

Chapter **18**

Working with vector Art

practical
computing
for
biologists

HADDOCK • DUNN

Lydia Danglot
20th of April



Practical computing for **biologists**

Chapter **18**



Working with Vector Art

Creation of vector art with Adobe Illustrator

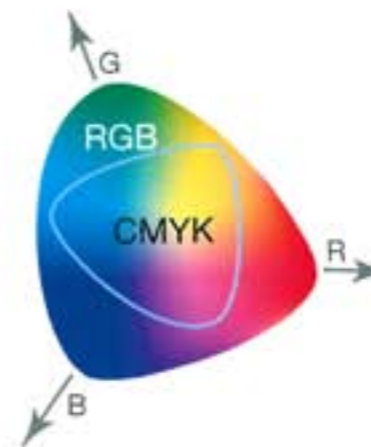
- ***Importing graphics and illustration in Illustrator***
- ***Drawing a shema directly in Illustrator***
- ***Converting a photo or a scan in a editable schema***

Anatomy of vector Art

- ***How to use Bézier curves***
- ***Selecting and manipulating objects***
- ***Transparancy and layers***
- ***Illustrator tips and shortcuts***

InDesign: how to design scientific figures and books

- ***Why using Indesign for generating your PhD memory***
- ***Creating figures with picture, graphics and photos***





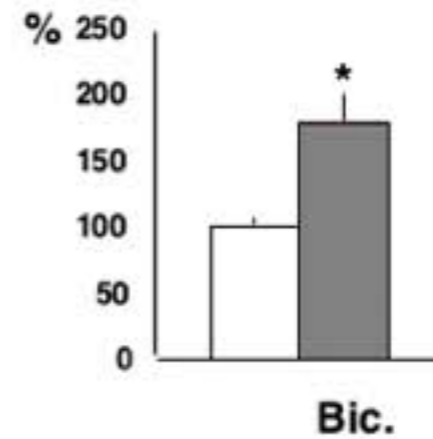
General Image Types



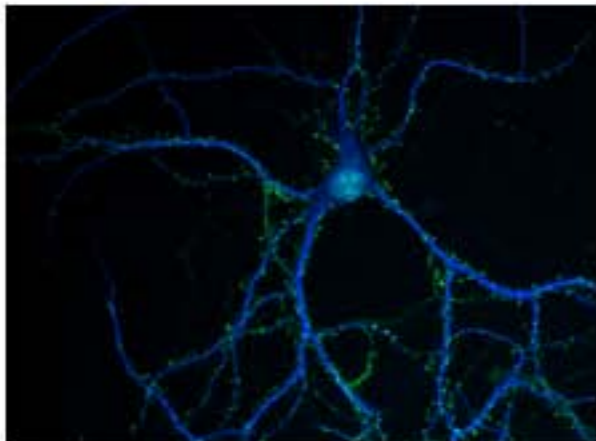
• Vector-based image :



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



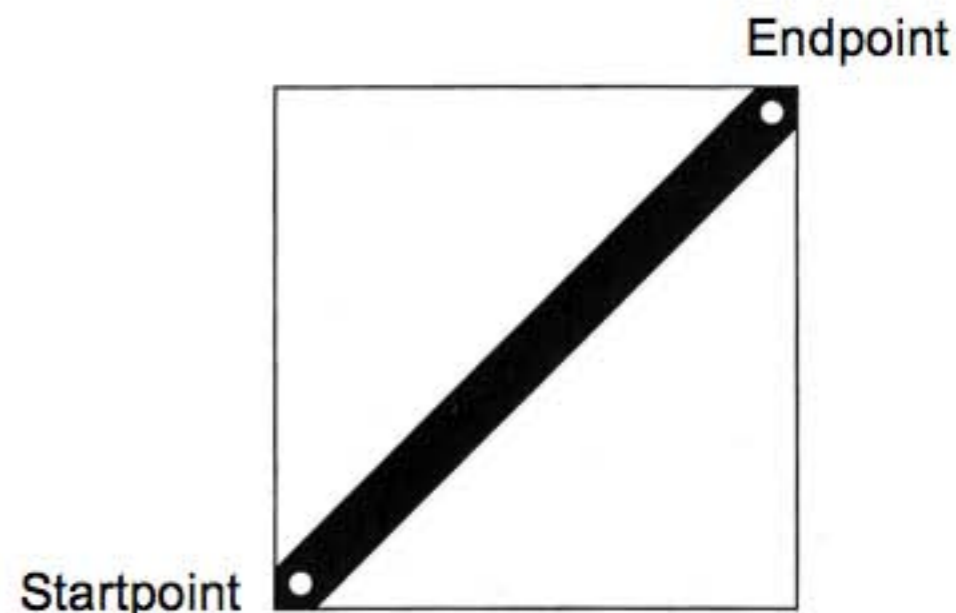
• Vector-based image :



In **vector art** the line is defined by **2 points**.

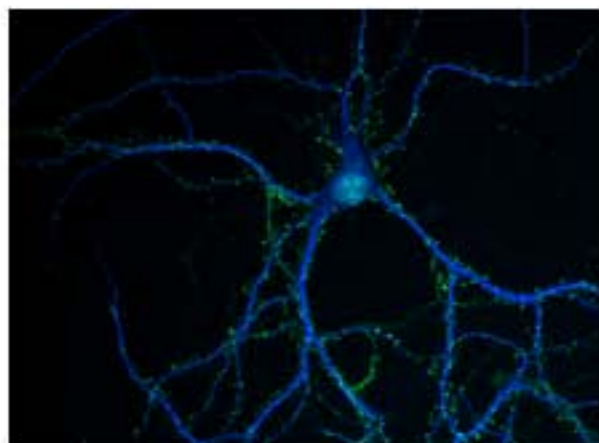
Storing info:

