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LITERARY
STUDIES

Edited by

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CHAPTER 24

THE VALUE OF QUALITATIVE RESEARCH FOR COGNITIVE LITERARY STUDIES

LAURA OTIS

NEARLY everyone has known the frustration of being told, “You’re not thinking. Use your head!” All too often, unfamiliar ways of thinking are mistaken for the absence of thought. What occurs in other people’s minds is a mystery, and often we presume that other people’s experiences match our own. Usually they don’t. The felt experience of thinking varies greatly from one individual to another, and each head houses a distinct mental world.

I’ve always been fascinated by people whose thoughts differ strikingly from mine. When I studied organic chemistry, I used to stare miserably at twin, candy-like pictures, amazed that people could see them as three-dimensional molecules. Images and movements don’t stick in my mind. I couldn’t tell you which way to turn the key to enter the apartment where I’ve lived for ten years. Each time I bring the key to the lock, it’s a fifty-fifty chance. Clockwise? Counterclockwise? Which way does a clock turn again?

Instead, my mind revels in words and sounds. I remember melodies, phrases, and stories with ease. Voices matter to me, and I absorb their nuances. My mind works like an iTunes library of remembered conversations. It’s not surprising that 29 years ago, I left a PhD program in neuroscience and a budding thesis project on membrane proteins. Deeply ashamed, I knew I’d turned down the wrong path, and I had to withdraw or die. The question is why I worked so hard for so many years developing skills that didn’t come naturally.

Individuals vary greatly in their abilities to form visual mental images, and their ways of thinking affect their reading experiences.¹ Individual mental styles differ from mental abilities and designate preferred ways of processing information. They vary with context and evolve as individuals learn, but in adulthood they often remain stable enough to be characterized.² When people read fiction or poetry, their visual mental imagery influences the meanings they construct from texts’ nuances.³ Many individuals read

specifically *for* the rich, visual worlds that fiction stimulates them to create. Others, who don't consciously visualize while reading, enjoy the resonances of patterns among words. These experiences are not mutually exclusive, and neither verbal sensitivity nor visual mental imagery can be ignored in studies of how texts make meaning.

In the past two decades, scholars from multiple fields have pointed out the relevance of visual mental imagery to literary analysis, and the need to consider individual variations in mental experiences. Ellen Esrock, Elaine Scarry, and most recently, G. Gabrielle Starr have shown how scientific knowledge of visual processing can help reveal the ways that literary texts work.⁴ Starr joins cognitive linguist Raymond W. Gibbs in arguing that individual differences in aesthetic experience should be studied by scientists as well as humanists. The era has passed in which laboratory researchers focus only on widely shared human experiences. "Individual variation is not something that can be pushed aside," Gibbs asserts. Researchers need to consider "what all people are doing" when they read literature, not generalize based on most people's habits.⁵ Starr, who collaborates with cognitive neuroscientists Edward A. Vessel and Nava Rubin, emphasizes that laboratory studies can help literary scholars understand how "cognitive architecture enables a variety of [reading] experiences."⁶

In the quest to understand how texts, cultures, and diverse brains create these wide-ranging experiences, qualitative research can complement laboratory and text-based studies. All three modes of research have their strengths and weaknesses: neuroscientific studies provide useful data, but laboratory environments rarely reproduce the ripe chaos of lived experience. Close readings of texts can offer brilliant insights but usually rely on a single mind's perspective. Interview-based research presents introspections from a variety of mental worlds. Of course, people lack conscious access to most of their thought processes, and they may not know their minds as well as they think they do. Psychological test results often contradict self-reports. The stories that emerge from personal experiences can have great epistemological value, however, as Kathryn Montgomery Hunter and Rita Charon have argued in their studies of medical learning.⁷ Personal insights may not create pillars of knowledge, but they can change the blueprints, suggesting new experiments to try. In the qualitative research described in this essay, interviews revealed amazing variation in what words stimulate people to see.

The insights reported in this essay stem from a larger, qualitative study examining how people's conscious experiences of thought vary.⁸ One aim of this project has been to learn how people differ in the visual mental images they form in response to spoken and written words. The 34 participants in this narrative study included scientists, novelists, poets, artists, scholars, designers, and a broad range of other creative professionals. Among them were Temple Grandin, Salman Rushdie, and poet laureate Natasha Trethewey. I selected the interviewees for the diverse ways in which they'd chosen to use their minds. In the spectrum of human thought, they represent only a small sliver. Most are American, educated, economically well off, and successful in some creative or professional endeavor. Still, the differences in their mental experiences are striking. If individuals in this narrow band of humanity varied so greatly in their relationships with words and images, the differences worldwide must be extraordinary.

LITERARY AND SCIENTIFIC STUDIES OF VISUAL MENTAL IMAGERY

In the 1990s, two interdisciplinary studies united literary, philosophical, and cognitive research on visualization. In *The Reader's Eye* (1994), Ellen Esrock showed how literary critics followed analytic philosophers and behavioral psychologists, regarding visual mental images as personal and unworthy of scholarly attention.⁹ As a result, analyses of visual mental images became scarce in the humanities and social sciences for much of the twentieth century. New Critics feared that discussions of what readers saw when they read (dancing palm trees, their mothers' faces) would divert the analytic lens from literary works to the readers' idiosyncratic minds.¹⁰ Esrock disagreed and demonstrated through astute readings how literary knowledge could be built by examining readers' mental images. Her study pays heed to individual, cultural, and historical variations in visual mental imagery.¹¹ While Esrock argues that readers' images can reveal the ways texts and human minds work, she acknowledges that no two minds respond to a text the same way. The individual differences that made mental imagery suspect to twentieth-century psychologists, philosophers, and critics make images all the more intriguing in the twenty-first.

