

A COMMUNICATOR'S GUIDE
TO THE
NEURO
SCIENCE
OF
TOUCH

TOME ONE TOME TWO
HAPTIC BRAIN HAPTIC BRAND



A PROJECT OF SAPPI NORTH AMERICA
sappi

HAPTICS IS THE SCIENCE OF TOUCH.

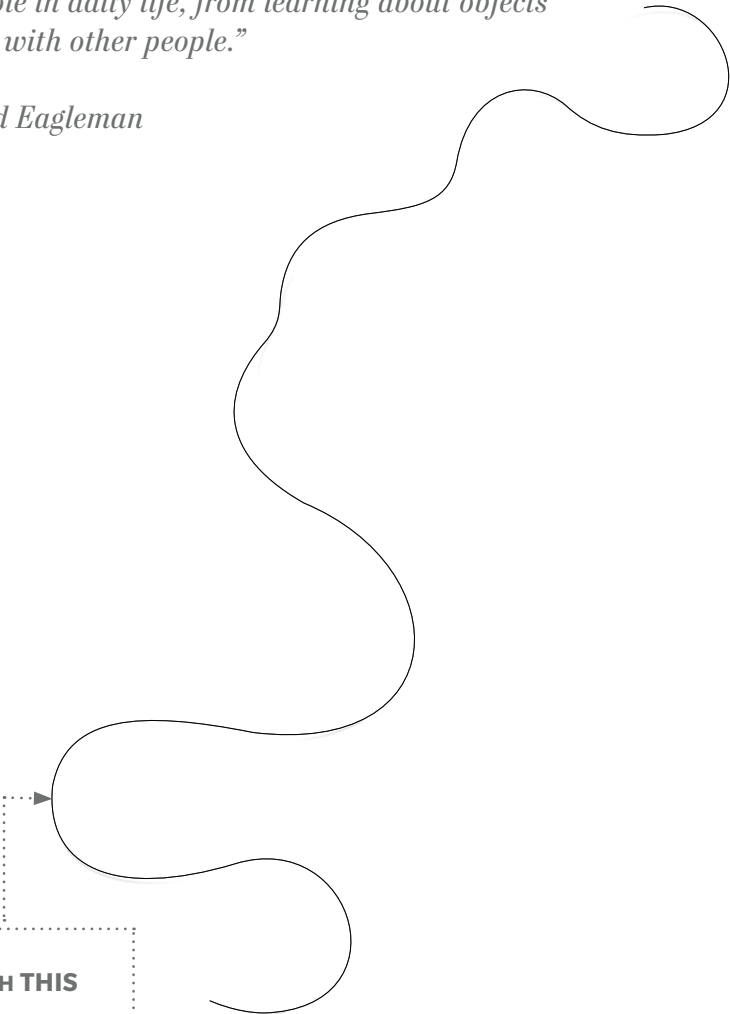
“In humans touch represents a powerful form of non-verbal communication. Our sense of touch plays a fundamental role in daily life, from learning about objects to communicating with other people.”

–Dr David Eagleman

fig. 1

TOUCH THIS

*Now imagine:
your finger can
detect a bump
3 microns wide,
three 100ths
the width of a
human hair.*



THIS IS A BOOK ABOUT NEUROSCIENCE.
IT IS ALSO A BOOK ABOUT
COMMUNICATION, PAPER, PERSUASION
AND
TOUCH.

IT IS PACKED WITH INFORMATION.

“I’m writing about a box, a piece of packaging. That description hardly begins to do justice to a design icon like this, but a box it is nonetheless. This is a box with a sense of history... Anyone who receives it can recall the first time, exactly where they were, who was giving it to them and, most importantly, why.” So writes Fitch’s Christian Davies in his essay on Tiffany’s design classic: “Ode to a Little Blue Box.”¹ He goes on to suggest that “While I can at least try to dissect the science behind [it],” personally experiencing it is what’s most meaningful. He is right on all counts. ¶ We at Sappi make some of the world’s most beautiful fine papers—papers that become part of extraordinary things like a box you don’t throw away, a catalog that lives on your coffee table, a magazine that inspires you and your children to help save the world. When things made of paper are this special, we look closely at why. And one of the first things we do is dissect the science. ¶ We are constantly learning about how media shape messages: Why do physical qualities like weight, texture, and warmth stir (or not) a deep sense of delight? How do they affect memory and comprehension? What makes a printed piece unforgettable? We never stop asking questions. And as members of a closely knit creative community, we are passionate about sharing what we learn. ¶ We recently invited renowned neuroscientist Dr David Eagleman to explore with us the science of haptics: how the things we touch shape the way we feel. And, knowing that communicating well is equal parts art and science, we looked at how some of the world’s most beloved brands express themselves. Here we are pleased to feature three that do it extraordinarily well. ¶ It’s been said that touch leaves a lingering “haptic trail” in memory, like the glitter stream a child with a sparkler leaves in the dark. We hope that this book will touch your brain, your hand, and your heart in ways you’ll remember long after you put it down. ¶

TOME ONE:

HAPTIC BRAIN



“HAPTIC BRAIN” WAS WRITTEN IN COLLABORATION WITH
DR DAVID EAGLEMAN

DIRECTOR OF BAYLOR COLLEGE OF MEDICINE’S
LABORATORY FOR PERCEPTION & ACTION AND THE INITIATIVE ON NEUROSCIENCE & LAW
DR EAGLEMAN WROTE THE INTERNATIONAL BESTSELLERS **SUM** AND **INCOGNITO: THE SECRET LIVES OF THE BRAIN**,
AND PRESENTS PBS’ 6-HOUR SERIES “THE BRAIN” AND “NEUROSCIENCE SHORTS,” THIS BOOKS ONLINE COMPANION.

MORE THAN HALF THE BRAIN
IS DEVOTED TO PROCESSING SENSORY EXPERIENCE,
AND MUCH OF THAT SENSORY RECEPTIVITY
FOCUSES ON TOUCH.

A 3-lb
wet computer,
THE BRAIN
is constantly
processing
incoming data
from the
senses.

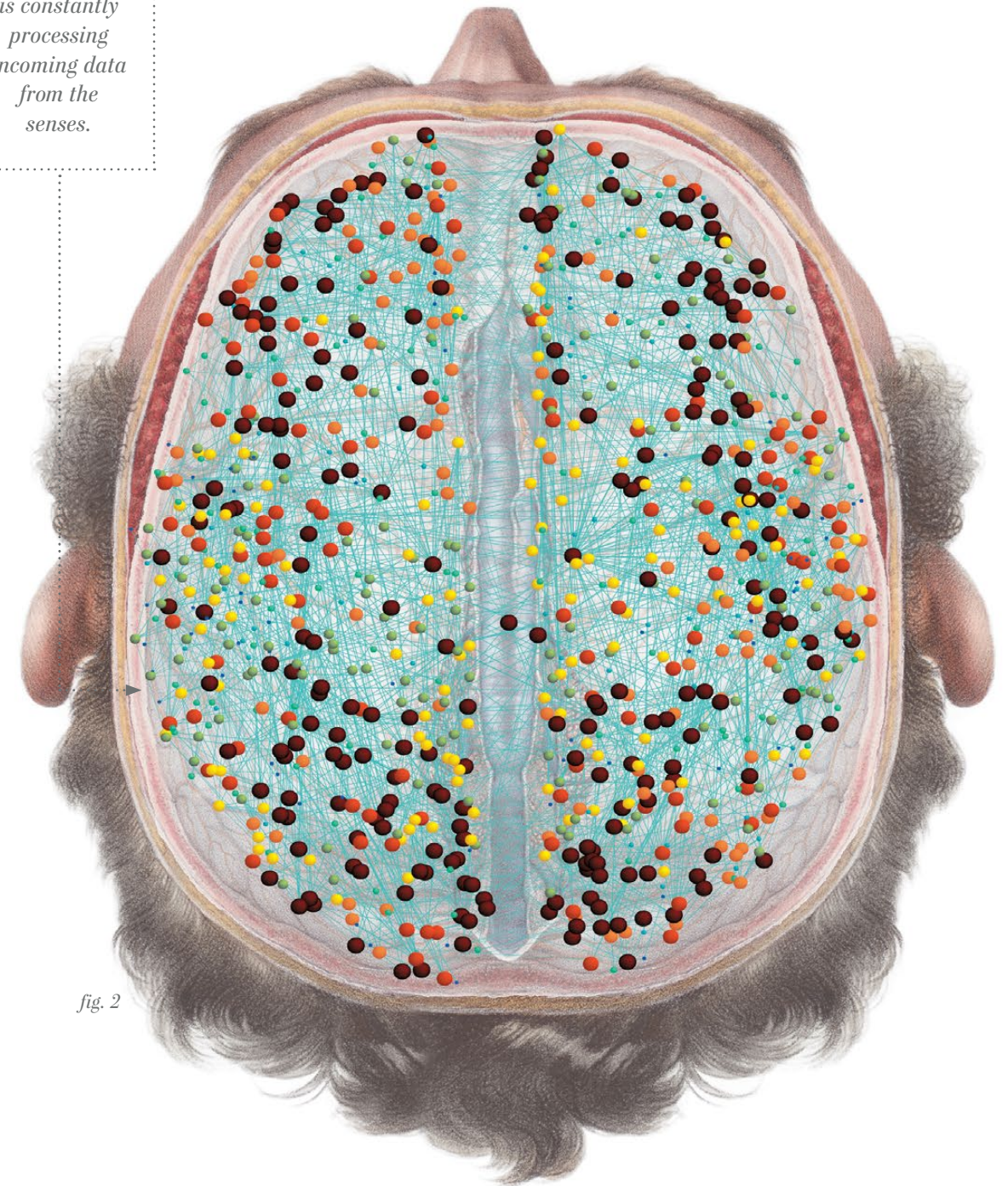


fig. 2



fig. 3

The brain consumes more than one fourth of the body’s energy resources. Nearly half that is devoted to processing input from the senses, and much of *that* sensory receptivity is dedicated to touch—the only faculty that’s distributed throughout the body. And, although touch receptors cover the body, they’re not distributed equally. Your lips get more than your knees, for example, and your hands are some of the most metabolically expensive real estate on your body. Children often draw people with gigantic hands and heads; maybe it’s because they instinctively sense that these are the most important parts of the body.

pg. 6

So why have our adaptive bodies (which evolve constantly to improve survival odds) come to devote so much attention to our hands? Is it that the hand is an extension of the mind? Scientists, philosophers, and other students of human experience say yes. Immanuel Kant posited that “*the hand is the visible part of the brain.*” A doctor about to perform surgery on a celebrated pianist’s hands was warned to be careful, “because you’re doing brain surgery.” For communicators, too, our hands are skilled communicative tools. They’re also the devices through which others receive our transmissions, and they color messages in ways we’d do well to understand.

pg. 7

THE BRAIN LIVES ENCHAMBERED IN
A DARK, SILENT SKULL
SEEING, HEARING, TOUCHING NOTHING.

THE HANDS ARE TRANSDUCERS:
THEY CONVERT MECHANICAL ENERGY INTO ELECTRICAL ENERGY
AND
SEND IT RACING UP THE SPINE TO
THE CEREBRAL CORTEX.

