KU LEUVEN

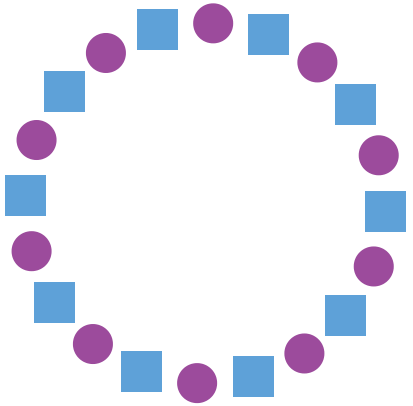
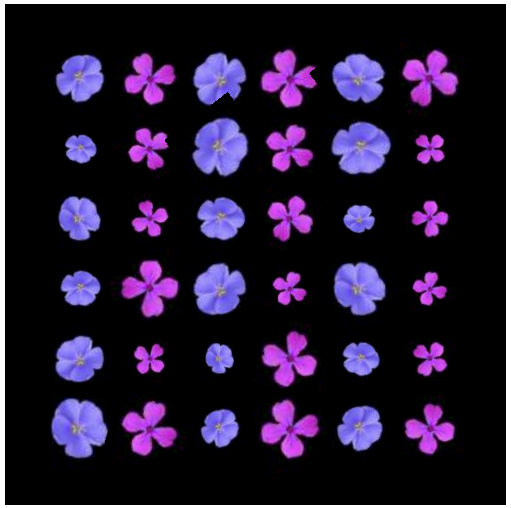
# Creating reproducible multi-element displays for your perception research using OCTA

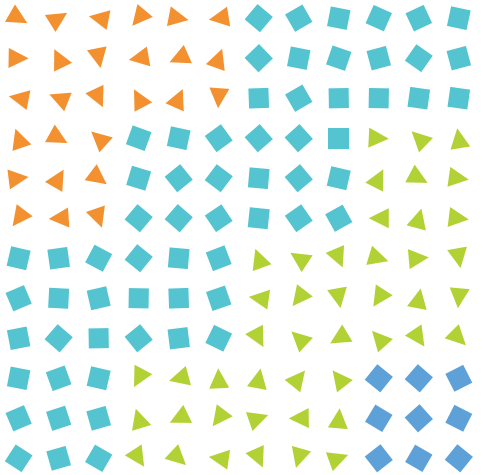
Eline Van Geert

KU Leuven, Belgium

August 25th, 2024

# OCTA workshop:
# What will you learn today?

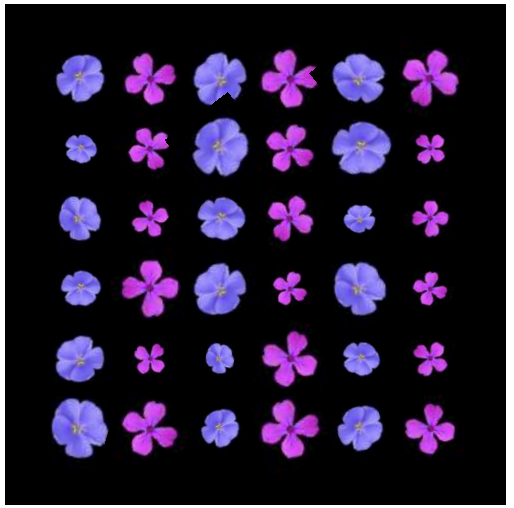




https://github.com/ElineVG/OCTA_workshop

# What will you learn today? Part I

- What is OCTA and why was it created?
- OCTA BASICS (app / code):
  - Installation and prerequisites
  - How to create an OCTA stimulus?
  - Stimulus types & features
  - Positions
  - Element features & feature patterns
  - Deviations
  - Order & complexity
  - Output options

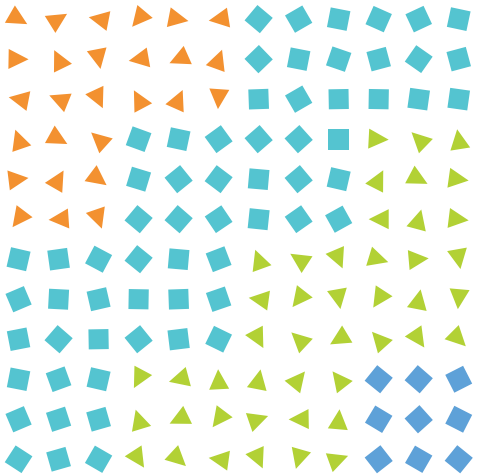




https://github.com/ElineVG/OCTA_workshop

# What will you learn today? Part II

- OCTA ADVANCED (code):
  - Dynamic features
  - Generating stimulus sets
  - Combining OCTA displays
- Use OCTA in your research (app / code)





https://github.com/ElineVG/OCTA_workshop

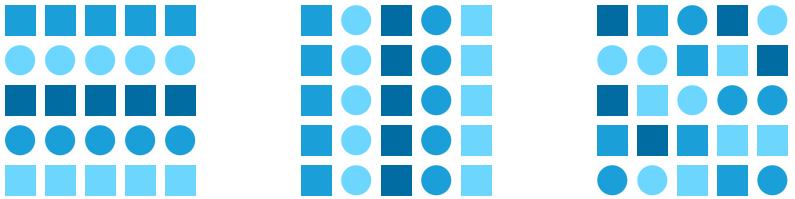
# OCTA:
# What and why?



https://github.com/ElineVG/OCTA_workshop

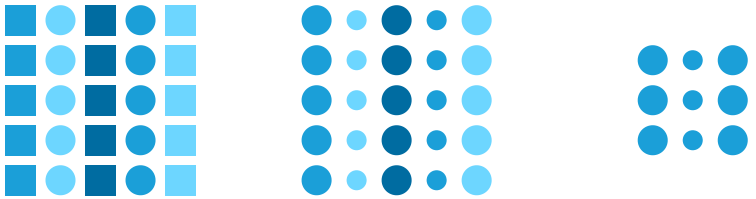
# Order and complexity?

## Order



aspects related to the structure and organization of information in a stimulus

## Complexity



aspects related to the quantity and variety of information in a stimulus

Van Geert, E., & Wagemans, J. (2020). Order, Complexity, and Aesthetic Appreciation. *Psychology of Aesthetics, Creativity, and the Arts.*



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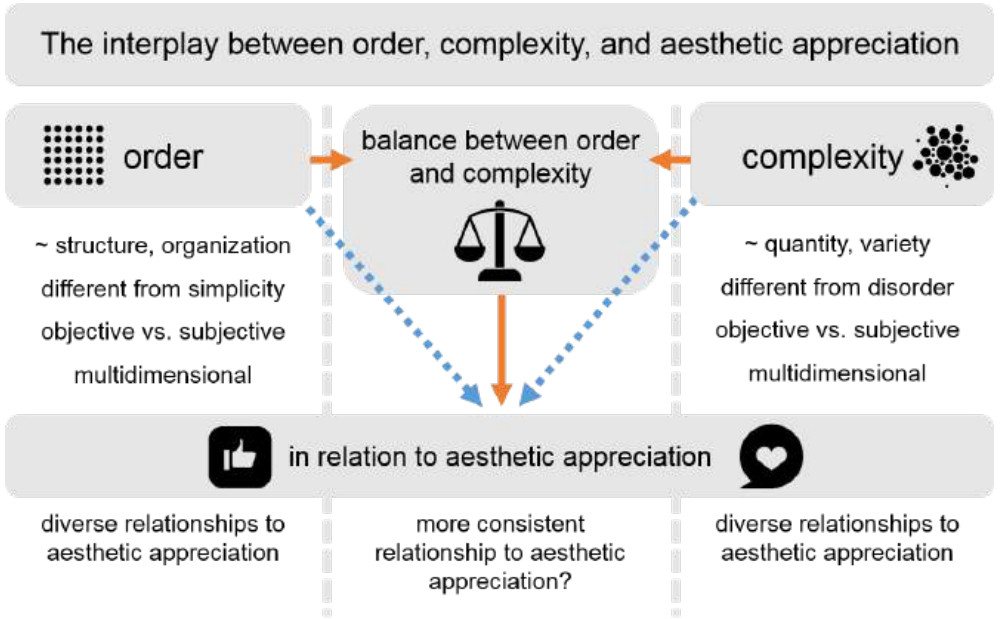
# Order, complexity, and aesthetic appreciation

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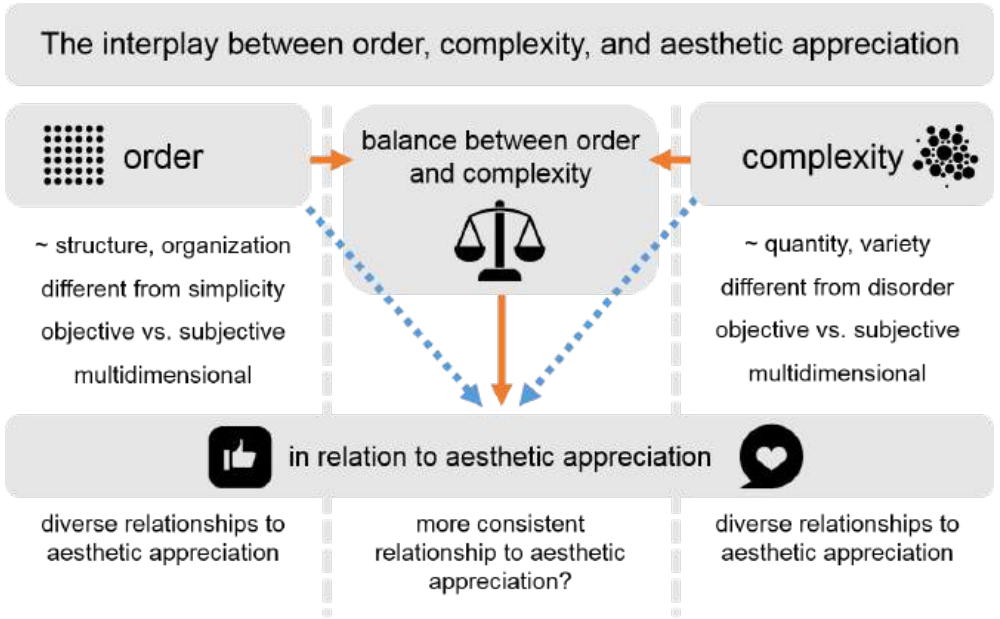
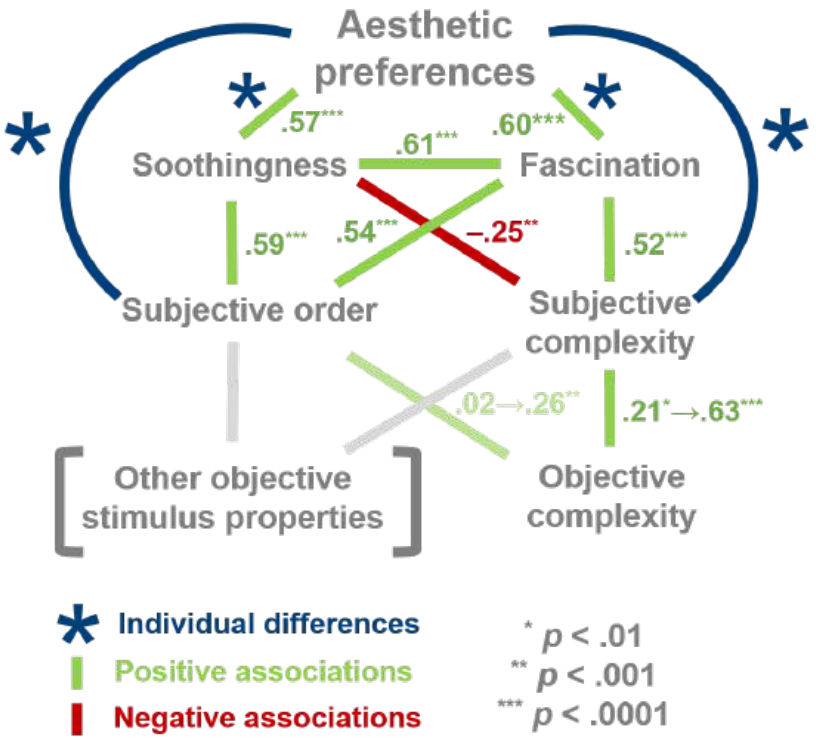
# Order, complexity, and aesthetic appreciation





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Van Geert, E., & Wagemans, J. (2019). Order, Complexity, and Aesthetic Preferences for Neatly Organized Compositions. *Psychology of Aesthetics, Creativity, and the Arts.*

