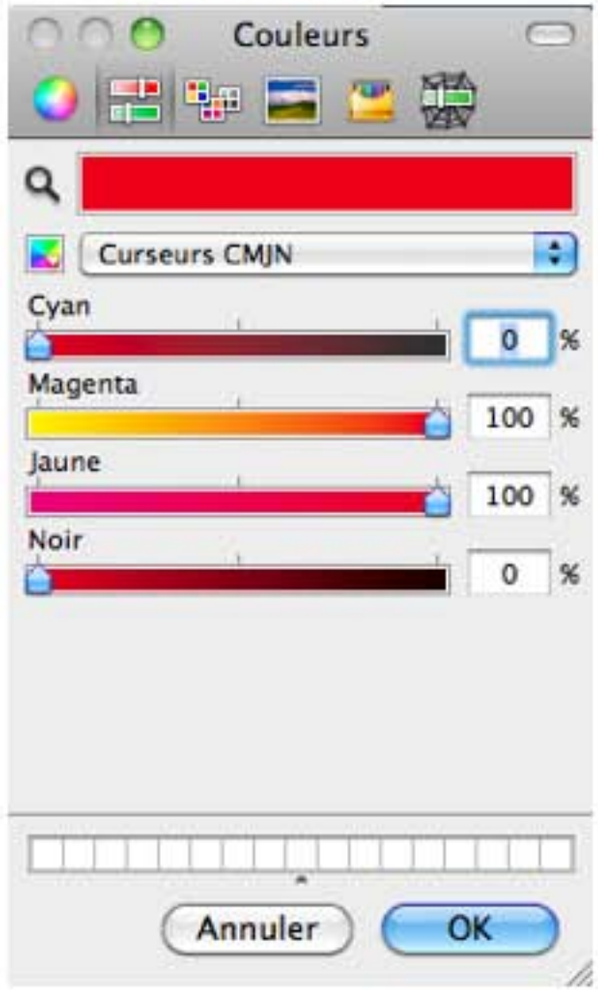


Color models & color space

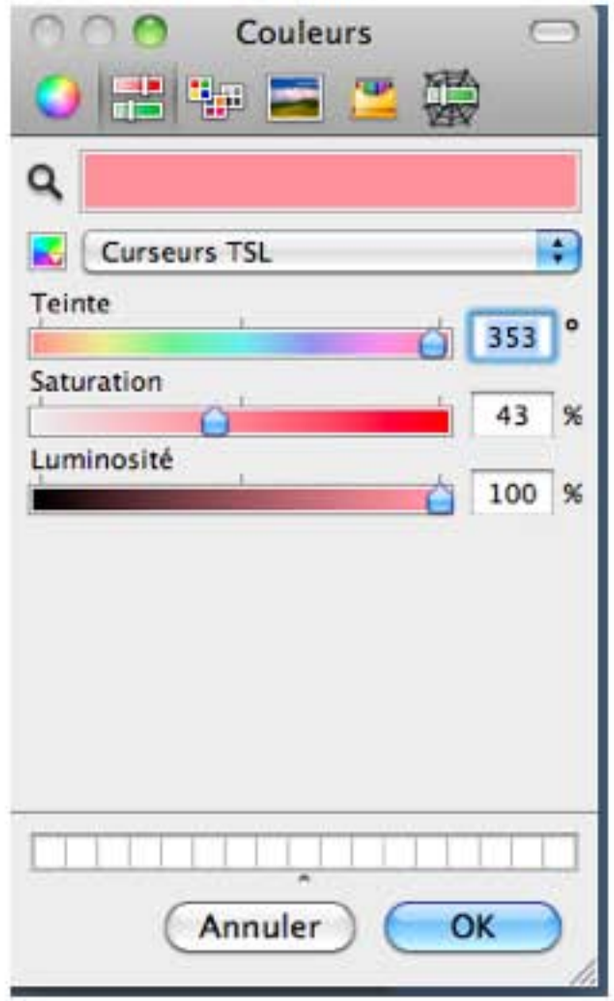
RVB