HAPTIC SENSATIONS FIRE
TINY ELECTRICAL IMPULSES
THROUGH THE BRAIN'S INTERCONNECTED NEURONS,
LEAVING TRACES OF THEIR PASSAGE.

TOUCH SUBTLY AND CONTINUALLY REMAKES THE MIND AS
CONSTELLATIONS OF CONNECTIONS
FORM AROUND EACH NEW EXPERIENCE.

HUMAN SENSORY SYSTEMS

AND THE MECHANICS OF TOUCH

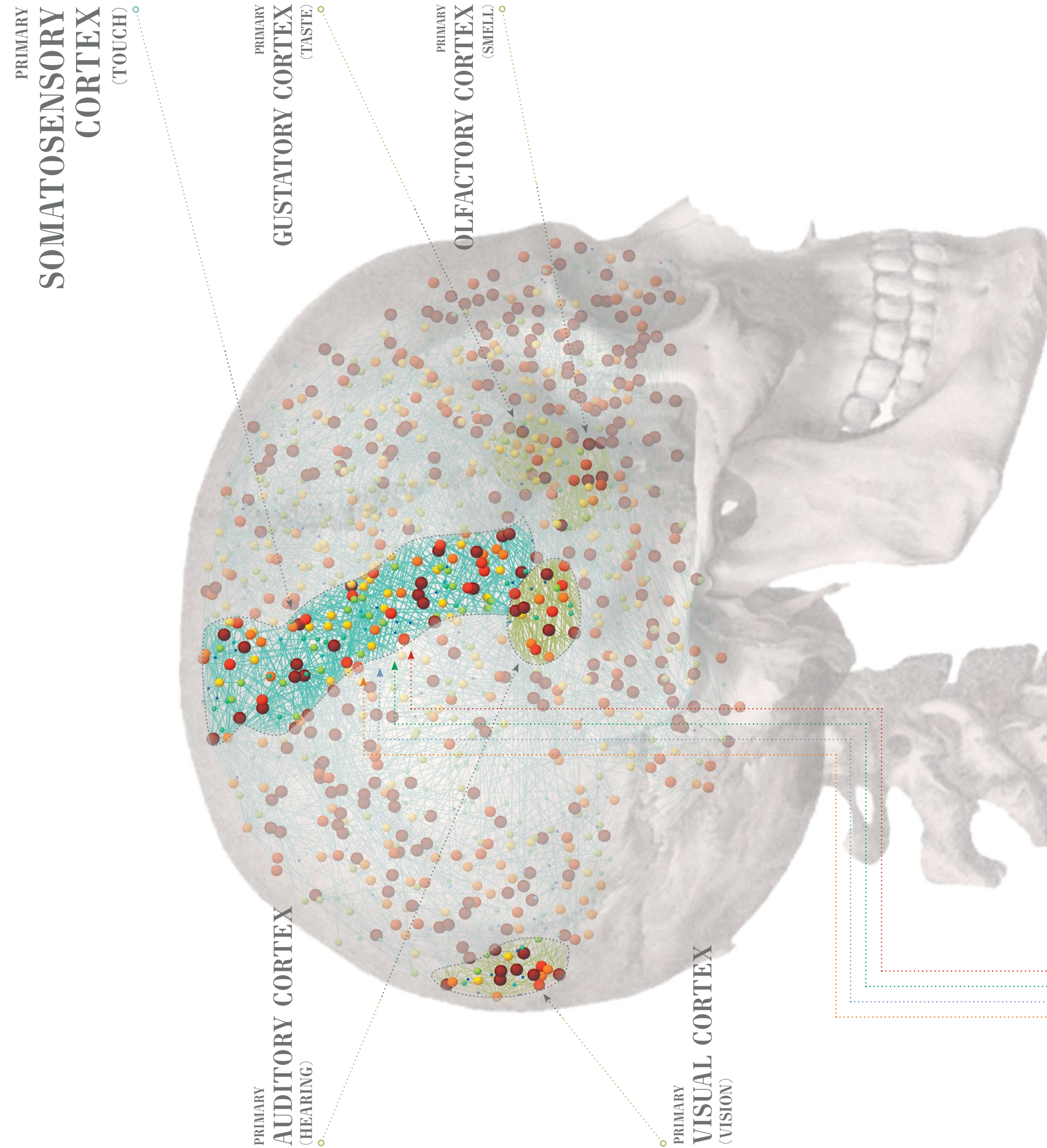
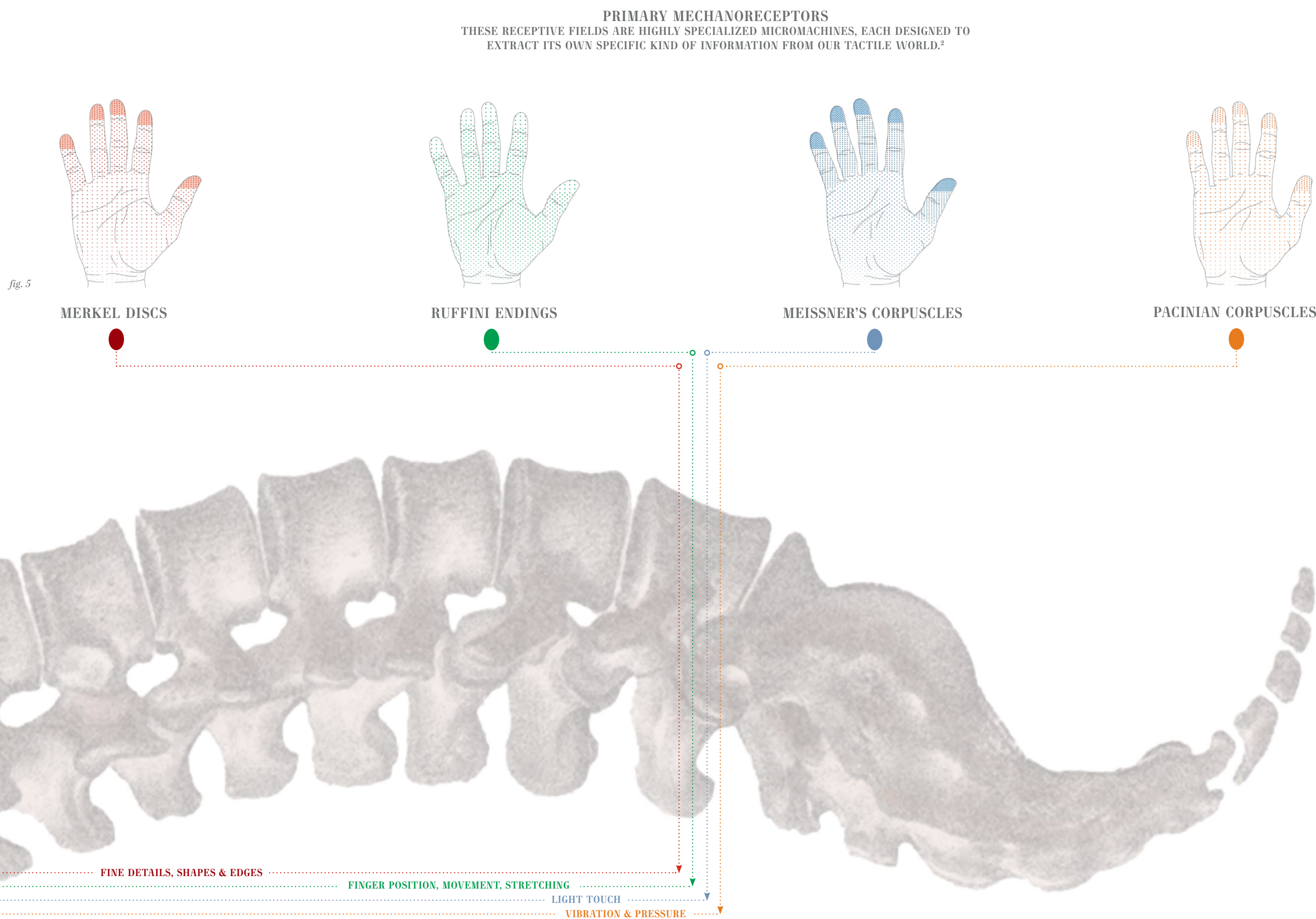


fig. 4
[ACTUAL SIZE]



Your hands are sensitive, highly developed instruments of touch. They have the greatest density of tactile receptors in your body, with specialized sensors for heat/cold, pain, itch, pressure, vibration, and shape packed tightly under the skin. Ridges and grooves on your fingertips serve as "sensation amplifiers," expanding the skin's surface area when they encounter pressure. Feeling doesn't happen in the top layer but in the layer underneath (which is why safecrackers sand their fingertips: to expose that sensitive second layer).

The four main sensor types each detect a different kind of touch; one senses pressure, for example, another detects prickles. Some are fast, some slow. (A pinprick may not hurt the most, but it hurts the fastest: the signal zips up to the brain at 98 feet per second. In contrast, a burn travels at only 6.5 feet per second—you scorch your hand before your brain registers the need to pull it off the stove.)³

This diagram shows the word "finger"⁴ written in Braille along with scans of how each kind of mechanoreceptor, acting alone, would interpret the dot. Only the Merkel Disks (the same fibers that know a quarter from a nickel by touch) get the pattern; the deeper Meissner's and Pacinian Corpuscles (the ones that know when you're gripping an object too hard) don't encode the bumps at all.

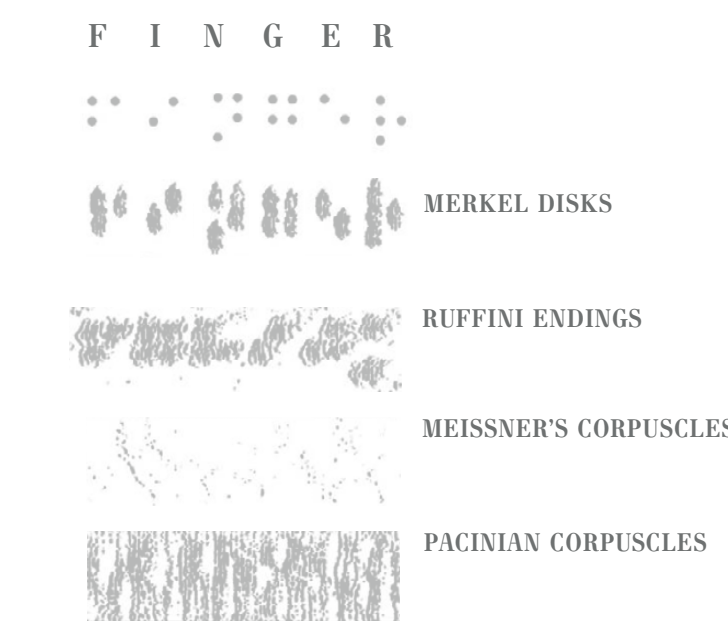


fig. 6

THE NATURE OF LOVE

Harry F. Harlow (1958)
University of Wisconsin

FIRST PUBLISHED IN *AMERICAN PSYCHOLOGIST*, 13, 673-685

Figure 14.1



Typical response to cloth mother surrogate in fear test.

