

“How Do You Know Unless You Look?": Brain Imaging, Biopower and Practical Neuroscience

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Abstract Brain imaging is a persuasive visual rhetoric by which neuroscience is articulated as relevant to the construction and maintenance of desirable selves. In this essay, I describe how “brain-based self-help” literature disseminates neuroscientific vocabularies to public audiences. In this genre, brain images are an authoritative visual resource for translating neuroscience into a comprehensive program for living. I use Foucault’s discussion of biopower to describe the ways in which brain-based self-help literature enables self-constitution in a biosocial age where health is a central means of communicating personal worth, social value and political order. The implications of this continuous self-fashioning are not limited to the personal realm but have important political consequences.

Keywords Biopower · Brain imaging · Neuroscience

Neuroscience increasingly permeates public discourse, transformed from a body of knowledge that is accessible only to experts into a “practical neuroscience” that serves as a guide for everyday living. Popular books such as Stephen Johnson’s *Mind Wide Open: Neuroscience and Everyday Life* and Sharon Begley’s *Train Your Mind, Change Your Brain* summarize contemporary neuroscience as a potent source of insight for daily life. In addition to these books by “lay” authors, neuroscientists and medical professionals are directly addressing public audiences to disseminate neuroscientific wisdom. One form in which neuroscientists address public audiences is instructional handbooks for living well that frame neuroscience as a comprehensive toolbox of techniques for living. Recent examples of these handbooks include Jeffrey Schwarz’s *Brain Lock: A Four Step Method to Change Your Brain Chemistry* (1996); Richard Restak’s *Mozart’s Brain and the Fighter Pilot: Unleashing Your Brain’s Potential* (2001); and Daniel Amen’s many books, including *Making a Good Brain Great: The Amen Clinic Program for Achieving and Sustaining Optimal Mental Performance* (2005).

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I identify these books as a unique genre: “brain-based self-help books.” Self-help books are linked to American ideals of self-mastery and self-invention, and they typically aim to inspire and instruct their readers by providing wisdom and encouragement for tasks ranging from the specific (finding a spouse, managing money responsibly) to the general (having a “peaceful soul”).¹ Self-help books are usually authored by experts for a lay or popular audience, but they are not a one-way transmission of authoritative information from expert to passive reader. A defining feature of the genre is that readers are constructed as active agents capable of empowering and improving themselves. Brain-based self-help books represent just such a translative discourse, making scientific knowledge accessible to a general audience. They conform to the generic constraints of self-help literature, and, in addition, they are authored by neuroscientists or neuropsychiatrists who rely heavily on contemporary brain research, especially brain imaging. In recent decades, brain images, Joseph Dumit documents, have “attained a brand-like status, symbolizing science, progress, biological selves, digital imaging and the technological powers of progress, all at once.”² Brain imaging is more than a scientific research agenda—it is a persuasive visual rhetoric by which neuroscience is articulated as relevant to the construction and maintenance of desirable selves.

In this essay, I focus on Daniel Amen’s recent publication, *Making a Good Brain Great: The Amen Clinic Program for Achieving and Sustaining Optimal Mental Performance* (2005), to address two central questions. First, how is the visual authority of brain images utilized to translate neuroscience into a comprehensive program for living? Second, what are the personal, social and political effects of this translation of neuroscience and its active uptake by public audiences? I use Foucault’s discussion of biopower to describe the ways in which brain-based self-help literature enables self-constitution in a biosocial age where health is a central means of communicating personal worth, social value and political order. Brain images discursively constitute the brain as a calculable space of attention and intervention and promote the “working on oneself in a continuous fashion so as to produce an efficient and adaptable subject.”³ As Rabinow suggests, the implications of this continuous self-fashioning are not limited to the personal realm but have political consequences. In this essay, my focus is on how individuals are impelled to constitute themselves in particular ways, and I do not describe a particular policy agenda that is served by these types of self-management. I do suggest that these popularized neuroscience discourses encourage particular *kinds* of selves, or particular types of citizens, who are more or less amenable to diverse political agendas. My attention to the “micro-political” processes of “making up” citizens links up to other scholarship that takes on the “macro-political” consequences of these transformations in public discourse.⁴ In this project, my focus is limited to an analysis of Amen’s text as a representative exemplar of brain-based self-help and, more broadly, popularizations of neuroscience in order to analyze the micro-rhetorical operation of the growing diffusion of neuroscience across the public grammar.

Medicine, biopower and government

Our contemporary political and economic order is commonly summarized with the shorthand “neoliberalism” or “advanced liberalism.”⁵ Neoliberal government has two key features. First, it involves the translation of political, personal and social issues into technical problems capable of calculated intervention. Aihwa Ong defines neoliberalism as “a new relationship between government and knowledge through which governing activities are recast as nonpolitical and nonideological problems that need technical

solutions.”⁶ Second, neoliberalism works through, and not against, individual freedom. Instead of imposing restrictive edicts, government works by constituting individuals as active citizen-agents and aligning the perceived interests of individuals with the interests of the state. Rhetorical mechanisms, including mass mediated messages such as self-help books, are important because the constitution of active citizens and the alignment of individual and state interests are at least partially the outcomes of persuasive processes.⁷