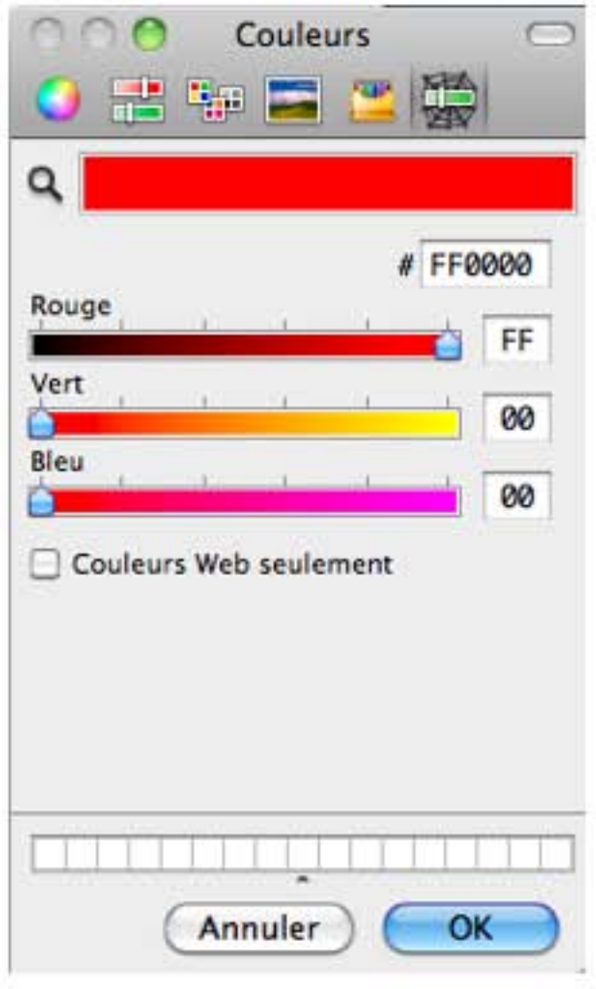
CMYK



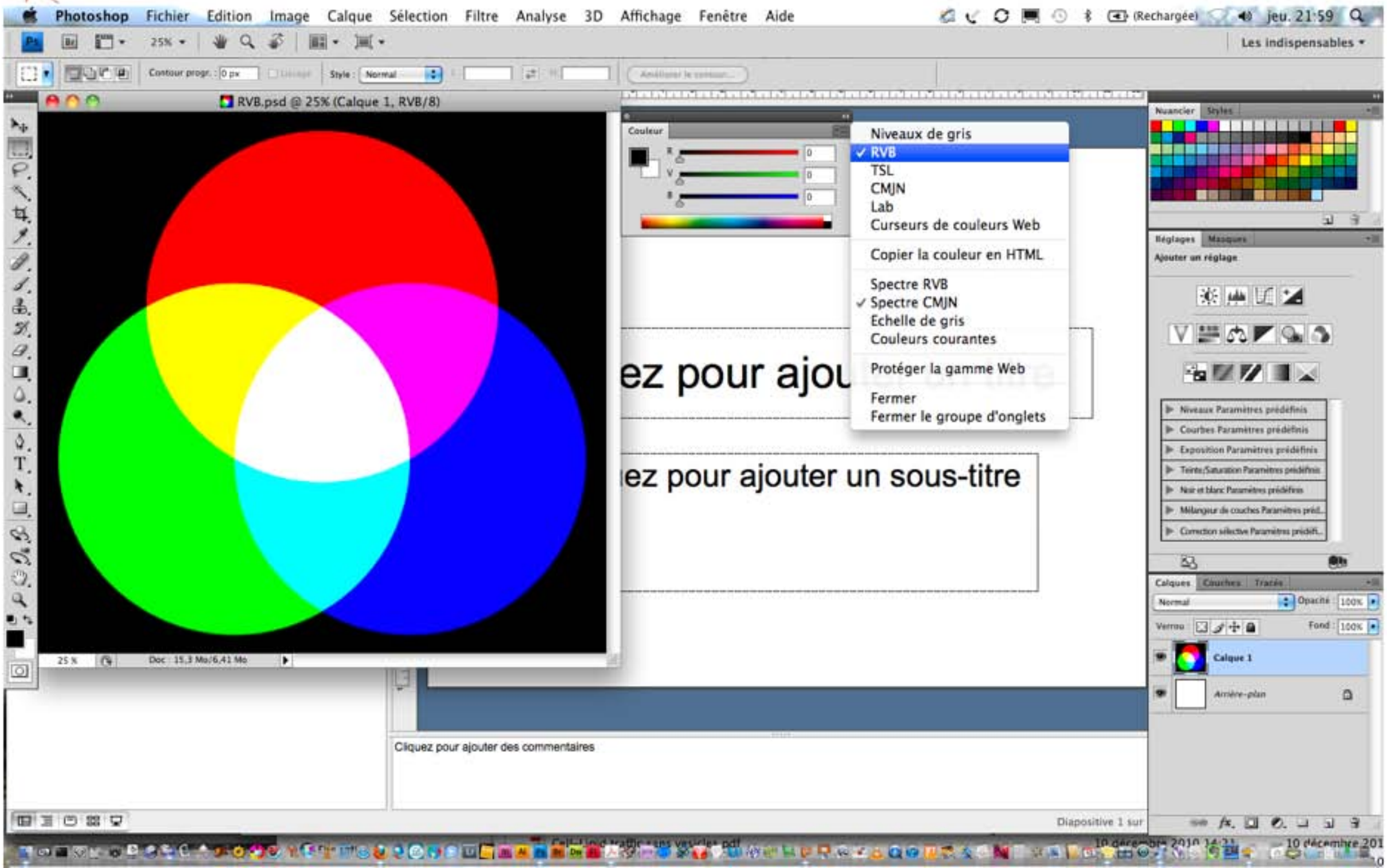
TSL



Hexadecimal (Web)



