Seen the Light?
The Nature, Structure, and Perception of Illumination

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@ University of Toronto | Logic and Philosophy of Science Group | 27.03.2025

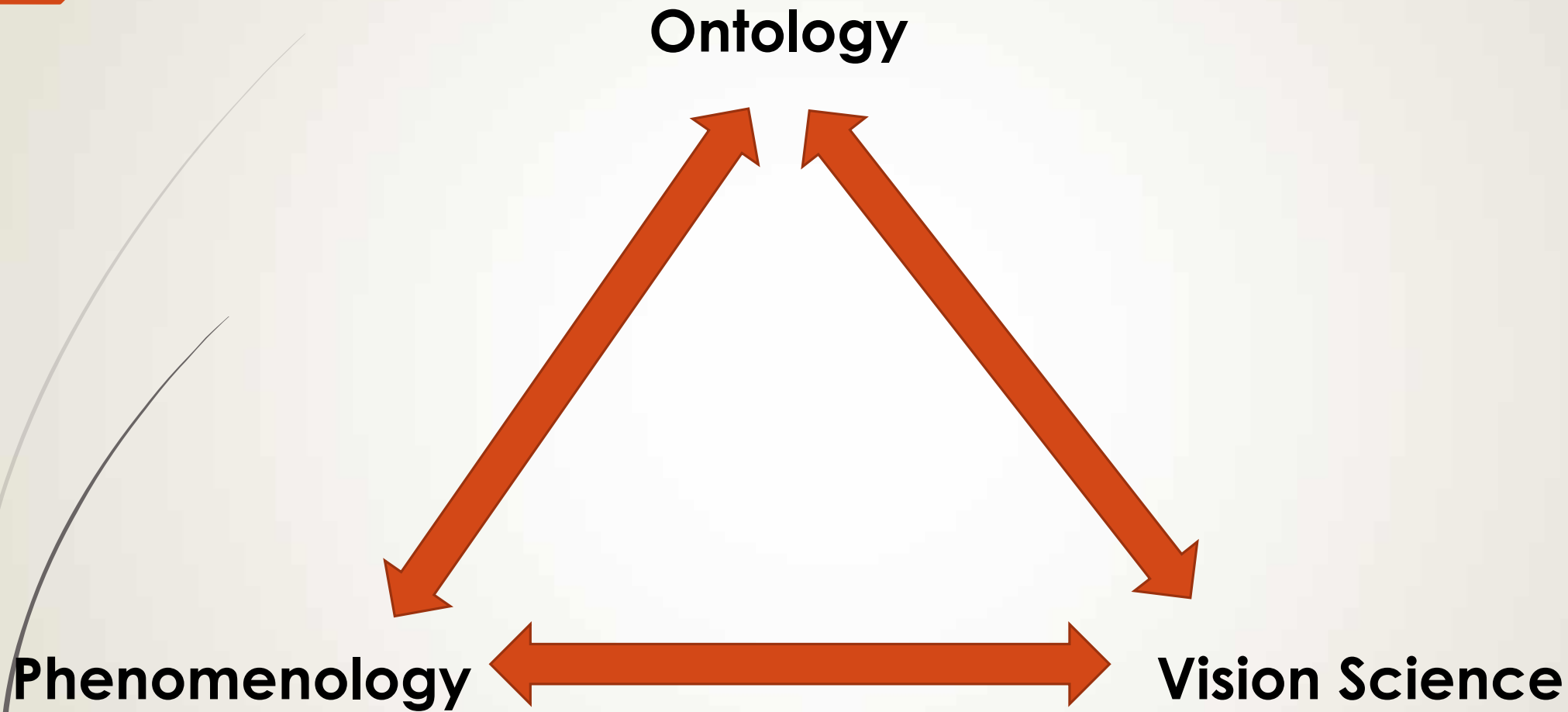
Scepticism about illumination perception

- **David Hilbert (2005: 151)**
- "What we see as changing with the illumination is an aspect of the object itself, not the light source or the space surrounding the object."

- **David Chalmers (2006: 87)**
- "It is best to talk of shadow properties instantiated at locations on objects, rather than talking of shadows: while we sometimes have the phenomenology of seeing shadows as objects, it is arguable that more often we do not."

Gibson (1986): Ecological Optics

Gershun (1939): Illumination Field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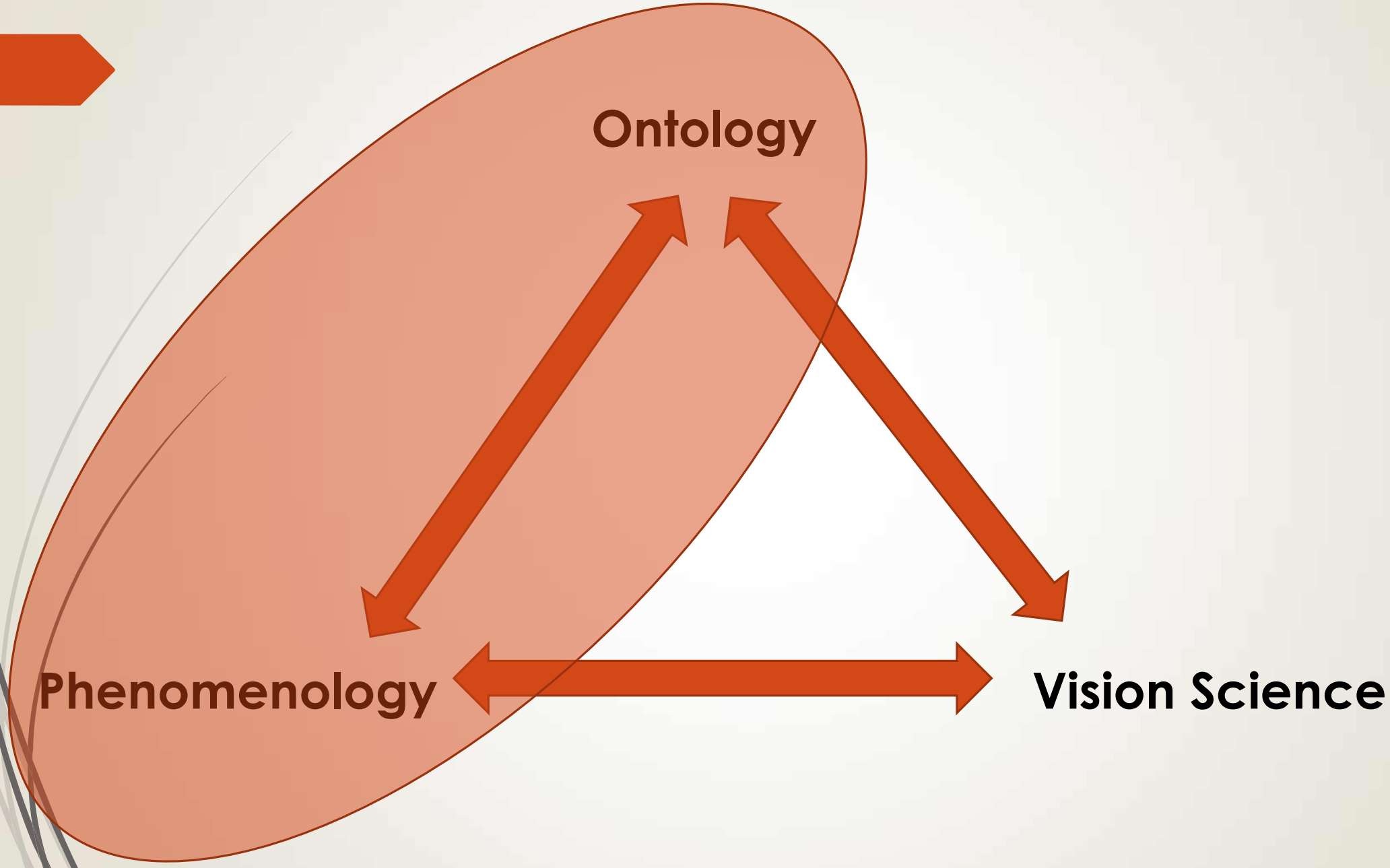
Vision Science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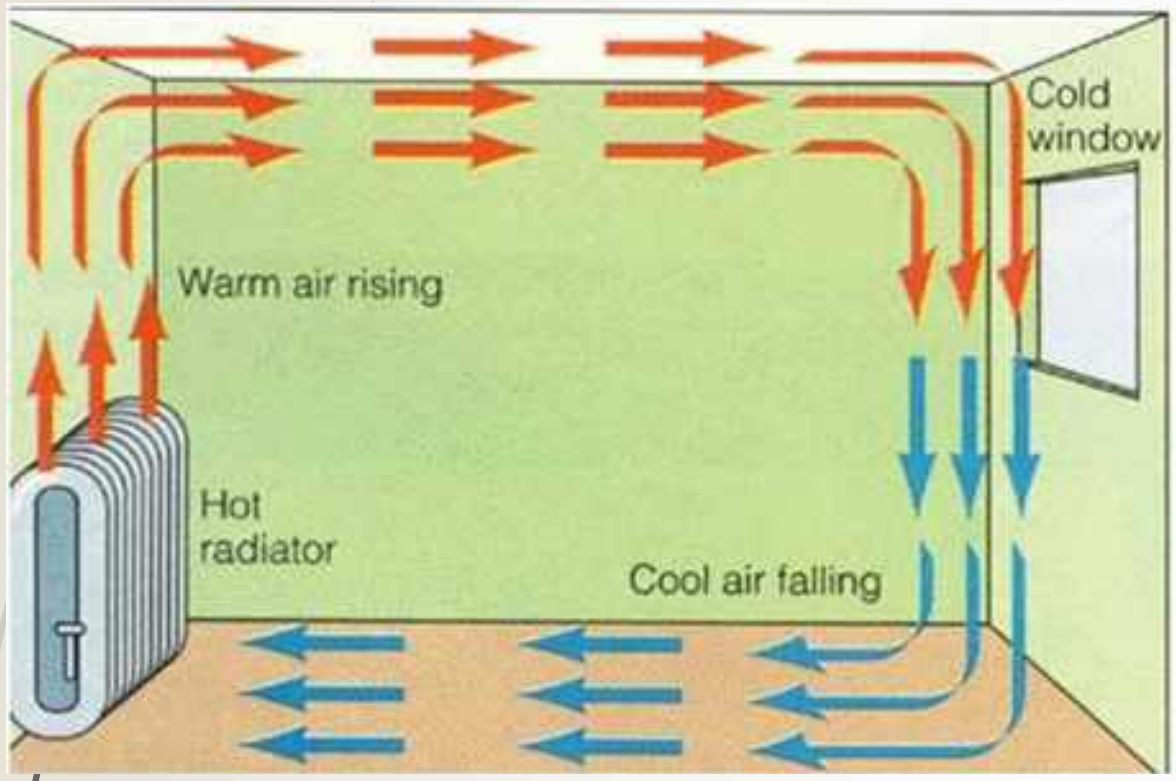
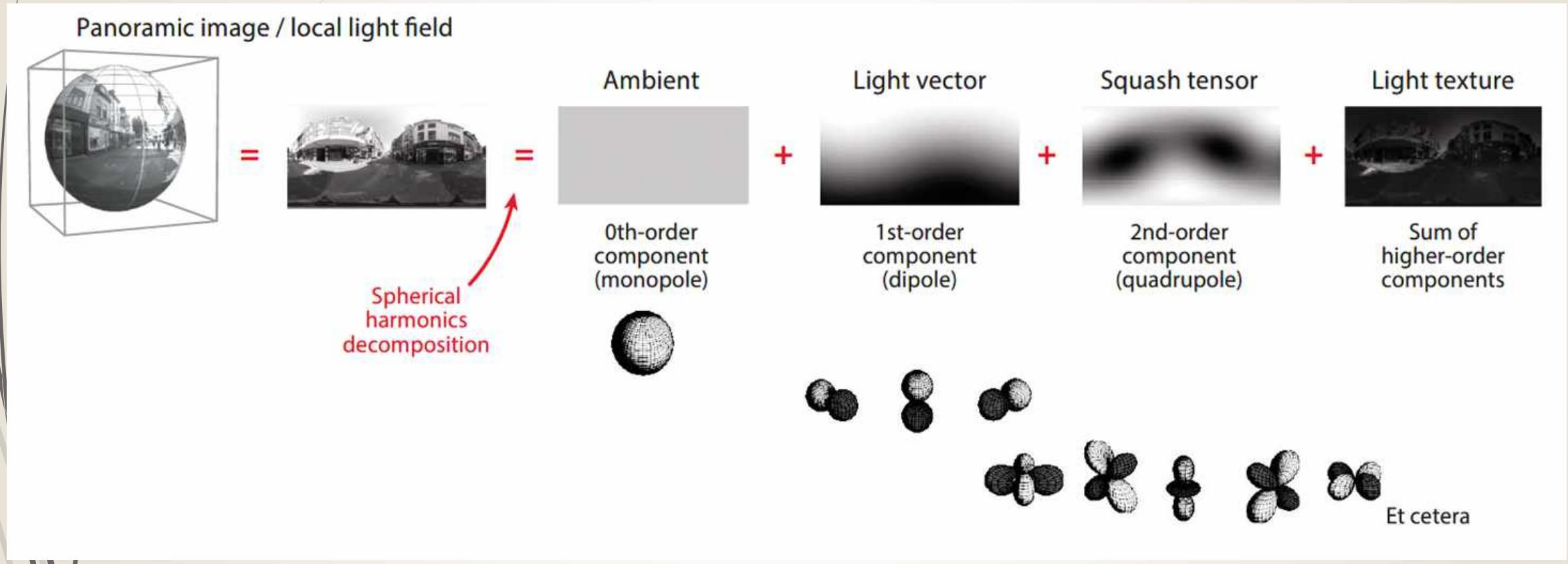
The Ontology of Illumination

The ecological optics of illumination

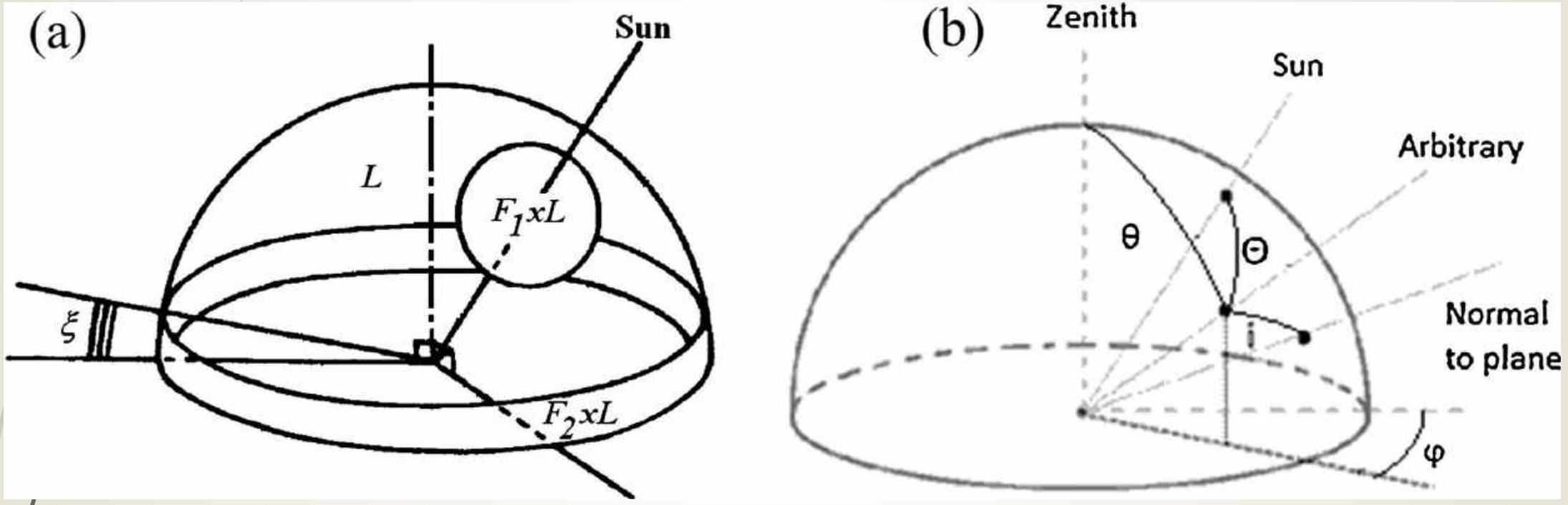
- **J. J. Gibson (1986: 50)**
- "Radiation becomes illumination by *reverberating* between the earth and the sky and between surfaces that face one another."