Because individuals play an active role in the governing process, a prominent type of power operative in the neoliberal context is what Foucault has described as “biopower.” Biopower, Foucault writes, designates “what brought life and its mechanisms into the realm of explicit calculations and made knowledge-power an agent of transformation of human life.”⁸ In other words, biopower functions at the level of life itself, bringing all of the mundane tasks of daily living into the realm of politics. This is a “microphysics of power” that permeates the most intimate reaches of human existence. Biopower is not imposed on subjects by a sovereign agent: it is “an integral, vital function that every individual embraces and reactivates of his or her own accord.”⁹ Biopower is not, in Foucault’s theorization, limited to biomedicine; however, biomedicine is an important enabling discourse for the distribution of biopower. It is through the discourse of biomedicine that diverse elements of daily existence are brought into scientific discourse and made amenable to management and intervention. Moreover, one of the ways in which individuals are induced to embrace and activate power over their own lives is in the name of health, a linchpin value of biomedicine. Paul Rabinow has described this contemporary political configuration as “biosocial,” as social practices and identities are increasingly articulated in biomedical terms and scientific knowledge is “embedded throughout the social fabric at the micro-level by medical practices and a variety of other discourses.”¹⁰ The articulation of the social at the level of biology is one means by which the neoliberal task of recasting government as simultaneously comprehensive, nonpolitical and nonideological is accomplished.

Brain-based self-help books function as discursive relays that disseminate neuroscientific ways of thinking, speaking and acting to individuals. These discourses accomplish two vital functions of biopower: first, all of life is rendered in calculable, scientific form and second, individuals are interpellated as active agents who can act to improve their health through techniques of self-government and self-management. Brain images are a crucial persuasive resource because they visualize a host of life activities as fundamentally biological processes that can be changed through calculated interventions. Brain-based self-help books impel readers to employ these interventions in pursuit of health. The movement of neuroscience as a comprehensive knowledge for daily living coincides with “healthism,” a growing health consciousness which places responsibility for health in the individual and “treats individual behavior, attitudes, and emotions as the relevant symptoms needing attention.”¹¹ Health, in other words, is expanded from a biomedical concept into a general *telos* of self-improvement, or rubric for the type of being individuals aspire to in a moral way.¹²

In this essay, I focus on Daniel Amen’s recent publication, *Making a Good Brain Great* (2005). Amen, a clinical neuroscientist, psychiatrist and brain-imaging expert, is in many ways a central node in his own rhetorical or discursive formation. Amen is the head of the four Amen Clinics, all of which specialize in the clinical use of SPECT brain imaging. He has a significant presence in the public sphere as the author of 20 books (translated into 13 languages), a number of audio and video programs, a regular column in *Men’s Health*, and numerous articles and interviews in popular sources such as *Newsweek*. Amen regularly appears on popular television shows, including the *Today* show, *Ricki Lake*, *The View* and

CNN, as well as radio shows and speaking engagements. He has won awards for his role in authoring anti-drug campaigns, as well as other areas of his research and writing. His book, *Change Your Brain, Change Your Life* (1999), was a *New York Times* bestseller, unexpectedly selling tens of thousands of copies in its first year, in part because it “struck a nerve with readers who love a ‘scientific’ hook.”¹³

Although Amen is a professor at the prestigious University of California at Irvine’s School of Medicine and a Distinguished Fellow of the American Psychiatric Association, he is not unconditionally accepted as a legitimate expert. Amen’s broad clinical applications of SPECT brain scans are not widely accepted by the neuroscientific community. The scientific consensus is that brain images have great potential as a research tool but limited practical applications in clinical settings. Notably, in Amen’s book, brain images are not used as a tool to diagnose illness or inadequacy; they are used as inventional resources to articulate neuroscience as a practical knowledge for everyday living. The brain, as visualized in a scan, becomes a discursive space for the coordination of personal, social and biological dimensions of life. In the remainder of this essay, I examine how Amen uses brain images to disseminate biological vocabularies and ways of acting to audiences, correlating ethical citizenship and personal fulfillment through brain images that translate both into calculable forms amenable to technical intervention in the name of health.

Fifteen days to a better brain!

Amen’s *Making a Good Brain Great* is constructed as an educational “how-to” manual, promising readers that they can improve their brains in as little as 15 days. The book is divided into two sections: the first details nine “brain-centered principles to change your life,” each chapter devoted to a specific principle. The primary purpose of these chapters is educational. The main theme is that the brain is a major actor in virtually all areas of life, and the first principle encapsulates this theme: “Your brain is involved in everything you do.” Throughout the first half of the book, Amen instructs his readers on the biology of the brain, the benefits of imaging technologies, and the different categories of living that are determined by brain biology. In the second half, Amen presents “The Amen Clinic Program For Making a Good Brain Great.” This is the “how-to” portion of the book. Each chapter is dedicated to a different set of tasks: maintaining a healthy diet, exercising on a regular basis, listening to soothing music, managing stress, and having positive social interactions, including regular sexual relations are themes of different chapters. In the concluding chapter, Amen combines these tasks into a 15-day program, with each day devoted to improvement in a specific area.

