

Perception

Prof. Riyadh Azzawi

Abdullah AlZibdeh

Introduction

In this summary, we discuss perception and the cues we use to perceive the world with. Collected questions are at the end.

Perception; Definition

Perception is the study of how we integrate sensory information into percepts of objects, and how we then use these percepts to get around in the world (a percept is a product of a perceptual process). It includes Recognition and Localization; both are important for survival. Another goal of perception is perceptual constancy. In all processes attention plays a role.

Recognition

It is recognizing an object by assigning it to a category; as this is a cat; this is a car, and so on. Recognizing people is by assigning visual input to a particular individual (that is Ahmed; this is Selma). Recognition allows us to infer many properties of the object.

We use many attributes of the object to recognize its shape; size; color; texture; orientation. All these may contribute, but the shape appears to play the most critical role. For example, we can recognize a cup regardless of its size; color; texture or orientation. We rely on the shape in its recognition. One piece of evidence is the recognition of objects from simple line drawings; which preserve only the shape of the objects.

Localization

To know where the objects in our environment are, the first thing that we have to do is to separate the objects from one another and from the background. So, the perceptual system can determine the position

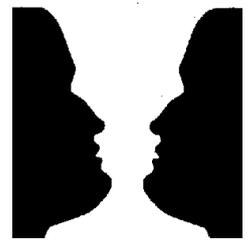
of this object, in three-dimensional world, including their distance from us and their patterns of movement.

Separation of objects

The image projected on our retina is a mosaic of varying brightness and colors. Somehow, our perceptual system organizes that mosaic into a set of discrete objects projected against a background.

Figure and ground

In a stimulus that contains two or more distinct regions, we see part of it as a figure and the rest as ground (background). The region seen as a figure contain the objects of interest, they appear more solid than the ground and appear in front of it.



Grouping of objects

We see not only the objects against a ground, but a particular grouping of the objects as well. The Gestalt psychologists proposed a number of determinants of grouping; proximity, similarity, good continuation and closure.

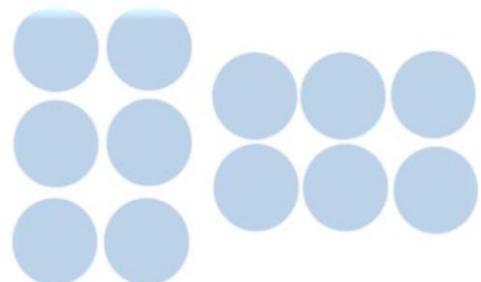
Similarity and proximity



Law of Similarity:

Items that are similar tend to be grouped together.

In the image above, most people see vertical columns of circles and squares.

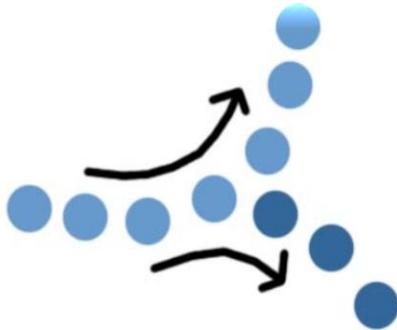


Law of Proximity:

Objects near each other tend to be grouped together.

The circles on the left appear to be grouped in vertical columns, while those on the right appear to be grouped in horizontal rows.

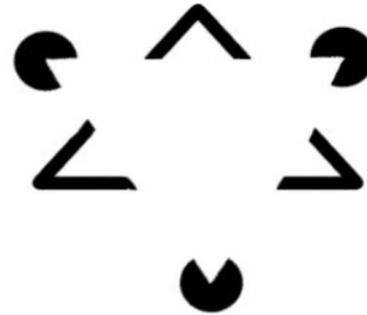
Continuity and closure



Law of Continuity:

Lines are seen as following the smoothest path.

In the image above, the top branch is seen as continuing the first segment of the line. This allows us to see things as flowing smoothly without breaking lines up into multiple parts.



Law of Closure:

Objects grouped together are seen as a whole.

We tend to ignore gaps and complete contour lines. In the image above, there are no triangles or circles, but our minds fill in the missing information to create familiar shapes and images.

Perceiving Distance

Depth cues

The retina is a two dimensional surface. This means that the retinal image is flat and has no depth at all. Therefore, we must use two dimensional cues as depth cues to infer distance in a three dimensional world. The cues are uni-ocular or binocular cues. A person using one eye is using monocular cues, these are:

1. Relative size: perceive the smallest as further.
2. Interposition: the overlapping object perceived as being nearest.
3. Relative height: objects nearer to the horizon perceived as being further away.
4. Linear perspective: when parallel lines in a scene appear to converge in the image, they appear as vanishing in the distance.

5. Shading and shadows: whenever a surface in a scene is blocked from receiving direct light a shadow is cast, if that shadow falls on a part of the same object that is blocking the light it is called an attached shadow or shading.

6. Motion parallax: seeing with both eyes rather than one gives us important advantage for depth perception. Because the eyes are separated in the head, each eye has a slightly different view of the same scene. The term binocular disparity is used to refer to the difference in the views seen by each eye. The disparity is largest for objects that are seen at close range and becomes smaller as the object recedes in the distance, beyond 3-4 m. binocular disparity loses its effectiveness as cue for depth.

Perceptual constancies

In addition to localization and recognition, the perceptual system has another goal; to keep the appearance of objects constant. (Real objects are constant in the shape, size, color and brightness.) Constancies make the task of localization and recognition easier.

Perceiving Motion

To move around our environment effectively, we need to know not only the location of static objects but also the moving ones.

Stroboscopic motion: what causes us to perceive motion? The simplest idea is that we perceive an object is in motion whenever its image moves across our retina. This is too simple, because we can see motion even when nothing moves on our retina. Stroboscopic motion is produced most simply by flashing a light in darkness and then, a few milliseconds later, flashing another light near the location of the first light, the light will seem to move from one place to the other like real motion as in movies.

Induced motion: When a large object surrounding a smaller one moves, the smaller object may appear to be the one that is moving even if it is static.

Real motion: our visual system is of course also sensitive to real motion. Some paths of motion on the retina must be attributed to movement of the eye over a stationary scene (reading). Other motion paths must be attributed to moving objects (as a bird enters our visual field). Moreover, some objects whose retinal image are stationary must be seem to be moving (following a flying bird with our eyes) while some objects whose retinal images are moving must be seen as stationary.

Selective adaptation

This is a loss in sensitivity to motion that occurs when we view motion. The adaptation is selective in that we lose sensitivity to the motion viewed and to similar motions but not to motion that differs significantly in direction or speed.

Attention

Attention is the ability to select some information for more detailed inspection, while ignoring other information. Attention involves selectivity. Most of the time, we are bombarded with so many stimuli that we are unable to recognize all of them. This is selective attention.

There are evidences indicate that we are born with considerable perceptual capacities. The natural development of some of these capacities may require years of normal input from the environment. But these clearly are learning effects on perception, as well.

Past-papers:

1. In which do we see motion with no object moving
2. Example of selective attention
3. Our ability to see an object coming out from its surroundings
4. You see a man wearing a blue shirt 100 meters away and recognized as your friend... according to gestalt which of the following perceptual constants u used to identify him: a- shape b- color c- shape and color d- brig

Answers:

1. – stroboscopic motion
2. – listening to lecture while others are whispering to you
3. – figure background discrimination
4. – Shape