



??



# Deep Questions of Data Visualization

Michael Friendly





While you were enjoying a relaxing week  
without classes, I was working hard,  
pondering the:

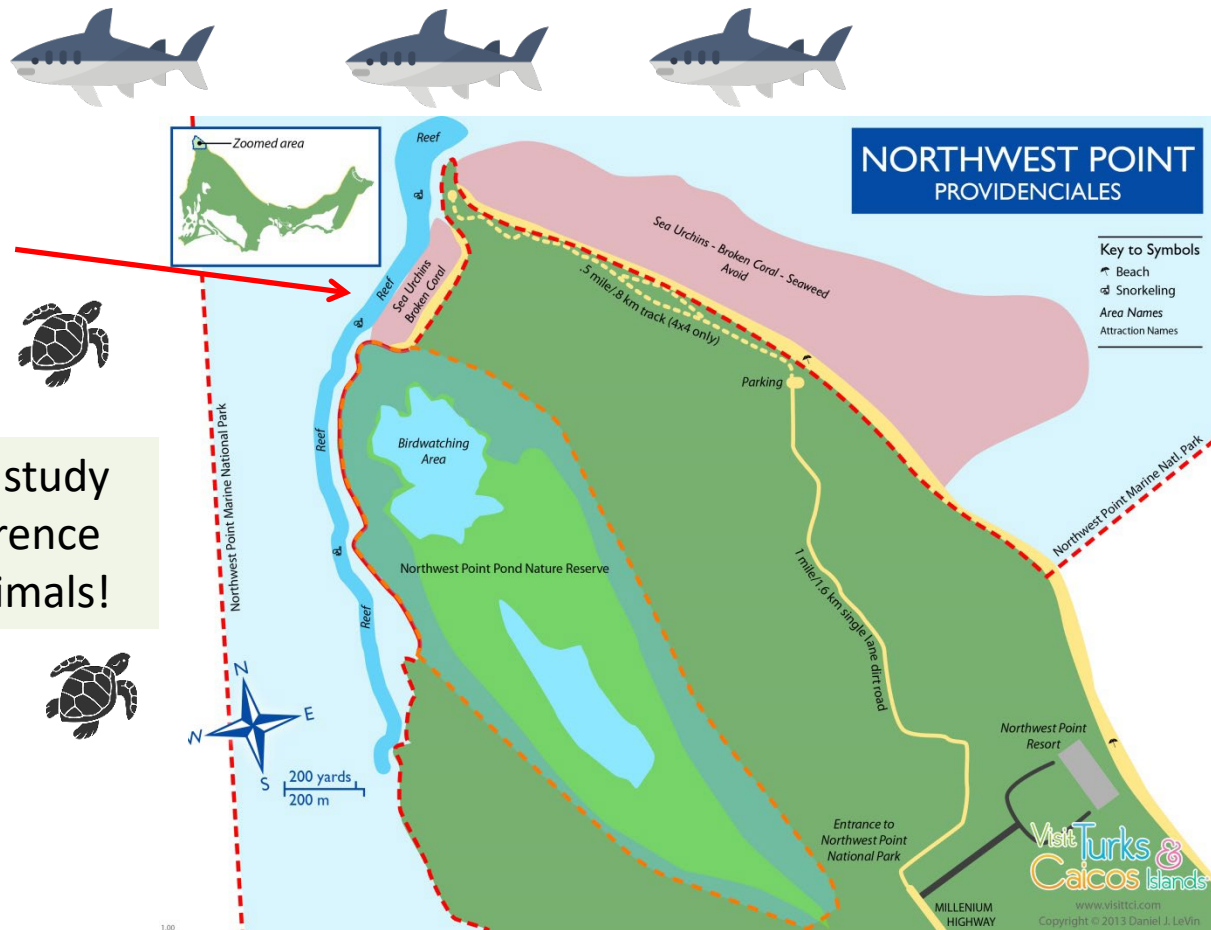
# Deep Questions of Data Visualization



# The Deep Question Research Institute, NorthWest Point, Providenciales, Turks & Caicos

The Wall  
(6000')

The first scientific study  
of graphical preference  
among marine animals!





