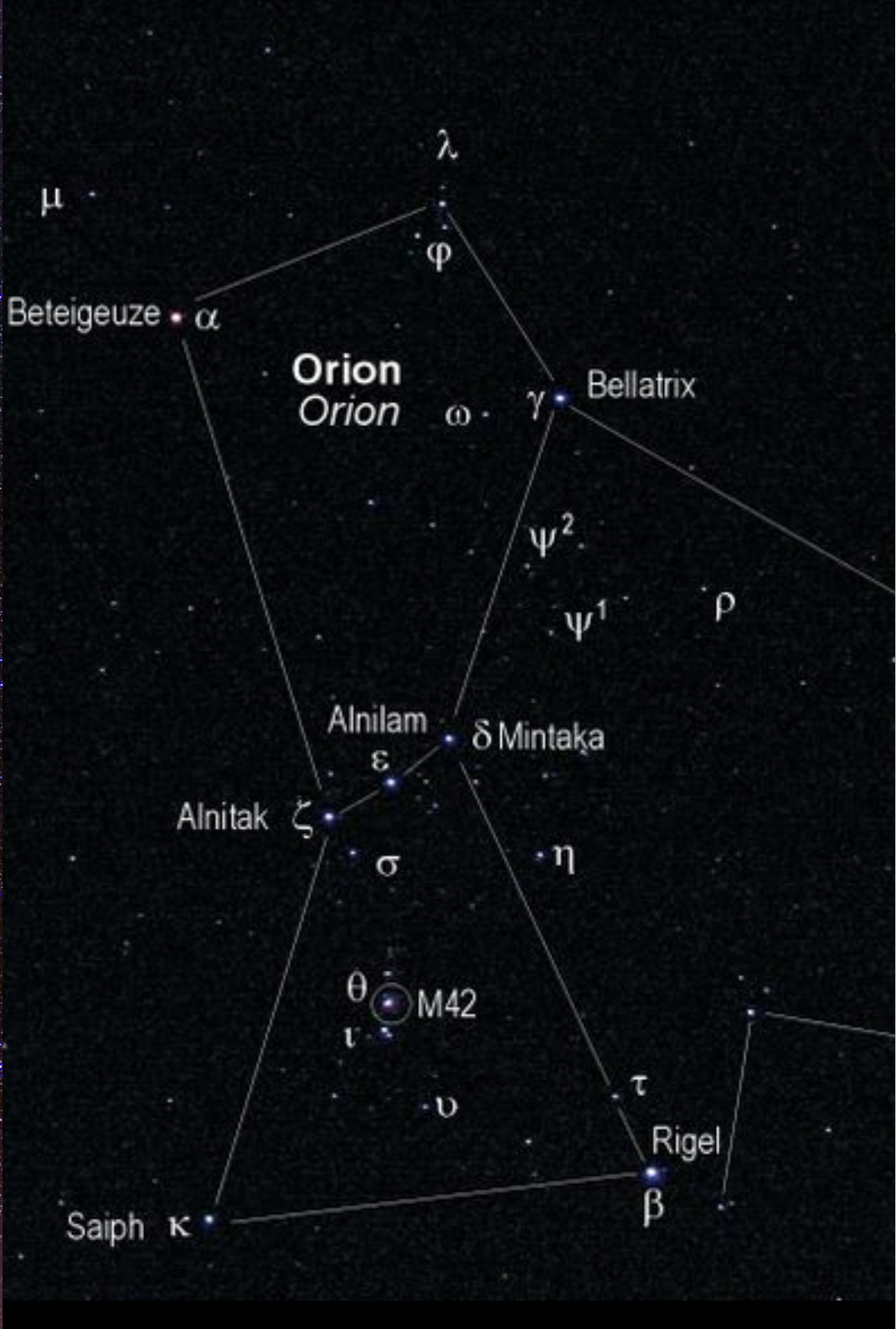


Patterns in Nature 9

Perception

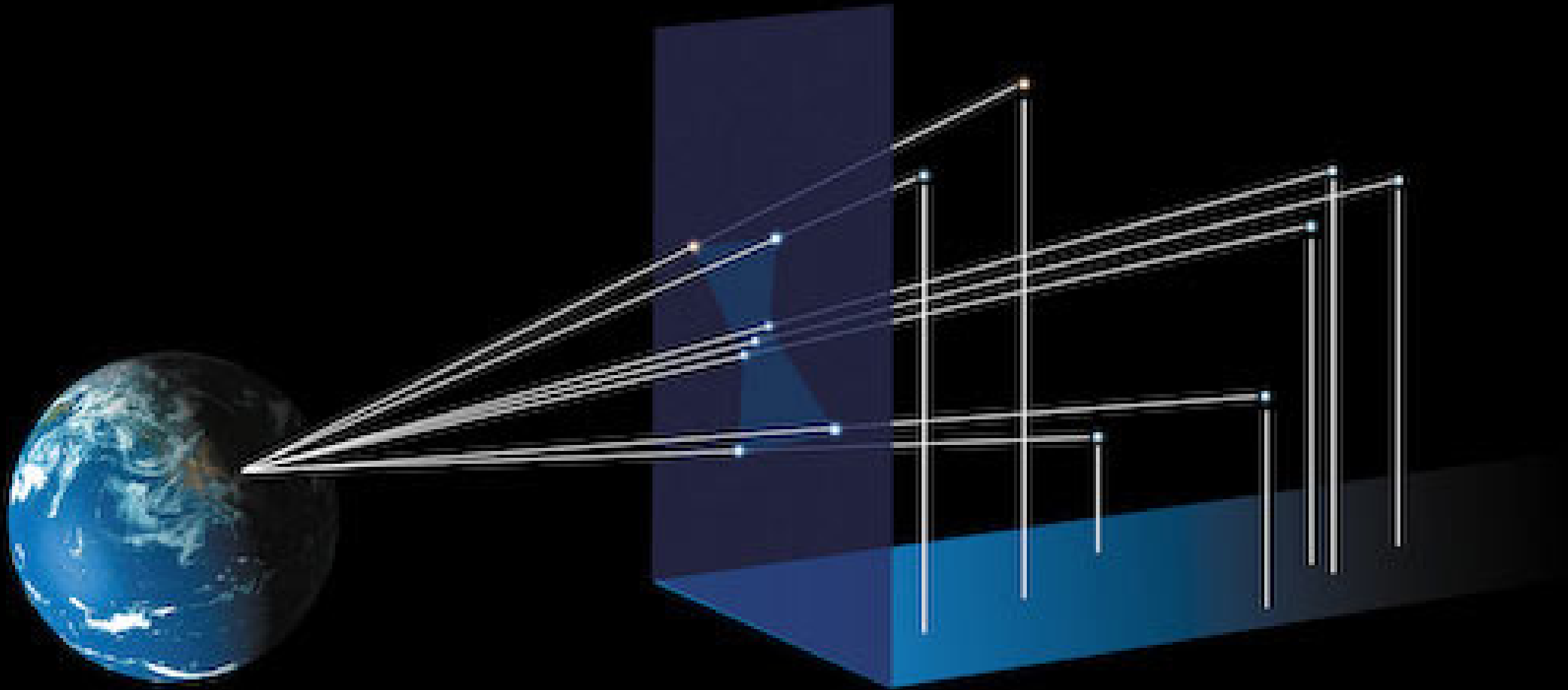
Stephan Matthiesen







Orion in 3 dimensions