# Earlier research

- effects of order and complexity often studied in isolation

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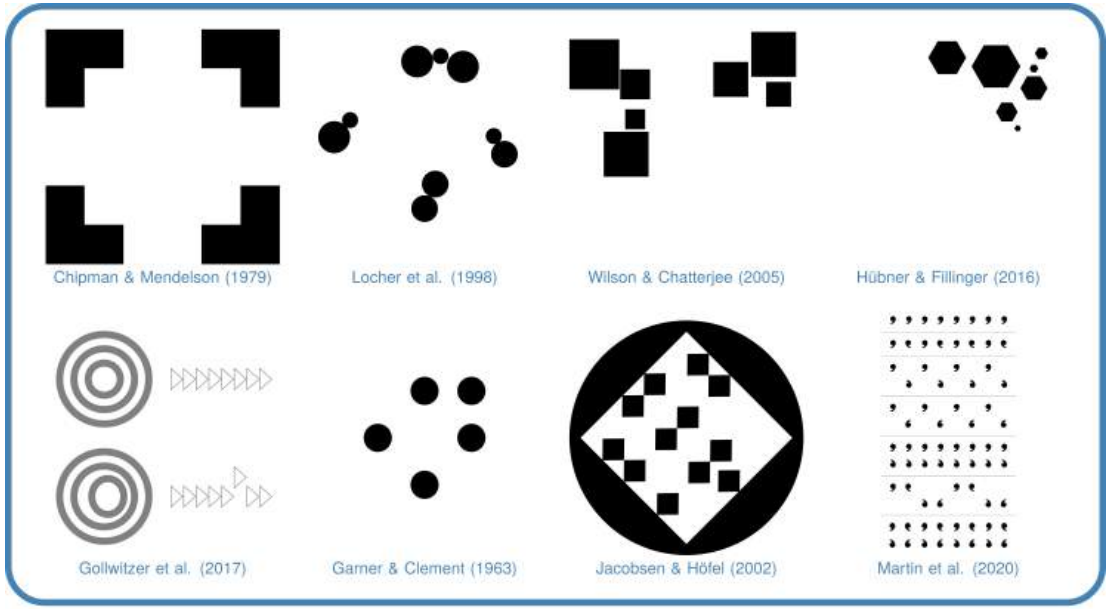
- when studied jointly, no parametric manipulations or a narrow, unidimensional view




Van Geert, E., Bossens, C., & Wagemans, J. (2023). The Order & Complexity Toolbox for Aesthetics (OCTA): A systematic approach to study the relations between order, complexity, and aesthetic appreciation. *Behavior Research Methods*, *55*, 2423–2446. https://doi.org/10.3758/s13428-022-01900-w



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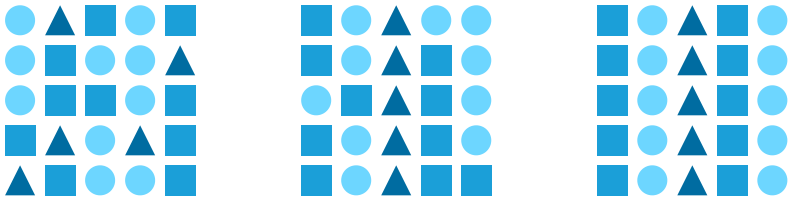
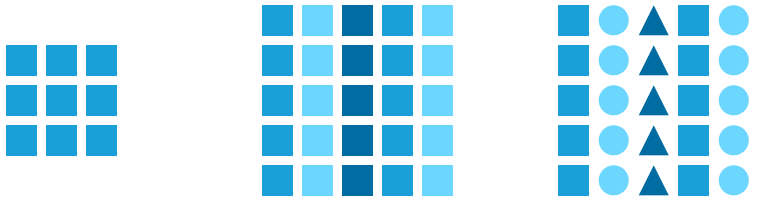
# Creating OCTA

- the Order and Complexity Toolbox for Aesthetics (OCTA)
- create an easy way to generate stimuli varying in complexity and/or order along multiple stimulus dimensions (e.g., shape, color, size, orientation)

## Order



## Complexity



Van Geert, E., Bossens, C., & Wagemans, J. (2023). The Order & Complexity Toolbox for Aesthetics (OCTA): A systematic approach to study the relations between order, complexity, and aesthetic appreciation. *Behavior Research Methods*, *55*, 2423–2446. https://doi.org/10.3758/s13428-022-01900-w



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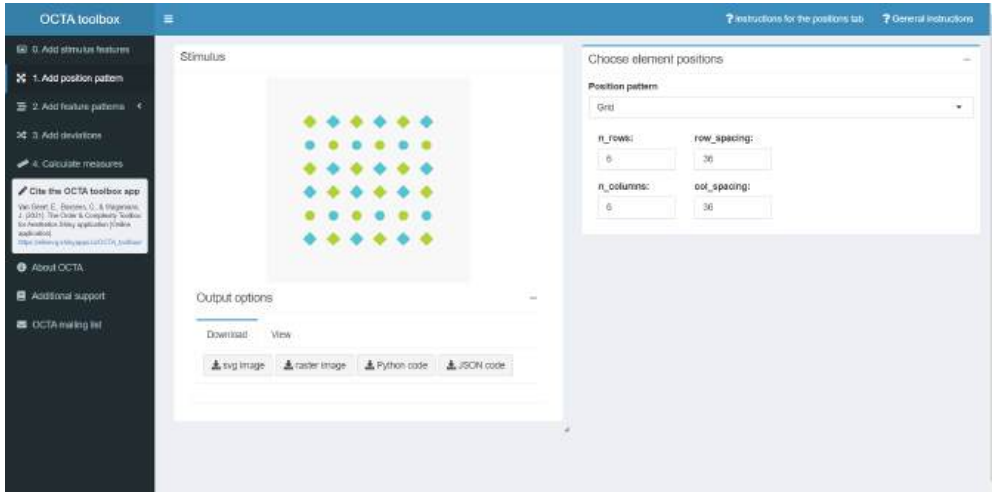
# Creating OCTA

openly available
reproducible stimuli
aesthetic appreciation
complexity
free order
expandible stimulus sets
systematic variations
Shiny application
Python package

```python
"""
OCTA toolbox: demo
"""
from octa.Stimulus import Grid
from octa.patterns import GridPattern
from octa.shapes import Ellipse, Rectangle, Triangle

## Create new stimulus
stim = Grid(n_rows = 6, n_cols = 6, background_color = "none",
            row_spacing = 40, col_spacing = 40)

## Determine shape of elements used in the stimulus
stim.shapes = GridPattern.RepeatAcrossColumns([Rectangle, Triangle, Ellipse])

## Determine color of elements used in the stimulus
colors_to_use = ["#1b9fd8", "#6dd6ff", "#006ca1"]
stim.fillcolors = GridPattern.RepeatAcrossColumns(colors_to_use)

## Determine size of elements used in the stimulus
stim.boundingboxes = GridPattern.RepeatAcrossColumns([(30,30)])

stim.Show()
```






https://github.com/ElineVG/OCTA_workshop

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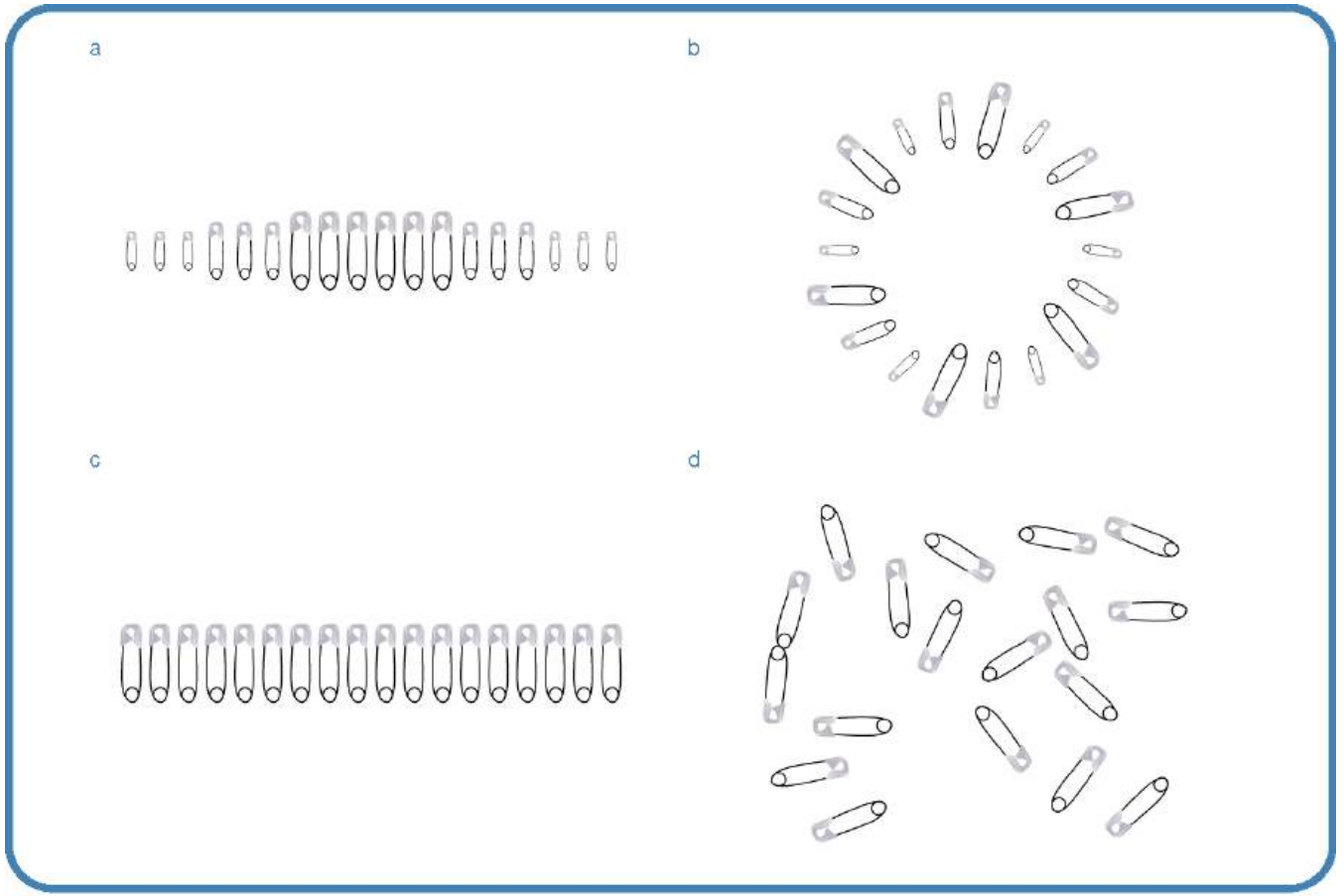
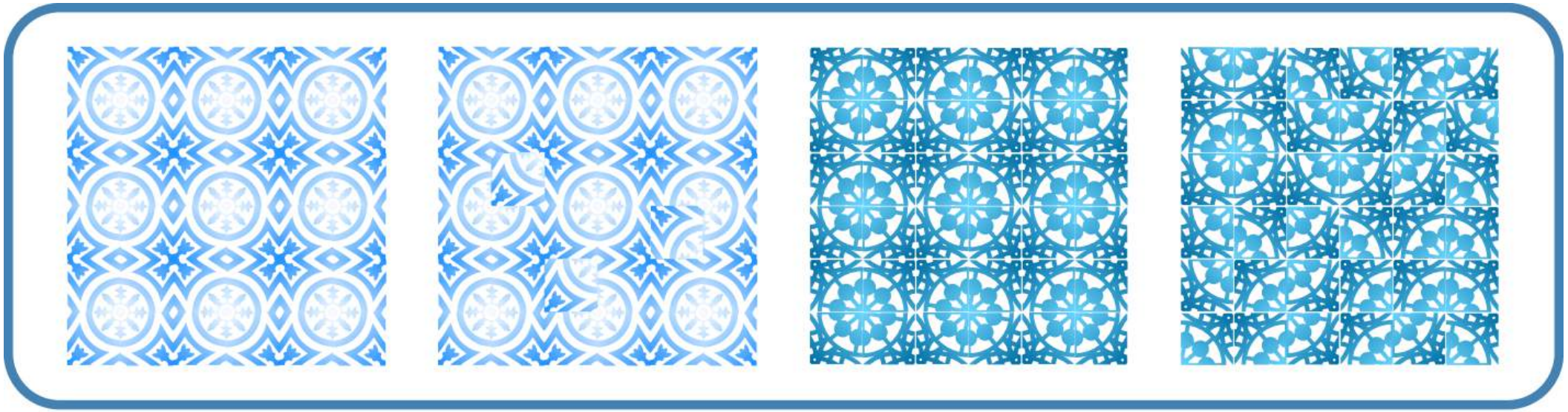
# Going beyond geometric shapes