In terms of the content of his suggestions, Amen hardly breaks new ground. In many respects, the second half of the book reads like an annotated amalgam of existing self-help books, each devoted to a specific topic such as diet, exercise, social interaction or stress management. For instance, in the diet chapter Amen condemns those foods that are “laden with calories, refined carbohydrates, and damaged fats,” indicting the fast-food culture that thrives on “super-sizing” unhealthy products.¹⁴ His alternative is to increase water intake while decreasing consumption of the bad foods and focusing on a diet of protein, good fats, and carbohydrates. The chapter even includes a collection of healthy recipes, ranging from a low-fat chicken omelet to blueberry ice cream. There is nothing novel about these recommendations, and they are so commonplace they verge on the clichéd. The difference is that these are described as recommendations that are designed not for the health of the person but the health of the brain. Food is a “powerful brain medicine,” and the suggestions

are “brain-promoting nutritional tips” (89, 91). Calorie restriction is “helpful for the brain,” and the recipes are “brain-healthy recipes” (89, 104).

The rest of the chapters follow this pattern. Commonplace recommendations for self-improvement are reiterated, this time in terms of their effects on the brain. Physical exercise is important because it allows the brain to generate new neurons, and coordination activities are lauded for their brain-enhancement potentials. Regular sexual relations are vital to a healthy brain because it is “the largest sex organ in the body,” involved in everything one does, “including everything sexual” (134). “Weird” sexual fetishes are “brain symptoms” (143). The how-to recommendations are all consistent with this formula: take existing, commonsensical knowledge (including social mores) and re-articulate it in terms of how it relates to the brain as both cause and consequence of behavior.

Amen brings all of life, down to the most mundane details (for instance, individuals are advised to use real, rather than artificially flavored, vanilla extract in the milk they are to consume before bedtime to ensure proper rest), within the domain of neuroscience. Every aspect of life presents a potential opportunity for self-fashioning and improvement. The ubiquitous brain images populating the book’s pages provide support for this assimilation of life into the rubric of what Amen calls “practical neuroscience.” Because brain images can be produced in correlation with virtually any activity or differentiated identity (specific thoughts, emotions, behaviors, and specific types of persons, such as depressed, female, or young), they can provide visual evidence that all of these activities and identities are biological and, more specifically, neurological. Further, because the brain images are dynamic and can visually depict neurological changes in coordination with different technical interventions (including medication, behavior therapy, and “positive thinking”), diverse medical, social and personal technologies are articulated in terms of their value for “health.” In Amen’s book, brain images are both an essential part of the verbal narrative and an important material feature of the text. Amen frequently references brain images by calling upon descriptions of the imaging process and the images themselves to support his claims, and he includes multiple representations of brain images for the readers’ own consumption. In the next section, I describe the types of images Amen uses with specific attention to their visual composition.

“How do you *know* unless you *look*?”

This is the title of Amen’s seventh chapter (emphasis mine), and it indicates that knowledge is intimately connected to, and in fact dependent on, looking. Brain images are central to Amen’s project, and they are the evidence that grounds both the nine brain-centered principles and the detailed recommendations for brain improvement. Amen is recognized for using SPECT (single photon emission computed tomography) imaging in clinical settings. His clinics have performed more than 30,000 of these scans, comprising the largest database of SPECT images. SPECT imaging is a nuclear medicine procedure that measures brain blood flow, and the assumption is that brain blood flow is correlated with brain activity. The data is constructed into 3D images that model these patterns of brain activity. Amen’s books are replete with black-and-white representations of these images, and his website and educational pamphlets include colored representations of SPECT images (Figs. 1, 2).

The SPECT images are presented as visual evidence that is highly legible to even an untrained audience. Amen explains: “SPECT scans look at function or how the brain works. SPECT results are actually very easy to read and understand. We look at areas of the brain that work well, areas that work too hard, and areas that do not work hard enough” (8). Later

Fig. 1 Underside active view of a normal brain from Amen's SPECT Atlas. Image used with permission of Amen Clinics. The figure is from Amen's *Images Into Human Behavior: A Brain SPECT Atlas*