Love is a wondrous state, deep, tender, and rewarding. Because of its intimate and personal nature it is regarded by some as an improper topic for experimental research. But, whatever our personal feelings may be, our assigned mission as psychologists is to analyze all facets of human and animal affection into their component variables. So far, this mission. The little we know about love transcends simple observation, and the little we know about it has been written better by poets than by scientists. But of greater concern is the fact that psychologists who write textbooks, not of interest in the origin and development of affection, but they seem to be unaware of its value.

The apparent repression of love in psychologists stands in sharp contrast with the taken by many famous and normal people. "Love" has the highest reference frequency cited in Bartlett's book of *Familiar Quotations*. It appears that this emotion has long had a special and fascination for human beings, regardless of the attitude taken by psychologists; but the question even by famous and normal people, have a redundancy. These authors and authorities have taken love from the child and infant and made it the property of the adolescent and adult.

Thoughtful men, and probably all who have speculated on the nature of love. From a psychological point of view, the general plan is simple. The initial love responses of the human being are made by the infant to the mother or surrogate. From this intimate attachment to the mother, multiple learned and generalized affectional responses are formed.

Unfortunately, beyond these simple facts we know little about the fundamental variables underlying the formation of affectional responses and little about the mechanisms through which the love of the infant for the mother develops into the multifaceted response patterns characterizing love or affection in the adult. Because of the dearth of experimentation, theories about the fundamental nature of affection have evolved at the level of observation, intuition, and discerning guesswork, whether these have been proposed by psychologists, sociologists, anthropologists, physicians, or psychoanalysts.

The position commonly held by psychologists and sociologists is quite clear: The basic motives are, for the most part, the primary drives—particularly hunger, thirst, elimination, pain, and sex—and all other motives, including love or affection, are derived or secondary drives. The mother is associated with

the reduction of the primary drives—particularly hunger, thirst, and pain—and through learning, affection or love is derived.

It is entirely reasonable to believe that the mother through association with food may become a secondary drive. External stimulus can become a secondary drive.

But the fact remains that this redundant literature demonstrates unequivocally that the primary drives suffer relatively rapid extinction. Contrary to the common belief, the mother's affection is not a primary drive. The mother's affection is a secondary drive. The mother's affection is a secondary drive. The mother's affection is a secondary drive.

Oddly enough, one of the few psychologists who

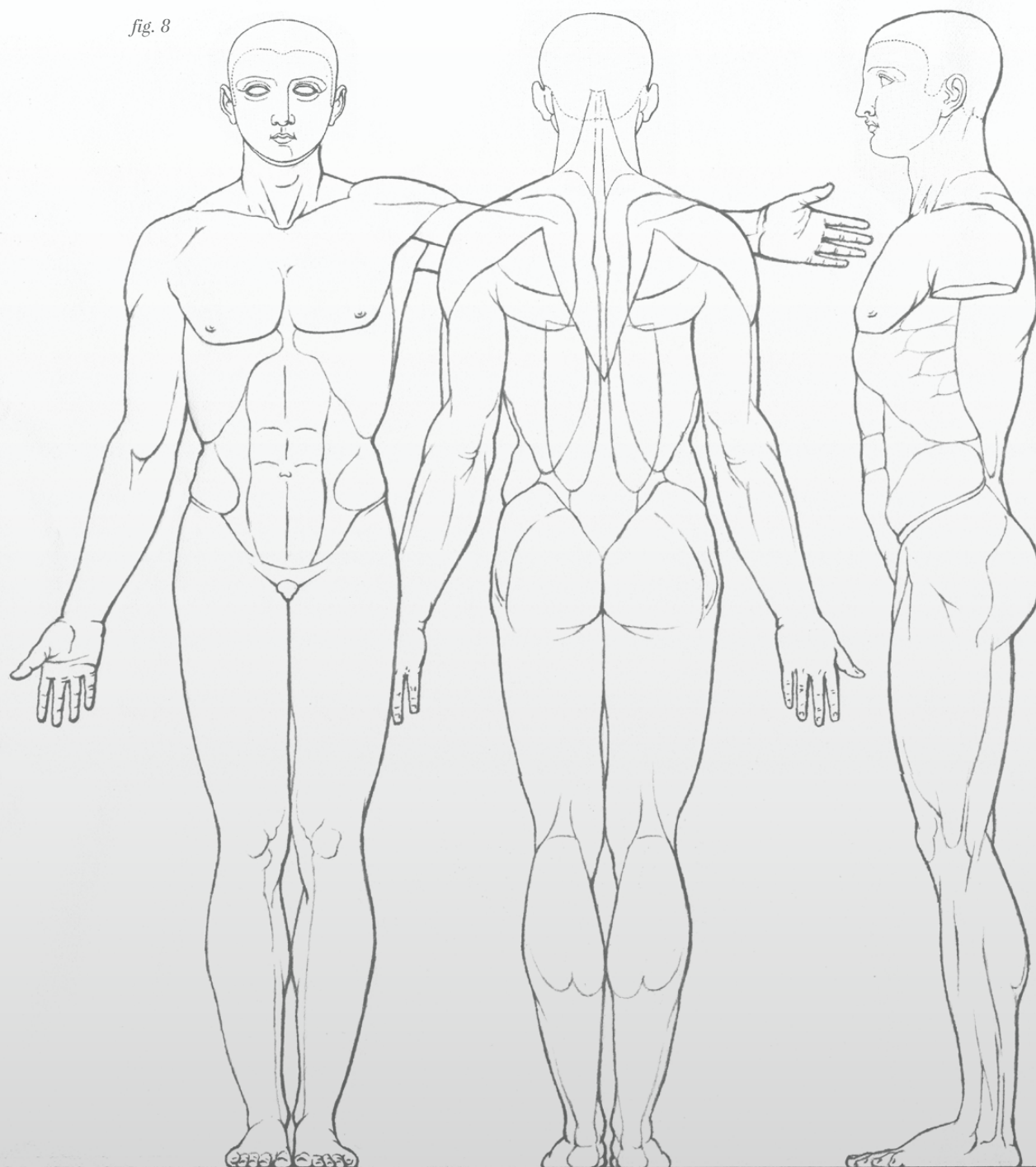
In the 1950s a scientist named Harry Harlow performed a series of haunting, controversial studies that have become classics in the field of neuroscience. Entitled "The Nature of Love,"²⁵ they demonstrated that baby rhesus monkeys exhibit a primal need for touch—overwhelmingly choosing the caress of a terrycloth mother-surrogate over food. Sixty years of science since that time has greatly expanded our understanding of all the important ways touch shapes the brain, and how necessary it is for cognitive health.

this to the oral erotic tendencies developed at an age preceding their subjects' memories. Their theories range from a belief that the infant has an innate need to achieve and suckle at the breast to beliefs not unlike commonly accepted psychological theories. There are exceptions, as seen in the recent writings of John Bowlby, who attributes importance not only to food and thirst satisfaction, but also to "primary object-clinging," a need for intimate physical contact, which is initially associated with the mother.

As far as I know, there exists no direct experimental analysis of the relative importance of the stimulus variables determining the affectional or love responses in the neonatal and infant primate. Unfortunately, the human neonate is a limited experimental subject for such researches because of his inadequate motor capabilities. By the time the human infant's motor responses can be precisely measured, the antecedent determining conditions cannot be defined, having been lost in a jumble and jungle of confounded variables.

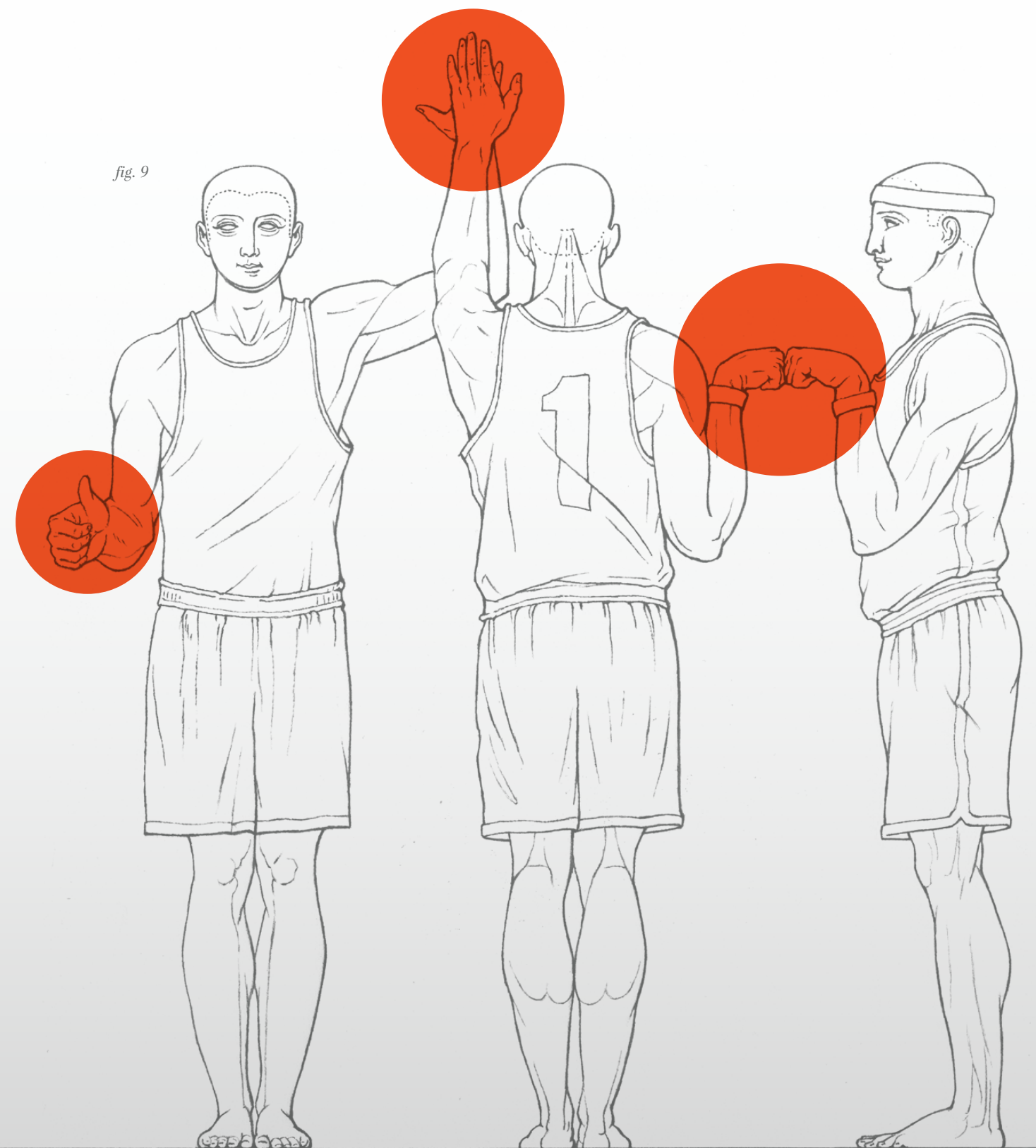
In *A Natural History of the Senses*, Diane Ackerman says, “The mind doesn’t really dwell in the brain, but travels the whole body on caravans of hormone and enzyme, busily making sense of the compound wonders we catalogue as touch, taste, smell, hearing, vision.” It’s poetic—and scientifically accurate. It is called “embodied cognition”: we understand the world through our bodies. And how things feel to us drives our thoughts and behaviors. When we say “rough day!” or “she’s a warm person,” we’re expressing how interwoven touch is into the way we experience a whole spectrum of interactions with the physical world.

