- ***Upright is honorable.*** Chinese and American participants associated honor-related phrases ("maintains honor" and "respects me") with arrows pointing up (↑) and right (→) (Lin & Oyserman, 2021).

As we attempt to decipher our world, our brain blends inputs from multiple channels. For example, more than 100 studies reveal captioned videos don't just boost speech comprehension among those with hearing loss, they benefit everyone (Gernsbacher, 2015). Captions help hearing children learn to read (by connecting sound to text). They enhance comprehension for those who are not native speakers of that language. And they boost attention and memory—of both TV commercials and course lectures.

But in a few select individuals, the brain circuits for two or more senses become joined in a phenomenon called *synesthesia,* where the stimulation of one sense triggers an experience of another (**FIGURE 20.11**). Early in life, "exuberant neural connectivity" produces some arbitrary associations among the senses, which later are normally—but not always—pruned (Wagner & Dobkins, 2011). In a brain that blends sensations, hearing music may activate color-sensitive cortex regions and trigger a sensation of color (Brang et al., 2008; Hubbard et al., 2005). Seeing a number may evoke a taste or color sensation (Newell & Mitchell, 2016; Ranzini & Girelli, 2019). People with synesthesia experience such sensory blends.

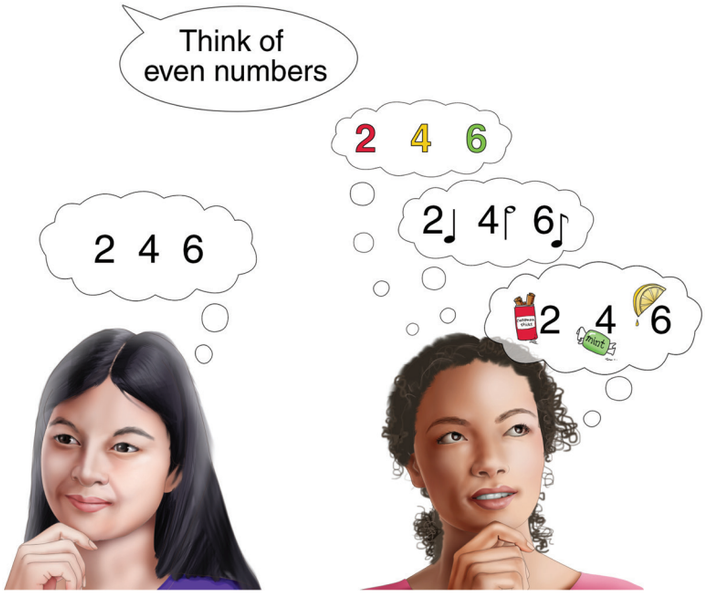

FIGURE 20.11
Synesthesia's symphony A person with synesthesia experiences blended sensations. For example, hearing numbers may evoke an experience of specific colors or smells or musical notes.

ASK YOURSELF

When have you experienced a feeling that you think could be explained by embodied cognition?

Perception Without Sensation?

LOQ 20-9 What are the claims of ESP, and what have most research psychologists concluded after putting these claims to the test?

The river of perception is fed by sensation, cognition, and emotion. If perception is the product of these three sources, what can we say about **extrasensory perception (ESP)**, which claims that perception can occur without sensory input? Are there indeed people—any people—who can read minds, see through walls, or foretell the future? Nearly half of Americans surveyed believe we are capable of ESP, and 41 percent believe in psychics (Gecewicz, 2018; Kim et al., 2015).

If ESP is real, we would need to overturn the scientific understanding that we are creatures whose minds are tied to our physical brains and whose perceptual experiences of the world are built of sensations. The most testable and, for this discussion, most relevant ESP claims are

- ***telepathy:*** mind-to-mind communication.
- ***clairvoyance:*** perceiving remote events, such as a house on fire across the country.
- ***precognition:*** perceiving future events, such as an unexpected death in the next month.

Closely linked to these ESP claims is *psychokinesis,* or "mind moving matter," such as levitating a table or controlling the roll of a die. (The claim, also called *telekinesis,* is illustrated by the wry request, "Will all those who believe in psychokinesis please raise my hand?") In Britain, psychologists created a "mind machine" to see if festival visitors could influence or predict a coin toss (Wiseman & Greening, 2002). Participants were given four attempts to call heads or tails, playing against a computer. By the time the experiment ended, nearly 28,000 people had predicted 110,959 tosses—with 49.8 percent correct, almost exactly as chance would predict.

Jon Carter/Cartoon Stock

extrasensory perception (ESP) the controversial claim that perception can occur apart from sensory input; includes telepathy, clairvoyance, and precognition.

parapsychology the study of paranormal phenomena, including ESP and psychokinesis (also called *telekinesis*).

Most psychological scientists are skeptical that paranormal phenomena exist. But in several reputable universities, **parapsychology** researchers search for possible ESP phenomena by performing scientific experiments (Cardeña, 2018; Storm et al., 2010a,b; Turpin, 2005). Before seeing how they conduct their research, let's consider some popular beliefs.

Premonitions or Pretensions?

Can psychics see into the future? No greedy—or charitable—psychic has been able to make billions on the stock market. Where were the psychics the day before the 9/11 terrorist attacks? Why could no psychics help locate Osama bin Laden afterward? Why did none of them prepare us for the Covid-19 pandemic?