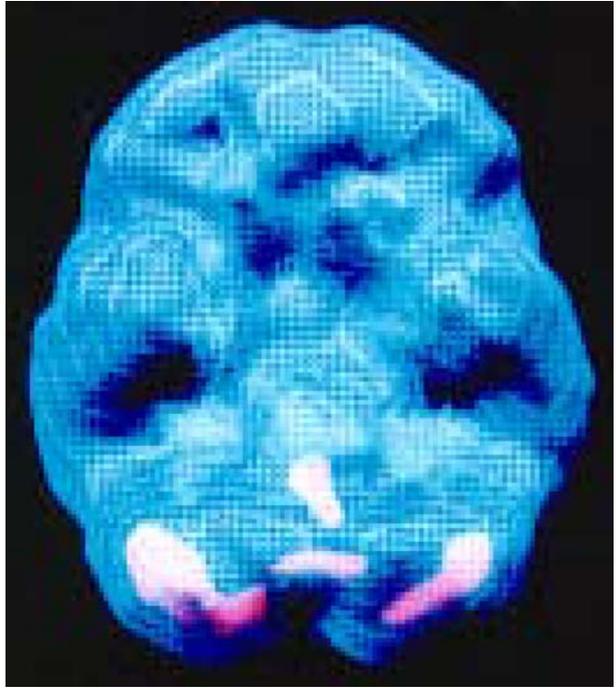
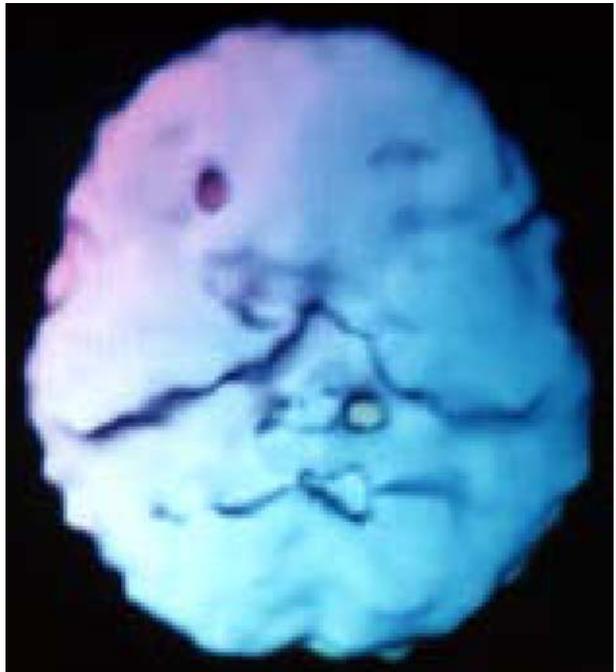


Fig. 2 Underside surface view of a normal brain from Amen's SPECT Atlas. Image used with permission of Amen Clinics. The figure is from Amen's *Images Into Human Behavior: A Brain SPECT Atlas*



he writes: “Scans must be clear, understandable, easily illustrative of brain function, and available to the patient on a timely basis. We believe our 3D rendering software makes the scans easy for professionals, parents, and families to understand” (255). Throughout *Making a Good Brain Great*, SPECT scans are presented as legible through Amen’s description of their usage in clinical settings and in the way the actual images are framed and presented.

There are two types of SPECT images: 3D surface images and 3D active images. The surface images depict blood flow at the brain’s cortical surface and are set to display the top >45% of brain activity. These images display brain function or activity, but they look like “objects,” or representative models of brain structure. They have an apparent density and solidity which foster the impression that if the referent were present, one could pick it up and hold it for visual and tactile inspection. The 3D surface image corresponding to a healthy brain shows “full, symmetrical activity” and looks like a clay model of an actual brain. It appears to be smooth, and there are no holes or gaps in the surface. The images of unhealthy brains appear to be moth-eaten, showing dramatic holes and gaps rather than a smooth structure and suggesting that the brain physically decays when it is correlated with the unhealthy state (for instance, negative thinking or drug use). In the book, all of the images are in black–white and grayscale. The colored images are even more dramatic. The brains are depicted in varying shades of yellow, orange, purple and blue. The top-down view of the healthy brain is an organized blend of yellows and reds, each shade subtly blending into the next. The unhealthy brains, covered in holes and structural defects, display sharply contrasting shades to illustrate the “underactivity” or “overactivity” associated with a particular area.

The other images are 3D active images, which compare average brain activity to the “hottest” 15% of activity. Looking much different than the surface images, these images look like graphs: the whole brain is modeled as a three-dimensional grid displaying fine lines interconnected in web-like fashion. Specific parts of this 3D diagram are filled in with shading to suggest overactivity. Although these images appear more like graphs than the surface images, which look like actual representations, they suggest a simple relationship between brain activity and the image. The complex averaging procedures and statistical work that go into producing such images are lost in the neat, simple-looking images presented for the readers’ consumption and interpretation.

Although I am not primarily concerned with the “truth value” of these images, it is worth pointing out that, like all functional brain imaging, they have no diagnostic utility. In other words, it is not possible to image an individual brain and determine from the image whether that person is healthy or whether he or she has a particular disorder. This is, in part, because brain activity varies substantially from individual to individual, and most research studies average data from many individuals to produce results about specific populations. In his discussion of imaging, Amen defines a healthy brain by way of external behavior: a healthy brain is identified, in other words, if the individual is a good citizen. This circularity highlights the fact that the images are not primarily diagnostic tools but persuasive tools with functions independent of their medical utility. They impel individuals to frame their lives within the context of neuroscientific knowledge, thinking of and acting on their lives, motivated by the never-ending pursuit of health.

Practical neuroscience as a program for living

Nikolas Rose writes that the dispersal of biological, including neuroscientific, vocabularies “makes up citizens in new ways.”¹⁵ In other words, as individuals come to take up the

biomedical terminologies disseminated by experts and adopt them as vocabularies capable of expressing their own problems and aspirations, they come to speak and act differently. Rose explains: “They use these phrases, and the types of calculation to which they are attached, to make judgments as to how they could or should act, the kinds of things they fear, and the kinds of lives for which they can hope.”¹⁶ This dissemination of biomedical language exhibits two important characteristics of biopower: first, terms and ideas must not only be transmitted but also actively adopted by their audience. Second, the terms are connected to ways of acting. If the vocabulary is adopted, specific modes of calculation and intervention will follow or, at least, become more likely ways of managing routine problems of living. Amen’s book illustrates this complex form of dissemination. As medical advice, Amen’s address is distinguished by its insistence that the patient *understand* his or her own problems. More importantly, individuals must understand their problems through the biological vocabulary of neuroscience. It is not enough for individuals to accept Amen’s prescriptions on the grounds of his expertise and authority; each person must come to a scientific understanding of his or her life experiences. Brain images authorize neuroscience as a “truthful discourse,” the correct and ethical way of accounting for oneself and others.

