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PERCEPTIBLE INFORMATION IN DESIGN

Aritra Mukherjee[1], Sugandh Malhotra[2], Lalit Kumar Das[3]

[1]M. Des. Student, IDC School of Design, Indian Institute of Technology Bombay
[2]Ex- Head, IDDC, Indian Institute of Technology Delhi
[3]Associate Professor, IDC School of Design, Indian Institute of Technology Bombay

Abstract

Everything that we see in the modern world, is/was designed by someone or a group of people. The design leverages our perception of information to convey information or emotion to our brain, to which we have certain triggers. The basic seven design drivers are the principles that drive a design towards perfection. For the perception of any information or emotions, the design must communicate necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities. This Paper aims at clearing what is the perception of information and its technicality, to describe perception in the field of design and to provide designers with a toolkit to implement the design driver efficiently.

Key Words: *Perception, Information, Emotion, Design*

1. Introduction

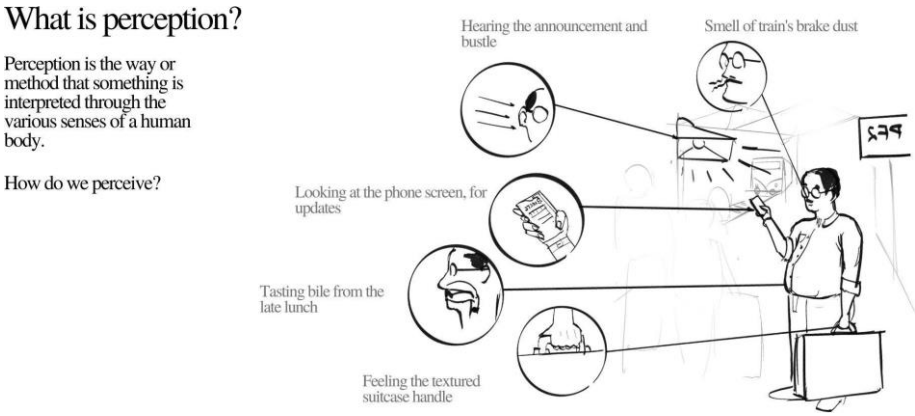
1.1 What Is Perception?

Touch, sight, audio, smell, and taste are the five senses that constitute perception. It also includes proprioception, a combination of senses that enables you to detect changes in your body's position and movement. (Cherry, 2020) It also includes cognitive processes that are necessary to analyze information, such as identifying a familiar face or smelling something familiar. Learn how we move from sensing stimuli in the environment to taking action based on that data (Fig 1).

1.1.1 Types of Perception

Some of the main types of perception include: vision, touch, sound, taste, and smell. Along with these, Balance, time, bodily position, acceleration, and the experience of

internal states are among the additional senses that allow us to perceive. Many of them are multimodal, involving many sensory modalities. Another crucial sort of perception is social perception, or the capacity to recognize and apply social clues about individuals



and relationships.

Fig. 1. Understanding perception

1.1.2 How It Works

The perceptual process is a set of stages that starts with the environment and ends with our perception of a stimulus and our response to it. It happens all the time, but you don't pay much thought to the actual process that occurs when you perceive the myriad stimuli that surround you at any one time.

The process of converting light falling on your retinas into a real visual image, for example, occurs instinctively and naturally. Without thinking about it, the minute changes in pressure against your skin allow you to sense objects happening.

1.1.3 Steps in the Perceptual Process

The following steps should be followed to carry on Perceptual process (Centre for Excellence in Universal Design. (n.d.)):

- The Environmental Stimulus
- The Attended Stimulus
- The Image on the Retina
- Transduction
- Neural Processing
- Perception
- Recognition Action

1.1.4 Impact of Perception

1. Environmental stimulation: The world is rich with stimuli that may be accessed through several senses to draw attention. Everything in the environment that has the potential to be recognized is considered an environmental stimulus.
2. The attended stimulus is the exact thing in the environment on which one's attention is focused.
3. The picture on the retina: This is accomplished by light traveling through the cornea and pupil of the eye and onto the lens. The cornea helps concentrate light as it enters the eye, and the iris of the eye determines how much light to let in by controlling the size of the pupils. An inverted picture is projected onto the retina by the cornea and lens working together.
4. Transduction: In the process of transduction, the picture on the retina is converted into electrical impulses. This permits visual signals to be delivered and understood by the brain.
5. Neural processing: The electrical impulses are next processed neurally. The path that a signal takes is determined by the sort of signal it is (i.e. an auditory signal or a visual signal).
6. Perception: You perceive the stimulus item in the environment in this phase of the process. This is the point at which you become aware of the stimuli (Centre for Excellence in Universal Design, n.d.).
7. Recognition: Perception entails more than simply becoming aware of the stimulus. The brain must also be able to identify and comprehend what you are feeling. The following phase, known as recognition, is the capacity to understand and provide meaning to the item.
8. Action: In response to the observed and acknowledged stimulus, some sort of motor activity happens in the action phase of perception. This might be a large action, like sprinting toward a distressed person, or something as minor as blinking your eyes in response to a cloud of dust in the air.

