Three

Seconds to Minutes Before

Nothing comes from nothing. No brain is an island.

Thanks to messages bouncing around your brain, a command has been sent to your muscles to pull that trigger or touch that arm. Odds are that a short time earlier, something outside your brain prompted this to happen, raising this chapter's key questions: (a) What outside stimulus, acting through what sensory channel and targeting which parts of the brain, prompted this? (b) Were you aware of that environmental stimulus? (c) What stimuli had your brain made you particularly sensitive to? And, of course, (d) what does this tell us about our best and worst behaviors?

Varied sensory information can prompt the brain into action. This can be appreciated by considering this variety in other species. Often we're clueless about this because animals can sense things in ranges that we can't, or with sensory modalities we didn't know exist. Thus, you must think like the animal to learn what is happening. We'll begin by seeing how this pertains to the field of ethology, the science of interviewing an animal in its own language.

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Ethology formed in Europe in the early twentieth century in response to an American brand of psychology, “behaviorism.” Behaviorism descended from the introduction’s John Watson; the field’s famed champion was B. F. Skinner. Behaviorists cared about universalities of behavior across species. They worshipped a doozy of a seeming universal concerning stimulus and response: rewarding an organism for a behavior makes the organism more likely to repeat that behavior, while failure to get rewarded or, worse, punishment for it, makes the organism less likely to repeat it. Any behavior can be made more or less common through “operant conditioning” (a term Skinner coined), the process of controlling the rewards and punishments in the organism’s environment.

Thus, for behaviorists (or “Skinnerians,” a term Skinner labored to make synonymous) virtually any behavior could be “shaped” into greater or lesser frequency or even “extinguished” entirely.

If all behaving organisms obeyed these universal rules, you might as well study a convenient species. Most behaviorist research was done on rats or, Skinner’s favorite, pigeons. Behaviorists loved data, no-nonsense hard numbers; these were generated by animals pressing or pecking away at levers in “operant conditioning boxes” (aka “Skinner boxes”). And anything discovered applied to any species. A pigeon is a rat is a boy, Skinner preached. Soulless droid.*

Behaviorists were often right about behavior but wrong in really important ways, as many interesting behaviors don’t follow behaviorist rules.*[1] Raise an infant rat or monkey with an abusive mother, and it becomes more attached to her. And behaviorist rules have failed when humans love the wrong abusive person.

Meanwhile, ethology was emerging in Europe. In contrast with behaviorism’s obsession with uniformity and universality of behavior, ethologists loved behavioral variety. They’d emphasize how every species evolves unique behaviors in response to unique demands, and how one had to open-mindedly observe animals in their natural habitats to understand them (“Studying rat social behavior in a cage is like studying dolphin swimming behavior in a bathtub” is an ethology adage). They’d ask, What, objectively, is the behavior? What triggered it? Did it have to be learned? How did it evolve? What is the behavior's adaptive value? Nineteenth-century parsons went into nature to collect butterflies, revel in the variety of wing colors, and marvel at what God had wrought. Twentieth-century ethologists went into nature to collect behavior, revel in its variety, and marvel at what evolution had wrought. In contrast to lab coat–clad behaviorists, ethologists tromped around fields in hiking shoes and had fetching knobby knees.*

Sensory Triggers of Behavior in Some Other Species

Using an ethological framework, we now consider sensory triggers of behavior in animals.*[2] First there's the auditory channel. Animals vocalize to intimidate, proclaim, and seduce. Birds sing, stags roar, howler monkeys howl, orangutans give territorial calls audible for miles. As a subtle example of information being communicated, when female pandas ovulate, their vocalizations get higher, something preferred by males. Remarkably, the same shift and preference happens in humans.

