



FIGURE 4.36 The “Birthday Paradox.”

As we reach a group size of 23 people, the probability that at least two people share the same birthday exceeds 0.5, or 50 percent. Research demonstrates that most people markedly underestimate the likelihood of this and other coincidences, sometimes leading them to attribute these coincidences to paranormal events.



Crystal ball readers claim to be able to tell us a great deal about ourselves and our futures. Yet many of them probably rely on cold-reading techniques that most of us could duplicate with relatively little training.

Further contributing to belief in ESP is our tendency to underestimate the frequency of coincidences (see Chapter 1). Most of us don't realize just how probable certain seemingly “improbable” events are. Take a crack at this question: *How large must a group of people be before the probability of two people sharing the same birthday exceeds 50 percent?*

Many participants respond with answers like 365, 100, or even 1,000. To most people's surprise, the correct answer is 23. That is, in a group of 23 people it's more likely than not that at least two people have the same birthday (see **FIGURE 4.36**). Once we get up to a group of 60 people, the odds exceed 99 percent. Because we tend to underestimate the likelihood of coincidences, we may be inclined to attribute them incorrectly to psychic phenomena.

PSYCHIC PREDICTIONS. For many years, science journalist Gene Emery tracked failed psychic predictions. In 2005, he found that psychics predicted that an airplane would crash into the Egyptian pyramids, astronauts would discover a Nazi flag planted on the moon, Earth's magnetic field would reverse, and a participant on a television reality show would cannibalize one of the contestants, none of which have occurred. Conversely, no psychic predicted any of the significant events that *did* occur in 2005, like Hurricane Katrina, which inflicted terrible loss of life and property damage on New Orleans and neighboring areas (Emery, 2005).

Many psychic forecasters make use of *multiple end points*, meaning they keep their predictions so open-ended that they're consistent with almost any conceivable set of outcomes (Gilovich, 1991). A psychic may predict, “A celebrity will get caught in a scandal this year.” But aside from being vague, this prediction is extremely open-ended. What counts as a “celebrity?” Sure, we'd all agree that Lady Gaga and Brad Pitt are celebrities, but does our congressional representative count? What about a local television newscaster? Similarly, what counts as a “scandal?”

What about psychics, like John Edward or James von Pragh, who claim to tell us things about ourselves or our dead relatives that they couldn't possibly have known? Most of these psychics probably rely on a set of skills known as *cold reading*, the art of persuading people we've just met that we know all about them (Hines, 2003; Hyman, 1977). If you want to impress your friends with a cold reading, **TABLE 4.3** contains some tips to keep in mind.

Cold reading works for one major reason: We humans seek meaning in our worlds and often find it even when it's not there. So in many respects we're reading into the cold reading at least as much as the cold reader is reading into us.

TABLE 4.3 Cold-Reading Techniques.

TECHNIQUE	EXAMPLE
Let the person know at the outset that you won't be perfect.	"I pick up a lot of different signals. Some will be accurate, but others may not be."
Start off with a <i>stock spiel</i> , a list of general statements that apply to just about everyone.	"You've recently been struggling with some tough decisions."
Fish for details by peppering your reading with vague probes.	"I'm sensing that someone with the letter M or maybe N has been important in your life lately."
Use the technique of <i>sleight of tongue</i> , meaning that you toss out so many guesses in rapid-fire fashion that at least a few of them are bound to be right.	"Has your father been ill?"; "How about your mother?"; "Hmmm ... I sense that someone in your family is ill or worried about getting ill."
Use a prop.	A crystal ball, set of tarot cards, or horoscope convey the impression that you're basing your reading on mystical information.
Make use of <i>population stereotypes</i> , responses or characteristics reported by many or even most people.	"I believe you have a piece of clothing, like an old dress or blouse, that you haven't worn in years but have kept for sentimental value."
Look for physical cues to the individual's personality or life history.	A traditional manner of dress often suggests a conventional and proper person, a great deal of shiny jewelry often suggests a flamboyant person, and so on.
Remember that "flattery will get you everywhere."	Tell people what they want to hear, like "I see a great romance on the horizon."

(Source: Hines, 2003; Hyman, 1977; Rowland, 2001)

Factoid

To persuade people you have ESP, try the following demonstration in a large group of friends. Tell them, "I want you to think of an odd two-digit number that's less than 50, the only catch being that the two digits must be different—because that would make it too easy for me." Give them a few moments, and say, "I get the sense that some of you were thinking of 37." Then pause and say, "I was initially thinking of 35, but changed my mind. Was I close?" Research shows that slightly more than half of people will pick either 37 or 35, which are population stereotypes (see Table 4.3) that can convince many people you possess telepathic powers (French, 1992; Hines, 2003).