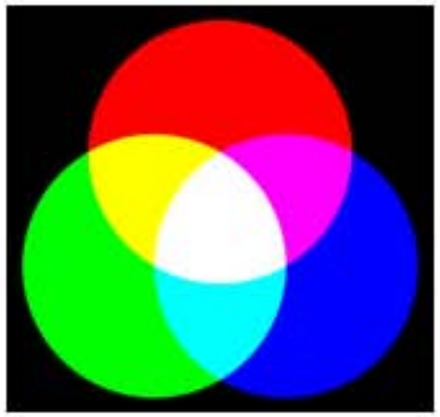
Color models & color space

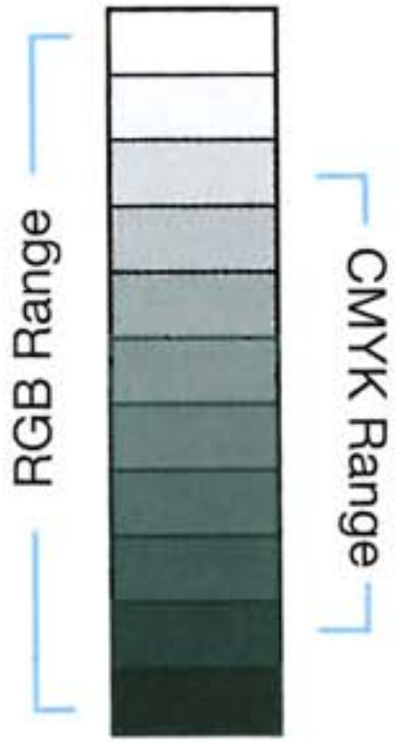


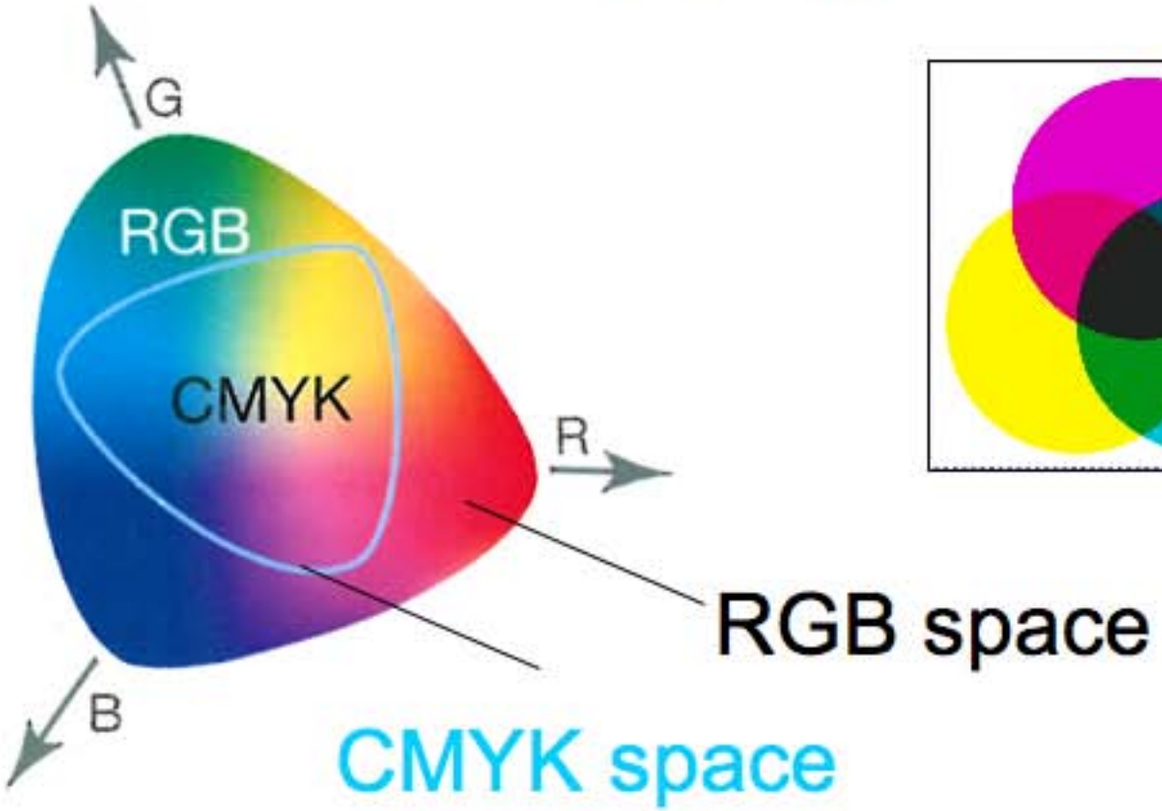
Color models & color space

RGB
screen / projectors

CMYK
Press - printers

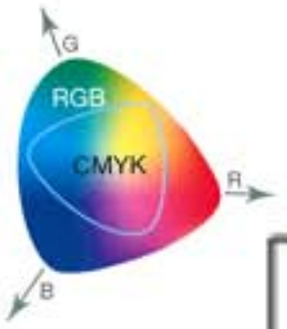






- RGB describes a larger portion of color space than does CMYK
- That the reason why it's hard to convert RGB to CMYK

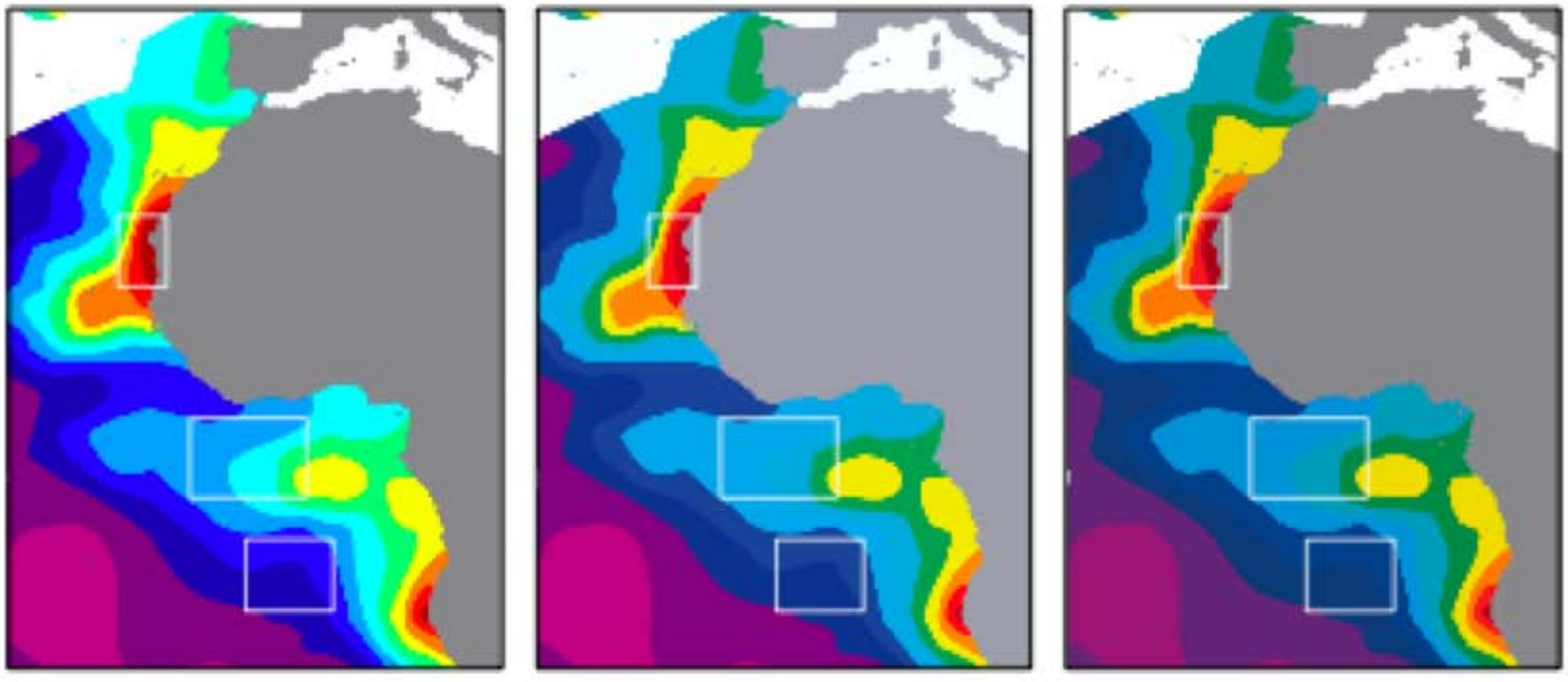
Color models & color space



RGB
(Screen)

CMYK
coated paper
(journal)

CMYK
uncoated paper
(laser printer)

