Through the looking-glass: Visual sensitivity to chirality

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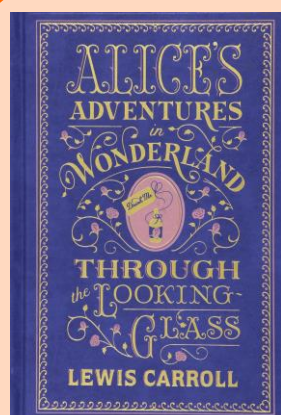LUX ET VERITAS

mit media lab

Question

If, like Alice, you fell into Wonderland – where everything is **mirror-reversed** – would you know?

Is vision sensitive to **chirality** in natural images?

a pattern is "chiral" if it cannot be superimposed on its mirror image

Try it!

Which one is flipped?

for each pair of images, which appears in its native orientation, and which is mirror-reversed?

answer key (from left): right, left, right

Stimuli

Experiment 1
"StreetStyle": 27k social media images
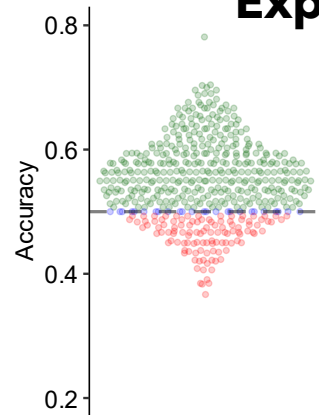
Experiment 2
faces, objects, natural scenes, artificial scenes
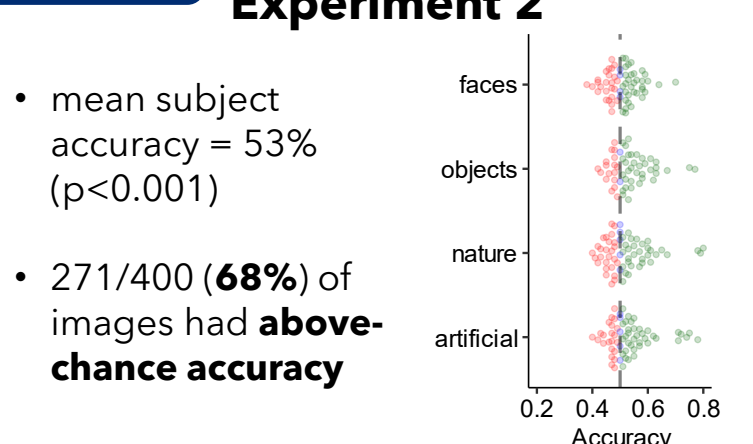
All images shown had **no text**

Results

Experiment 1

- mean subject accuracy = 55% ($p<0.001$)

- 364/500 (**73%**) of images had **above-chance accuracy**

Experiment 2

- mean subject accuracy = 53% ($p<0.001$)

- 271/400 (**68%**) of images had **above-chance accuracy**

But wait... does chirality *matter* in the mind?

Experiment 3

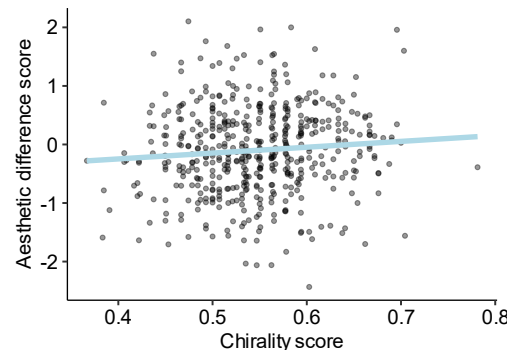### Chirality influences aesthetic experience

How beautiful are these images?

Half in **native** orientation, half **flipped** (E1 stimuli, random across subjects)

Aesthetic difference score = **native** – **flipped** rating

The more (detectably) chiral an image is, the better it looks in its **native** orientation! ($p=0.053$, $r=0.09$)

Experiment 4

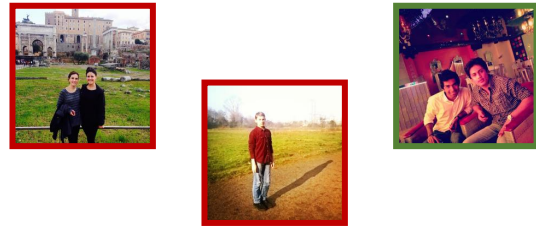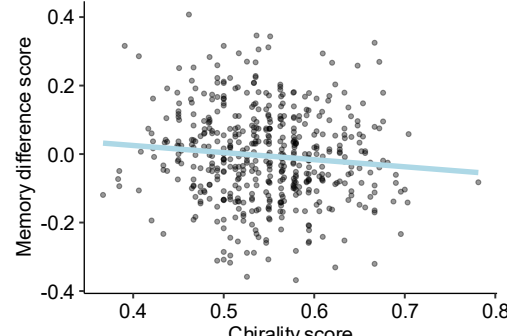### Chirality influences memorability

Have you seen this image before?

250 "old", 250 "new" half in **native** orientation, half **flipped** (E1 stimuli, random across subjects)

Memory difference score = % **native** – **flipped** correctly remembered

The more (detectably) chiral an image is, the easier it is to remember in its **flipped** orientation! ($p=0.023$, $r=-0.10$)

Conclusions

- The **visual system is sensitive to chirality** in a variety of natural images (experiments 1 and 2)
- Chiral images are **more pleasing in their native orientation** (experiment 3)
- Chiral images are **easier to remember in their flipped orientation** (experiment 4)

Want to learn more?
Try the experiments yourself and view additional information at:
https://perceptionresearch.org/chirality
Or email us at: tal.boger@yale.edu