The inducement to a neuroscientific vocabulary

In the brain-based self-help books, knowledge is intimately tied to practice or, in other words, *understanding* the self through neuroscientific terminologies is a crucial way of *transforming* the self. Readers are induced to adopt a neuroscientific vocabulary because it is a necessary component of the self-improvement program. Amen’s fifth principle, for instance, is “Know and Heal the Brain Systems That Run Your Life.” This chapter is intended to educate readers about the different functions of six brain systems. This understanding is not merely educational, however; it is vital to correction. Amen begins the chapter: “To make a good brain great, it is important to have a basic understanding of how the brain works, including its strengths and weaknesses” (32). He presents a “hands-on guide” to understanding the brain, emphasizing that it is essential to know “that certain parts of the brain tend to do certain things, and that problems in specific areas tend to cause identifiable troubles” (32). When one understands the way the brain functions, it is then possible to identify the precise location of problems and then begin “targeted treatment.”

This “hands-on guide” differs from impersonal pedagogical instruction, and it is highly participatory. Readers are invited to learn not about “the” brain but about *their* brain. Amen presents the Amen Clinic Brain System Quiz, a self-report quiz designed to assess the function of brain biology. The quiz asks readers to rate themselves on 60 different symptoms from 0 (never) to 4 (very frequently). The quiz includes items ranging from cognitive, emotional and physical health, such as “difficulty expressing empathy for others,” “upset when things do not go your way,” “trouble learning new information,” and “fingernail biting.” Each question is correlated with a specific area of the brain—prefrontal cortex, basal ganglia, and so forth. Individuals associate their answers with the appropriate brain area to assess overactivity or underactivity in each region. For example, inconsistency, troubled decisions, and impulsive, risky behavior (such as sexual promiscuity or drug abuse) are interpreted as signs of pathology in the function of the prefrontal cortex (39). Worrying excessively should be understood as “high activity in the ACG,” or the anterior cingulate gyrus. Each brain system is accompanied by a full-page table that lists the types of problems associated with under- or over-activity in that particular region.

The quiz conditions readers to understand their subjective experiences in biological terminologies that emphasize their neural origins. Readers are instructed in neuroscientific vocabularies and, more generally, in a logic of correlation that articulates personal and social events as fundamentally biological. Neuroscience is held out as a language that can be used to express everyday experiences, as in “It’s a low serotonin day,” or “Her PFC is clearly overactive.” These vocabularies are taken up as ways of understanding not only the self but also the behaviors of others. In *Change Your Brain, Change Your Life*, for instance, Amen writes that children with OCD (obsessive compulsive disorder) often have “cingulate parents.”¹⁷ Readers are advised that if they are engaging in an argument with someone who clearly has a “cingulate” problem or makes them think, “She’s so cingulate!,” the best thing to do is avoid the conflict by retreating to the bathroom with a large book.¹⁸ Neuroscience become a colloquial language to understand social behaviors. Here, cingulate becomes an adjective that describes not biology but observed character. Although the visual scan provides “evidence” that neuroscience is a truthful discourse for self-expression, the image is not a continual necessity for the attribution of observed behaviors to events in the brain. In other words, the brain images enable the assimilation of personal and social events into a neuroscientific paradigm by showing their biological nature, but once this biosocial paradigm is established, it enables a direct movement from the biological to the personal/social without an actual mediation of the image in each instance.

The biological vocabulary is not simply one among many: it is a way of understanding experience that one *should* adopt to the exclusion of alternatives. The brain-based self-help book compels readers to adopt this terminology through both scientific and moral appeals. First, by virtue of his scientific authority, bolstered by the presence of the images, Amen situates neuroscience as a valid and truthful vocabulary. He claims that he has looked at more brain scan images than any other person. Because the SPECT images are framed as accessible to his readers, they can share this expertise and extend it across their own lives.

In addition, the neuroscientific paradigm is the morally correct way to understand the behaviors and motives of both the self and others. Vocabularies of morality are coordinated with the value of health. A failure to adopt the neuroscientific paradigm results in “stigma” and “discrimination,” attitudinal barriers to healing and a sign of pathological social behavior. Understanding personal and social events in biological terms is itself a type of healing because it eliminates destructive attitudes such as guilt and self-blame. Alternative accounts are framed as “prejudice,” or harmful ignorance. Amen writes that a biological understanding results in “reduced shame, guilt, stigma and self-loathing. This understanding can promote self-forgiveness, often the first step in healing” (252). The negative thoughts that are produced by self-blaming are themselves causes of pathological brain patterns. Accepting that one’s behavior is caused by biological factors outside of their control is both a type of self-knowledge and a material action that literally changes the self.

