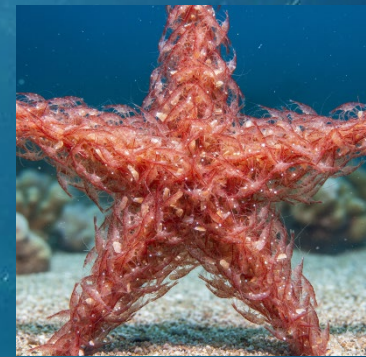




??



??



Deep Questions of Data Visualization



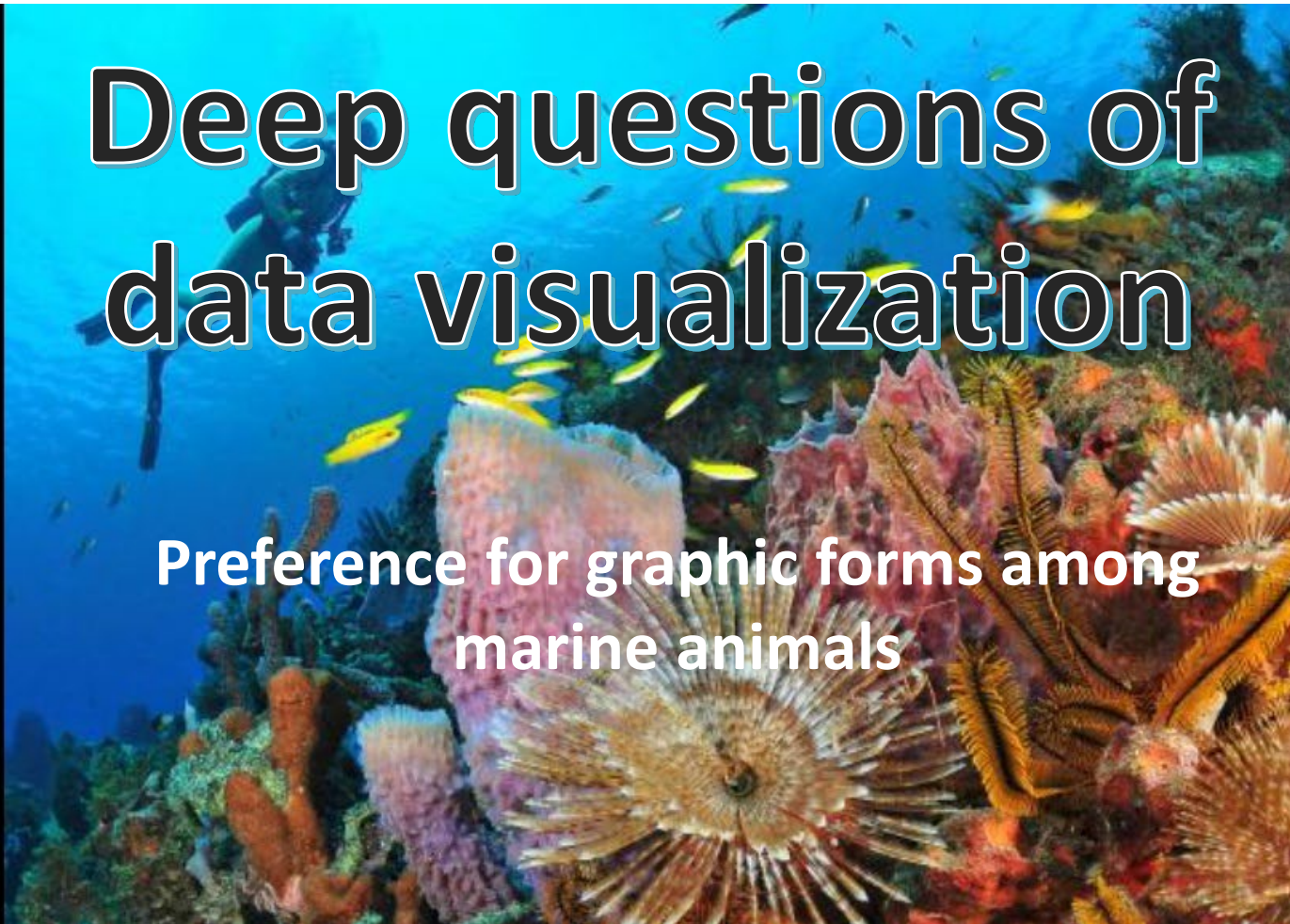
• Michael Friendly



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

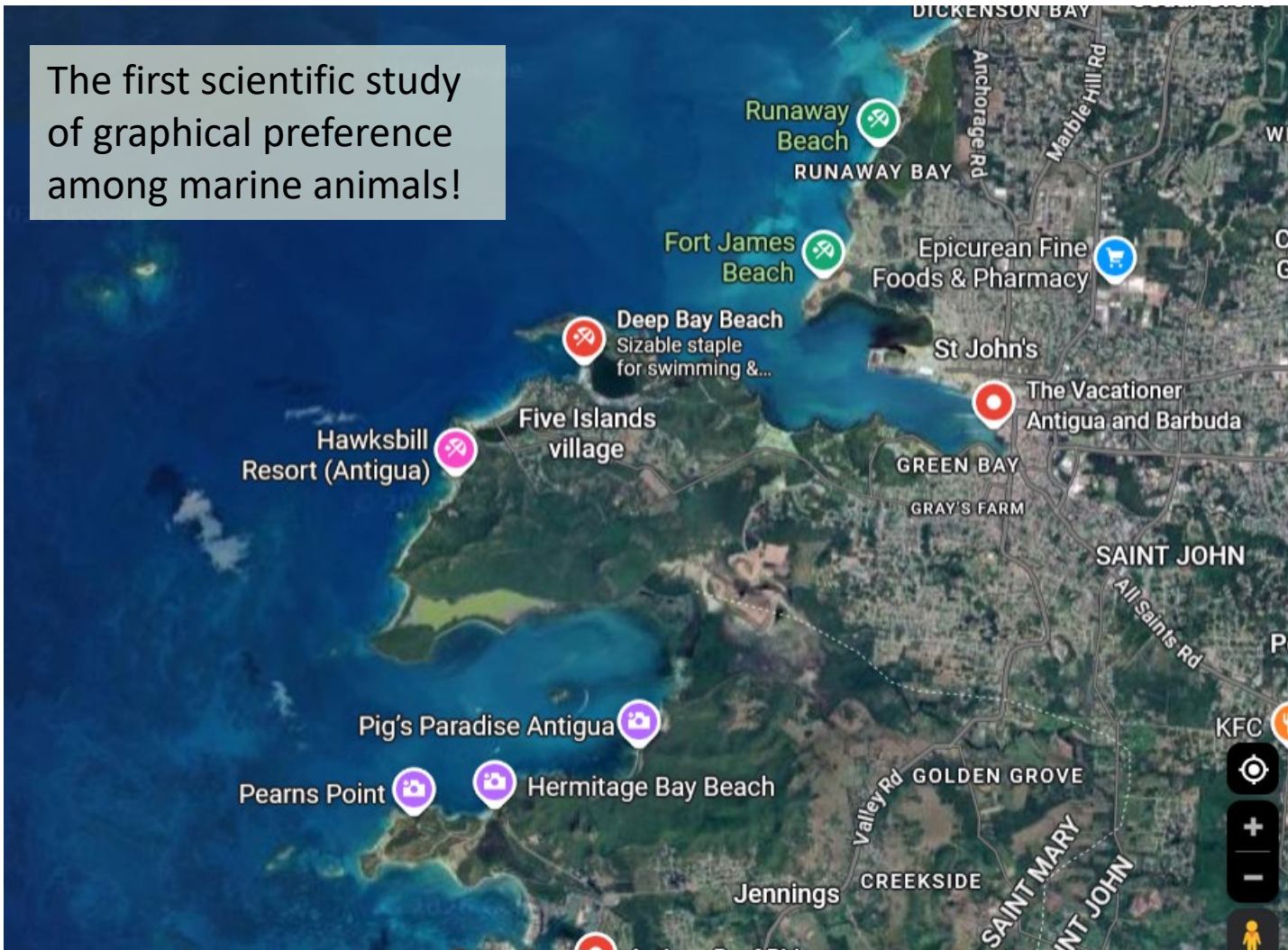
Deep questions of data visualization

Preference for graphic forms among marine animals



The Deep Question Research Institute, Hawksbill Resort, Antigua

The first scientific study
of graphical preference
among marine animals!