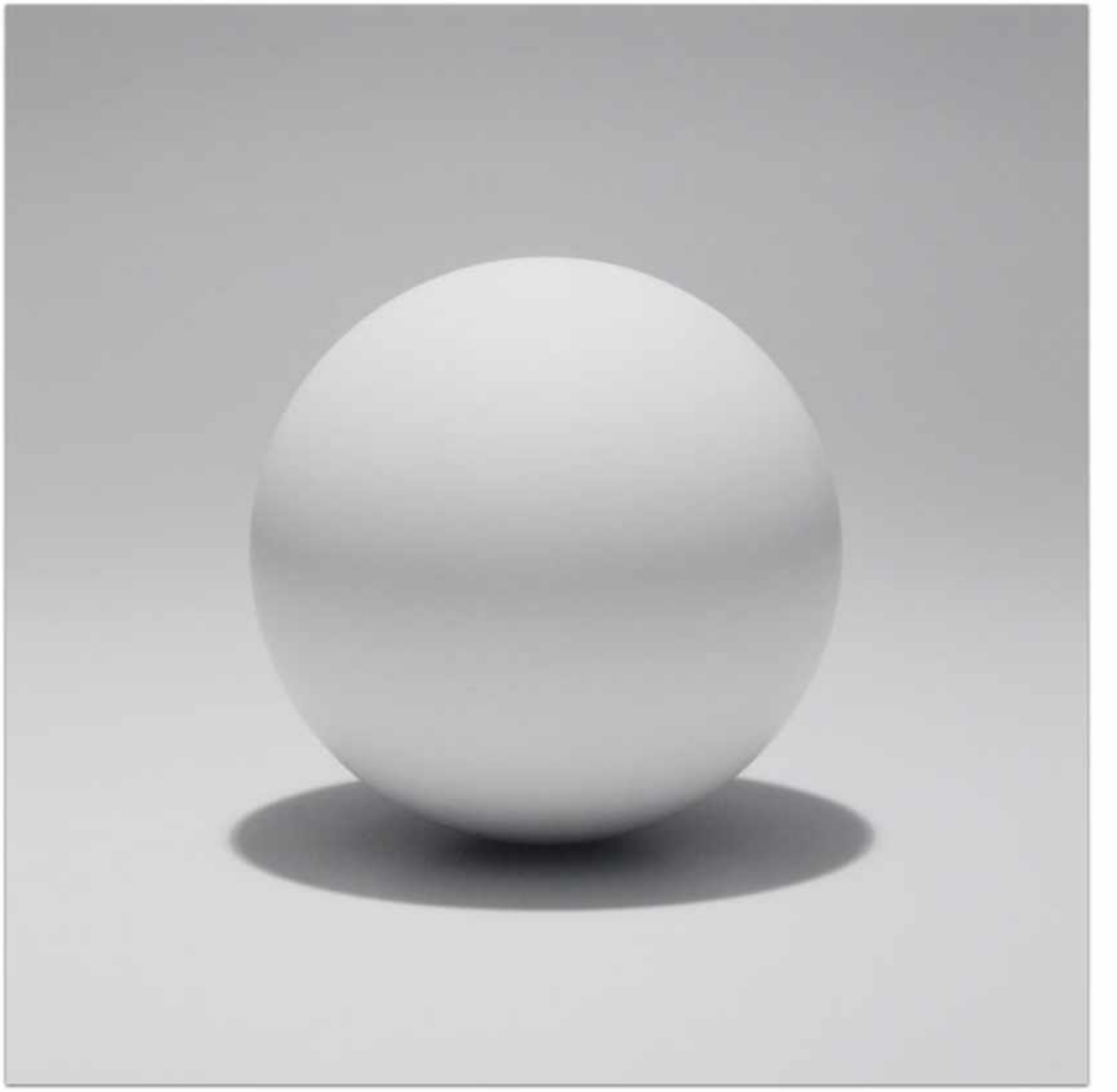

Cold
window
Warm air rising
Hot
radiator
Cool air falling

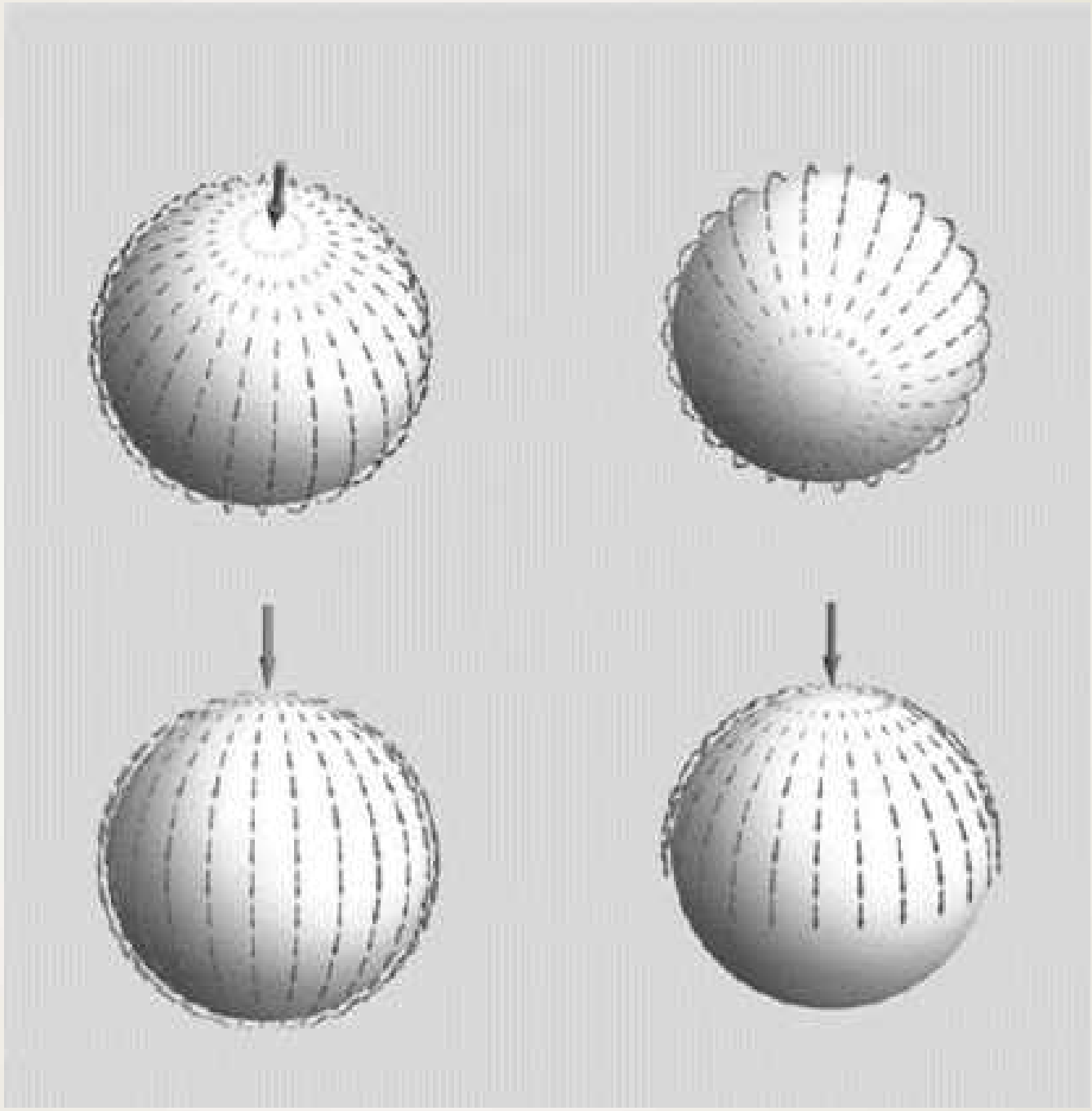


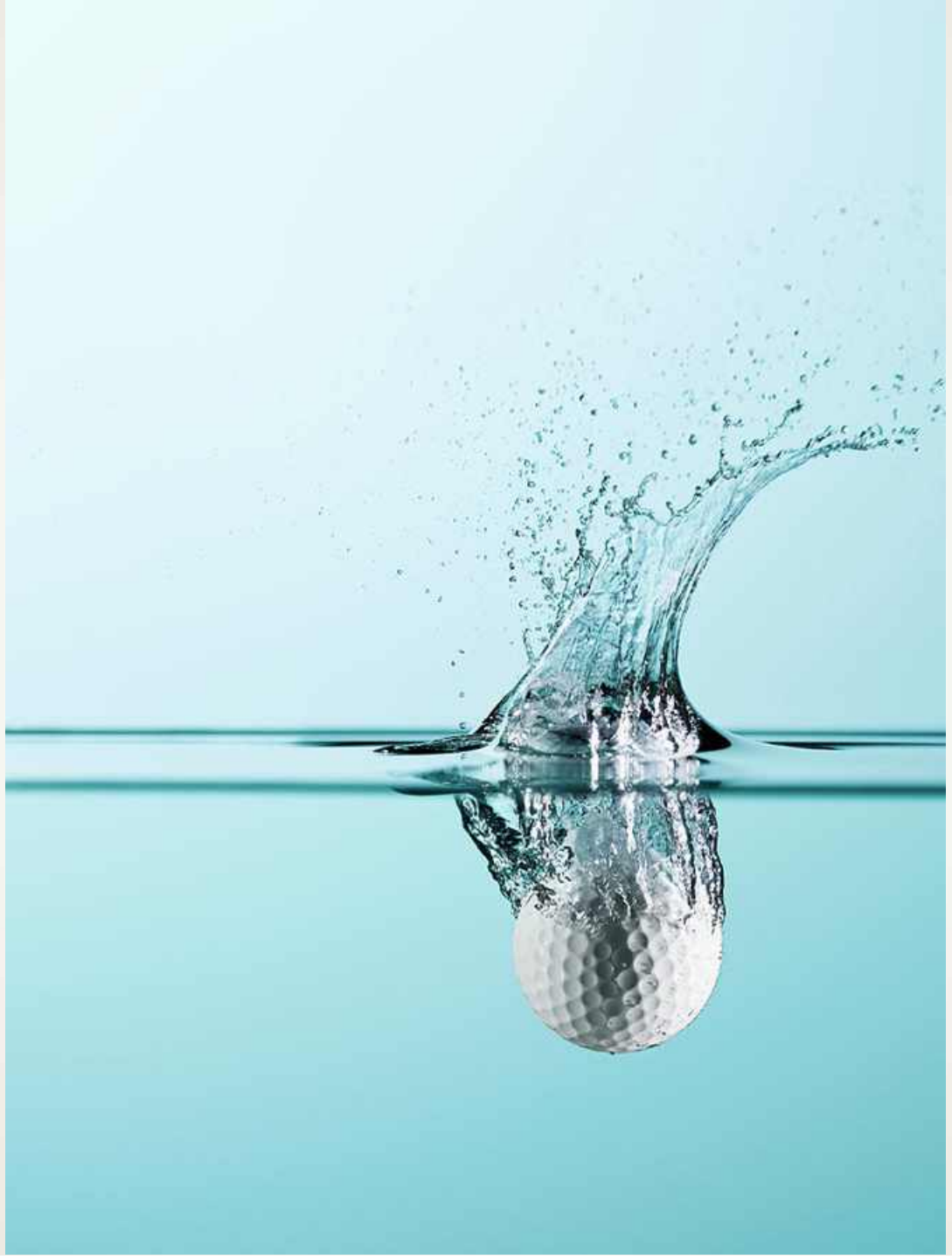
Pont, SC. (2019). Light: Toward a Transdisciplinary Science of Appearance and Atmosphere. *Annual Review of Vision Science*, 5, 503-527.