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



A 2 point vector line

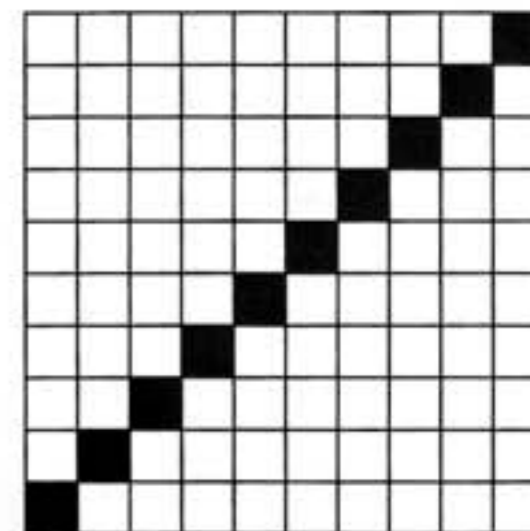
• Pixel-based image = bitmap = raster art :



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 :



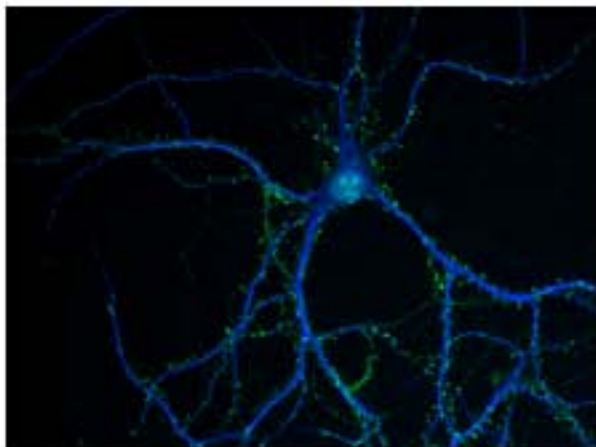
In **vector art** the file format can be :

- 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



General Image Types



• Vector-based image :



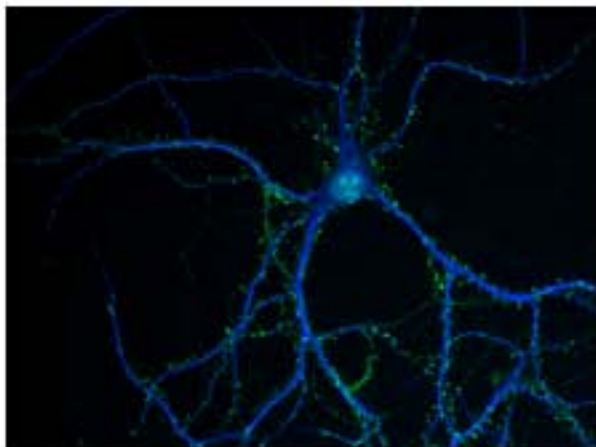
In **vector art** the file format can be :

- 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

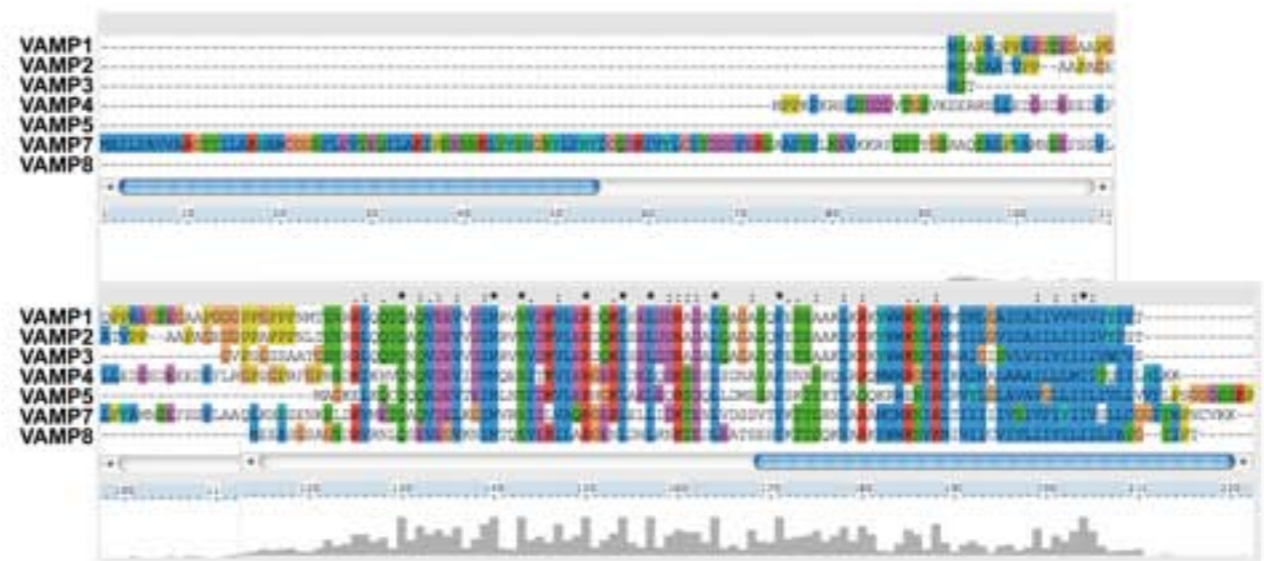
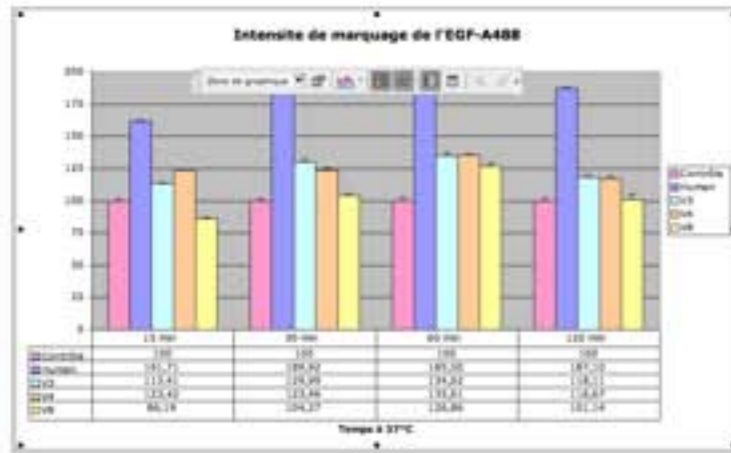


Generating vector art



There are 3 common ways to create vector art :

- Export a graph or a phylogeny tree from another program (Excel, Clustall, ...)