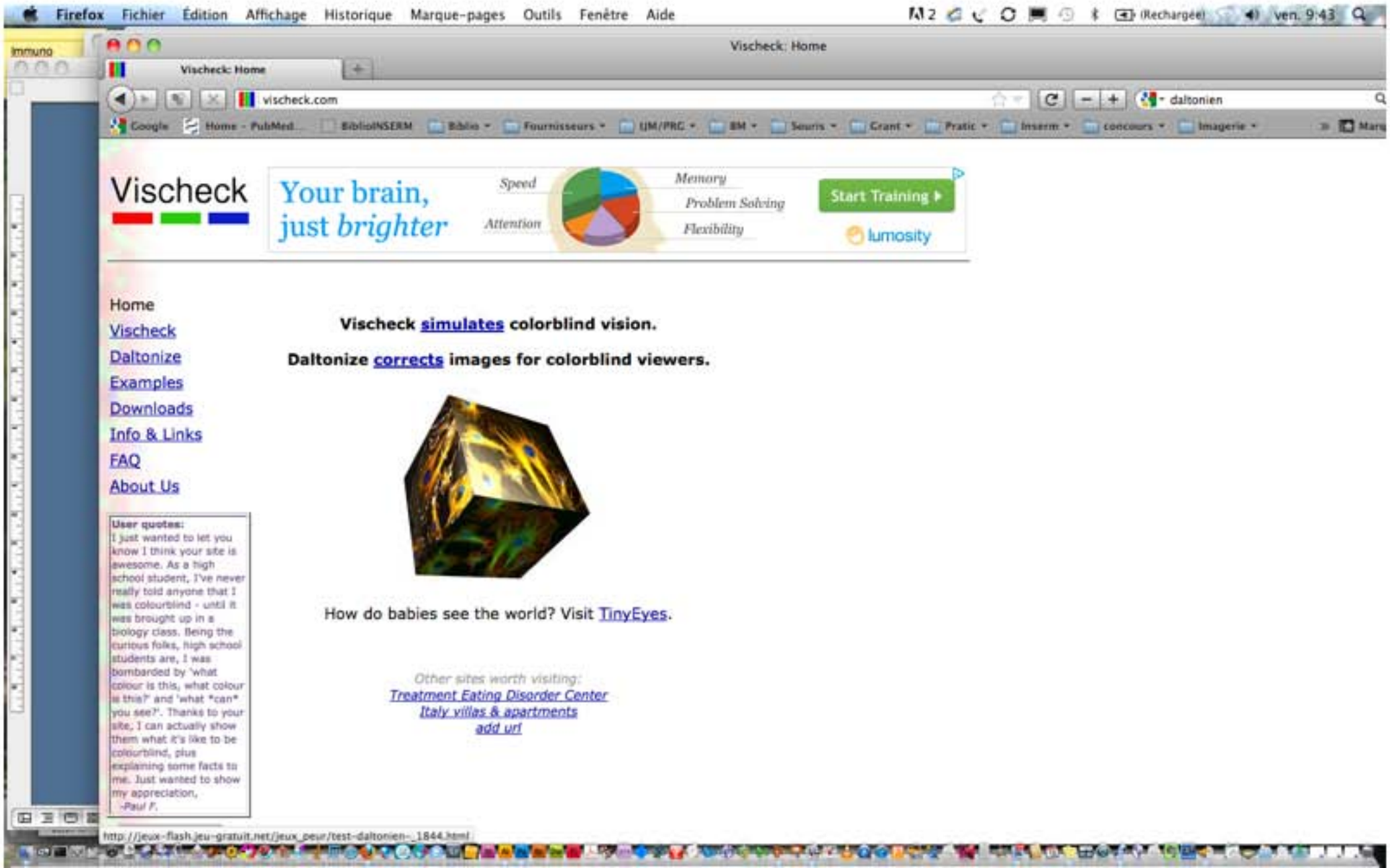


- RGB describes a larger portion of color space than does CMYK
- information about the oceanographic features in white boxes are lost in CMYK.

Color choices

At least 7% of males have some degree of color blindness, which affects the ability to tell red and green apart.

For this reason, you should avoid using red, and replace it by magenta.



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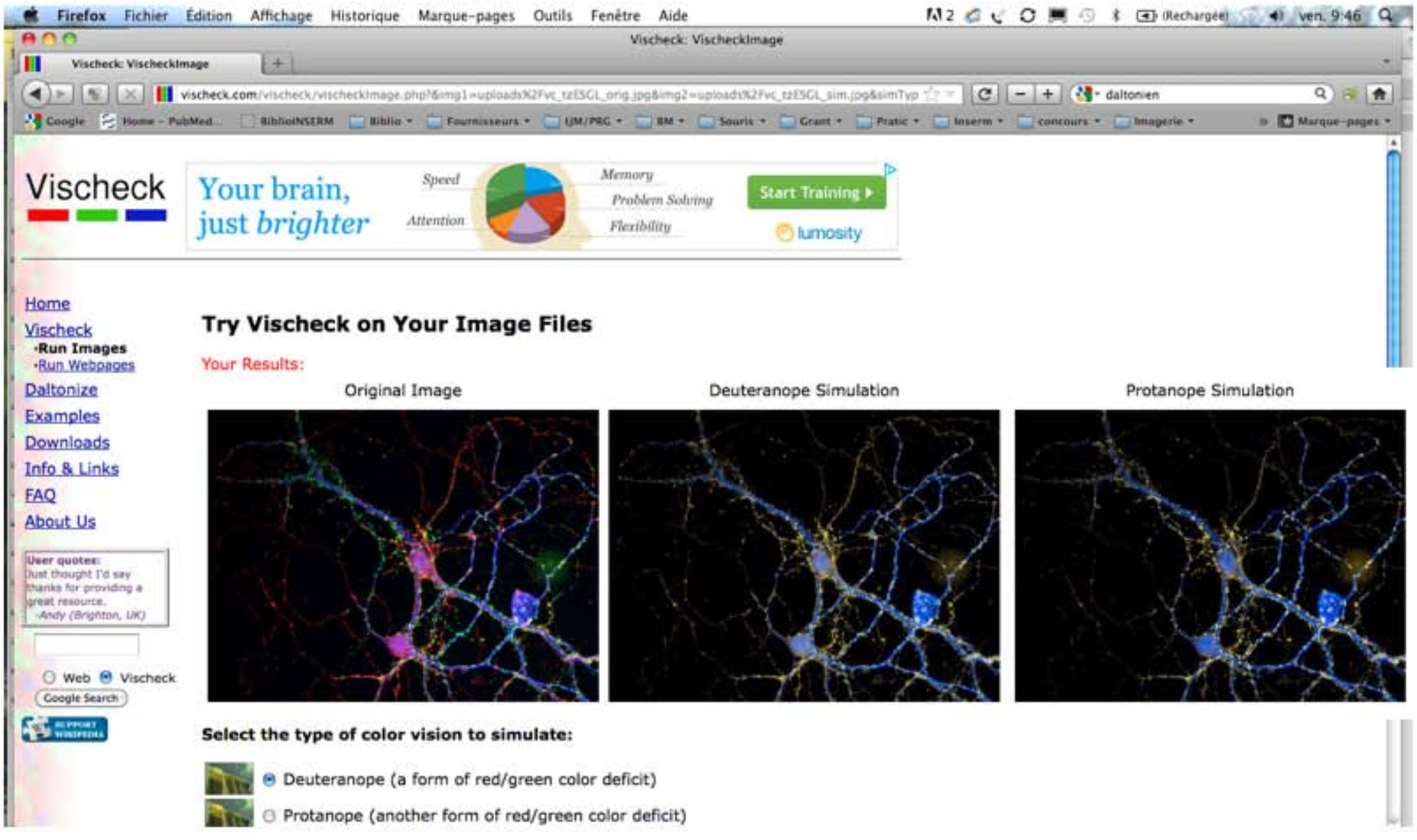