This moral imperative to adopt a biological framework applies to the behaviors of others as well, including behaviors with significant social consequences. For instance, Amen has testified in court numerous times, using the evidence of brain scans to argue that criminal acts should be treated as illnesses rather than acts of social deviance. For example, he talks about a man who was upset because he thought that his wife was neglecting him. When he became convinced by brain scans that her behavior was biological in origin, he no longer blamed his wife for harboring negative feelings toward him. The husband’s attitude of blame toward his wife is in itself a pathological symptom—“stigma”—that restricts his ability to achieve optimal health.

Assimilating life into neuroscience

Making a Good Brain Great exemplifies what Dumit describes as “the cultural and visual logics by which [brain scan] images persuade viewers to equate person with brain, brain with scan” (36). Through these cultural and visual logics, individual character is collapsed into biology by way of brain scans that provide concrete visual evidence of the neurobiological nature of virtually every subjective experience or social interaction. The Amen Clinic Brain System Quiz described previously provides an example of this identification. The quiz is framed as a substitute for a brain scan for those who are unable to get their brains or the brains of their loved ones scanned. The implication is that brain scans provide the same type of knowledge as introspective techniques such as the self-report data. Brain scans can, in this articulation, literally visualize subjective character.

Amen often frames the images in equivocal vocabularies that situate the scans as representations of *both* biology *and* character. Looking at a brain scan is equivalent to looking at the ultimate depths of one’s true self, or psychic interior. Amen posits a direct relationship between character and biology in his second principle: “When your brain works right, you work right; when your brain is troubled, it is hard to be your best self” (7). This equation is authorized by images: “This principle came to me after *looking* at hundreds of scans on my own patients. Not only do I read scans, I also work directly with patients and families, *looking* into the lives of the people behind the images” (7, emphasis mine). Two different senses of looking are used here: a literal looking at material images and a figurative looking into people’s lives. Throughout his manual, Amen uses “looking” in an equivocal fashion, identifying viewing of a scan with understanding and evaluating lives: “Look at any aspect of behavior—relationships, school, work, religion, sports—and in the middle of it all is brain function” (4). There is a similar equivocation in adjectives used to describe both the scan and subjective existence. Amen identifies “the *quality* of brain function represented by the scans” with “the *quality* of the decisions, outcomes, and emotional connections in the lives of my patients” (8). In the first usage, quality can be assessed visually and calculated, and in the second usage, quality is an abstract designation, as in “quality of life.” Quality of image is assessed in terms of “underactivity” and “overactivity.” The 3D surface images reveal underactivity by depicting certain areas of the brain as gaping holes or moth-eaten structures and mark overactive areas as “hot spots” on otherwise bare grids of lines. The images are graphical renderings of statistical data, so in the sense of the image, “overactivity” is a quantitative, calculated assessment of brain blood flow patterns. These terms can also be applied to subjective and social aspects of existence as qualitative judgments about mannerisms or emotions. For example, low activity in the prefrontal cortex is associated with “lack of empathy” and “poor judgment” (38). High activity in the PFC is linked to being “overfocused,” “rigid” and “inflexible” (38).

Overactive and underactive evaluate in terms of degree, and these judgments can be either quantitative or qualitative depending on whether a visual rendering of graphic data or subjective experiences and social interactions are being assessed. By fusing these two dimensions—the biological and the personal/social—Amen’s expert discourse implies that the personal and social dimensions of living share the qualities of the scan itself and can be calculated, measured, and corrected through precisely calibrated technical interventions.¹⁹

The fusion of biological and social, and specifically brain scan and character, occurs through the value of health. Health is a metavalue that encompasses both biological and social (or characterological) normativity. Because brain scans cannot be used to diagnose social or character-related pathologies, health is imputed to the scans based on assessment of character. In other words, brain scans cannot provide transparent access to character—it

is through character, as self-identified by individuals or observed in social interaction, that signifiers of health are attributed to scans. Health is operationalized not in terms of biological markers but in terms of social expression of good character. Social pathologies that signal poor brain health include relationship problems, crime, and other types of discontent and deviance.

Amen's distinction between "will-driven" and "brain-driven" behavior illustrates how health is operationalized in terms of personal character and social behavior: "Will-driven behavior comes from a healthy brain. It allows you to exert conscious choice over a situation to work in your own best interest" (8). Healthy, will-driven behavior is goal directed and productive and includes social relationships as well as individual behaviors and attitudes. People with healthy brains "tend to make the best employees, the best husbands and wives, the best parents, friends, employees, and citizens" (11–12). Brain-driven behavior occurs when the brain does not function in a healthy manner and literally "hijacks" the will. Brain malfunctions deprive individuals of their free will and deny them "access to their true selves" (12). Amen frequently uses the term "hijack" to describe the brain's action on the self. Amen describes his conclusions of clinical practice, "The brain function of my patients who did bad things was much worse than that of people who were living productive, healthy lives" (15). He summarizes this in the form of a principle, "When your brain works right, you work right, and when the brain is troubled, it is very hard to be your best self!" (16). The scans, because they "bear the objective authority of science," become powerful resources for what Dumit calls "objective self-fashioning," the ongoing process of accounting for oneself to both the self and others.²⁰