- Draw an image
- Trace an existing piece of pixel art



Exporting graph from excel

Excel Fichier Edition Affichage Insertion Format Outils Graphique Fenêtre Aide

Verdana 10 Zone de graphique

060606-Facs analyse.xls

Intensite de marquage de l'EGF-

	15 min	30 min	60 min
Contrôle	100	100	100
Human	161,71	189,92	185,50
V3	113,41	129,99	134,62
V4	123,42	123,46	135,61
V8	86,19	104,27	126,86

Temps à 37°C

Imprimer

Imprimante : Konica C360PS 172.25.0.39

Préréglages : Konica recto verso-2 par pages

Copies et pages

Copies : 1 Assemblées

Pages : Toutes (1 page)

De : 1 à : 1

Imprimer : Sélection Feuilles sélectionnées Classeur entier

Échelle : Adapter à 1 page(s) sur 1 page(s)

Afficher l'aperçu rapide

Mise en page...

PDF Aperçu

- Enregistrer au format PDF...
- Enregistrer au format PostScript...
- Faxer le document PDF...
- Envoyer le document PDF par courrier électronique
- Save as Adobe PDF
- Enregistrer en PDF-X
- Enregistrer le document PDF vers iPhoto
- Enregistrer le document PDF dans le dossier de reçus Web
- Enregistrer le PDF dans Papers
- Modifier le menu...

Annuler Imprimer

Feuil9 IntEGFS Intensite VAMP Feuil3 Int EGF4 Feuil1 Int EGF2 NEGF3 Feuil5 % PECFR2 Feuil2 Feuil4 Feuil8 NEGF Vamp % EGF1 Int EGF



Importing graph from excel

The screenshot shows the Adobe Illustrator interface. The 'Fichier' (File) menu is open, with 'Ouvrir...' (Open...) selected. In the background, a bar chart titled 'Intensite de marquage de l'EGF-A488' is visible, showing data for four time points (15 min, 30 min, 60 min, 120 min) across five conditions (Control, Human, V3, V4, V8). Below the chart is a data table:

	15 min	30 min	60 min	120 min
100	100	100	100	100
161,75	189,82	185,50	187,10	
133,41	139,99	134,62	136,11	
123,42	123,46	125,61	126,67	
86,19	104,27	126,84		

An 'Ouvrir' (Open) dialog box is open, showing a file browser for 'Chap18-VectorArt'. The file '060606-Facs analyse.xls' is selected. The dialog also shows a sidebar with folders like 'APPAREILS', 'PARTAGES', and 'EMPLACEMENTS'. At the bottom of the dialog, there are 'Annuler' and 'Ouvrir' buttons.



Generating vector art (clustal)

There are 3 common ways to create vector art :

- Export a graph or a phylogeny tree from another program (Excel,



...)



The screenshot shows the ClustalX application window. The 'File' menu is open, and the option 'Write Alignment as Postscript' is highlighted in blue. The menu items are:

- Load Sequences ⌘O
- Append Sequences
- Save Sequences as... ⌘S
- Load Profile 1
- Load Profile 2
- Save Profile 1 as...
- Save Profile 2 as...
- Write Alignment as Postscript ⌘P**
- Write Profile 1 as Postscript
- Write Profile 2 as Postscript