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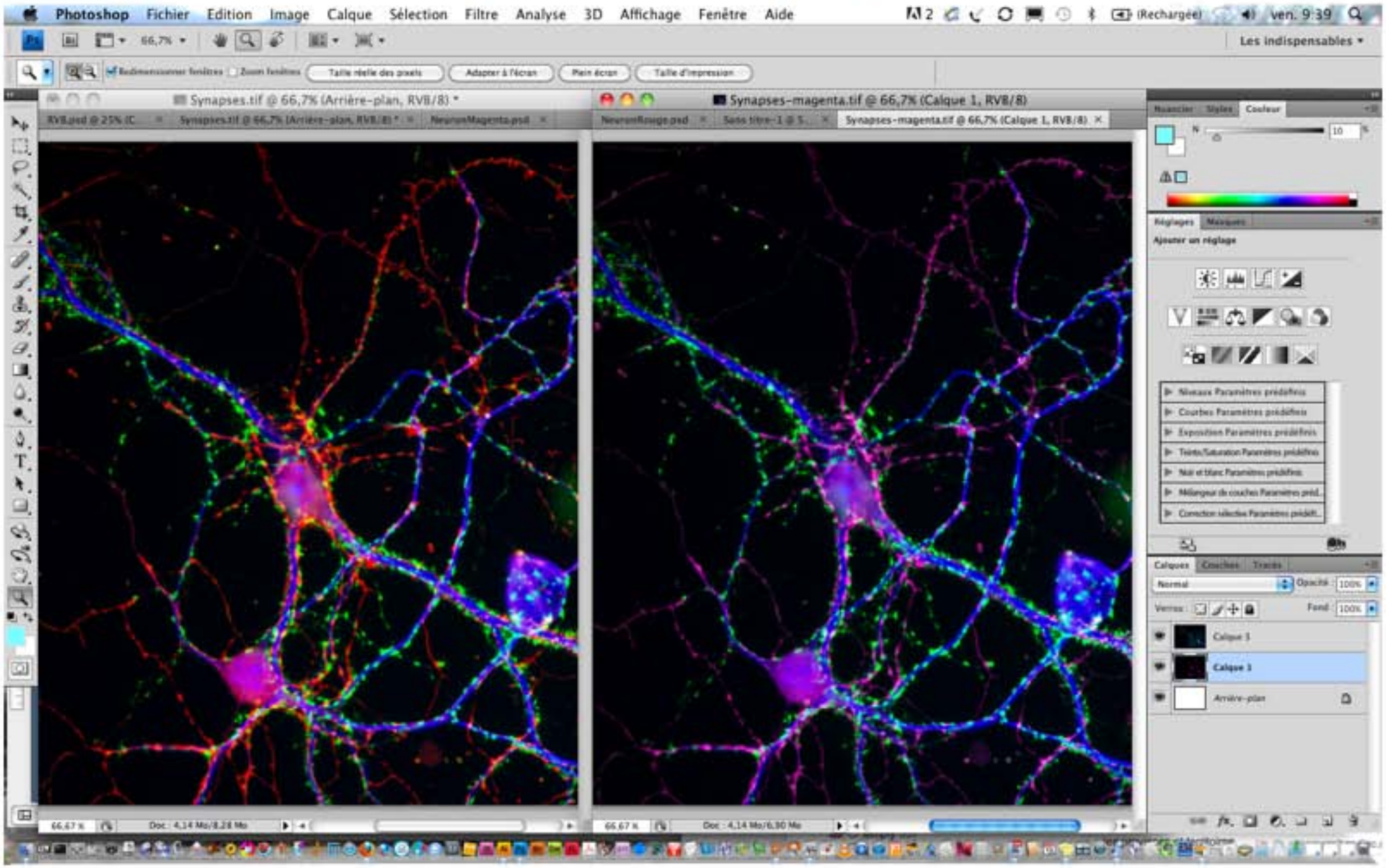
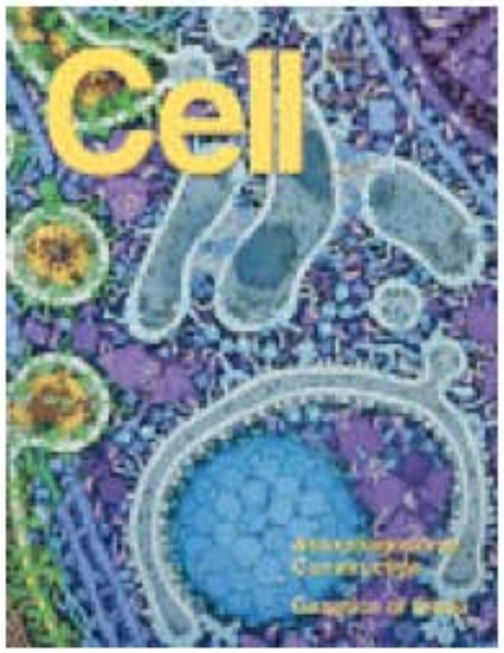