Worm constellations („convermations“)?





Which sequence is more likely?

You toss a coin 20 times and get the sequence:

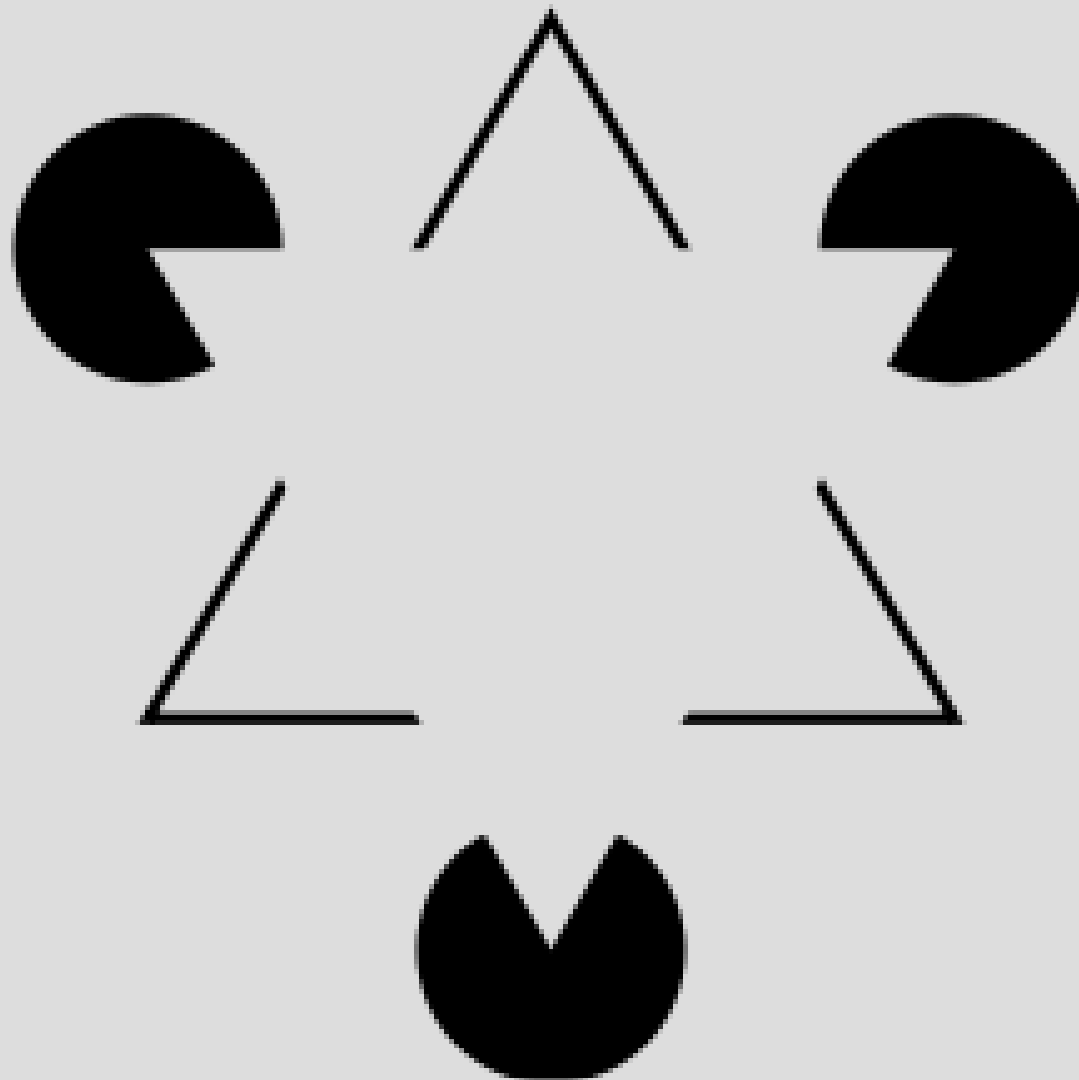
HHHHHHHHHHHHHHHHHHHHHH

You do it again and get:

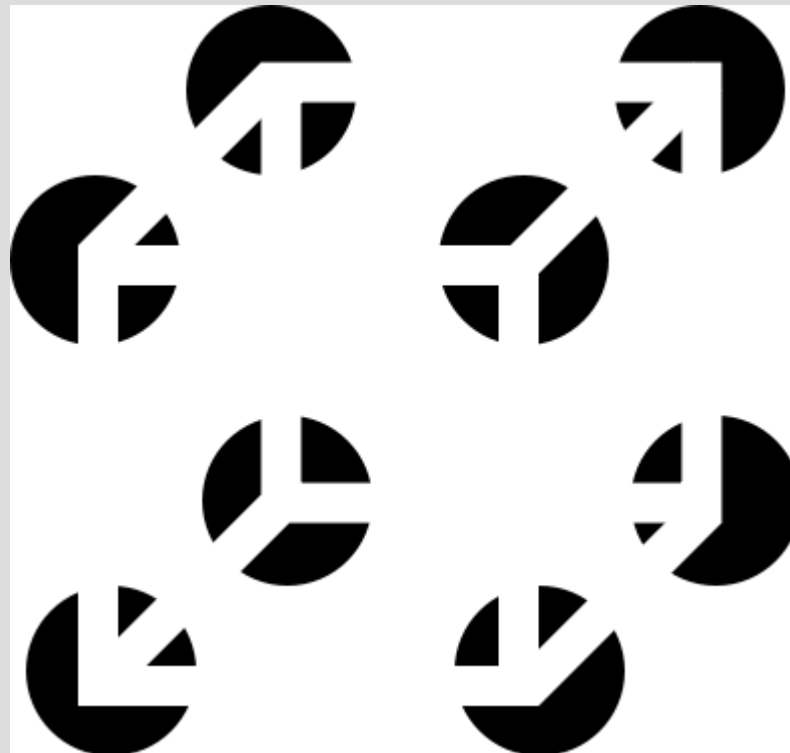
HTHHTTTHHHTTTTHTHTTTHT

Which sequence is more likely?

