Data visualisation and information design at the science-policy interface

Drawing from the IPCC experience.

Understanding how Humans process visual information is key to creating accessible figures to non-experts.

Gomis M. I.[1], Berger S.[1], Matthews R.[1], Connors S.[1], Yelekci O.[1], Harold J.[2], Morelli A.[3], and Johansen T. G[3].
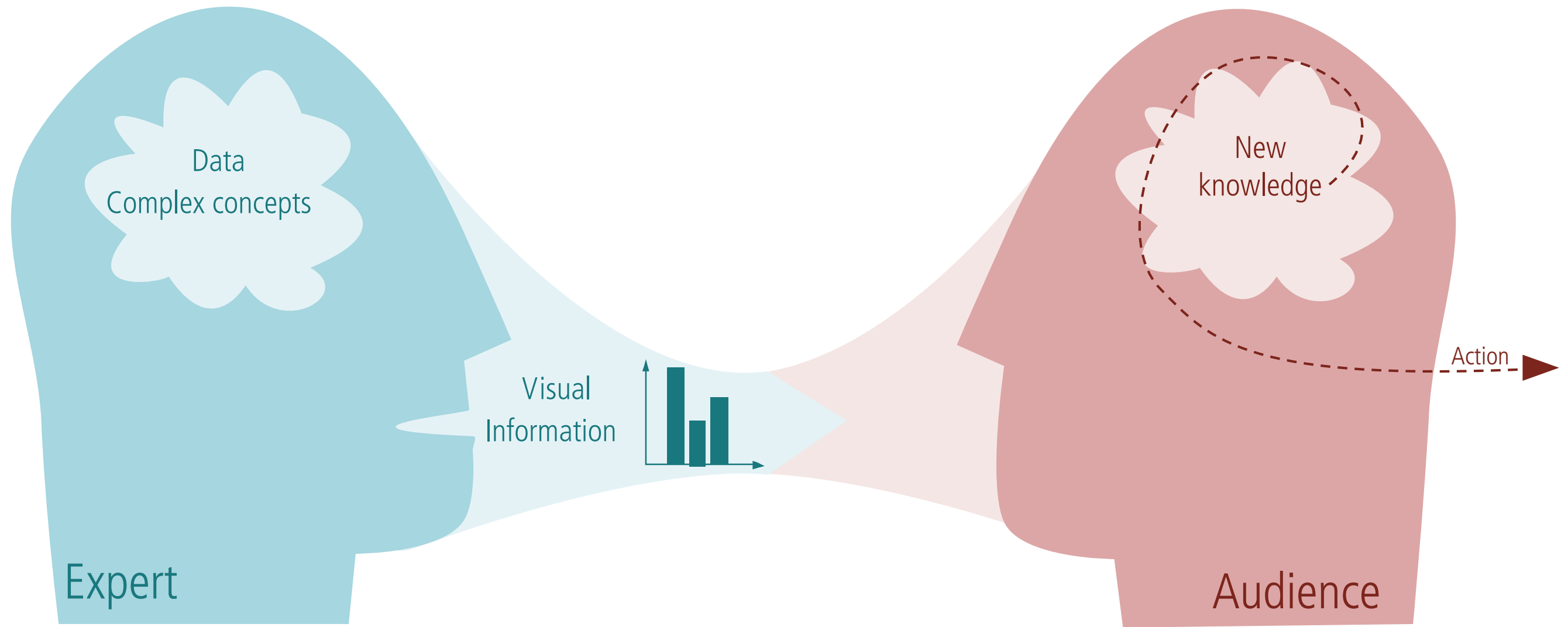
[1] IPCC WGI TSU, Université Paris Saclay, France.
[2] Tyndall Centre for Climate Change Research, University of East Anglia, UK.
[3] Infodesignlab, Norway.