Converting RGB to CMYK to publish



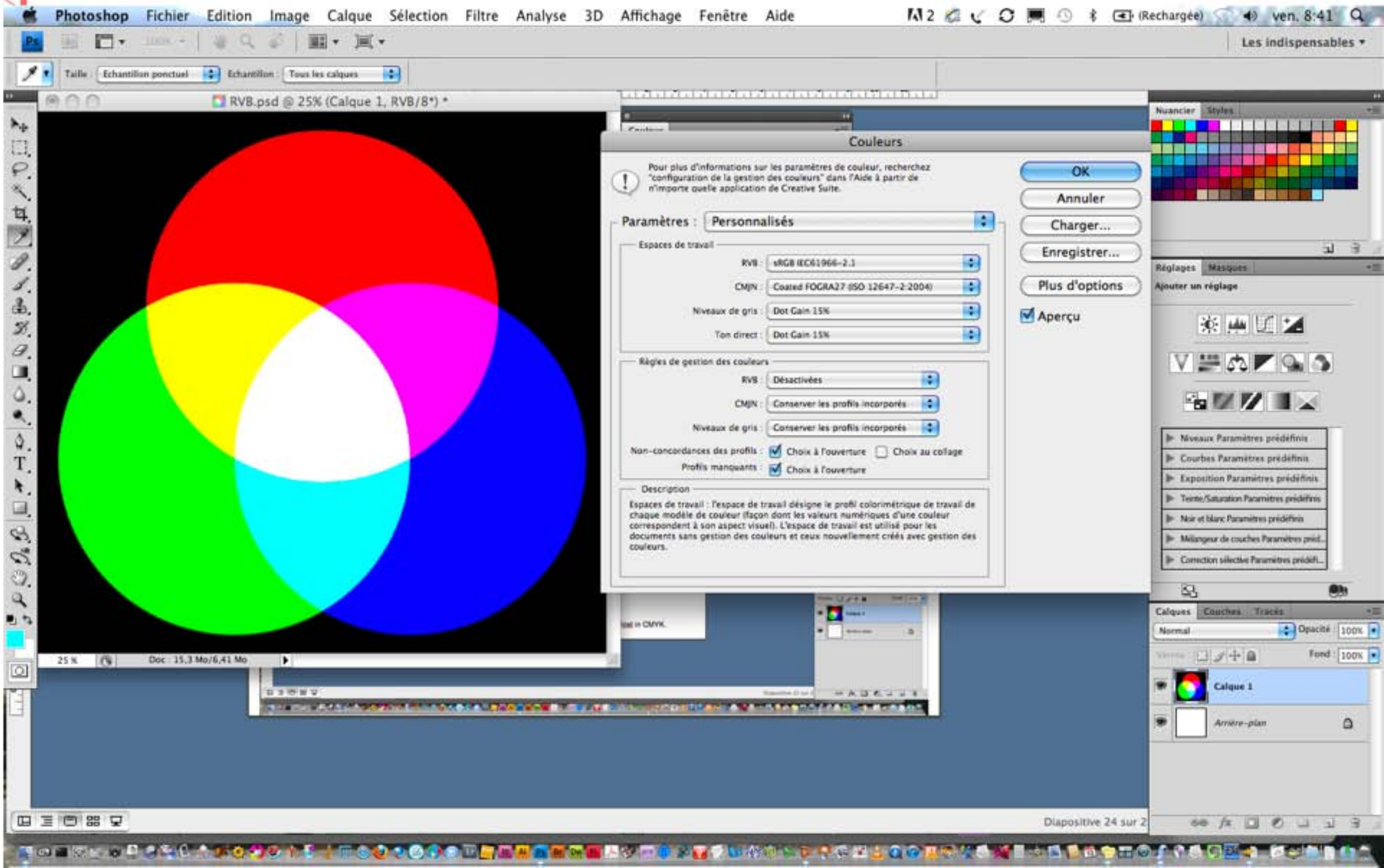
RGB
(Screen)

CMYK
coated paper
(paper copy)

- Select color mode (RGB)
- Attribute a profile (Adobe RGB 1998)
- Use the command convert to profile (RGB -> CMYK)

Converting RGB to CMYK to publish

Converting RGB to CMYK to publish



Converting RGB to CMYK to publish

Photoshop Fichier Edition Image Calque Sélection Filtre Analyse 3D Affichage Fenêtre Aide

Annuler ⌘Z
Aller vers l'avant ⇧⌘Z
Aller vers l'arrière ⌥⌘Z
Atténuer... ⇧⌘F
Couper ⌘X
Copier ⌘C
Copier avec fusion ⇧⌘C
Coller ⌘V
Coller dedans ⇧⌘V
Effacer
Orthographe...
Rechercher et remplacer du texte...
Remplir... ⇧F5
Contour...
Echelle basée sur le contenu
Transformation manuelle ⌘T
Transformation
Alignement automatique des calques...
Fusion automatique des calques...
Définir une forme prédéfinie...
Utiliser comme motif...
Créer une forme personnalisée...
Purger
Paramètres prédéfinis Adobe PDF...
Gestionnaire des paramètres prédéfinis...
Couleurs... ⇧⌘K
Attribuer un profil...
Convertir en profil...
Raccourcis clavier... ⌥⇧⌘K
Menus... ⌥⇧⌘M

