Big Data

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A massive database of information is not, in itself, "big data." There is no self-evident scale or statistically significant line that must be crossed before *data* moves from its ordinary state to something novel and, well, *big*. Instead, the idea of big data refers to a way of imagining totality through computational tools. It is a structure of contemporary experience, not a discrete method or volume of empirical information.

The idea of big data does not emerge *ex nihilo* during the late-twentieth and twenty-first centuries. The philosopher Ian Hacking explains that scientists and citizens alike began to encounter an "avalanche of numbers" in the nineteenth century (1990, p. 5). There are important continuities between the scale and techniques of contemporary data science and the earlier developments charted by scholars like Hacking. Nonetheless, what's distinctive about big data is that it is rooted in the exponential growth of information-technology systems, digital media, and the rise of personal computing technologies. These material and technological developments have made an older numerical way of thinking newly imaginable and actionable.

This entry examines how contemporary literary fiction explores this way of thinking about vast scales of data via information technology. While most contemporary writers are critical of the societal and personal costs of this phenomenon, some present data systems and analysis as important components of utopian politics. I describe literary texts written by both skeptics and proponents as "data fictions," by which I mean works that take up big data as a structuring feature of contemporary experience. I begin by analyzing data fictions from the 1980s and 1990s before the idea of big data gained currency in tech circles, and then I examine a range of ways in which big data informs literary writing since the idea's formal articulation and the closely related advent of Google and other information-technology companies.

DATA FICTIONS BEFORE "BIG DATA"

The first usage of the term "big data" appears to be a 1997 article published in the proceedings of the 8th Institute of Electrical and Electronics Engineers Visualization Conference (Cox and Ellsworth 1997). Yet this appearance in a printed journal is not the only, or even primary, source of the idea. The nineteenth-century development of information infrastructure was a necessary precondition for big data (see

Cortada 2016). Post-1945 ideas about a "global village" and the popularization of cybernetics were also influential (see Tierney 2018). The first personal computers of the late 1970s and 1980s later made it possible for American consumers to perceive data computation as relevant for their everyday lives. Perhaps most important, though, is that personal computing was a prerequisite for private corporations to gather large swaths of user data (Zuboff 2019, pp. 233–254).

Each of these developments made big data a key part of the structures of contemporary experience. However, these trends were highly uneven across the American public. The popularization of data culture has been marked by a persistent "digital divide," a term that designates the inequalities of access to computers and the Internet (see Chakraborty and Bosman 2005).

Marge Piercy's novel *He, She and It* (1991) takes up many of these political and social issues within contemporary data culture. The novel imagines a future world run by multinational technology companies, or "multis." These corporations are in control of affluent urban centers, but they bring in laborers from poorer areas of exurban sprawl. One such area is known as the Glop. Access to computer technology in the Glop is irregular, although residents are able to "plug in" to the Net, a kind of public utility akin to the Internet. Apart from the multi's urban centers and impoverished exurbs, there are also rare towns and enclaves that have developed their own information systems and technological defenses. Piercy's novel focuses on the town of Tikvah, which teeters on the edge of maintaining its independence from the multis.

The management of data is a major front in this struggle for independence. One of the novel's main characters, a woman named Malkah, maintains Tikvah's digital defenses. Malkah's daughter, Riva, "began to move from pure data piracy toward something more political and even more dangerous." Riva, we

learn, is on a "crusade of liberating information from the multis" (1991, p. 29). Yet Riva does not view her activism as stealing information; rather, as she explains, "I liberate it. Information shouldn't be a commodity. That's obscene" (p. 194). Riva's activities make her a target of several multis. She eventually persuades Malkah and her own daughter to fight against a particularly powerful multi, and this resistance leads them to "project" themselves into data systems to steal information about the multi's strategy to conquer the town of Tikvah (p. 267).

