

**Exploring the Outside and the Inside:
Double Vision in Joan Slonczewski's *Brain Plague***

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Abstract: With its vision of how the possibility of enhancing the human brain by means of intelligent microbes would change the nature of humanity, Slonczewski's *Brain Plague* (2000) provides a fertile ground for multiple interpretations. Deploying the theme of intelligence and the brain, it belongs to the literature linked to the life sciences. In terms of its generic aspect, the novel should be classified as hard science fiction, because it is predicated on scientific underpinnings. In this paper, however, *Brain Plague* is, in the first place, viewed as a double parabolic projection serving as a social critique of the actual world and as an educational tool. Employing the notions of *parabolic projection* and *conceptual metaphor*, both formulated under the cognitive poetics paradigm, the paper seeks to demonstrate how Slonczewski, a scientist holding a PhD in biology and a popular writer, elicits in the reader the aesthetic effect called *cognitive engagement*.

Keywords: brain, hard science fiction, parabolic projection, conceptual metaphor, cognitive engagement.

Aster had aged, she had gradually seen
how people mirrored their own gods.
(Slonczewski 2000: 118)

Characteristically, all science fiction aims at re-configuring and re-modifying our hitherto perception of the real world. Instead of defamiliarizing the ordinary, it “does the opposite – the extraordinary becomes commonplace” (Slonczewski 1993). Thus, it lies at the heart of science fiction to evoke in the reader the aesthetic effect called *cognitive estrangement*¹. As Mark Turner (1987: 9) has it, literary works subsumed

¹ Darko Suvin's concept expounded first in *Metamorphoses of Science Fiction* (1979). It refers specifically to the science fiction genre, and is analogous in its effect to defamiliarization. In his *Poetics of Science Fiction* (2000: 169), Stockwell defines *cognitive estrangement* as “the mapping of earthly knowledge onto alien environments,” the reading experience which results in a struggle for meaning.

under this genre not only vivify and stimulate our cognitive apparatus but they, first and foremost, manipulate it. Such a capacity to challenge the reader's *Idealized Cognitive Models*¹ (Lakoff 1987) has its best exemplification in the form of two synonymous processes – *isomorphism* (Stockwell 2000: 200) and *parabolic projection* (Turner 1996) – which occur at the moment of encountering a fictional text world. Essentially, both concepts are based on the assumption that any reading of science fiction entails an act of projecting, or mapping, the real world and the text world onto each other.

Joan Slonczewski's phenomenally popular *Brain Plague* (2000), as I argue in this paper, makes no exception here. It also re-structures readers' current perception of reality by encouraging them to view new worlds, or Darko Suvin's *novums* (1979), "in terms of existing familiar knowledge" (Stockwell 2000: 169). However, unlike most science fiction works, it seems to escape the simplistic, two-directional mapping paradigm outlined above. By focalizing the story through two concomitant perspectives, through frequent and abrupt perceptual shifts between Chrys, the protagonist, and a civilization of sentient microbes inhabiting her brain, *Brain Plague* reflects what I propose to call a double parabolic projection. Seen thus, the novel requires the reader to juggle with two unfamiliar and cognitively challenging textual universes: one positioned inside the brain and the other located outside it, in the Fold, a fictional world which is Slonczewski's original vision of future humanity. As will be shown, in its exposition of these two concurrent, yet closely linked perspectives, *Brain Plague* utilizes two different literary strategies. While the space conceived of as "outside" is created merely through cognitive estrangement, the "inside" world relies heavily on a catalogue of conceptual metaphors, such as THE BRAIN IS A CITY or HUMAN BEINGS ARE GODS. In effect, juxtaposing two independent accounts of one common story means that the two parabolic projections – the "outside" and the "inside" – will inevitably overlap and complement each other to finally give a comprehensive overview of Slonczewski's vision. What forms the main focus of this paper is how *Brain Plague*, to use Turner's words (1987: 9), "evokes and manipulates" the reader's cognitive apparatus for the purpose of performing educational and critical functions.

¹ ICMs are simplified structures through which we make sense of the world around us. Made up of such categories as our previous experiences, our existing knowledge or our cultural background, they constitute conceptual bases for "understanding and negotiating the world and our lives" (Stockwell 2001: 33).