Elaine Scarry's highly original *Dreaming by the Book* (1999) broke ground by calling attention to the ways novelists and poets inspire visualization. Using her own visual mental imagery as a starting point, Scarry probed the texts of writers from Homer to Heaney to determine how they evoked vivid internal scenes. Scarry relied on psychologist Stephen Kosslyn's evidence that the same brain regions enable visual mental imagery and visual perception. She argued that "imagination produces a mimesis of sensation by miming the deep structure that brings the sensation about."¹² Through perceptive close readings, Scarry discovered literary techniques that stimulate readers to create dynamic images. Poets and novelists often describe the play of light over surfaces, for instance, or invite readers to move diaphanous images across others so that the background images appear more solid. Skilled writers evoke imagery so vividly, Scarry proposed, because they intuitively understand human brains. Literary and scientific scholars can benefit equally from writers' knowledge, because finely crafted literature offers "a set of instructions for mental composition."¹³

Epistemologically, *Dreaming by the Book* draws on Scarry's own visually rich mental experiences, but it does not stop there. Like the literature she explores, it invites readers to conduct mental experiments and try each technique she describes.¹⁴ Although her work is introspective, she has spoken with scientists, writers, and other readers to compare visualization experiences. *Dreaming by the Book* excels not just in its determination to learn *how* writers inspire mental images but in its insistence on plasticity. While Scarry does, at times, seem to presume that others will respond visually to literature just as she does, she tries to make readers more aware of their imagery and to practice manipulating it. My qualitative research supports Scarry's finding that experiences

with visual mental imagery can change depending on how one uses it. Since my failed attempts to picture organic molecules, I have learned that individual ways of thinking are not destinies.

Francis Galton's surveys in the early 1880s suggested the vast range of the human visual imagination.¹⁵ When asked to visualize the table where they had eaten breakfast that morning, some individuals claimed to see it as vividly as they had while eating; others, more dimly; and some pictured nothing at all.¹⁶ Galton suspected that his participants—many of whom were scientists—had been stripped of an inherent human ability by an educational system that favored abstract, verbal analyses. "Our bookish and wordy education," he argued, "tends to repress this valuable gift of nature."¹⁷ From 1900 to 1910, the German Würzburg School psychologists explored individual variations in visual mental imagery despite their claim that people could experience "imageless thought."¹⁸ From the 1910s until the early 1960s, however, behavioral psychologists' rejection of imagery as a research topic and introspection as a research method slowed the investigation of inner, conscious visual experiences.

Shifts in cultural values and the emergence of cognitive science led to fresh studies of mental imagery in the 1970s. Psychologist Allan Paivio proposed that human minds encode experiences in parallel, largely independent verbal and nonverbal pathways. He developed a "Ways of Thinking" questionnaire to indicate whether individuals preferred one mode or the other.¹⁹ Paivio's survey contained 86 true-false items such as "I do not form a mental picture of people or places when reading of them."²⁰ Psychologist Alan Richardson chose 15 of Paivio's most revealing prompts—such as "I don't believe that anyone can think in terms of mental pictures"—to form a "Visual Verbal Questionnaire" to evaluate cognitive style.²¹ Doubting that the true-false format revealed individuals' abilities, psychologist David Marks asked participants to visualize spontaneously to prompts such as "a storm blows up, with flashes of lightning."²² In Marks' "Vividness of Visual Imagery Questionnaire," participants rated their images from 1 ("perfectly clear and vivid as normal vision") to 5 ("no image at all, you only 'know' you are thinking of the object").²³ Results of these 1970s questionnaires aligned with people's notions of themselves as "visual" or "verbal," but they failed to correlate with psychometric test results. It made no sense that people who considered themselves "visual" performed so badly when asked to rotate imaginary blocks. What was wrong?

In the early 1980s, neuroscientists discovered that human brains process visual information in two parallel, largely independent streams: a dorsal pathway, which analyzes distances, dimensions, directions, and speeds, and a ventral one, which examines colors, textures, patterns, and shapes in a more holistic way.²⁴ It occurred to cognitive neuroscientist Maria Kozhevnikov that people might vary in their tendencies to process visual information spatially or pictorially, relying more on the dorsal or ventral streams, respectively. In behavioral and neuro-imaging experiments conducted since 2002, Kozhevnikov and her colleagues have confirmed this hypothesis.²⁵ There is no single, unified "visual" cognitive style as opposed to a verbal one—a category that may also harbor multiple cognitive trends. Rather than a linear spectrum from "visual" to "verbal," human cognitive styles might be imagined as occupying a three-dimensional

space ruled by spatial, “object” (pictorial), and verbal axes. An individual’s cognitive habits might be represented as a mobile point, which drifts through a sector of this space defined by spatial, object, and verbal coordinates. In the 1970s, questionnaire and test results had failed to align because Richardson’s and Marks’s surveys emphasized object preferences, whereas psychological tests were measuring spatial abilities.

Kozhevnikov’s explorations of the spatial and object styles have led to some surprising discoveries. She and her team have noticed a “trade-off” between spatial and object skills, and between the corresponding cognitive styles. Individuals may be very good at schematic thinking, which requires judging distances, dimensions, and speeds; they may excel at holistic, pictorial cognition, which demands that they recall visual details or recognize hidden forms. But people rarely do extremely well at both, perhaps because of a “bottleneck” in visual attention.²⁶ Those who prefer to think visually fall into “spatial” and “object” groups, whose experiences of thought can differ greatly. Interestingly, people who consider themselves “verbal” and excel on verbal tests often have average spatial and/or object abilities.²⁷ To a large extent, my qualitative research has supported Kozhevnikov’s finding. When asked to describe what they see when they read, verbally inclined people often reveal penchants for object or spatial imagery. By thinking of themselves as “verbal,” they may fail to develop potentials to exercise their minds in other ways.

VISUAL RESPONSES TO SPOKEN LANGUAGE

W. J. T. Mitchell has shown that “image” has no clear, unified definition and that cultural pumps maintain the word/image binary.²⁸ Sign languages, idiographic characters, and the reading of written texts all indicate how visual and verbal processes blend into one another. Mitchell believes that for millennia, Western religious views that contrast visually perceived images with imperceptible, divine wisdom have cast suspicion on visual representations.²⁹ Jacques Derrida has proposed that Western philosophy favors oral transmissions over written texts, so that images conjured by written words are doubly suspect.³⁰ In the past decade, cognitive science experiments have supported the poststructuralist claim that Westerners respond differently to written and spoken language. French scientist Michel Denis and his colleagues, who study the interactions of visual mental imagery and verbal language, noticed in a 2009 investigation how differently participants described the same route when offering written or spoken directions.³¹ Visual/verbal and image/word fail as clear-cut dichotomies, since both visual imagery and verbal language can assume and share so many different forms.

There is no reason to believe, therefore, that people’s visual responses to single, spoken words will indicate the visual mental imagery they’ll form when reading written texts. I will describe some responses to individual words, however, because they suggest the variety of people’s inner visual experiences. I have noticed a correlation—though not a

quantifiable one—between the visual mental imagery evoked by conversations and that inspired by reading literature.