There are also visual triggers of behavior. Dogs crouch to invite play, birds strut their plumage, monkeys display their canines menacingly with "threat yawns." And there are visual cues of cute baby–ness (big eyes, shortened muzzle, round forehead) that drive mammals crazy, motivating them to care for the kid. Stephen Jay Gould noted that the unsung ethologist Walt Disney understood exactly what alterations transformed rodents into Mickey and Minnie.*[3]

Then there are animals signaling in ways we can't detect, requiring creativity to interview an animal in its own language.[4] Scads of mammals scent mark with pheromones—odors that carry information about sex, age, reproductive status, health, and genetic makeup. Some snakes see in infrared, electric eels court with electric songs, bats compete by jamming one another's feeding echolocation signals, and spiders identify intruders by vibration patterns on their webs. How about this: tickle a rat and it chirps ultrasonically as its mesolimbic dopamine system is activated.

Back to the rhinencephalon/limbic system war and the resolution ethologists already knew: for a rodent, emotion is typically triggered by olfaction. Across species the dominant sensory modality—vision, sounds, whichever—has the most direct access to the limbic system.

Under the Radar: Subliminal and Unconscious Cuing

It's easy to see how the sight of a knife, the sound of a voice calling your name, a touch on your hand can rapidly alter your brain.[5] But crucially, tons of subliminal sensory triggers occur—so fleeting or minimal that we don't consciously note them, or of a type that, even if noted, seems irrelevant to a subsequent behavior.

Subliminal cuing and unconscious priming influence numerous behaviors unrelated to this book. People think potato chips taste better when hearing crunching sounds. We like a neutral stimulus more if, just before seeing it, a picture of a smiling face is flashed for a twentieth of a second. The more expensive a supposed (placebo) painkiller, the more effective people report the placebo to be. Ask subjects their favorite detergent; if they've just read a paragraph containing the word "ocean," they're more likely to choose Tide—and then explain its cleaning virtues.[6]

Thus, over the course of seconds sensory cues can shape your behavior unconsciously.

A hugely unsettling sensory cue concerns race.[7] Our brains are incredibly attuned to skin color. Flash a face for less than a tenth of a second (one hundred milliseconds), so short a time that people aren't even sure they've seen something. Have them guess the race of the pictured face, and there's a better-than-even chance of accuracy. We may claim to judge someone by the content of their character rather than by the color of their skin. But our brains sure as hell *note* the color, real fast.

By one hundred milliseconds, brain function already differs in two depressing ways, depending on the race of the face (as shown with neuroimaging). First, in a widely replicated finding, the amygdala activates. Moreover, the more racist someone is in an implicit test of race bias (stay tuned), the more activation there is.[8]

Similarly, repeatedly show subjects a picture of a face accompanied by a shock; soon, seeing the face alone activates the amygdala.[9] As shown by Elizabeth Phelps of NYU, such "fear conditioning" occurs faster for other-race than same-race faces. Amygdalae are prepared to learn to associate something bad with Them. Moreover, people judge neutral other-race faces as angrier than neutral same-race faces.

So if whites see a black face shown at a subliminal speed, the amygdala activates.[10] But if the face is shown long enough for conscious processing, the anterior cingulate and the “cognitive” dlPFC then activate and inhibit the amygdala. It’s the frontal cortex exerting executive control over the deeper, darker amygdaloid response.

Second depressing finding: subliminal signaling of race also affects the fusiform face area, the cortical region that specializes in facial recognition.[11] Damaging the fusiform, for example, selectively produces “face blindness” (aka prosopagnosia), an inability to recognize faces. Work by John Gabrieli at MIT demonstrates less fusiform activation for other-race faces, with the effect strongest in the most implicitly racist subjects. This isn’t about novelty—show a face with purple skin and the fusiform responds as if it’s same-race. The fusiform isn’t fooled—“That’s not an Other; it’s just a ‘normal’ Photoshopped face.”

In accord with that, white Americans remember white better than black faces; moreover, mixed-race faces are remembered better if described as being of a white rather than a black person. Remarkably, if mixed-race subjects are told they’ve been assigned to one of the two races for the study, they show less fusiform response to faces of the arbitrarily designated “other” race.[12]

Our attunement to race is shown in another way, too.[13] Show a video of someone’s hand being poked with a needle, and subjects have an “isomorphic sensorimotor” response—hands tense in empathy. Among both whites and blacks, the response is blunted for other-race hands; the more the implicit racism, the more blunting. Similarly, among subjects of both races, there’s more activation of the (emotional) medial PFC when considering misfortune befalling a member of their own race than of another race.