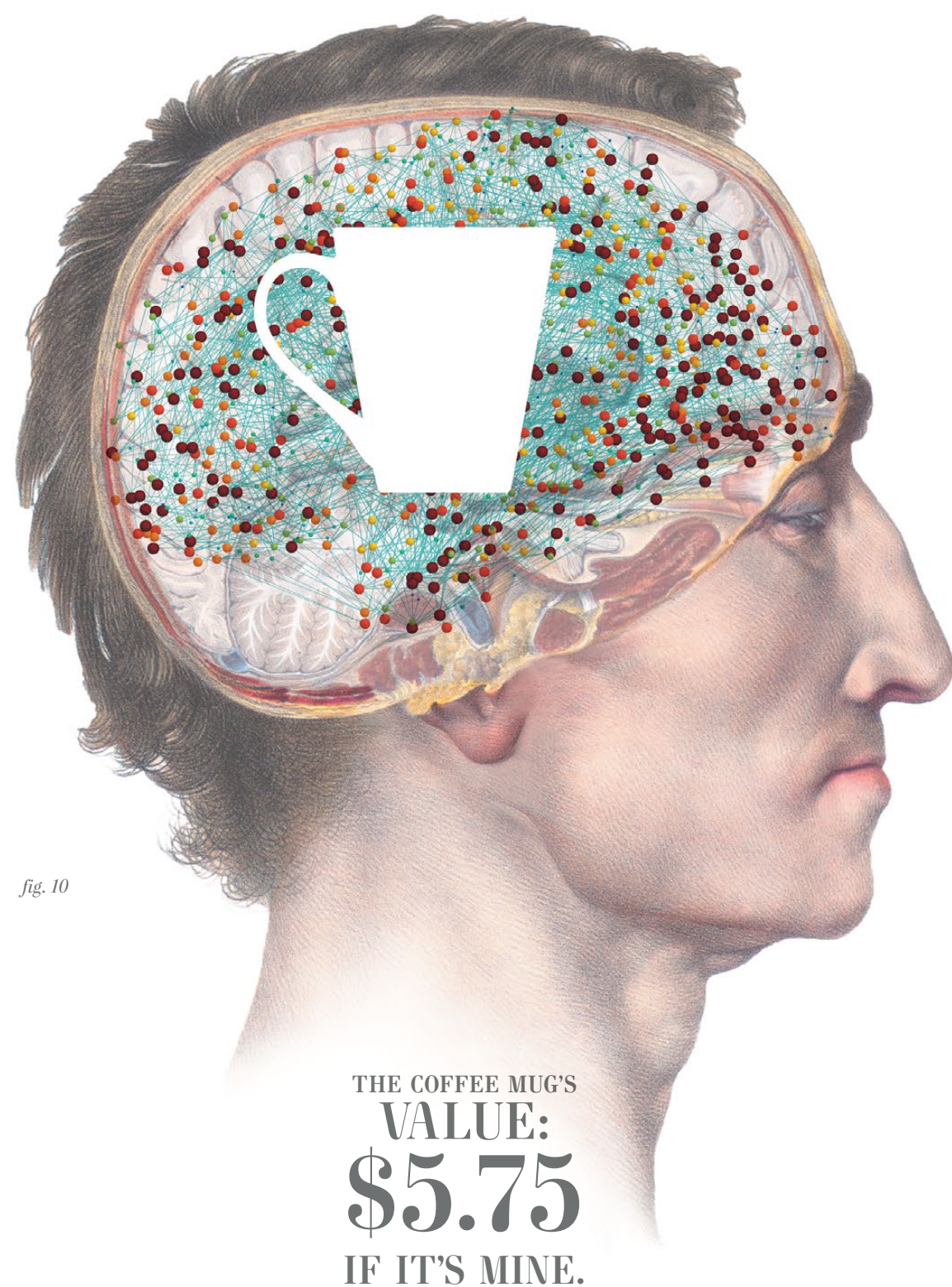
fig. 8



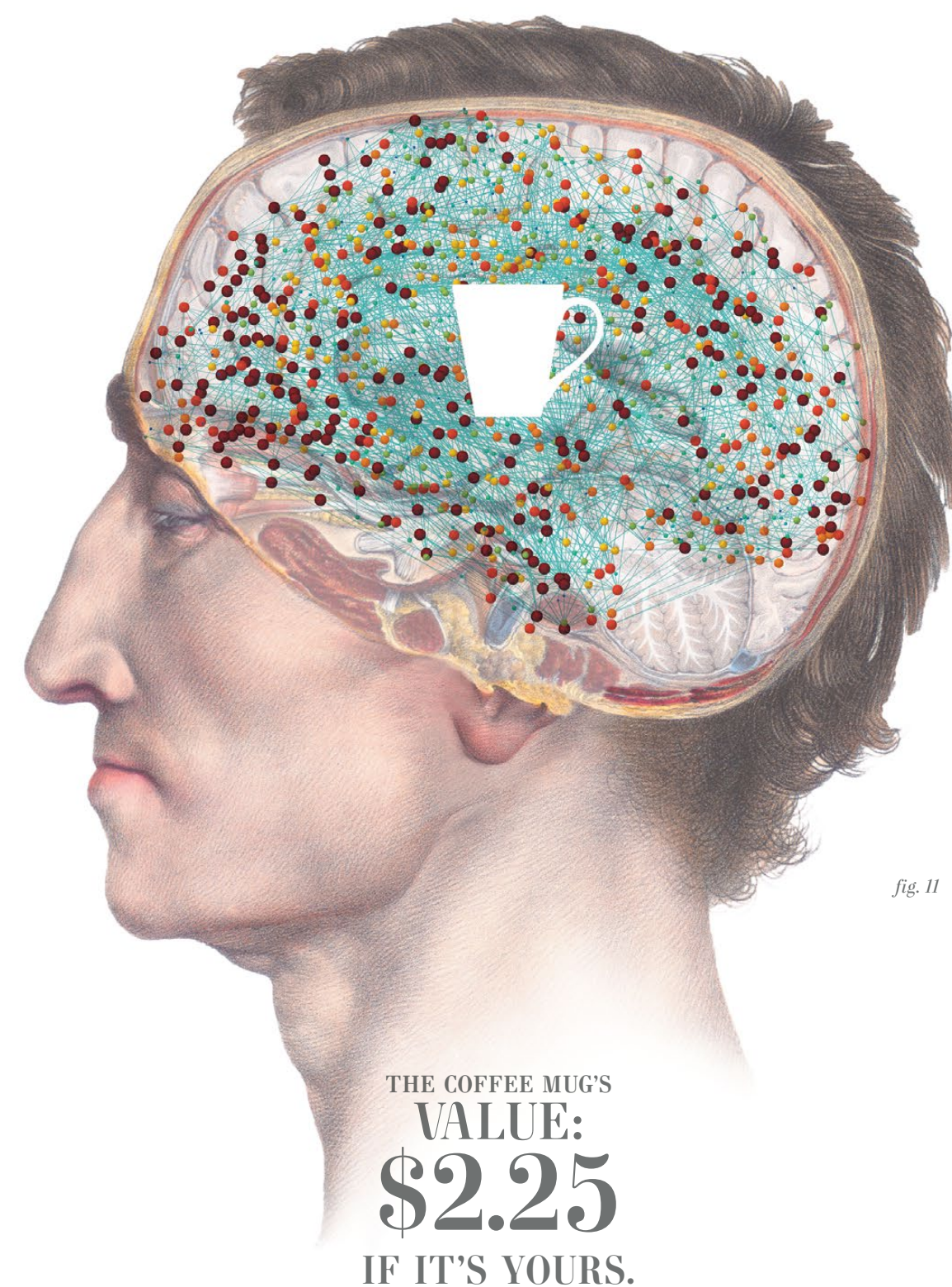
That big, beautiful sensory organ we come wrapped in doesn’t just tell us about the physical world, it is the interface through which we talk back. The action of touch is reciprocal—you can’t touch without being touched. So we use it constantly to communicate, and interpersonal touch forms a happy kind of social glue. Studies show that people who are lightly touched by a server in a restaurant leave bigger tips;⁶ doctors who touch their patients are seen as more caring (and their patients get well faster);⁷ NBA teams who interact physically during games—high-fives, chest-bumps, butt-slaps, and the like—consistently win more games.⁸

fig. 9





To touch a thing is to trigger a reaction: as soon as we do, we begin to feel differently about it. We begin to feel we own it, and research shows that makes us value it more. It is called the Endowment Effect.⁹ If I win baseball tickets at a raffle, I might sell them to you for \$200. But if *you* are the one doing the selling, I'm willing to pay \$175 tops. This bias toward the bird-in-hand is hardwired into mammalian brain architecture—it is even true across species: a monkey will take his banana over your oats, even if oats are a favorite food.



The Endowment Effect is of great interest to lawmakers, economists, and communicators. It turns out the effect is so strong that you don't have to physically own something to trigger it, a suggestion of ownership is enough to make us feel possessive. Scientific studies show that people who merely touch an object,¹⁰ or even *imagine touching it*, begin exhibiting a sense of ownership. Touching something else (like a paper catalog) that tips the psyche toward "ownership imagery" can be a cognitive surrogate for touching the object itself.¹¹

GOOD? BAD?

fig. 12

All of our senses literally help the brain “make sense” of the world. They do it piecemeal, relaying data-rich fragments back to a control center where they can be reassembled into meaningful patterns. When enough pieces come together, the brain says *Ball! Catch the ball*. But here’s the weird thing: that often happens at a level just below consciousness—your hand snaps forward to catch the ball before your conscious mind could have possibly formulated a response. This has compelled scientists to delve deeper into how the subconscious informs our decision-making.

pg. 16

Neuroscientists Antonio Damasio and Stephen Bechara wanted to measure the time gap between conscious and subconscious awareness. They set up four decks of cards as a test. Some of the decks had dominantly winning, or “good” cards, others were filled with losers. Players could choose. They calculated that it took 40-50 draws for test subjects to begin consciously selecting from the good decks. But, interestingly, palms began to sweat slightly when hovering over “bad” decks after just *ten* draws, a stress response that indicated the subconscious had already... well, made up its mind.¹²

pg. 17

In 1943 a scientist named Solomon Asch wanted to understand how we form our first impressions of others. He discovered that we usually think of people first as either “warm” or “cool,” and that we generally agree that specific sets of traits characterize each.¹³ This suggested some questions about perception: are our subconscious minds influenced by those touch-based metaphors? If we feel something on our skin—something warm (or cool, or soft, or solid, rough or smooth)—while we’re doing something else, what happens? Do our brains transfer that skin touch onto “feelings” about unrelated things? It would be years before we’d find out.