Unsurprisingly, asking people, “Do you see anything when you hear a word spoken?” elicited a complex array of answers. Two participants, literary scholar Katherine Hayles and attorney Diana Richmond, initially thought I was asking whether they pictured a written word.³² Nobel Prize-winning biologist Elizabeth Blackburn explained that her visualizations depend on the words she hears. If I said “elephant,” she would probably picture an elephant, but if I said “and,” she would see the word “and.”³³ Eventually I settled on “bridge” as a cue because it was concrete but suggestive, though it brought some surprises.³⁴ When neuroscientist Tony Movshon heard “bridge,” he thought of people playing the card game.³⁵ The choice of “bridge” as a prompt also revealed the workings of visual culture. The Brooklyn and Golden Gate bridges emerged from so many minds that I suspected “bridge” was summoning popular images as well as lived experiences—if the two can be distinguished.

Several participants warned me that the interview process was driving them to visualize when they normally wouldn’t. Hayles and interdisciplinary scholar David Krakauer indicated that by directing their attention to visual mental imagery, I was urging their minds to behave in ways they ordinarily didn’t. Krakauer at first saw nothing for “bridge,” but he envisioned a stone bridge when he tried to picture one. “I feel I ought to be visual,” he laughed, “But this is very dangerous, because I think I’m through language creating this thing.”³⁶ By calling people’s attention to visualization, I evoked some images that either wouldn’t have existed or might not have reached consciousness.

Still, the “bridge test” revealed an extraordinary range of experiences with visual mental images and words. Like Hayles and Krakauer, several other participants said that they don’t normally picture anything when they hear a single word, unless they’re prompted and actively trying. Salman Rushdie commented, “Words are themselves, as far as I’m concerned. You can put them together in such a way that you can see things. . . . Words for me are the tool of the trade. . . they’re like the jeweler’s gold. They’re the thing you have to mold and shape into the thing that you’re making.”³⁷ Rushdie visualizes when he combines words but not when he encounters one alone.

Several of the people who didn’t spontaneously visualize bridges leaped quickly to metaphor. These included epidemiologist Venkat Narayan and literary scholar Michael Holquist. Narayan pictured “a kind of bridge connecting two things” such as the one linking Emory University’s public health and humanities buildings. When I asked him for more detail, Narayan said only that he was imagining “some sort of connection between unrelated parts.”³⁸ I interviewed Holquist in his Lower East Side apartment overlooking the Manhattan Bridge.

“If I say ‘bridge,’ do you see anything?” I asked.

“Sitting where you are, you would understand why I would.”

“What does it look like?”

“It looks like the Manhattan Bridge.”

Holquist’s eyes were not directed toward the window.

“And what does the Manhattan Bridge look like?” I pressed.
 “An attempt to come to grips with the Brooklyn Bridge.”³⁹

Maybe if Holquist had wanted to, he could have described blue-gray towers and cables in vivid detail. But the bridge’s relationship to other bridges interested him more than its visual appearance, which his mind may or may not have registered.

Other participants cared deeply about the visual details of their imagined bridges. In some cases, their voices conveyed the excitement of visual mental imagery. “Immediately a bridge comes to me. . . a picture of a bridge, soon as you said bridge!” exclaimed cell biologist Barry Shur. He envisioned a “beautiful picture” that his daughter took for him of “an aqueduct looking, beautiful, old medieval bridge in Scotland over some water.”⁴⁰ Painter Mary Welty saw a covered wooden bridge: “Shade in the middle. Sun on the outside. Stream underneath.” I asked her if the wood had color, and she said it was red, then specified, “It’s falling off the bridge red.”⁴¹ Welty’s description gives the impression of a full-fledged, internal scene complete with reflections and shadows. Shur pictured a photograph, and Welty, an actual bridge, but both described their mental pictures vividly and holistically. They experienced images in that moment that might just as well have been real.

Other participants saw schematic images more akin to drawings or models than perceived scenes. Banking software salesperson Jane von Seggern pictured something like “an erector set” with metal girders.⁴² Geoscientist Lynn Margulis envisioned “something spanning water,” and when I pressed, “What does it look like?” she responded, “I don’t have those details.” She later saw the nearby Coolidge Bridge over the Connecticut River, but only after she’d been pondering bridges for several seconds.⁴³ Neuroscientist Hugh Wilson imagined “an abstract truss bridge, fairly long.” He quickly added, “it was a particular sort of bridge—can I name where it was, probably not.”⁴⁴ Participants such as these three tended to say what *kinds* of bridges they were seeing rather than naming specific bridges they had viewed.

These schematic mental images of bridges differed from detailed, colorful representations, and the people who experienced them didn’t always think of themselves as visually sensitive or skilled. Some of my participants even seemed unaware that their mental diagrams *counted* as visual mental imagery. Because the visual/verbal questionnaires of the 1970s emphasized object visualization, the keen, active imaginations of many who prefer spatial imagery have gone unnoticed.

A tendency toward spatial cognitive processing opens ways to use mental imagery, however, that can enhance the reading experience. Poet Kate Thorpe spontaneously described the angle from which she was viewing her imagined bridge. “It’s in front of me, as if I’m going to cross it,” she said. “It looks wider closer to me than in the middle.”⁴⁵ This was her first response to my question, “What does it look like?” I hadn’t asked her where she was standing relative to the bridge, but she thought that I needed to know. Hugh Wilson’s and Temple Grandin’s descriptions of their mental worlds suggest the dynamic nature of spatial visualization, which Scarry has identified as vital for fiction-reading.⁴⁶ In Oliver Sacks’s 1995 narrative about Grandin, he noted her “constant

reading” and quoted an article in which she declared, “I have little interest in novels with complicated interpersonal relationships. . . . Detailed descriptions of new technologies in science fiction. . . are much more interesting.”⁴⁷ When I asked Grandin, “Do you see anything when you read?” she responded that she does. When reading a science fiction novel in which a whole world is created, she finds that “I’m making a movie of it in my head.”⁴⁸ The rewarding work of manipulating visual mental images seems to drive her reading. Both Wilson and Grandin compared their mental processes to Photoshop, describing how they can move individual parts of images and substitute or selectively color components.⁴⁹ With their sensitivity to angles, motions, and the relationships among parts, thinkers such as Thorpe, Grandin, and Wilson make adept, creative readers who can contribute to literary discussions. They may detect implications of physical descriptions that many other readers fail to notice.