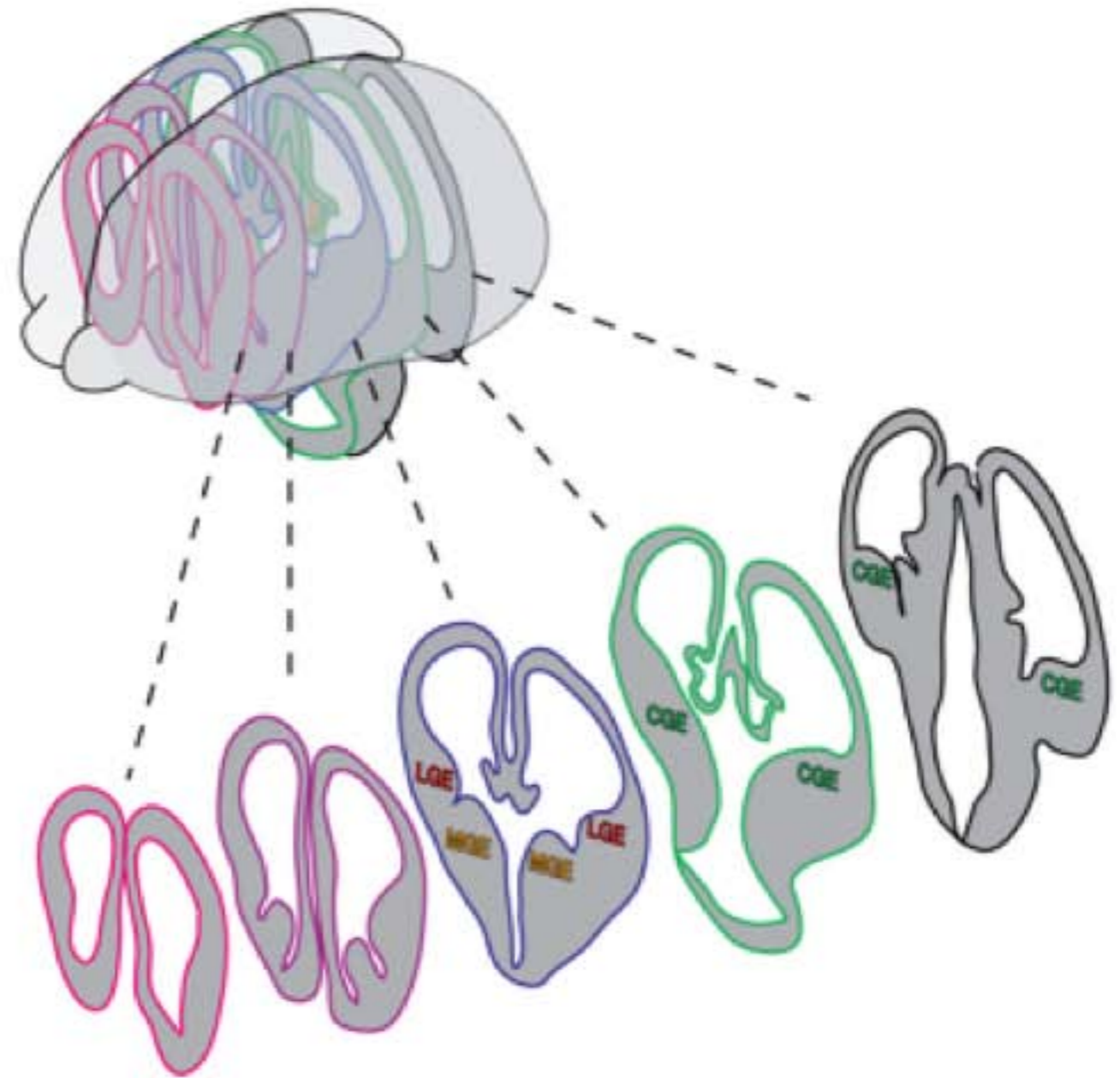
The background shows a sequence alignment view with a color-coded bar at the top and a sequence viewer at the bottom. The sequence viewer shows two lines of sequence data:

```
7325|ref|NP_001171263.1|...
7330|ref|NP_001171264.1|...
```




Drawing in Illustrator

- From basics forms to complex shema :





Illustrator Panels

The screenshot shows the Adobe Illustrator application window with the 'Fenêtre' (Window) menu open. The menu lists various panels and their keyboard shortcuts. The background shows the Illustrator workspace with a toolbar on the left and a 'Nuancier' (Color palette) panel on the right.

Panel Name	Keyboard Shortcut
Nouvelle fenêtre	
Disposition	
Espace de travail	
Extensions	
Cadre de l'application	
✓ Barre de l'application	
✓ Contrôle	
✓ Outils	
Alignement	⇧ F7
Aperçu de l'aplatissement	
Aperçu des séparations	
Aspect	⇧ F6
Baguette magique	
Calques	F7
Contour	⌘ F10
Couleur	F6
Dégradé de couleurs	⌘ F9
Formes	F5
Guide des couleurs	⇧ F3
Informations sur le document	
Infos	⌘ F8
Interactivité SVC	
Liens	
Navigation	
✓ Nuancier	
Options d'objet	⌘ F11
Pathfinder	⇧ ⌘ F9
Scripts d'action	
Styles graphiques	⇧ F5
Symboles	⇧ ⌘ F11
Texte	
Transformation	⇧ F8
Transparence	⇧ ⌘ F10
Variables	
Bibliothèques de formes	
Bibliothèques de nuances	
Bibliothèques de styles graphiques	
Bibliothèques de symboles	



Illustrator Panels

The screenshot shows the Adobe Illustrator application window. The 'Fichier' (File) menu is open, displaying the following options:

- Nouveau... ⌘N
- Nouveau d'après un modèle... ⇧⌘N
- Ouvrir... ⌘O
- Ouvrir les fichiers récents
- Parcourir dans Bridge... ⇧⌘O
- Partager mon écran...
Device Central...
- Fermer ⌘W
- Enregistrer ⌘S
- Enregistrer sous... ⇧⌘S
- Enregistrer une copie... ⇧⌘S
- Enregistrer comme modèle...
- Archiver...
- Enregistrer pour le Web et les périphériques... ⇧⌘S
- Version précédente F12
- Importer...
- Enregistrer pour Microsoft Office...
- Exporter...
- Scripts
- Format de document... ⇧⌘P
- Mode colorimétrique du document
- Informations... ⇧⌘I
- Imprimer... ⌘P

The background shows the main workspace with a color palette on the right and various toolbars. The top menu bar includes 'Fichier', 'Edition', 'Objet', 'Texte', 'Sélection', 'Effet', 'Affichage', 'Fenêtre', and 'Aide'. The status bar at the bottom indicates 'jamais enregistré' (never saved).



Illustrator Panels

The screenshot shows the Adobe Illustrator application window. The menu bar at the top includes 'Illustrator', 'Fichier', 'Edition', 'Objet', 'Texte', 'Sélection', 'Effet', 'Affichage', 'Fenêtre', and 'Aide'. The 'Edition' menu is currently open, displaying a list of editing actions with their respective keyboard shortcuts. The main workspace is empty, showing a large white area with a thin black border. On the left side, there is a vertical toolbar with various drawing tools. On the right side, there are several panels, including a 'Nuancier' (Color palette) and a 'Fenêtre' (Window) panel. The status bar at the bottom indicates the file name 'jamais enregistré' and the zoom level '81%'.