Amen's distinction between will-driven and brain-driven behavior shows how health is a moral, as much as a biological, pursuit. Health is akin to human "goodness," viewed in terms of social behaviors. Healthy humans are good citizens: in their "natural" healthy state, humans are fundamentally good creatures who form positive relationships, excel in the workplace, exhibit attitudes of kindness and compassion, and refrain from criminal or other socially devalued behavior. Any deviation from this "ideal citizen" is evidence of a brain pathology that is outside of the individual's direct control. By translating desirable personal and social traits in terms of health, the neuroscientific discourses describe "ideal citizenship" as the natural, innate state of individuals. This is how moral and ideological ideals are translated into neutral and technical matters: citizenship, defined as "health," becomes an apolitical, natural state that is, by definition, in the interests of the individual.

The pursuit of health

The "neutral" value of health provides the framework for the individual pursuit of self-improvement. Because brain images assimilate virtually all areas of life into a neuroscientific rubric, health is unmoored from biology and encompasses behaviors, attitudes and relationships. As a meta-value regulating existence, health is not a clearly demarcated state that one can reach but an ever-receding goal that necessitates a continuous pursuit. Health, in other words, can *always* be improved but can never be achieved. Neuroscientific vocabularies authorize a host of self-fashioning modalities, or "treatment programs," designed to maximize health. Because these technologies are "treatment programs," they are simply technical interventions designed to achieve or restore a natural ideal—any political or ideological cast is subordinated. Individuals are impelled to adopt wide-ranging treatment programs in response to a "duty to be well" which frames the failure to pursue health as an individual moral failing and a lack of social responsibility.

Health, as Crawford writes, has become “a pan-value or standard by which an expanding number of behaviors and social phenomena are judged.”²¹

One major form of treatment is psychotropic medications. Amen recognizes the persuasive force of the brain scan images when he writes, “A SPECT scan allows patients to see a physical representation of their problems that is accurate and reliable, and that helps to increase compliance—pictures are powerful. It can influence a patient’s willingness and ability to accept and adhere to the treatment program” (52). The “treatment program” might include medication but is by no means limited to drug therapy. Amen tells the story of one woman who was “desperate to function as the good mother she wanted to be to her child.”²² Amen diagnosed her with depression and prescribed Prozac. The woman, however, “did not want to see herself in that light or be stigmatized” by the label of mental illness. She stopped taking the medication, until Amen ordered a brain scan and “was able to point out to her the marked increase in activity in that area of her brain. It provided me with the evidence needed to convince her to go back on Prozac for a while longer.”²³ In this case, the scan images convinced the patient that the source of her poor mothering was biological and hence necessitated biologically based treatments. More importantly, the scans convinced her of the “reality” of her illness, ameliorating the stigma associated with problems that are thought to stem from character or personality. The change in interpretation produced by the scan changed what consuming medications *meant* to this patient.

Medications are only one part of the “treatment programs.” Treatment is an ongoing process that includes a close attention to the moment-by-moment status of the brain, and images are used to evidence the biological effects of every activity and mood. Amen tells of one patient who was scanned twice: the first time, she was told to meditate on things that she was thankful for. In the second scan, she was told to think about all of the things she hated about her life. The comparison of the scans allowed her to “see the difference that an attitude of gratitude can make in the brain” (151). Amen warns: “Negative thought patterns change the brain in a negative way. Being grateful for the wonderful things in your life literally helps you have a brain to be grateful for” (151). Individuals must constantly tend to their thoughts because literally “every thought” has an immediate, physical effect on the brain (152). This constant attention takes the form of consistent monitoring and reflection. Individuals must *think about* their thoughts, examining each one and assessing its positive or negative quality. This reflection should take the form of writing. Amen recommends, “Whenever you feel sad, mad, or nervous, write out what you are thinking. You will notice that many of those thoughts are irrational and hurtful” (153). Amen includes a specific worksheet, the “One-Page Miracle,” in which readers are asked to write down their major goals using three headings (Relationships, Work/Finance and Self). The paper is to be placed in a conspicuous location and consciously reflected on at least once every day.

Amen’s book is rife with different practices that are part of the brain “treatment program,” ranging from listening to specific types of music, filling out various worksheets, watching the movie “Pollyanna” on a regular basis, and laughing regularly. These specifications of caring for the self are grounded in the visual authority of brain scans, which reveal the physical correlates of virtually all activities and are deployed as evidence of the ways in which these activities affect the brain. As the comparative brain scans demonstrating the value of an “attitude of gratitude” show, the brain can change in an instant in response to a mood or behavior. The functional brain scans support a treatment program that is continuous and ongoing, a lifelong project that is never complete. This continuous self-management of life is what Foucault terms biopower, investing living bodies and bringing “life and its mechanisms into the realm of explicit calculations,”

making “knowledge-power an agent of transformation of human life.”²⁴ The visual depiction of the brain parallels the contemporary understanding and treatment of the brain as a functional space of distributed activity subject to a constant series of corrections and modifications.