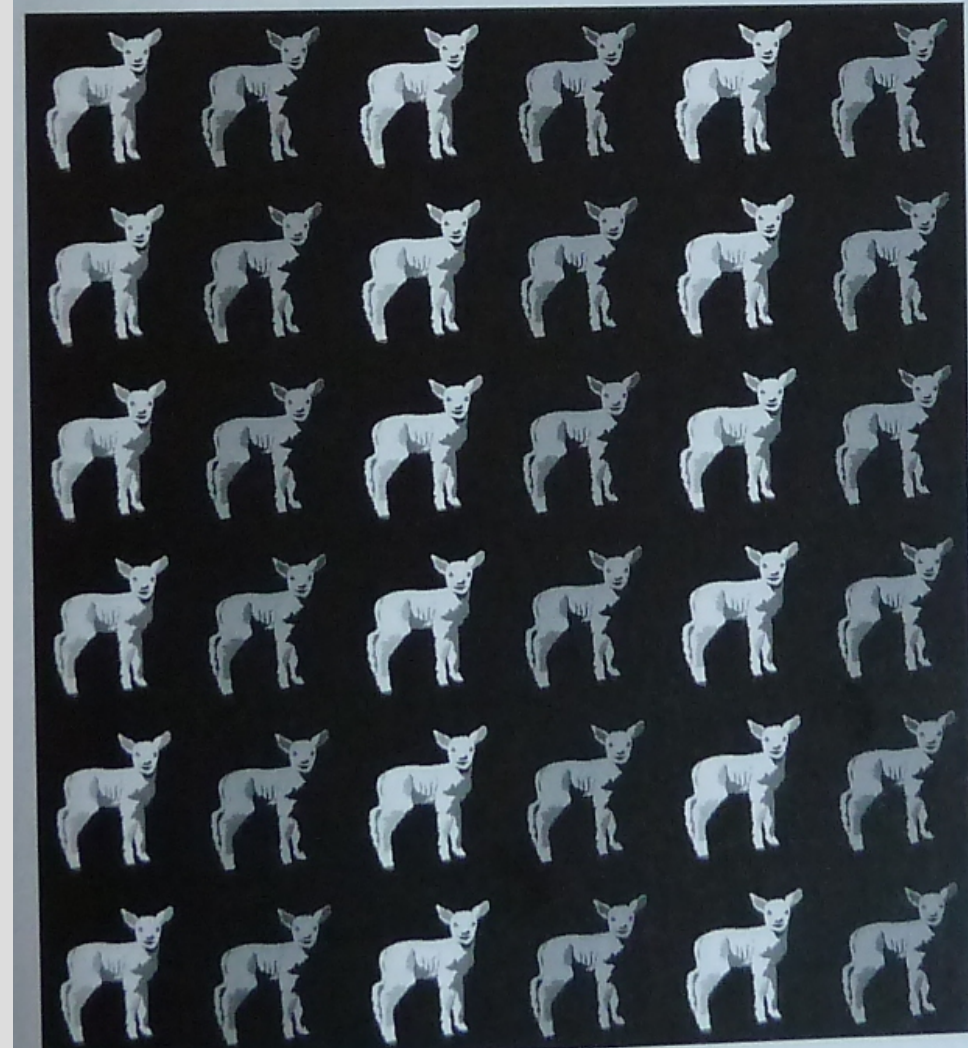
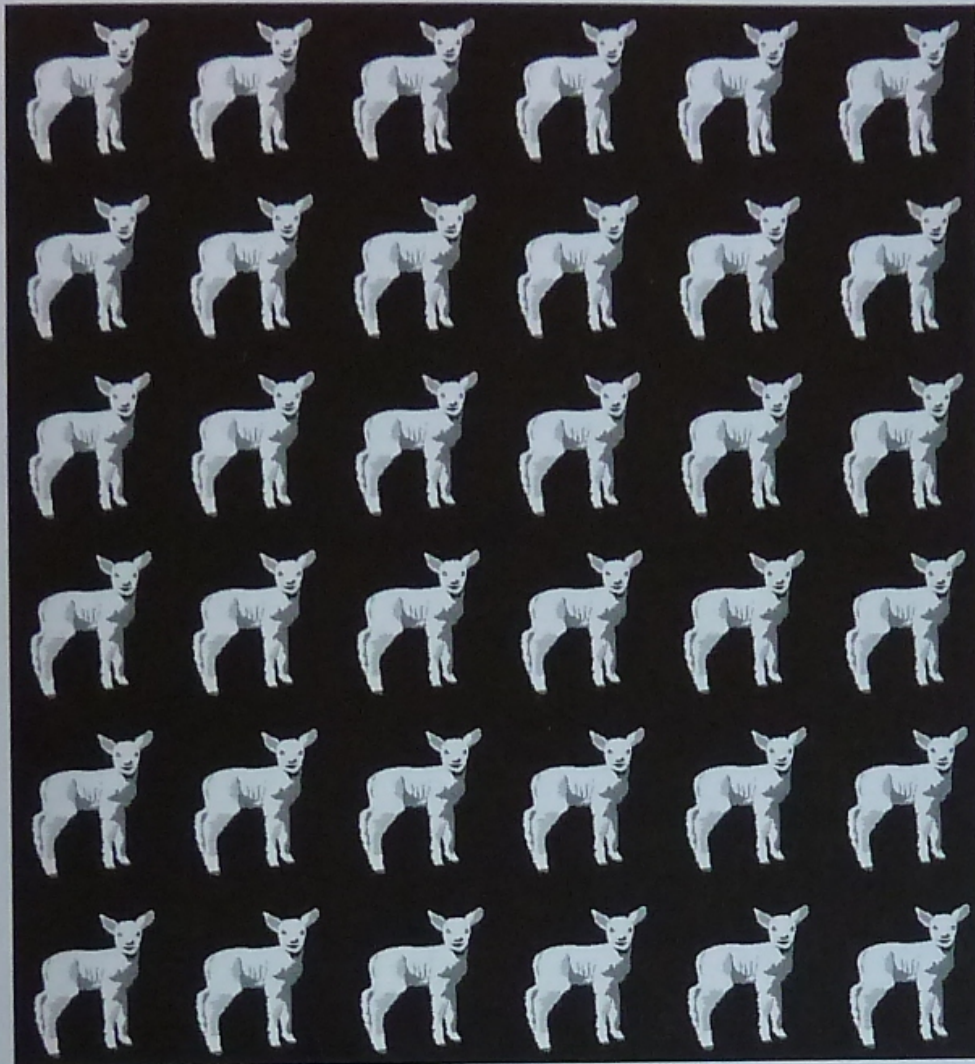
Kanizsa figures