Research team aboard the *MV Playfair*

Divers suit up



Shark experiment: Pies vs. Bars

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

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

Sample stimulus items

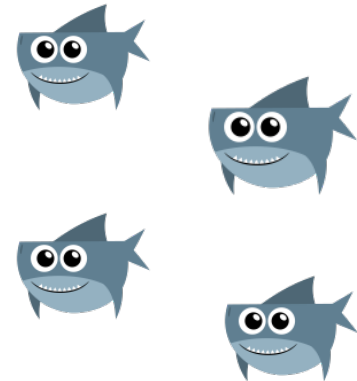
Conch pie



Granola bar

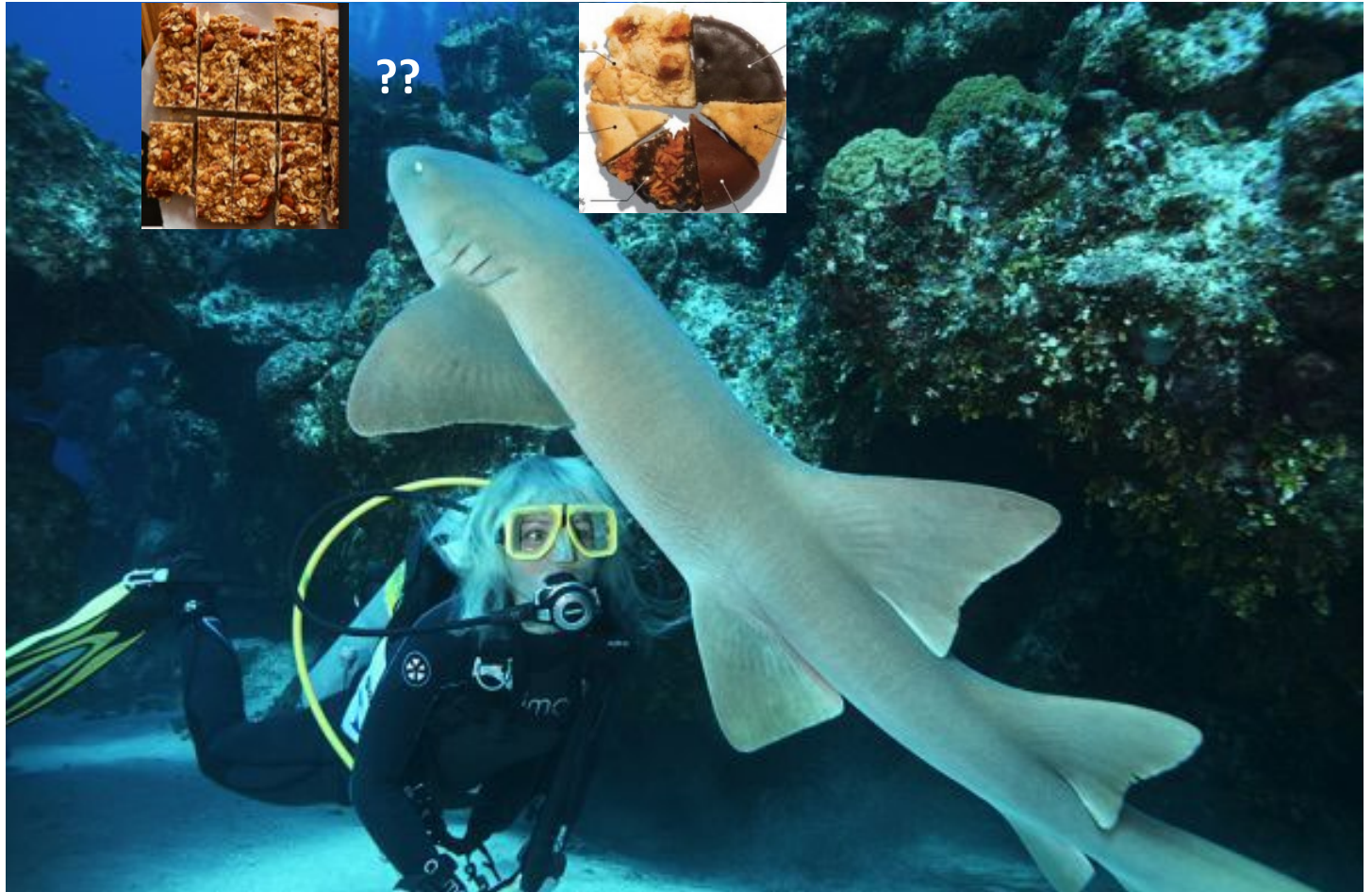


Subjects



Shark experiment

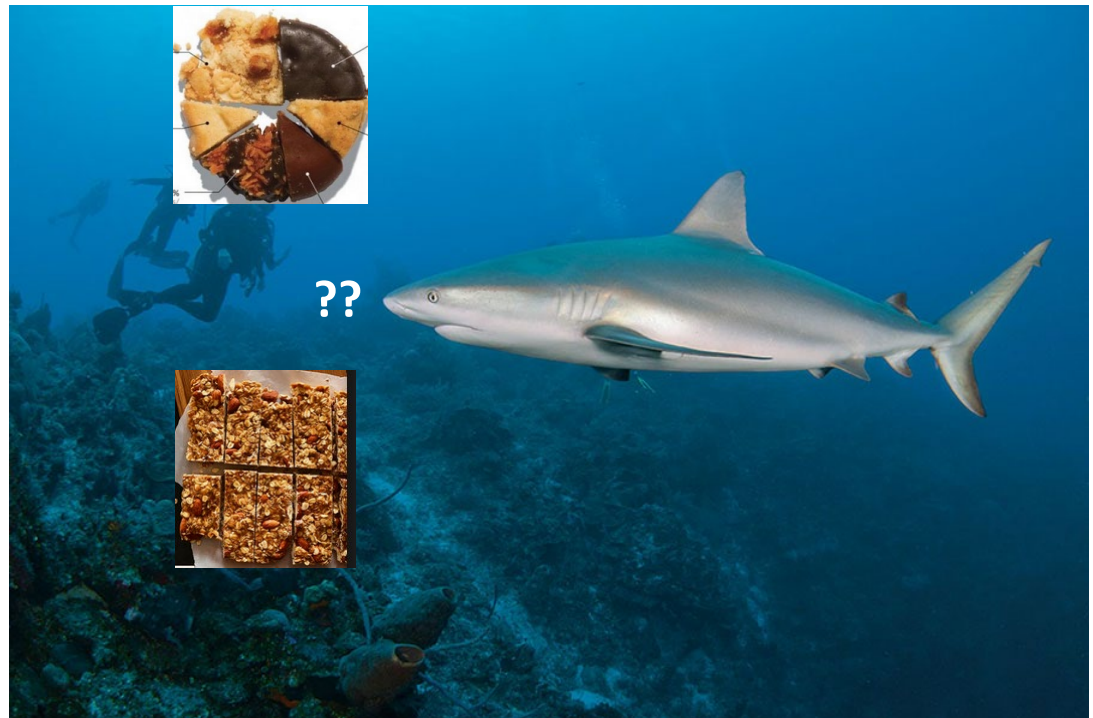
One experimental trial:



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



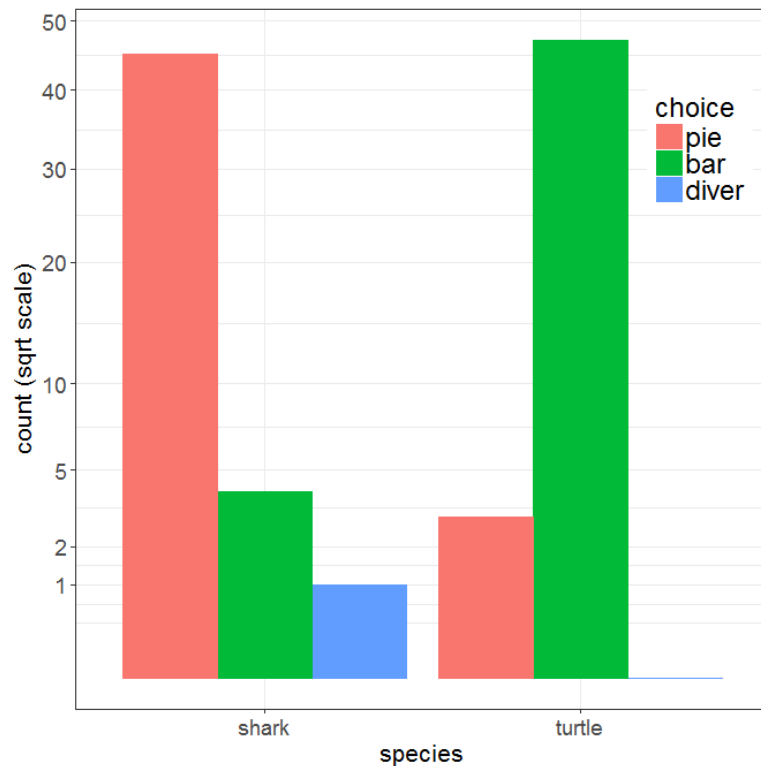
Visualizing the results

Successful visualizations require some time for reflection

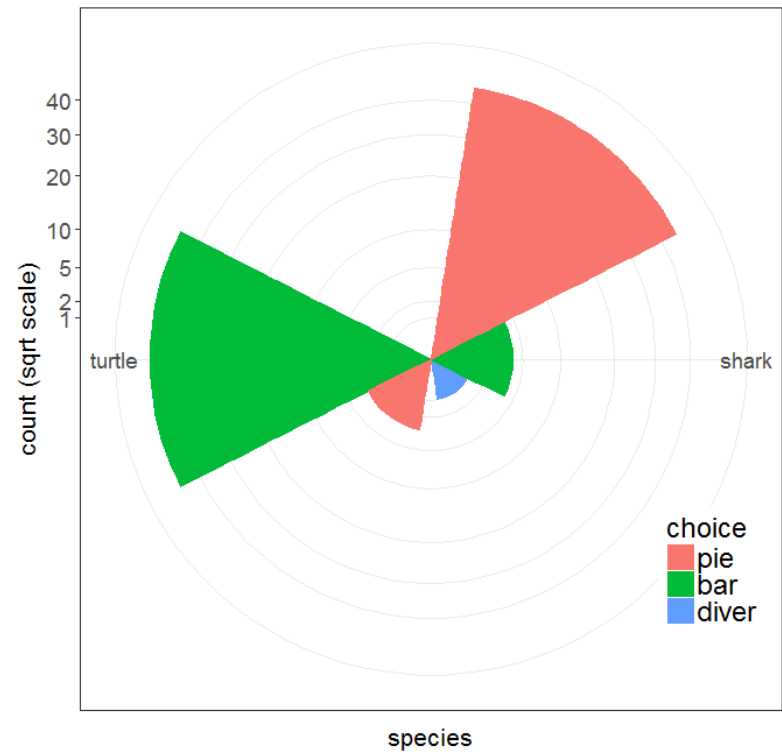