1. *Brain Plague* as hard science fiction

Set in an indefinite future in the universe of Fold, the novel¹ speculates how the possibility to enhance specific capacities of the mind through incorporation of intelligent micro-organisms into the brain would alter the nature of humanity. In order to translate the theory into practice, Slonczewski features Chrys, an artist, who, in a desperate attempt to escape the financial and artistic impasse, decides to enroll in an experiment designed to boost her creativity. In consequence, she becomes host to the Eleutherians, a colony of over a million micros who “think of their human hosts as gods”² (Johnson 2000). As it turns out later, micros, analogously to their human carriers, do not form monolithic cultures: they are individuals possessing diverse personalities and endowed with various gifts. Significantly, having unlimited access to the human circulatory system, they can either “raise human creativity to unimagined heights” (Slonczewski 2000) or spread the title brain plague, that is, enslave their human hosts by activating “the neurotransmitter dopamine to control human pleasure” (Slonczewski, Levy 2003: 177). Although Slonczewski considers and extrapolates both possibilities, in *Brain Plague* she foregrounds the devastating effects of microbial manipulation. Her novel chronicles how Chrys, together with her micros, and other human hosts engage in a collective struggle to subvert the addictive power of the plague and finally prevent the moral collapse of humanity.

Deploying the theme of intelligence and the brain³, *Brain Plague* belongs to the literature linked to the life sciences. Besides its primary thematic adherence to Mary Shelley’s *Frankenstein* (1818), which ineluctably reverberates in the history of the biology-oriented strain of science fiction, Slonczewski’s novel is arguably redolent of such works as Olaf Stapledon’s *Odd John* (1935), Poul Anderson’s *Brain Wave* (1954), Vernon Vinge’s *A Deepness in the Sky* (1999) or Michael Crichton’s much celebrated *The Andromeda Strain* (1969). Influenced by those pieces, Slonczewski drew some ideas from her predecessors. For example, there exists a close analogy between Slonczewski’s brain-enhanced human hosts and Anderson’s or Vinge’s depictions of “normal people” being upgraded to, respectively, super geniuses or “highly talented

¹ Because *Brain Plague* has not received the critical attention it merits, it constitutes an intriguing, uncharted territory of study.

² Needless to say, in her work Slonczewski makes extensive use of personification, comparing microbes to sentient persons.

³ According to Slonczewski and Levy (2003: 175), “over the past century science fiction related to biology” has yielded a number of recurrent motifs. Besides the theme of intelligence and the brain, it takes as its main subjects “mutation and evolution, genetic engineering, sexuality and reproduction, and environment and biosphere.”

workers who think only of the job at hand” (Slonczewski, Levy 2003: 177). Likewise, in its use of a near-apocalyptic mode, *Brain Plague* echoes *The Andromeda Strain*. Still, while in Crichton’s text it is the omniscient narrator and human characters solely who relate how an extraterrestrial microbe almost exterminates humanity, Slonczewski goes a step further by offering the reader a possibility to view the plague from its arcane source – from the perspective of microbes¹.

Abundant in scientifically validated assumptions, most of the works outlined above mark, as Slonczewski and Levy (2003: 174) posit, a paradigm shift from physics to “biology as the ‘hard science’ frontier of the future.” Indeed, notwithstanding its numerous forays into the areas of sociology, sexuality and religion, *Brain Plague*’s consanguinity with hard science fiction² is clear, especially in light of Williams S. Bainbridge’s and Murray Danziel’s (1978: 167) definition of the genre, according to which hard science fiction encompasses “stories built around certain facts or speculations” and utilizes extrapolation as its predominant mode. Supposedly, Slonczewski’s doctorate in molecular biophysics and biochemistry obtained from Yale University could further attest to the scientific credibility of all her fictional works. Moreover, when inquired about her sources of inspiration, Slonczewski has pointed to her “experience in an actual scientific laboratory” as well as readings of “research journals such as *Science and Nature*” (Slonczewski 1993), which corroborates David N. Samuelson’s (1993: 196) view that “hard SF writers echo the work of scientists, engineers, and fiction writers in general.” This analogy indicates, among other things, that the process of writing hard science fiction entails a “thorough, not selective . . . scientific development in stories” (Westfahl 1993: 166). Thus, any hard SF work like *Brain Plague* has to rely on expository prose. Much as it implies didacticism, this kind of narrative technique should not be mistakenly reduced to lecturing the reader. Rather, as John J. Pierce (1993: 181) argues, it should foster “cognitive engagement,”³ “the aesthetic effect” hard science fiction elicits in the reader.