Conclusion: neuroscience, biopower, and the “duty to be well”

The dispersal of neuroscientific vocabularies and ways of living through brain-based self-help books lubricates the function of biopower in contemporary society. Individuals are impelled to manage and improve themselves through a host of self-fashioning technologies, actively participating in their own government. The types of norms and behaviors promoted in these discourses appear to emanate from individuals’ own desires to achieve their optimal state of health. The brain images render a truth that is internal in two senses: first, the scans are thought to make literally visible the inaccessible interiors of the corporeal body. Second, because scan and character are identified in the brain discourses, the images manifest a psychic interiority, the space of individual character or subjective existence. The images ground neuroscientific knowledge in a truth that is at once objective and technical and derived from the individual’s own internal, unique subjectivity. Individuals are governed through their own desires, their own interests in becoming healthy subjects—they are, in Nikolas Rose’s terms, “obliged to be free,” in a political context where modes of self-management and self-improvement “are more profoundly subjectifying because they appear to emanate from our own individual desires to fulfill ourselves in our everyday lives, to craft our personalities, to discover who we really are.”²⁵ Government operates through freedom and subjectivity as a constituting force, rather than from without as a constraining force.

This obligation to freedom is made effective through contemporary discourses of health. Monica Greco writes that health and illness “have become vehicles for the self-production and exercise of subjectivities,” manifest in a “duty to be well.”²⁶ Health is something that is not imposed but must be chosen voluntarily by individuals, a capacity of the will framed in moral terms. Amen’s book shows how, in the name of health, individuals are induced to a host of different modes of self-care and self-management. Because these initiatives are taken up at the behest of the individual, for their own improvement, they appear to be apolitical. The “natural” vocabulary of neuroscience contributes to this perception that the proscribed means of self-transformation are simply correctives that will restore an individual to his or her natural, healthy state. However, in terms of neoliberal government, practical neuroscience plays an important role in constituting efficient and adaptable citizens, or “healthy” individuals who are also “healthy” citizens who participate in effective government.

Endnotes

- 1 For general discussions of the self-help genre, see Dolby, *Self Help Books: Why Americans Keep Reading Them*, and McGee, *Self-Help, Inc.: Makeover Culture in American Life*.
- 2 J. Dumit, “Is It Me Or My Brain? Depression and Neuroscientific Facts.” *Journal of Medical Humanities*, 24(1/2): 36.
- 3 P. Rabinow, “Artificiality and Enlightenment: From Sociobiology to Biosociality.” In *Incorporations*, eds. J. Crary and J.C.S. Kwinter. (New York: Zone, 1992): 242.
- 4 For excellent analyses that link up the micro-political dimensions of making up citizens to specific political programs, see for example: Rose, *Governing the Soul*; Ong, *Neoliberalism as Exception*; and many of the essays in Graham Burchell, Colin Gordon, and Peter Miller (Eds.), *The Foucault Effect*.

- 5 See, for instance: Mitchell Dean, *Governmentality: Power and Rule in Modern Society*; and Nikolas Rose, *Governing the Soul*.
- 6 A. Ong, *Neoliberalism as Exception: Mutations in Citizenship and Sovereignty*. (Durham, NC: Duke University Press, 2006): 3.
- 7 For a general discussion of the dissemination of medical knowledge through mass media, see Lester Friedman (Ed.), *Cultural Sutures*.
- 8 M. Foucault, *The History of Sexuality*. (New York: Pantheon, 1978): 143.
- 9 M. Hardt and A. Negri, *Empire*. (Cambridge, MA: Harvard University Press, 2000): 23–24.
- 10 Rabinow, 241.
- 11 R. Crawford, "Healthism and the Medicalization of Everyday Life." *International Journal of Health Services*, 10 (3): 368. See also M. Greco, "Psychosomatic Subjects and the 'Duty to be Well': Personal Agency Within Medical Rationality." *Economy and Society*, 22 (3): 357–370.
- 12 I. Hacking, "Self-Improvement." In *Foucault: A Critical Reader*, ed. D. C. Hoy (Oxford: Basil Blackwell, 1986): 235–241.
- 13 J. Quinn, "Get a 'Life.' The Year Begins With Self-help Successes." *Publisher's Weekly* (1 March 1999): 25–26.
- 14 D. G. Amen, *Making a Good Brain Great: The Amen Clinic Program for Achieving and Sustaining Optimal Mental Performance*. (New York: Harmony, 2005): 89–90. Subsequent references to this book appear in the text.
- 15 N. Rose, *The Politics of Life Itself*. (Princeton, NJ: Princeton University Press, 2006): 140.
- 16 Ibid, 141.
- 17 D. G. Amen, *Change Your Brain, Change Your Life*. (New York: Times, 1998): 165.
- 18 Ibid, 177.
- 19 See also Waldby, *The Visible Human Project*, on the correspondence of digital images to modes of calculation and intervention.
- 20 Dumit, "Is It Me Or My Brain?," 44.
- 21 Crawford, "Healthism," 380–381.
- 22 Amen, *Change Your Brain, Change Your Life*, 49.
- 23 Ibid.
- 24 Foucault, *The History of Sexuality*, 143.
- 25 N. Rose, *Inventing Ourselves*. (Cambridge, MA: Cambridge University Press, 1998): 17.
- 26 Greco, "Psychosomatic Subjects," 357.

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