Understanding precedes action and change

A. Morelli

WHAT IS THE
Intergovernmental **P**anel on **C**limate Change

1988

Clear **scientific view** about **climate change**

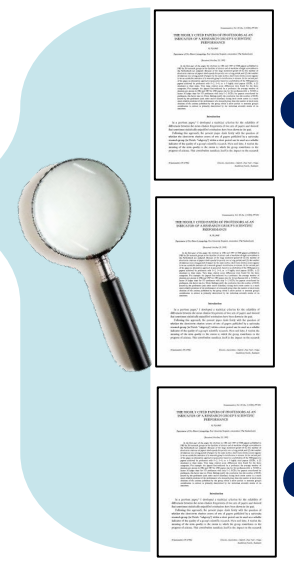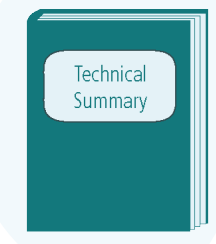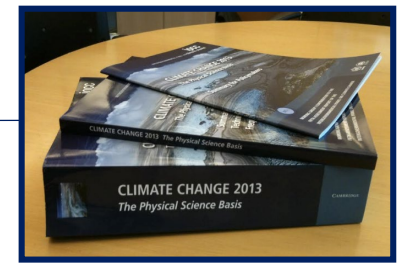Support **decision makers**

The IPCC **assesses** the science

Science Policy

Option **1**
Option **2**
Option **3**

Policy relevant

Policy non-prescriptive

Global

CLIMATE CHANGE 2013 The Physical Science Basis

Summary for Policymakers

Technical Summary

Report

Draft Review

Reviewers (Science community)

Authors (selected scientists)

Delegates (195 country-members)

Approval

From drafting to publishing, the process involves different stakeholders

Summary for Policymakers
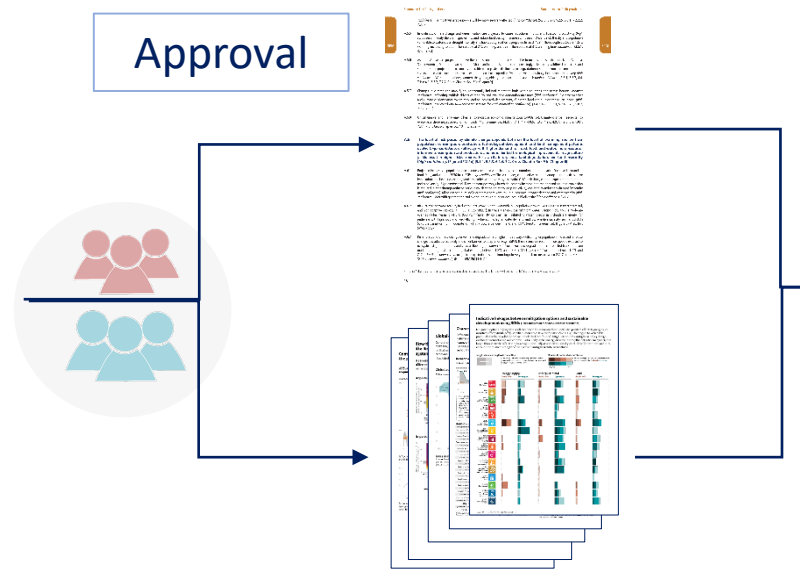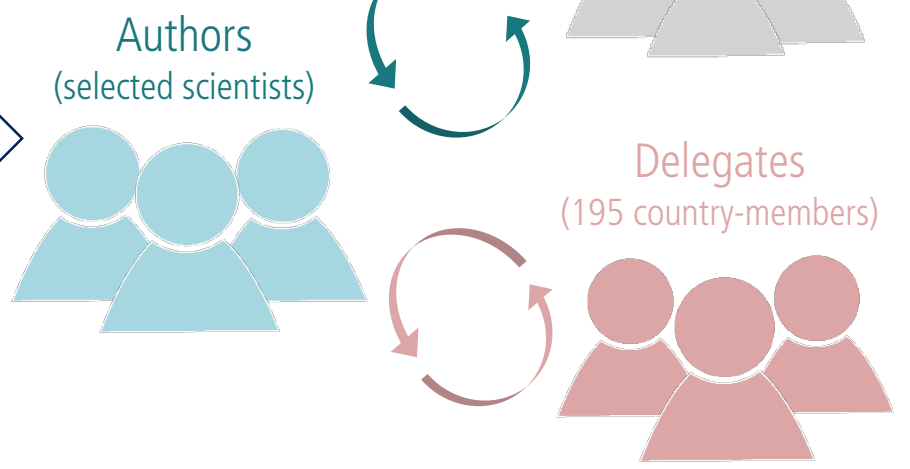
Governments Policy makers

Framework

4/ Key design choices based on cognitive principles

- Spatial thinking ability
- Color perception (visual and cultural)
- Perception of visual attributes and shapes
- Perception of verbal and visual information

- Gestalt principles
- Adapted graph format
- Directing visual attention
- Using colors to only convey information
- …..