¹ Noteworthy, in *Brain Plague* the accounts from the world inside the brain are printed in italics.

² The subject of hard science fiction would necessitate a separate study. For an in-depth discussion of the genre, see David Hartwell’s *The Ascent of Wonder* (1994). Hartwell enumerates a number of characteristics that denote hard science fiction: (1) “the beauty of truth”; (2) “feels authentic to the experienced reader”; (3) “relies, at some point of the story, on expository prose rather than literary prose”; (4) “relies on scientific knowledge external to the story”; (5) “achieve its characteristic effect essentially through informing, by being, in fact, didactic” (1994: 30-4).

³ One may ask how Pierce’s *cognitive engagement* differs from Suvin’s *cognitive estrangement*. First and foremost, the former notion applies only to the hard branch of science fiction. According to Pierce (1993: 181), in hard science fiction “we do not feel estranged from that reality; instead, we feel caught up and even entranced by it.”

2. *Brain Plague* as double parable

As a work of hard science fiction, *Brain Plague* carries out two main functions: it may serve as an educational tool and as a social critique. Admittedly, it accomplishes this twofold purpose by re-figuring the reader's "perception and habits of interpretation" (Stockwell 2000: 203) through the introduction of a brand new cognitive model in the body of narrative. Within the cognitive poetics framework (Tsur 1992; Stockwell 2002), which forms the methodological basis for this paper, Slonczewski's novel would be thus seen as parable, "a fundamental, continuous, cognitive instrument of thought" (Burke 2003: 115) that "encourages a mapping of the whole universe with the reader's reality" (Stockwell 2000: 204). As already hinted, *Brain Plague*, with its two-dimensional narrative structure based on perceptual shifts between the text worlds outside and inside Chrys's brain, in fact transpires to expose a double parabolic projection. Hence, it may be convincingly hypothesized that the interpretative task of Slonczewski's double parable involves three stages. First, readers conceptually map their reality onto the complex universe created in *Brain Plague* in order to appraise what the actual world and the encountered text-world have in common. As soon as they have determined to what extent the Fold departs from their own world, the second stage ensues: a cross-mapping between the outer space inhabited by different representatives of humanity and the inner space, Chrys's brain populated by intelligent microbes. Only when the meanings from these two parabolic projections are blended¹ into one conceptual space, can the reader decode the educational and critical messages conveyed in *Brain Plague* to later assess their relevance to the actual world. In the discussion that follows I intend to investigate how Slonczewski's vision both broadens our knowledge of the workings of the human brain and alters our understanding of the reality as we know it.

Still, to clear the deck for proper analysis, it is essential to explain one more basic term that underlies the study – conceptual metaphor (CM). As signaled in the introductory part, Slonczewski utilizes this device to conceptually bind the microbes' inner settlement, the brain, to the exterior world. For example, the brain plague could be arranged to exhibit similarities to an imbalanced society. An innumerable quantity of works, with George Lakoff's and Mark Johnson's groundbreaking *Metaphors We Live By* (1980) at the forefront, has already made the case for perceiving CM as a mode of thought that permeates our everyday discourse,

¹ In Burke's (2003: 118) view, "a blend is a kind of meeting-point between (or more) conceptual structure."

rather than as a rhetorical, purely decorative device that results in *dead metaphors*¹. Just like a parable, CM assumes an interaction of at least two domains of knowledge. In the words of Stockwell (2000: 203), a metaphor can be seen “as a mapping of the familiar source domain [grounded in our experience] onto the unfamiliar [abstract] target domain.” Clearly, this rule hardly applies to most of science fiction works. Rooted in cognitive estrangement, science fictional metaphors transgress the boundaries of the prototypical paradigm by conceptually placing their source domains on a par with their target domains. As Peter Stockwell (2000: 203) astutely notes, in science fiction “the domain presented as if it is familiar is in fact as alien as the target it is supposed to structure and clarify.” In effect, works such as *Brain Plague* have the capacity for producing “explanatory metaphors” (Stockwell 2000: 203) that oscillate between the scientific and the literary and, in doing so, conflate an expressive mode with the scientific one.