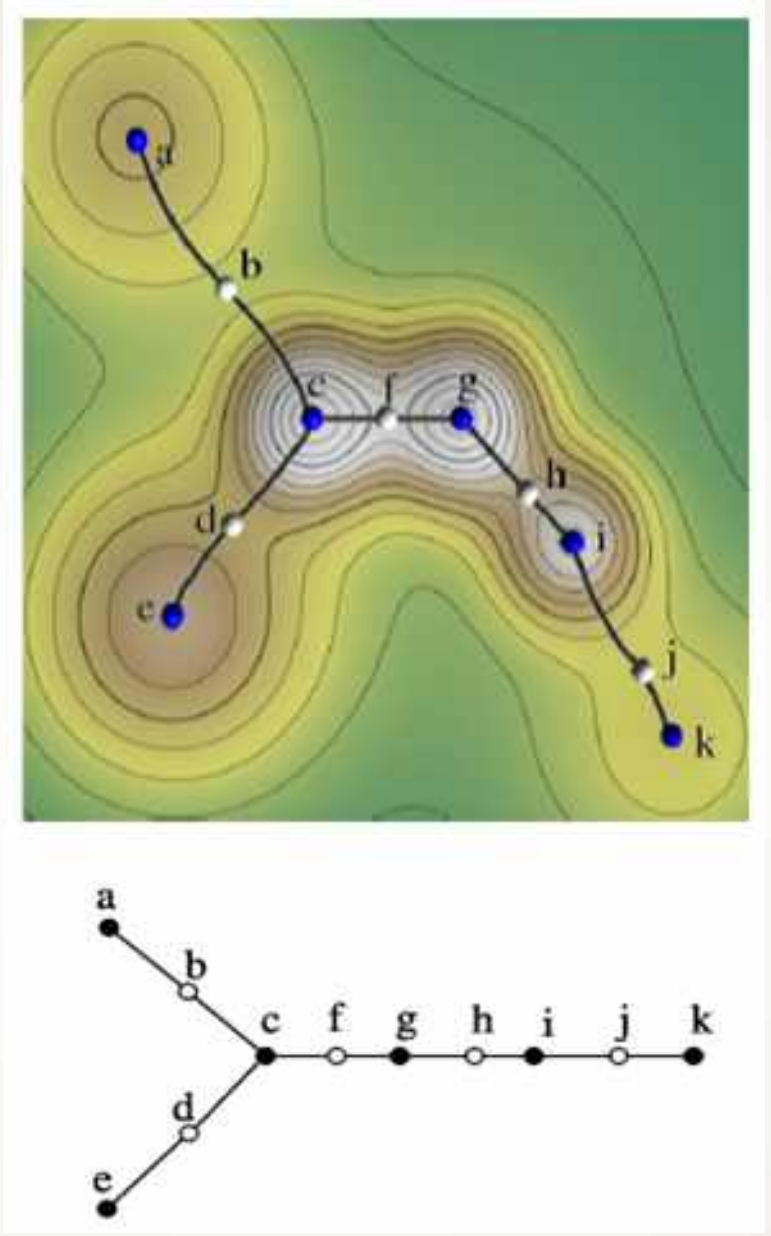

DUKE
STREET
DUKE
STREET


(a)
Sun
L
F_1xL
ξ
F_2xL
(b)
Zenith
Sun
Arbitrary
θ
Θ
Normal
to plane
i
φ

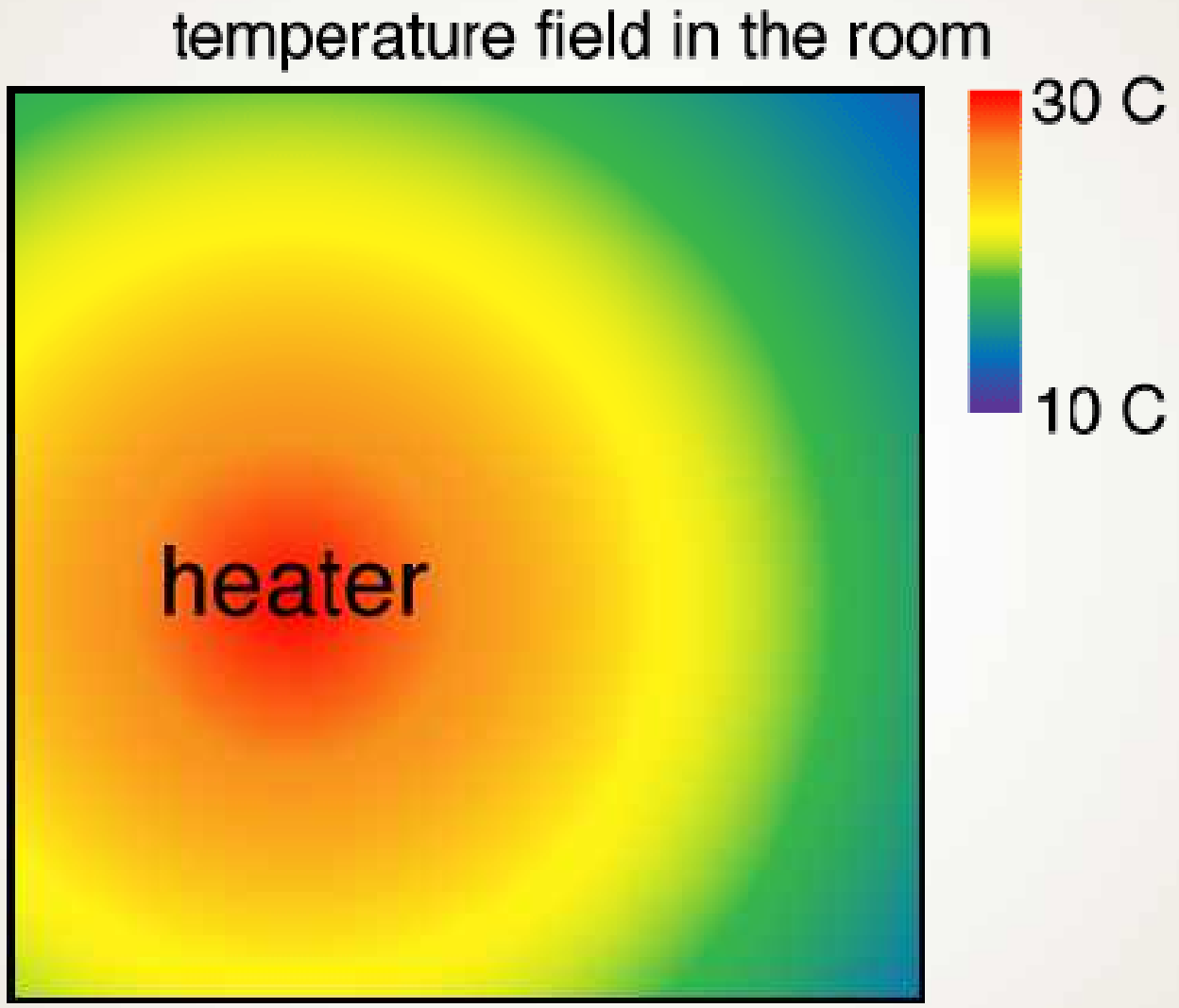


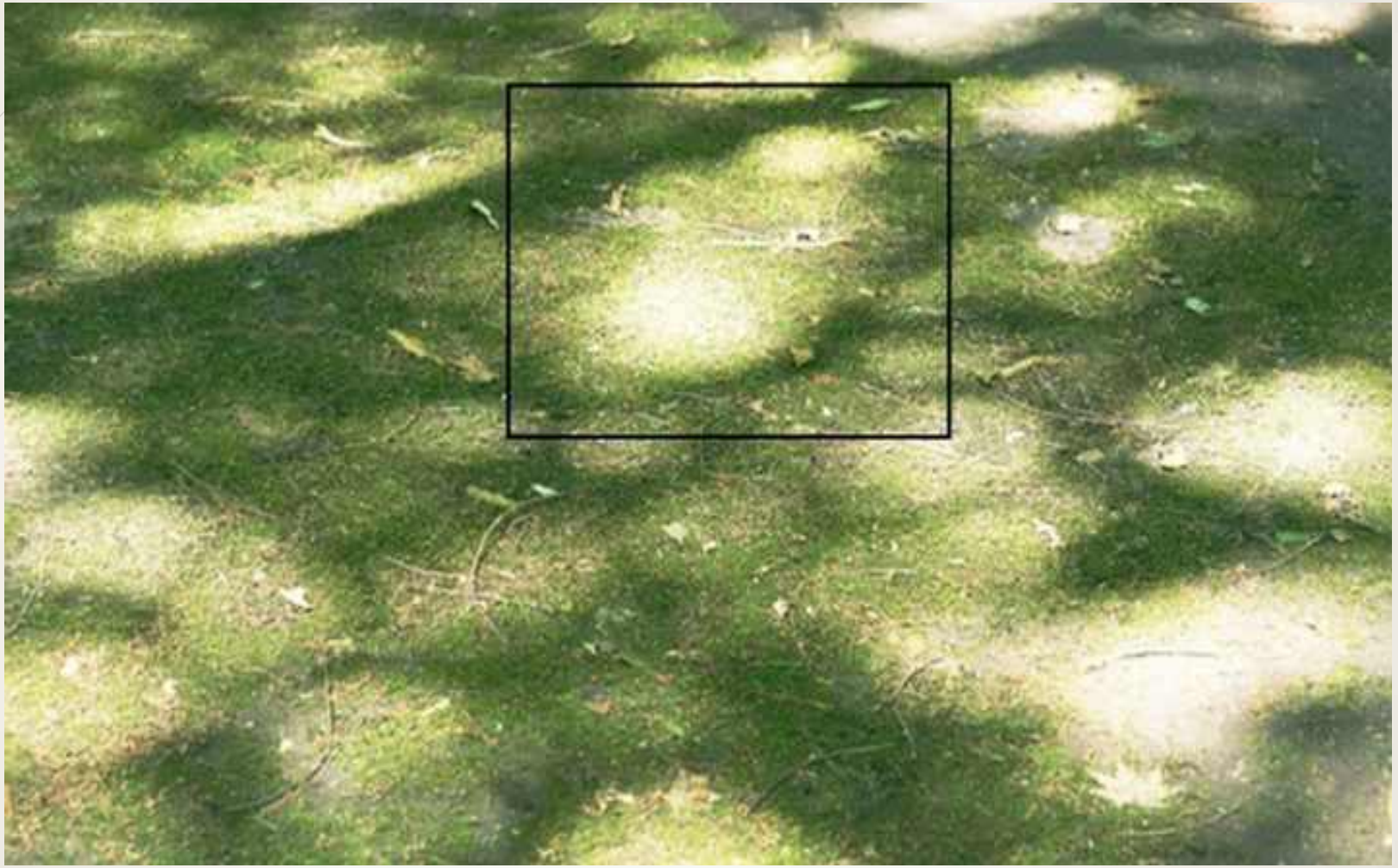


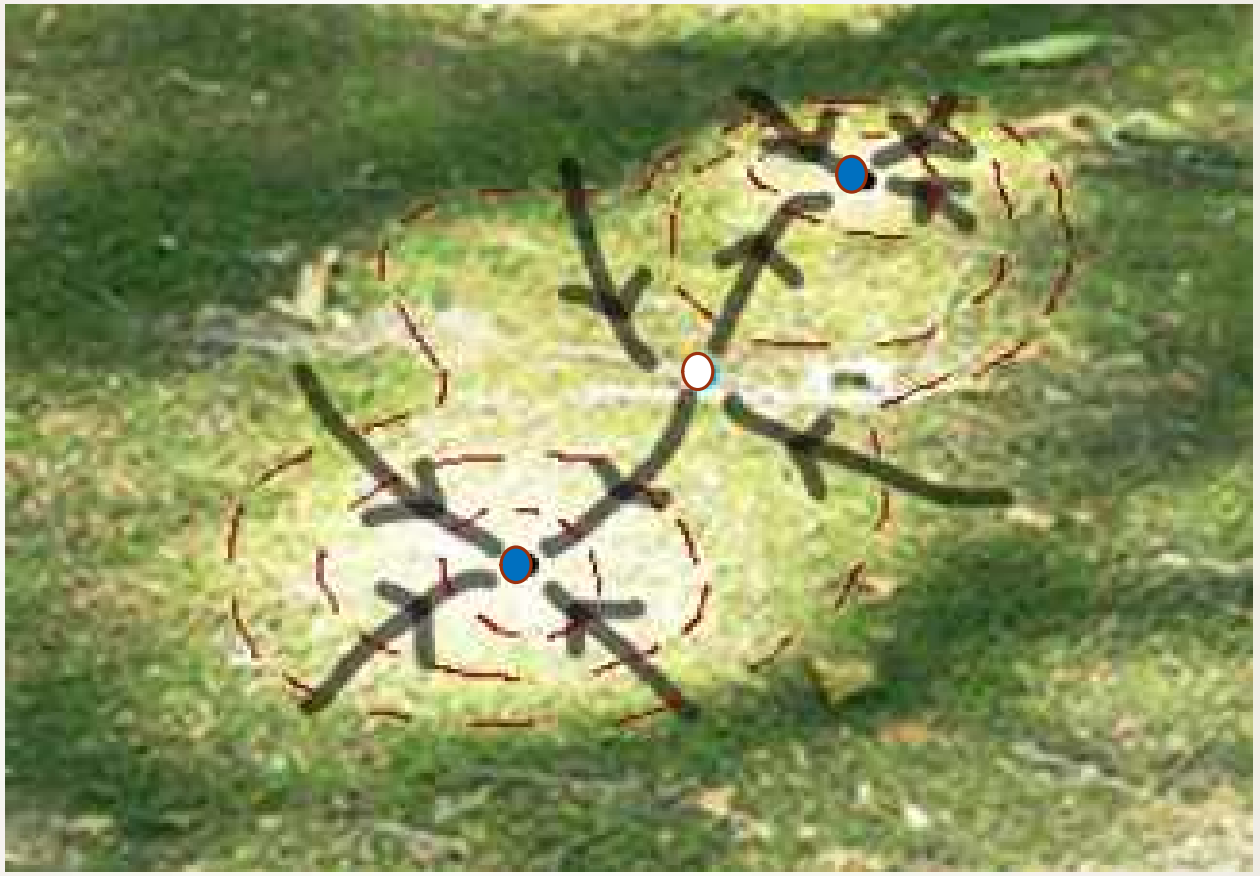


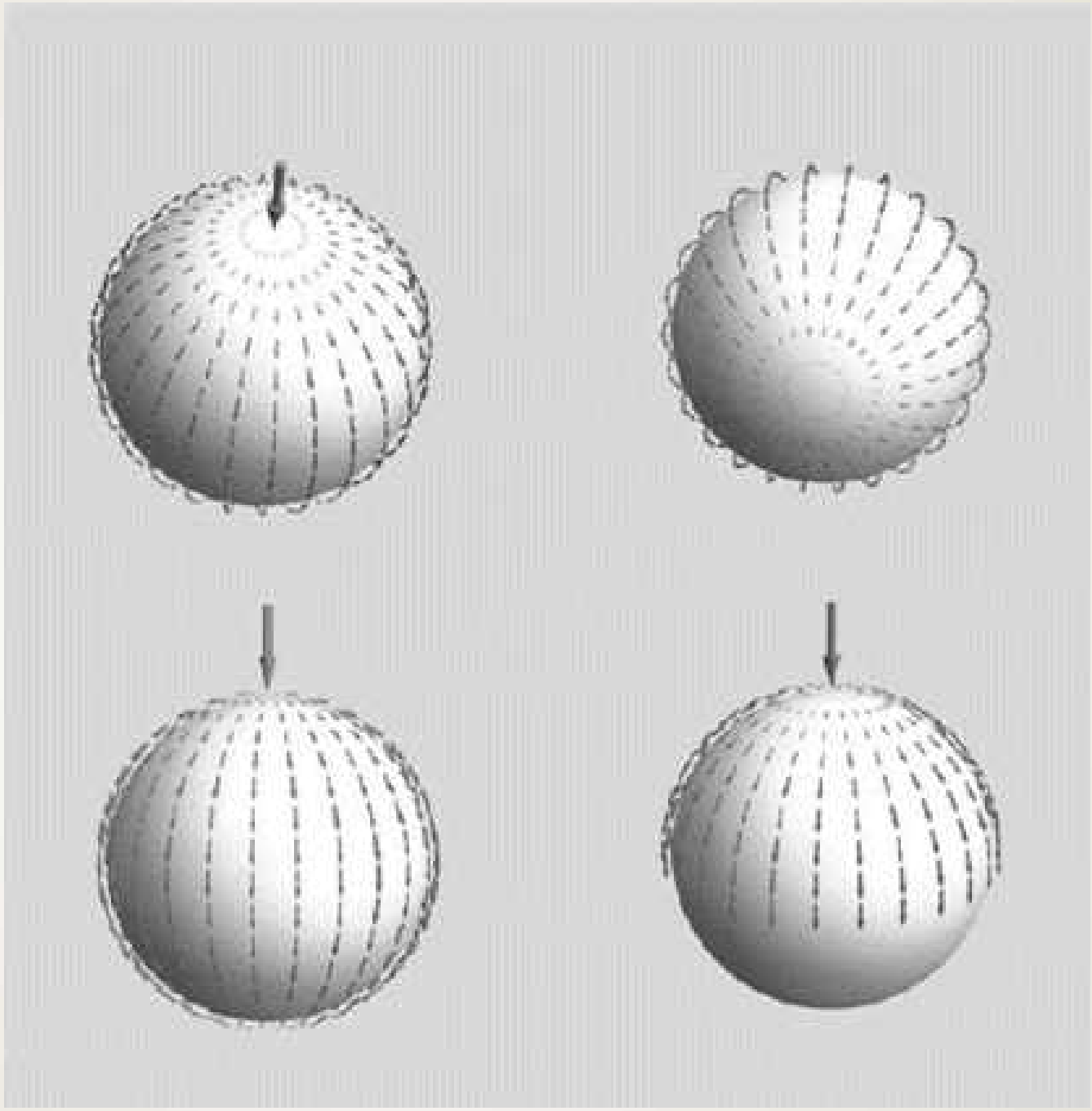


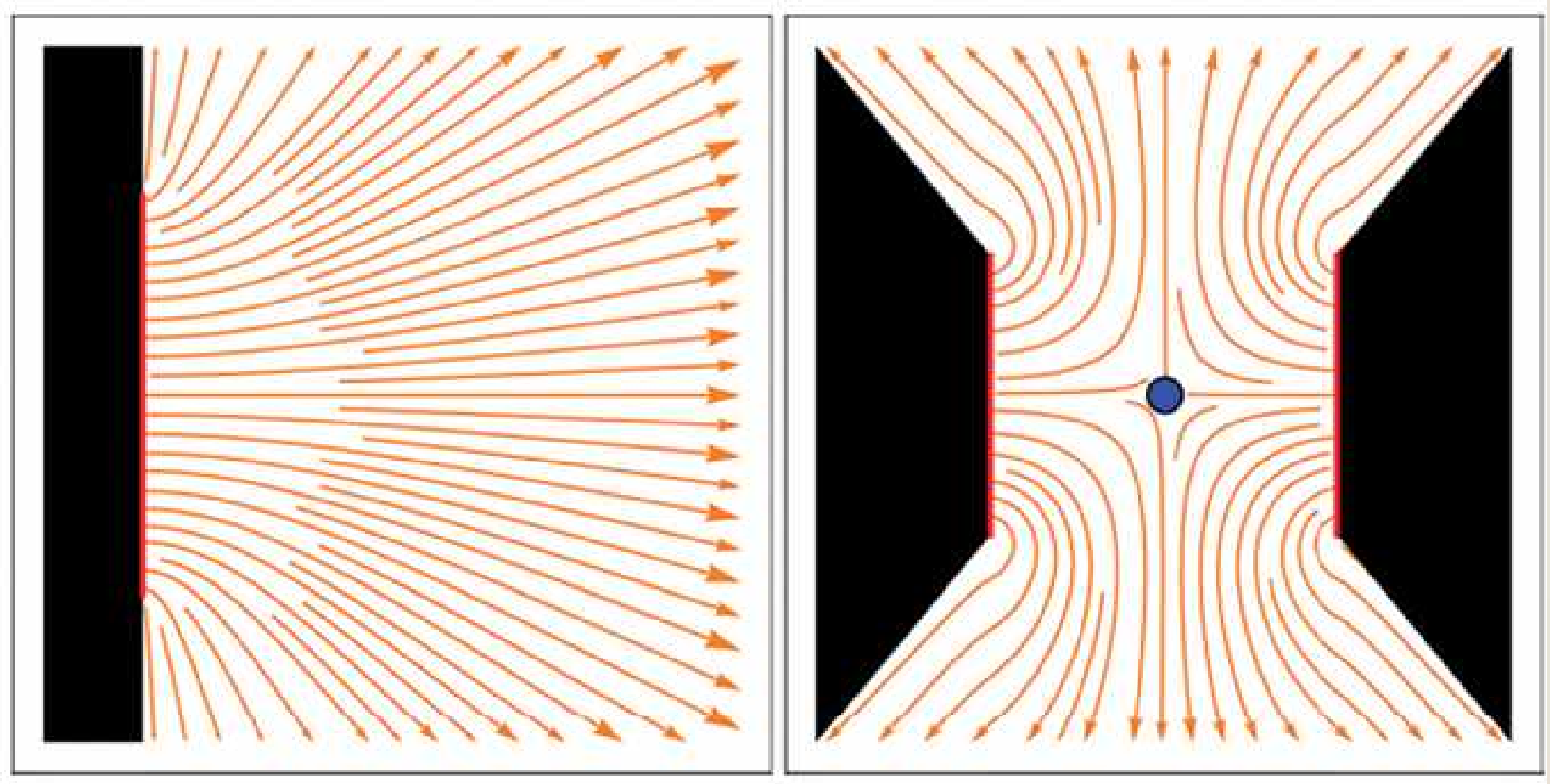