Imaginary figures



Principle of similarity



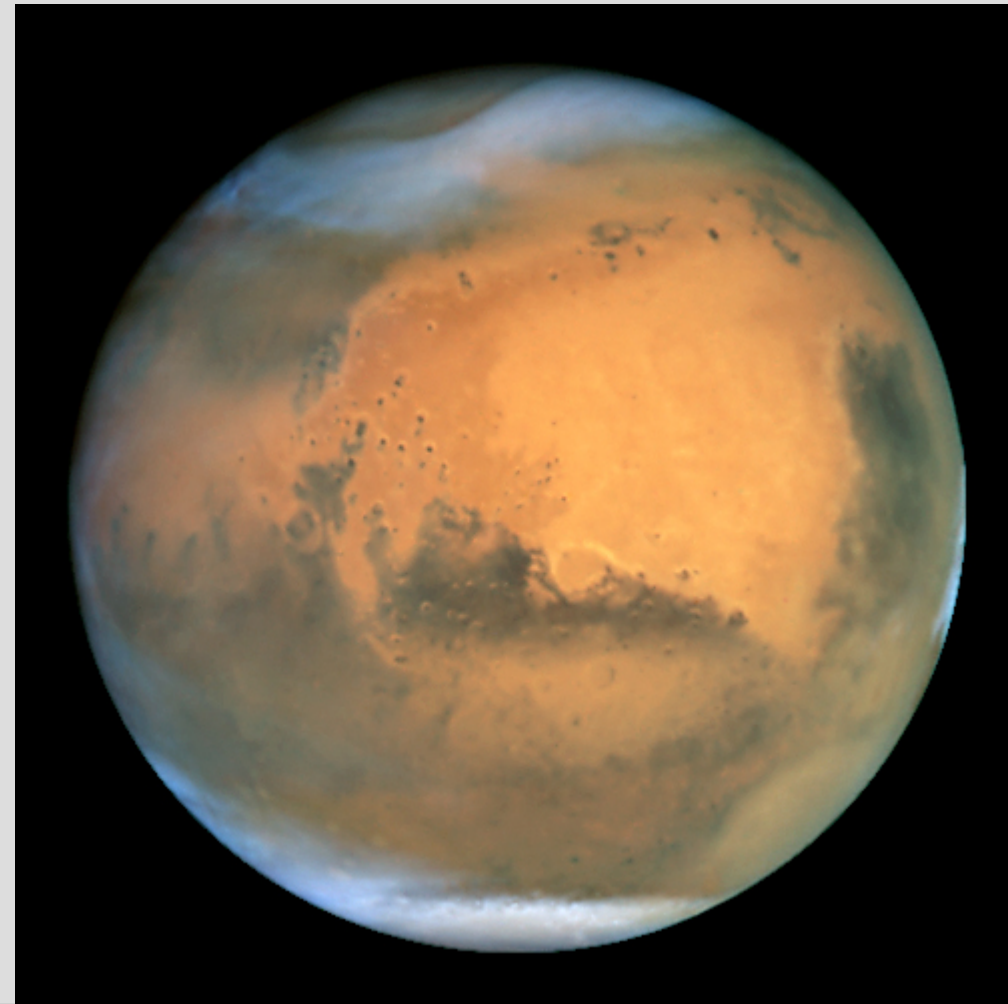
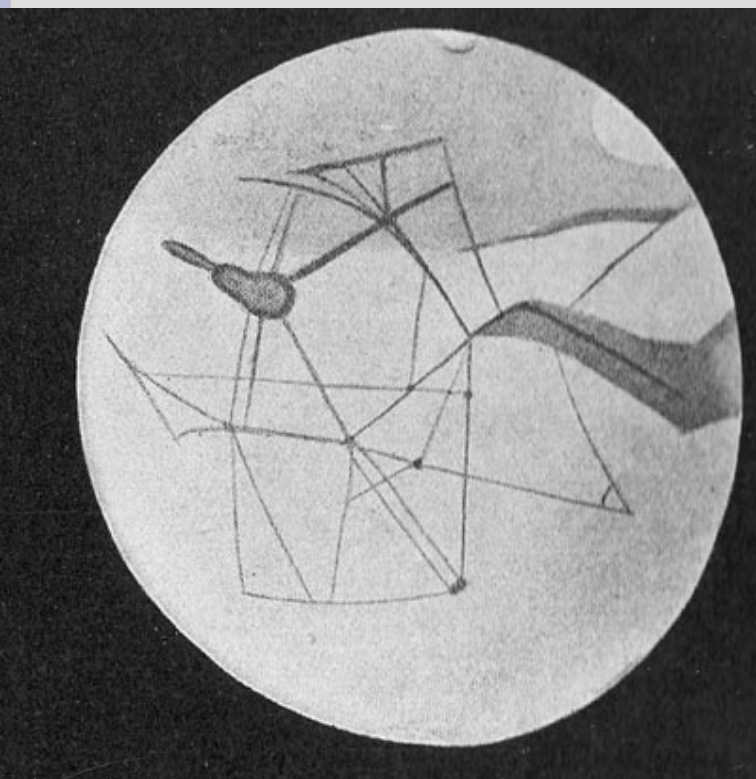
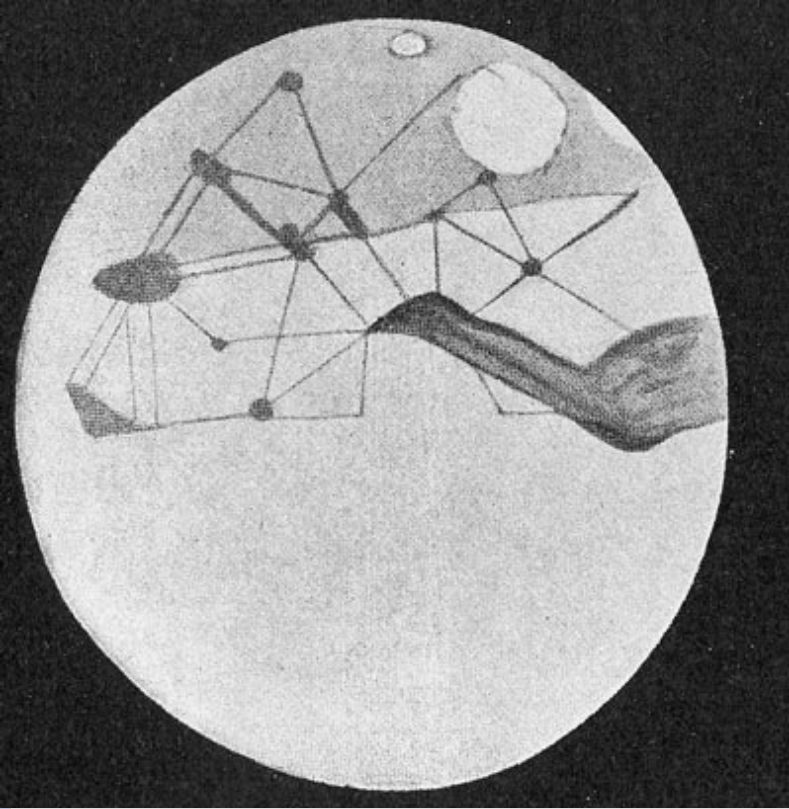
Gestalt perception (gestalt = the whole)