# Research team\* aboard the *MV* *Playfair*

Divers suit up



\* Thanks for technical assistance from Provo Divers

# Shark experiment: Pies vs. Bars

Do sharks prefer **conch pie charts** or **granola bar charts**?

Design: Two-alternative forced-choice,  $n=50$  trials

Conch pie



Granola bar

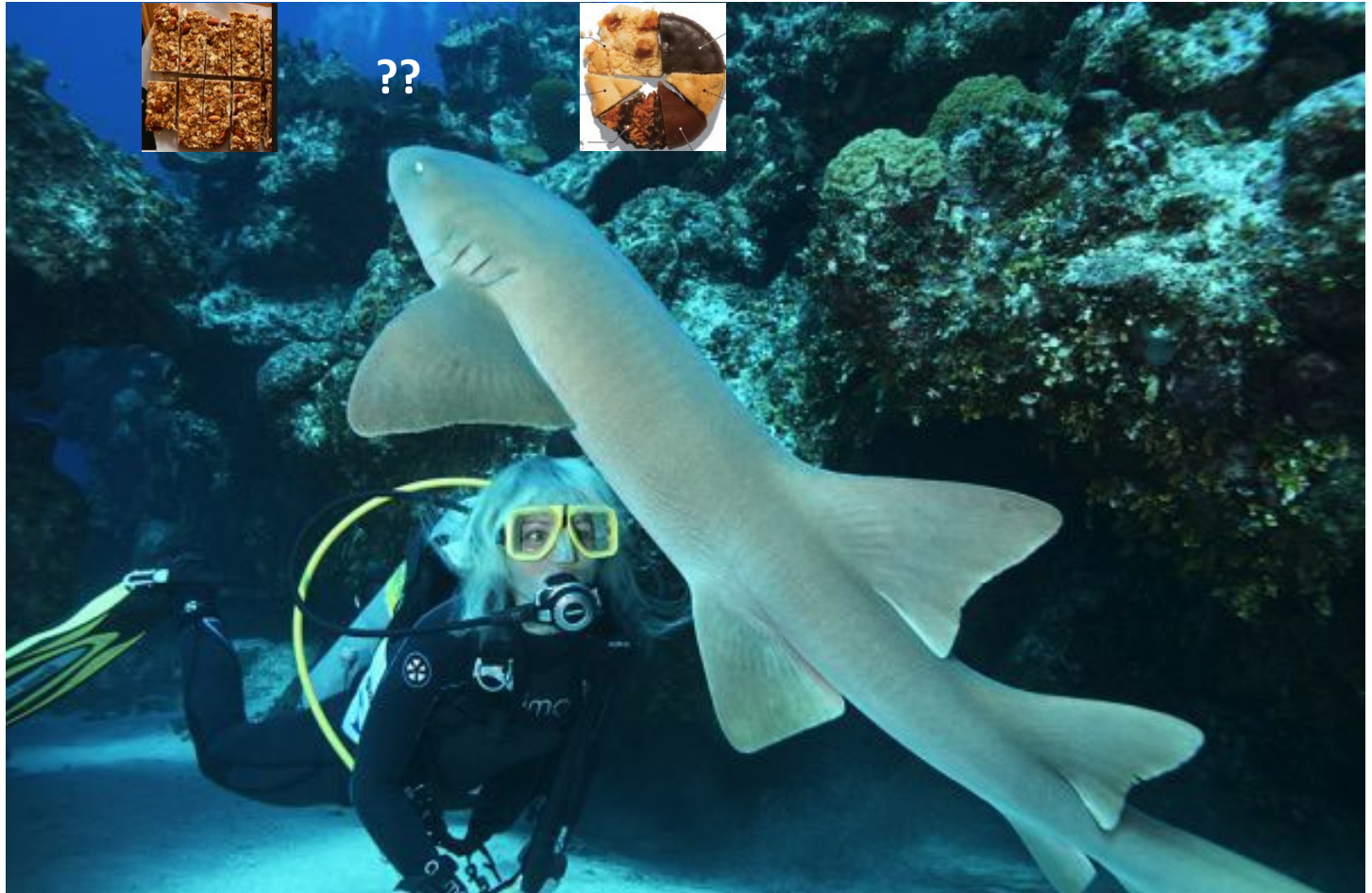


Sample stimulus items



# Shark experiment

One experimental trial:

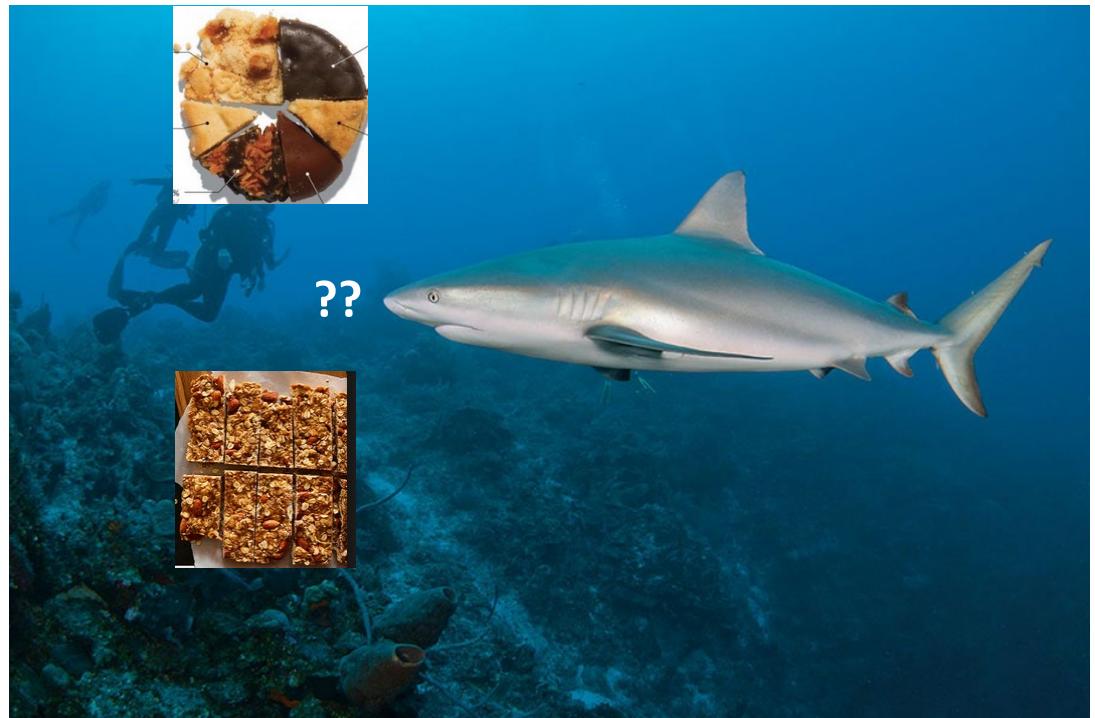




# Shark experiment: Pies vs. Bars

Results: Sharks show an overwhelming preference for conch pie

Choice	n
Pie	45
Bar	4
Diver *	1



\* Ethics disclosure: All divers were volunteers. None were consumed in this experiment.

# Turtle experiment

Does this generalize? What about turtles?