3. Deconstruction of religion

No matter how vigorously Slonczewski attempts to involve us into her idea to typecast human beings in the role of gods and, by extension, to render microbes as people, she fails to do so. *Brain Plague* accommodates a negotiation space in which the artificially demarcated harmony between intelligent microorganisms and their hosts surfaces hints of discord. Needless to say, throughout the novel it is especially the label of divinity attached to human beings that is put under question. Clearly, as Farah Mendlesohn (2003: 270) points out, in its emblematic switches of roles, *Brain Plague* embodies “a challenge to the ethics of God’s authority.”

As the novel uncovers, it becomes clear that the HUMAN BEINGS ARE GODS conceptual metaphor rests on shaky foundations. Even though none of the human beings wrestling with a civilization of million extremely absorbing microbes overtly rejects their designation as gods, they all consider themselves primarily as hosts. On the level of an individual, a comparable stance is adopted by Chrys. No sooner does she become host to the Eleutherians, a colony of creative architexts, than she realizes that playing the thankless role of god imposes more duties than prerogatives. Regardless of her current mood, Chrys cannot fail to “connect with [her] growing population” (*BP* 59). She is obliged to maintain excellent health, because any symptoms of low spirit, depression or disease would automatically cause panic

¹ Traditionally, it has been believed that metaphors lose their metaphorical force by virtue of their later conventionalization in the everyday lexicon

within the microbes' realm inextricably linked to the body of their carrier. Enslaved by the "most fundamental principle of mercy" (*BP* 228) that her micros invoke when faced with a punishment, Chrys naturally relinquishes one of few godly privileges granted to her—to "offer life or death" (*BP* 21). This helplessness on the part of gods, intertwined with growing skepticism about the scope of their authority, manifests itself even more conspicuously in two key scenes: when Chrys becomes conscious of her absolute dependence on the Eleutherians and when she inaptly succumbs to biblical rhetoric by dictating her makeshift ten commandments to the microbes.

Approached from the perspective of the outside, the concurrently delineated assertion that MICROBES ARE PEOPLE occurs to convey more veracity, albeit human beings frequently challenge this new order. At first, the role of microbes is reduced to their useful function. Even Chrys, later dubbed by her colony "the God of Mercy" (*BP* 21), initially regards her inhabitants merely as "cultured cells" "full of arsenic," implanted to "boost brainpower" and "protect from the plague" (*BP* 7, 13) infecting humanity. "Evolved within human carrier" (*BP* 14) and filled with a human-like longing for rewards by way of Azetidine (an equivalent of dopamine), microbes seem to entirely rely on their carriers. Only deceptively so. With time, Chrys's inhabitants become possessed by one pervasive desire that poses a threat of addiction to their host: to "invade the central brain tissue" (*BP* 29) responsible for stimulating the carrier's feeling of pleasure. That the Eleutherians naturally exude a confidence of free spirit libertines only further undermines Chrys's authority. So volatile and corrupt a landscape bears a close resemblance to the outer space of humans, insofar as to incite Daener, the most die-hard supporter of "promoting micro rights" (*BP* 130) in the novel, into implicitly putting forward the idea that MICROS ARE HUMAN BEINGS. Microbes, or people, mirror their carriers, or gods, and Daener proves it by mapping both communities onto each other. He arrives at two valid conclusions: besides depending on their hosts in the same way that humans cannot exist "without our planet, our atmosphere," microbes resemble their gods in their unquenchable thirst for discovering and terraforming a new habitable world (*BP* 98).

It comes as no wonder that Daener's endeavours to promote intelligent micro-organisms as people meets with enthusiasm on the part of micros. Not only do they think of themselves as an advanced civilization made up of heterogeneous communities, such as architects, accountants or social workers, but they even view their worlds inside brains as superior to that of their carriers, despite the fact that

Aster's symptomatic account of "how people mirrored their gods" (*BP* 118) may give evidence to the contrary. On the face of it, microbes' open acknowledgement of the gods' authority (e.g., hosts can choose their people and give them names) and their fanatical devotion to the hosts reminds one of a religious sect. Nonetheless, it later turns out that when seen from the inside, human gods can hardly be rendered as omniscient ("they can learn from us") or omnipotent ("what had the true gods done to prevent it?"¹). As Mendlesohn (2006) notes, in Slonczewski's novel "God is to be argued with, not obeyed blindly," which again causes readers to reassess the relevance of the HUMAN BEINGS ARE GODS conceptual metaphor underlying *Brain Plague*.