- **Proximity:**
group items close together
- **Similarity:**
group items of the same kind
- **Closure:**
tendency to complete patterns
- **Continuation:**
tendency to see shapes that continue smoothly

Martian canals

Percival Lowell (1855-1916)

Hubble Space Telescope



What is this?

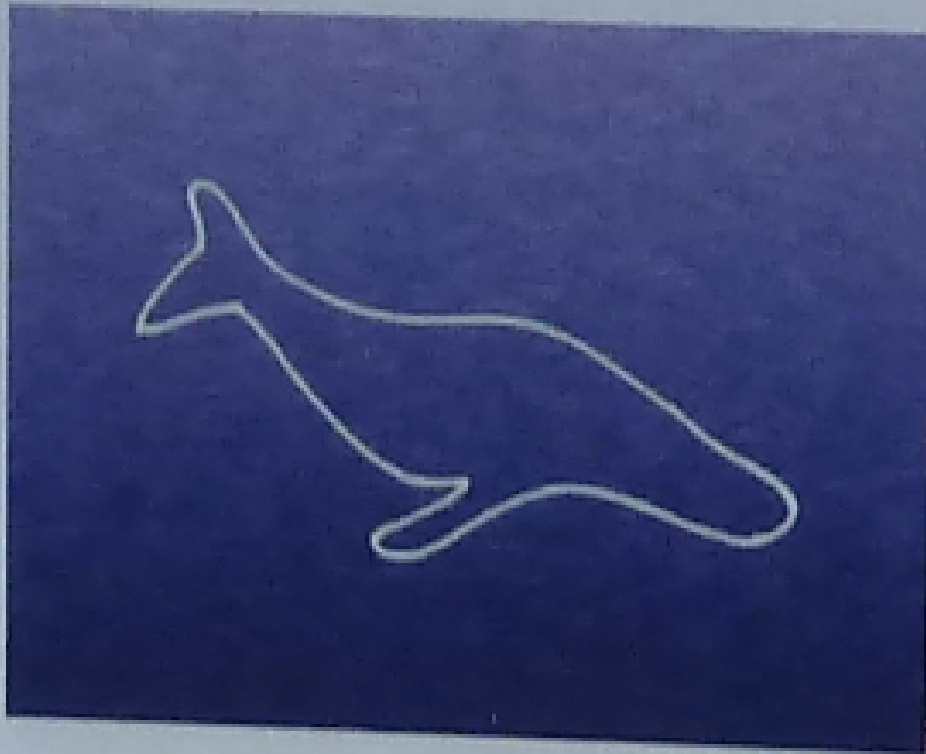
B

Perception is influenced by context

B

12
A B C
14

Which animal is this?



Top-down and bottom-up perception

Bottom-up: relatively „raw“ sensory input from primary sense organs flows to „higher level“ processing areas

Top-down: information from memory or expectation influences the interpretation of sensory input

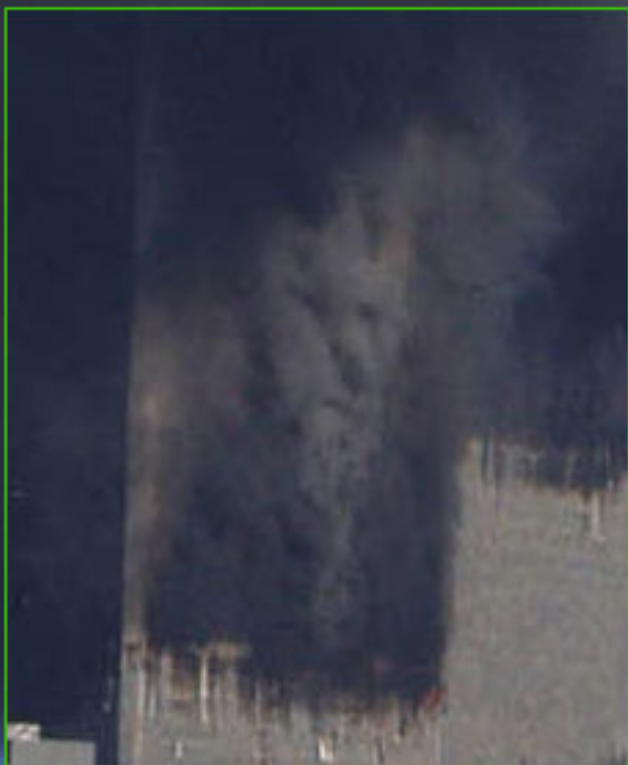
Seeing is believing ... and believing is seeing