The perceptual process allows you to experience the world around you and interact with it in ways that are both appropriate and meaningful.

1.2 The Three Brains

The information that we perceive processes in our brain, most of which are in the most visceral parts of the brain. That is also known as the reptilian brain.

It took millions of years for our brain to evolve into what it is today. Even today, the functioning of the brain is understood by its evolution. The brain is distinguished into three broad parts- The visceral, behavioral and reflective parts. The visceral brain is the oldest and behavioral the newest level of the brain, as per evolution.

The new brain constitutes its latest development in evolution, and it represents the conscious part of the brain. It is responsible for logical decisions and reasoning. The midbrain is responsible for processing emotions and controls the behavior of a person. The old brain helps us in survival since it developed millions of years ago when survival was the basic need.

The old brain controls instinctive impulses, like fight or flight responses, physical maintenance, personal grooming and mating. It works voluntarily, on a visceral level but has a considerable impact on our decisions and life (Eissen et al., 2014). This old brain plays a large role in the perception and processing of information. The reason it is called the reptilian brain is that it represents the modern-day brain of a reptile. The other two brain levels also play a role in how a human responds to the triggers from the reptilian brain. During anger or rage, the reptilian brain takes over the other two parts of the brain. When people feel they are making decisions from the heart instead of the brain, they are using the old brain (Fig 2).

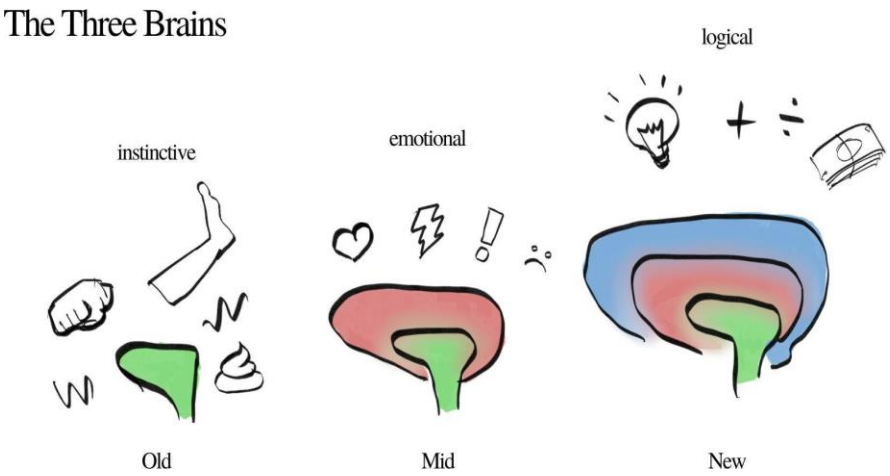


Fig. 2. The three levels of the human brain

1.3 The Visceral Brain Level

Our 'old' or reptilian brain level is linked to what we term the visceral level. Unconsciously,

automatic and quick judgments are produced at this level. This is what we refer to as our gut instinct. It is a reaction to exterior appearances that causes us to classify something as "beautiful" or to associate a colour with a mood. This level influences how something impacts us, and emotions emerge as a result of this response.

The behavioral level is concerned with the efficiency of usage and can promote or inhibit both other levels. The reflective level, which rationalizes and intellectualizes, is the third. It receives no sensory input directly, but it guards and attempts to bias the behavioral level. Cultural variations become apparent at this level, and views are formed, which then affect and alter our behavior. Everyone's visceral level is pretty much the same; it operates by matching patterns. Our old brain is still actively hunting for patterns that were imprinted at an early period in development, even if our initial cave home has given place to city and rural residences.

1.4 Patterns

We can tell the difference between positive and negative patterns. Bright, vivid hues; warmth; symmetry; round, smooth curves; sensuous shapes are all examples of positive patterns. Unexpected strong light; darkness; naked, flat terrain; too dense environment; large crowds of people; deformed human forms; looming things; sharp items are examples of negative patterns. Note how nicely these fit in with primitive survival; the flowers and fruits are symmetrical and have brilliant, intense hues. To protect our safety, we must be aware of unexpected changes in light or sharp objects, among other things (Fig 3).