Action	Shortcut
Annuler Saisie	⌘Z
Rétablir	⇧⌘Z
Couper	⌘X
Copier	⌘C
Coller	⌘V
Coller devant	⌘F
Coller derrière	⌘B
Effacer	
Rechercher et remplacer...	
Suivant	
Orthographe...	⌘I
Modifier le dictionnaire personnalisé...	
Utiliser comme motif...	
Modifier les couleurs	
Modifier l'original	
Aplatissements prédéfinis des transparences...	
Vectorisations prédéfinies...	
Impressions prédéfinies...	
Paramètres prédéfinis Adobe PDF...	
Paramètres prédéfinis SWF...	
Couleurs...	⇧⌘K
Attribuer un profil...	
Raccourcis clavier...	⇧⌘K



Illustrator Panels

The screenshot shows the Adobe Illustrator application window. The menu bar at the top includes 'Illustrator', 'Fichier', 'Edition', 'Objet', 'Texte', 'Sélection', 'Effet', 'Affichage', 'Fenêtre', and 'Aide'. The 'Objet' menu is currently open, displaying a list of options:

- Transformation
 - Répéter la transformation ⌘D
- Disposition
 - Déplacement... ⌘M
 - Rotation...
 - Miroir...
 - Mise à l'échelle...
 - Déformation...
- Transformation répartie... ⌘⇧D
- Réinitialiser le cadre de sélection

Below these are several other menu items, some with keyboard shortcuts:

- Associer ⌘G
- Dissocier ⌘⇧G
- Verrouiller
- Tout déverrouiller ⌘⇧Z
- Masquer
- Tout afficher ⌘⇧Z
- Décomposer...
 - Décomposer l'aspect
 - Aplatissement des transparences...
 - Pixellisation...
 - Créer un filet de dégradé...
 - Créer une mosaïque...
- Tranche
- Tracé
 - Dégradé de formes
 - Distorsion de l'enveloppe
 - Peinture dynamique
 - Vectorisation dynamique
 - Habillage de texte
- Masque d'écrêtage
- Tracé transparent
- Convertir en plans de travail
- Graphe

The interface also shows a toolbar on the left with various drawing tools, a 'Nuancier' (color palette) on the right, and a status bar at the bottom indicating 'jamais enregistré' (never saved).



Illustrator Panels

The screenshot shows the Adobe Illustrator application window. The 'Affichage' (View) menu is open, displaying various view-related options and their keyboard shortcuts. The main workspace is visible in the background, showing a document with a selection box and various toolbars.

Option	Shortcut
Tracés	⌘Y
Aperçu de la surimpression	⇧⌘Y
Aperçu en pixels	⇧⌘Y
Format d'épreuve	
Couleurs d'épreuve	
Zoom avant	⌘+
Zoom arrière	⌘-
Ajuster le plan de travail à la fenêtre	⌘0
Tout ajuster à la fenêtre	⇧⌘0
Taille réelle	⌘1
Masquer le contour de sélection	⌘H
Masquer les plans de travail	⇧⌘H
Afficher les limites d'impression	
Afficher les tranches	
Verrouiller les tranches	
Masquer le modèle	⇧⌘W
Afficher les règles	⌘R
Afficher les règles du plan de travail	⇧⌘R
Masquer le cadre de sélection	⇧⌘B
Afficher le damier de transparence	⇧⌘D
Masquer le texte lié	⇧⌘Y
Masquer l'annoteur de dégradé de couleurs	⇧⌘G
Afficher les espaces de peinture dynamique	
Repères	
✓ Repères commentés	⌘U
Afficher la grille	⌘'
Magnétisme de la grille	⇧⌘'
✓ Magnétisme du point	⇧⌘'
Nouvelle vue...	
Vues...	



Illustrator Tools

The screenshot shows the Adobe Illustrator application window with a comprehensive tool palette overlay. The palette is organized into several sections:

- Basic Tools:** Line, Arc, Spiral, Polar Grid, Rectangular Grid, Pen Tool, Add Anchor Point Tool, Delete Anchor Point Tool, Convert Anchor Point Tool, Direct Select, Select Lasso, and Group Select.
- Text Tools:** Text, Text Area, Text Path (L), Text Path (R), Vertical Text, and Vertical Text Area.
- Shape Tools:** Rectangle, Round Rectangle, Polygon, Flare, Star, Oval, and Erase.
- Image and Filter Tools:** Warp, Pucker, Scallop, Twirl, Bloat, and Wrinkle.
- Symbol Tools:** Symbol Sprayer, Symbol Spinner, Symbol Shifter, Symbol Sizer, Symbol Screener, Symbol Scruncher, and Symbol Stainer.
- Advanced Tools:** Magic Wand, Paint Brush, Rotate, Warp, Symbol Sprayer, Mesh, Eyedropper, Slice, Hand, Swap Fill/Stroke, Toggle Stroke, Toggle Fill, Default Fill/Stroke, Blend, Auto Trace, Scissors Knife Tool, and Reshape.
- Graphing Tools:** Stacked Column Graph, Bar Graph, Area Graph, Pie Graph, Scatter Graph, and Radar Graph.
- Other Tools:** Rotate, Reflect, Twirl, Bloat, Wrinkle, Symbol Sprayer, Symbol Spinner, Symbol Shifter, Symbol Sizer, Symbol Screener, Symbol Scruncher, Symbol Stainer, Eyedropper, Measure, Paint Bucket, Hand, Printable Page, Slice, and Slice Selection.

The background shows the Illustrator workspace with a document titled "060606-Facs analyse.pdf @ 100% (RVB) Ab". The top menu bar includes "Texte", "Sélection", "Effet", "Affichage", "Fenêtre", and "Aide". The status bar at the bottom indicates "Jamais enregistré".