Inanimate, animate things and things with mind

- It seems our perceptual system uses a fundamental categorization of all objects:
 - Inanimate things (don't move on their own)
 - Animate things (move on their own)
 - Things with a mind (complex intentions)
- Faces are also special
 - Prosopagnosia (Face blindness)
- There is (possible) a bias towards seeing living things and faces in ambiguous stimuli









Cafe
OPEN
←

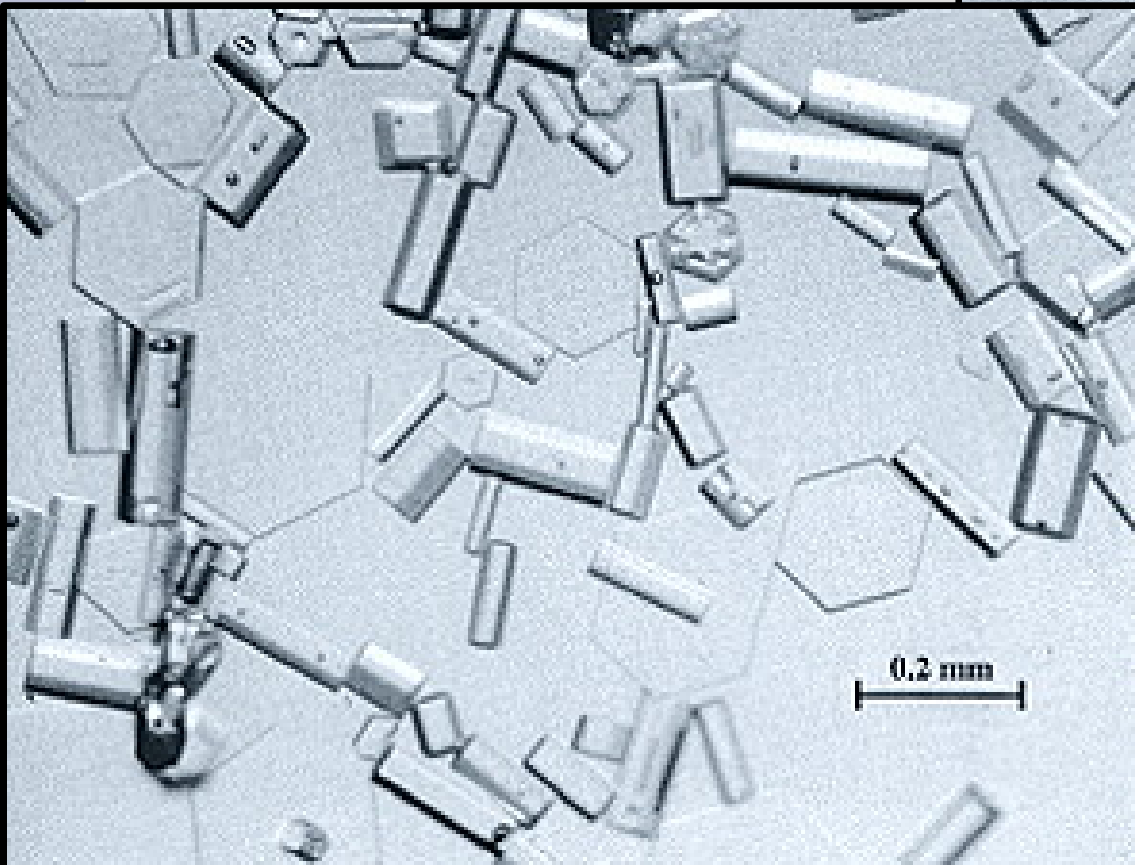
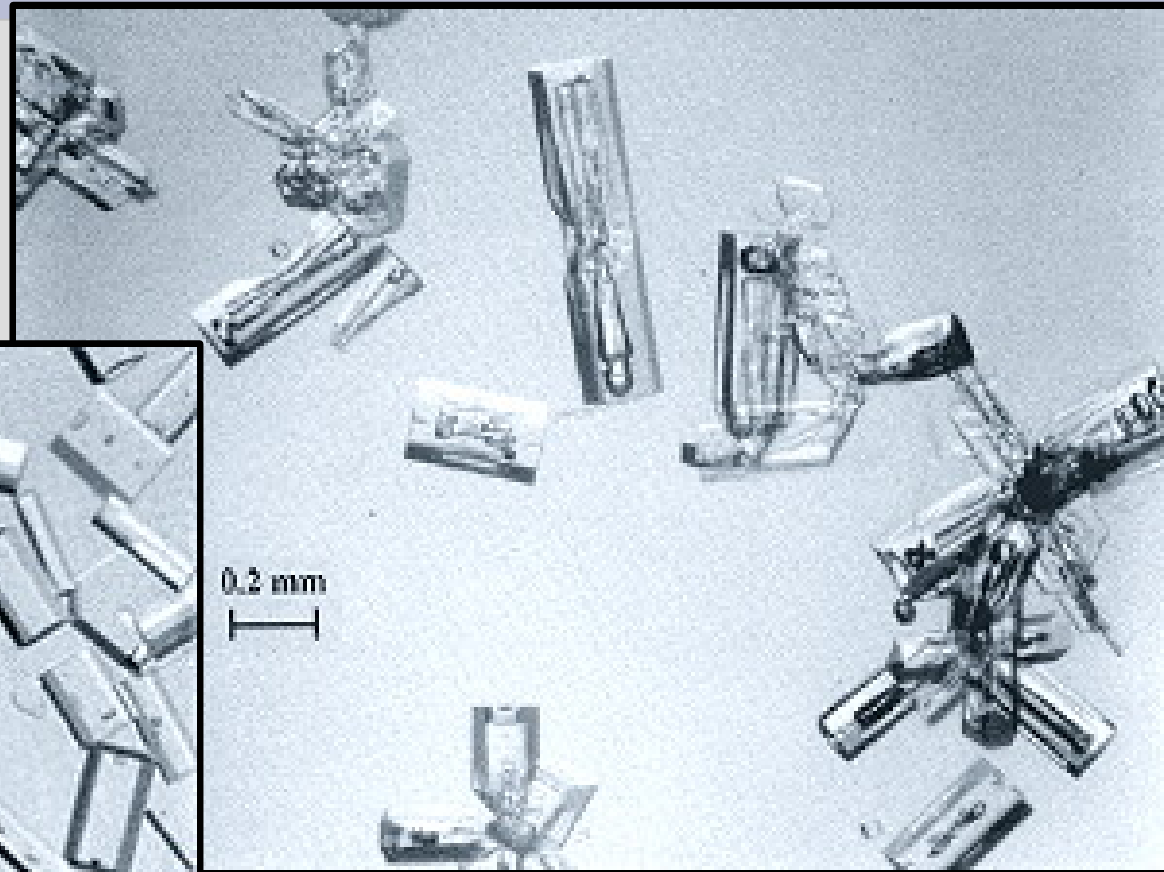