Visualizing the results

Bar chart



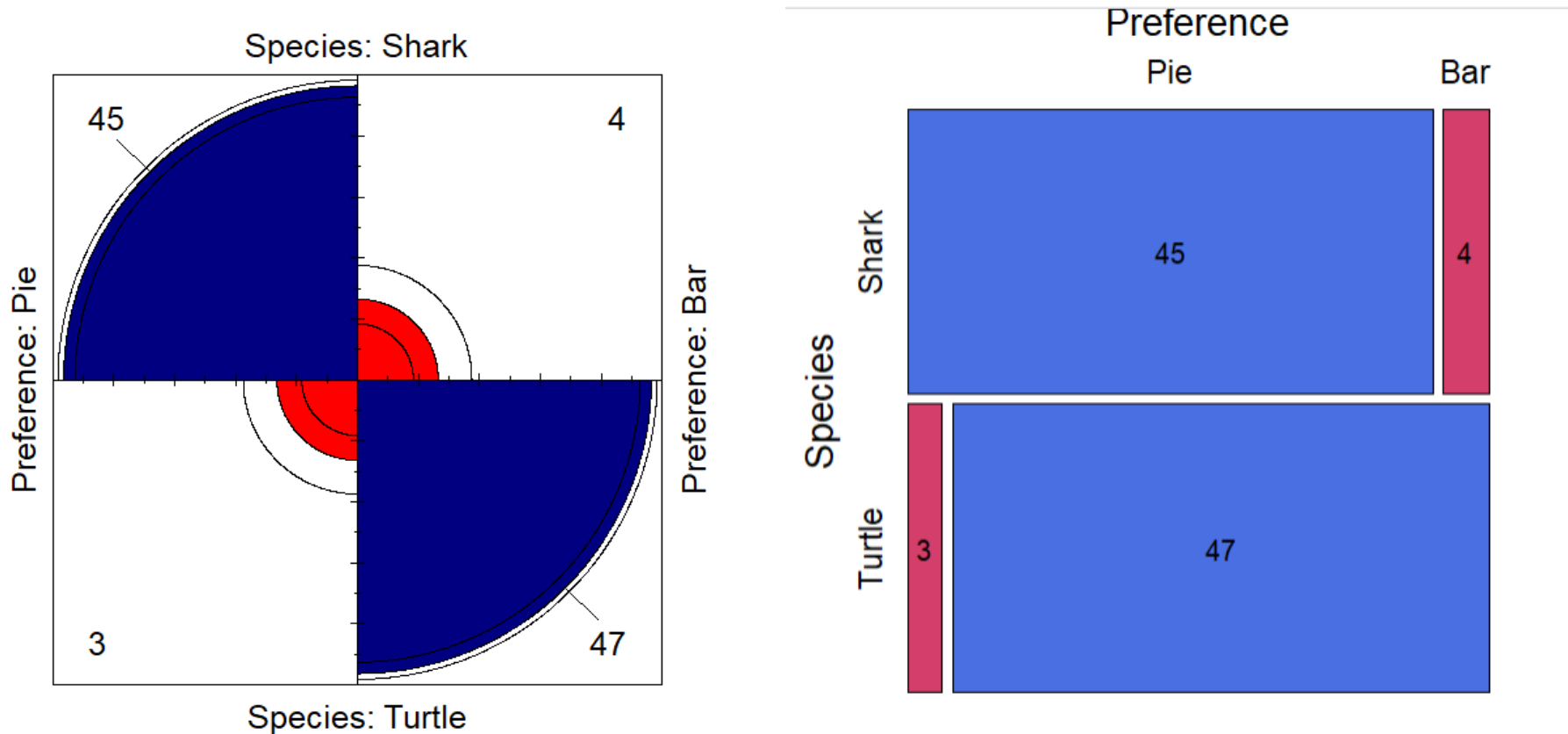
Windrose = bar chart + polar coords



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 2026 *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