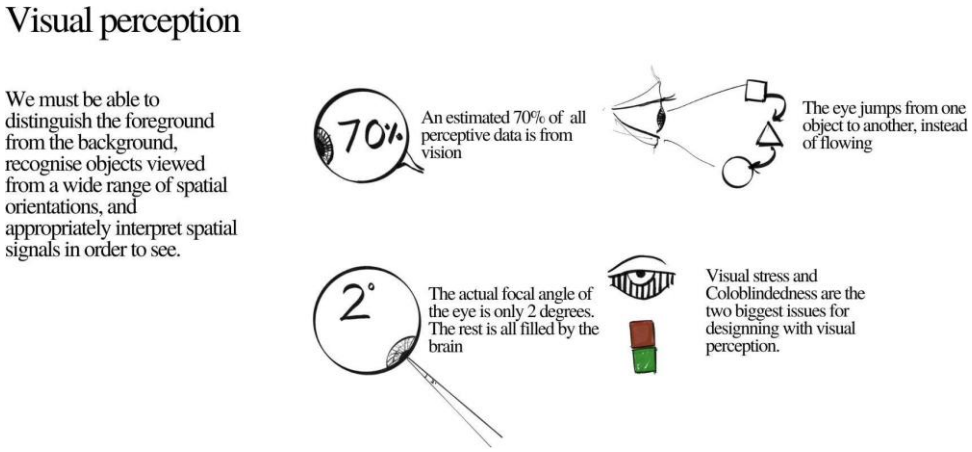


Fig. 3. Understanding visual perception

1.5 Acquired Taste

The brain began as a reptile brain, then evolved to include the midbrain, and finally evolved into

a reflective brain. When we compare this to how people develop from kid to adult, we can observe that the sequence in which the various brain levels are utilized is very similar. The visceral (survival) level of the brain is mostly used by little children. As a result, visceral concepts are frequently displayed in toys for young children. We tend to explore experiences beyond this level as we get older. We begin to use our reflective and behavioral brains, which can eventually overrule visceral responses. Viscerally bad things can be transformed into reflectively positive things. Crowds or noisy cities, for example, become second nature to us (or we conquer our dread of them). Another example is the bitter flavour found in many delectable and rich foods. In addition, our colour preferences become more complex and sophisticated. Acquired taste refers to the exploration and appreciation of things beyond the visceral level's constraints.

2. The Function of Gestalt theory in Perception

The Gestalt principles can aid in the organization and unification of visual information. We'll concentrate on prägnanz, closure, figure-ground, proximity, likeness, continuity, experience, uniform connection, and symmetry, among the roughly one hundred and forty Gestalt principles. Gestalt theory is characterized by concepts derived from investigations on how people interpret different types of visual information (Eissen et al.,2014).

Reading emotions is critical for survival in evolution. We tend to read emotional responses into anything, animate or inanimate, as a result of this. The act of putting human thoughts and feelings onto animals (pets) and inanimate things is known as anthropomorphism (Fig 4).

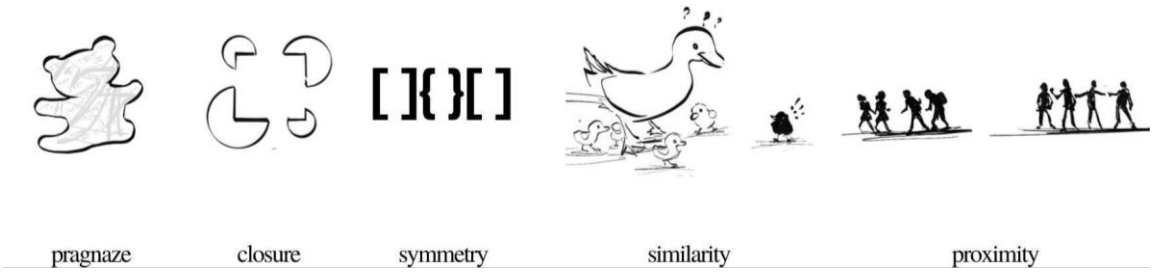


Fig. 4. A few gestalt principles through doodles

2.1 Gestalt Theory: An Introduction

One of the optical illusions of eyesight is the belief that you can see everything in front of you. In

truth, you only see a small area of your range of vision when you're 'active.' The foveal visual field is defined as a vertical angle with a 2-degree angle. It is encompassed by the parafoveal vision field, with which it forms a 22-degree vertical angle (Eissen et al., 2014). This area roughly corresponds to the space covered by your hand when you extend your arm in front of you and open it up; your hand now covers your active vision field. Isn't it quite small?