This has major implications. In work by Joshua Correll at the University of Colorado, subjects were rapidly shown pictures of people holding either a gun or a cell phone and were told to shoot (only) gun toters. This is painfully reminiscent of the 1999 killing of Amadou Diallo. Diallo, a West African immigrant in New York, matched a description of a rapist. Four white officers questioned him, and when the unarmed Diallo started to pull out his wallet, they decided it was a gun and fired forty-one shots. The underlying neurobiology concerns “event-related potentials” (ERPs), which are stimulus-induced changes in electrical activity of the brain (as assessed by EEG—electroencephalography). Threatening faces produce a distinctive change (called the P200 component) in the ERP waveform in under two hundred milliseconds. Among white subjects, viewing someone black evokes a stronger P200 waveform than viewing someone white, regardless of whether the person is armed. Then, a few milliseconds later, a second, inhibitory waveform (the N200 component) appears, originating from the frontal cortex—"Let's think a sec about what we're seeing before we shoot." Viewing a black individual evokes less of an N200 waveform than does seeing someone white. The greater the P200/N200 ratio (i.e., the greater the ratio of I'm-feeling-threatened to Hold-on-a-sec), the greater the likelihood of shooting an unarmed black individual. In another study subjects had to identify fragmented pictures of objects. Priming white subjects with subliminal views of black (but not white) faces made them better at detecting pictures of weapons (but not cameras or books).[14]

Finally, for the same criminal conviction, the more stereotypically African a black individual's facial features, the longer the sentence.[15] In contrast, juries view black (but not white) male defendants more favorably if they're wearing big, clunky glasses; some defense attorneys even exploit this "nerd defense" by accessorizing their clients with fake glasses, and prosecuting attorneys ask whether those dorky glasses are real. In other words, when blind, impartial justice is supposedly being administered, jurors are unconsciously biased by racial stereotypes of someone's face.

This is so depressing—are we hardwired to fear the face of someone of another race, to process their face less as a face, to feel less empathy? No. For starters, there's tremendous individual variation—not everyone's amygdala activates in response to an other-race face, and those exceptions are informative. Moreover, subtle manipulations rapidly change the amygdaloid response to the face of an Other. This will be covered in chapter 11.

Recall the shortcut to the amygdala discussed in the previous chapter, when sensory information enters the brain. Most is funneled through that sensory way station in the thalamus and then to appropriate cortical region (e.g., the visual or auditory cortex) for the slow, arduous process of decoding light pixels, sound waves, and so on into something identifiable. And finally information about it ("It's Mozart") is passed to the limbic system.

As we saw, there's that shortcut from the thalamus directly to the amygdala, such that while the first few layers of, say, the visual cortex are futzing around with unpacking a complex image, the amygdala is already thinking, "That's a gun!" and reacting. And as we saw, there's the trade-off: information reaches the amygdala fast *but is often inaccurate*.[16] The amygdala thinks it knows what it's seeing before the frontal cortex slams on the brakes; an innocent man reaches for his wallet and dies.

Other types of subliminal visual information influence the brain.[17] For example, the gender of a face is processed within 150 milliseconds. Ditto with social status. Social dominance looks the same across cultures—direct gaze, open posture (e.g., leaning back with arms behind the head), while subordination is signaled with averted gaze, arms sheltering the torso. After a mere 40-millisecond exposure, subjects accurately distinguish high- from low-status presentations. As we'll see in chapter 12, when people are figuring out stable status relations, logical areas of the frontal cortex (the vmPFC and dlPFC) activate; but in the case of unstable, flip-flopping relations, the amygdala also activates. It's unsettling when we're unsure who gets ulcers and who gives them.