Schematic scalar topological skeleton. Correa (2011)


temperature field in the room
30 C
10 C
heater

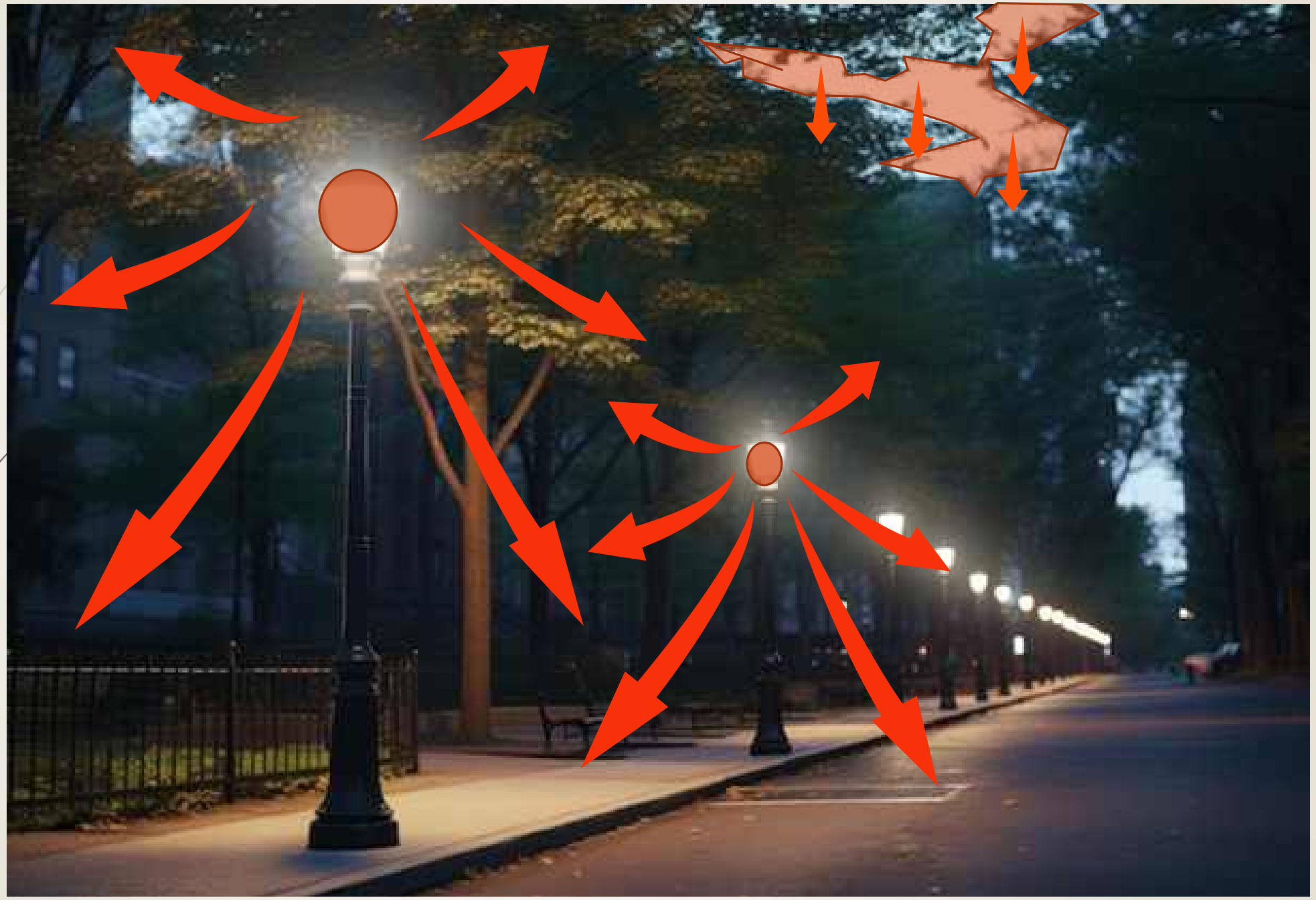




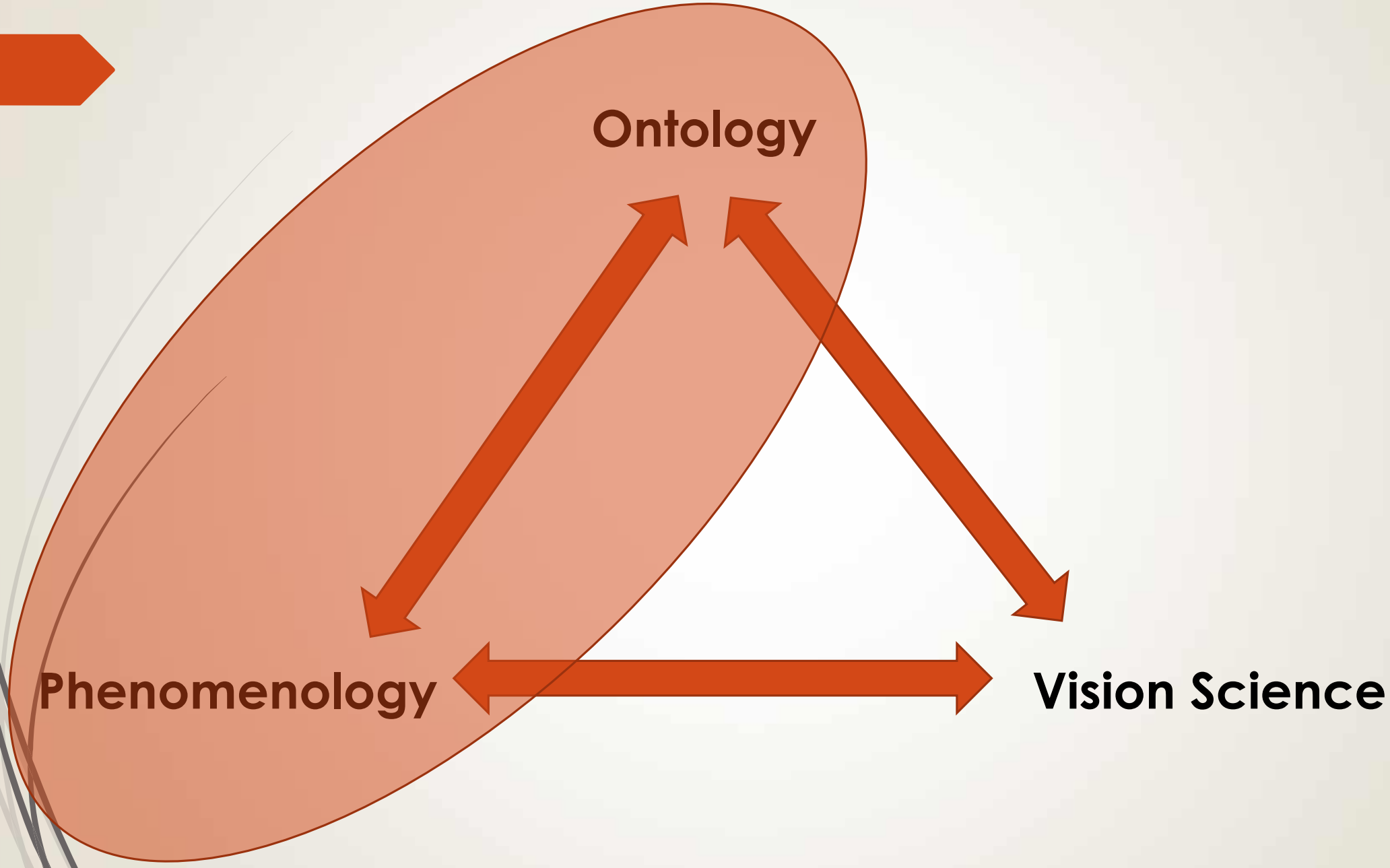




van Doorn AJ, Koenderink JJ, Todd JT, Wagemans J. (2012). Awareness of the light field: the case of deformation. *i-Perception*, 3:467–480.



