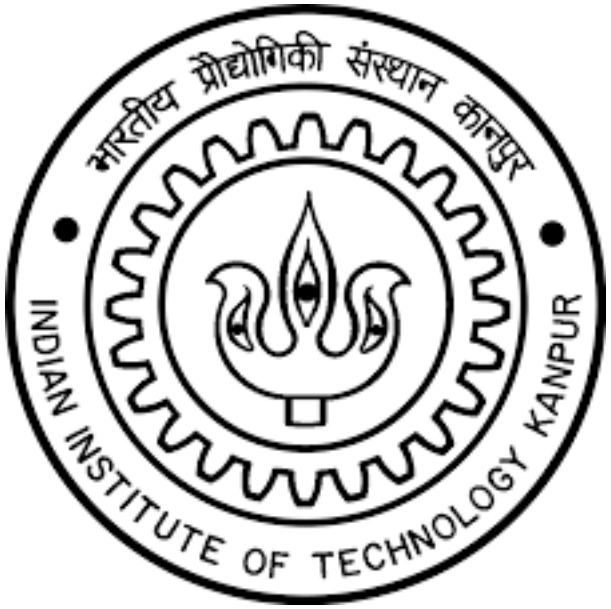

Indian Institute of Technology
Kanpur

In Collaboration
with

National Program on Technology Enhanced Learning (NPTEL)

Presents

Course Title:

Basic Cognitive Processes

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Lecture 20: Approaches to Visual Perception - 3

Helmholtz's Theory of Unconscious Inference

- Helmholtz proposed a principle called the ***theory of unconscious inference,*** which states that some of our perceptions are the result of unconscious assumptions that we make about the environment.

- This theory was proposed to account for our ability to create perceptions from stimulus information that can be seen in more than one way.

- For example:

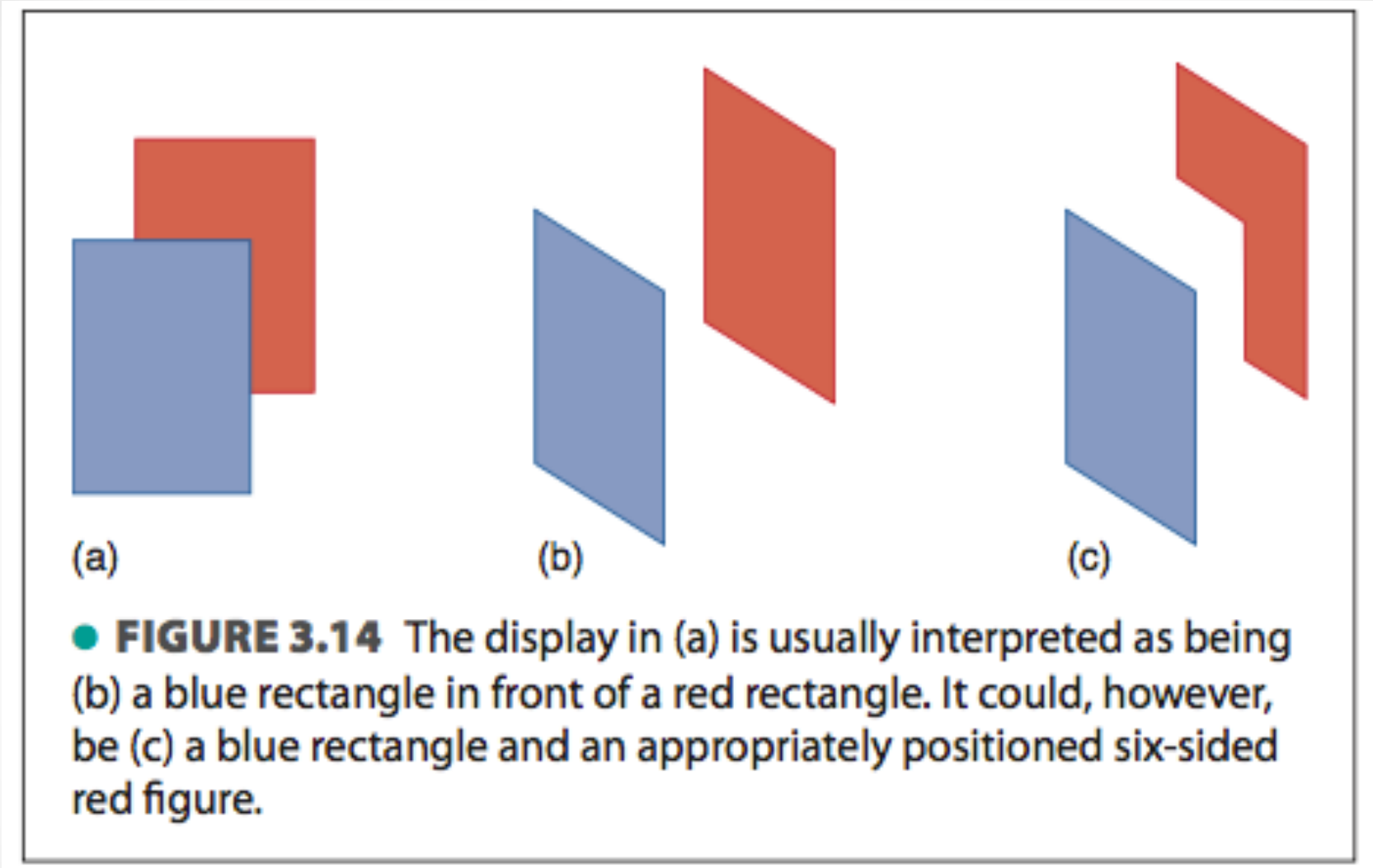

FIGURE 3.14 The display in (a) is usually interpreted as being (b) a blue rectangle in front of a red rectangle. It could, however, be (c) a blue rectangle and an appropriately positioned six-sided red figure.

Image: Goldstein E.B. (2010). Cognitive Psychology: Connecting Mind, Research & Everyday Experience. *Wadsworth Publishing.* 3rd Ed. (Fig. 3.14, p.58)

- The theory of unconscious inference includes the ***likelihood principle,*** which states that we perceive the object that is *most likely* to have caused the pattern of stimuli we have received.

- Thus, we infer that it is likely that the fig 3.14 is a rectangle covering another rectangle because of experiences we have had with similar situations in the past.

- Helmholtz therefore described the process of perception as being similar to the process involved in solving a problem.

- The problem is solved by a process in which the observer applies his or her knowledge of the environment in order to infer what the object might be.

- In cases such as the one we discussed, this process is unconscious, hence the term ***unconscious inference.***

Gestalt Approach to Perception

The Whole is More than the Sum of It's Parts

- The Gestalt Psychologists were the first group of psychologists to systematically study **perceptual organisation** in the 1920's in Germany.

- Some of the notable names were, Johann Wolfgang von Goethe, Ernst Mach, Kurt Koffka, Max Wertheimer, Wolfgang Kohler etc.

- The basic idea of perceptual organisation is the fact that, "any image tends to be perceived according to the organisation of the elements with in rather than merely according to the nature of the individual elements themselves"

Law of Closure

Image: Stangor (2010). Introduction to Psychology. *Flat World Knowledge*. (p.192).