VISUAL MENTAL IMAGES FORMED WHILE READING

What an individual pictures in response to the spoken word “bridge” doesn’t reliably predict what she or he will see while reading fiction. Among my 34 participants, however, I noticed the same kinds of descriptions that people reported for the word “bridge”: (1) little or no visual mental imagery; (2) vivid, detailed imagery; or (3) schematic imagery focused on spatial arrangements. Some readers don’t consciously experience imagery, or it is so dim and vague that they can’t describe it. If they do form visual mental images, they tend not to regard these internal pictures as essential for appreciating the story. Michael Holquist said that his visualization depended on the novel he was reading and mentioned Dostoevsky as an author who made him visualize. “What do you see when you read Dostoevsky?” I asked, and he answered, “Embarrassment.” He then specified, “It’s layered. The first level. . . you see the scene as he gives it. . . . And then the expressions. . . that come with the. . . subtle interchange of misprisions that indicate that everybody’s getting it wrong.”⁵⁰ As he did with the Brooklyn Bridge, he moved quickly from the literal level of visual perception to the metaphoric one of “seeing” thoughts, feelings, and relationships, maybe because he found it more compelling.

Not all fiction readers are aware of forming visual mental images, and not all who form images value them. Several participants indicated that they experience some imagery, but other aspects of fiction intrigue them more. Interdisciplinary scholar David Krakauer responded, “I think I probably form very vague, statistical representations of scenes and people. . . I couldn’t. . . draw for you the actor or the protagonist. . . . I think my internal representation is not that exact.” He loves to read finely crafted novels, but he explains: “I’m interested in permutations of symbols, and science does it; mathematics does it; novel-writing does it, good novel-writing.”⁵¹ A novel’s play of symbols interests him much more than his visual representations of its events. Neuroscientist

Tony Movshon also forms visual images but pays more attention to the characters' mental worlds. "When I'm involved in a novel," he specifies, "It's more about characters and events and sort of cognitive structures than the images that I usually get."⁵² Epidemiologist Venkat Narayan experiences visual mental imagery, but the resonances of a novel's language intrigue him more. "When I come across interesting language, that excites me a lot, and I tend to . . . relive that language a lot," he said. "So then I read a few pages and I wander away thinking about the sentences." I asked him what it means to "relive language," and he explained, "I like the construction of sentences, particularly when there's allegory involved, or there's poetry involved. . . the language animates the person for me."⁵³ As the insights of these three scholars suggest, visual mental imagery, characterization, and creative use of language combine as motives for reading that can't easily be distinguished. Yet visualization isn't always a key part of the process. For some readers, it arises like noise in a restaurant, where the real business at hand is savoring language.

For other readers, visual mental imagery offers the food that sustains the reading process. "It's one of the pleasures of reading," says attorney Diana Richmond, who also writes novels.⁵⁴ Painter Rigoberto A Gonzalez loves to read fiction because of the images it makes him form. His mental pictures give him ideas and develop his imagination.⁵⁵ Musician and office manager Barbara Zettel finds that the visual images evoked by novels give her a chance to travel. "Sometimes I guess my visual [imagery] is more a curiosity," she reflects. "If I've not been a lot of places. . . it's the curiosity of understanding, for instance, what does Seattle look like in the mountains, in the rain, and. . . the fog and the smell of the ocean, and I *feel* I'm there. . . . The visual helps me because then I get a sense of a place where I've never been."⁵⁶ No map would ever let her see Seattle in this detail.

OBJECT IMAGERY EVOKED BY LITERARY TEXTS

Readers do not fall neatly into categories; certainly they didn't in my qualitative study. It is worth asking whether the spatial, object, and verbal cognitive style categories developed by cognitive scientists even serve a purpose in building knowledge about literature. I have found the work of Kozhevnikov and her colleagues valuable, however, for indicating the range of visual responses to written texts. It complements Scarry's introspective, text-based study by indicating how greatly individuals vary in their relationships with imagery before they try her mental exercises. Olessia Blajenkova, Michael Motes, and Kozhevnikov have found that those who tend toward object visualization "prefer to construct colorful, high-resolution, picture-like images of individual objects and to encode and process images holistically."⁵⁷ Those inclined toward the spatial style "prefer to construct schematic representations of objects and spatial relations among objects, generate and process images part by part, and are capable of performing complex spatial

transformations.”⁵⁸ If one understands the object and spatial styles as tendencies rather than absolute categorizations, reading becomes an experience that can vary enormously depending on how individual minds respond to writers’ invitations to visualize.⁵⁹

With radiant enthusiasm, several participants told me that when they read, they see “everything!” “What’s everything?” I asked geoscientist Lynn Margulis, and she specified, “Well, the people, their interactions. I do have this graphic imagination.”⁶⁰ Web designer Harriet Goren said, “I guess I see the whole—novel. It’s always a very visual experience for me. It always has been. Whatever the setting is, whatever I imagine the people look like.”⁶¹ Flamenco dancer and choreographer Linda Richardson said, “I actually just envision the entire story. As I’m reading. . . I actually have visual images of what’s going on with the characters, the plot.”⁶² When I asked painter Mary Welty what it means to see everything, she explained, “Whether you say it or. . . I read it, it comes visually. I guess I create my own characters.” Still, her visualization depends on the writer’s skill. “If a writer is very good at explaining in detail, the feeling, the smell, if it’s windy out,” she qualified, she sees “the whole description of a scene that I could paint.” Like these four gifted visualizers, participants who reported seeing the whole novel often emphasized the characters and setting.

Based on the phrasing and emotional expression of my participants, I suspect that those who say, “I see everything!” tend toward the object style. This hypothesis is speculative and cannot be confirmed without behavioral experiments. These readers often referred to the characters’ appearances and actions and the details of their immediate environment. Novelist and philosopher Rebecca Newberger Goldstein reported, “Oh, I see a lot, actually. . . I’ve formed a picture of the characters—[a] very, very precise picture often, of the characters, and. . . I’m seeing them doing what they’re doing.” She specified, however, that “It’s not like watching a movie. . . because. . . you’re also so involved with the words and the language, and I’m processing that as well.”⁶³ As Kozhevnikov’s group has found, individuals can combine verbal and object tendencies, and responding visually to a text does not exclude sensitivity to its linguistic patterns.