Assess Your Knowledge

FACT or FICTION?

1. In top-down processing, we construct a whole stimulus from its parts. **True / False**
2. We perceive depth only when we have two slightly different views from our eyes. **True / False**
3. The earth's atmosphere enlarges the appearance of the moon, creating the moon illusion. **True / False**
4. Reversed subliminal messages can lead to violent actions. **True / False**
5. Belief in ESP can be partly explained by our tendency to underestimate the probability of coincidences. **True / False**

Answers: 1. F (p. 151); 2. F (p. 151); 3. F (p. 156); 4. F (p. 159); 5. T (p. 162)



Study and Review in MyPsychLab

Your Complete Review System



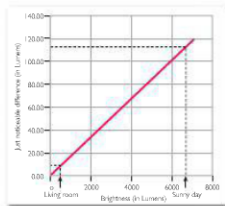
Study and Review in MyPsychLab

Two Sides of the Coin: Sensation and Perception 126–132

4.1 IDENTIFY THE BASIC PRINCIPLES THAT APPLY TO ALL SENSES.

Transduction is the process of converting an external energy, such as light or sound vibration, into electrical activity within neurons. The doctrine of specific nerve energies refers to how each of the sensory modalities is handled by specific regions of the brain. Even though most connections in the brain are faithful to one sense modality, brain regions often respond to information from a different sense.

1. The process of converting external stimulus energy into neural activity is called _____. (p. 127)
2. A _____ is a specialized cell that transduces a specific stimulus. (p. 127)
3. The _____ is the lowest level of a stimulus needed for the nervous system to detect a change 50 percent of the time. (p. 127)
4. _____ states that there is a constant proportional relationship between the JND and the original stimulus intensity. (pp. 127–128)
5. A striking example of cross-modal processing is the _____ effect. (p. 128)
6. Sir Francis Galton (1880) was the first to describe _____, a condition in which people experience cross-modal sensations, like hearing sounds when they see colors—sometimes called “colored hearing”—or even tasting colors. (p. 129)



4.2 DISCUSS THE ROLE OF ATTENTION AND THE NATURE OF THE BINDING PROBLEM.

To adapt to the challenges of an ever-changing environment, flexible attention is critical to survival and well-being. Yet attention must also be selective so that we are not overwhelmed by sensory inputs. One of the great mysteries of psychology is how we are able to bind different pieces of sensory information and cues together into a unified whole.

7. Donald Broadbent's (1957) _____ theory of attention views attention as a bottleneck through which information passes. (p. 129)
8. What does the cocktail party effect tell us about our ability to monitor stimuli outside of our immediate attention? (p. 130)
9. When we're unable to detect stimuli that are in plain sight when our attention is focused elsewhere, it is called _____. (p. 130)



Listen in MyPsychLab to chapter audio

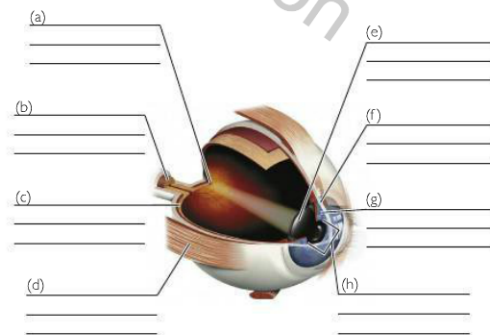
10. _____ refers to the mysterious way our mind combines different visual cues into a unified perception of a scene. (pp. 130–131)

Seeing: The Visual System 132–139

4.3 EXPLAIN HOW THE EYE STARTS THE VISUAL PROCESS.

The lens in the eye accommodates to focus on images both near and far by changing from “fat” to “flat.” The lens optimally focuses light on the retina, which lies at the rear of the eye. The retina contains rods and cones filled with pigments. Additional cells in the retina transmit information about light to ganglion cells, and the axons of these cells combine to form the optic nerve.

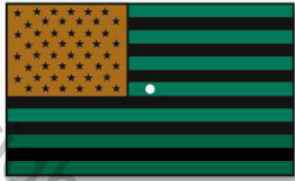
11. The _____ spectrum refers to the range of wavelengths of light that humans can see. (p. 132)
12. The intensity of reflected light that reaches our eyes is called _____. (p. 132)
13. Consisting of cells that are completely transparent, the _____ changes its curvature to keep images in focus. (p. 134)
14. We can think of the _____ as a “movie screen” onto which light from the world is projected. (p. 134)
15. _____ are receptor cells that allow us to see in low light, and _____ are receptor cells that allow us to see in color. (pp. 134–135)
16. Identify each eye component and its function. (p. 133)



4.4 IDENTIFY THE DIFFERENT KINDS OF VISUAL PERCEPTION.

Our visual system is sensitive to shape and color. We use different parts of the visual cortex to process these different aspects of visual perception. V1 cells are sensitive to lines of a particular orientation. Color perception involves a mixture of trichromatic and opponent processing.