Projecting oneself into data systems becomes a tool of political resistance and an opportunity for artistic self-creation. Data projections also call attention to the fluidity of identity, particularly in terms of gender and sexuality. *He, She and It* thus invokes the corporate politics and political promises of data, and it inflects those themes through feminist ideas about identity. These themes have resurfaced in more recent fiction on artificial intelligence, such as Annalee Newitz's *Autonomous* (2017). These novels differ from many other works on the cultural and social significance of information systems and data aggregation by exploring the forms of gendered and ethnic inequality that mark technology usage.

There are also important continuities between *He, She and It* and other early data fictions. William Gibson's short story "Burning Chrome" (1982), for instance, takes up the idea of information-technology monopolies, which exploit a vast area known as the Sprawl. These themes appear again in Gibson's novel *Neuromancer* (1984). This influential novel tells the story of a data thief named Henry Dorsett Case. Case is hired to steal information from a conglomerate called Sense/Net. Thus, like Piercy's *He, She and It*, Gibson's *Neuromancer* presents data as a commercial product and political tool of multinational corporations. Both novels imagine individual technology users – hackers and computer

engineers – as morally compromised but nonetheless admirable heroes who resist data commodification. However, Case later learns that his job was coordinated by a powerful artificial intelligence system, so the nature of his agency or ability to resist data-coordinated schemes comes into question.

The largest scale and aggregation of data in *Neuromancer* is located in the novel's now-famous term *cyberspace*, which is a "graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and con-stellations of data" (Gibson 2016, p. 52). The novel presents data as an abstraction made vis-ible through computational technology, but it also locates data as the object on the outer bor-ders of the mind's capacity for thought. Data is *real* in the novel, but paradoxically it is also "unthinkable." It exists, but only in the mind's "nonspace," as though these "constellations of data" are situated in a vastness beyond any human capacity for comprehension. This gloss on the reality of cyberspace anticipates con-nections between big data and posthumanism, explored further below.

Data fictions from the 1980s and 1990s suggest how closely the advent of big data would be tied to the "electronic elsewheres" created by the Internet (see Berry, Soyoung, and Spigel 2010, p. vii). Other data fictions from this period include Samuel R. Delany's *Stars in My Pocket Like Grains of Sand* (1984), some stories in *Byte Beautiful* (1985) by James Tiptree, Jr. (aka, Alice Bradley Sheldon), Pat Cadigan's *Synners* (1992), and Richard Pow-ers's *Galatea 2.2* (1995).

BIG DATA AND THE KNOWLEDGE ECONOMY

Following the early period of data fictions, big data would figure into a diverse range of fic-tion writing, expanding beyond science fic-tion to works of literary realism. This breadth of influence is not surprising, because the term *data* is an interdisciplinary and genre-defying object (see Gregg and Nafus 2017). Indeed, many works of contemporary literary realism feature vast aggregations of data less as the text's governing thematic code than as a necessary element of contemporary plot and everyday experience. In such works, it's as if big data runs in the background, becoming visible only intermittently when characters engage with information technologies and digital media that express wider transforma-tions in the knowledge economy of the twenty-first century.

In Jhumpa Lahiri's *The Lowland* (2013), a Bengali-American professor named Gauri worries that the rise of digital technologies has deleterious effects on her intellectual life: "Too much is within her grasp now. . . . Glowing screens, increasingly foldable, portable, com-panionable, anticipating any possible question the human brain might generate. Containing more information than anyone has need for" (2013, p. 334). Gauri contrasts the largely dig-itized forms of research in the contemporary university with her pre-digital educational experience. While digital media make it pos-sible to find out about Indian history or her family members through a search engine, Gauri does not experience this availability as the democratization of knowledge. Instead, vast troves of data and the internet browsers that make them legible are merely "informa-tion" dislodged from comprehensible human "need." Big data is knowledge without the con-text of human finitude.