It was psychologist John Bargh who took on those questions. He devised a clever scenario: volunteers met a researcher who, seemingly balancing an awkward armful of folders, asked the subject to briefly hold her coffee. The coffee was either iced or hot. After handing back the coffee, volunteers performed what they thought was the experiment: hear a description of a fictitious person then rate them on a scale just like Asch’s original 1943 test. Would the volunteers who had held the warm cup identify the person with the “warm” set of personality traits? Consistently, they did.¹⁴ One fleeting touch influenced a completely unrelated judgment.

WARM?

COOL?

fig. 13

fig. 14

ROUGH?
HEAVY?
HARD?

fig. 15

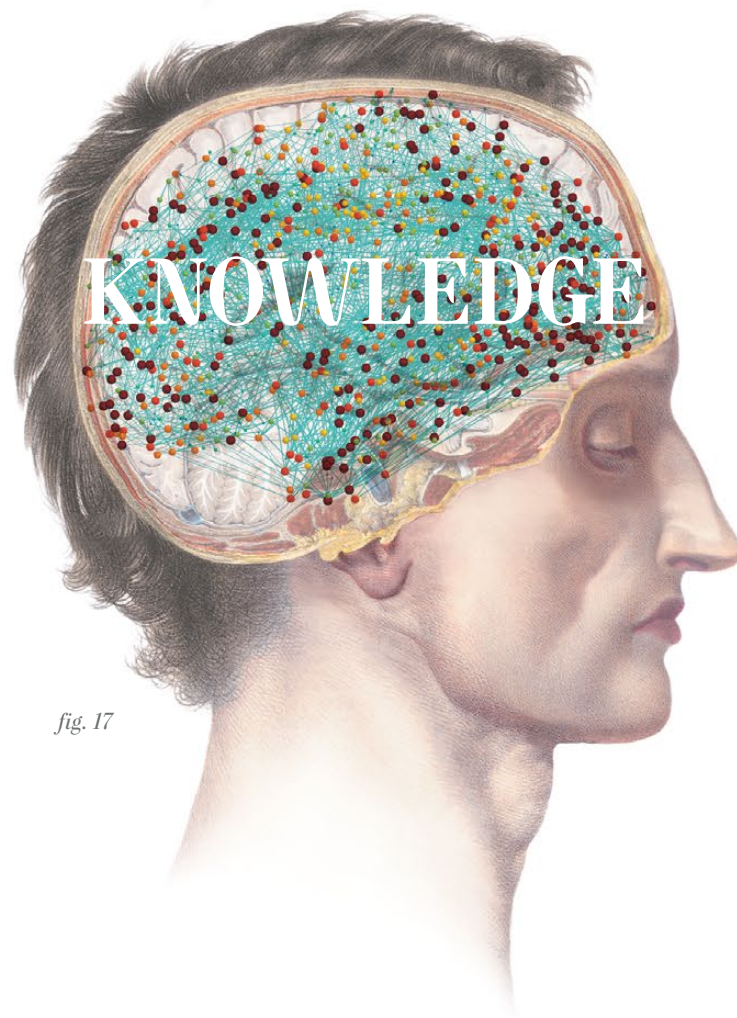
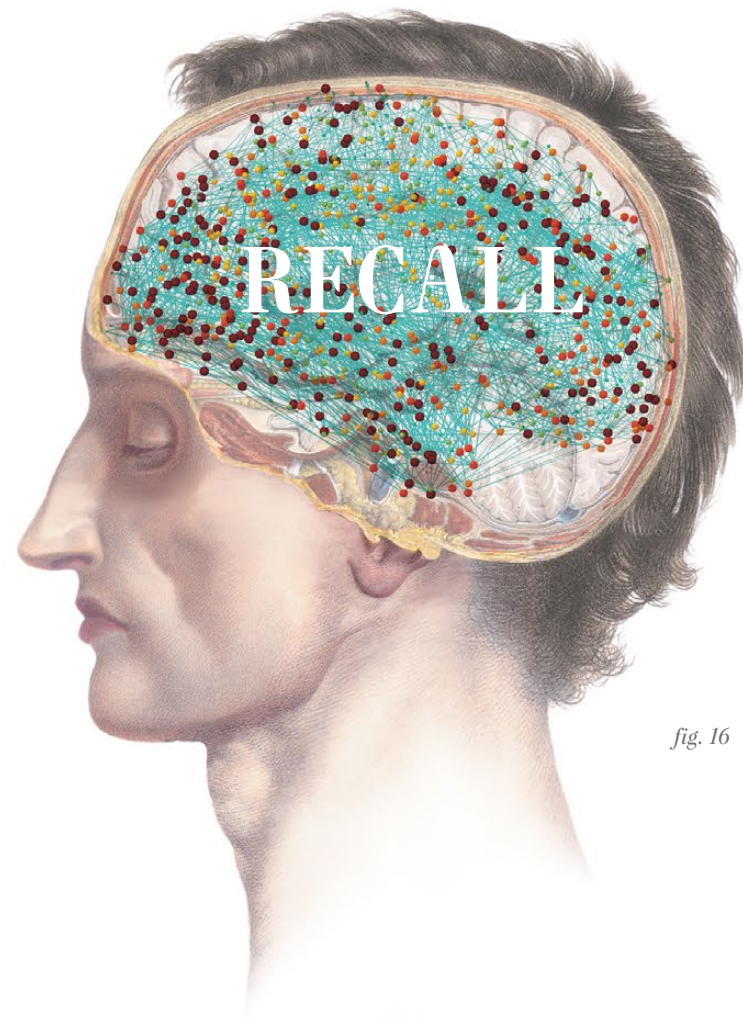
Humans gravitate toward warmth—it's a biological imperative. But do less compelling sensations, say texture or weight, influence our impressions of unrelated things as well? Bargh and colleagues tested this broader hypothesis in a series of brilliant follow-ups,¹⁵ and found that it held. Touching things with metaphorical physical qualities—objects that were heavy, light, hard, soft, rough, or smooth—made people rate others more highly for those same characteristics. Those who held a heavier clipboard rated a job candidate as more solid. Interestingly, it didn't make applicants seem more honest or more likable, it specifically conferred gravitas.

SMOOTH?
LIGHT?
SOFT?

The central message of these studies is that what we touch shapes what we feel, influencing perceptions both consciously and subconsciously. And if touch shapes our impressions of people and situations, what about companies and brands? A recent study asked, "Are corporations people too?" and found that the answer is yes.¹⁶ When people make judgments about people, specific areas of the brain light up on fMRI scans—areas that don't activate when they think about objects. Corporations? fMRI scans show the brain sees and relates to them as "people," not as "things." The implications for communicators are profound.

WHAT WE TOUCH

SHAPES WHAT WE FEEL.



Psychologists distinguish between recalling something—a relatively weak form of memory—and knowing something, which implies a much stronger cognitive bond. Students that cram for an exam, for example, have to search their minds later to recall the information. Ask about something they *know*, however, and the answers come effortlessly. When touch is part of an experience, it helps shift the brain into the deep level of engagement most conducive to building knowledge.¹⁷

TOUCH CAN ALSO SHAPE
WHAT WE KNOW.

“PEOPLE UNDERSTAND AND REMEMBER
WHAT THEY READ ON PAPER

BETTER THAN WHAT THEY READ ON SCREEN.

RESEARCHERS THINK
THE PHYSICALITY OF PAPER
EXPLAINS THIS DISCREPANCY.”

—FERRIS JABR

“WHY THE BRAIN PREFERS PAPER”
SCIENTIFIC AMERICAN

Living things need touch to survive: it’s a primary channel for sending and receiving information about our world. Communicating through touch arouses good emotions and brings people together. But, although a mother’s touch or a chest-bump on the basketball court communicate powerfully, these are very different from the deliberate communication that happens when we write something down. And it is *that* difference that lies at the heart of why humans are cognitively distinct from other species on this planet in the first place: we humans are special because we can read and write. Those are not skills for which we come hardwired. The ability to derive meaning from abstract letterforms is not built into our neural circuitry; every generation has to learn it anew, and when we do it rearranges the way our brains are built. ¶ Reading and writing only happen when the brain grows the interconnected neural pathways for sharing information. And here it gets really interesting: the media we use to carry our messages have a lot to do with how those neural pathways get developed. The medium shapes the message, but even more importantly *it shapes the brain*.¹⁸ ¶ The mind that learned about the world through Homer’s oral poetry was constitutionally different from ours. Tactile media, which captured words and pinned them down on stone tablets and later papyrus, initiated a profound evolution in how human brains are organized. Paper, lightweight enough to traverse continents in weeks rather than decades, became the most radically successful communications innovation of the last two millennia, and it’s played a huge part in shaping how our minds work today. ¶ Now, as new media emerge and evolve—media less haptic than paper but much more immediate—we have to consider which to use for what purposes, asking questions about each medium: How does it work? For which jobs is it best suited? When, and why, would we choose it instead of other options? ¶

Computers and digital devices have taken over many of the jobs that paper used to do, shifting its role from data storage toward pure communication. Yet we seldom think about exactly what happens when we communicate on paper. Maybe this is because we tend to think of paper simply as a delivery device for moving information from point A to point B. But what if there is more to it than that? What if, like hot coffee or hard chairs, paper's influence extends beyond its utility? ¶ Neuroscientists, psychologists, and other researchers have looked at how people interact with paper, comparing it to their interactions with other media, in more than one hundred published studies since the early '90s. These studies dominantly show that people read best on paper for three reasons: it makes content more intuitively navigable; it facilitates better mental “mapping” of information; and reading on paper drains fewer of our cognitive resources, making retention a little easier.¹⁹⁻²¹ All of this is because paper is a physical, tangible medium. ¶ When you consider memory and comprehension, paper looks even better: studies show that when we read on paper we process information differently, sustaining a deeper level of interest.¹⁷ Online reading is often purposeful and utilitarian, a kind of information foraging. But paper directs attention and working memory much differently, with a resulting increase in what neuroscientists identify as knowledge rather than recall. ¶ Even “digital natives” are more likely to remember something longer when they read it on paper.¹⁷ ¶ The Eagleman Lab took this one step further and tested the effects of paper *quality*, finding that people who read about a (fictitious) company on heavy, high-quality coated paper understood and remembered the content significantly better than those who read on either lighter, lower quality uncoated paper or on a computer screen. What's more, they had more positive feelings about the company. ¶