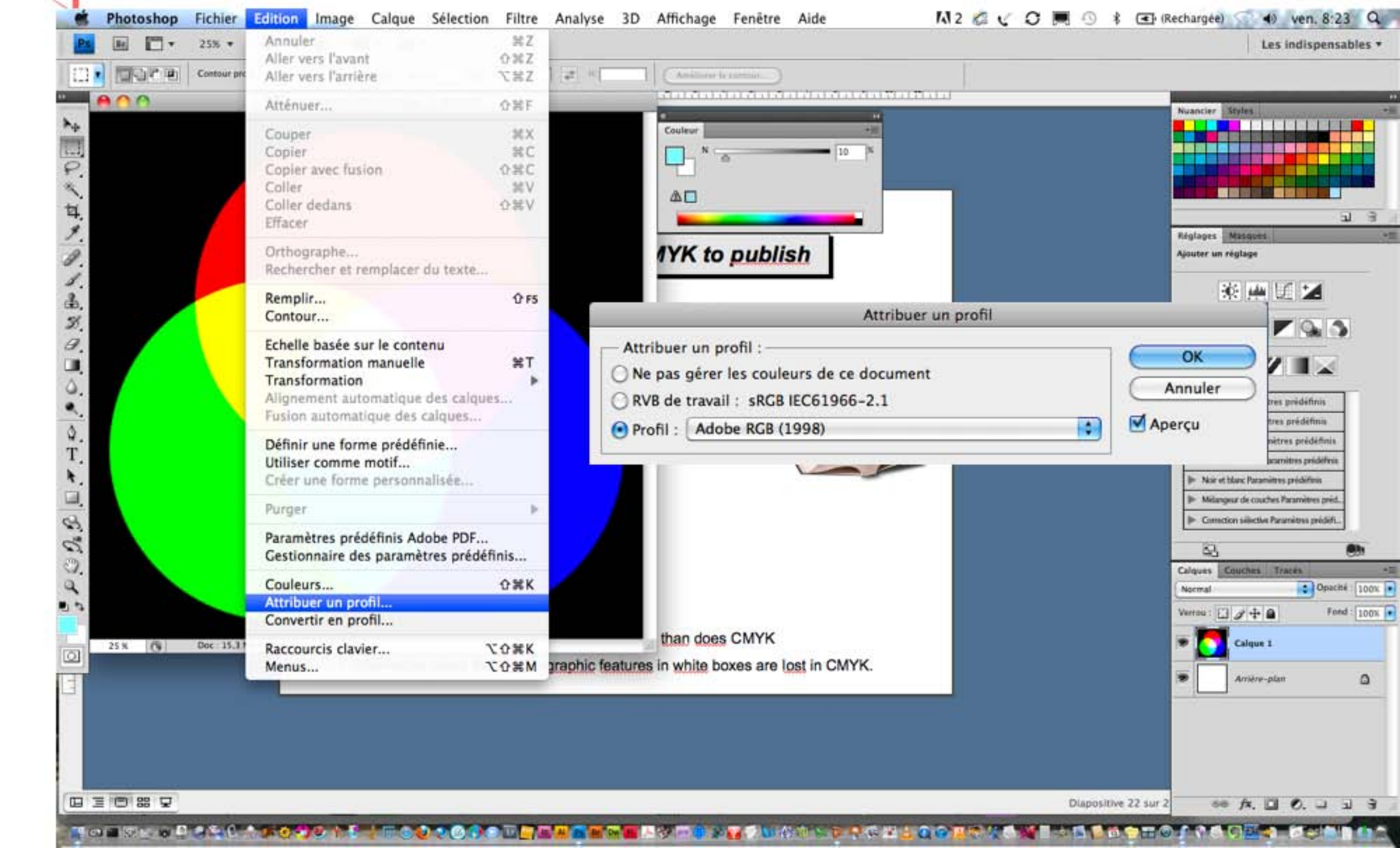
YK to publish

CMYK
coated paper
(paper copy)

than does CMYK

graphic features in white boxes are lost in CMYK.

Converting RGB to CMYK to publish



Converting RGB to CMYK to publish

Photoshop Fichier Edition Image Calque Sélection Filtre Analyse 3D Affichage Fenêtre Aide

Annuler ⌘Z
Aller vers l'avant ⇧⌘Z
Aller vers l'arrière ⌥⌘Z
Atténuer... ⇧⌘F
Couper ⌘X
Copier ⌘C
Copier avec fusion ⇧⌘C
Coller ⌘V
Coller dedans ⇧⌘V
Effacer
Orthographe...
Rechercher et remplacer du texte...
Remplir... ⇧F5
Contour...
Echelle basée sur le contenu
Transformation manuelle ⌘T
Transformation
Alignement automatique des calques...
Fusion automatique des calques...
Définir une forme prédéfinie...
Utiliser comme motif...
Créer une forme personnalisée...
Purger
Paramètres prédéfinis Adobe PDF...
Gestionnaire des paramètres prédéfinis...
Couleurs... ⇧⌘K
Attribuer un profil...
Convertir en profil...
Raccourcis clavier... ⌥⇧⌘K
Menus... ⌥⇧⌘M