Similarly, in *A Person of Interest* (2008) by Susan Choi, a professor named Hendley is killed by a bomb mailed to him in a package bearing the logo of a large information-technology firm. Hendley is "only recently somewhat renowned, and only specifically for the computer-science branch of the math department" (2008, p. 6). This work, scorned by the pure mathematicians in the

department, is shrouded in language of tech "evangelism," for his work is heralded as "midwifing an unprecedented information-technology age that would transform the world as completely as had the industrial revolution" (p. 6). Mathematics becomes an important component of the novel's suspense, but data functions as something like math's popular foil. In fact, the titular "person of interest" is Professor Lee, an aging Asian-born mathematician in the same department. Lee's work stands in contrast to Hendley's, because his status in the prestige hierarchy of US higher education is "laughable" (p. 6). The custodian of big-data information systems stands in for the trendy vanguard of the knowledge economy, while pure mathematics seems outmoded and irrelevant.

Lahiri's and Choi's novels suggest how big data appears in contemporary fiction as a symptom of the possible eclipse of traditional institutions of knowledge production. As Choi's novel suggests, this anxiety often leads to comparisons between the advent of digital information systems and the "industrial revolution." Yet the revolution in the Canadian-American writer Ruth Ozeki's *A Tale for the Time Being* (2013) extends beyond higher education and economic structures to how knowledge itself is being reformulated in the image of data. Ozeki's novel follows the parallel lives of a writer named Ruth and a teenager named Nao, who writes a diary that Ruth later finds not long after the 2011 tsunami that devastated Japan. The diary leads Ruth to search the Internet for information about Nao, her family, the victims of the tsunami, the subsequent meltdown of a nuclear reactor, and a score of interrelated – or only tangentially related – queries. These searches lead Ruth to reflect on the effects of digital information on her intellectual life. Whereas she once was able to focus and think deeply, now the "spring [of thought] had dried up,

the pool was clogged and stagnant. She blamed the Internet" (2013, p. 92).

Using online search engines, Ruth scans troves of information about such topics as ADHD, Japanese genres of writing, and remote Buddhist monasteries. Much like Gauri's concerns in *The Lowland*, Ruth's inquiries lead her to doubt the rightness or benefit of searching through so much information. "Is the Internet a kind of temporal gyre," she wonders, "sucking up stories, like geodrift, into its orbit?" (2013, p. 114). The answer to this question is both yes and no, for Ruth's searches do yield helpful information about the distressing events recorded in Nao's diary. Yet the truth also seems to escape the data compilers, and this possibility points to the fact that the big data running in the background of the novel has its limits. "Information," she finds, "is a lot like water; it's hard to hold on to, and hard to keep from leaking away" (p. 197). Like Emerson's claim that things tend to "slip through our fingers then when we clutch hardest," information in Ozeki's novel escapes us regardless of the far-reaching grasp of our media technologies and information systems (Emerson 1971–2013, vol. 2, p. 29).

This slipperiness becomes particularly complicated when Ruth connects information technology and knowledge production to modern theories of quantum physics. Such theories attend to "the smallest scales and atomic increments" that make up reality. The idea of quantum entanglement, in particular, eerily implies that "attention might have the power to alter reality" (2013, p. 409). The connections between quantum physics and information science are complicated, and their convergence in the novel underwrites certain mysterious turns of plot. The upshot, though, is that Ruth comes to believe that technology users' entanglement with information systems affect both the observer and the observed. The data running behind the

novel is therefore not discrete; technology users – and novel readers – are entangled with the most minute and expansive scales of information.

These novels present big data as a signal phenomenon of wider changes in the structures of contemporary knowledge production. The ability to access information globally, and to find real-time results about the world, change how contemporary technology users come to know what they know and feel what they feel. Anxiety and discontent seem to be the prevailing sensibilities about automated assessments of data and massive aggregations of information, particularly as those technologies are often only felt as humming abstractly in the background.