Bezier curves



The screenshot shows the Adobe Illustrator interface. The top menu bar includes 'Illustrator', 'Fichier', 'Edition', 'Objet', 'Texte', 'Sélection', 'Effet', 'Affichage', 'Fenêtre', and 'Aide'. The toolbar on the left contains various drawing tools, with the 'Pencil tool' (Outil Plume) and its sub-tools expanded. The main workspace displays a diagram of Bezier curves with labels: 'End anchor', 'Smooth anchor', 'Handle', 'Control line', and 'Corner anchor'. A large diagram on the right shows a complex curve with multiple handles and control lines, illustrating how they define the curve's shape. The status bar at the bottom indicates '100%' zoom and 'Fichier non géré'.

FIGURE 18.3 Bézier curves The three anchor points of these curves are all the same, but their control handles give them very different shapes: (A) smooth anchor; (B) corner point; (C) one handle retracted; (D) both handles retracted; (E) smooth anchor point, but with the control handles rotated 180° relative to (A).



PathFinder

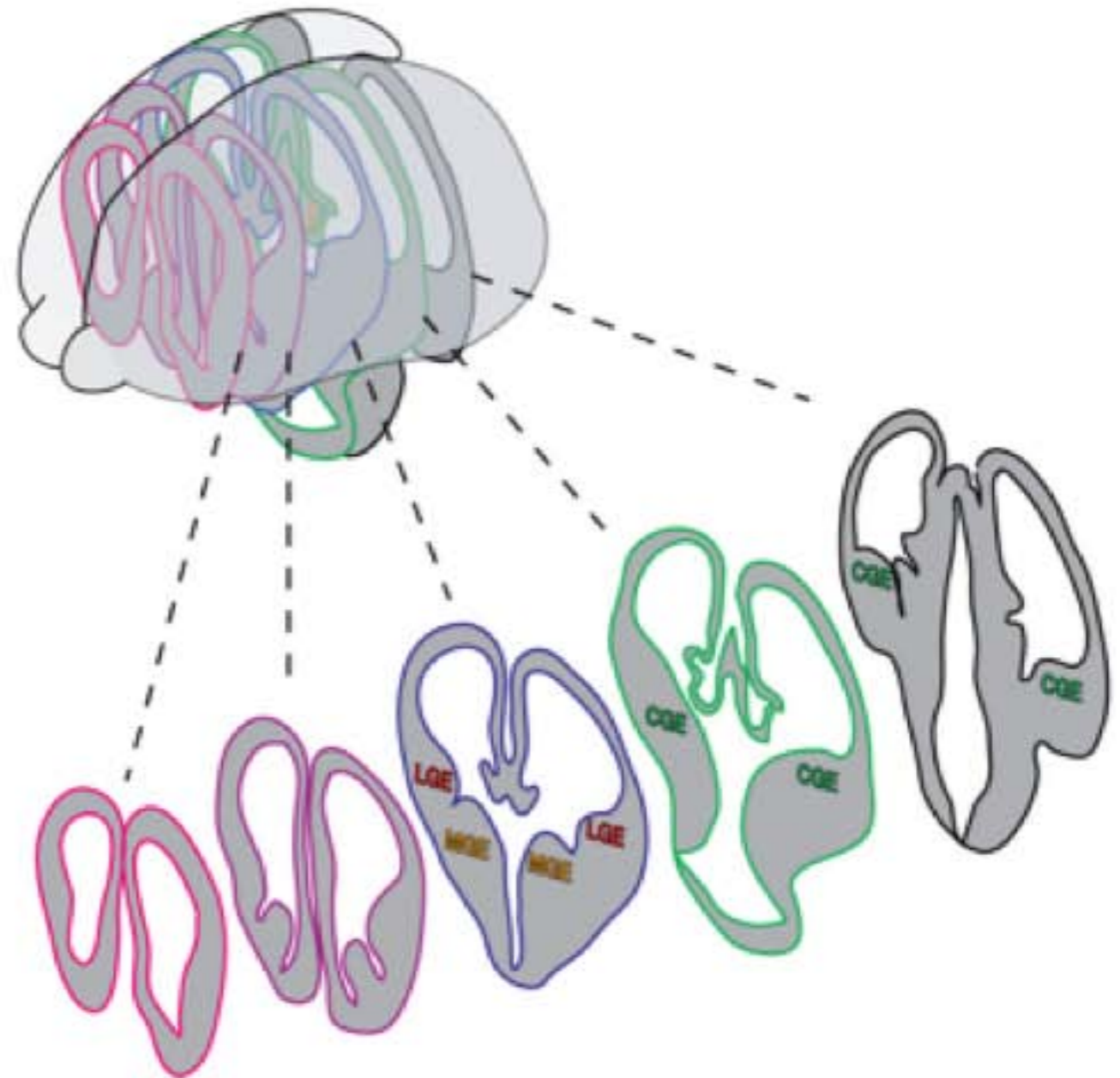
The screenshot displays the Adobe Illustrator interface. The top menu bar includes 'Illustrator', 'Fichier', 'Edition', 'Objet', 'Texte', 'Sélection', 'Effet', 'Affichage', 'Fenêtre', and 'Aide'. The top status bar shows 'Aucune sélection', 'Contour: 1 pt', 'Style: Copie', 'Opacité: 100%', and 'Configuration du document'. The main workspace shows a document titled 'Bezier.ai @ 100% (RVB/Aperçu)'. On the left, the 'Pathfinder' panel is open, showing 'Modes de la forme' and 'Pathfinders' options. The central workspace contains a diagram titled 'Join Function' illustrating the process of joining two overlapping shapes. The top row shows two overlapping squares, followed by their union, and then the intersection. The bottom row shows the intersection of two overlapping L-shaped polygons, followed by the union of the two shapes, and finally the intersection of the two shapes with a circular highlight on the overlapping area. The right side of the interface features a 'Couleur' panel with a 'Guide des couleurs' and a color bar. The bottom status bar shows '100%' zoom and 'Fichier non géré'.