The Perception of Illumination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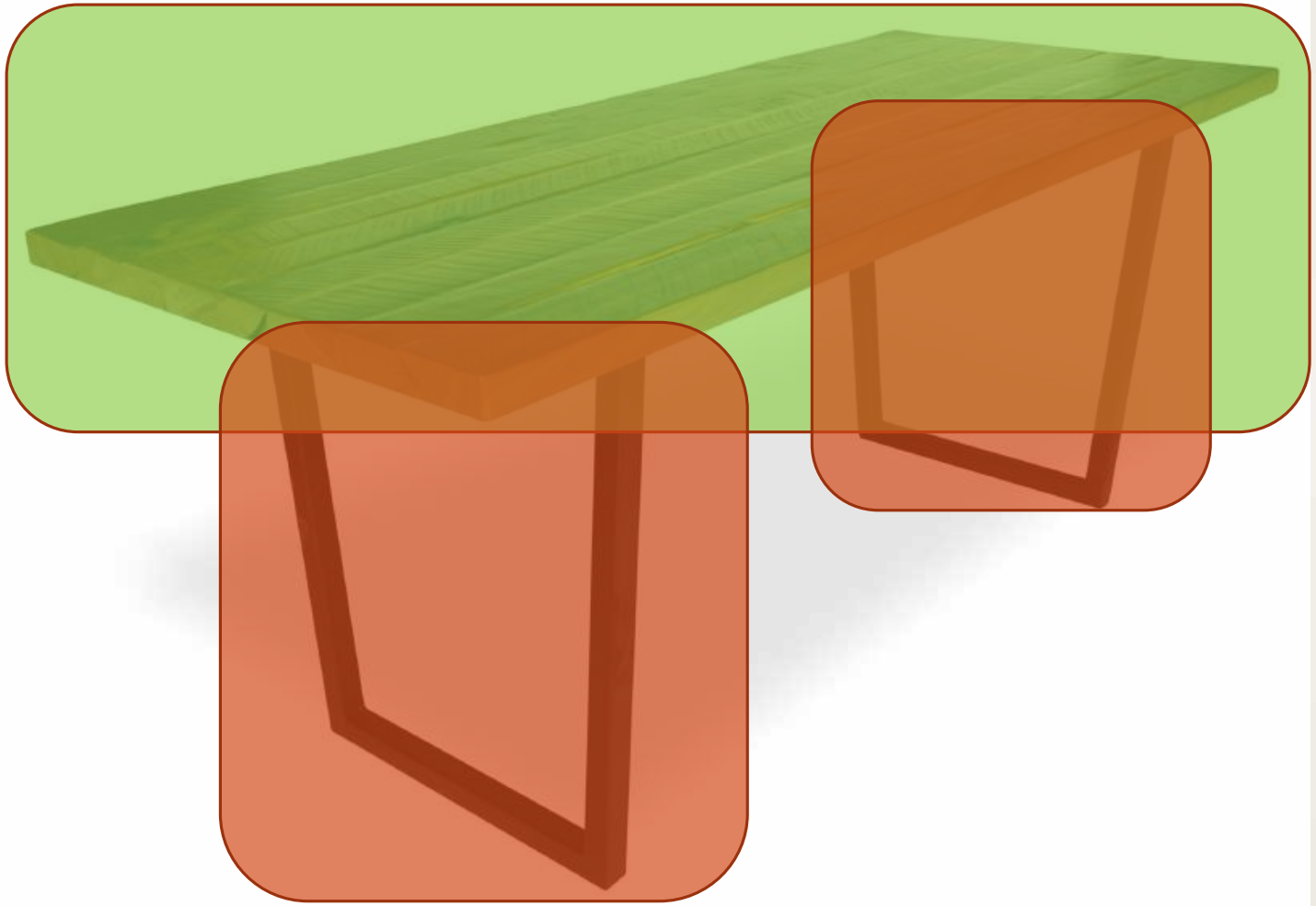
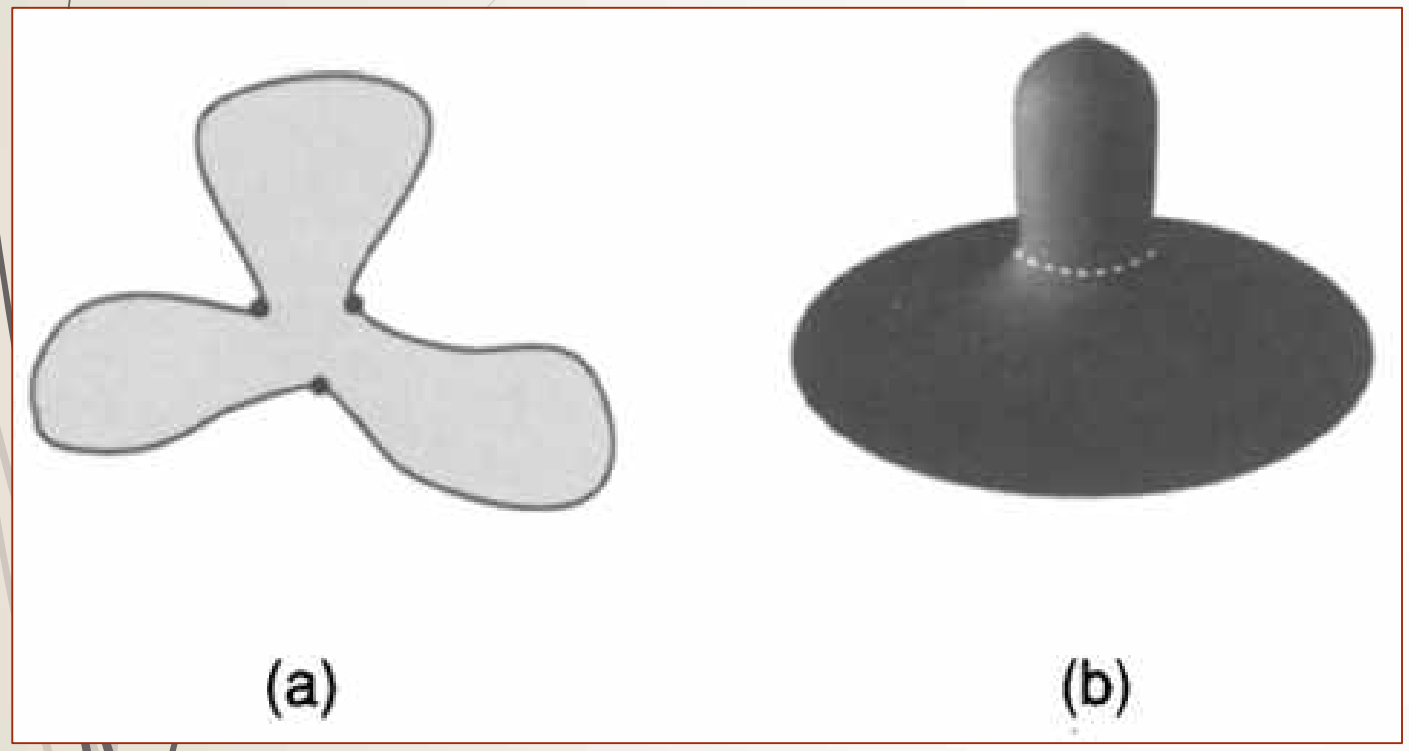
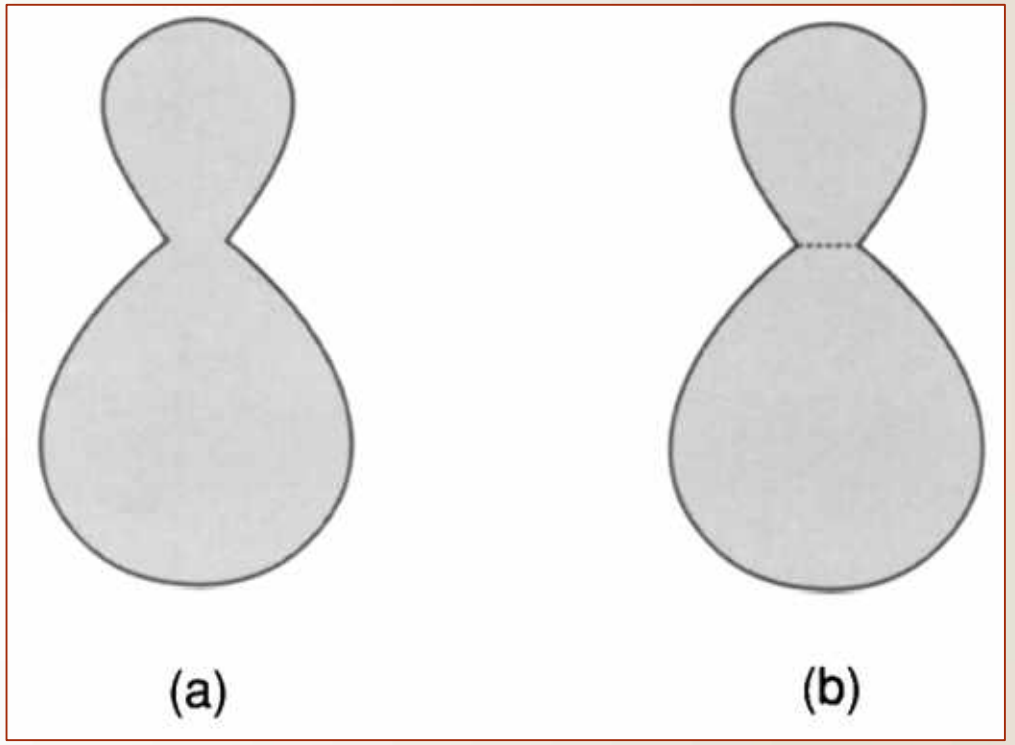
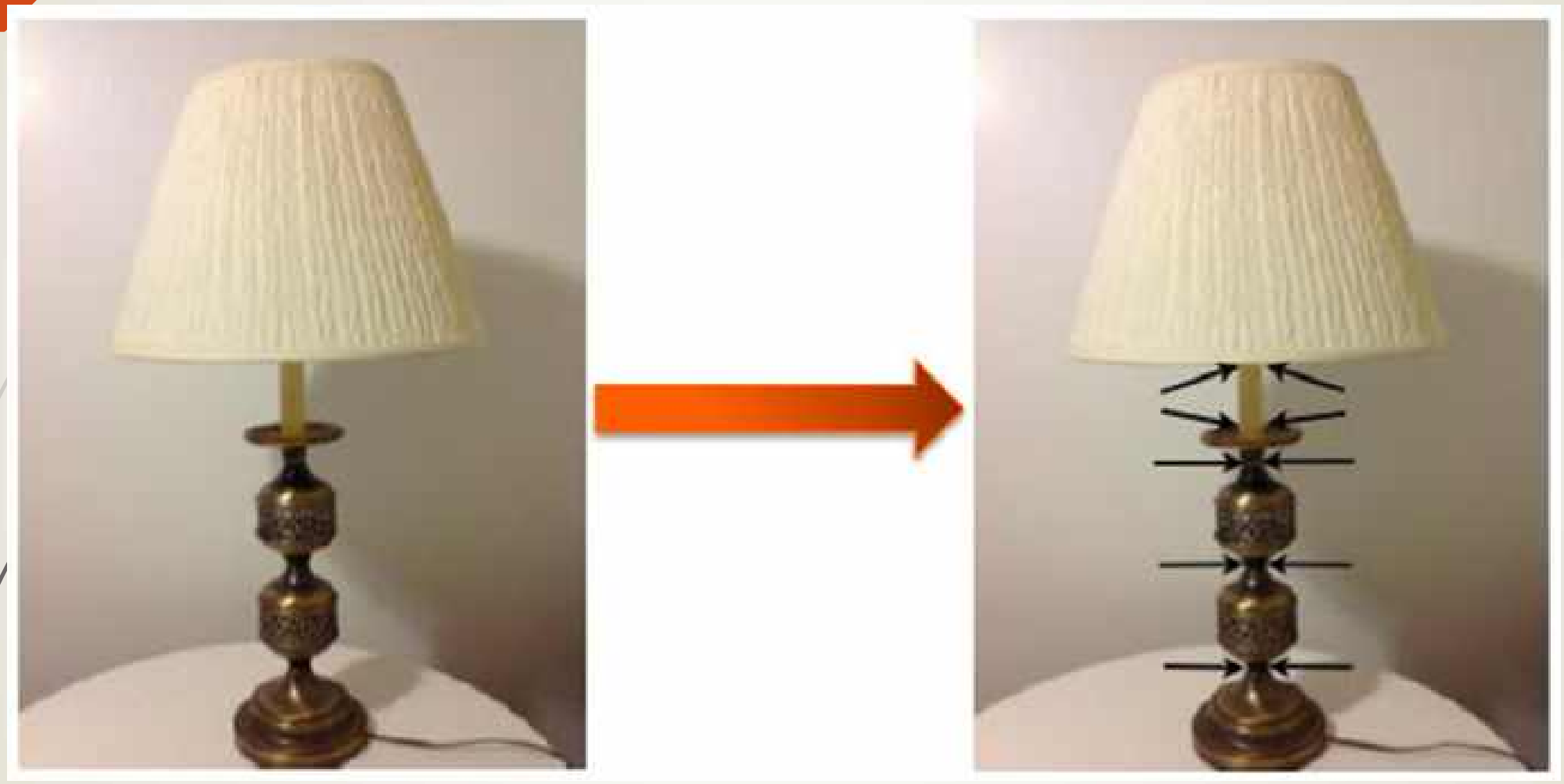