https://github.com/ElineVG/OCTA_workshop

# More flexible, open, and reproducible alternative for existing closed tools (e.g., Flextiles)





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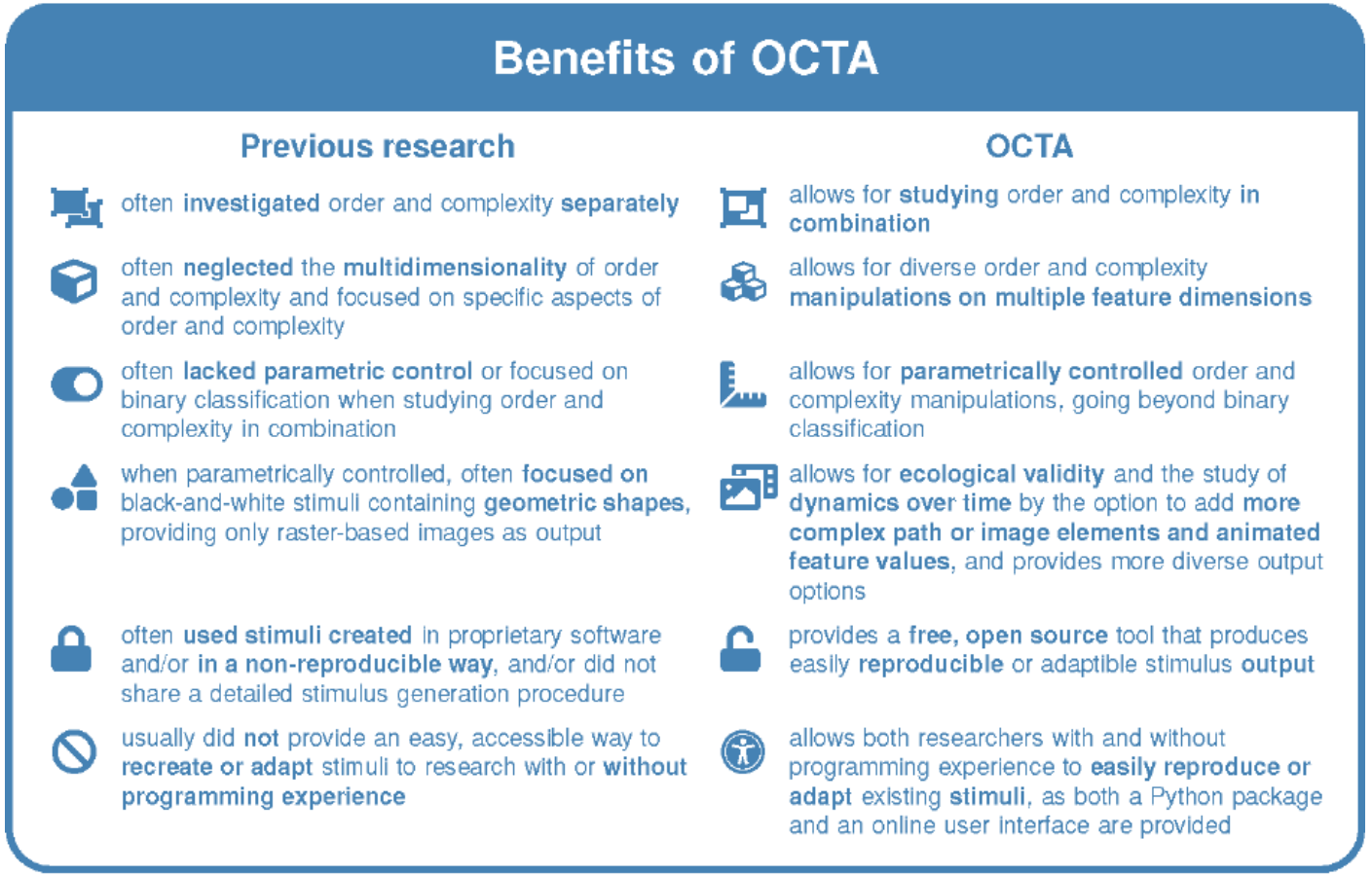
# Benefits of OCTA



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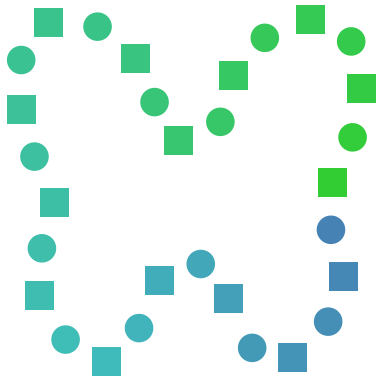
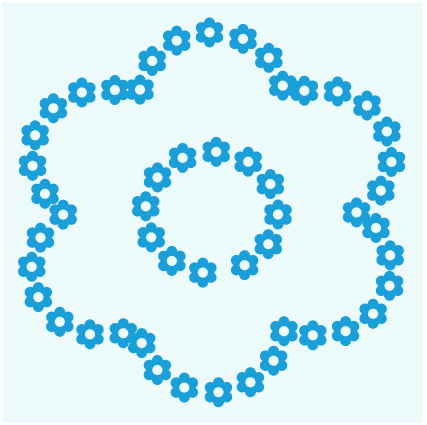
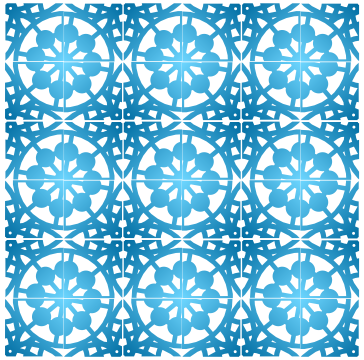
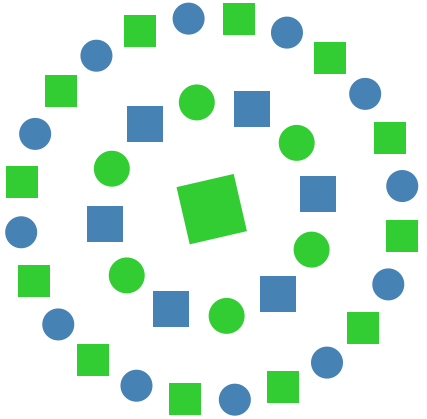
# Example OCTA stimuli



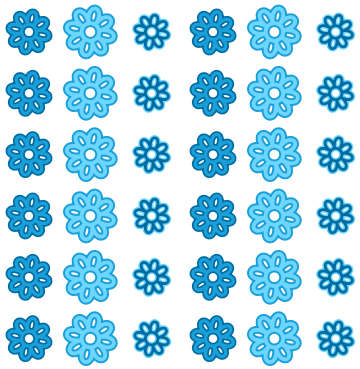


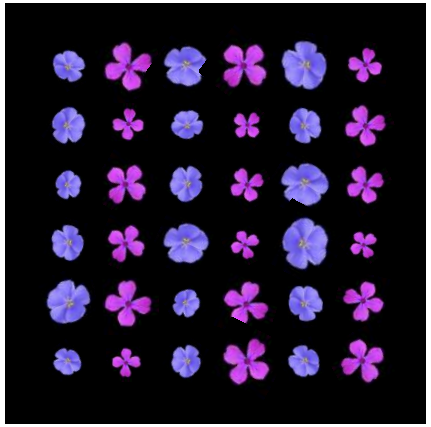


Using a tile created by Lluisa Iborra available on the Noun Project

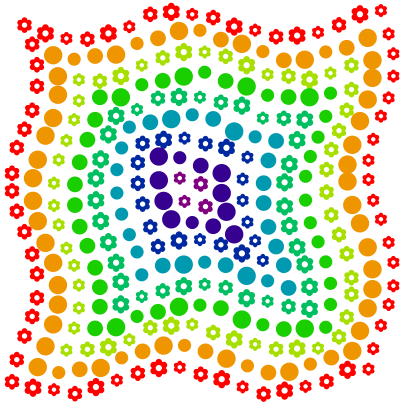



Recreated based on the official IAEA 2021 logo





Flower images from Hůla and Flegr (2016)





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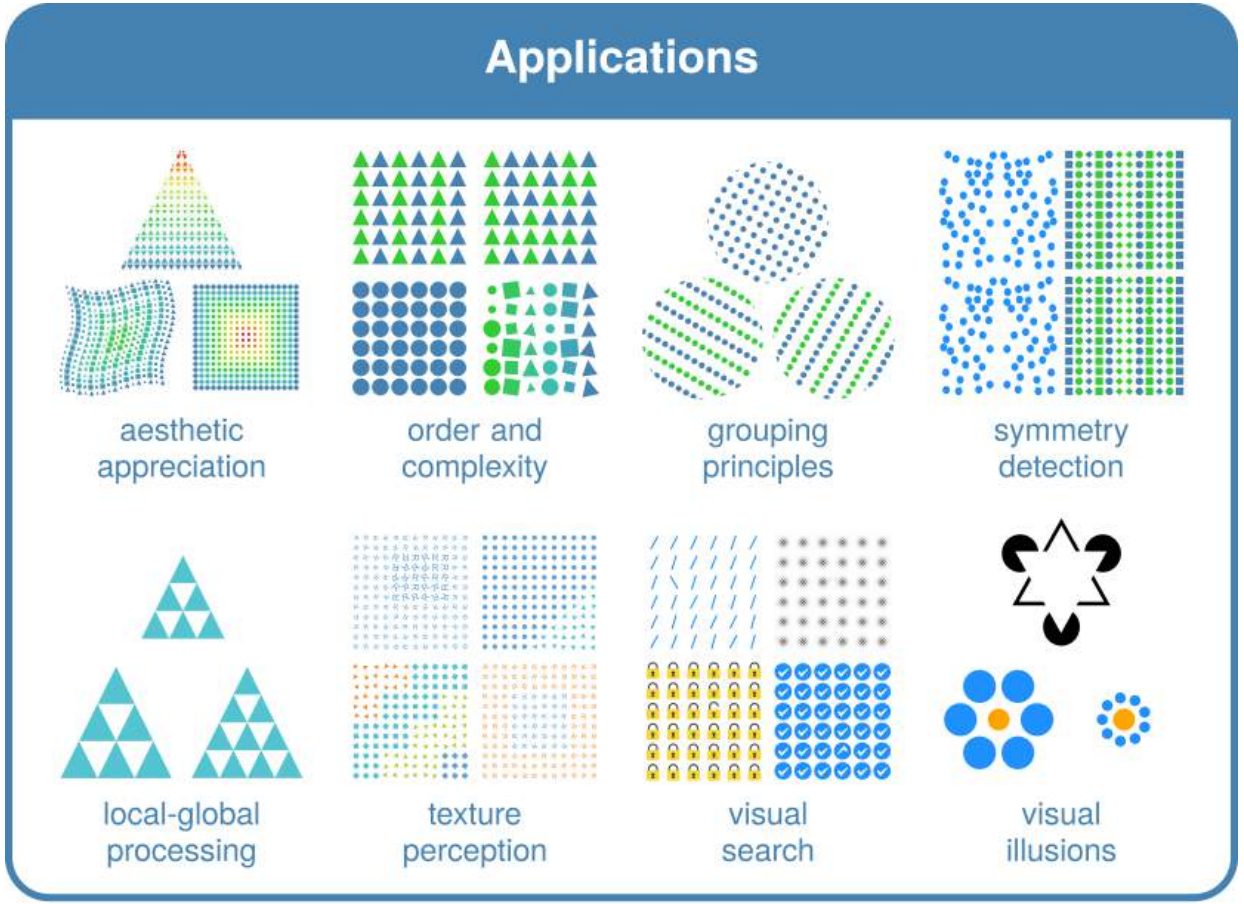
# Applications






https://github.com/ElineVG/OCTA_workshop

# Cite OCTA when using it!

Always cite OCTA when using it in your work;

**Van Geert, E., Bossens, C., & Wagemans, J. (2023). The Order & Complexity Toolbox for Aesthetics (OCTA): A systematic approach to study the relations between order, complexity, and aesthetic appreciation.** *Behavior Research Methods*, *55*, 2423–2446. https://doi.org/10.3758/s13428-022-01900-w

If you also want to refer to the Python toolbox or the Shiny app specifically, you can use:

- for the Python toolbox: Van Geert, E., Bossens, C., & Wagemans, J. (2021). The Order & Complexity Toolbox for Aesthetics Python library [Computer software]. https://github.com/gestaltrevision/OCTA_toolbox
- for the app: Van Geert, E., Bossens, C., & Wagemans, J. (2021). The Order & Complexity Toolbox for Aesthetics Shiny application [Online application]. https://elinevg.shinyapps.io/OCTA_toolbox/

# OCTA:
# Let's start!



https://github.com/ElineVG/OCTA_workshop

# OCTA:
# App demo



https://github.com/ElineVG/OCTA_workshop

# Workshop documents

Find the workshop materials on GitHub: https://github.com/ElineVG/OCTA_workshop

From this GitHub page, access the interactive workshop document:
https://colab.research.google.com/drive/1v5AVb76tQ-aGVdJFvKi5Rqrw4IuRMztP?usp=sharing

If you want to work with the app **during** the workshop, also open one of these links:

- https://octa.shinyapps.io/OCTA_app1/
- https://octa.shinyapps.io/OCTA_app2/
- https://octa.shinyapps.io/OCTA_app3/
- https://octa.shinyapps.io/OCTA_app4/

**After** the workshop, access the app here:

- https://elinevg.shinyapps.io/OCTA_toolbox/

# Installation and requirements: APP

No installation needed! Open the app in your browser:

If you want to work with the app **during** the workshop, also open one of these links:

- https://octa.shinyapps.io/OCTA_app1/
- https://octa.shinyapps.io/OCTA_app2/
- https://octa.shinyapps.io/OCTA_app3/
- https://octa.shinyapps.io/OCTA_app4/

**After** the workshop, access the app here:

- https://elinevg.shinyapps.io/OCTA_toolbox/

# Installation and requirements: PYTHON

To run octa online:

- surf to https://github.com/ElineVG/OCTA_workshop
- click on the link to the interactive Google Colab document: https://colab.research.google.com/drive/1v5AVb76tQ-aGVdJFvKi5Rqrw4IuRMztP?usp=sharing

To run octa locally on your computer:

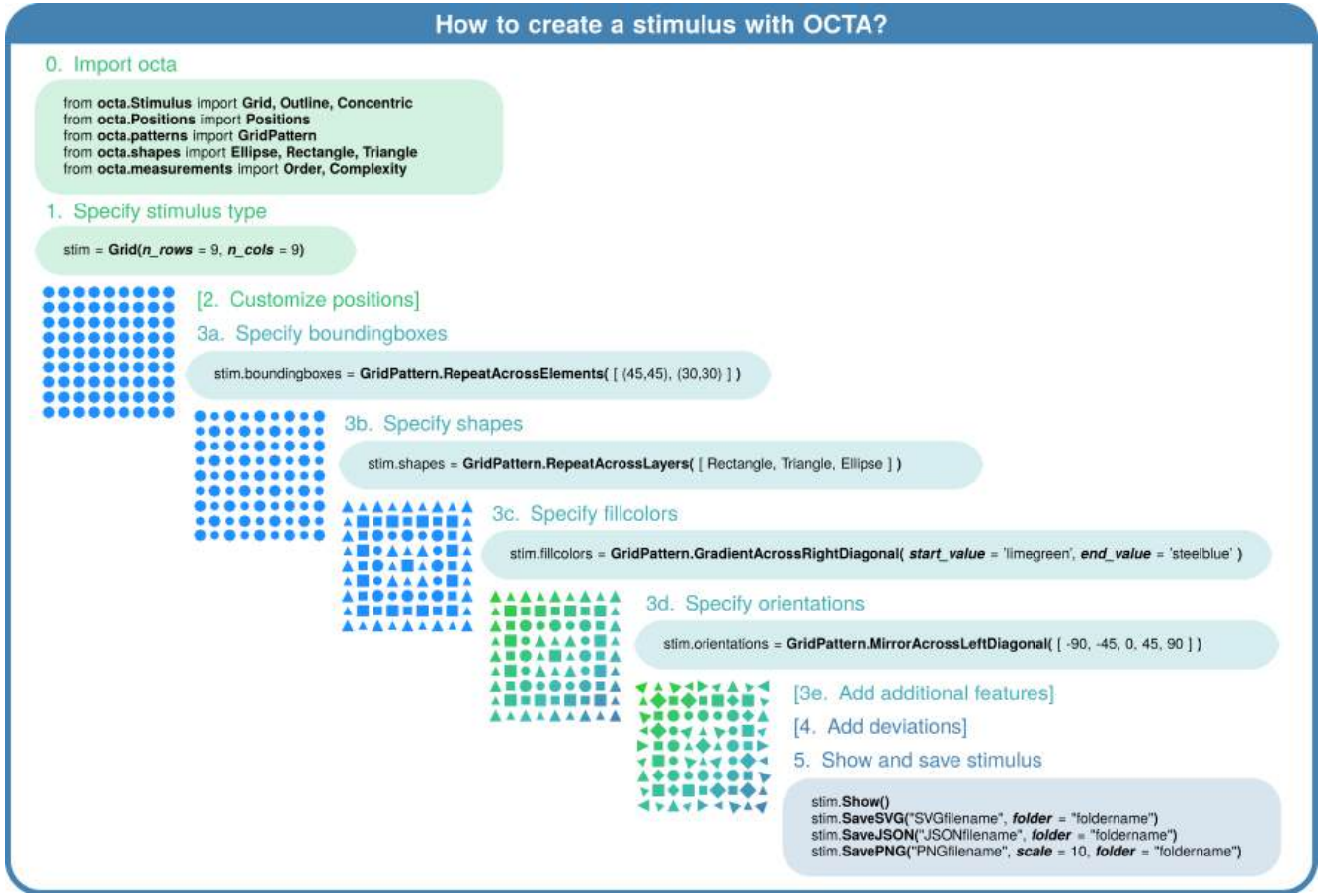
- Open the software you use to open Python documents (Spyder / PyCharm / ...)
- install the following packages (or check whether already installed): svgwrite svg.path svgpathtools svgutils jsonpickle html2image svglib reportlab colour IPython pandas
- install octa: pip install octa

# Installation and requirements: PYTHON

Load the most common functions part of the octa package:

```
from octa.Stimulus import Grid, Outline, Concentric, Stimulus
from octa.Positions import Positions
from octa.patterns import GridPattern, Pattern, Sequence, LinearGradient
from octa.shapes import (Ellipse, Rectangle, Triangle, Polygon, RegularPolygon,
                         Path, PathSvg, Image, FitImage, Text)
from octa.measurements import Order, Complexity
```

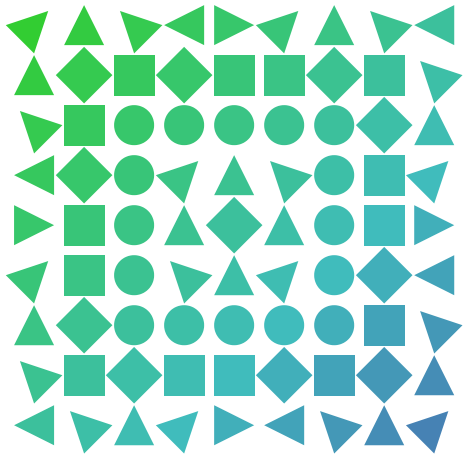
# How to create an OCTA stimulus?






https://github.com/ElineVG/OCTA_workshop

# Create your first OCTA stimulus!



```
stimulus = Grid(9,9, row_spacing=25, col_spacing=25)

stimulus.boundingboxes = GridPattern.RepeatAcrossElements([(20,20)])
stimulus.shapes = GridPattern.RepeatAcrossLayers([Rectangle, Triangle, Ellipse])
stimulus.fillcolors = GridPattern.GradientAcrossRightDiagonal(start_value = 'limegreen', end_val
stimulus.orientations = GridPattern.MirrorAcrossLeftDiagonal([-90,-45,0,45,90])
stimulus.Show()
```



https://github.com/ElineVG/OCTA_workshop

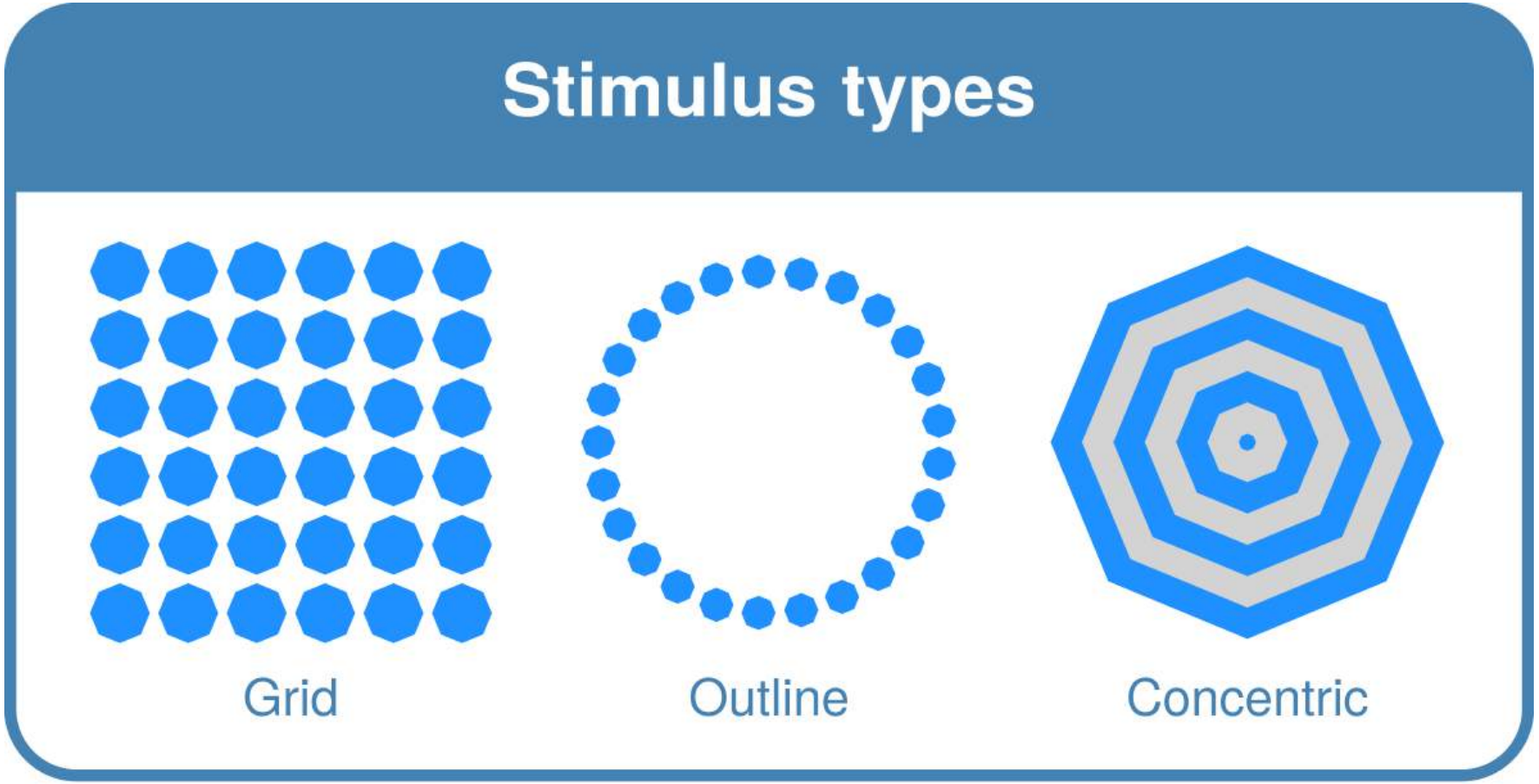
# Exercise 1

1. Click the ‘Run Code’ button to create your first OCTA stimulus.
2. Can you change the number of rows and columns to 12 instead of 9?
3. Can you change the elements’ colors to go from red to limegreen?
4. Can you change the color gradient to go across the rows (`AcrossRows`) instead of across the right diagonal (`AcrossRightDiagonal`)?



https://github.com/ElineVG/OCTA_workshop

# 1. Specify stimulus type



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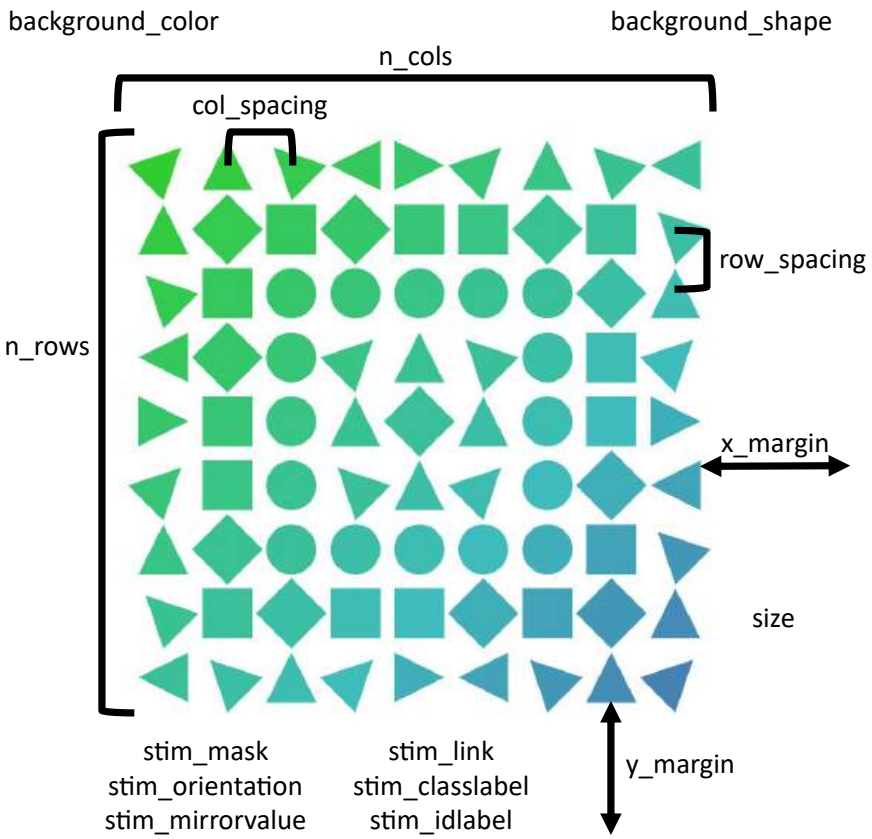
# 1. Specify stimulus characteristics






https://github.com/ElineVG/OCTA_workshop

# 1. Specify stimulus characteristics

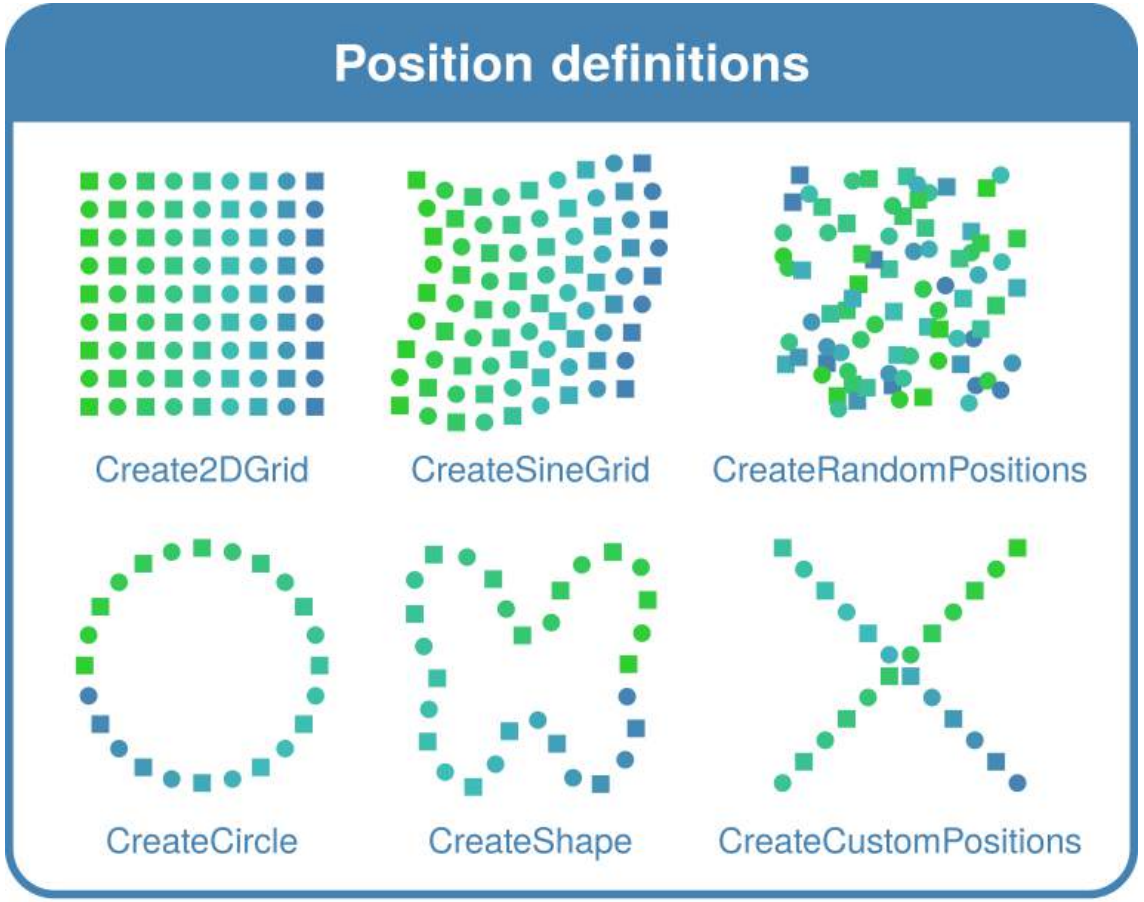
When defining stimulus type:

```
stimulus = Grid(n_rows = 3, n_cols = 6, background_color = "gainsboro")
stimulus.Show()
```