Drawing in Illustrator



- From basics forms to complex shema :





Drawing in Illustrator

• Tracing over an Illustration :

Illustrator Fichier Edition Objet Texte Sélection Effet Affichage Fenêtre Aide

Tracer

Tracer.ai* @ 100% (RVB/Aperçu)

0606-Facs analyse.pdf @ 100% (RVB/Aperçu) x Figure4.ai @ 102.41% (CMJN/Aperçu) x Sans titre - 2* @ 81% (RVB/Aperçu) x Tracer.ai* @ 100% (RVB/Aperçu) x

Outil Crayon (N)
Outil Arrondi
Outil Gomme

Contour Dégradé Transpa

Epaisseur 3 pt
Points 4
Alignement de contour
 Pointillé

Tracé Blanc Tracé Blanc Tracé Blanc

1. Import
2. Lock the object
3. Trace over the object
4. Adjust point



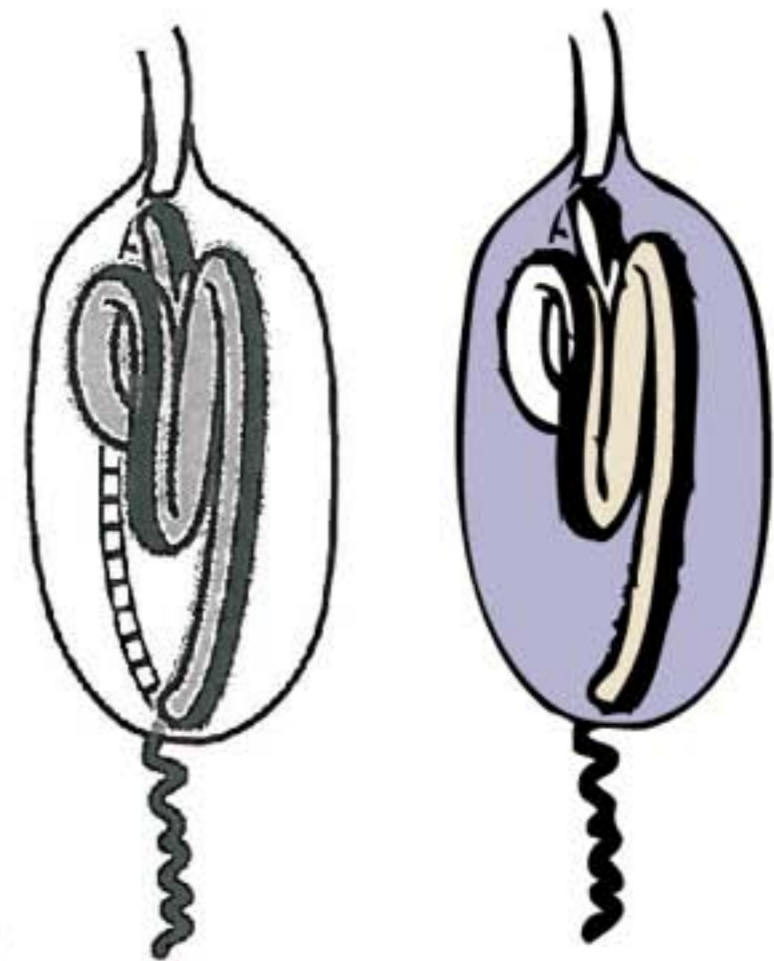
Generating vector art

There are 3 common ways to create vector art :

- Trace an existing piece of pixel art



The screenshot shows the Adobe Illustrator interface. The 'Objet' menu is open, and 'Vectorisation dynamique' is selected. The sub-menu 'Options de vectorisation...' is also open, showing options like 'Ne pas afficher d'image', 'Afficher l'image d'origine', 'Afficher l'image corrigée', 'Afficher l'image transparente', 'Ne pas afficher de résultat de vectorisation', and 'Afficher le résultat de vectorisation'. To the right of the screenshot are two side-by-side illustrations of a biological structure, showing the original pixel art and its vectorized version.





Chapter **18**



Working with Vector Art

Creation of vector art with Adobe Illustrator

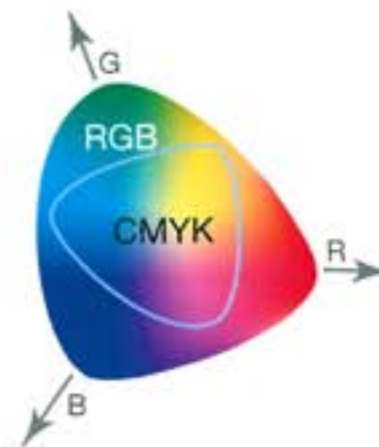
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Anatomy of vector Art

- ***How to use Bézier curves***
- ***Selecting and manipulating objects***
- ***Transparancy and layers***
- ***Illustrator tips and shortcuts***