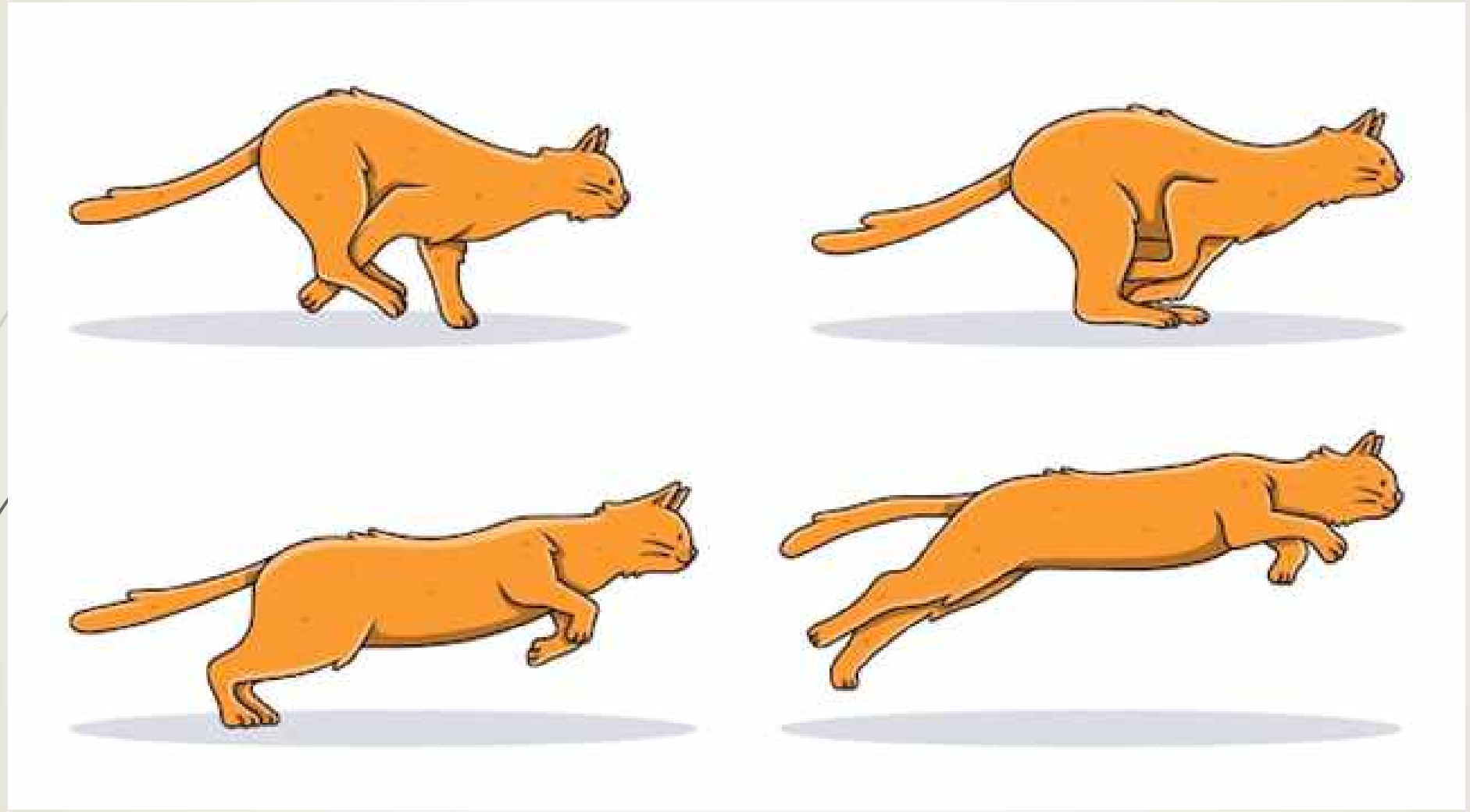


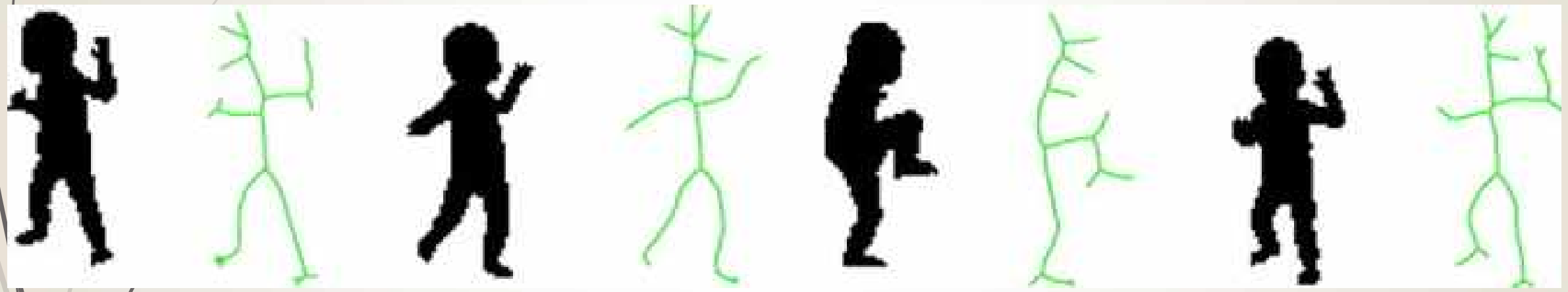


Minima and short-cut rules for parthood structure. Singh et al. (1999).

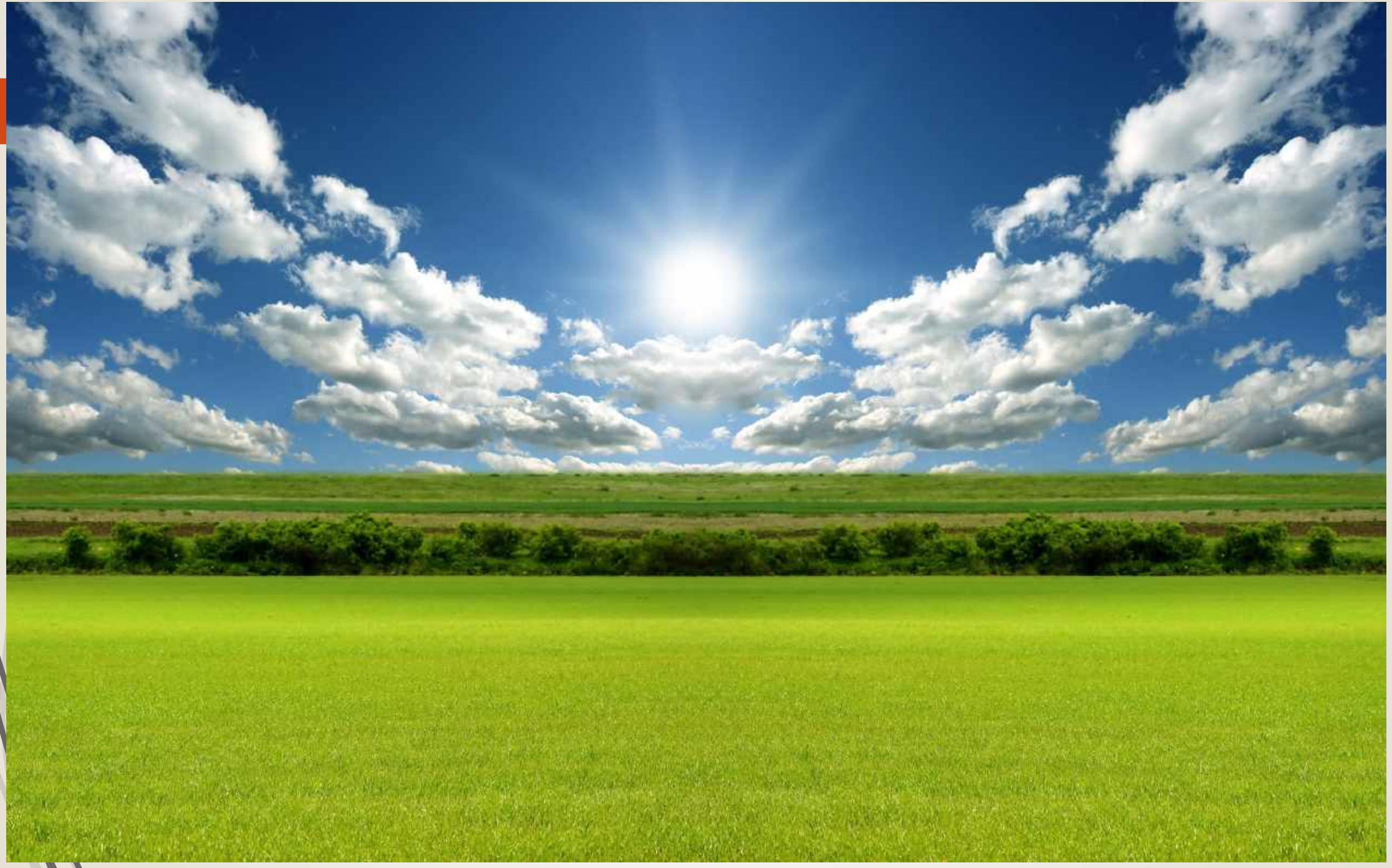


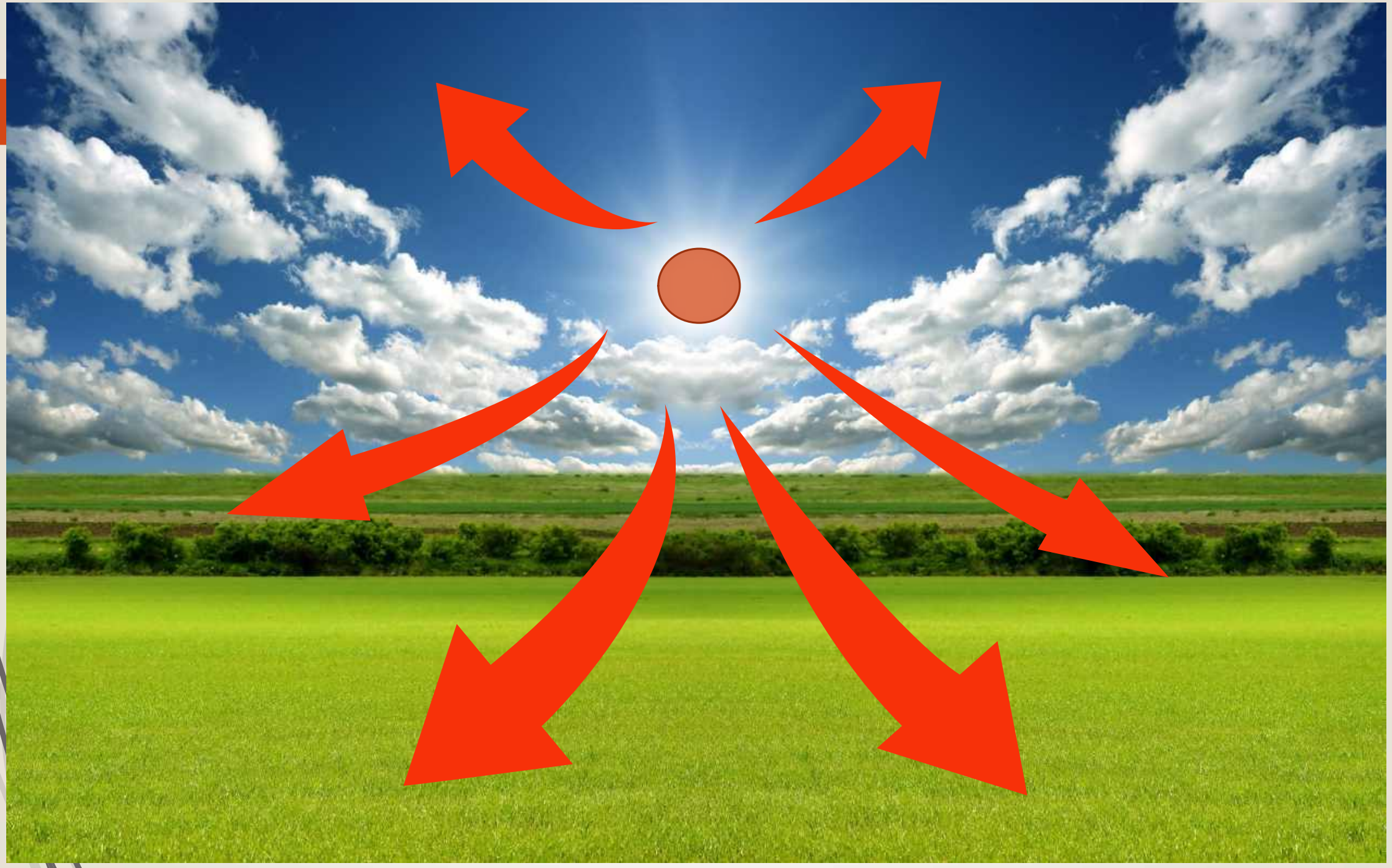
Minima and short-cut rules for parthood structure. Green (2017).