When biologist and cartoonist Jay Hosler reads fiction, he finds that his visual mental imagery has “a dreamlike quality, an incompleteness to it.” He reports that

The images that I focus on tend to be the objects that the text is focusing on. . . I tend to be able to see when people are in stressful situations. I tend to imagine faces during an emotional moment. . . If someone’s stressed out, . . . those are the faces that I can see, because. . . I find myself empathizing with them, and so that sort of internal face of my own stress gets projected in my brain.⁶⁴

In the human brain, the fusiform face area—involved in facial recognition—is associated with the ventral stream that supports object processing.⁶⁵ A reader such as Hosler—who focuses on facial expressions when writing his own graphic novels—may make more extensive and efficient use of this processing due to both inclination and practice.

Cell biologist Barry Shur’s responses to neuroscientist Santiago Ramón y Cajal’s writing suggest the joy and excitement of object visualization. Shur first told me that he visualizes less when he reads than when he hears spoken language, maybe because

“the words are visual enough for me when I’m reading.” Then he described his experience of reading Cajal’s *Advice to a Young Investigator*. “I’m seeing myself holding the Kindle, OK? As we’re talking!” he exclaimed. When Shur reads Cajal’s book, he explains, “I see an old 1900 laboratory with. . . Ramón y Cajal sitting there. . . talking to some students. . . I picture him at a podium.” His level of engagement made me think he saw detailed images, so I asked, “What color is the podium?” and his visual world opened up:

Oh, . . . it’s dark wood, and he’s in. . . a velvet robe. . . I’m thinking of. . . the Renaissance almost. . . not nineteenth century at all, . . . much more Galileo-like. . . It’s sort of. . . romanticism. . . Now that we’re talking about it, . . . flashes are coming in, more of. . . a Sherlock Holmes kind of look, . . . kind of a high collar, and sort of that style.⁶⁶

Shur’s description evolves as it unfolds, revealing details that probably didn’t coexist in a given instant. In the moment of the interview, these images were very real, though his description may differ from what he experienced while reading.

Shur’s report also indicates how greatly visual mental worlds draw on cultural images from films, advertisements, textbooks, and websites. In Shur’s mind, Cajal’s lab is “everything you want a lab to be. It’s dark and dingy, and it’s high ceilings with gothic windows.” “Where are you getting this?” I asked, and he identified the source as a black-and-white film about Marie Curie.⁶⁷ Undoubtedly, readers who experience rich visual mental imagery construct it from a hodgepodge of sources, so that it constitutes a cultural collage as well as a response to a specific writer’s cues. It is likely, however, that fiction writers anticipate readers like Shur—and that some writers process visual information just as he does. Although some of his imagery has been brought to the text, his creativity and excitement indicate what fiction’s visual cues can stimulate some minds to do.

THE FEEL OF TEXT-DRIVEN SPATIAL IMAGERY

Not every fiction reader visualizes characters or the details of rooms or landscapes. “I don’t have a visual image of the main characters. . . it occurs to me,” reflected literary scholar Jonathan Culler.⁶⁸ He doesn’t usually “have any idea what color hair they have, or anything like that.” Culler does experience visual mental images when he reads, but they often involve the locations of characters and the architectural layouts through which they move. “Occasionally I . . . visualize spatial relationships,” he said. “I don’t. . . actually visualize the main character particularly, but I do. . . sort of have some images. . . where was the building that was under surveillance, and where did the two people meet in front of it?” Rather than picturing faces, he imagines “the layout of the building” or “the directional sense of a street scene at the building.” He savors patterns in the text’s language, and simultaneously he visualizes, keeping track of where the characters are.

Culler's descriptions of visual mental imagery suggest the experience of readers with spatial tendencies. Because questionnaires probing cognitive styles have emphasized object skills, many spatially inclined readers may not have realized that their mental experiences while reading qualify as visual mental images. Many spatially inclined people don't consider themselves "visual," although they inhabit image-rich mental worlds. As in Culler's case, they may combine spatial and verbal processing in creative ways, forming mental representations that map what texts are doing.

When mathematician and philosopher of science Sabine Brauckmann reads a novel, she sees "a movie script."⁶⁹ She considers whether a story would make a good movie, or whether it has "too much thinking in it" that is not easily translatable into images. Rather than viewing characters and landscapes, she envisions "more like a kind of flux." She specified, "I see the whole story, the plot, maybe, more than I see words. Or the logics behind that." As she reads, she envisions the novel's overall structure as one might visualize the blueprint of a building. Poet Kate Thorpe first told me that she envisions characters when she reads novels, but then she reconsidered. "I don't really imagine characters," she qualified. "I see them, but. . . I couldn't describe them to you afterwards. . . I guess I see rooms. I see architecture and directions towards things and places in a city. . . very architectural. . . very structural."⁷⁰ Brauckmann's and Thorpe's responses raise the issue of what it means to "see" when you read. As they move through texts, their minds construct representations that seem to differ from those visually perceived. "Flux" and "structural" suggest diagrams rather than detailed reconstructions, but producing these images is a creative process.

Game designer Jason Rohrer has wondered for years how the images in his mind's eye relate to those visually perceived. He describes them as "halfway between pictures and. . . symbols. Almost like icons."⁷¹ Since Rohrer creates visual displays for players, he often compares his visual mental images to onscreen representations and describes his imagery in those terms. A strawberry he sees in his mind's eye is "almost like a cartoon of a strawberry. . . It doesn't have. . . as many details to it. . . it doesn't have all the subtle shading and highlighting and. . . specular highlights that a regular strawberry would have." His mental imagery differs greatly from painter Mary Welty's, which includes shadows and reflected colors. Rohrer does picture characters when he reads novels or stories, but like Culler and Thorpe, he focuses on the spaces through which they move. Culler has noticed that he envisions architectural layouts even when novels offer no "spatial indications,"⁷² and Rohrer describes his reading experience the same way:

Even if the room is not really described that the characters are operating in, I sort of construct a room for them and keep that consistent. . . . Stories are very nonspatial. . . [so] I do sort of fill in a lot of that spatial stuff. . . . Then later on in the story if there's something that. . . actually describes those spatial relations explicitly, sometimes they'll kind of clash, and I'll have to refactor.

