

# How perceived causality influences perceived symmetry

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**Introduction**

Similar concavities  
Different causes

Examples where the process shaping the object is salient

'true' shape

shape scission → transformation

How does **causal interpretation of negative parts influence perceived symmetry?**

**Experiment 2**

**Interpretation changes perceptual organization**

Transformation: complete, bitten, smoothed

Bitten shape similarity compared to complete smoothed

rough, bitten, neither (smooth)

complete, bitten, smoothed

shape 1 to shape 11

perceived symmetry axis, shape area

super-imposed conditions

shape 2, shape 5, shape 6, shape 7, shape 10

**Task**

1. Rating

2. Dot placement

rough, bitten, neither (smooth)

**Experiment 3**

**Roughness does not determine 'bite' interpretation**

rough, bitten, neither (smooth)

complete, bitten, smoothed, partly rough, rough, 1,2 & 3, 1,3,4 & 5

complete, bitten, smoothed, partly rough, rough

**Experiment 1**

Subjects take 'bites' into account!

'true' axes, shape skeletons (grassfire), fit to shape contour (non-linear PCA), fit to responses (non-linear PCA)

Shape A, Ellipse, Butterfly, Kidney, Banana, Apple, Bitten ellipse, Heart, Rectangle, shape 10

**Conclusion**

- Subjects spontaneously compensate for 'bites' in symmetric & familiar shapes
- For asymmetric & unfamiliar shapes subjects are uncertain about response
- Reported symmetry axis changes with causal interpretation of concavity
- Generative models of shape play an important role in perceptual organization and shape perception

**intrinsic properties**  
stable, intrinsic attributes of objects: e.g. material

**extrinsic properties**  
variable, incidental attributes of scene or viewing circumstances: e.g. processes/forces

'true' shape, shape scission, transformation