Halos



Real Ice Crystals

Crystals collected during a superb South Pole display on 17th January 1986.



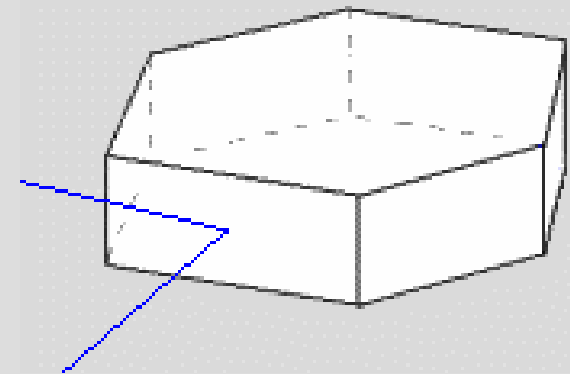
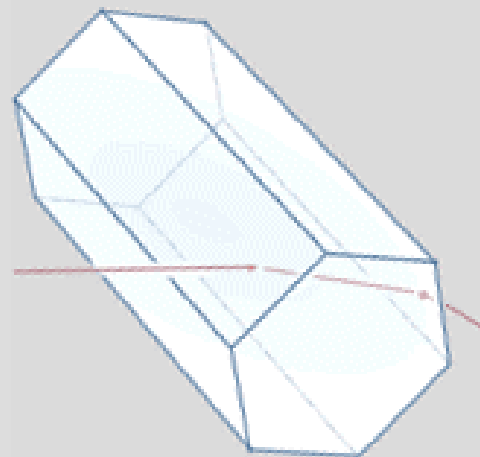
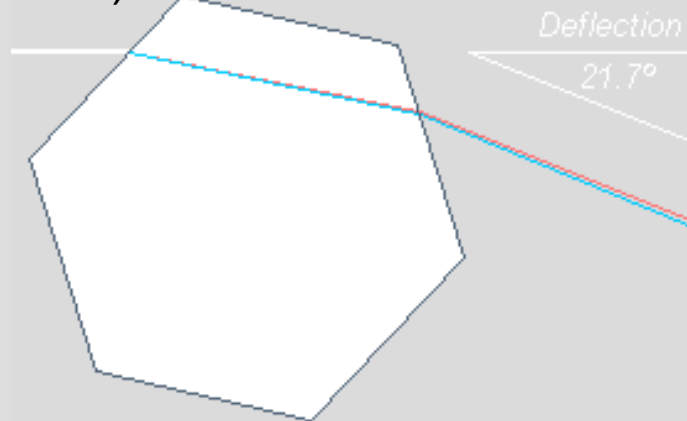
Crystals from a mediocre halo display 16 days earlier. They have large inclusions and their faces are imperfect

Refraction and reflection in ice crystals

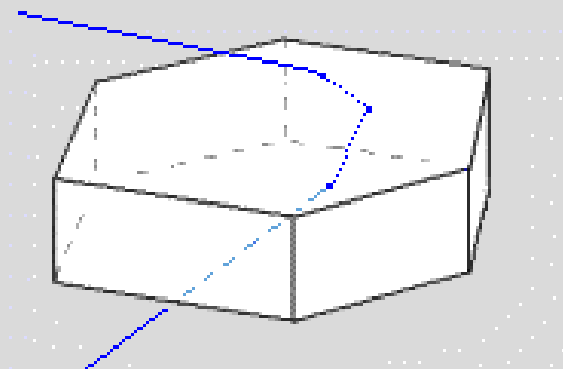
Refraction:

Minimum deflection: 21.6°

Also larger angles when crystal is rotated
(less intense)



(External) Reflection:
Any angle; strongest when
rays graze the surface



Internal
reflection
(multiple)









Patterns in Nature Outline

1. Introduction
2. Waves and oscillations
3. Regularity and chaos
4. Animal cooperation
5. Spatial patterns
6. Aggregation and growth processes
7. Cellular automata
8. Fractals
9. Miscellaneous topics
10. Concluding session