Expanding scope: Antigua experiment

A new, more comprehensive experiment was just conducted in Antigua

Species



shark



turtle



stingray

Stimuli



Conch pie



Granola bar



Shrimp star charts

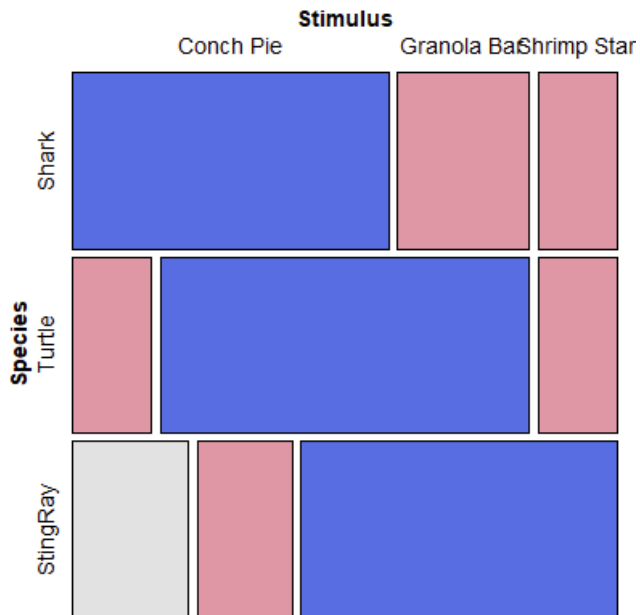
n = 100 trials for each species

Antigua experiment: Results

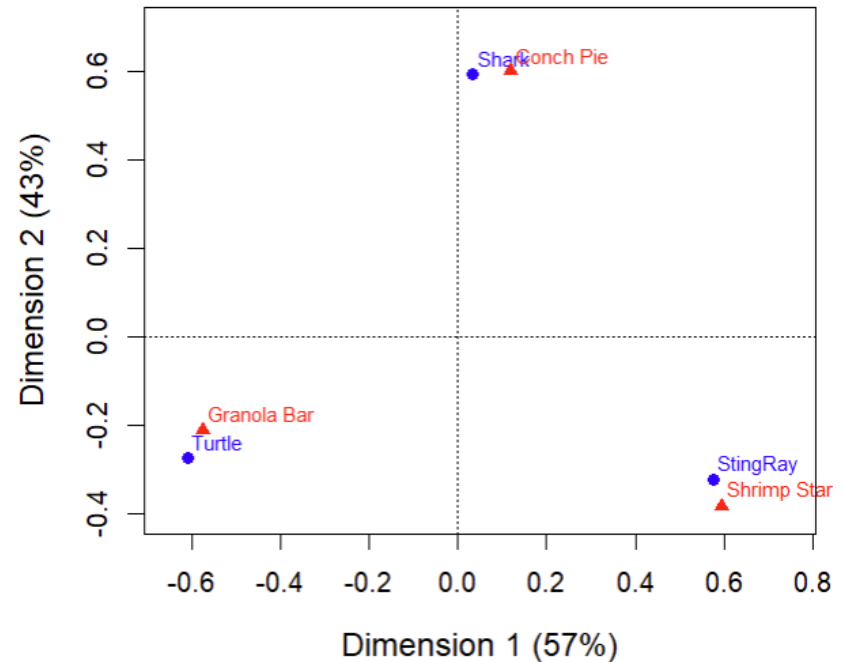
```
> addmargins(freq)
```

	Stimulus						
Species	Conch	Pie	Granola	Bar	Shrimp	Star	Sum
Shark		60		25		15	100
Turtle		15		70		15	100
StingRay		22		18		60	100
Sum		97		113		90	300

```
mosaic(freq)
```



```
ca(freq) |> plot()
```