Psychic visions offered to police departments have been no more accurate than guesses made by others (Nickell, 2005; Palmer, 2013; Radford, 2010). But their sheer volume increases the odds of an occasional correct guess, which psychics can then report to the media. Such visions can sound amazingly correct when later retrofitted to match events. Nostradamus, a sixteenth-century French psychic, explained in an unguarded moment that his ambiguous prophecies "could not possibly be understood till they were interpreted after the event and by it." Shoot, and then call whatever you hit the target.

A headline you've never seen: "Psychic wins lottery."

Are everyday people's "visions" any more accurate than psychic predictions? Do our dreams foretell the future, as people from both Eastern and Western cultures tend to believe (Morewedge & Norton, 2009)? Or do they only seem to do so when we recall or reconstruct them in light of what has already happened? Are our remembered visions merely revisions? After famed aviator Charles Lindbergh's baby son was kidnapped and murdered in 1932, but before the body was discovered, two Harvard psychologists invited people to report their dreams about the child (Murray & Wheeler, 1937). How many visionaries replied? 1300. How many accurately envisioned the child dead? Five percent. How many also correctly anticipated the body's location—buried among trees? Only 4. Although this number was surely no better than chance, to those 4 dreamers, the accuracy of their apparent precognitions must have seemed uncanny.

"A person who talks a lot is sometimes right." —Spanish proverb

Given countless daily events, and given enough days, some stunning coincidences are bound to occur. By one careful estimate, chance alone would predict that more than a thousand times per day, someone on Earth will think of another person and then, within the next 5 minutes, learn of that person's death (Charpak & Broch, 2004). Thus, when explaining an astonishing event, we should "give chance a chance" (Lilienfeld, 2009). With enough time and people, the improbable becomes inevitable.

"It's not *impossible*, my dear. It's just a very remarkable coincidence—and remarkable coincidences do happen." —Agatha Christie's Miss Marple in *Sleeping Murder*, 1976

Putting ESP to Experimental Test

When faced with claims of mind reading or out-of-body travel or communication with the dead, how can we separate fiction from strange-but-true fact? Psychological science offers a simple answer: *Test claims to see if they work*. If they do, so much the better for the ideas. If they don't, so much the better for our skepticism.

Both believers and skeptics agree that what parapsychology needs is a reproducible phenomenon and a theory to explain it. Parapsychologist Rhea White (1998) spoke for many in saying that "the image of parapsychology that comes to my mind, based on nearly 44 years in the field, is that of a small airplane [that] has been perpetually taxiing down the runway of the Empirical Science Airport since 1882 . . . its movement punctuated occasionally by lifting a few feet off the ground only to bump back down on the tarmac once again. It has never taken off for any sustained flight."

How might we test ESP claims in a controlled, reproducible experiment? An experiment differs from a staged demonstration. In the laboratory, the experimenter controls what the "psychic" sees and hears. On stage, the psychic controls what the audience sees and hears.

Daryl Bem, a respected social psychologist, once quipped that "a psychic is an actor playing the role of a psychic" (1984). Yet this one-time skeptic reignited hopes for replicable evidence of ESP with nine experiments that seemed to show people anticipating future events (Bem, 2011). In one, when an erotic scene was about to appear on a screen in one of two randomly selected positions, Cornell University participants guessed the right placement 53.1 percent of the time (beating chance by a small but statistically significant margin).

Despite Bem's research surviving critical reviews by a top-tier journal, critics found Bem's methods and statistical analyses "badly flawed" and "biased" (Alcock, 2011; Wagenmakers et al., 2011). And so, conclude parapsychology's critics, after "nearly 150 years of efforts" to document ESP, "there has been, literally, no progress" (Reber & Alcock, 2020). Anticipating such skepticism, Bem made his research materials available to anyone who wished to replicate his studies. Multiple attempts have met with minimal success and continuing controversy (Bem et al., 2015; Ritchie et al., 2012; Wagenmakers, 2014). Regardless, science is doing its work:

- It has been open to a finding that challenges its own assumptions.
- Through follow-up research, it has assessed the reliability and validity of that finding.

And that is how science sifts crazy-sounding ideas, leaving most on the historical waste heap while occasionally surprising us.

For 19 years, the late skeptic and magician James Randi offered $1 million "to anyone who proves a genuine psychic power under proper observing conditions" (Randi, 1999; Thompson, 2010). French, Australian, and Indian groups have made similar offers of up to 200,000 euros (CFI, 2003). Large as these sums are, the scientific seal of approval would be worth far more. To refute those who say there is no ESP, one need only produce a single person who can demonstrate a single, reproducible ESP event. (To refute those who say pigs can't talk would take but one talking pig.) So far, after more than a thousand aspirants, no such person (or pig) has emerged (Fox, 2020).

"At the heart of science is an essential tension between two seemingly contradictory attitudes—an openness to new ideas, no matter how bizarre or counterintuitive they may be, and the most ruthless skeptical scrutiny of all ideas, old and new." —Carl Sagan (1987)

RETRIEVAL PRACTICE

RP-7 If an ESP event did occur under controlled conditions, what would be the next step to confirm that ESP really exists?

ANSWERS IN APPENDIX E

* * *

To feel awe, mystery, and a deep reverence for life, we need look no further than our own perceptual system and its capacity for organizing formless nerve impulses into colorful sights, vivid sounds, and evocative smells. As Shakespeare's Hamlet recognized, "There are more things in Heaven and Earth, Horatio, than are dreamt of in your philosophy." Within our ordinary sensory and perceptual experiences lies much that is truly extraordinary—surely much more than has so far been dreamt of in our psychology.