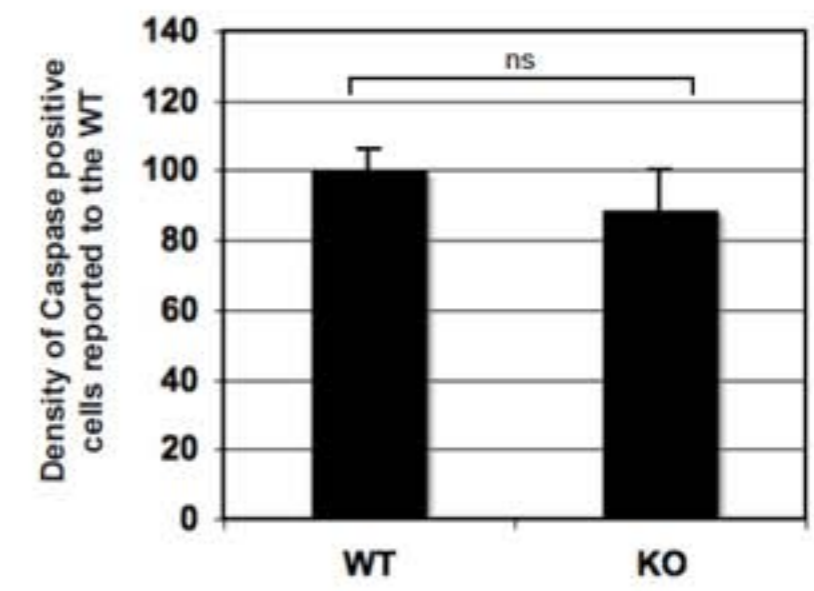
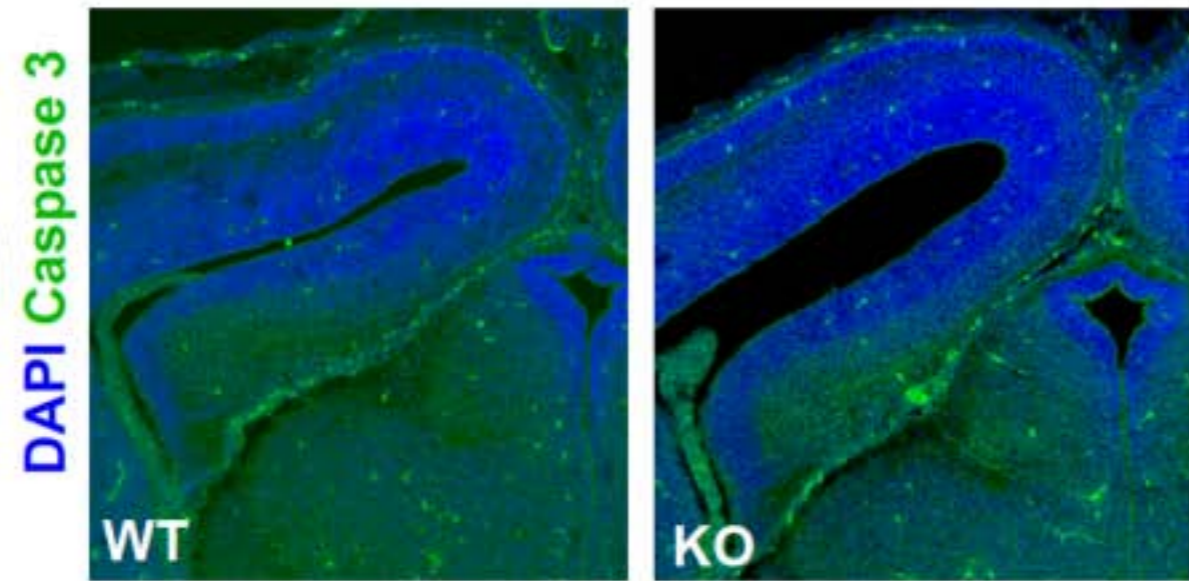
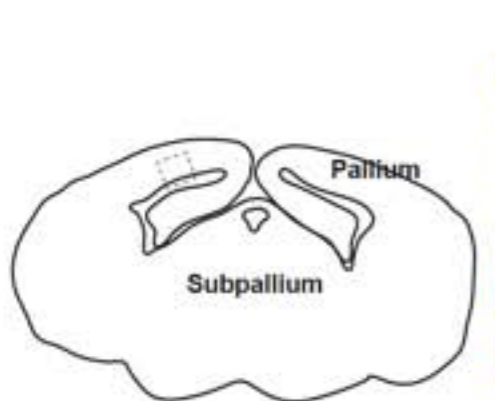
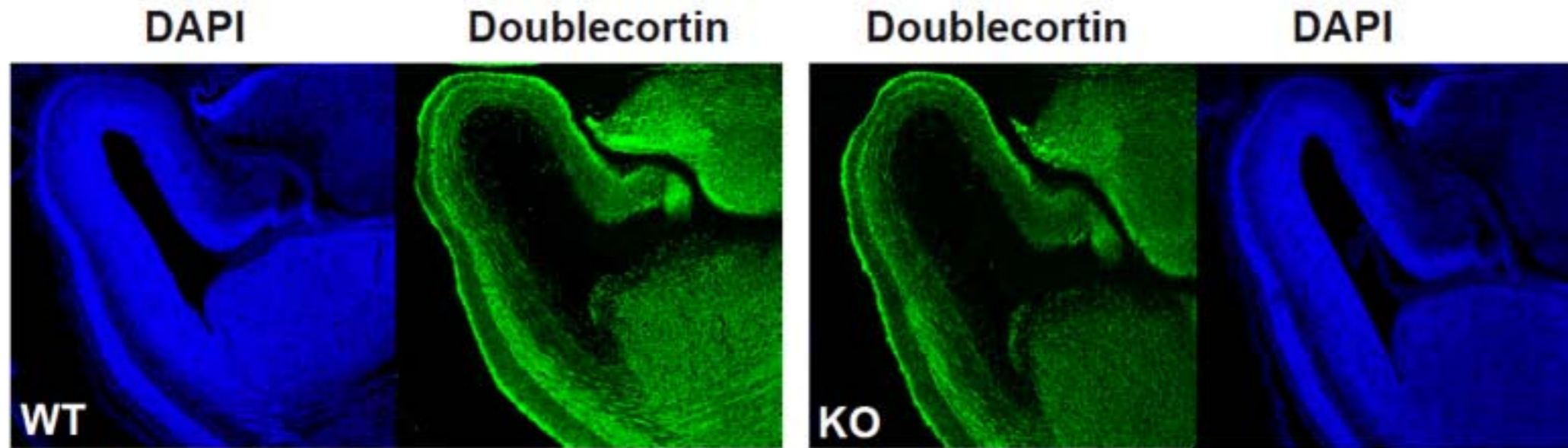
InDesign: how to design scientific figures and books

- ***Why using Indesign for generating your PhD memory***
- ***Creating figures with picture, graphics and photos***





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.