There's also subliminal cuing about beauty.[18] From an early age, in both sexes and across cultures, attractive people are judged to be smarter, kinder, and more honest. We're more likely to vote for attractive people or hire them, less likely to convict them of crimes, and, if they are convicted, more likely to dole out shorter sentences. Remarkably, the medial orbitofrontal cortex assesses both the beauty of a face and the goodness of a behavior, and its level of activity during one of those tasks predicts the level during the other. The brain does similar things when contemplating beautiful minds, hearts, and cheekbones. And assumes that cheekbones tell something about minds and hearts. This will be covered in chapter 12.

Though we derive subliminal information from bodily cues, such as posture, we get the most information from faces.[19] Why else evolve the fusiform? The shape of women's faces changes subtly during their ovulatory cycle, and men prefer female faces at the time of ovulation. Subjects guess political affiliation or religion at above-chance levels just by looking at faces. And for the same transgression, people who look embarrassed—blushing, eyes averted, face angled downward and to the side—are more readily forgiven.

Eyes give the most information.[20] Take pictures of two faces with different emotions, and switch different facial parts between the two with cutting and pasting. What emotion is detected? The one in the eyes.[*][21]

Eyes often have an implicit censorious power.[22] Post a large picture of a pair of eyes at a bus stop (versus a picture of flowers), and people become more likely to clean up litter. Post a picture of eyes in a workplace coffee room, and the money paid on the honor system triples. Show a pair of eyes on a computer screen and people become more generous in online economic games.

Subliminal auditory cues also alter behavior.[23] Back to amygdaloid activation in whites subliminally viewing black faces. Chad Forbes of the University of Delaware shows that the amygdala activation increases if loud rap music—a genre typically associated more with African Americans than with whites—plays in the background. The opposite occurs when evoking negative white stereotypes with death metal music blaring.

Another example of auditory cuing explains a thoroughly poignant anecdote told by my Stanford colleague Claude Steele, who has done seminal research on stereotyping.[24] Steele recounts how an African American male grad student of his, knowing the stereotypes that a young black man evokes on the genteel streets of Palo Alto, whistled Vivaldi when walking home at night, hoping to evoke instead "Hey, that's not Snoop Dogg. That's a dead white male composer [exhale]."

No discussion of subliminal sensory cuing is complete without considering olfaction, a subject marketing people have salivated over since we were projected to watch Smell-O-Vision someday. The human olfactory system is atrophied; roughly 40 percent of a rat's brain is devoted to olfactory processing, versus 3 percent in us. Nonetheless, we still have unconscious olfactory lives, and as in rodents, our olfactory system sends more direct projections to the limbic system than other sensory systems. As noted, rodent pheromones carry information about sex, age, reproductive status, health, and genetic makeup, and they alter physiology and behavior. Similar, if milder, versions of the same are reported in some (but not all) studies of humans, ranging from the Wellesley effect, discussed in the introduction, to heterosexual women preferring the smell of high-testosterone men.

Importantly, pheromones signal fear. In one study researchers got armpit swabs from volunteers under two conditions—either after contentedly sweating during a comfortable run, or after sweating in terror during their first tandem skydive (note—in tandem skydives you're yoked to the instructor, who does the physical work; so if you're sweating, it's from panic, not physical effort). Subjects sniffed each type of sweat and couldn't consciously distinguish between them. However, sniffing terrified sweat (but not contented sweat) caused amygdaloid activation, a bigger startle response, improved detection of subliminal angry faces, and increased odds of interpreting an ambiguous face as looking fearful. If people around you smell scared, your brain tilts toward concluding that you are too.[25]

Finally, nonpheromonal odors influence us as well. As we'll see in chapter 12, if people sit in a room with smelly garbage, they become more conservative about social issues (e.g., gay marriage) without changing their opinions about, say, foreign policy or economics.

Interoceptive Information

In addition to information about the outside world, our brains constantly receive "interoceptive" information about the body's internal state. You feel hungry, your back aches, your gassy intestine twinges, your big toe itches. And such interoceptive information influences our behavior as well.