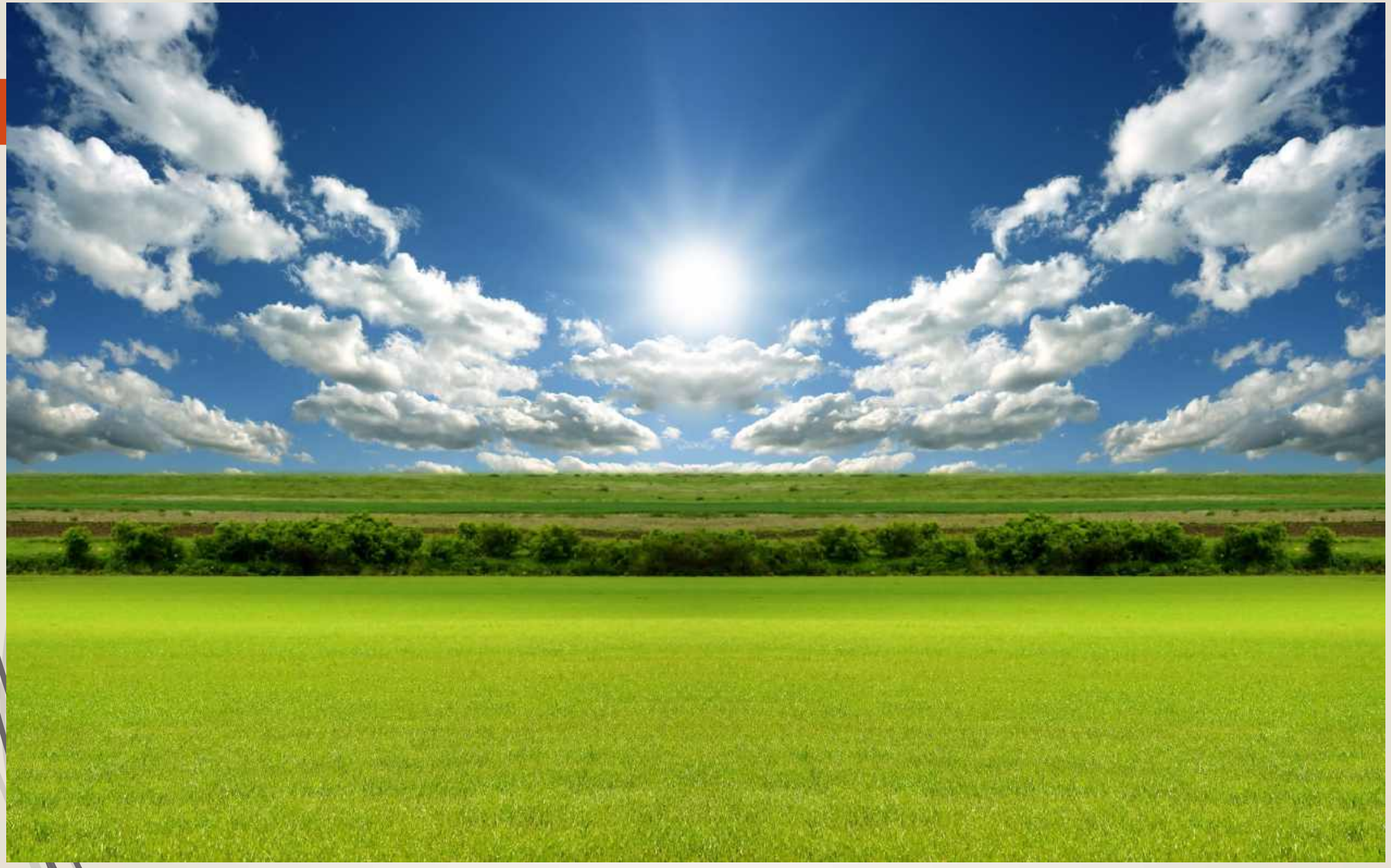


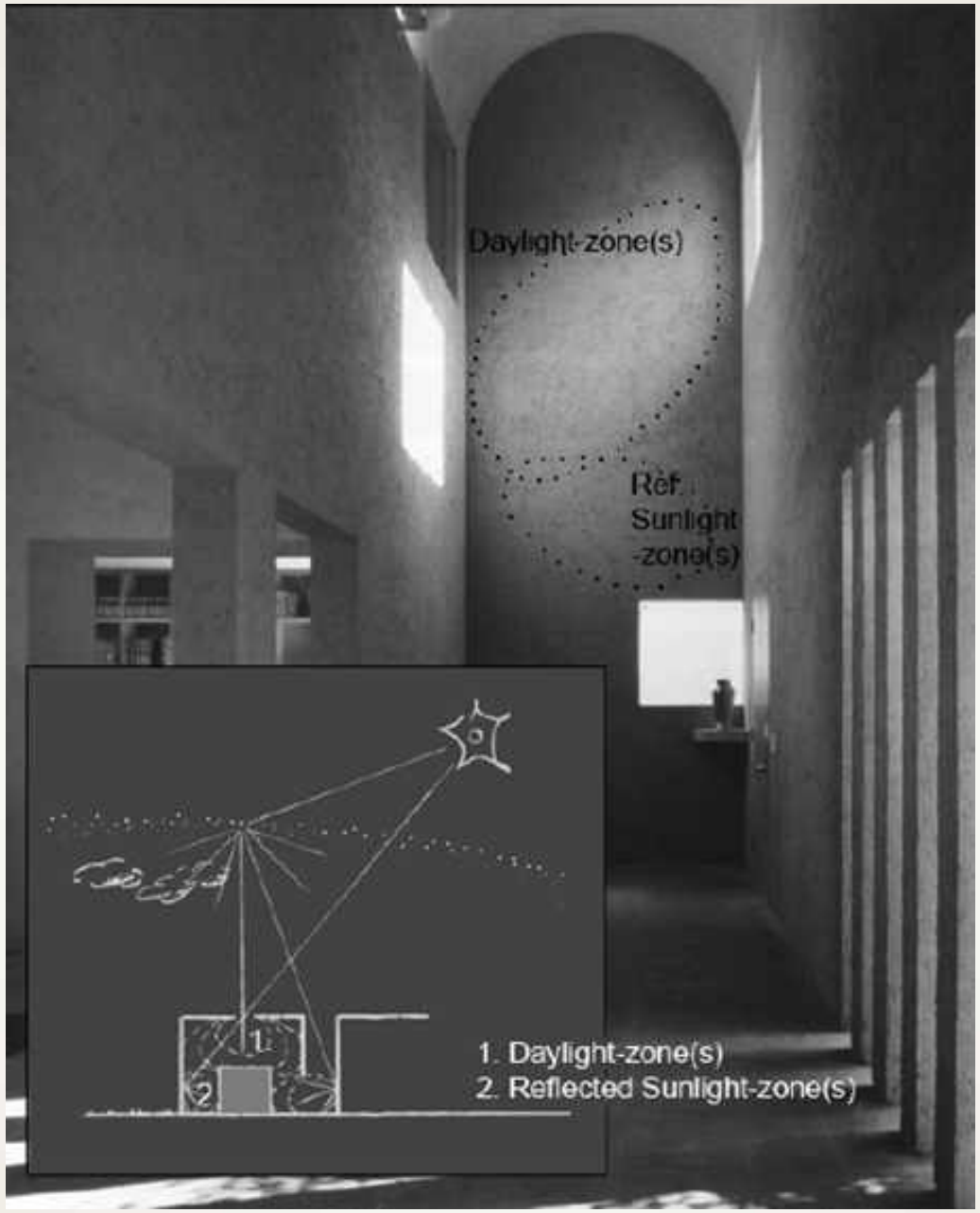


Silhouette of doll figure represented by medial axis structure. Kimia (2003).