Law of Proximity

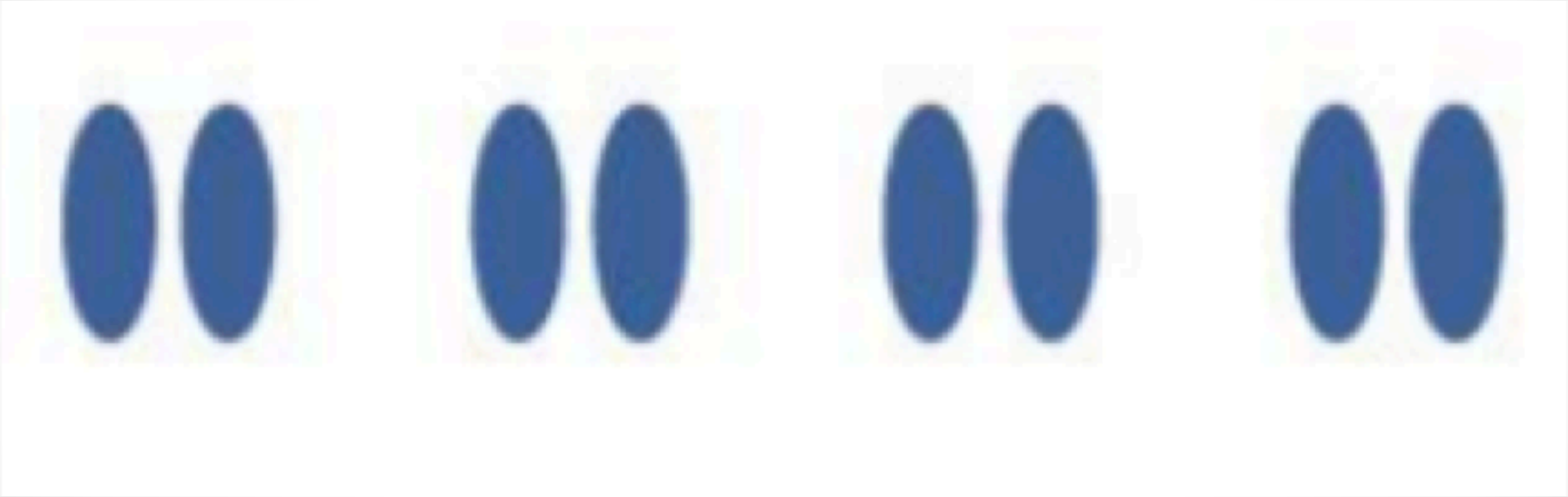

Image: Stangor (2010). Introduction to Psychology. *Flat World Knowledge*. (p.191).

Law of Similarity

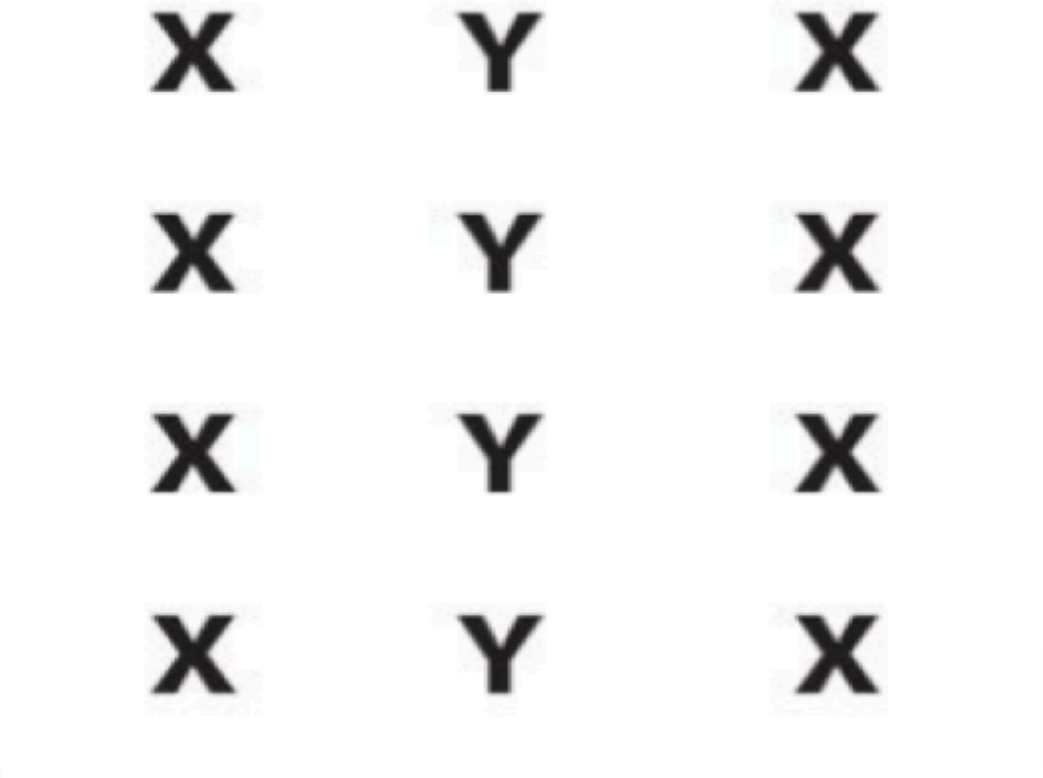

Image: Stangor (2010). Introduction to Psychology. *Flat World Knowledge*. (p.190).