Results: Turtles show an overwhelming preference for granola bar charts

Choice	n
Pie	3
Bar	47
Diver	0





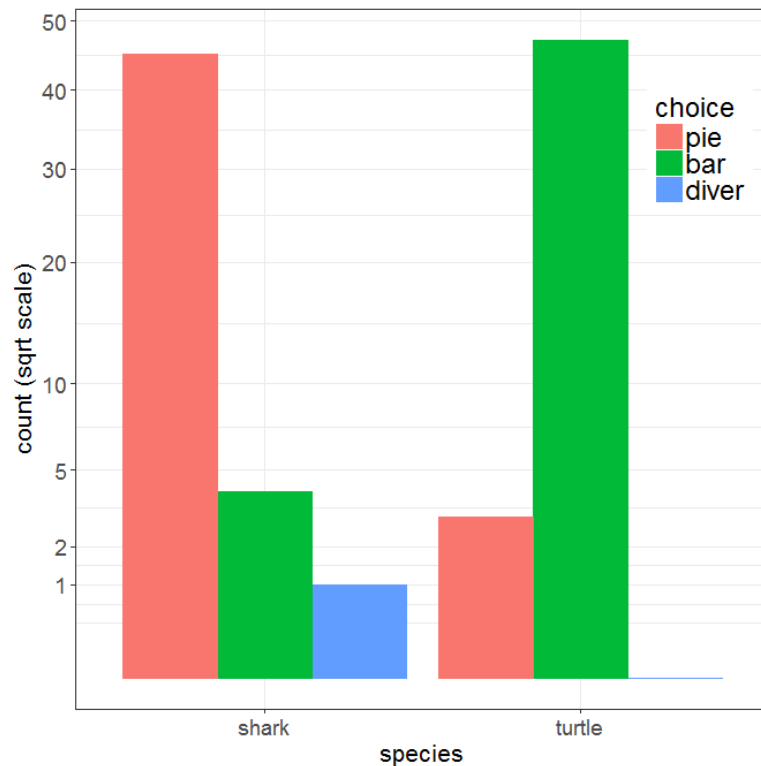
# Visualizing the results

Successful visualizations require some time for reflection

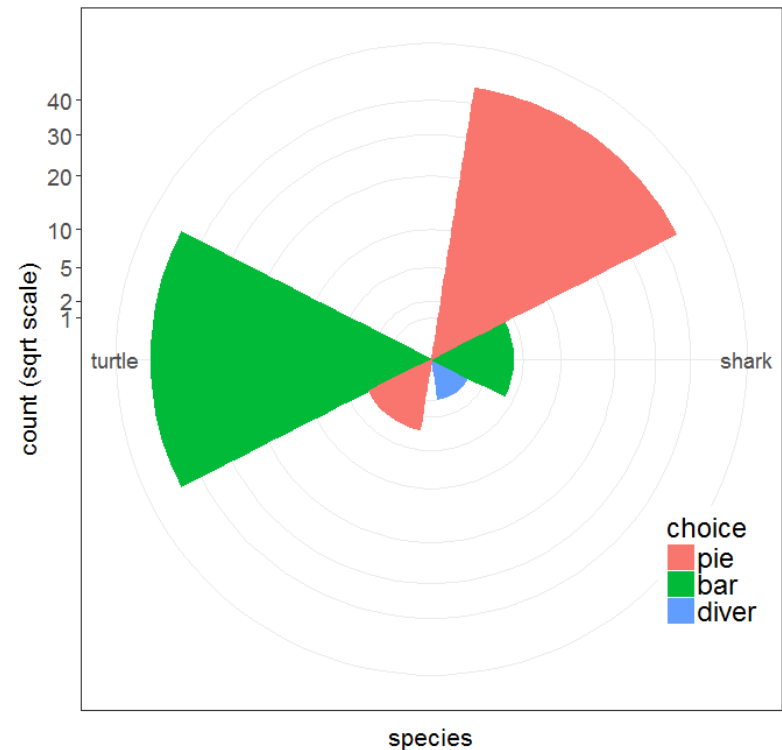


# Visualizing the results

Bar chart



Windrose = bar chart + polar coords

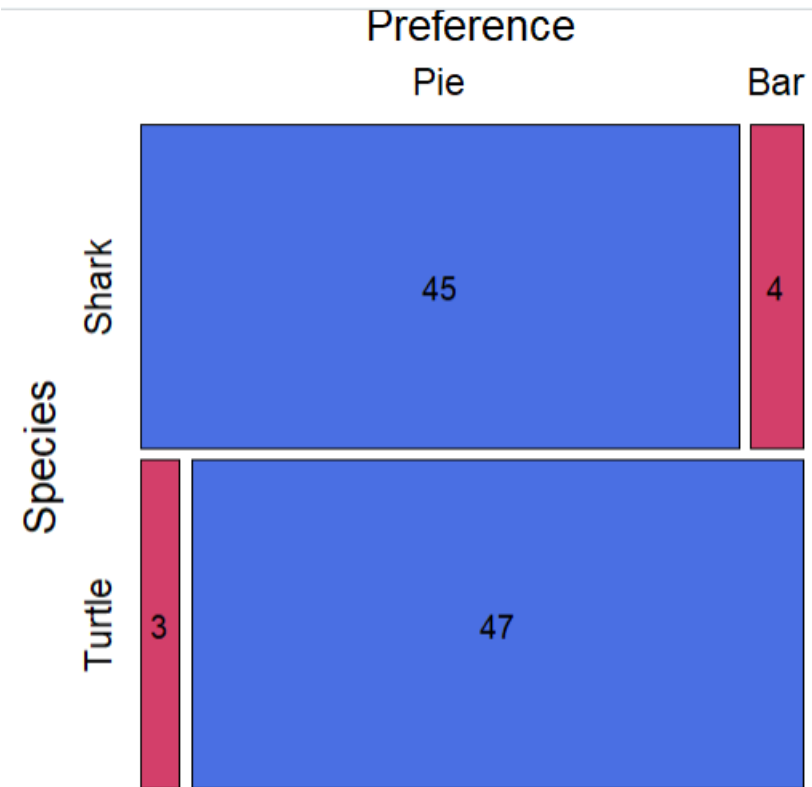
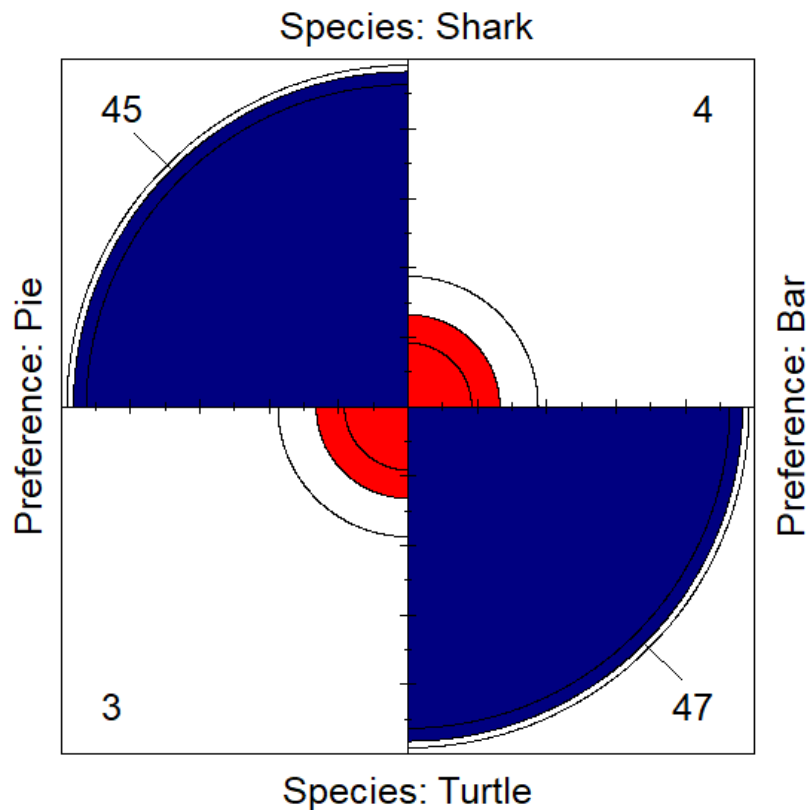


Which do you prefer? Is there something better before I publish this?



# Visualizing the results

What about fourfold plots & mosaic displays?



# The *Red Stripe* Award



The research reported\* here was given the February 2023 *Red Stripe* Award by the **Deep Question Research Institute**



*“A Four Stripe research project!”*

\* This research was **not** supported by the National Sciences and Engineering Research Council of Canada

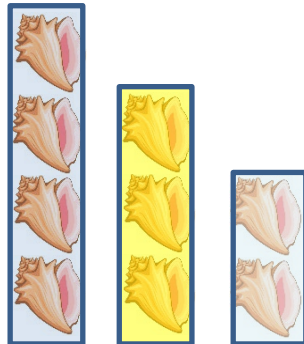


# Further research

- Include the obvious and necessary control conditions in a 2 x 2 factorial design (chart type × **food type**):
  - conch **bar** charts vs. conch pie charts
  - granola **pie** charts vs. granola bar charts



Conch pie



Conch bar



Granola pie



Granola bar

## Extend this to other species

- Dolphins: known to be much smarter than sharks & turtles
- Caribbean lobsters (no claws!) are stupider
- Is graphical preference related to intelligence?



Image ID: MHT6P0  
www.alamy.com







Nellie the  
nurse shark



Tommy turtle

Dramatis personnae