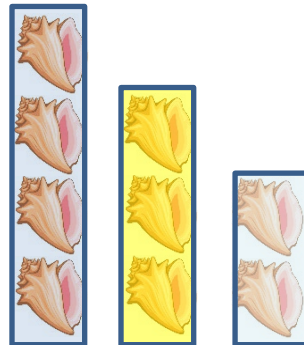


Further research

- 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

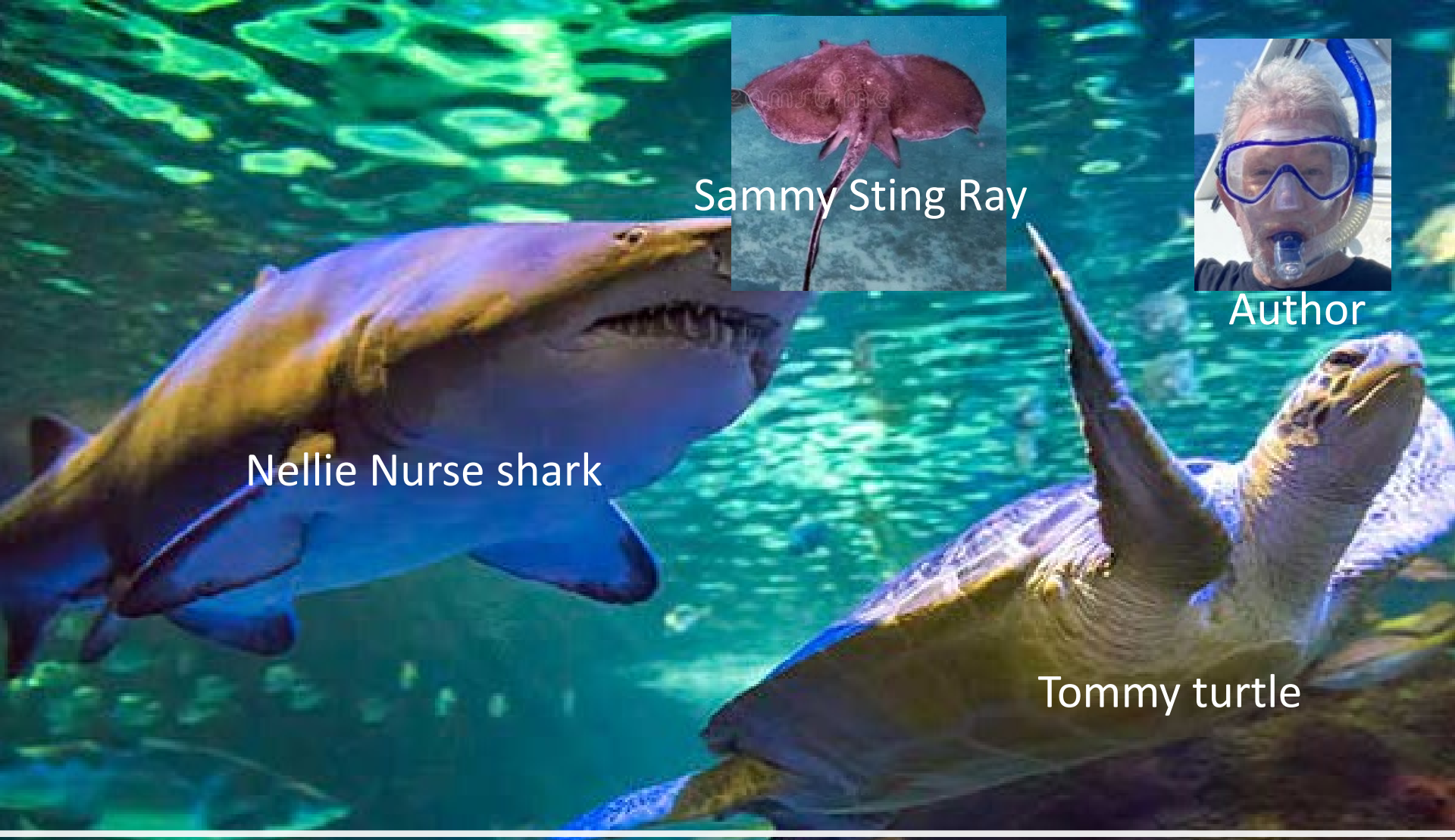
Extend this to other species

- 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





Sammy Sting Ray



Author

Nellie Nurse shark

Tommy turtle

Dramatis personae