How did we come to believe that we can see everything in front of us? Because our eyes do not generally gaze, they travel at high speeds, recording everything in front of us and helping our brain to fit up all the jigsaw parts. As a result, the brain gets millions of sensory signals every second and attempts to make sense of them. The brain associates tastes, odours, and other sensations with what we see with our eyes. It contrasts current observations with earlier ones. Our brain interprets by looking for meaning in and connections between the numerous things it perceives. This is referred to as perception (Eissen et al.,2014). These eye movements are known as motion parallax, and the short moments when our eyes rest are known as fixations. These fixations do not occur at random but are concentrated in specific areas. This phenomenon was researched by scientists as early as the 1890s. They noticed that the test participants' fixations centered on the eyes and mouths in the image, which are important locations for face and emotion recognition. We seek significance and also for a connection between the components we perceive. As a result, we typically prefer to gaze at harmonious visuals rather than ones that lack harmony. On rare occasions, you may even recognise shapes that do not exist, such as seeing clouds shaped like an animal or a face on the moon. Although the principles do not specify how to convey your visual information during a product presentation, they do explain how this information is viewed.

2.1.1 The Principle of Prägnanz (concise)

We shall aim to arrange or reduce visual information to the simplest form feasible, i.e., more regular, symmetric, and orderly, according to this concept. It's a powerful idea that can be applied to our overall sense of perception, not simply visual perception. We seek simplicity and purpose in the things we see. We attempt to perceive something basic and meaningful even in complicated shapes. We want simple, straightforward (symmetrical) forms with as few as feasible (Eissen et al., 2014).

2.1.2 The Closure Principle

We complete partial pictures or objects in our brain according to this approach. To form a coherent or meaningful overall image, we fill in the visual gaps. This was necessary for human survival in the early stages of evolution. Many predators would hide in the shadows, just partially visible to humans.

2.1.3 The Symmetry Principle

We tend to interpret items as symmetrical. Most things may be split into two almost symmetrical parts. We instinctively unite two symmetrical things into one cohesive form when we observe them.

2.1.4 The principle of Similarity

We tend to group things or objects that have similar characteristics or that appear to be the same. Colour, value, texture, size, location, and other characteristics can be used to connect them. This idea, for example, underpins brand identity, among other things.

2.1.5 The Principle of Proximity

This is the perceptual propensity to combine visual elements that are close together, but elements that are further off are perceived as autonomous, or not related. This is due to relatedness, which allows us to see groupings or chunks rather than separate, independent items.

2.1.6 The Uniform Connectivity Principle

This concept states that items with uniform visual qualities are viewed as being more connected than those without uniform visual features.

2.1.7 The Continuity Principle

The concept of (good) continuity, continuation, or linearity expresses the idea that things moving in the same direction are regarded to be related to one another. In this way, the brain may sense lines even when they are not physically there. As a result, we can readily read road maps or distinguish between the 'figure' and the 'ground.'

2.1.8 The Experience Principle

We make instinctive comparisons between what we see and what we already know. Icon designers have made excellent use of this idea. When referring to a letter or a trash can, use an envelope icon to represent email and a trash can icon to represent 'delete.'

2.1.9 The Figure/Ground Principle

Objects are distinguished from their surroundings by the eye. Objects such as silhouettes, forms, or contours automatically become the 'figure,' while the surrounding space becomes the 'ground' (Cherry, 2020).

3. Examples of Perceptible Information in Design

3.1 Good Examples of Design

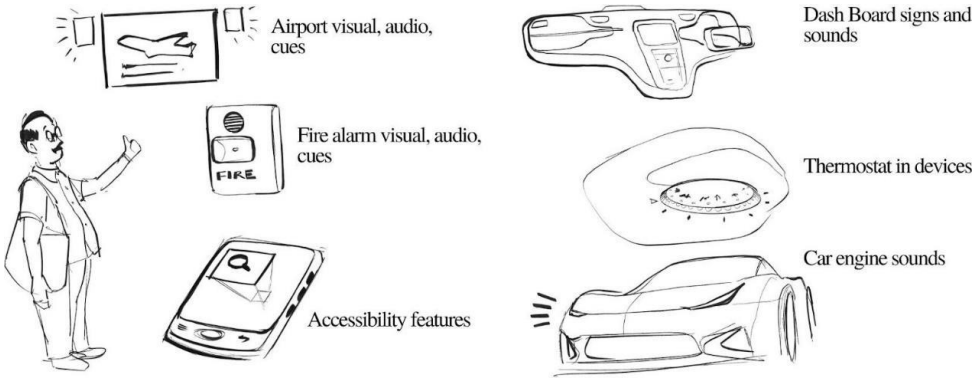


Fig. 5. Some good examples of design based on perceptible information

Airports have a lot of information flowing around, which is managed very efficiently. Airport sign boards and announcements make it very easy and intuitive to perceive information equitably. Signages are large and clear, information boards have all the information that a passenger might need to travel, like time difference, departure, arrival, flight number, boarding time, check-in, etc. Fire alarms have visual and auditory cues that help to perceive a fire emergency quickly. They have pulsating lights and loud sounds that can make everyone aware of the situation. Accessibility features in smartphones like magnifier, narration and voice assistance help a diverse range of users to make the most out of smartphones.