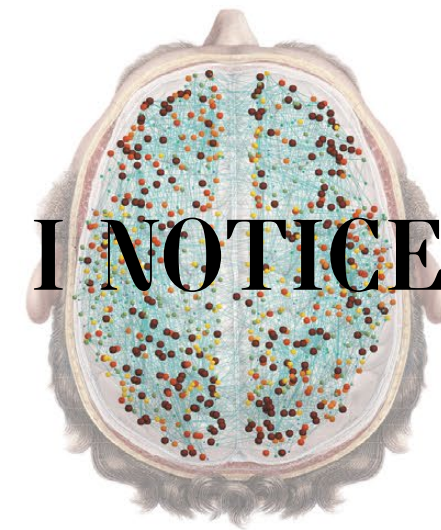


fig. 18

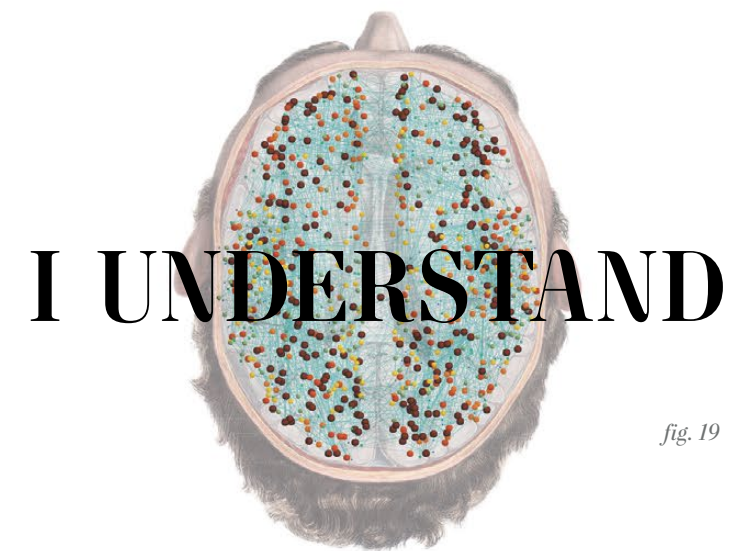


fig. 19

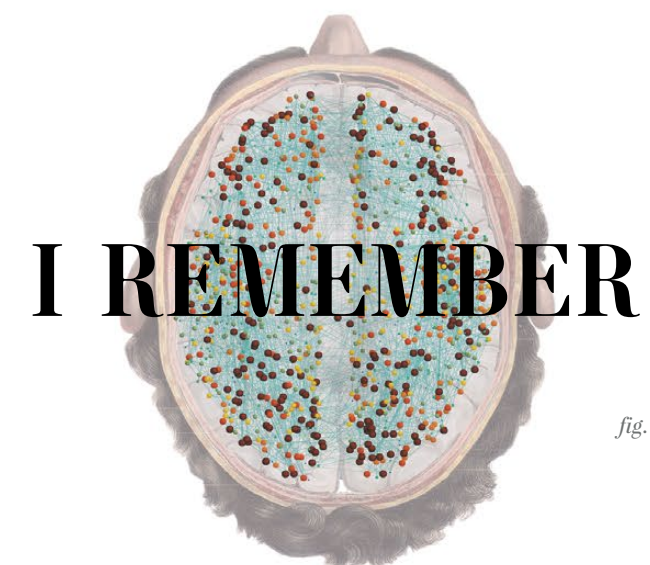


fig. 20

In a 2015 Eagleman Lab study, subjects read a company brochure on high-quality coated paper, lower-grade uncoated paper, or online. (Design was similar for all, and companies were randomly assigned a medium.) The study found that those who read on high-quality paper understood and remembered the content best by significant margins. Companies presented on the coated paper left the best first impressions, and people were most likely to recommend those brands to friends. A week later people still preferred the companies they read about on the high-quality paper, with name recall for those brands highest by a factor of 3:1.

TOME TWO:

HAPTIC BRAND



THIS PUBLICATION FEATURES

APPLE, BMW AND WORLD WILDLIFE FUND

MASTERS IN THE ART AND SCIENCE OF COMMUNICATION.

The most
successful brands
appeal to our
HAPTIC BRAINS
with clarity,
authenticity, and
relevance.

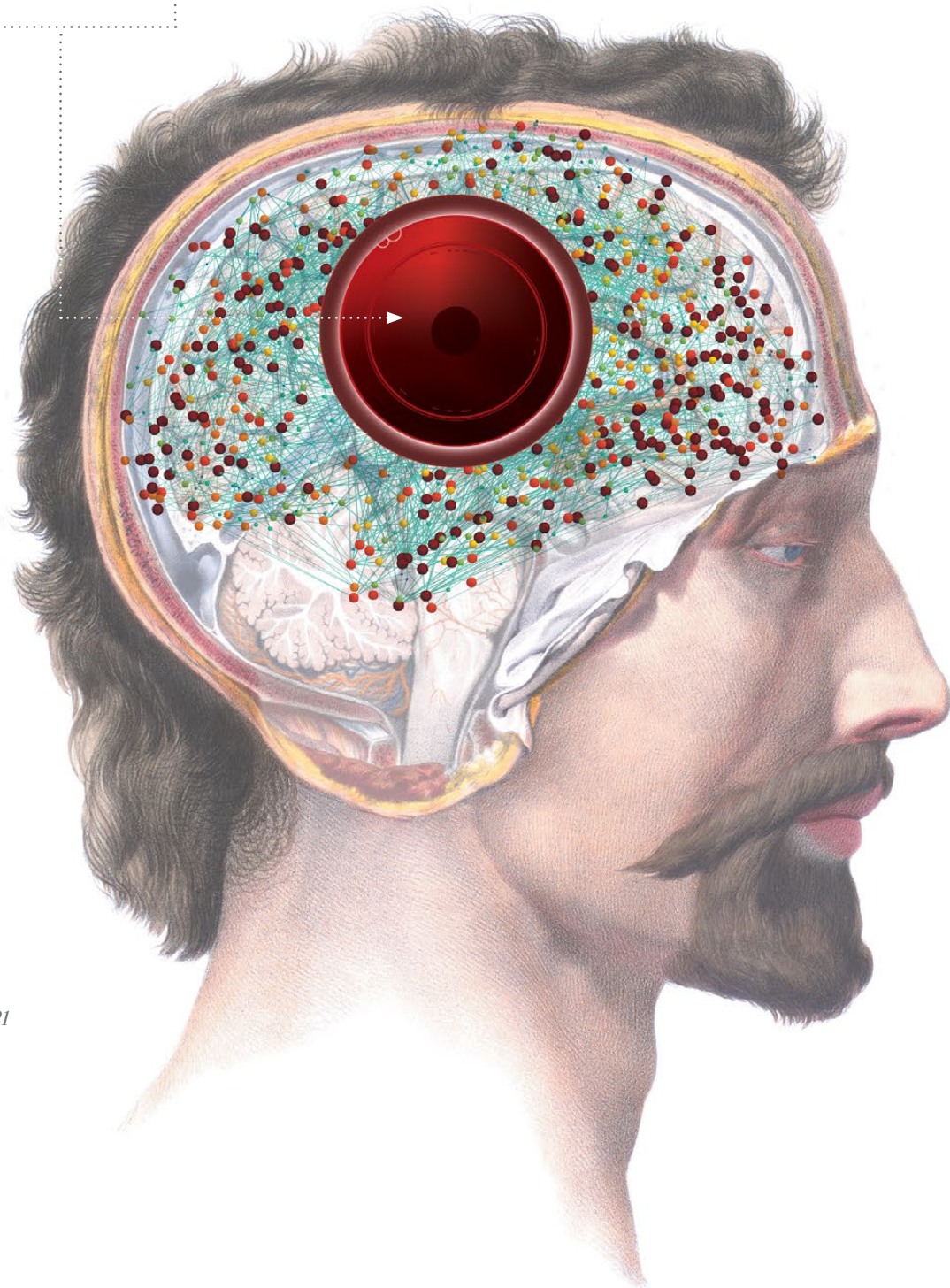


fig. 21

Studies show that wine drunk from a wineglass is perceived as being of better quality than wine drunk from a plastic cup—which seems pretty obvious. It also stands to reason that the world of wineglasses encompasses a wide range of quality. ¶ In her classic 1955 essay, Beatrice Warde equates wine to ideas and good typography to a crystal goblet, pointing out that the finest glass is not the one wrought of solid gold but the one that’s “clear, thin as a bubble and as transparent...calculated to reveal the beautiful thing which it was meant to contain.”²² The main job of communicators is to identify what is unique, and good, about a brand and create a program that reveals it as clearly. ¶ A communicator’s tools are words and ideas, expressed through typefaces, colors, and form, delivered on a medium that further shapes the content it carries. With so many media vying for a share of brand dollars, communicators sometimes look to science to help assess the alternatives. That is what Condé Nast did when it hired the research firm Olson Zaltman to investigate how people interact with magazines, and how their responses to TV and magazine ads are different. The study revealed that, “...Because paper is ‘lighter in its assertion of control,’ it draws readers in. [Readers] engage with the content—not just ads but all content—more fully.”²³ ¶ *New York Times* discovered something similar when it explored the current revival in printed catalogs. Retailers shifting to online catalogs found sales plummeting, as people missed the haptic qualities of the catalogs they were used to. Now mailings of paper catalogs have rebounded—but the form is changing dramatically as companies find exciting new ways to make catalogs relevant.²⁴ ¶ The brands in this book, among the world’s largest and most highly regarded, use the power of touch in communications that are beautiful, effective, and uniquely *theirs*. Looking at them, we get a delightful feel for what is possible.

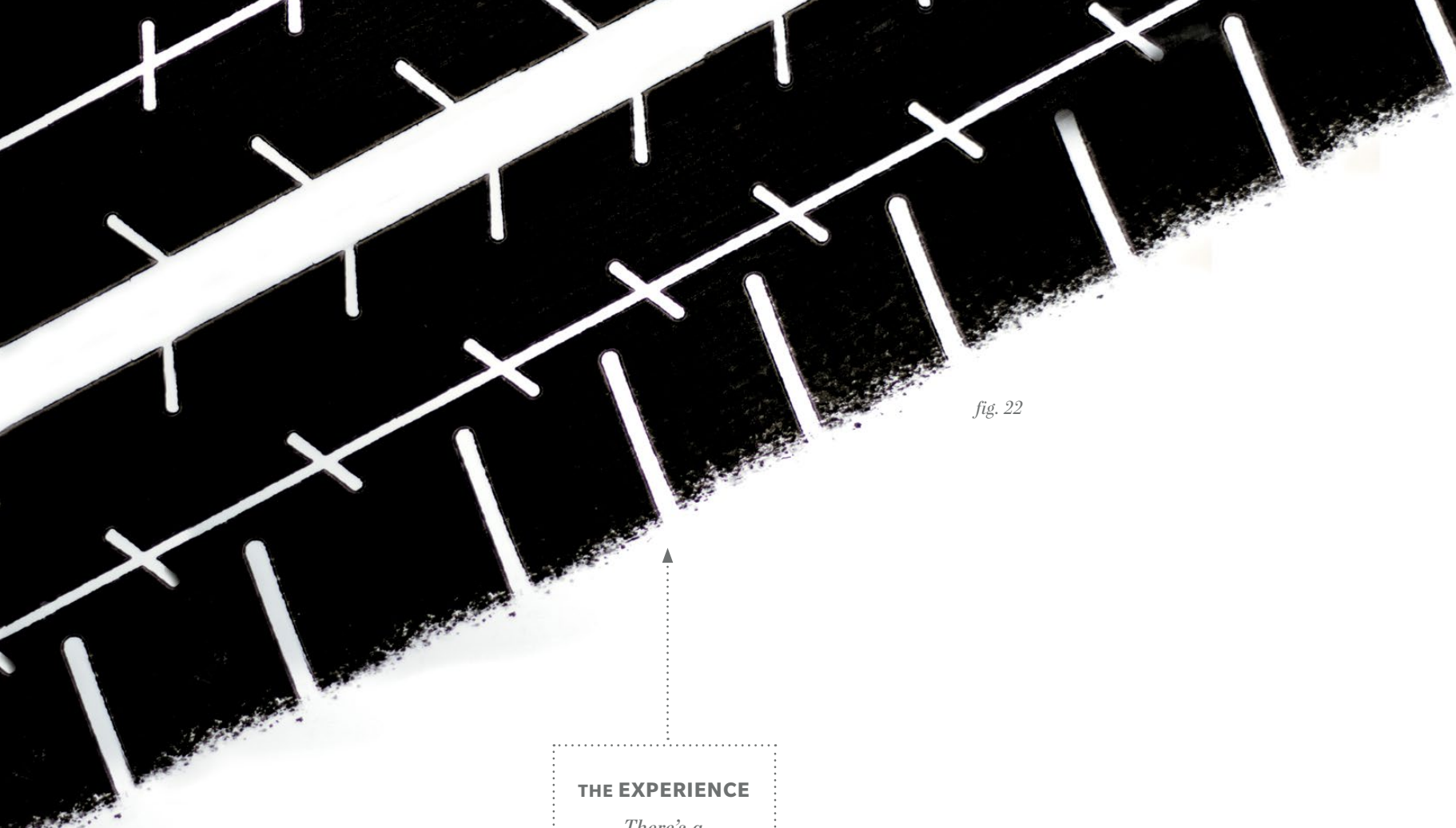


fig. 22

THE EXPERIENCE

There's a sensual power inherent in BMW's brand experience: the smell of rubber, the sound of the engine, the feel of the road. The brand's communications have to somehow let people feel it all.