Law of Good Continuation

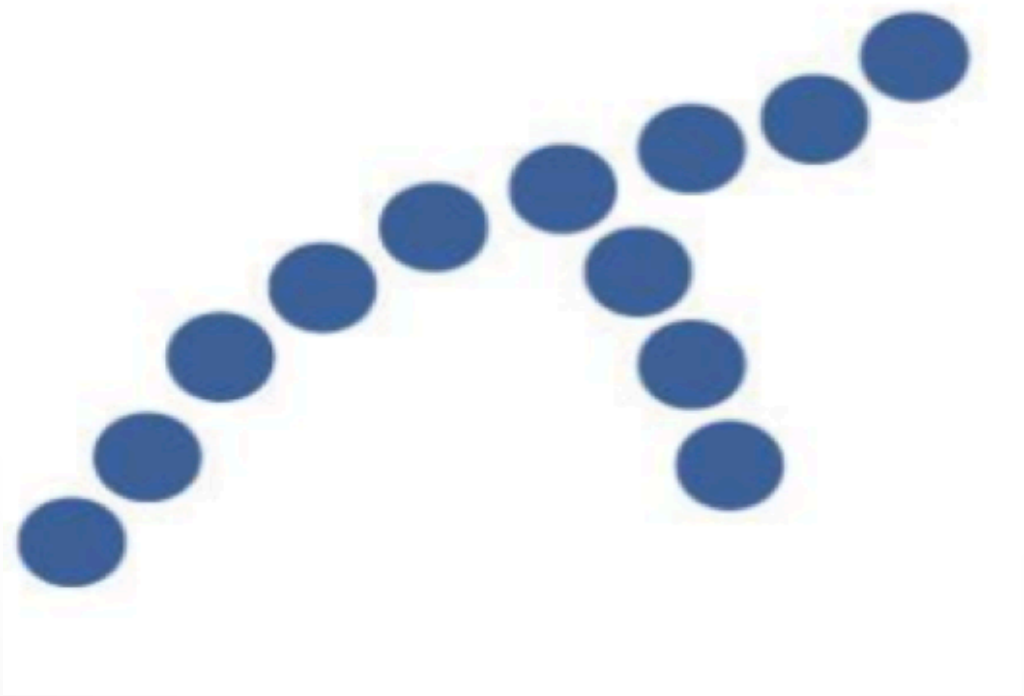

Image: Stangor (2010). Introduction to Psychology. *Flat World Knowledge*. (p.191).

- The Gestalt researchers formulated many other organisational laws, but most of them were deemed to be the manifestations of the **Law of Pragnanz**, described by Koffka as:

"***Of several geometrically possible organisations that one will actually occur which possesses the best, simplest and most stable shape***" (Koffka, 1935).