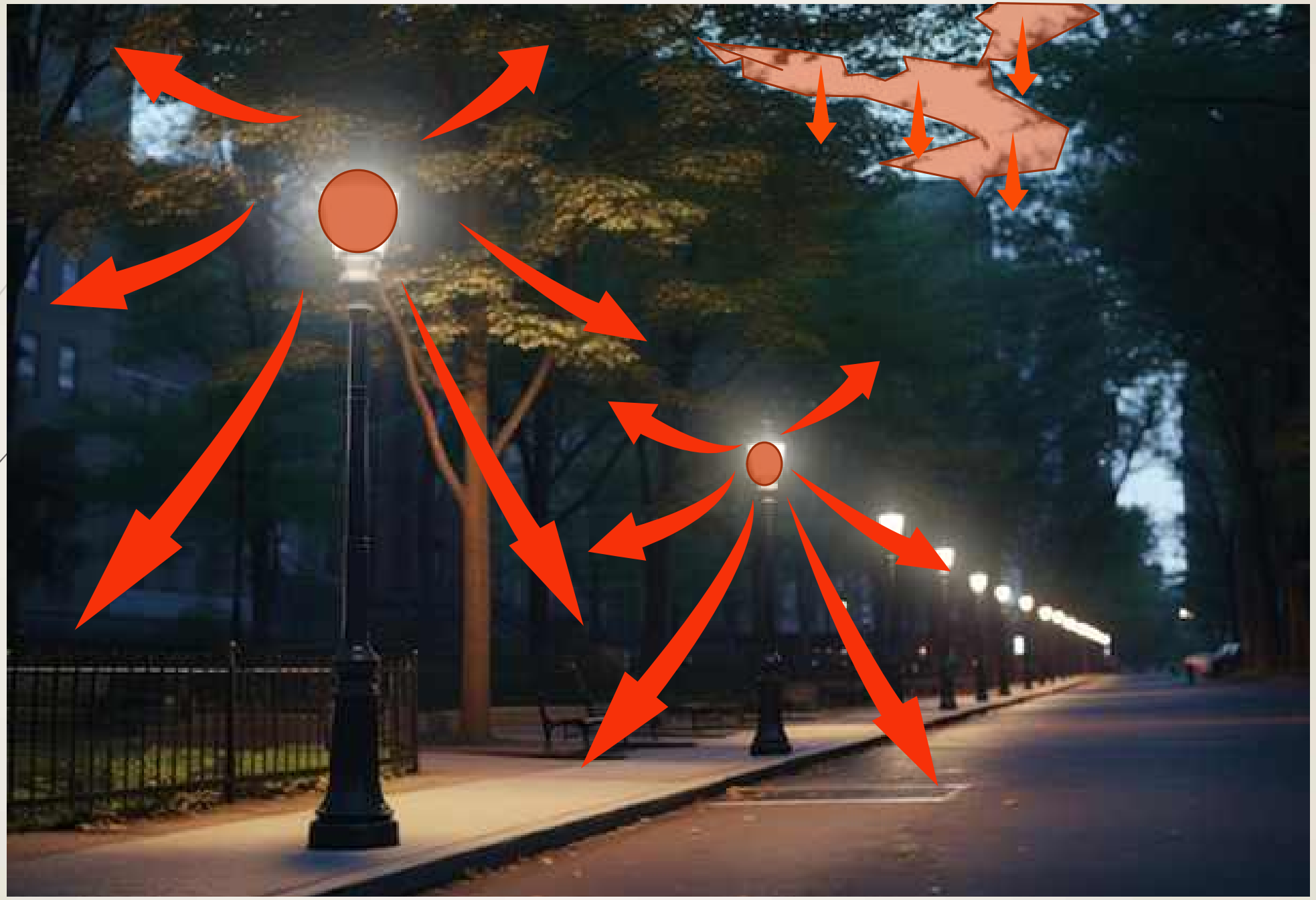


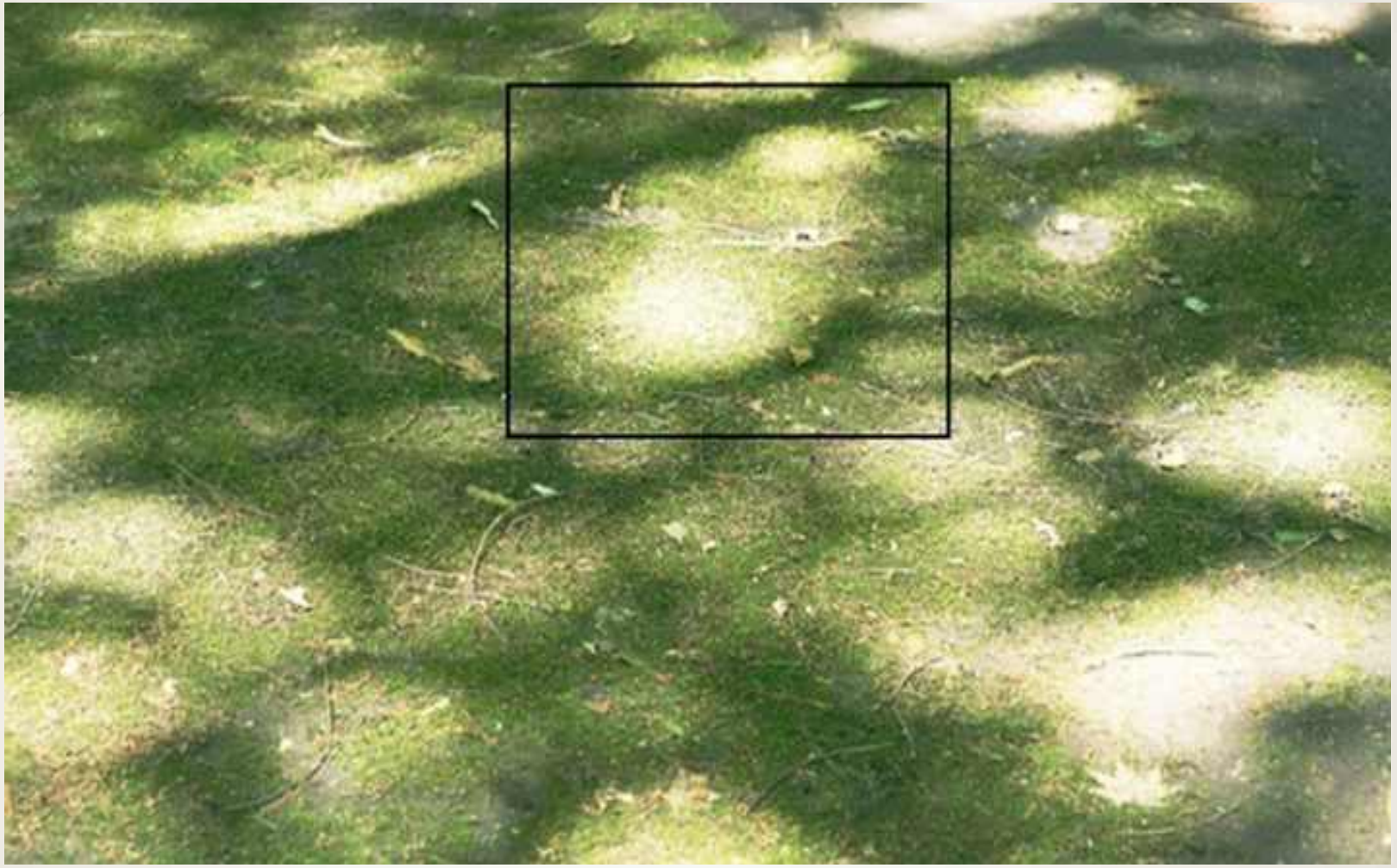


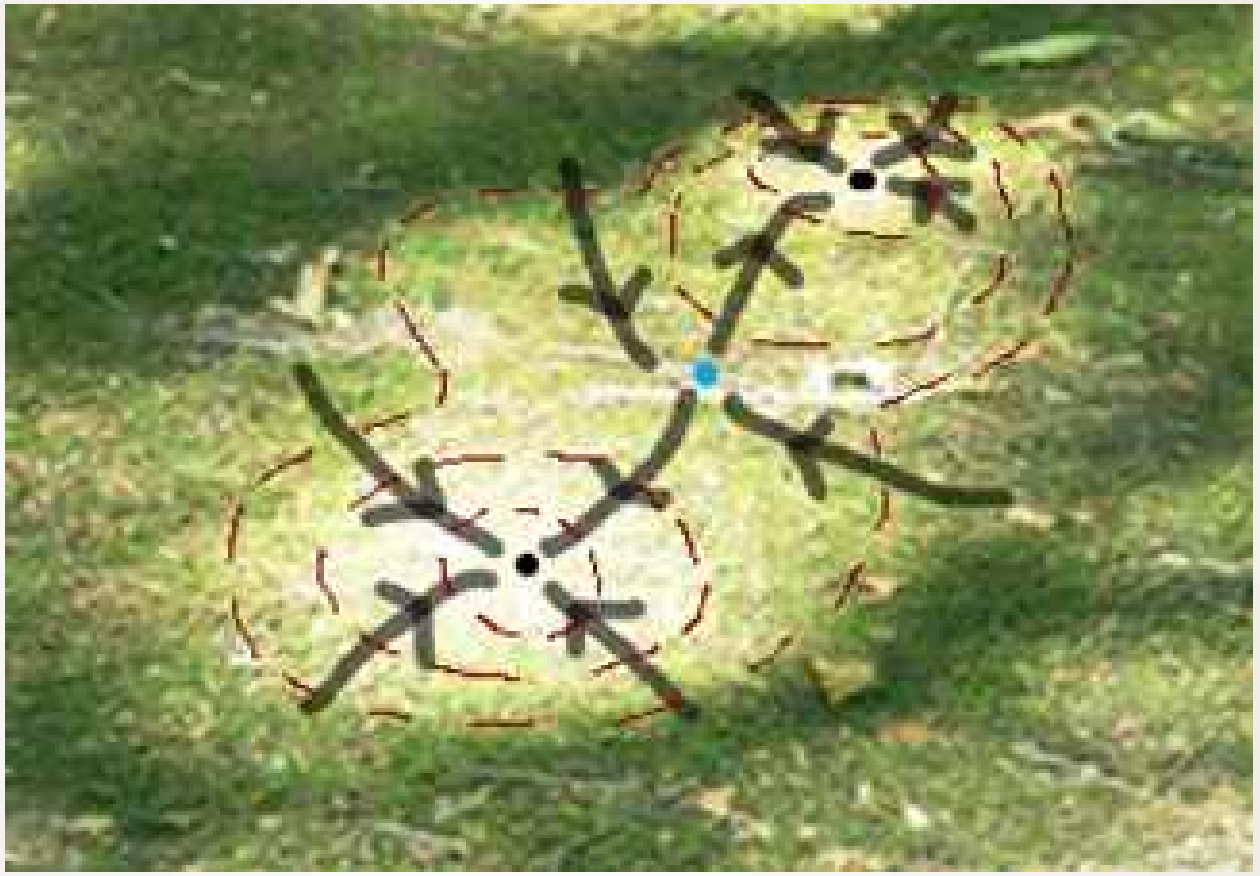


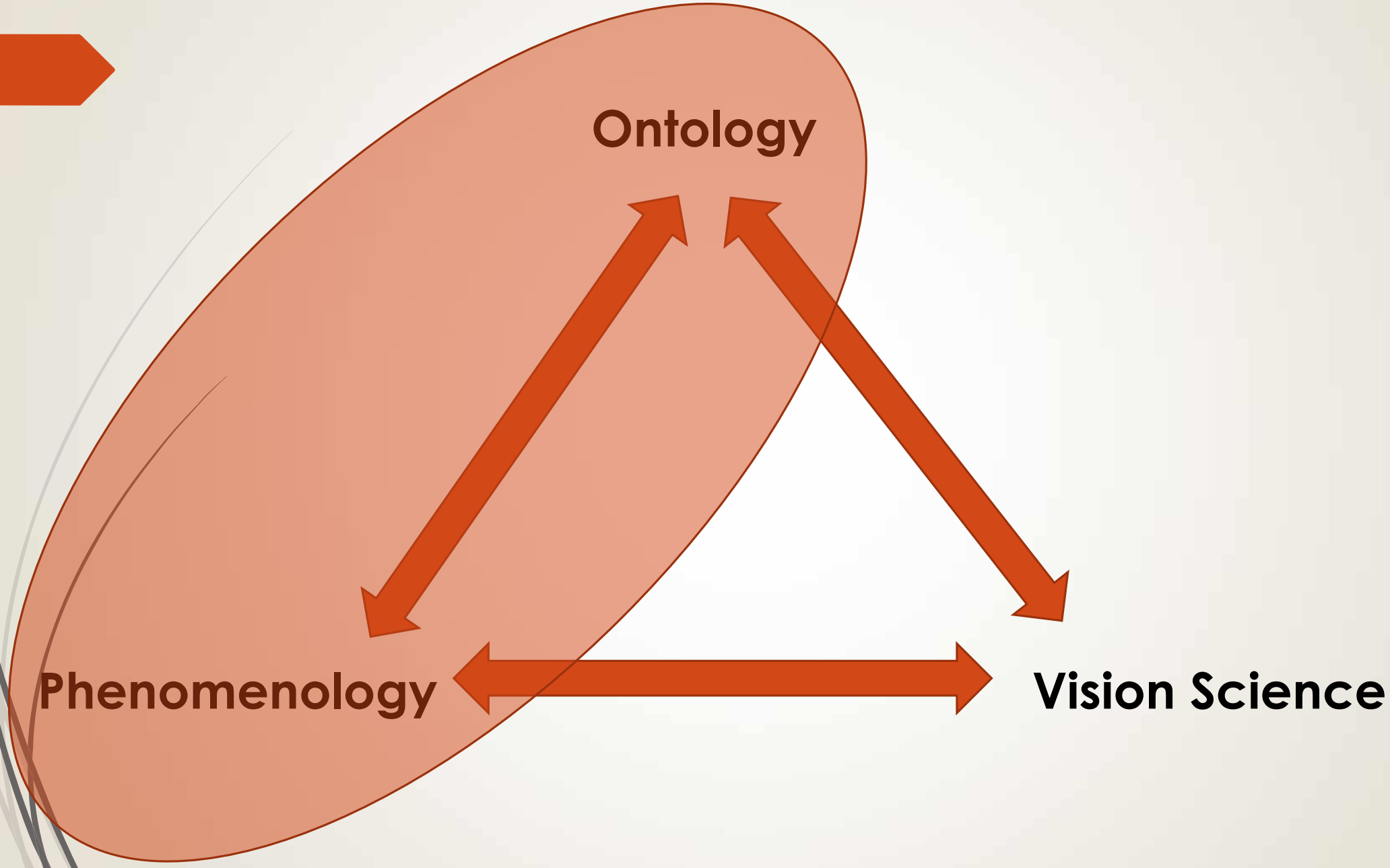


Madsen (2007). Light zones as concept and tool





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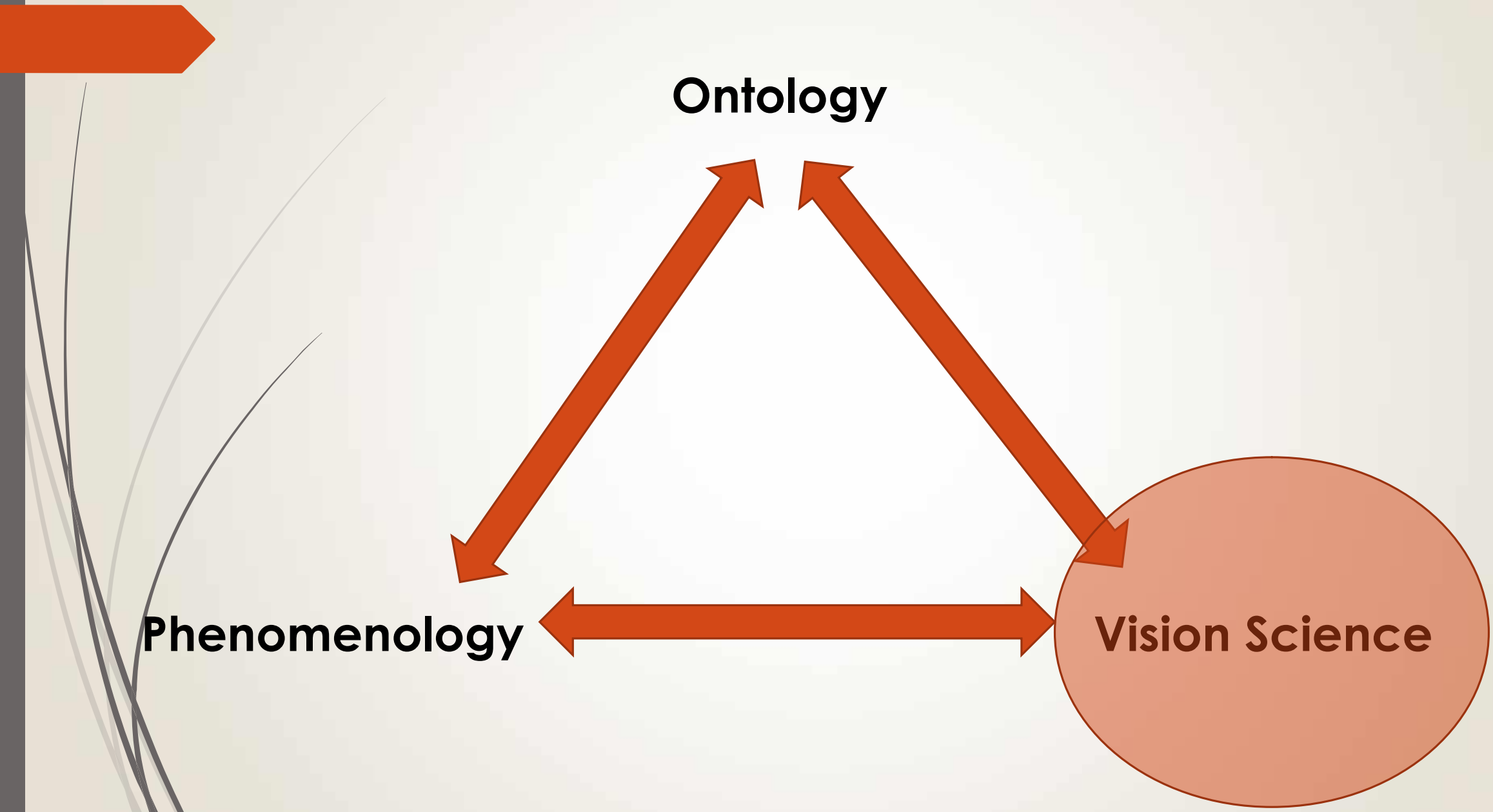
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a) Sunlight

b) Diffuse skylight

c) Divergent

Koenderink, J; Pont, S; van Doorn, A; Kappers, A; Todd, J. (2007). The visual light field. *Perception* 36:1595–1610.

a) Sunlight

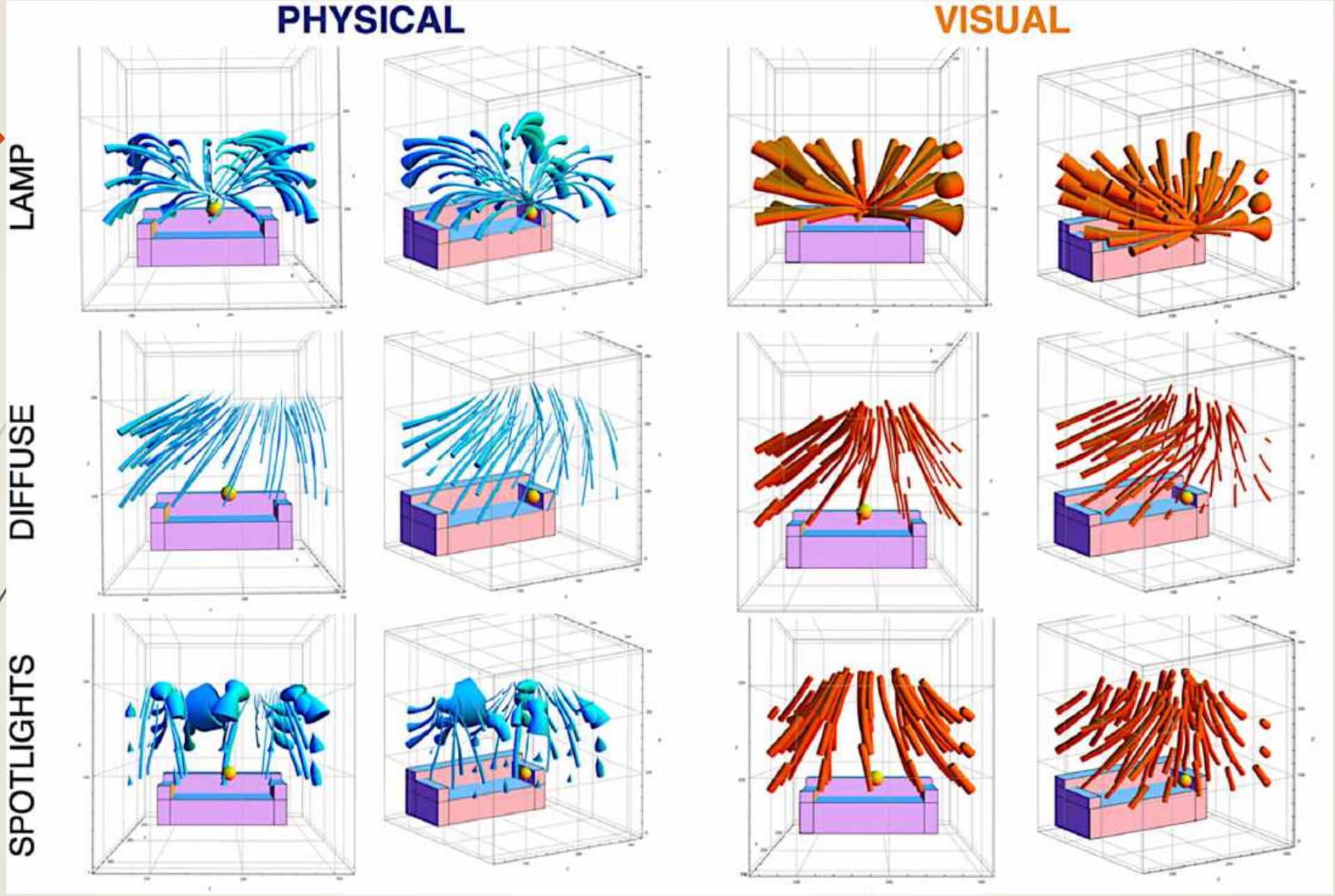
Koenderink, J; Pont, S; van Doorn, A; Kappers, A; Todd, J. (2007). The visual light field. *Perception* 36:1595–1610.

c) Divergent

Koenderink, J; Pont, S; van Doorn, A; Kappers, A; Todd, J. (2007). The visual light field. *Perception* 36:1595–1610.

Figure 1. Light conditions: visible light source (LAMP), diffused light sources in the ceiling on the right side of the scene (DIFFUSE), two collimated light sources in the ceiling, one on the left and the other on the right side of the scene (SPOTLIGHTS).

Kartashova T, Sekulovksi D, de Ridder H, Pas SF, Pont SC. (2016). The global structure of the visual light field and its relation to the physical light field. *Journal of Vision* 16(10):9, 1-16.



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Thanks!