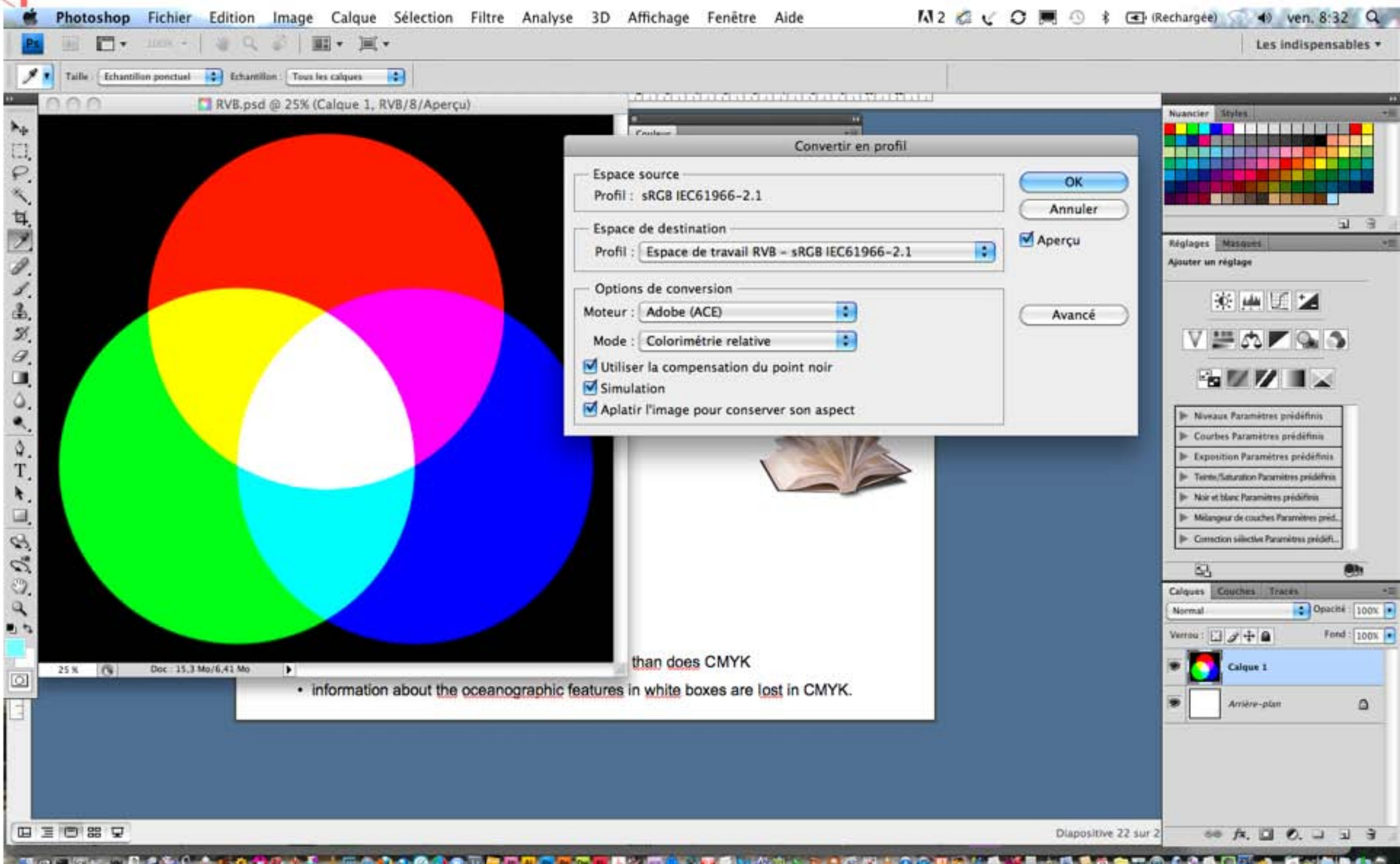
YK to publish

CMYK
coated paper
(paper copy)

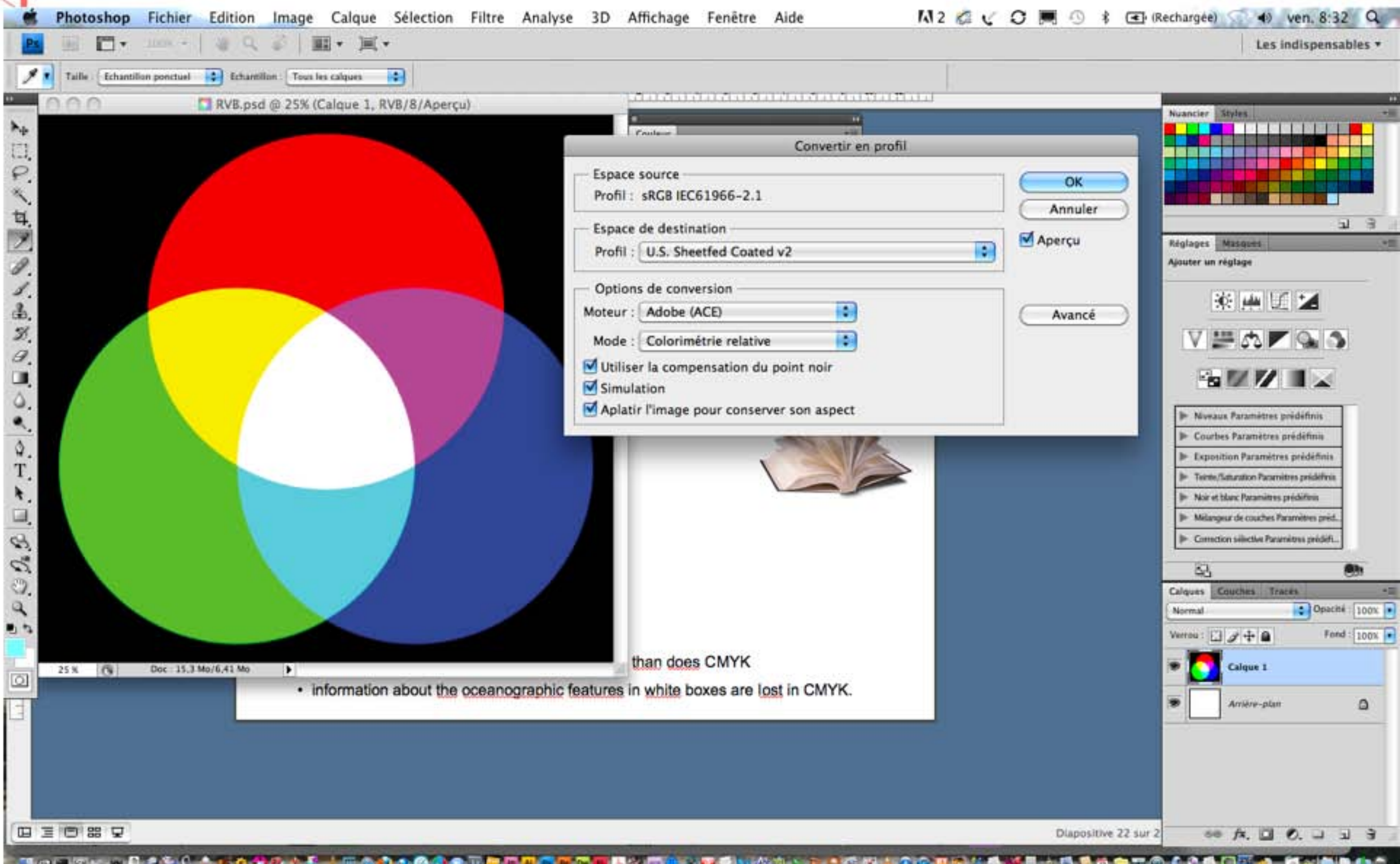
than does CMYK

graphic features in white boxes are lost in CMYK.

Converting RGB to CMYK to publish



Converting RGB to CMYK to publish



The decision making process

- ***Summary :***

- Use pixel art images for photographic image.
- Prefer vector art for most everything else.
- Use layers to organize your graph & photos.
- Use RGB color for Web, photos and Presentation.
- Convert to CMYK at the very last, for printing.

Vector Art Infinitely Scalable Formats: `PDF, EPS, SVG, AI`	**Pixel Art*** Set pixel dimensions Formats: `PNG, JPEG, TIFF, BMP`	
CMYK Color printed matter	Almost any figure in a printed paper 65 WAVLAPTFAYGFKV WAALAPTLAYGFKV WVSLITSLSYGGKC WPTLVTTFSYGVQC PYLLSHILGYGYYH PLLIGPNLGYGFYQ YDIITTAFQYGFRV FDIVSVAFSYGNRA	Printed image with no annotation 300 DPI print; 100 DPI Web
RGB Web display, presentations	Diagrams for Web or presentations	Photo without annotation 300 DPI print; 100 DPI Web
Grayscale Images without color, with tonal range	Almost any use, print or projected	Photo without color or annotation 300 DPI print; 100 DPI Web
Black & White Images without color, without tonal range	Line drawings	Scanned Text *Rosacea.* pattern o *Praya* an Final resolution: 600 DPI for print 100 DPI for Web