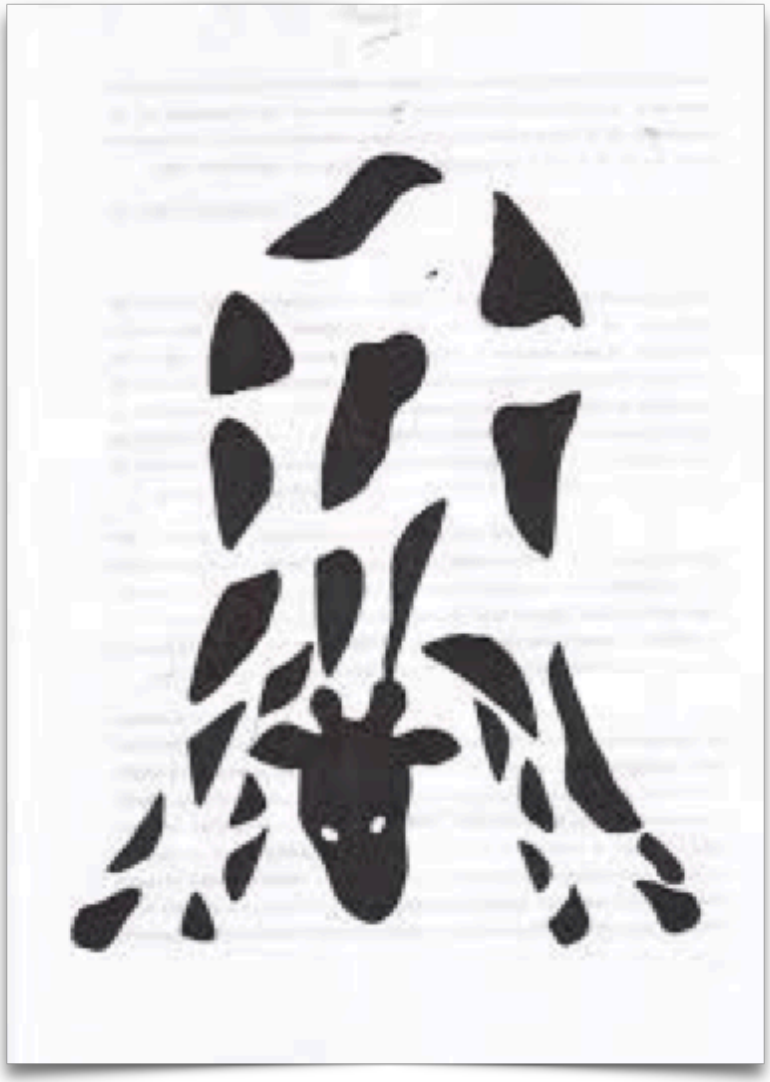

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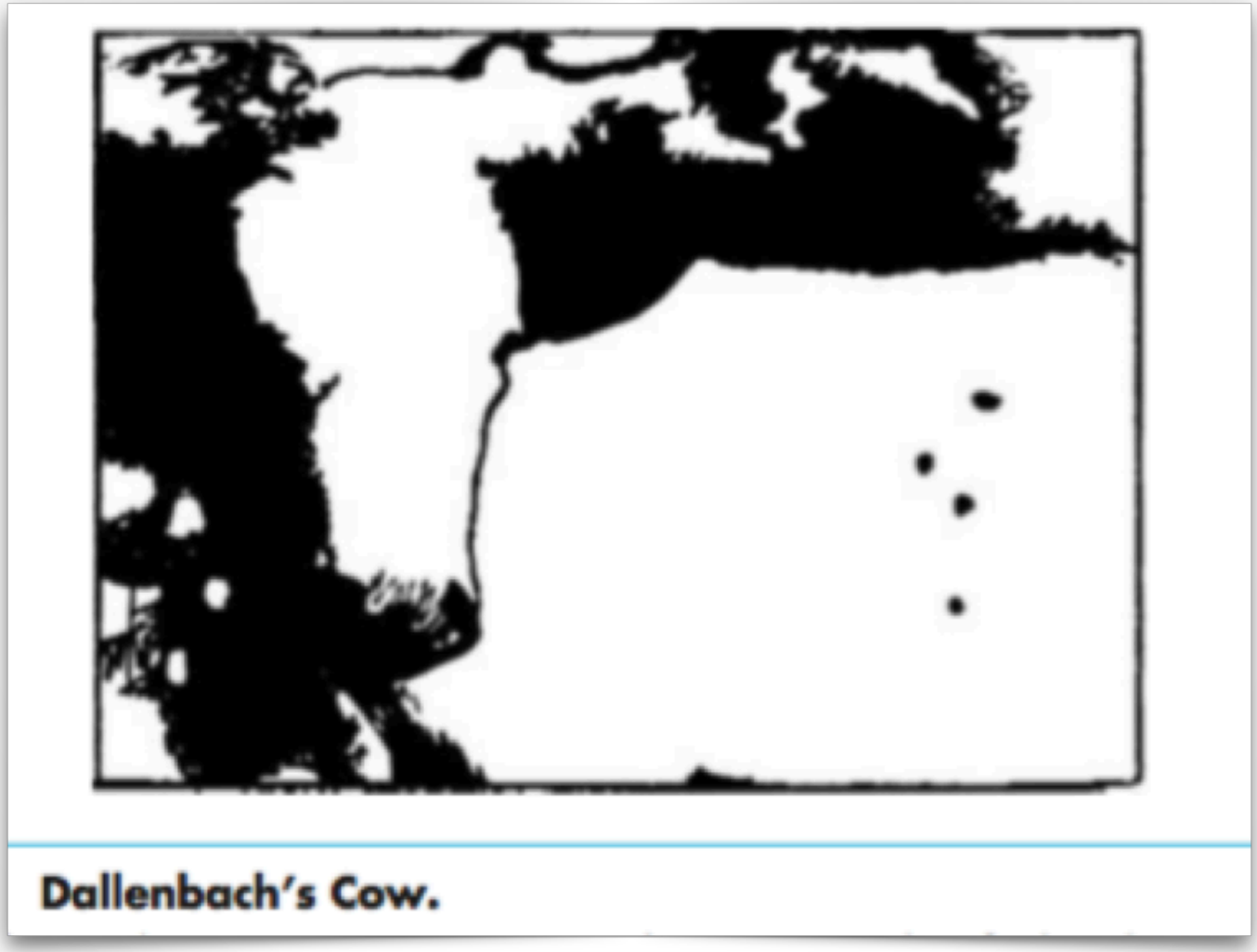
Image: [http://graphicdesign.spokanefalls.edu/tutorials/process/gestaltprinciples/proximity/images/proximity01.gif]