This brings us to the time-honored James-Lange theory, named for William James, a grand mufti in the history of psychology, and an obscure Danish physician, Carl Lange. In the 1880s they independently concocted the same screwy idea. How do your feelings and your body's automatic (i.e., "autonomic") function interact? It seems obvious—a lion chases you, you feel terrified, and thus your heart speeds up. James and Lange suggested the opposite: you subliminally note the lion, speeding up your heart; then your conscious brain gets this interoceptive information, concluding, "Wow, my heart is racing; I must be terrified." In other words, you decide what you feel based on signals from your body.

There's support for the idea—three of my favorites are that (a) forcing depressed people to smile makes them feel better; (b) instructing people to take on a more "dominant" posture makes them feel more so (lowers stress hormone levels); and (c) muscle relaxants decrease anxiety ("Things are still awful, but if my muscles are so relaxed that I'm dribbling out of this chair, things must be improving"). Nonetheless, a strict version of James-Lange doesn't work, because of the issue of specificity—hearts race for varying reasons, so how does your brain decide if it's reacting to a lion or an exciting come-hither look? Moreover, many autonomic responses are too slow to precede conscious awareness of an emotion.[26]

Nonetheless, interoceptive information influences, if not determines, our emotions. Some brain regions with starring roles in processing social emotions —the PFC, insular cortex, anterior cingulate cortex, and amygdala—receive lots of interoceptive information. This helps explain a reliable trigger of aggression, namely pain, which activates most of those regions. As a repeating theme, pain does not cause aggression; it amplifies preexisting tendencies toward aggression. In other words, pain makes aggressive people more aggressive, while doing the opposite to unaggressive individuals.[27]

Interoceptive information can alter behavior more subtly than in the pain/aggression link.[28] One example concerns how much the frontal cortex has to do with willpower, harking back to material covered in the last chapter. Various studies, predominantly by Roy Baumeister of Florida State University, show that when the frontal cortex labors hard on some cognitive task, immediately afterward individuals are more aggressive and less empathic, charitable, and honest. Metaphorically, the frontal cortex says, “Screw it. I’m tired and don’t feel like thinking about my fellow human.”

This seems related to the metabolic costs of the frontal cortex doing the harder thing. During frontally demanding tasks, blood glucose levels drop, and frontal function improves if subjects are given a sugary drink (with control subjects consuming a drink with a nonnutritive sugar substitute). Moreover, when people are hungry, they become less charitable and more aggressive (e.g., choosing more severe punishment for an opponent in a game).* There’s debate as to whether the decline in frontal regulation in these circumstances represents impaired capacity for self-control or impaired motivation for it. But either way, over the course of seconds to minutes, the amount of energy reaching the brain and the amount of energy the frontal cortex needs have something to do with whether the harder, more correct thing happens.

Thus, sensory information streaming toward your brain from both the outside world and your body can rapidly, powerfully, and automatically alter behavior. In the minutes before our prototypical behavior occurs, more complex stimuli influence us as well.

Unconscious Language Effects

Words have power. They can save, cure, uplift, devastate, deflate, and kill. And unconscious priming with words influences pro- and antisocial behaviors.

One of my favorite examples concerns the Prisoner’s Dilemma, the economic game where participants decide whether to cooperate or compete at various junctures.[29] And behavior is altered by “situational labels”—call the game the “Wall Street Game,” and people become less cooperative. Calling it the “Community Game” does the opposite. Similarly, have subjects read seemingly random word lists before playing. Embedding warm fuzzy prosocial words in the list—“help,” “harmony,” “fair,” “mutual”—fosters cooperation, while words like “rank,” “power,” “fierce,” and “inconsiderate” foster the opposite. Mind you, this isn’t subjects reading either Christ’s Sermon on the Mount or Ayn Rand. Just an innocuous string of words. Words unconsciously shift thoughts and feelings. One person’s “terrorist” is another’s “freedom fighter”; politicians jockey to commandeer “family values,” and somehow you can’t favor both “choice” and “life.”*[30]