4. Reconsideration of modern society

Besides inviting the reader to reconsider the issue of religious belief, *Brain Plague* in the first place provides a thorough critique of contemporary society. Abundant in political allusions, it seeks to tackle the problems of ethnicity and sexuality that currently agitate the modern world. Significantly, as a double parabolic projection, *Brain Plague* offers two complementary perspectives on those issues: we may look at our society both by extrapolating it and by projecting brain functions onto selected facets of reality.

Heterogeneous and fluid, but at the same time stratified and hierarchical, the Fold, an extrapolated version of the actual Western world, is not a typical democracy. Slonczewski metaphorically alludes to this peculiar dichotomy through the description of the Comb, a magnificent sky-scraper epitomizing the conceptual organization WEALTH IS UP and POVERTY IS DOWN: "the legendary windows soared beautifully up the honeycombed chamber. But in the bottom row, nearest the ground each window was cracked" (*BP* 71). Looking from the top down, the top echelons of society are occupied by sentients, "virtual humans" (*BP* 199), and Elysians, wealthy, infrared elf-like people displaying sophisticated tastes. Free of "crime or disorder of any kind" (*BP* 110), both communities have virtually achieved technological and social utopias and have decidedly outsmarted the other ethnic groups. Whereas Elysians and sentients form an elite of aristocrats; the broad middle class segment is on the one hand made up of Valan humans, whom the reader of *Brain Plague* would most likely identify as prototypical Earth people, and on the other, Sapiens and simians, representing, respectively, blue collar workers and immigrants. Finally,

¹ *BP* 31, 222.

going deep under the surface of the Fold leads to “a place of no return” (BP 215)—the Slave World. It is populated by “wasted away” humans, with “their limbs like sticks and flies over their eyes and mouths” (BP 232), who have fallen victim to the title brain plague, a state caused by microbial masters flooding the neuron of the pleasure center with dopamine. Abandoned and alienated from the rest of society, the lowest caste in Slonczewski’s universe metaphorically serves as a reminder that, regardless of the social status, “the brain endangers all law-abiding citizens” (BP 242) who choose to indulge in untamed hedonism. Inevitably, such a multicultural landscape arouses mutual prejudices, like that of Sapiens against simians, with the former shouting chauvinistic slogans about the “pollution of the blood” (BP 76) and scapegoating simians as gorilla descendants¹. This indicates that in her novel Slonczewski attempts to “deal with racial issues” (Leonard 2003: 254), albeit in doing so, she refrains, unlike most science fiction authors, from proposing colour-blindness as a solution to eradicate racism. Nevertheless, the reader may notice that at this point, on the level of the first parabolic projection, she hedges any definitive statements on the issue of ethnicity and multiculturalism. By contrast, the exploration of the outer narrative dimension reveals that, as an outspoken feminist, Slonczewski adopts a clear perspective on the problem of sexuality, reiterating throughout the novel that heteronormativity is “a medieval obsession”² (BP 44).

Determined to prevent the collapse of their respective civilizations, both human beings and microbes become united by one prevalent thought: to protect the brain. As hinted above, the inhabitants of the outer space implicitly voice this concern by means of the BRAIN PLAGUE IS AN IMBALANCED SOCIETY metaphor which refers to a moral decline of their society. In the case of the inner world of microbes, whose existence entirely depends on the lifestyle (“have mercy on yourself. Your dopamine and serotonin have fallen drastically”) and culinary habits (“your blood sugar is low (...) you need to eat more regularly”³) of the carrier, Slonczewski introduces a modified, biological version of the above concept—THE UNDERNOURISHED BRAIN IS AN IMBALANCED SOCIETY. Within the realm of Eleutheria, “filaments bent and chemically deformed from lack of vitamins” and “skin puckered in with dehydration” (BP 89, 114) signify poverty or malformation. Like in the Fold, the

¹ Typecast in the novel in the role of anti-immigrant faction, Sapiens also insist that “SIMS GO BACK TO JUNGLE – HOMO IS FOR SAPIENS” (BP 8).