Image: [https://www.google.co.in/search?biw=1280&bih=627&tbm=isch&sa=1&q=african+continent+gestalt&oq=african+continent+gestalt&gs_l=psy-ab.3...101077.106189.0.106636.19.18.0.0.0.0.200.1930.0j13j1.14.0....0...1.1.64.psy-ab..6.2.251...0i8i13i30k1j0i8i30k1.eHuNCUjYVVo#imgrc=dJlFKiZbZ9xxNM:]

Moving Further…

Sternberg & Sternberg (2011). Cognitive Psychology. *Wadsworth Publishing.* 6th Ed. (Fig 3.3, p. 90).



Dallenbach's Cow.

Sternberg & Sternberg (2011). Cognitive Psychology. *Wadsworth Publishing.* 6th Ed. (Fig 3.3, p. 90).

Constructivist Approaches to Perception

- The notion that perceiving something involves using stored knowledge as well as information coming in from the senses is embodied in form of an approach referred to as the **constructivist approach to perception.**

- this is based on the idea that the sensory information that forms the basis of perception is incomplete. & it is necessary to build our perception of the world from *incomplete* information.

- to accomplish that, we use what we already **know** about the world to interpret the incomplete sensory information coming in, and to 'make sense' of it. The stored knowledge is used to aid in the recognition of objects.

- Two of the foremost proponents of the constructivist approach were Irvin Rock (1977.1983,1997) & Richard Gregory (1980).

- Gregory suggested that individuals attempted to recognize objects by generating a series of **perceptual hypotheses** about what the object might be.

- Gregory conceptualized this process as being akin to how a scientist might investigate a problem by generating a series of hypotheses and accepting the one that is best supported by the data.

- Stored knowledge is assumed to be central to the generation of perceptual hypotheses as it allows us to fill in the gaps in our sensory input.

- the influence of stored knowledge is guiding perceptual hypotheses can be demonstrated by impoverished figures.