There are more examples. In Nobel Prize–winning research, Daniel Kahneman and Amos Tversky famously showed word framing altering decision making. Subjects decide whether to administer a hypothetical drug. If they’re told, “The drug has a 95 percent survival rate,” people, including doctors, are more likely to approve it than when told, “The drug has a 5 percent death rate.”*[31] Embed “rude” or “aggressive” (versus “considerate” or “polite”) in word strings, and subjects interrupt people more immediately afterward. Subjects primed with “loyalty” (versus “equality”) become more biased toward their team in economic games.[32]

Verbal primes also impact moral decision making.[33] As every trial lawyer knows, juries decide differently depending on how colorfully you describe someone’s act. Neuroimaging studies show that more colorful wording engages the anterior cingulate more. Moreover, people judge moral transgressions more harshly when they are described as “wrong” or “inappropriate” (versus “forbidden” or “blameworthy”).

Even Subtler Types of Unconscious Cuing

In the minutes before a behavior is triggered, subtler things than sights and smells, gas pain, and choice of words unconsciously influence us.

In one study, subjects filling out a questionnaire expressed stronger egalitarian principles if there was an American flag in the room. In a study of spectators at English football matches, a researcher planted in the crowd slips, seemingly injuring his ankle. Does anyone help him? If the plant wore the home team’s sweatshirt, he received more help than when he wore a neutral sweatshirt or one of the opposing team. Another study involved a subtle group-membership manipulation—for a number of days, pairs of conservatively dressed Hispanics stood at train stations during rush hour in predominately white Boston suburbs, conversing quietly in Spanish. The consequence? White commuters expressed more negative, exclusionary attitudes toward Hispanic (but not other) immigrants.[34]

Cuing about group membership is complicated by people belonging to multiple groups. Consider a famous study of Asian American women who took a math test.[35] Everyone knows that women are worse at math than men (we'll see in chapter 9 how that's not really so) and Asian Americans are better at it than other Americans. Subjects primed beforehand to think about their racial identity performed better than did those primed to think about their gender.

Another realm of rapid group influences on behavior is usually known incorrectly. This is the "bystander effect" (aka the "Genovese syndrome").[36] This refers to the notorious 1964 case of Kitty Genovese, the New Yorker who was raped and stabbed to death over the course of an hour outside an apartment building, while thirty-eight people heard her shrieks for help and didn't bother calling the police. Despite that being reported by the *New York Times*, and the collective indifference becoming emblematic of all that's wrong with people, the facts differed: the number was less than thirty-eight, no one witnessed the entire event, apartment windows were closed on that winter's night, and most assumed they were hearing the muffled sounds of a lover's quarrel.[*]

The mythic elements of the Genovese case prompt the quasi myth that in an emergency requiring brave intervention, the more people present, the less likely anyone is to help—"There's lots of people here; someone else will step forward." The bystander effect does occur in nondangerous situations, where the price of stepping forward is inconvenience. However, in dangerous situations, the more people present, the *more* likely individuals are to step forward. Why? Perhaps elements of reputation, where a larger crowd equals more witnesses to one's heroics.

Another rapid social-context effect shows men in some of their lamest moments.[37] Specifically, when women are present, or when men are prompted to think about women, they become more risk-taking, show steeper temporal discounting in economic decisions, and spend more on luxury items (but not on mundane expenses).[*] Moreover, the allure of the opposite sex makes men more aggressive—for example, more likely in a competitive game to punish the opposing guy with loud blasts of noise. Crucially, this is not inevitable—in circumstances where status is achieved through prosocial routes, the presence of women makes men more prosocial. As summarized in the title of one paper demonstrating this, this seems a case of “Male generosity as a mating signal.” We’ll return to this theme in the next chapter.

Thus, our social environment unconsciously shapes our behavior over the course of minutes. As does our physical environment.

Now we come to the “broken window” theory of crime of James Q. Wilson and George Kelling.[38] They proposed that small signs of urban disarray—litter, graffiti, broken windows, public drunkenness—form a slippery slope leading to larger signs of disarray, leading to increased crime. Why? Because litter and graffiti as the norm mean people don’t care or are powerless to do anything, constituting an invitation to litter or worse.