² In addition, *Brain Plague* could also be inscribed into the literature dealing with the theme of transhumanism. So advanced a civilization as the Fold enables those who can afford it to “specify exact age, color and . . . a change of gender” (BP 41).

³ BP 194, 248.

poor ones among microbes face social exclusion. Under the pretext of refining eugenics, the elders implement a policy to forbid those “incapable of work, (...) jostling aimlessly among the red cells, begging for vitamins” (*BP* 178) from breeding. Comparing malnourished cells to social outcasts, this brain society analogy in the first place aims to present the brain as a self-regulatory system exposed to natural selection. Simultaneously, through the second parabolic projection an opportunity arises for the reader of *Brain Plague* to detect, through explanatory metaphors, conceptual correspondences between A SOCIETY AND THE BRAIN.

As opposed to the complex social structure of the Fold, the community of microbes has established a clear-cut two-class hierarchy, with priests and elders at the top regulating the life of the majority. As illustrated by the example of Eleutheria, each of the two groups performs different functions: while most of the ordinary inhabitants have to reproduce – to “keep merging and dividing” – the “depressed and philosophical” elders rule over their constantly breeding citizens by “patrolling (...) veins,” “regulating the mining of vitamins from the blood,” purging blood from “the viruses and parasites” and even “establishing a system of social welfare” (*BP* 32, 36, 46, 113, 136). On the other hand, this official, prototypically patriarchal segmentation, into the superior and the inferior, conflicts with the Eleutherians’ image of an androgynous society. Bearing a close resemblance to Plato’s utopian project, the microbial society could be regarded as an oligarchy. Still, however anachronistic, Eleutheria’s social order showcases a relatively stabilized microcosm that eventually proves more effective than the democratic rule established in the Fold, which is mainly due to the microbes’ curious and receptive nature.

Constantly on the trail of new impressions, the Eleutherians travel, explore and communicate. Each of these activities is rendered in *Brain Plague* as, accordingly, the DEVELOPING IS TRANSFERRING, KNOWING IS TASTING and EXPRESSING IS EMITTING metaphors. First of all, as opposed to the hermetic ethnic groups within the bounds of the Fold, Chrys’s microbes consider paying visits to other brain colonies and intermingling with foreign microbial civilizations as the key to enhancing Eleutheria. As one of Chrys’s most devoted microbes observes, “the Eleutherians who returned from the Diaspora were a different people than before” (*BP* 305). By recruiting new immigrants and by renewing ties with strict blue angels, smart wizards or mathematically talented minions, the architects from Eleutheria not only prove capable of “refining their models of the growth of the Comb” (*BP* 89) but they also gain a fresh perspective to re-assess the existing social order in their

community. Enchanted by the egalitarianism of the Slave World and determined to combat widespread poverty in her land, Rose, the most rebellious of Chrys's microbes, calls for perceiving "all sisters (...) as one cell" (BP 117). Understandably, this violent urge for communist society meets with a chorus of protests on the part of other leading Eleutherians, who strongly disapprove of an authoritarian rule. In sum, TRANSFERRING and INTERMINGLING, as seen from the perspective of the "inside" world, rejuvenates and enriches society, which, in turn, leads to the conclusion that Slonczewski, for all her earlier lack of judgment on the topic of ethnicity, espouses multicultural policies as an index of thriving communities. If Slonczewski employs the DEVELOPING IS TRANSFERRING metaphor to make a political statement, then by utilizing the EXPRESSING IS EMITTING and KNOWING IS TASTING metaphors, she intends to map microbes' basic bodily functions onto human beings' elementary acts and, in doing so, to equate us with biological organisms. Firstly, micros' emission of both molecules of disdain, respect and excitement or "placating pheromones of the highest quality" (BP 263) aims to show us that "our emotions are regulated by chemicals" (Schellenberg 2000). Secondly, their ability to explore and understand their surroundings through tasting—"tasting the New World (...) tasting intricate molecules of the great Cisterna Magna (...) tasting telltale molecules" (BP 26, 32, 164) in the blood responsible for memory—give tangible evidence of the genetically ingrained human habit of discovering the world through senses.

5. Reconceptualization of basic abstract concepts

Exhibiting analogies between the brain world and the extrapolated version of our actual world, *Brain Plague* at the same time alters our comprehension of such abstract notions as happiness, pain, love and death. Explored mainly from the "inside" and less so from the "outside," in Slonczewski's novel these categories may be understood in terms of two conceptual domains—the biological and the popular—that complement each other to offer the reader a more integrated view of the world they inhabit.