BIG DATA AND THE POSTHUMAN

The idea of big data is often associated with the technological supersession of the human and humanistic scales of value. This technological version of posthumanism appears tacitly in the three Vs most often used to define big data: volume, variety, and velocity. Each of these characteristics ostensibly marks limits of prior modes of analysis and human reasoning. Thus, the journalist Chris Anderson announces a new age of big data in an influential 2008 article in *Wired* magazine: "Sixty years ago, digital computers made information readable. Twenty years ago, the Internet made it reachable. Ten years ago, the first search engine crawlers made it a single database. Now Google and like-minded companies are sifting through the most measured age in history, treating this massive corpus as a laboratory of the human condition" (Anderson 2008).

Such announcements exemplify how big data is often linked with a vexed kind of posthuman discourse. The promises of big data are here focused on better understanding humanity, yet the very idea of big data also

indicates how the human capacity for analytical thinking and value judgments are inadequate to the forms of knowledge made newly accessible by data science. Humanity is the limit that big data transcends but also the golden fleece that big data tries to capture through measurement.

This tension appears late in Richard Powers's novel *The Overstory* (2018). One of the novel's main characters, a programmer named Neelay, creates a powerful computer program to "learn what life wants from humans" (2018, p. 489). The machine-learning program crawls the Internet, gathering information from databases, social media, and a countless number of personal devices. It analyzes all living things, both human and nonhuman, at an incomprehensible speed and scale. In the time it takes a human being to "form one self-judging thought," the narrator explains, "a billion packets of program pass over. They course under the sea in great cables – buzzing between Tokyo, Chengdu, Shenzhen, Bangalore, Chicago, Dublin, Dallas, and Berlin. And the learners begin to turn all this data into sense" (p. 489). The "billion packets of program" is itself a vast network of algorithms, and that program runs across an even larger scale of information. This information lacks "sense" or meaningfulness apart from the analytical powers of the algorithms. It's not the data alone that matters, but it's what Neelay's program does with data that counts.

Powers's novel follows the branching narratives of several characters as they interact with one another and, more importantly, with forests and trees. Yet the later appearance of a big-data program is notable, for this form of machine learning comes to take the shape of the living organisms that have been the focus of so much of the novel. In effect, the data "learners" come to supplant the human thinkers. The novel depicts these "learners" in evolutionary language: "They split and replicate, these master

algorithms that Neelay lofts into the air. They're just starting out, like simplest cells back in the Earth's morning. But already they've learned, in a few short decades, what it took molecules a billion years to learn to do" (2018, p. 489). In the attempt to understand life, the learning program becomes a living thing. The narrator even calls it "the next new species," a living and thinking entity that comes into existence "simply by placing billions of pages of data side by side" (p. 496).

Powers explores similar connections between the natural and the digital in his earlier work, including *Orfeo* (2014), which culminates in an attempt by a man named Peter Els to use DNA as a kind of musical score, as though genetics and data science were natural bedfellows with musical composition. Related aspects of the relation between data analysis and posthumanism also appear in Greg Bear's *Darwin's Radio* (1999) and *Darwin's Children* (2003), novels that imagine the gene-editing technologies made possible through data analysis.

Whereas these novels have a sense of admiration for technological experiments with the natural world, several stories in George Saunders's *In Persuasion Nation* (2006) criticize what one critic describes as the "the technoscientific promises of consumer capitalism" (Lake 2013, p. 66). For example, the story "My Flamboyant Grandson" follows a man named Leonard Petrillo and his grandson Teddy. Records of consumer behavior enable real-time advertisements that Leonard cannot escape, as ads are beamed directly to technological implants worn by seemingly every person in the narrative world. In keeping with Saunders's characteristic satire, this technological fantasy devolves into the absurd: "in the doorway of PLC Electronics," Leonard recounts, "a life-size Gene Kelly hologram suddenly appeared, tap-dancing, saying, 'Leonard, my data indicates you're a bit of an old-timer like myself! [. . .] Why not come in and let Frankie Z. explain the latest gizmos!'" (2006, p. 16). Teddy does not see a holograph of Gene Kelly but instead "his hero Babar, swinging a small monkey on his trunk while saying that his data indicated that Teddy did not yet own a Nintendo" (p. 16).