17. The idea that color vision is based on our sensitivity to three different colors is called the _____ theory. (p. 136)
18. _____ is our ability to use minimal patterns to identify objects. (p. 136)
19. The ability to see afterimages after staring at the figure on the next page is explained by the _____ theory. (p. 137)



4.5 DESCRIBE DIFFERENT VISUAL PROBLEMS.

Blindness is a worldwide problem, especially in underdeveloped countries. There are several types of color blindness, the most common being red-green. The phenomenon of blindsight demonstrates that some blind people can make decent guesses about the location of objects in their environments.

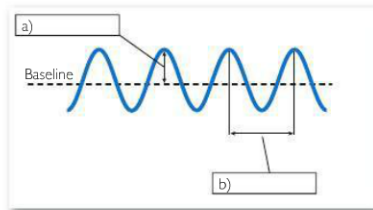
20. A person with _____ can tell us the shape and color of an object, but can't recognize or name it. (p. 138)

Hearing: The Auditory System 139–142

4.6 EXPLAIN HOW THE EAR STARTS THE AUDITORY PROCESS.

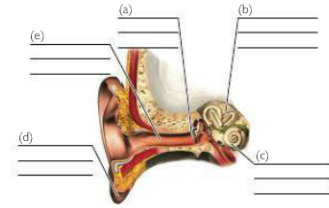
Sound waves created by vibration of air molecules are funneled into the outer ear. These vibrations perturb the eardrum, causing the three small bones in the middle ear to vibrate. This process creates pressure in the cochlea, which contains the basilar membrane and organ of Corti, in which hair cells are embedded. The hair cells then bend, thereby exciting them. The message is relayed through the auditory nerve.

21. Identify the items in the figure showing sound waves. (p. 139)



22. _____ refers to the frequency of the sound wave, and is measured in hertz (Hz). (p. 139)
23. The height of the sound wave corresponds to _____ and is measured in decibels (dB). (p. 140)
24. We refer to _____ to describe the complexity or quality of a sound. (p. 140)
25. The _____ lies in the inner ear and converts vibration into neural activity. (p. 140)
26. The organ of Corti and basilar membrane are especially critical to hearing because _____ are embedded within them. (p. 140)
27. Identify the components and their functions in the hearing process. (p. 141)

Printed by Binger Xu (xuxx726@umn.edu) on 12/6/2015 from 131.212.251.205 authorized to use until 1/8/2016. Use beyond the authorized user or valid subscription date represents a copyright violation.



4.7 IDENTIFY THE DIFFERENT KINDS OF AUDITORY PERCEPTION.

Place theory is pitch perception based on where along the basilar membrane hair cells are maximally excited. Frequency theory is based on hair cells reproducing the frequency of the pitch in their firing rates. In volley theory, groups of neurons stagger their responses to follow a pitch.

28. The perception of high-pitched tones by the basilar membrane can be explained by the _____ theory. (p. 141)
29. Two theories related to perceiving low-pitched tones are the _____ theory and _____ theory. (p. 141)
30. _____ is due to a malfunctioning of the ear, especially a failure of the eardrum or the ossicles of the inner ear. (p. 142)

Smell and Taste: The Sensual Senses 142–145

4.8 IDENTIFY HOW WE SENSE AND PERCEIVE ODORS AND TASTES.

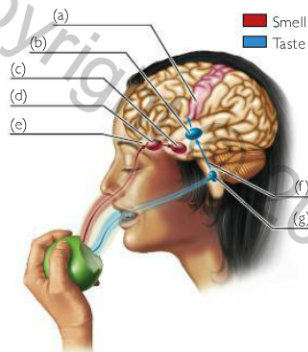
The tongue contains taste receptors for sweet, sour, bitter, salty, umami, and perhaps fat. Our ability to taste foods relies largely on smell. Olfactory receptors in our noses are sensitive to hundreds of different airborne molecules. We react to extremely sour tastes, which may be due to food spoilage, with disgust. We also appear sensitive to pheromones, odorless molecules that can affect sexual responses.