Or after stimulus has been created:

```
stimulus = Grid(3,3)
stimulus.n_cols = 6
stimulus.background_color = "gainsboro"
stimulus.Show()
```

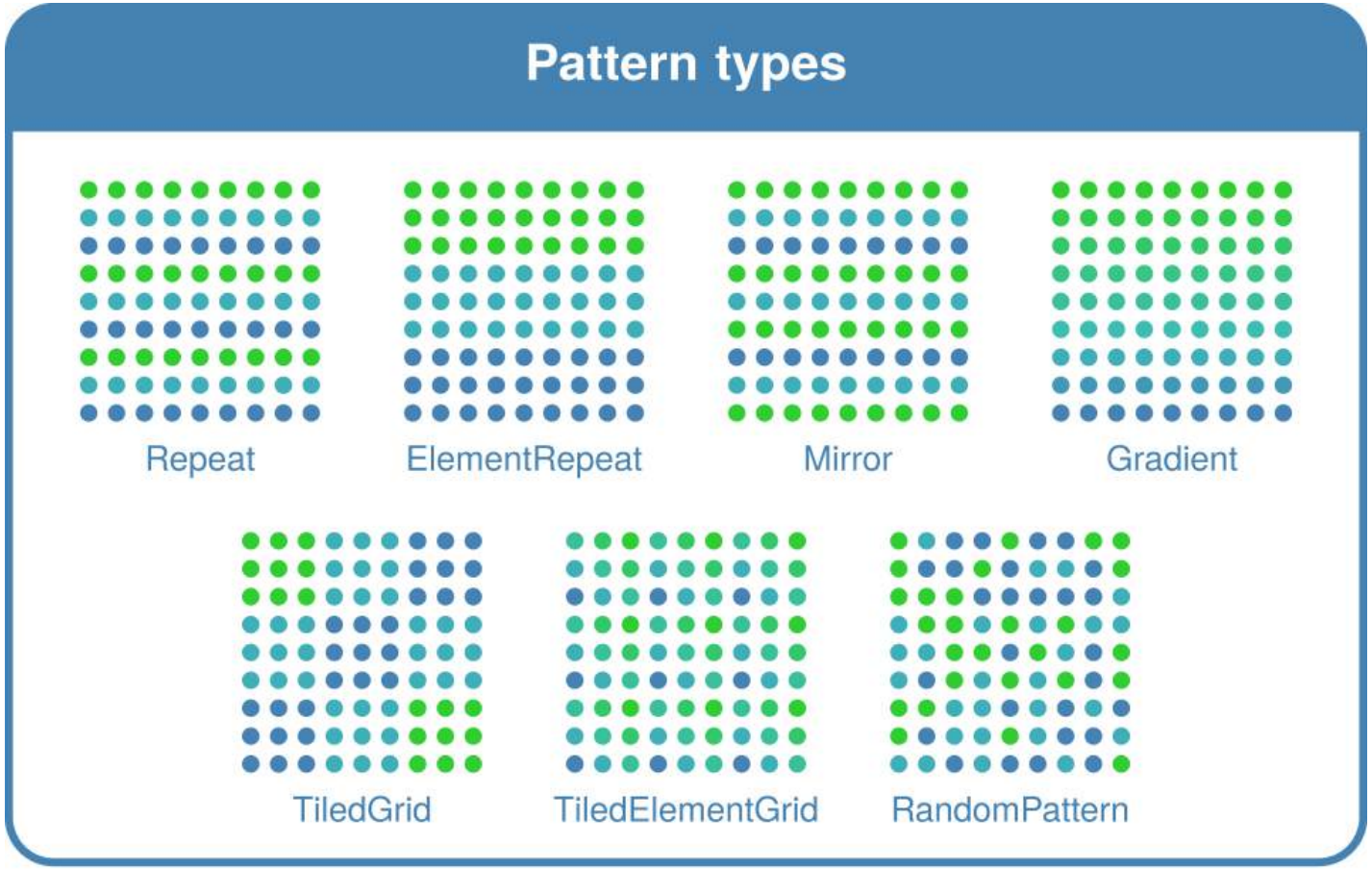
# 2. Customize positions






https://github.com/ElineVG/OCTA_workshop

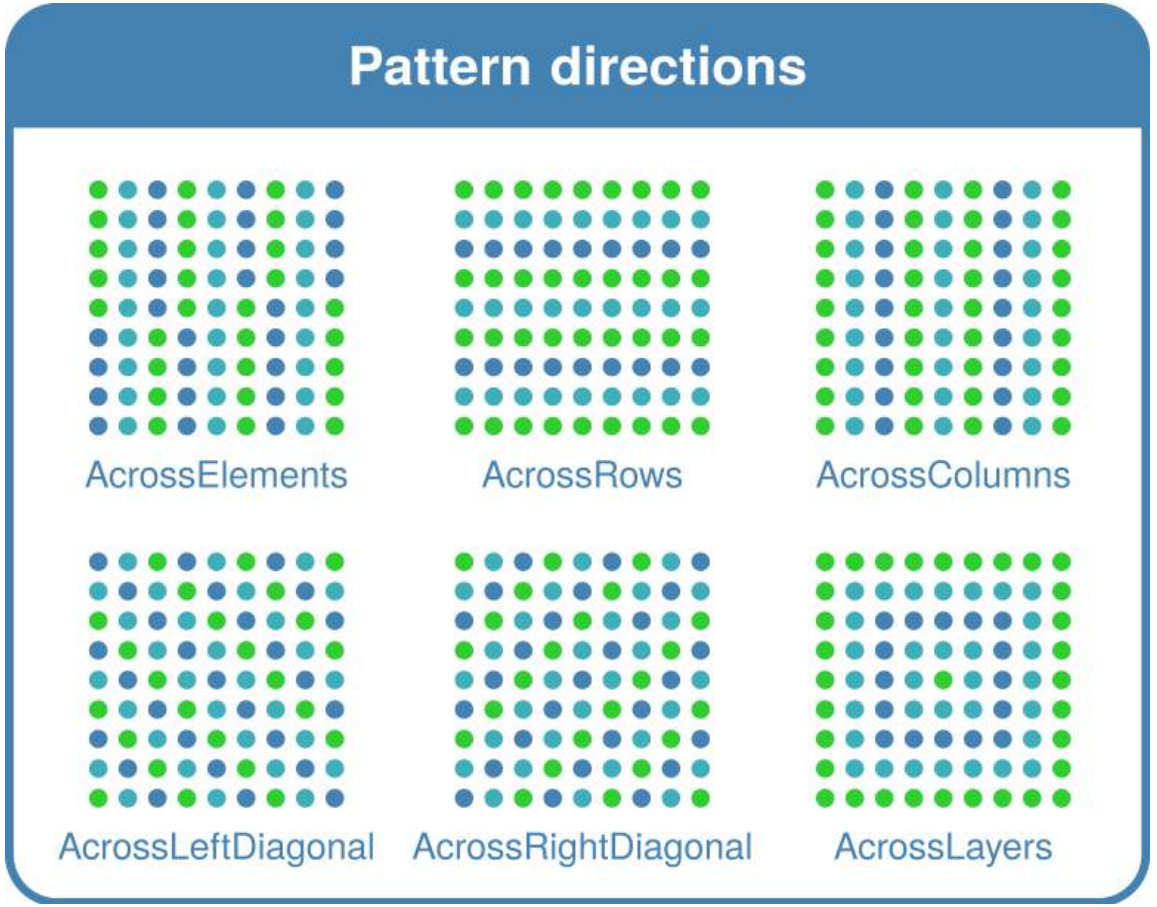
# 3. Specify pattern types






https://github.com/ElineVG/OCTA_workshop

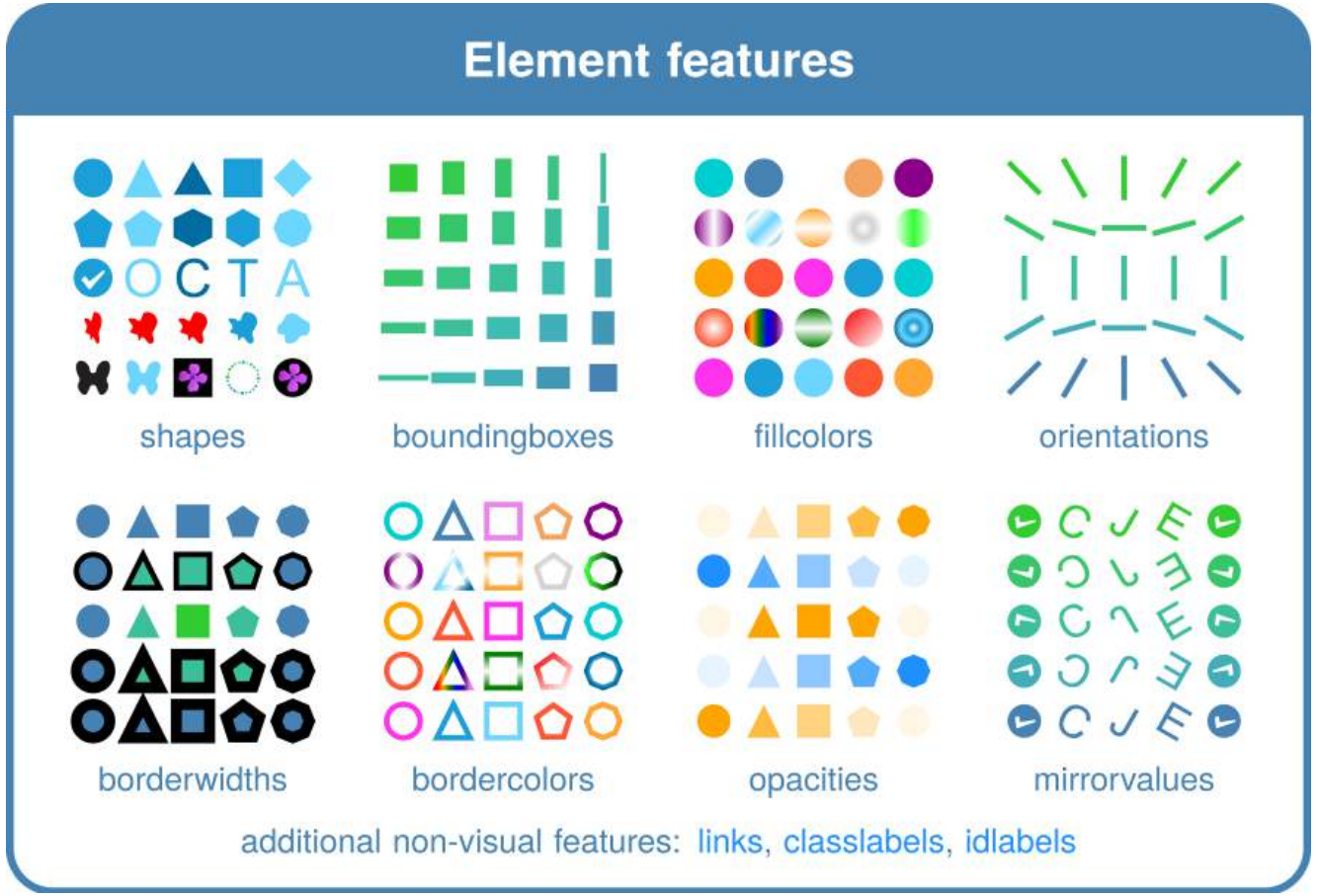
# 3. Specify pattern directions






https://github.com/ElineVG/OCTA_workshop

# 3. Specify element features





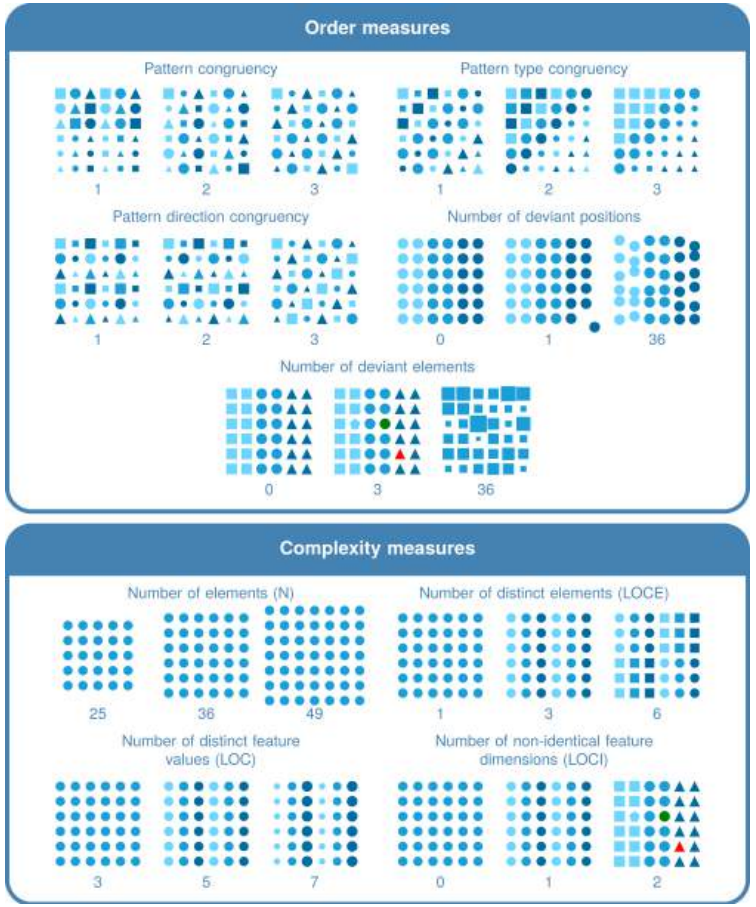

https://github.com/ElineVG/OCTA_workshop

# 4. Add deviations




https://github.com/ElineVG/OCTA_workshop

# 4. Order & complexity measures






https://github.com/ElineVG/OCTA_workshop

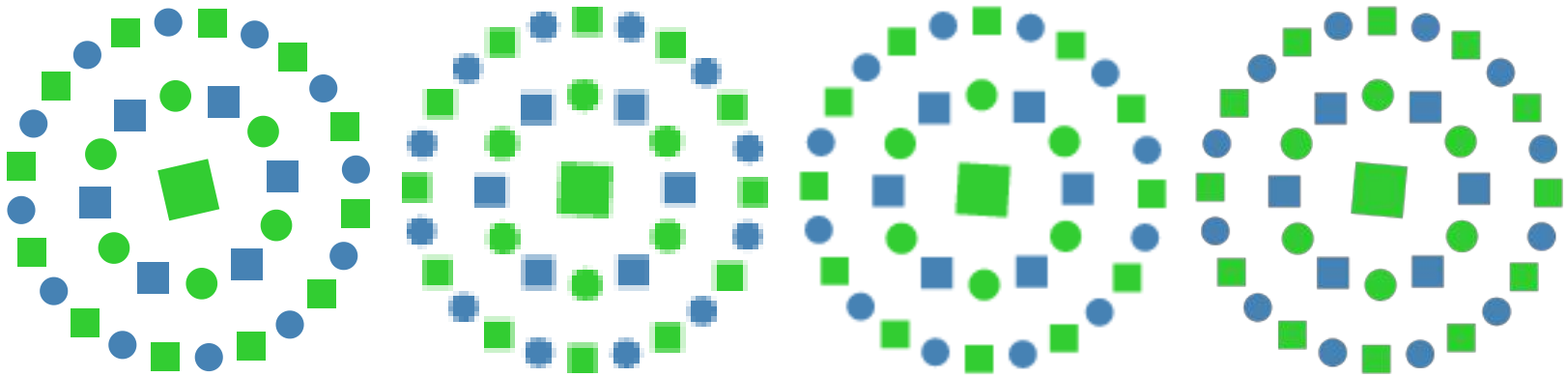
# 5. Show & save stimulus

- stimulus as vector image (SVG)
- stimulus as raster image (PNG, JPG, PDF, TIFF)
- computer-readable JSON output to recreate the stimulus
- (in Python with the LoadFromJSON function)

**In the online Shiny app: download or view the Python code to (re)create the stimulus in Python**

**Set a seed to reproduce the exact same random deviations!**

**Scale option to increase quality for raster images** [SVG - PNG scale 0.5 - PNG scale 1 - PNG scale 10]:





https://github.com/ElineVG/OCTA_workshop

# 5. Show and save stimulus

**Points of attention:**

- Always add random.seed(..) just before each SaveSVG/PNG/JPG/... function (because the stimulus is regenerated for each of those). Otherwise, random values will differ between different output files.
- Always stimulus.Render() when using GetSVG(). Otherwise, the stimulus will not be rendered automatically and values will not be updated.
- **Be aware that svg may be removed when you add SavePNG or SaveJPG!** Therefore it is best to save each output type in a separate folder.

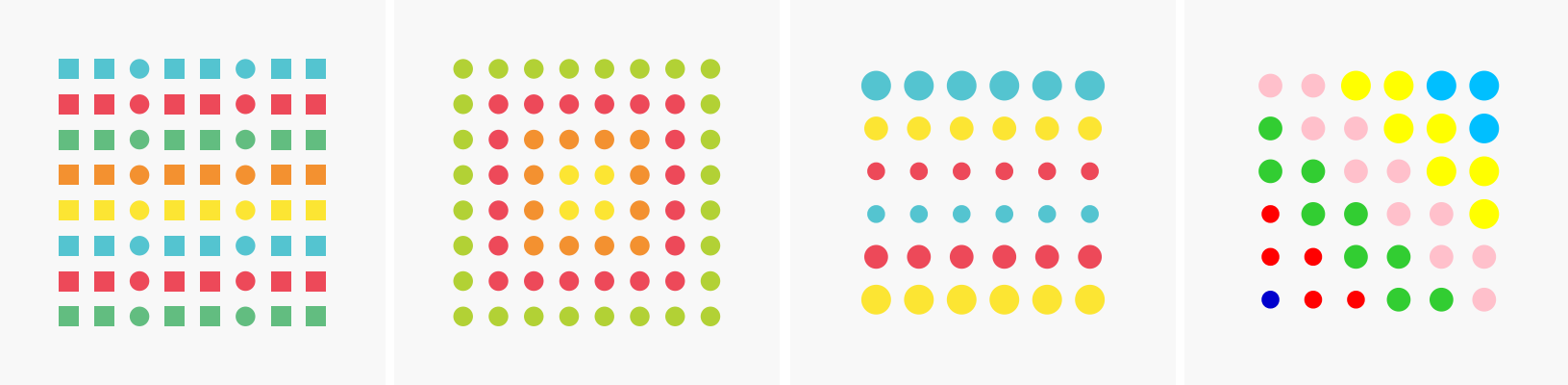
# Terminology

| Terminology used in OCTA | |
|---|---|
| order | aspects related to the structure and organization of elements in a stimulus |
| complexity | aspects related to the quantity and variety of elements in a stimulus |
| stimulus | overall display, total configuration including one or more elements |
| element | object, part of stimulus display which is usually repeated and spatially separated from other parts |
| stimulus feature | certain feature of the stimulus as a whole (e.g., size, orientation, background color, background size) |
| element feature | certain feature of the elements in the stimulus (e.g., shape, size, color, orientation) |
| (element) position pattern | overall configuration of the element positions in the stimulus (e.g., rectangular grid, sinegrid, circle, shape) |
| (element) feature pattern | overall configuration of the element features in the stimulus (combination of pattern values, pattern type, and pattern direction) |
| pattern values | the values of an element feature that will be used in the stimulus |
| pattern type | type of structure or organization present for a certain feature across the elements in the stimulus (e.g., pattern repeat, element repeat, mirror symmetry, gradient) |
| pattern direction | the direction in which the pattern values are applied according to the pattern type across the stimulus (e.g., across elements, across rows, across columns) |
| position deviation | deviation from the position pattern, either by the addition of random jitter to the element positions or by the adaptation or removal of specific element positions |
| element deviation | deviation from the element feature patterns present in the stimulus, by removing elements from the stimulus, swapping element positions, or randomizing element positions |
| feature deviation | deviation from at least one element feature pattern, by removing elements from the stimulus, swapping one or more features between elements in the stimulus, randomizing element or feature positions, changing the feature value of one or more random or specified elements in the stimulus, or by jittering one or more numeric element features |



https://github.com/ElineVG/OCTA_workshop

# Challenges!



Need some help? Look here: https://colab.research.google.com/drive/1m5bKqK6oE0qf2J1AUn4CAcvG7Ged698-?usp=sharing