The absurdity of these data projections becomes a source of social alienation for Leonard and his grandson. Indeed, Saunders's stories suggest how the world imagined by data transforms the human into an object of data-generated capital. Consumer behavior becomes a form of input, which in turn is processed by algorithms that underwrite a capitalist economy. Accordingly, "human" makes sense not as a product of humanist ideals or as a biological-metaphysical construct but as a resource for algorithmic computation.

BIG DATA AND EXTRACTIVE ECONOMIES

These technological transformations of what it means to be human highlight some of the important continuities between the politics of big data and earlier forms of quantitative techniques. The ledgers and accounting practices of the plantation economy is another source for the uses of big data, for these earlier practices created the need for another kind of numerical information. Novels such as Edward P. Jones's *The Known World* (1994), for example, explore this earlier form of information culture associated with a slave economy. Jones tells the story of a former slave named Henry Townsend, who soon builds his own plantation. Townsend purchases slaves "from a man down from Fredericksburg who had a lot of five slaves to sell and had the most informative leaflet full of the history of those slaves" (2003, p. 50). Such passages are indicative of the novel's engagement with a longer history of informa-

tion culture, in which deeds, maps, ledgers, and other forms of numerical data underwrote the institutions of chattel slavery.

Even as Jones's novel shows how plantation accounting transformed human beings into numerical objects, other works of contemporary American fiction explore how big-data technologies reimagine individuals as objects of numerical value within a capitalist economy. Such works depict digital information-gathering as a new kind of extractive economy. For example, in Thomas Pynchon's *Bleeding Edge* (2013), a woman named Maxine Tarnow follows the implausible wealth associated with hashslingrz, a firm that offers computer security services. Tarnow eventually learns about a computer chip that "sits quietly in a customer's machine absorbing data, from time to time transmitting what it's gathered out to interested parties" (2013, p. 248). The chip extracts data and commodifies it for sale on an illicit market.

Pynchon's work takes digital technology as an opportunity for corporate extraction, but other works of contemporary fiction associate big data aggregations with governmental programs. In David Foster Wallace's unfinished novel *The Pale King* (2011), the "Author's Foreword" includes a long footnote about 1987, "the year that computers and a high-powered statistical formula known as the ANADA (for 'Audit-No Audit Discriminant Algorithm') were first used in the examination of nearly all individual US tax returns" (2011, p. 70). The footnote establishes vague connections between this program and the life and work of one of the novel's main characters, who works for the Internal Revenue Service. Through such connections *Pale King* overlays the idea of literary character onto governmental techniques for exploiting big data.

The maps made visible by big data also appear in Jonathan Franzen's *Purity* (2015),

which follows a character named Andreas who twice receives "dumps of internal email and algorithmic software that plainly revealed how [Google] stockpiled personal user data and actively filtered the information it claimed passively to reflect" (2015, p. 478). Yet Andreas balks at going public with this information: "In both cases, fearing what Google could do to him, Andreas had declined to upload the documents. To salvage his self-regard, he'd been honest with the leakers: 'Can't do it. I need Google on my side'" (p. 478). The episode suggests that big data only cursorily leads to transparency and greater social order. In reality, the megacorporations that compile and deploy big data stifle dissent passively, in this case by simply offering other useful and more benign-seeming services.

Whereas earlier forms of extractive capitalism quantified the relation between human chattel and material resources, data-driven methods focus on transforming the details of users' habits and lives into commodities. Blake Crouch's *Recursion* (2019) offers an interesting reformulation of this view, imagining a world in which a neuroscientist named Helena Smith creates a technology that maps the human memory structure. She learns about a quantum processor that might allow for "the sort of enormous data-set mapping problem" characteristic of the human brain (2019, p. 33). Initially Helena imagines the project as a way to re-experience notable moments from one's past, but the prospect of extracting and reproducing memories leads her to stumble upon a larger conspiracy being investigated by a cop named Barry Sutton.