BMW wanted something special for fans of its M6 Coupe. “The driving experience is all power and torque,” says Matt Mullins, Chief Instructor at BMW’s Performance Driving School. “This car *wrinkles the pavement*.” Project manager Brandi Orlando recalls, “We had a professional driver take an aggressive, 560 horsepower car and do tire-smoking donuts on paper taped to the road! We were so nervous. It was all hot sun and ink spraying, and it was beautiful. By the end of the ride we had captured the M’s unmatched performance with hundreds of gorgeous, one-of-a-kind M Prints.”

THE PRINTING

BMW turned an M6 Coupe into a printing press, with specially-designed pressure tanks spraying ink onto the car's rear tires as it zoomed from zero to sixty in 4.1 seconds—driving over paper.

THE PAPER

Can paper hold up to a car that tears up pavement? It's an extraordinary challenge, calling for paper of ultra-performance quality and durability.

Professional driver. Closed course. Do not attempt.

“WE SAID, ‘THERE’S NO WAY TO
CAPTURE THE M PERFORMANCE ON PAPER.’
AND THEN WE DID IT.”

—MANUEL SATTIG
MANAGER, BRAND STRATEGY & COMMUNICATION

BMW

fig. 24



THE BRAND

*“Simplicity,
elegance, beauty,
cleverness, humility.*

*Directness.
Truth.*

*Zoom out enough
and you*

*can see that
the same things
that define
Apple’s products
apply to Apple
as a whole.”*

*—John Gruber,
Daring Fireball*

fig. 25

Apple®

MacBook Pro

15-inch LED-backlit widescreen notebook

AirPort Extreme

45W MagSafe Power Adapter

iPad Air

MacBook Pro

“Apple’s products are unique not only on their feature merits, but because of the way they’re conceived, designed, built, sourced, manufactured, shipped, marketed, sold, opened, held, and used.” So says technology blogger Charlie Kindel, and he is right. Authoritative and uncluttered, the white box quietly commands you to pick it up. Its design anticipates exactly the path your hands will take to unveil the device nestled inside; its smooth coolness is a haptic taste of things to come. Even Apple’s advertising, praised as “minimalist,” “serene,” and “visually stunning,” has the unmistakable tactile quality that defines Apple.

fig. 26

CRITICS SAY APPLE'S IPHONE SEEMS MORE
LIKE A STONE YOU MIGHT FIND IN A STREAM
THAN A DEVICE. SIMILARLY, THE PACKAGE IT COMES IN DEFIES
TRADITIONAL NOTIONS OF WHAT A BOX CAN BE.

THE BOX

"Apple pays as much attention to its packaging as it does to its products... Getting it just right is [an] obsession."
The Guardian

THE UNBOX

"Anyone who's purchased anything from Apple in the last decade knows just how beautiful an experience unboxing their products is."
—Gizmodo

fig. 27



THE HAPTICS

*Of its new
Apple Watch
the company
says, "We
found a way
to give technology
a more
human touch.
Literally."
Not surprisingly
the advertising
incorporates haptic
qualities too.*

A TWELVE-PAGE VOGUE MAGAZINE AD ANNOUNCING THE GROUNDBREAKING NEW APPLE WATCH

UPHOLDS APPLE'S TRADITION OF TREATING ADVERTISING AS ART
AND COMMUNICATING THE BRAND THROUGH TOUCH.



38mm Silver Aluminum Case
Green Sport Band

THE MISSION

*World Wildlife Fund
exists to
conserve nature
and reduce
the most pressing
threats to
the diversity of life
on Earth.
Its vision is to
build a future
in which
people live in
harmony with
nature.*



fig. 29

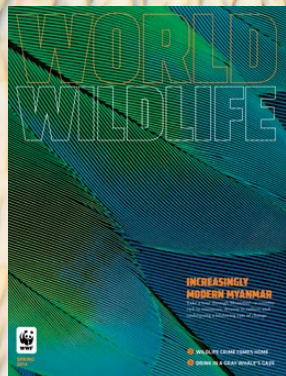


fig. 30



fig. 31

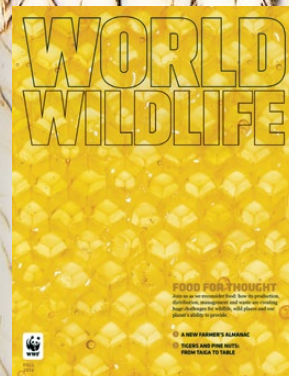


fig. 32



fig. 33

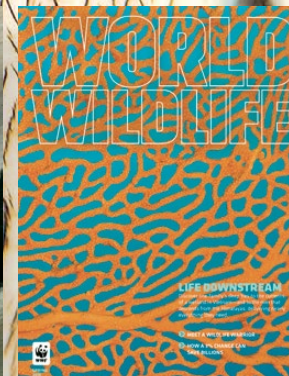


fig. 34

“World Wildlife Fund must engage millions in our conservation mission,” says Terry Macko, Senior Vice President, Marketing and Communications. “We created *World Wildlife* to make the world’s species and places more tangible—to put them directly in people’s hands.” Helping readers understand and care about seemingly distant issues is a mission the magazine accomplishes by presenting nature at its most majestic. Vivid stories and photographs bring the animals close enough to touch. Readers often guess at the tightly cropped cover images (ivory, feathers, fur, hide) then turn the page to find a “reveal” that explores that animal’s story in detail.

WHAT DO PINE FORESTS,
THE RUSSIAN GOVERNMENT
AND TIGERS
HAVE IN COMMON?

fig. 35

**NO FORESTS,
NO TIGERS**

*WWF uses
the power of
its beloved
global brand
to engage
governments,
communities, and
leading
corporations in
helping save
species and
habitats—like
endangered tigers
and the forests
they call home.*



fig. 36



Beautiful photography is embedded in the way *World Wildlife* tells its story. Thoughtful design, first-class printing, and fine paper collude to bring images to life, putting readers in contact with animals most will never see in person. Compelling editorials take the magazine's readers behind the scenes to explore, learn, and lose themselves in wonder. *World Wildlife* gives the world's leading conservation organization (with close to five million members globally) a gorgeous physical touchpoint—inspiring readers, connecting them intimately with nature's grandeur, and inviting people everywhere to work together to preserve the planet we share.

“SEEING IS BELIEVING,
BUT
FEELING IS THE TRUTH.”

—THOMAS FULLER, GNOMOLOGIA

1732

READINGS

TOUCH: THE SCIENCE OF HAND, HEART, AND MIND
David Linden (Viking 2015)

“THE READING BRAIN IN THE DIGITAL AGE: WHY PAPER STILL BEATS SCREENS”
Ferris Jabr (*Scientific American*, November 2013)

THE HAND, AN ORGAN OF THE MIND: WHAT THE MANUAL TELLS THE MENTAL
Zdravko Radman (MIT Press, 2013)

INCOGNITO: THE SECRET LIVES OF THE BRAIN
David Eagleman (Vintage 2012)

PROUST & THE SQUID: THE STORY & SCIENCE OF THE READING BRAIN
Maryanne Wolf (Harper Perennial 2008)

“HAMLET’S BLACKBERRY: WHY PAPER IS ETERNAL”
William Powers (Harvard University Press, 2007)

THE FEELING OF WHAT HAPPENS: BODY & EMOTION IN THE MAKING OF CONSCIOUSNESS
and DESCARTES ERROR: REASON, EMOTION & THE HUMAN BRAIN
Antonio Damasio (Mariner Books 2000 and Penguin Books 2005, respectively)

UNDERSTANDING MEDIA: THE EXTENSIONS OF MAN
Marshall McLuhan with introduction by Lewis H Lapham (MIT Press 1994)

A NATURAL HISTORY OF THE SENSES
Diane Ackerman (Vintage 1991)

ENDNOTES

THE MECHANICS OF TOUCH

1. C Davies, “Ode to a little blue box—Christian Davies on Tiffany’s design classic”, (*The Drum*, 2015)
2. EP Gardner, JH Martin, TM Jessell, “Principles of neural science”, (McGraw Hill Medical, 2000), 431-449
3. D Ackerman, *A Natural History of the Senses* (Vintage, 1991), 107
4. Adapted from JR Phillips, RS Johansson, KO Johnson, “Representation of braille characters in human nerve fibers”, (*Experimental Brain Research* vol 81(3), 1990), 589-592

THE NECESSITY OF TOUCH

5. HF Harlow, “The nature of love” (University of Wisconsin, 1958), first published in *American Psychologist* vol 13, 673-685, archived in *Classics in the History of Psychology*, an internet resource by CD Green

EMBODIED COGNITION & COMMUNICATIVE TOUCH

6. A Crusco, CG Wetzel, “The Midas touch: The effects of interpersonal touch on restaurant tipping”, (*Personality & Social Psychology Bulletin* vol 10(4), 1984), 512-517
7. MW Kraus, C Huang, D Keltner, “Tactile communication, cooperation, and performance: an ethological study of the NBA”, (*Emotion* vol 10(5), 2010), 745-749
8. E Montague et al, “Nonverbal interpersonal interactions in clinical encounters and patient perceptions of empathy”, (*Journal of Participatory Medicine* vol 5, 2013)

TOUCH & PERCEIVED OWNERSHIP

9. D Kahneman, J Knetsch, R Thaler, “Experimental tests of the endowment effect and the Coase theorem”, (*The Journal of Political Economy* vol 98(6), 1990), 1325-1348
10. J Peck, V Barger, A Webb, “In search of a surrogate for touch: The effect of haptic imagery on perceived ownership”, (*Journal of Consumer Psychology* vol 23(2), 2013), 189-196
11. J Peck, S Shu, “The effect of mere touch on perceived ownership”, (*Journal of Consumer Research* vol 36(3), 2009), 434-447