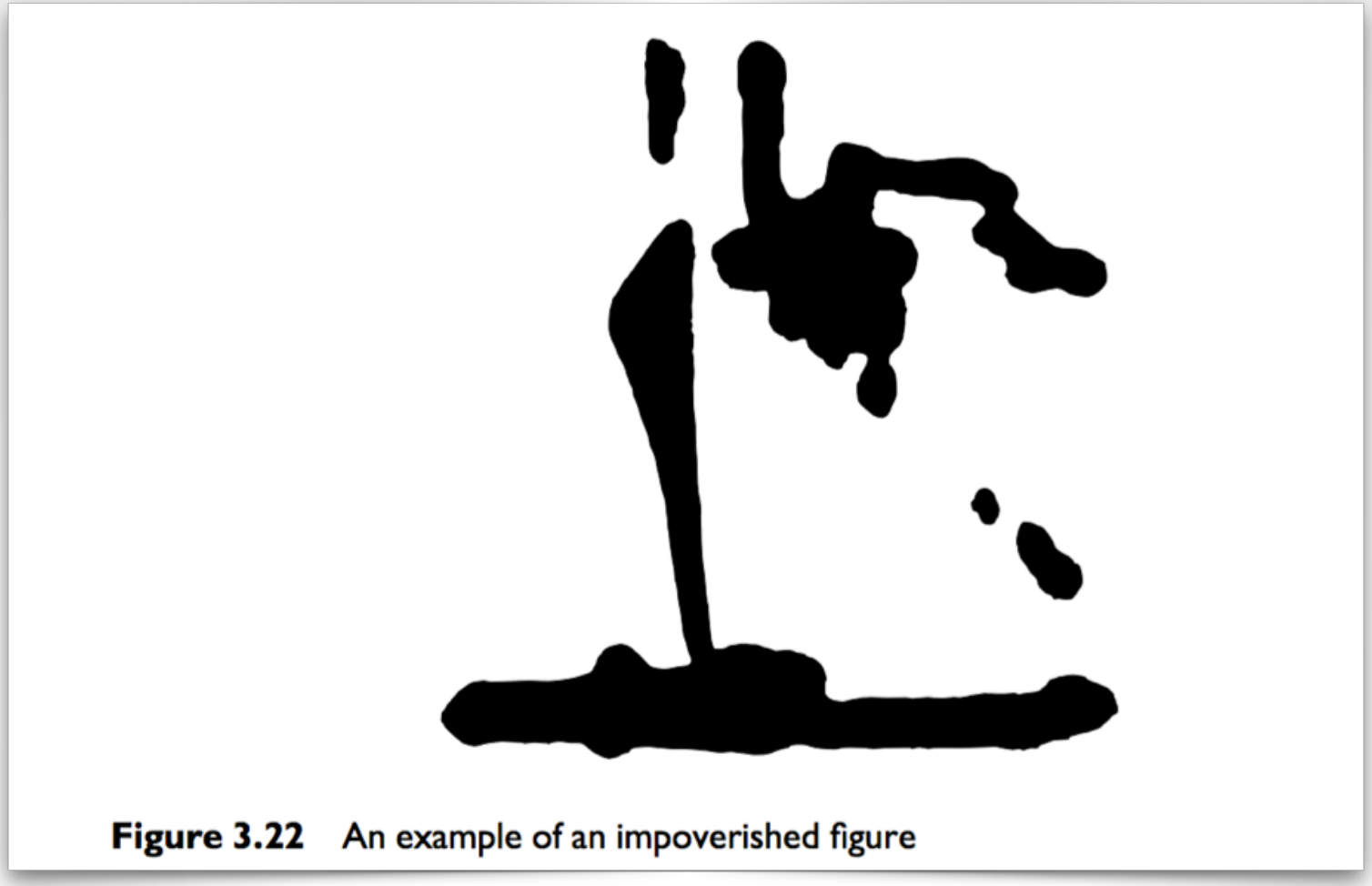


Figure 3.22 An example of an impoverished figure

Image: Braisby & Gellatly (2005). Cognitive Psychology. *Oxford University Press*. (Fig. 3.22, p. 100).