31. Airborne chemicals that interact with receptors in the lining of our nasal passages are called _____. (p. 143)
32. We detect taste with _____ that are on our tongue. (p. 143)
33. We're sensitive to _____ basic tastes, the last of which, _____, was recently discovered. (p. 143)
34. There is a (weak/strong) tendency for individual taste receptors to concentrate at certain locations on the tongue. (p. 143)
35. Our taste perception (is/isn't) dependent largely on our sense of smell. (p. 143)
36. Both tasting disgusting food and viewing facial expressions of disgust activate the _____. (p. 144)
37. What chemicals do some perfume advertisers inaccurately claim are contained in their products which, when worn, allegedly trigger a physical response from others? (p. 144)



Answers are located at the end of the text.

38. A region of the _____ is a site of convergence for smell and taste. (p. 145)
39. Label the brain components involved in the processes of smell and taste. (p. 145)



40. Researchers have showed that cancer patients who lose their sense of taste have a (better/worse) prognosis. (p. 145)

Our Body Senses: Touch, Body Position, and Balance 146–150

4.9 DESCRIBE THE THREE DIFFERENT BODY SENSES.

The three body senses are called “somatosensory” for body sensation, “proprioception” for muscle position sense, and “vestibular sense” for the sense of balance and equilibrium. The somatosensory system responds to light touch, deep pressure, hot and cold temperature, and tissue damage. Our muscles contain sense receptors that detect stretch and others that detect force. We calculate where our bodies are located from this information. We’re typically unaware of our sense of equilibrium.

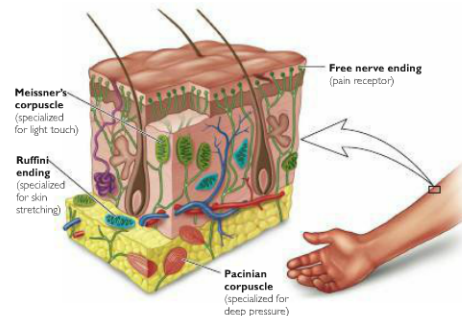
41. The body’s system for touch and pain is the _____ system. (p. 146)
42. Our sense of body position is called _____. (p. 146)
43. The _____, also called the sense of equilibrium, enables us to sense and maintain our balance. (p. 146)

4.10 EXPLAIN HOW PAIN PERCEPTION DIFFERS FROM TOUCH PERCEPTION.

There’s a large emotional component to pain perception that’s not present with touch. This is because pain information activates parts of the limbic system in addition to the somatosensory cortex.

44. We sense touch, temperature, and especially pain, with _____. (p. 146)
45. Our fingertips have the (least/most) nerve endings. (p. 146)
46. Information about body touch, temperature, and painful stimuli travels in the _____ nerves before entering the spinal cord. (p. 146)
47. Touch information travels more (slowly/quickly) than pain stimuli information. (p. 146)

48. Explain the process by which humans detect physical pressure, temperature, and pain. (p. 147)



49. Describe the “mirror box” treatment and identify its role in helping people who have lost limbs. (p. 148)



4.11 DESCRIBE THE FIELD OF PSYCHOLOGY CALLED HUMAN FACTORS.

The field of human factors starts with what psychologists have learned about sensation and perception, and then designs user-friendly devices, like computer keyboards and airplane cockpits, with this knowledge in mind.

50. Psychologists can use what we know about human psychology and sensory systems—ranging from our body position sense to vision—to build more _____, or worker-friendly, gadgets and tools of the trade. (p. 150)

Perception: When Our Senses Meet Our Brains 151–163

4.12 TRACK HOW OUR MINDS BUILD UP PERCEPTIONS.

Information travels from primary sensory to secondary sensory cortex and then on to association cortex. Along the way, perception becomes increasingly complex. We also process many different inputs simultaneously, a phenomenon called parallel processing. In addition to sensory inputs, our perceptual sets and expectations influence our perceptions. Perceptual constancy allows us to perceive stimuli across varied conditions.

51. In (top-down/bottom-up) processing, we construct a whole stimulus from its parts. (p. 151)
52. Name the processing model taking place when you look at this image with a caption of “woman” versus a caption of “saxophone player.” (p. 151)
53. The process by which we perceive stimuli consistently across varied conditions is _____. (p. 152)



54. The Gestalt principle illustrated by the image of the incomplete circle and rectangle is _____. (p. 153)



4.13 DESCRIBE HOW WE PERCEIVE PEOPLE, OBJECTS, AND SOUNDS IN OUR ENVIRONMENT.

Many neurons assembled in vast neural networks are probably responsible for face recognition. We perceive motion based on comparing visual frames like those in a movie, and we perceive depth by using both monocular and binocular cues. Cues also play an important role in locating sounds. Sometimes perception deceives us and we experience illusions.