3/ What is the "narrative"?

2/ Who is the intended audience and its background?

5/ Test and evaluate on your target audience – Did they get the message (**1/**)?

No   **Yes**

Complexity VS simplicity

Designing a figure is **context-dependent**

1/ what the message/intent of the visual?

Data
Complex concepts

New knowledge

Visual Information

Expert

Audience

More?

Books
"The Visual Display of Quantitative Information" by Edward R. Tufte
"Fundamentals of Data Visualization" by Claus O. Wilke

Recommendations to the IPCC and guidance for researchers (Harold et al., 2017)
https://tyndall.ac.uk/sites/default/files/Data_Visuals_Guidance_Full_Report_0.pdf

Peer-reviewed papers

Harold, Jordan, et al. "**Cognitive and psychological science insights to improve climate change data visualization.**" *Nature Climate Change* 6.12 (2016): 1080.

Daron, J. D., et al. **"Interpreting climate data visualisations to inform adaptation decisions."** *Climate Risk Management*, *10*, (2015): 17-26.

Rodríguez Estrada, F. C., et al. **"Improving visual communication of science through the incorporation of graphic design theories and practices into science communication."** *Science Communication* 37, no. 1 (2015): 140-148.

Grainger, S. et al. **"Environmental data visualisation for non-scientific contexts: Literature review and design framework."** *Environmental Modelling & Software* 85 (2016): 299-318.

Schneider, B. "**Climate model simulation visualization from a visual studies perspective.**" *Wiley Interdisciplinary Reviews: Climate Change* 3.2 (2012): 185-193.

Rougier, N. P., et al. "**Ten simple rules for better figures.**" (2014): e1003833.

On the Co-design process by our collaborators Infodesignlab
Article: *Co-designing scientific information for the IPCC special reports (click here)*
Videos: *Co-designing the IPCC special report* (click here)

Data visualisation tools

Rawgraphs Quadrigram tableau Semiotics Observable
plotly datawrapper post-editing: Inkscape *(like Illustrator but free)*

Twitter accounts @AlbertoCairo @Visualisingdata
@DataVizSociety @R_Graph_Gallery
@MelichatGo
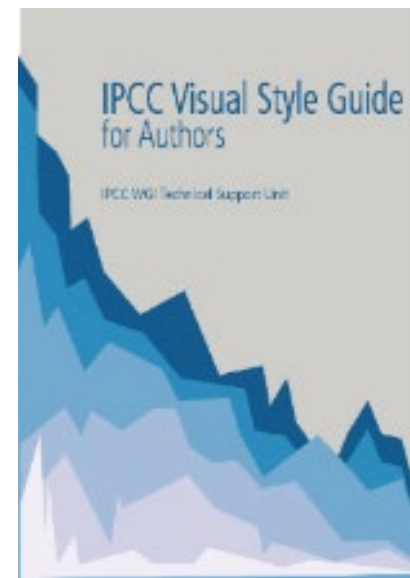
IPCC visual style guide for Authors

Available here

Gestalt Principles (principles or grouping) are a set of principles in psychology, first proposed by Gestalt psychologists to account for the observation that humans naturally perceive objects as organized patterns and objects. Gestalt psychologists argued that these principles exist because the mind has an innate disposition to perceive patterns in the stimulus based on certain rules. These principles are organized into five categories: Proximity, Similarity, Continuity, Closure, and Connectedness
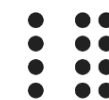
Source: Wikipedia

Gestalt Principles

Good Figure
Objects grouped together tend to be perceived as a single figure. Tendency to simplify.

Proximity
Objects tend to be grouped together if they are close to each other.

Similarity
Objects tend to be grouped together if they are similar.

Continuation
When there is an intersection between two or more objects, people tend to perceive each object as a single uninterrupted object.

Closure
Visual connection or continuity between sets of elements which do not actually touch each other in a composition.

Symmetry
The object tend to be perceived as symmetrical shapes that form around their center.