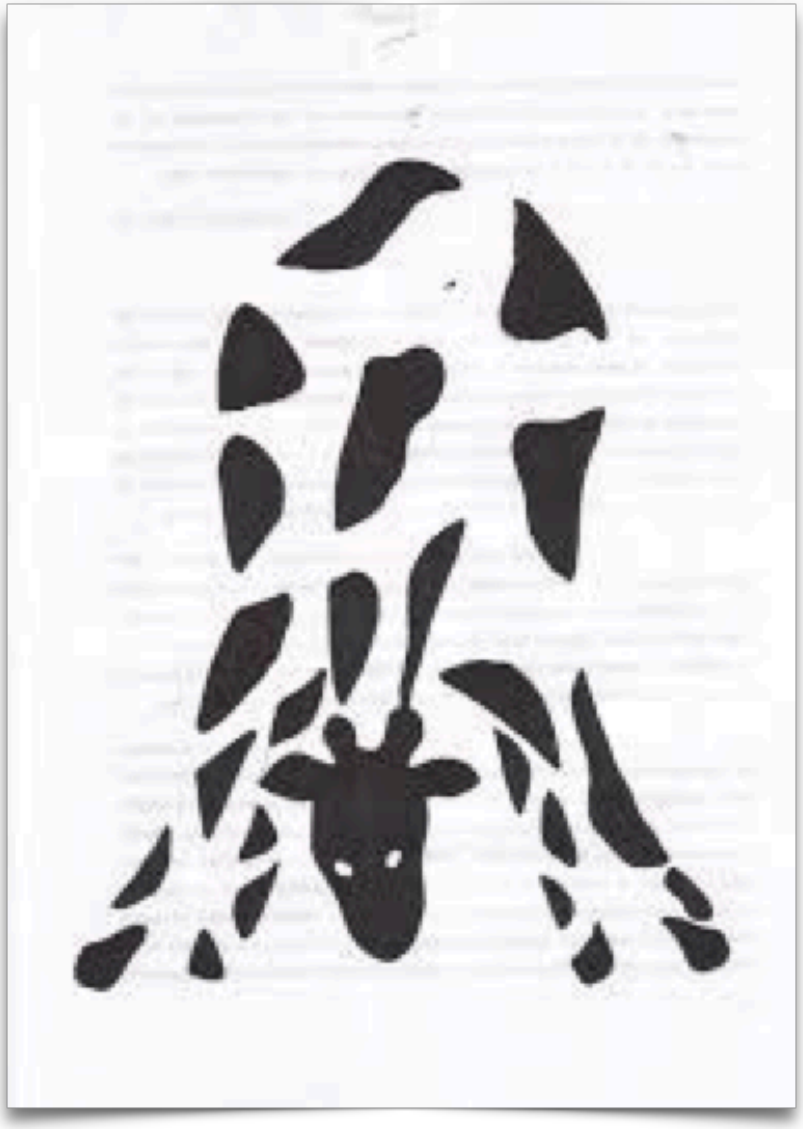


Image: [https://s-media-cache-ak0.pinimg.com/736x/2f/b2/34/2fb23424dd80ae04fe78d188fd4644e0--gestalt-laws-tech-art.jpg]

- The use of knowledge to guide our perceptual hypotheses may not always lead to ‘correct perception’; sometimes the same may lead towards accepting incorrect hypotheses and in ‘false perception’.

Figure 3.23 The mask of Hor

Image: Braisby & Gellatly (2005). Cognitive Psychology. *Oxford University Press*. (Fig. 3.23, p. 100).

- Although the constructivist approach in general & Gregory's theories in particular, provide an attractive explanatory framework for perception, there are areas of the theory that are left 'vague'.

- for e.g. how do we actually generate hypotheses & how do we know when to stop & decide which is the right one!

- however, there appears to be evidence that perceptions of the outside world can be ‘constructed’ using information flowing ‘up’ from the senses & combined with knowledge flowing ‘down’.

- note that this is entirely in contrast to Gibson & Marr.

To Sum Up

- We examined alternative or top – down approaches to perception.
- We saw that in addition to information from the sensory experience, information already stored in the brain/mind shall be useful in making sense of the external environment, especially in case of impoverished information from the senses is delivered.
- We may conclude that both top –down & bottom up processes may be involved in constructing perceptual representations of the external world.

References

- Braisby & Gellatly (2005). Cognitive Psychology. *Oxford University Press*.