Rohrer's, Culler's, and Thorpe's descriptions of fiction-reading suggest the active, creative aspects of spatial processing. Approaching literature with a spatial cognitive style does not exclude responding to it verbally or feeling its language acutely. Spatially driven

reading does involve sensitivity to structures, perspectives, and positions that may matter less to other readers.

Whether spatially inclined readers work with fiction or nonfiction, their schematic approach helps them to construct meanings. "When I'm reading. . . I'm not aware that I'm seeing things. . . if things mean colors, forms, shapes," says psychologist Gerd Gigerenzer. "It's more like putting puzzles together. It's more a meta-thing."⁷³ Visualization helps him to interpret texts, but he experiences it as an abstract, schematic process. "It's not that you see a puzzle in front [of you]," he explains. "But it's more the image of what I'm doing. [A] meta-image." Constructing mental representations such as these may not feel like a visual experience. When Kate Thorpe reads philosophy, she reflects, "I think I do see things, but they're not necessarily images. . . . They're often more structural. . . more like a network outline."⁷⁴ Literary scholar Katherine Hayles visualizes when she reads fiction, picturing the protagonist if she's immersed in a novel. As she moves through nonfiction, however, she's aware of a different process, one that she doesn't experience as visual. "It's as if my internal landscape is rearranging itself," she reflects, "to make room for this new insight or approach. And that's not particularly a visual process, but it's a highly meditative process. . . . It's more like a sensation than it is a visualization."⁷⁵ Hayles regards herself as a verbally inclined person, but like Gigerenzer's and Thorpe's metaphors, her figurative language reveals the spatial aspects of her interpretive process.

The insights of Hayles, Culler, and Thorpe indicate how some readers combine verbal and spatial cognitive tendencies to make sense of literary texts. If there's a visual/verbal spectrum, Hayles puts herself at the "extreme verbal end of it," but she describes learning in terms of rearranging an internal landscape.⁷⁶ Literary scholar Mark Bauerlein pictures nothing when he hears spoken words, and he visualizes "only dimly" when he reads novels.⁷⁷ He describes reading Heidegger's philosophy, however, in spatial terms, saying, "you need to think things through, and around, and over, and above." For Bauerlein, understanding a complex thought means, "I can put my arms around the idea now." When he comprehends a system of ideas after a long period of intense study, "a spatial positioning clicks. . . and I see [it] in spatial terms." Culler, who confessed at one point, "I've never been particularly interested in the visual," defines thought as "seeing connections that will produce a structure."⁷⁸ Readers with formidable verbal skills may not realize that they also approach texts spatially. If they developed the spatial processing toward which their minds also incline, their reading experiences might be even more powerful.

POETS' AND NOVELISTS' EXPERIENCES WITH VISUAL MENTAL IMAGERY

If one wants to understand the role of mental images in literary interpretation, it is worth listening to writers as well as readers. Poets and fiction-writers vary in their relationships

with visual mental images, and their mental pictures shape the works they create. “It’s a picture that haunts me,” says poet laureate Natasha Trethewey, thinking about the ways her poems emerge.⁷⁹ Each one comes to her differently. Sometimes she hears a line in her head, as though a voice were speaking, but she reflects, “I think [a poem] always begins in a visual image.” Trethewey knows that she’s visually oriented, since as a school-girl she entertained classmates by describing every detail of her grandmother’s house. Trethewey’s self-descriptions suggest that she inclines toward object visualizing, and that her combined gifts for verbal and visual processing make her extraordinary poems possible.

Poet Kate Thorpe, who may incline more toward spatial visualization, values visual mental imagery just as much. Thorpe fills notebooks with what she calls “the music,” interesting words and phrases that resonate when they combine. Thorpe’s poems often originate from “the music,” but she doesn’t trust her writing until it elicits visual images. She always envisions something “if the poem is working,” and she adds, “If I’m writing nonsense, that’s kind of how I know, because it’s just based on music, and it’s not based on meaning.” Sometimes she’ll write for “pages and pages,” laughs Thorpe, until she’s forced to ask herself, “What is [this poem] doing?” At these times she steps back and asks, “Is this saying anything?” The best way to answer this question is to ponder, “Can I see something from it?”⁸⁰ For Thorpe, visualization and meaningfulness go together, so much so that poems that don’t evoke images feel nonsensical. Although visual mental imagery enters her creative process late and shapes Trethewey’s from the start, both poets rely on images to craft language.

My qualitative study suggests that novelists vary as much as poets in their use of visual mental images. Diana Richmond envisions characters while reading fiction, and she does the same when writing her own. “If I’m plotting something I’m writing,” she describes, “I’m watching what the person’s doing and figuring out what will happen next—what the obstacles will be, or the conversation will be. . . so it’s a moving picture. I’m seeing my character.”⁸¹ Rebecca Newberger Goldstein told me her novels sometimes start with a visual image, but after reflecting, she corrected herself. “You know what? I think that that’s wrong. I think that the images come afterwards.” Most often, Goldstein’s stories emerge from a “conflicted feeling.” She explains, “I have to divide this conflict into various characters, and then, *boom*. The characters will come to me.” If she does visualize before her story coalesces, she’ll see “a particular type of character.” She specifies, “I see this character very strongly, and a kind of person. And I’m trying to discover who he is and what his story is.”⁸² For Richmond and Goldstein, both of whom form vivid images of characters while reading, writing fiction often involves picturing the people it’s about. Object visualization may drive their fiction, at least in part, since close observation of their imagined characters tells them who these people are.

Visual mental imagery can guide fiction-writing even when the images are more schematic and abstract. Salman Rushdie’s descriptions of his creative process suggest the ways that spatial imagery can shape novels. Like Goldstein, Rushdie can experience vivid, detailed, colorful images from which novels emerge as he determines what he’s seeing. He recalls that

When I was thinking about. . . *Shalimar the Clown*, I initially had this very strong image of a murder scene. . . where there was an elderly man dead on the floor with a man standing over him with a knife. . . This was the scene that kept recurring, and I didn't know who they were even, these people. . . I really had to sit around for quite a while and decide who these people were.⁸³

Rushdie, who has a strong visual memory, consulted his image as he formed narratives to explain what was happening.