KNOWLEDGE & THE SUBCONSCIOUS MIND

12. A Bechara, A Damasio et al, “Insensitivity to future consequences following damage to human prefrontal cortex”, (*Cognition* 50(1-3), 1994), 7-15

THE EFFECT OF INCIDENTAL TOUCH

13. SE Asch, “Forming impressions of personality”, (*Journal of Abnormal and Social Psychology* vol 41(3), 1946), 258-290
14. JM Ackerman, CC Nocera, JA Bargh, “Incidental haptic sensations influence social judgments and decisions”, (*Science* vol 328(5986), 2010), 1712-1715
15. LE Williams, JA Bargh, “Experiencing physical warmth promotes interpersonal warmth”, (*Science* vol 322(5901), 2008), 606-607
16. M Plitt, R Savjani, D Eagleman, “Are corporations people too? The neural correlates of moral judgments about companies and individuals”, (*Social Neuroscience* vol 10(2), 2015), 113-125

HOW MEDIA SHAPES MESSAGES

17. F Jabr, “The reading brain in the digital age: Why paper still beats screens”, (*Scientific American* vol 309(5), 2013), 48-53
18. M Wolf, *Proust and the Squid, The Story & Science of the Reading Brain* (Harper Perennial, 2008)

19. R Ackerman, T Lauterman, “Taking reading comprehension exams on screen or on paper?

A metacognitive analysis of learning texts under time pressure”, (*Computers in Human Behavior* vol 28(5), 2012), 1816-1828

20. A Mangen, B Walgermo, K Brønnick, “Reading linear texts on paper versus computer screen:

Effects on reading comprehension”, (*International Journal of Educational Research* vol 58, 2013), 61-68

21. E Wästlund et al, “Effects of VDT and paper presentation on consumption and production of information: Psychological and physiological factors”, (*Computers in Human Behavior* vol 21(2), 2005), 377-394

HAPTIC BRANDS

22. B Warde, H Jacob, *The Crystal Goblet: Sixteen Essays on Typography* (World Publishing Company, 1955)
23. W Powers, “Hamlet’s Blackberry: Why paper is eternal”, (*Shorenstein Center on Media, Politics and Public Policy*, 2006)
24. R Ruiz, “Catalogs, after years of decline, are revamped for changing times”, (*New York Times*, 2015)

“[We] interact with
the medium,
using [our] senses and
cognitive abilities to
understand
the content. In the case
of paper,
this is the moment
we pick up a sheet,
or a magazine
or a book,
and begin reading.

—

If we could get to
the bottom of
that moment—which we
take for granted
though it
is a profound,
almost magical event—
we might be able
to say why
paper has endured
this far into
the age of electronic
media, and
why it is eternal.”

—WILLIAM POWERS
from his essay “Hamlet’s Blackberry: Why Paper is Eternal”

COLOPHON

ENDNOTES, READING LIST, & PRODUCTION NOTES

Scan this page to access linked endnotes, reading list, and production details for this book.

The branded communications featured in this book are selected by Sappi as outstanding examples of best practices in branding. The names, trademarks, symbols, logos, and all other intellectual property of the companies, organizations, and brands appearing herein are the exclusive property of their respective owners and should not be interpreted as an endorsement of or by Sappi; any legal and equitable rights in their intellectual property are exclusively reserved to those owners.

Limited-edition playing cards (*MGCO Green Deck*, *fig. 12*) are designed by Misc. Goods Co. and manufactured by United States Playing Card Co.

APPLE This book is not affiliated with, endorsed by, or connected to Apple Inc. Every Apple product and Apple package photographed in this book is a registered trademark of Apple Inc. Sappi North America is not associated with any Apple product shown in this book. *A Communicator’s Guide to the Neuroscience of Touch* is an independent publication and has not been sponsored, endorsed, or certified by Apple Inc. and is not affiliated in any way with Apple Inc. Quotes are referenced from existing publicly available materials.

BMW This book is an independent publication of Sappi North America and has not been sponsored, endorsed, or certified by BMW. “The Making of an MPrint” (*vid. 7*) was conceived, designed and produced by KBS+ in collaboration with Classic Color Inc, Chicago.

WORLD WILDLIFE FUND *A Communicator’s Guide to the Neuroscience of Touch* is an independent publication of Sappi North America and has not been sponsored, endorsed, or certified by World Wildlife Fund (WWF). This book does not imply that WWF endorses Sappi nor its products, nor is any partnership between WWF and Sappi implied. Cover images: *Ivory* (*fig. 29*) by Andries Alberts/Dreamstime.com; *Feathers* (*fig. 30*) by Glamorous Images/Shutterstock.com; *Bison Hide* (*fig. 31*) by Linda Van Der Heiden; *Honeycomb* (*fig. 32*) by Adam Voorhes/WWF-US and styling by Robin Finlay; *Zebra Stripes* (*fig. 33*) by Masterfile Royalty Free; *Coral* (*fig. 34*) by iStock.com/ifish. *Pine Nut Tiger* (*fig. 35, vid. 9*) by David Arky; Black & white photography (*fig. 36*) by Nine François. *World Wildlife* is designed by Pentagram. Editorial Director: Alex MacLennan

CONCEPT, RESEARCH, WRITING, DESIGN

Rigsby Hull

SCIENCE ADVISOR AND PRESENTER FOR “NEUROSCIENCE SHORTS”

Dr David Eagleman

ILLUSTRATIONS, PHOTOGRAPHY AND VIDEO

Jonathan Hull (*interconnected brain*), Carmen Garza (*haptic heads*),
Andy Dearwater (*mechanoreceptor diagrams; embodied cognition & communicative touch*),
Andy Goodwin (*photographer*), Dan Mohr (*videographer*)

VIDEO PRODUCTION

Rigsby Hull

ANATOMICAL ILLUSTRATIONS

From collections archived at the Thomas Fisher Rare Book Library, University of Toronto
by Nicholas Henri Jacob, 1831 – 1854

TYPEFACE

Science Modern, redrawn for this project from Jules Didot’s *Specimen de la Nouvelle Foundrie*, 1842
by James Puckett, Dunwich Type Foundry

SAPPI SUSTAINABILITY PRACTICES

Paper is one of the most sustainable mediums for communications. Sappi’s paper is derived from renewable resources, made with high levels of renewable energy and is recyclable. Sappi works with suppliers who share our commitment to sustainability, and we adhere closely to third-party chain-of-custody certification guidelines for fiber procurement. Nearly 80% of the energy used in our North American mills comes from renewable sources, and we are a certified SmartWay Transport Party, focused on reducing greenhouse gas emissions and conserving fuel. Concern for the life-cycle of paper extends to disposal, and we support recycling outreach and education to help make sure that paper is reused and does not end up in a landfill. Sappi papers are available with SFI®, FSC® and PEFC® chain-of-custody certifications.

This book is printed on McCoy Silk · *Cover:* 100lb. Cover · *Text:* 100lb. Text · *Gatefold:* 100lb. Text

Sappi is a trademark of Sappi Limited · McCoy is a registered trademark of Sappi North America

© 2015 Sappi North America · All Rights Reserved

PLEASE  RECYCLE

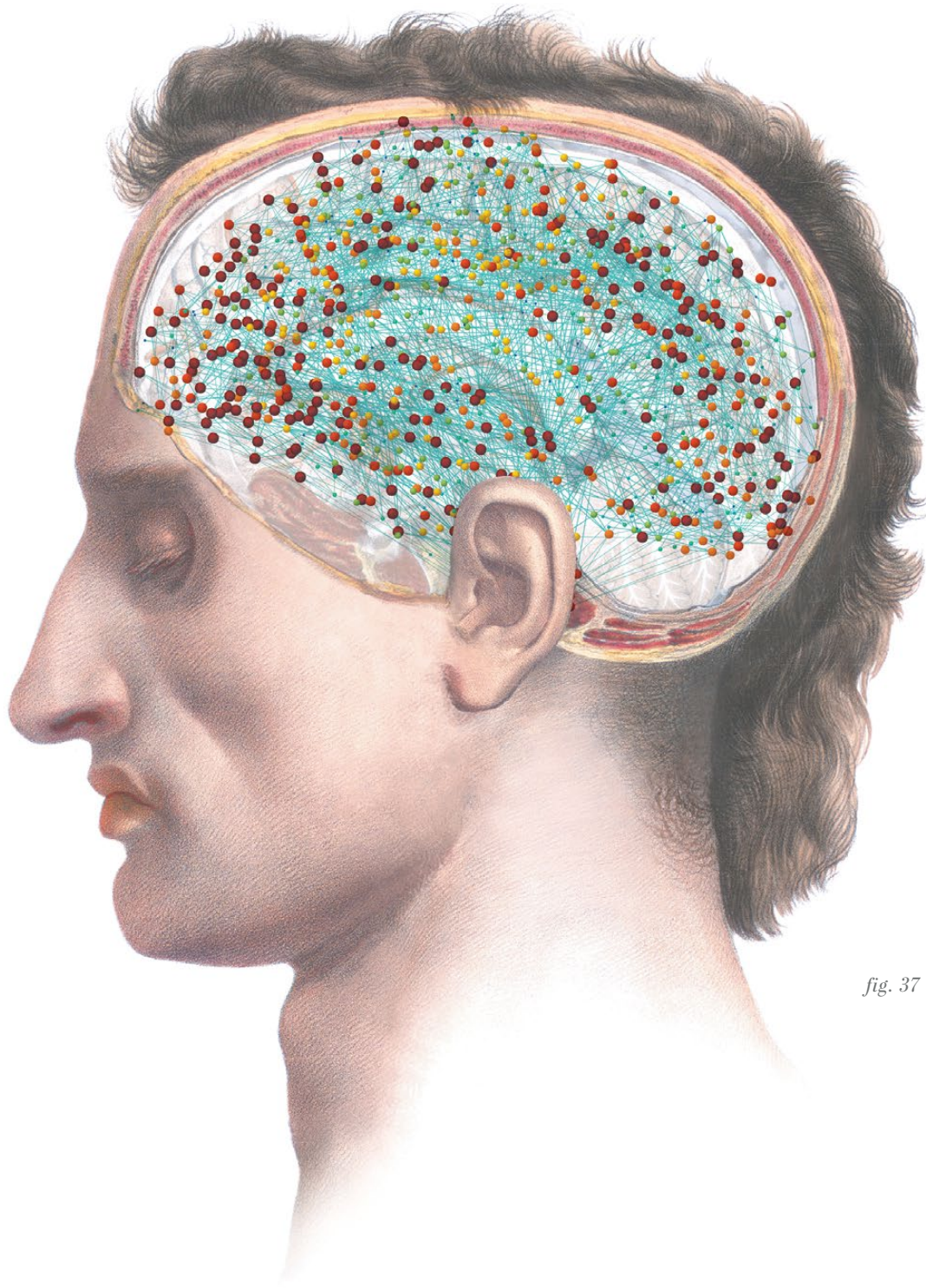


fig. 37

sappi
Inspired by life

255 STATE STREET, BOSTON MASSACHUSETTS 02109

WWW.SAPPI.COM/NA 800.882.4332