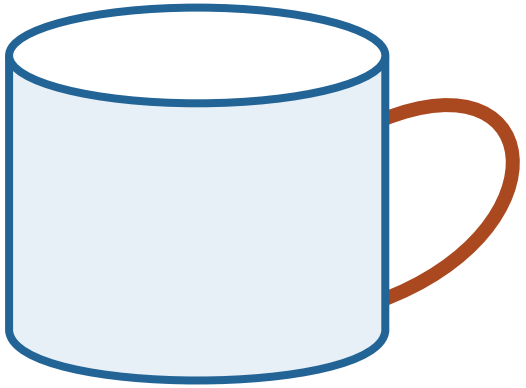
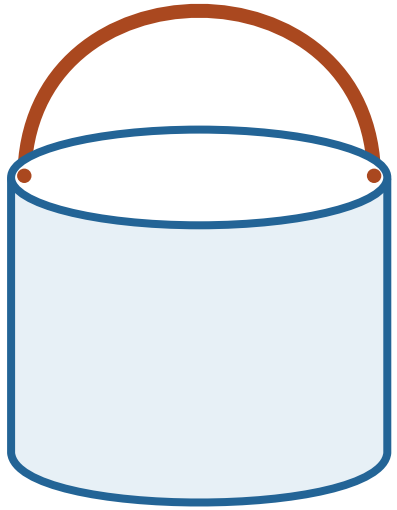
Same parts. Different object.



Cup

Handle on the side



Pail

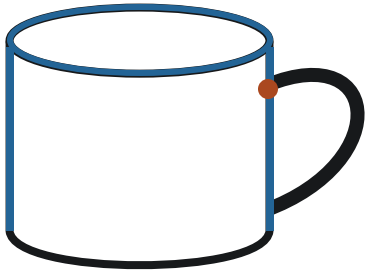
Handle on top

Component-Based Out-of-Distribution Detection

Cup and pail example adapted from Biederman (1987), Fig. 3.

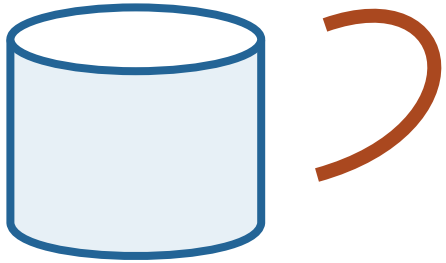
What the visual system recovers

Contour cues



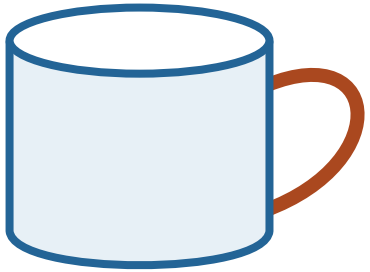
Curved rim and parallel sides

Simple volumes (geons)



Cylinder and curved handle

Parts and relations

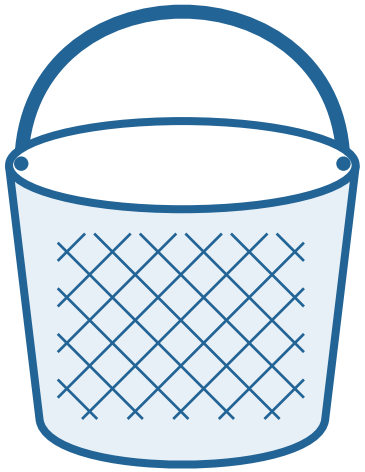


Handle attached to the side

A new view can still reveal the same parts and relations.

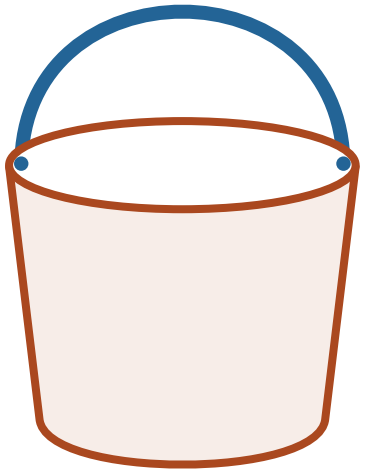
Two ways a familiar object can look wrong

Reference basket



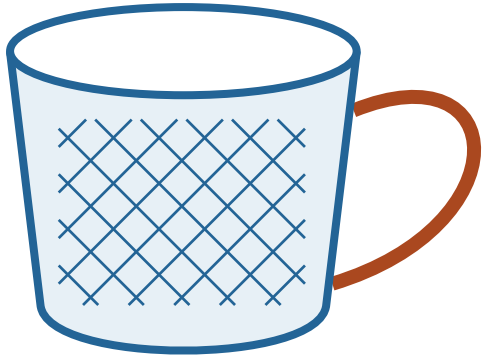
Woven body, handle above

Appearance shift



Smooth body

Composition shift



Woven body, handle on the side

CoOD checks appearance and arrangement

Component Shift Score (CSS)

Do the expected parts look right?



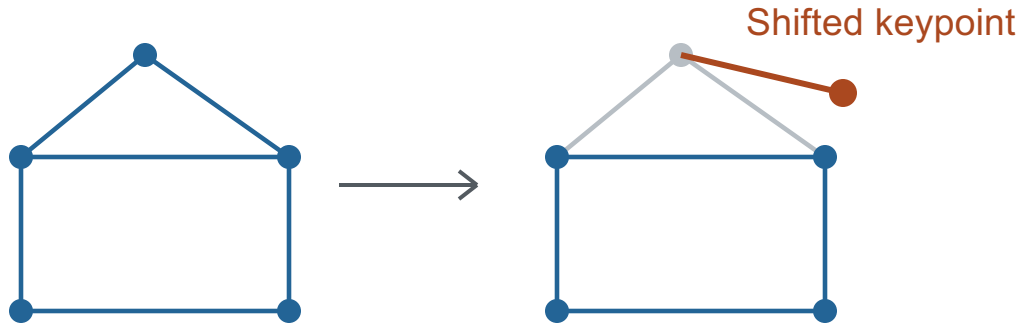
Head



Trunk

Compositional Consistency Score (CCS)

Do the parts line up with a known example?



ID reference

Aligned test

Post-hoc on a pretrained encoder

CoOD improves ImageNet OOD detection

ImageNet-1K · Frozen CLIP ViT-B/16

Method	AUROC ↑	FPR95 ↓
MCM	90.2%	37.6%
CSP*	95.7%	22.3%
CoOD	**96.2%**	**15.6%**

What if the handle moves?

Normal position



Handle on the side

Counterfactual



Handle across the top

Counterfactual



Handle inside the cup

The wing reveals the mismatch

Blue grosbeak

Global prediction: indigo bunting



Local patch responses

CoOD checks the expected parts



Head response



Weak wing response

CoOD decision: OOD

OOD evidence comes from parts and their arrangement.