Other introspections of this versatile author indicate that he uses imagery to shape his novels' structure. Thinking about what his stories have in common, he reflects, "There's usually quite a strong image or series of images near the center of the book." As a series, his visual images can pattern the work as a recurring motif unifies a piece of music. According to Rushdie, each one "accrues meaning because of the number of situations in which it finds itself. . . . It becomes the sum total of all its appearances." At the same time, Rushdie specifies, "I see a book as a shape, and I'm trying to understand always what kind of shape it is." As he writes, he envisions the novel's structure in three dimensions. "I do actually have in my head an actual physical shape," he explains. "The book looks like this. . . . It looks like concentric circles, or it's got stories within stories. . . . I have to understand in each section of the book what shape it is, and how. . . those parts connect to the larger shape."⁸⁴ His description brings to mind Gigerenzer's "meta-image," Thorpe's "network outline," and Hayles's rearrangement of an internal landscape. Spatial imagery formed from a need to understand may be as essential for creating fictive worlds as for reading difficult philosophy.

CONCLUSION

Regardless of readers' cognitive styles, all reading experiences depend on the language of literary texts. Whether people tend toward verbal, object, or spatial processing or any combination of these, they complain about bad writing and notice how differently they respond to fiction depending on how it is written. "I love language," declares neuroscientist Hugh Wilson. "I get very annoyed when I have to read something that isn't well written, but that's because it gets in the way of my visualizing. A poorly written novel doesn't cause me to visualize. . . very effectively."⁸⁵ Wilson's claim points toward the interdependence of visual mental imagery and verbal language. Readers' minds create images, but texts' phrases evoke them. Any analysis of imagery elicited by reading needs to address the unique structures, figurative systems, and nuances of verbal texts.

To generate useful knowledge about how texts and minds interact, we need to pool our epistemological resources. Qualitative studies give voice to the lived experience of text-inspired mental imagery in ways that behavioral and neuro-imaging experiments cannot. Interview-based research offers a complement to laboratory data, and it reinforces interdisciplinary work such as Scarry's and Starr's, which combines literary

scholarship with cognitive neuroscience. The qualitative research reported here supports Starr's contention that neural structures make possible a *range* of aesthetic experiences,⁸⁶ and Scarry's notion that dim visual worlds can bloom if people listen to gifted writers' instructions. Kozhevnikov's and Blazhenkova's finding that individuals tend toward spatial, object, or verbal processing has great importance for literary scholars, but it should not be reduced to categorization. These cognitive neuroscientists' experiments indicate how verbal, spatial, and object skills can coexist even if an individual's cognitive style emphasizes one mode of processing. The insights of my participants suggest that they do have preferred mental styles, but also curiosity and willingness to learn. Looking back on my experiences with molecules, I suspect that I survived biochemistry because I *made* my mind form images, although it would have preferred musing about language. Literary studies often ignore the joys of reading, but in the case of visual mental imagery, these joys can be instructive. The pleasures that motivate minds to read can reveal how those minds work.

NOTES

1. G. Gabrielle Starr, who uses fMRI to investigate responses to literature, music, and art, has found that "the fundamental ability to have vividly imagined enactments of literary works is. . . not uniform." Visual representations constitute only one form of mental imagery, which occurs in multiple modalities and is usually mixed. Starr emphasizes the close relationship between mental imagery and aesthetic experiences in chapter 12 in this volume, "Theorizing Imagery, Aesthetics, and Doubly Directed States."
2. Maria Kozhevnikov, "Cognitive Styles in the Context of Modern Psychology: Toward an Integrated Framework of Cognitive Style," *Psychological Bulletin* 133.3 (2007): 464. Starr warns, however, that "there are also differences [in mental imagery] for any given reader, from one encounter with a text to another." Starr, chapter 12 in this volume.
3. Starr also maintains that "imagery has epistemic value." Starr, chapter 12 in this volume.
4. See Ellen J. Esrock, *The Reader's Eye: Visual Imaging as Reader Response* (Baltimore: Johns Hopkins University Press, 1994); Elaine Scarry, *Dreaming by the Book* (New York: Farrar, Strauss and Giroux, 1999); and G. Gabrielle Starr, "Multi-sensory Imagery," *Introduction to Cognitive Cultural Studies*, ed. Lisa Zunshine (Baltimore: Johns Hopkins University Press, 2010).
5. Raymond W. Gibbs, "The Individual in the Scientific Study of Literature," *Scientific Study of Literature* 1.1 (2011): 97, 101.
6. G. Gabrielle Starr, "Evolved Reading and the Science(s) of Literary Study: A Response to Jonathan Kramnick," *Critical Inquiry* 38 (2012): 424. See also Edward A. Vessel, G. Gabrielle Starr, and Nava Rubin, "The Brain on Art: Intense Aesthetic Experience Activates the Default Modal Network," *Frontiers in Human Neuroscience* 6 (2012): 9.
7. See Kathryn Montgomery Hunter, *Doctors' Stories: The Narrative Structure of Medical Knowledge* (Princeton: Princeton University Press, 1991), and Rita Charon, *Narrative Medicine: Honoring the Stories of Illness* (New York: Oxford University Press, 2006).
8. This study was approved by the Emory University IRB in July 2009 and was rated "exempt." The full results will be published in my forthcoming book, *The Narrative Study of Individual Thinking* (New York: Oxford University Press, 2015).