55. The _____ is the illusion of movement created by successive flashing images. (p. 154)
56. To perceive three dimensions using only one eye, it is necessary to use _____ cues. (p. 155)
57. In the Müller-Lyer illusion a line of identical length appears (longer/shorter) when it ends in a set of arrowheads pointing inward than in a set of arrowheads pointing outward. (p. 157)

4.14 DISTINGUISH SUBLIMINAL PERCEPTION FROM SUBLIMINAL PERSUASION.

Subliminal perception refers to the processing of sensory information that occurs below the limen or threshold of conscious awareness. Subliminal persuasion refers to subthreshold influences over our attitudes, choices, or behaviors.

58. If a stimulus cannot be identified at better than chance levels, it is considered to be _____. (p. 158)
59. Subthreshold influence over our votes in an election is a good example of subliminal _____. (p. 158)

4.15 ANALYZE THE SCIENTIFIC EVIDENCE FOR AND AGAINST THE EXISTENCE OF ESP.

Most people accept the existence of ESP without the need for scientific evidence, in part because they greatly underestimate how likely it is that a coincidence occurs by chance.

60. Research suggests that the extraordinary claim of ESP (is/isn't) matched by equally extraordinary evidence. (p. 161)

Apply Your Scientific Thinking Skills

Use your scientific thinking skills to answer the following questions, referencing specific scientific thinking principles and common errors in reasoning whenever possible.

1. We can find scores of subliminal self-help tapes and MP3s advertised online despite the fact that studies show they are ineffective. Locate two examples of these products and examine their claims scientifically. Apart from the illusory placebo effect, what are other reasons that people who purchase these products might think they work?
2. Go online and locate psychic predictions for the *upcoming* year from at least two different sites. What common techniques

do they employ (such as multiple end points)? Now try to find predictions for the *past* year. How many of them were accurate? And how might those who made the predictions try to explain why they didn't come true?

3. Research the claims that proponents of aromatherapy make about the health benefits of essential oils. What does scientific research tell us about these claims?

Further Your Understanding

EXTEND YOUR KNOWLEDGE WITH THE MYPSYCHLAB VIDEO SERIES

Watch these videos in MyPsychLab. Follow the "Video Series" link.

-  **The Basics: In Full Appreciation of the Cookie** Watch how the simple act of eating a chocolate chip cookie involves all of our senses, and several parts of the brain are involved in forming our perception of that experience.
-  **In the Real World: Pain Management** See how injury is communicated to the brain, how pain signals can be intensified or blocked, and what the safest, most effective methods are for pain management.
-  **What's In It For Me? Perceptual Magic in Art and Movies** Investigate the ways in which artists play on and exploit sensation and perception to create works of art and illusion.

EXPERIENCE PSYCHOLOGICAL RESEARCH WITH MYPSYCHLAB SIMULATIONS

Access these simulations in MyPsychLab. Follow the "Simulations" link.

-  **Ambiguous Figures** View ambiguous figures and find out if what you "see" can be influenced by what you've viewed previously.

APPLY YOUR CRITICAL THINKING SKILLS WITH MYPSYCHLAB WRITING ASSESSMENTS

Complete these writing assignments in MyPsychLab.

The Gestalt psychologists maintained that when people perceive sensory elements, their tendency is to see things in terms of the entire form or pattern rather than as individual parts. Identify and describe these basic principles of perceptual organization from the Gestalt perspective: figure-ground, similarity, proximity, and closure.



Consciousness

EXPANDING THE BOUNDARIES OF PSYCHOLOGICAL INQUIRY

The Biology of Sleep 171

- The Circadian Rhythm: The Cycle of Everyday Life
- Stages of Sleep
- Lucid Dreaming
- Disorders of Sleep

Dreams 178

- Freud's Dream Protection Theory
- Activation-Synthesis Theory
- Dreaming and the Forebrain
- Neurocognitive Perspectives on Dreaming

evaluating claims Dream Interpretations 181

Other Alterations of Consciousness and Unusual Experiences 182

- Hallucinations: Experiencing What Isn't There
- Out-of-Body and Near-Death Experiences
- Mystical Experiences
- Hypnosis

from inquiry to understanding Why Do We Experience Déjà Vu? 185

psychomythology Age Regression and Past Lives 190

Drugs and Consciousness 191

- Substance Use Disorders
- Depressants
- Stimulants
- Narcotics
- Psychedelics

Your Complete Review System 200