These contemporary data fictions represent big data as an extractive technique within what Shoshana Zuboff (2019) calls "surveillance capitalism," or the monitoring of users by private corporations, which intend to profit from user data.

BIG DATA AND SOCIALITY

If user data has become a commodity for exchange, big data has also altered how contemporary technology users understand collectivity. The advent of aggregative technologies has created a new form of what the philosopher Charles Taylor (2004) calls modern social imaginaries. Big data has presented itself as an image for social totality (see Wagner-Pacifici, Mohr, and Breiger 2015; Mangrum 2018).

The idea that big-data technologies somehow disclose the real shape of the social – but also become generative of new forms of collectivity – is a prominent theme of Barry Lyga and Morgan Baden's young-adult novel *The Hive* (2019). This dynamic also animates Dave Eggers's acclaimed *The Circle* (2013), which questions the kinds of utopianism underwriting seemingly benevolent companies like Twitter, Snapchat, and Facebook. The title of Eggers's novel refers to a global corporation, which purchases and absorbs the world's major tech firms (2013, p. 23). The result is the Unified Operating System, the first universal information system, which puts "all of every user's needs and tools" into "one account, one identity, one password, one payment system, per person" (p. 21).

This consolidation of online data allows the Circle to know seemingly everything about everyone, but more importantly it allows the company to make predictions on the basis of that information. This, of course, is the promise of big data: it can disclose patterns that are evident at scales simply too vast for the human mind, but it also purports to reveal future realities and aspects of our lives unknown even to ourselves. Eggers's novel interrogates this relationship between truth, sociality, and big-data technologies. The novel is particularly suspicious of the consolidation of digital technology under powerful corporate entities. However, *The*

Circle also shows why such techno-idealism nonetheless seems plausible to many workers in this sector. As the novel's protagonist Mae Holland says, "Who else but utopians could make utopia?" (2013, p. 30).

A version of Mae's question echoes throughout Malka Older's *Infomocracy* (2016), which imagines a future political system of "centenals," or groups of 100,000 voters, who make both electoral and everyday decisions in response to real-time, fact-checked information. Wearable technology enables individuals to access verified data about seemingly anything. Unlike skeptical treatments of big data, though, *Infomocracy* imagines this future order as based on a wholly transparent system of global technology. This system is run by a trans-national corporation called Information, which strives to be politically neutral. This arrangement would be a recipe for disaster in the other novels discussed in this entry, but *Infomocracy* takes the thought experiment as a serious and laudable kind of utopian experimentation. After all, centenals have access to verified information, even if it is technologically mediated, and thus have greater democratic control. As one technologist says, "Information is a public good. [...] We cannot give ourselves the power to see and leave everyone else blind" (2016, p. 260).

Data – as an idea, but also as the product of institutional design and technological infrastructure – does come under scrutiny in *Infomocracy*. For example, an agent of Information named Mishima acknowledges "that neither elections nor Information are neutral, that subtle changes in where centenal boundaries are drawn would lead to completely different outcomes, and that as much as they try to balance it, Information workers end up transmitting their most minute preferences and prejudices through the subjective choices of their work" (2016, p. 291). Biases are baked into the algorithms and the institutions of big-data democracy. Nonetheless,

recognizing these shortcomings does not lead Mishima to reject the system: "she casts her lot with [Information] anyway, because she can't think of anything better" (p. 291).

CONCLUSION

The novels and short stories discussed in this entry show how big data is a variable marker of contemporary sensibilities about information technology and corporatized media. These sensibilities most often gravitate around anxieties and deep-seated skepticism. The close proximity of corporate power to big data is the primary source of anxiety in contemporary fiction. However, some contemporary writers also deploy data science and computational analysis as resources for imagining utopian experimentation.

SEE ALSO: Cyberpunk; Eggers, Dave; Gibson, William; Lahiri, Jhumpa; Piercy, Marge; Pynchon, Thomas; Ozeki, Ruth; Powers, Richard; Saunders, George; Wallace, David Foster

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