# Additional challenges!

- Remove the background color (TAB 0)
- Try to use the animated orientation (TAB 0)
- Try different position patterns (e.g., SineGrid; TAB 1)
- Add additional features like border widths or opacities (TAB 2)
- Remove 3 random elements from the display (TAB 3)
- Add uniform position jitter (TAB 3)
- Give 1 element a custom fillcolor (e.g., ‘violet’, ‘black’; TAB 3)
- Find the level of element complexity (LOCE; TAB 4)
- Explore the example stimuli (SUPPORT TAB)



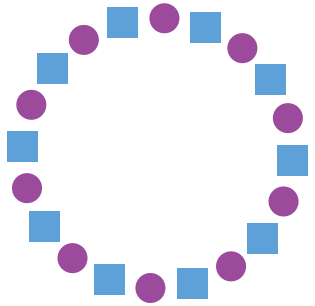
https://github.com/ElineVG/OCTA_workshop

# OCTA:
# Advanced topics



https://github.com/ElineVG/OCTA_workshop

# Dynamic features

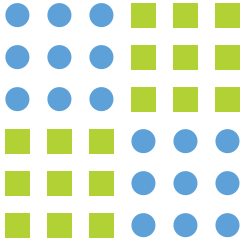


```
stim = Outline(n_elements = 20, x_margin = 0, y_margin = 0, shape_boundingbox = (90,90), backgro
                  stim_orientation =  ['animate', '0', '360', "dur='40s', repeatCount='indefinit

stim.boundingboxes = GridPattern.RepeatAcrossElements( [ (20,20) ] )
stim.shapes = GridPattern.RepeatAcrossElements( [ Ellipse, Rectangle ] )
stim.fillcolors = GridPattern.RepeatAcrossElements( [ "#9C4B9C", "#5EA1D8" ] )

stim.orientations = GridPattern.RepeatAcrossElements(
  [ ['animate', '360', '0', "dur='40s', repeatCount='indefinite'"] ] )

stim.Show()
stim.SaveSVG("stim_example1", folder = "")
```



https://github.com/ElineVG/OCTA_workshop

# Dynamic features



```
stim = Grid(n_rows = 6, n_cols = 6, row_spacing = 35, col_spacing= 35, size = (250,250))

stim.boundingboxes = GridPattern.RepeatAcrossElements( [ (20,20) ] )


stim.fillcolors = GridPattern.TiledElementGrid(source_grid = GridPattern.RepeatAcrossRightDiagon
  [ ['animate', '#5EA1D8', 'values = "#5EA1D8;#B2D135", begin = "0s", calcMode = "discrete",
  dur = "5s", repeatCount = "indefinite"'] ,
   ['animate', '#B2D135', 'values = "#B2D135;#5EA1D8", begin = "0s", calcMode = "discrete",
   dur = "5s", repeatCount = "indefinite"'] ], 2, 2), tile_multiplier = 3)

stim.shapes = GridPattern.TiledElementGrid(source_grid = GridPattern.RepeatAcrossRightDiagonal(

stim.Show()
stim.SaveSVG("stim_example2", folder = "")
```



https://github.com/ElineVG/OCTA_workshop

# Dynamic features

- animate
- set

More examples in the app under 'Custom' colors, orientations, etc.

More info on SVG animation: https://www.w3schools.com/graphics/svg_animation.asp

# Dynamic features

No dynamic feature options for shape in OCTA directly, BUT:

- you can add a gif video as shape using the image tag
- you can create a dynamic svg in which the shape changes and add it using the image tag
- you can create static OCTA stimuli and concatenate them in a video (e.g., using moviepy)

# Generating a stimulus set

```
# Load necessary objects and functions from OCTA
from octa.Stimulus import Grid
from octa.patterns import GridPattern
from octa.shapes import Ellipse, Rectangle

# Set variable values to use in stimulus set
cols = [ "#5EA1D8", "#B2D135",  "#F39130", "#ED4959"]
# [ "#9C4B9C", "#5EA1D8", "#54C4D0", "#62BD80", "#B2D135", "#FCE533", "#F39130", "#ED4959"]
colors_in_set1 = []
for i in range(len(cols)):
  for j in range(len(cols)):
    # do not add those conditions where both colors are the same:
    if cols[i] != cols[j]:
      colors_in_set1.append([cols[i], cols[j]])
```

# Generating a stimulus set

```
shapes = [ Ellipse, Rectangle, RegularPolygon(5) ]
shapes_in_set1 = []
for i in range(len(shapes)):
  for j in range(len(shapes)):
    # do not add those conditions where both shapes are the same:
    if shapes[i] != shapes[j]:
      shapes_in_set1.append([shapes[i], shapes[j]])
#shapes_in_set1 = [ [Ellipse, Rectangle], [Ellipse, RegularPolygon(3)], [Ellipse, RegularPolygon
```



https://github.com/ElineVG/OCTA_workshop

# Generating a stimulus set

```
# Define base stimulus [with features that stay same across all stimuli in set]
stim = Outline(n_elements = 20, x_margin = 0, y_margin = 0, shape_boundingbox = (90,90), backgro
                  stim_orientation =  ['animate', '0', '360', "dur='40s', repeatCount='indefinit

## Add non-changing features of base stimulus
stim.boundingboxes = GridPattern.RepeatAcrossElements( [ (20,20) ] )
stim.orientations = GridPattern.RepeatAcrossElements( [ ['animate', '360', '0', "dur='40s', repe
```