9. Esrock, *The Reader's Eye*, 2–3.
10. Esrock, *The Reader's Eye*, 49–51.
11. Alan Richardson points out Esrock's attention to individual and historical differences in "Studies in Literature and Cognition: A Field Map," in *The Work of Fiction: Cognition, Culture, and Complexity*, ed. Alan Richardson and Ellen Spolsky (Hampshire, UK: Ashgate, 2004), 17.
12. See Stephen M. Kosslyn, *Image and Brain: The Resolution of the Imagery Debate* (Cambridge: MIT Press, 1994), 17, and Scarry, *Dreaming by the Book*, 256 n. 6.
13. Scarry, *Dreaming by the Book*, 191, 244.
14. Alan Richardson believes that Scarry's thought experiments give her introspective work "something like an empirical warrant." Richardson, "Studies in Literature and Cognition," 18.
15. Francis Galton, *Inquiries into Human Faculty and Its Development* (London: Macmillan, 1883).
16. Galton, *Inquiries into Human Faculty*, 89–91.
17. Galton, *Inquiries into Human Faculty*, 113–14.
18. Martin Kusch, "The Politics of Thought: A Social History of the Debate between Wundt and the Würzburg School," in *The Dawn of Cognitive Science: Early European Contributors*, ed. Liliana Albertazzi (Dordrecht: Kluwer, 2001), 61–62.
19. Allan Paivio, *Imagery and Verbal Processes* (New York: Holt, Rinehart and Winston, 1971), 9, 495.
20. Allan Paivio and Richard Harshman, "Factor Analysis of a Questionnaire on Imagery and Verbal Habits and Skills," *Canadian Journal of Psychology* 37.4 (1983): 473.
21. Alan Richardson, "Visualizer-Verbalizer: A Cognitive Style Dimension," *Journal of Mental Imagery* 1 (1977): 114.
22. David F. Marks, "Visual Imagery Differences in the Recall of Pictures," *British Journal of Psychology* 64.1 (1973): 24.
23. Marks, "Visual Imagery Differences," 18.
24. Eric R. Kandel, James H. Schwartz, and Thomas M. Jessell, *Principles of Neural Science*, 4th ed. (New York: McGraw Hill, 2000), 500–502.
25. See Maria Kozhevnikov, Stephen Kosslyn, and Jennifer Shephard, "Spatial vs. Object Visualizers: A New Characterization of Visual Cognitive Style," *Memory and Cognition* 33.4 (2005): 710.
26. Maria Kozhevnikov, Olesya Blazhenkova, and Michael Becker, "Trade-off in Object versus Spatial Visualization Abilities: Restriction in the Development of Visual-Processing Resources," *Psychonomic Bulletin and Review* 17.1 (2010): 30.
27. Kozhevnikov, Kosslyn, and Shepard, "Spatial vs. Object Visualizers," 712.
28. W. J. T. Mitchell, *Iconology: Image, Text, Ideology* (Chicago: University of Chicago Press, 1986), 1–3.
29. Mitchell, *Iconology*, 32.
30. Jacques Derrida, *Of Grammatology*, trans. Gayatri Chakravorty Spivak (Baltimore: Johns Hopkins University Press, 1976).
31. Marie-Paule Daniel, Edyta Przytula, and Michel Denis, "Spoken versus Written Route Directions," *Cognitive Processes* 10.2 (2009): 201–3.
32. N. Katherine Hayles, interview by the author, May 5, 2010; Diana Richmond, interview by the author, June 16, 2010.
33. Elizabeth Blackburn, interview by the author, April 30, 2010.

34. I owe my “bridge” test to Temple Grandin, who told me that when she wants to assess someone’s visual skills, she asks him or her to visualize a church steeple. She has found that people vary greatly in this ability, and that the most visually oriented people refer to specific steeples they have seen rather than generic structures. Temple Grandin, interview by the author, March 18, 2010.
35. Tony Movshon, interview by the author, May 18, 2010.
36. David Krakauer, interview by the author, June 25, 2010.
37. Salman Rushdie, interview by the author, March 2, 2010.
38. Venkat Narayan, interview by the author, June 11, 2010.
39. Michael Holquist, interview by the author, May 20, 2010.
40. Barry Shur, interview by the author, April 1, 2010.
41. Mary Welty, interview by the author, June 29, 2010.
42. Jane von Seggern, interview by the author, May 7, 2010.
43. Lynn Margulis, interview by the author, May 30, 2010.
44. Hugh Wilson, interview by the author, June 2, 2010.
45. Kate Thorpe, interview by the author, March 27, 2011.
46. Scarry, *Dreaming by the Book*, 81.
47. Oliver Sacks, *An Anthropologist on Mars: Seven Paradoxical Tales* (New York: Vintage–Random House, 1995), 260–61. Sacks does not indicate which article by Grandin he is quoting.
48. Grandin, interview. Grandin’s report that she experiences intense visual mental imagery while reading science fiction speaks to Katrina Fong’s, Justin Mullin’s, and Raymond Mar’s studies comparing how reading different literary genres can affect interpersonal sensitivity. Katrina Fong, Justin Mullin, and Raymond Mar, “Fiction and Interpersonal Sensitivity: Exploring the Role of Fiction Genres,” *International Society for Empirical Research on Literature*, Montreal, Canada, July 9, 2012.
49. Grandin, interview; Wilson, interview.
50. Holquist, interview.
51. Krakauer, interview.
52. Movshon, interview.
53. Narayan, interview.
54. Richmond, interview.
55. Rigoberto A Gonzalez, interview by the author, February 6, 2011.
56. Barbara Zettel, interview by the author, June 14, 2010.
57. Olessia Blajenkova, Maria Kozhevnikov and Michael A. Motes, “Object-Spatial Imagery: A New Self-Report Imagery Questionnaire,” *Applied Cognitive Psychology* 20 (2006): 243.
58. Blajenkova, Kozhevnikov, and Motes, “Object-Spatial Imagery,” 243.
59. Gabrielle Starr has also noticed that “even for readers who imagine vividly, there are key differences” in the kinds of mental images that people form, and these differences shape their reading experiences. Starr, chapter 12 in this volume.
60. Margulis, interview.
61. Harriet Goren, interview by the author, February 4, 2011.
62. Linda Richardson, interview by the author, May 11, 2011.
63. Rebecca Newberger Goldstein, interview by the author, May 28, 2010.
64. Jay Hosler, interview by the author, February 3, 2011.

65. Gunter Loffler, Grigori Yourganov, Frances Wilkinson, and Hugh R. Wilson, "fMRI Evidence for the Neural Representation of Faces," *Nature Neuroscience* 8.10 (2005): 1386.
66. Shur, interview.
67. Shur, interview.
68. Jonathan Culler, interview by the author, May 31, 2010.
69. Sabine Brauckmann, interview by the author, May 13, 2010.
70. Thorpe, interview.
71. Jason Rohrer, interview by the author, June 28, 2010.
72. Culler, interview.
73. Gerd Gigerenzer, interview by the author, December 10, 2009.
74. Thorpe, interview.
75. Hayles, interview.
76. Hayles, interview.
77. Mark Bauerlein, interview by the author, November 4, 2009.
78. Culler, interview.
79. Natasha Trethewey, interview by the author, February 15, 2010.
80. Thorpe, interview.
81. Richmond, interview.
82. Goldstein, interview.
83. Rushdie, interview.
84. Rushdie, interview.
85. Wilson, interview.
86. Starr, "Evolved Reading," 424.

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