The dashboard of a car is designed in such a way that all the vital information can be perceived

by the driver in an effortless manner, be it a HUD or the switches and gauges, in a close call situation it helps the driver gain control quickly by various feedbacks.

Thermostats in devices, like electric iron, is also a very good example of the application of perceptible information in the design. They make a clicking sound with each unit rotation and has bumps on the surface, which makes tactile perception easier. By a combination of all the indicators, thermostats ensure the perfect setup and prevent mishaps.

Engine sounds of cars are important, as even electric vehicles are being mandated to have some sound as an indicator that it's passing by. This sound makes people perceive the awareness that a car is perhaps approaching and apply caution while crossing a road, or changing lanes while driving (Fig 5).

3.2 Bad Examples of Design

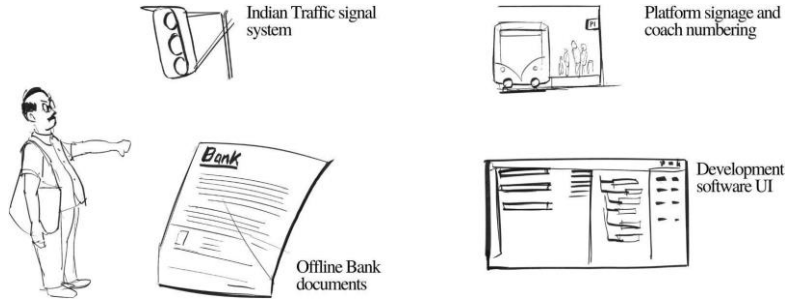


Fig. 6. Some bad examples of design based on perceptible information

There are a lot of bad examples of design that are not very perceptible at a glance.

The Indian traffic signal is very confusing and faulty. With improperly planned road systems, traffic signals are a nightmare.

Offline bank documents are supposed to make various bank procedures easier for people who do not want to do them digitally. Instead, they are extremely difficult to read and understand, hence making it not perceivable.

Platform signage and coach numbering in Indian Railways is not updated in many stations and trains, hence creating confusion and sometimes resulting in loss of money and time (Fig 6).

4. Guidelines for Designers

Centre for Excellence in Universal design proposes following guidelines for Designers to

implement perceptible information (Fig. 7):

1. Using visual, auditory and tactile feedback to the design process, to integrate equitable design principles.
2. Using Gestalt principles, like visual order, spacing, etc. to make it stand out.
3. Implementing clarity and contrast to help make a design easily perceivable.
4. Providing compatibility with other designs to make the perception process equitable.

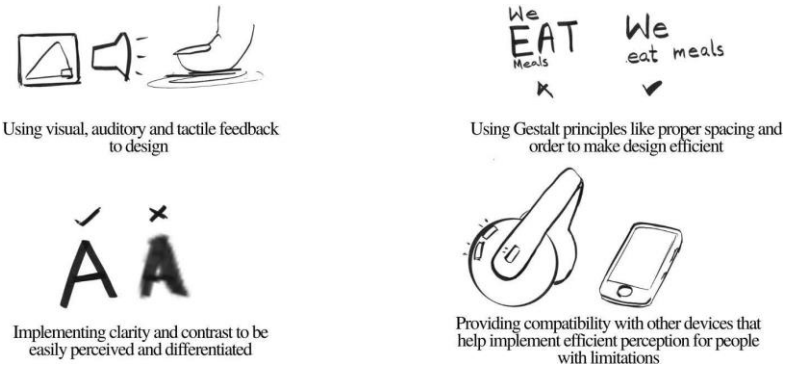


Fig. 7. Guidelines for Designers to implement perceptible informations.

5. Conclusion

In conclusion, everything that we see, hear or touch has an initial registration in our brain, which is the starting point of a perception process. Our job as Designers is to make this process as intuitive and easy as possible. By implementing the Universal Design Principles, we can make any experience better and easy. We should always keep in mind the guidelines and then proceed with a design to make it more perceptible.

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