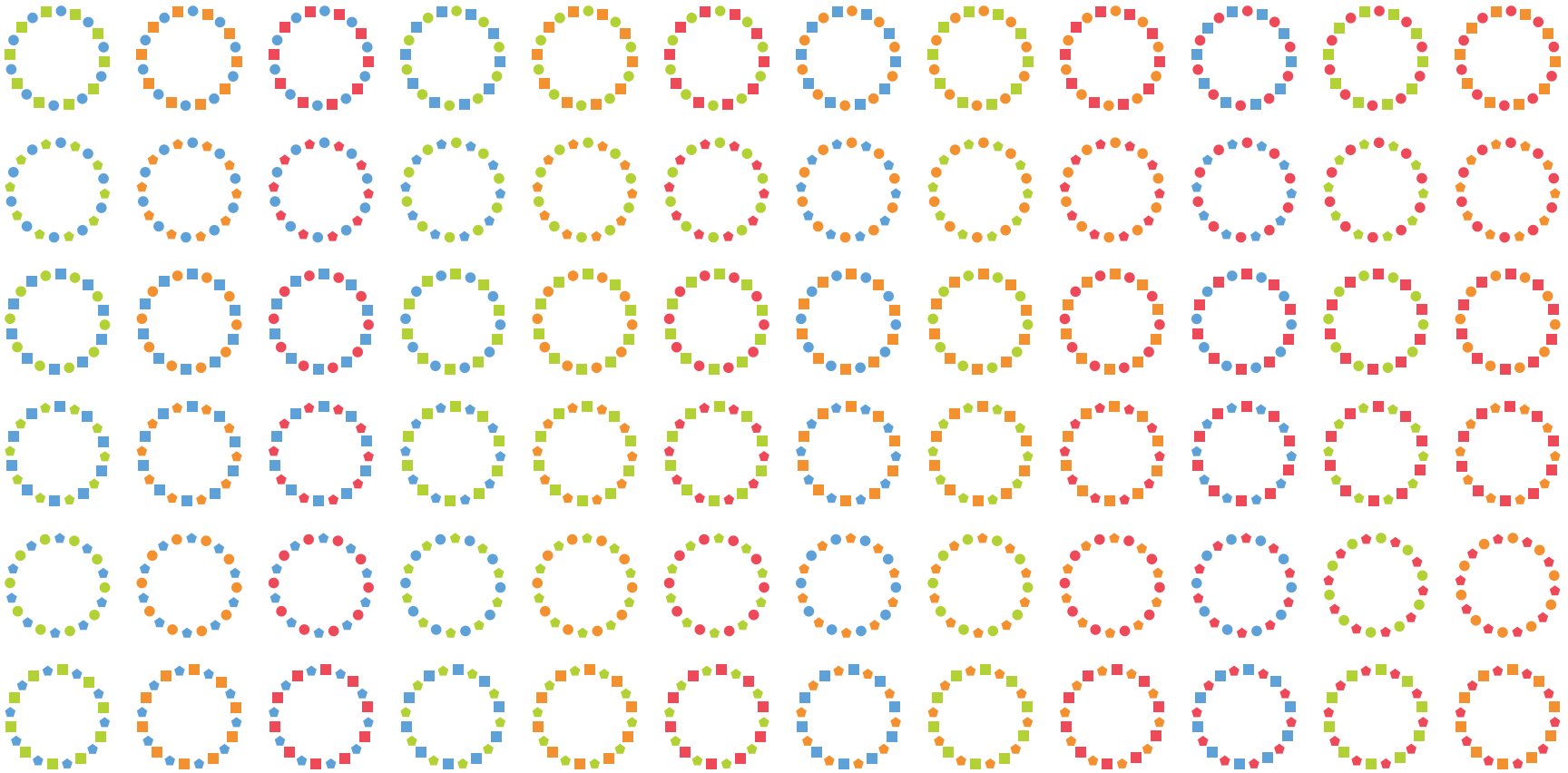


https://github.com/ElineVG/OCTA_workshop

# Generating a stimulus set

```
for chosen_colors in range(len(colors_in_set1)):
  for chosen_shapes in range(len(shapes_in_set1)):

    # Define stimulus name
    stimname = "outlinestim_" + str(chosen_shapes+1) + "_" + str(chosen_colors+1)

    # Add fillcolors for the elements
    stim.fillcolors = GridPattern.RepeatAcrossElements( colors_in_set1[chosen_colors] )

    # Add shapes for the elements
    stim.shapes = GridPattern.RepeatAcrossElements( shapes_in_set1[chosen_shapes] )

    # Save stimulus
    stim.Render()
    #stim.Show()
    stim.SaveSVG(stimname, folder = "")
```

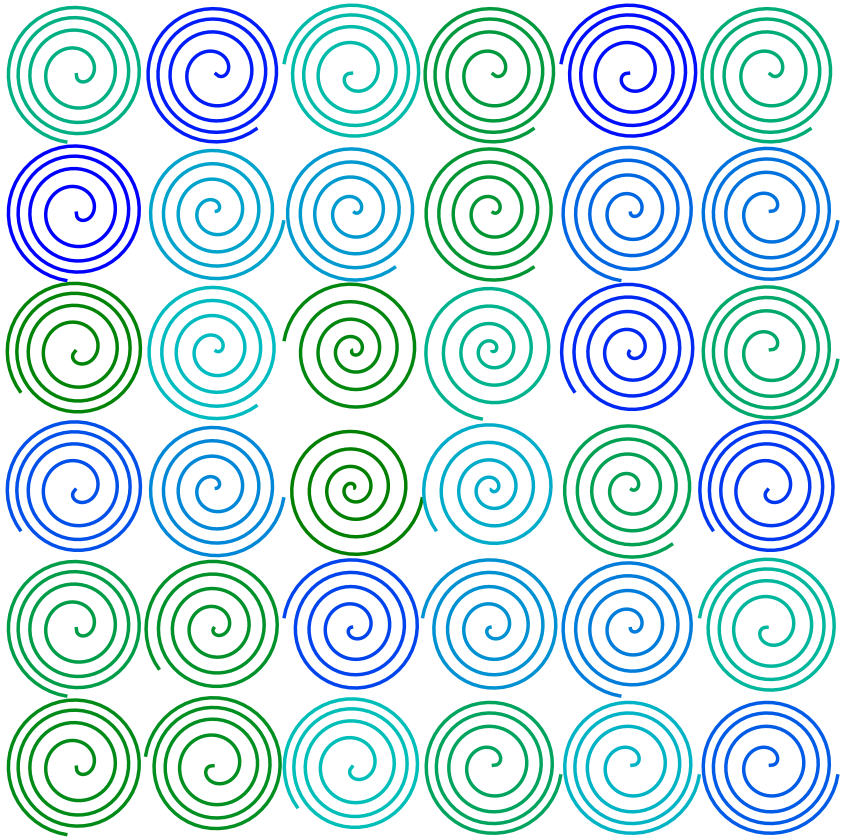
# Arranging different OCTA displays





https://github.com/ElineVG/OCTA_workshop

# Define your own shapes





https://github.com/ElineVG/OCTA_workshop

# Define your own shapes

```
import numpy as np
from abc import ABC, abstractmethod
from svgpathtools import parse_path
# from math import floor
from octa.shapes.Path import Path_

class BaseShapeGenerator(ABC):
    @abstractmethod
    def generate_baseshape(self):
        pass

class Transformer(ABC):
    @abstractmethod
    def generate_transformation(self):
        pass

def GeneralizedArchimedeanSpiral(a, k=0, c=1, n_rotations=3, clockwise = True, starting_point =
    if name == None:
        name = "Path_"

    rho = generate_radialpoints(n_rotations, n_points)

    r = k + a * pow(rho, (1/c))

    return generate_radialpath(r = r, rho = rho, clockwise = clockwise, starting_point = startin
```

# Define your own shapes

```
def LogarithmicSpiral(a, b, n_rotations=3, clockwise = True, starting_point = "right", transforr
    if name == None:
        name = "Path_"

    rho = generate_radialpoints(n_rotations, n_points)

    r = a * np.exp(b*rho)

    return generate_radialpath(r = r, rho = rho, clockwise = clockwise, starting_point = startin


def generate_radialpoints(n_rotations, n_points):

    i = np.array(range(0,n_points))
    point_distance = np.pi * 2 * n_rotations / n_points
    rho = i*point_distance

    return rho
```



https://github.com/ElineVG/OCTA_workshop

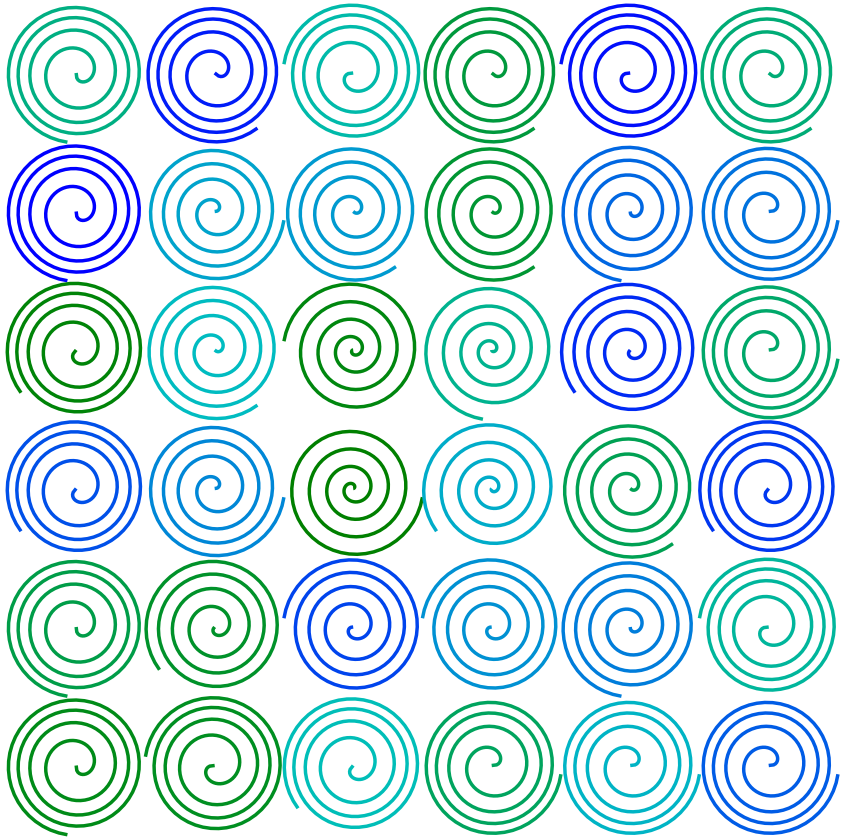
# Define your own shapes

```
def generate_radialpath(r, rho, clockwise = True, starting_point = "right", change_aspectratio =

    if transformation is not None:
        transform = transformation.generate_transformation(rho)
        r = transform * r

    if starting_point == "right":
        start = 0
    elif starting_point == "left":
        start = np.pi
    elif starting_point == "top":
        start = (3*np.pi/2)
    elif starting_point == "bottom":
        start = (np.pi/2)

    xdirection = 1
    ydirection = 1

    if clockwise == True:
        if starting_point in ["left", "right"]:
            ydirection = 1
        elif starting_point in ["top", "bottom"]:
            xdirection = 1
    elif clockwise == False:
        if starting_point in ["left", "right"]:
            ydirection = -1
        elif starting_point in ["top", "bottom"]:
            xdirection = -1
```

# Define your own shapes

```
from octa.Stimulus import Grid, Outline, Concentric
from octa.patterns import GridPattern

stimulus = Grid(n_rows = 6, #n_rows,
                n_cols = 6, #n_rows,
                #size = (250,250),
                row_spacing = 80, #spacing,
                col_spacing = 80, #spacing,
                background_color = 'none')

shapegradient = [GeneralizedArchimedeanSpiral(a = 0.1315, c = c_var, k = 0, clockwise = False, s
stimulus.shapes = GridPattern.RepeatAcrossLayers(shapegradient)

stimulus.fillcolors = GridPattern.RepeatAcrossElements(["none"])
stimulus.borderwidths = GridPattern.RepeatAcrossElements([0.05])
colors_to_use = ["red", "green", "blue"]
stimulus.bordercolors = GridPattern.GradientAcrossElements(colors_to_use[2], colors_to_use[1]).R

## Determine size of elements used in the stimulus
stimulus.boundingboxes = GridPattern.RepeatAcrossElements([(80,80)])

stimulus.orientations = GridPattern.RepeatAcrossElements([0,45,90,135,180]).RandomizeAcrossEleme

stimulus.Show()
stimulus.SaveSVG('spiralgrid')
```