Broken-window thinking shaped Rudy Giuliani’s mayoralty in the 1990s, when New York was turning into a Hieronymus Bosch painting. Police commissioner William Bratton instituted a zero-tolerance policy toward minor infractions—targeting subway fare evaders, graffiti artists, vandals, beggars, and the city’s maddening infestation of squeegee men. Which was followed by a steep drop in rates of serious crime. Similar results occurred elsewhere; in Lowell, Massachusetts, zero-tolerance measures were experimentally applied in only one part of the city; serious crime dropped only in that area. Critics questioned whether the benefits of broken-window policing were inflated, given that the approach was tested when crime was already declining throughout the United States (in other words, in contrast to the commendable Lowell example, studies often lacked control groups).

In a test of the theory, Kees Keizer of the University of Groningen in the Netherlands asked whether cues of one type of norm violation made people prone to violating other norms.[39] When bicycles were chained to a fence (despite a sign forbidding it), people were more likely to take a shortcut through a gap in the fence (despite a sign forbidding it); people littered more when walls were graffitied; people were more likely to steal a five-euro note when litter was strewn around. These were big effects, with doubling rates of crummy behaviors. A norm violation increasing the odds of that *same* norm being violated is a conscious process. But when the sound of fireworks makes someone more likely to litter, more unconscious processes are at work.

A Wonderfully Complicating Piece of the Story

We've now seen how sensory and interoceptive information influence the brain to produce a behavior within seconds to minutes. But as a complication, the brain can alter the *sensitivity* of those sensory modalities, making some stimuli more influential.

As an obvious one, dogs prick up their ears when they're alert—the brain has stimulated ear muscles in a way that enables the ears to more easily detect sounds, which then influences the brain.[40] During acute stress, all of our sensory systems become more sensitive. More selectively, if you're hungry, you become more sensitive to the smell of food. How does something like this work? A priori, it seems as if all sensory roads lead to the brain. But the brain also sends neuronal projections *to* sensory organs. For example, low blood sugar might activate particular hypothalamic neurons. These, in turn, project to and stimulate receptor neurons in the nose that respond to food smells. The stimulation isn't enough to give those receptor neurons action potentials, but it now takes fewer food odorant molecules to trigger one. Something along these lines explains how the brain alters the selective sensitivity of sensory systems.

This certainly applies to the behaviors that fill this book. Recall how eyes carry lots of information about emotional state. It turns out that the brain biases us toward preferentially looking at eyes. This was shown by Damasio, studying a patient with Urbach-Wiethe disease, which selectively destroys the amygdala. As expected, she was poor at accurately detecting fearful faces. But in addition, while control subjects spent about half their face-gazing time looking at eyes, she spent half that. When instructed to focus on the eyes, she improved at recognizing fearful expressions. Thus, not only does the amygdala detect fearful faces, but it also biases us toward obtaining information about fearful faces.[41]

Psychopaths are typically poor at recognizing fearful expressions (though they accurately recognize other types).[42] They also look less at eyes than normal and improve at fear recognition when directed to focus on eyes. This makes sense, given the amygdaloid abnormalities in psychopaths noted in chapter 2.

Now an example foreshadowing chapter 9's focus on culture. Show subjects a picture of an object embedded in a complex background. Within seconds, people from collectivist cultures (e.g., China) tend to look more at, and remember better, the surrounding "contextual" information, while people from individualistic cultures (e.g., the United States) do the same with the focal object. Instruct subjects to focus on the domain that their culture doesn't gravitate toward, and there's frontal cortical activation—this is a difficult perceptual task. Thus, culture literally shapes how and where you look at the world.*[43]

CONCLUSIONS

No brain operates in a vacuum, and over the course of seconds to minutes, the wealth of information streaming into the brain influences the likelihood of pro- or antisocial acts. As we’ve seen, pertinent information ranges from something as simple and unidimensional as shirt color to things as complex and subtle as cues about ideology. Moreover, the brain also constantly receives interoceptive information. And most important, much of these varied types of information is subliminal. Ultimately, the most important point of this chapter is that in the moments just before we decide upon some of our most consequential acts, we are less rational and autonomous decision makers than we like to think.