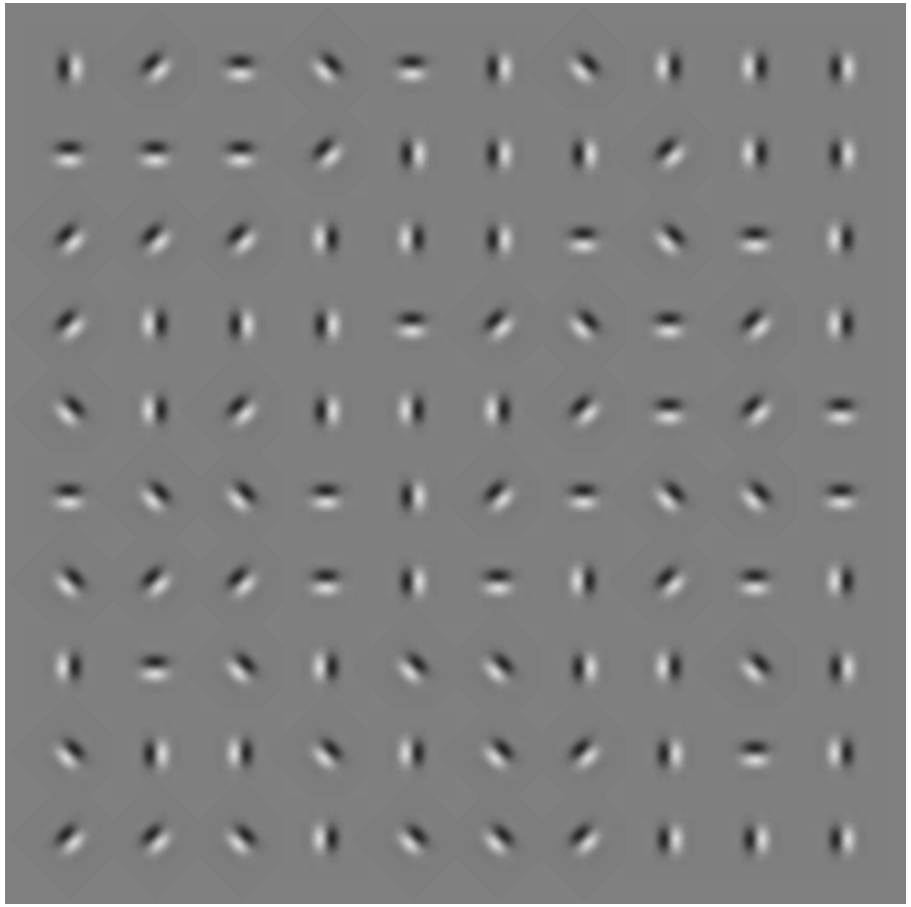
# Define your own shapes





https://github.com/ElineVG/OCTA_workshop

# Integrate elements from stimupy





https://github.com/ElineVG/OCTA_workshop

# Integrate elements from stimupy

```
pip install stimupy

from stimupy.components import shapes
from stimupy.utils import plot_stim, plot_stimuli, array_to_image
from stimupy.stimuli import gabors, waves

sinewave = waves.sine_linear(visual_size=(10, 10), ppd=10,
                             n_bars=5,
                             intensities=(0.0, 1.0),
                             origin='center')

gabor = gabors.gabor(visual_size=(10, 10), ppd=15,
                     n_bars=5,
                     intensities=(0.0, 1.0),
                     origin='center',

                     sigma=1)

plot_stimuli({'Gabor': gabor})

array_to_image(arr = gabor["img"], filename = "gabor.png")
```



https://github.com/ElineVG/OCTA_workshop

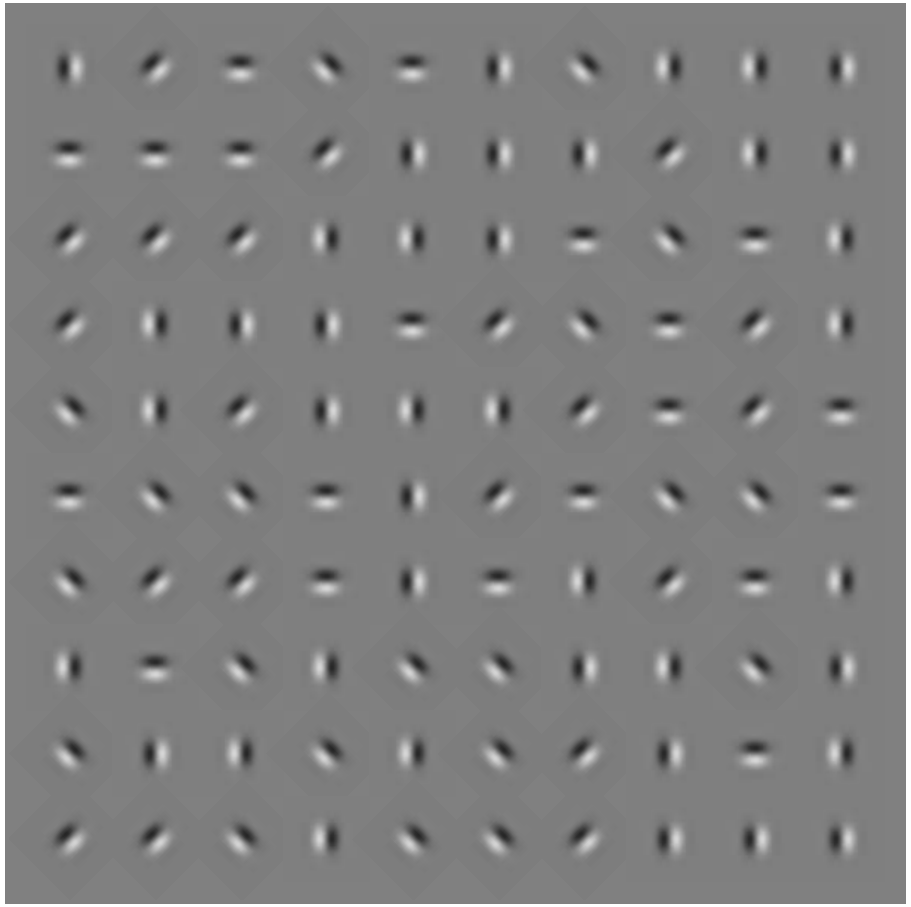
# Integrate elements from stimupy

```
from octa.Stimulus import Grid, Outline, Concentric
from octa.patterns import GridPattern
from octa.shapes import Image

stimulus = Grid(10, 10, row_spacing= 80, col_spacing = 80, background_color = 'grey')

stimulus.shapes = GridPattern.RepeatAcrossElements([Image("gabor.png")])

stimulus.fillcolors = GridPattern.RepeatAcrossElements(["none"])
stimulus.borderwidths = GridPattern.RepeatAcrossElements([0.05])
colors_to_use = ["red", "green", "blue"]
stimulus.bordercolors = GridPattern.GradientAcrossElements(colors_to_use[2], colors_to_use[1]).R

## Determine size of elements used in the stimulus
stimulus.boundingboxes = GridPattern.RepeatAcrossElements([(80,80)])

stimulus.orientations = GridPattern.RepeatAcrossElements([0,45,90,135,180]).RandomizeAcrossEleme

stimulus.Show()
stimulus.SaveSVG('gaborgrid')
```



https://github.com/ElineVG/OCTA_workshop

# Integrate elements from stimupy





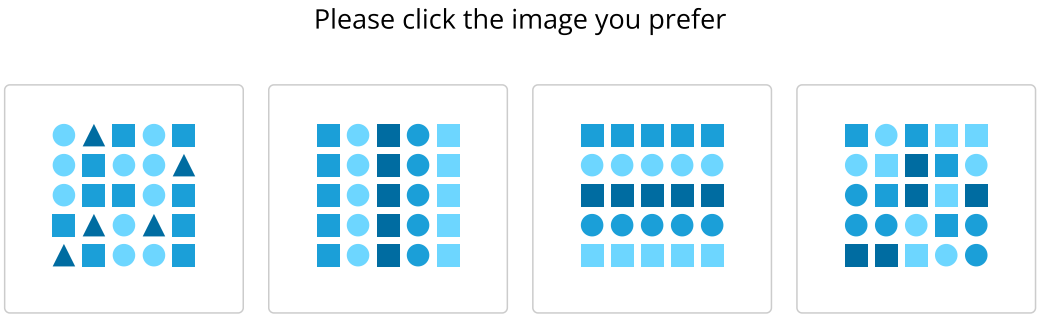
https://github.com/ElineVG/OCTA_workshop

# OCTA:
# Use OCTA in your research!



https://github.com/ElineVG/OCTA_workshop

# Use pregenerated OCTA stimuli in your experiments




**Possible with any software**

**Psychopy: needs raster images**

**Demo experiments in jspsych** www.jspsych.org/

Let participants...

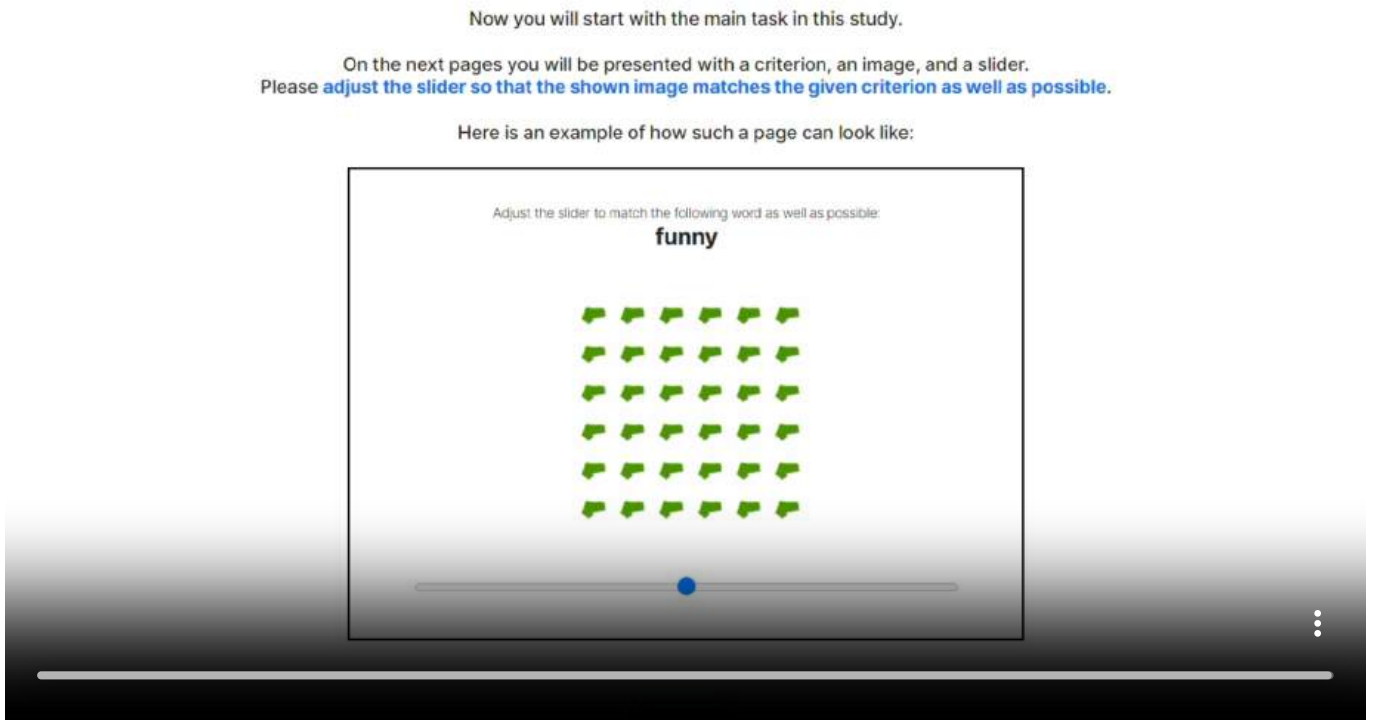
- choose which image they prefer
- rate images on aesthetic value
- arrange elements on a canvas
- create a pleasing or interesting stimulus
- change an existing stimulus
- ...



https://github.com/ElineVG/OCTA_workshop

# Generate OCTA stimuli during the experiment

Possible with **PsyNet** (www.psynet.dev)






https://github.com/ElineVG/OCTA_workshop

KU LEUVEN

# OCTA:
# The future



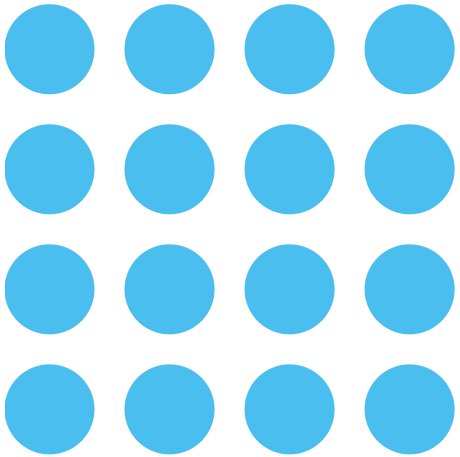
https://github.com/ElineVG/OCTA_workshop

# Future developments

- additional position patterns & deviation options
- additional animation options
- option to create multiple stimuli at once
- …

**Which additional features would you like to see?**

**What other feedback or suggestions do you have for OCTA?**





https://github.com/ElineVG/OCTA_workshop

# Cite OCTA when using it!

Always cite OCTA when using it in your work;

**Van Geert, E., Bossens, C., & Wagemans, J. (2023). The Order & Complexity Toolbox for Aesthetics (OCTA): A systematic approach to study the relations between order, complexity, and aesthetic appreciation. Behavior Research Methods, 55, 2423–2446. https://doi.org/10.3758/s13428-022-01900-w**

If you also want to refer to the Python toolbox or the app specifically, you can use:

- for the Python toolbox: Van Geert, E., Bossens, C., & Wagemans, J. (2021). The Order & Complexity Toolbox for Aesthetics Python library [Computer software]. https://github.com/gestaltrevision/OCTA_toolbox
- for the app: Van Geert, E., Bossens, C., & Wagemans, J. (2021). The Order & Complexity Toolbox for Aesthetics Shiny application [Online application]. https://elinevg.shinyapps.io/OCTA_toolbox/

# Further resources

- Read the OCTA paper
- Use the OCTA Shiny app
- Use the OCTA Python package
- Subscribe to the OCTA mailing list
- Check the OCTA documentation and example stimuli
- Revisit the OCTA workshop


**Eline Van Geert**

GestaltReVision, KU Leuven

Computational Auditory Perception, MPIEA



**Thanks to**

my research groups, institutions, and funder

my collaborators