The interplay between the scientific and popular discourses is initiated when Andra, one of the carriers, reflects on the essence of human life. Her bold conviction that "humans didn't evolve to feel good. We evolved to survive and reproduce" (BP 154) agrees with micros' more biological explanation. According to their account, happiness is "a simple thing – it all ends up with dopamine," as opposed to pain, an

emotion “much more complicated than joy (...) travelling through many different circuits and having many causes” (BP 55-6). Likewise, Chrys’s understanding of love as “cruel, cruel on the mountain, cruel in the city” (BP 119) can be mapped onto microbes’ empirically grounded explication of the concept: “the two priests tasted their records of hormone levels in the god’s circulation (...) there was always a rise in adrenaline (...) love is more than adrenaline and dopamine. There’s phenylethylamine and oxytocin” (BP 249). But even for the biologically-oriented Eleutherians, divine love, or more specifically, the love between Chrys and Deaner, bears far more reaching consequences. “Richer arachnoid (...) pulsing with phenylethylamine” (BP 288) foreshadows a Golden Age in Eleutheria. Deprived of such prosperity for many microbial centuries, Chrys’s people stubbornly persist in convincing their god of benefits that would accrue from “touching the Center” (BP 89), that is, artificially flooding neurons with dopamine. Aware of the fact that succumbing to that temptation could lead to addiction and, eventually, the brain plague, or mental death, Chrys consistently turns down the offer. As similar negotiating spaces between the Eleutherians and their host multiply, it becomes clear how symbiotic an organism they all form. Chrys learns later that, although “the brain heals, carriers who lose their people die”¹ (BP 267). Hence, it may be assumed that one of Slonczewski’s premises behind *Brain Plague* is to present the human body as a system regulated both from the outside (by humans) and inside (by different kinds of cells).

6. World reconstruction

So far it has been demonstrated how in *Brain Plague* Slonczewski maps the outer and inner spaces onto each other and blurs the boundaries between biology and society to (1) make a travesty of fanatical belief in God; (2) critique the existing social order of the actual world; and (3) strip the concepts of love, death, happiness and pain of their traditional, metaphorical underpinnings by reducing them to biological phenomena. Now, it seems that in terms of their world-building elements and spatial representations, both worlds—the Fold and Eleutheria—bear comparatively little, if any similarity. Hence, in lieu of one symbiotic space, Slonczewski maps out two separate universes. Whereas the projected world of Fold

¹ Whereas a carrier’s dying process is metaphorically portrayed as a hopeless and intense longing for the lost microbes, the last days of a microbe’s life are illustrated in biological terms: “her own proteins were breaking down,” “losing arsenic atom by atom” or “barely able to flash a word” (BP 75, 88, 103).

is an extrapolation of what the reader's actual world may look like in the future; the inner world of microbes exemplifies the way THE BRAIN may be imagined as A CITY. In sum, the reader must grapple with two cognitively unfamiliar models that can hardly be projected onto one another.

Life in the Fold centers around nanotechnology. Most of its inhabitants wear nanotex, "an intelligent clothing material" featuring an automatic body-cleaning option, live in "sentient buildings" grown out of nanoplast and drive "bubble cars that glide over the intelligent pavement" (BP 2, 5). Those on the edge of destitution, on the other hand, populate the Underworld, a place infested with "cancerplast, a piece of building root that had gone wrong" and filled with "the scent of sewage and shorted-out plast" (BP 8). Radioactively contaminated, terraformed and devoid of birds, the barren land of Fold rekindles bad memories of "the Brother Wars" (BP 231) that erupted in the past. Evidently, Slonczewski's extrapolated universe matches the stereotypical image of science fictional landscape. Still, even if her vision of the outer space borders on cliché, she also incorporates some innovative ideas, like that of sentient apartments which/who could "spit out things and take a new tenant" or "windows" (BP 3) flashing before one's eyes. All the same, when measured against Marie-Laure Ryan's *Principal of Minimal Departure* (1991), a framework determining in terms of such categories as time, language, objects and nature to what extent a given text elicits cognitive estrangement, *Brain Plague* testifies to barely hinder one's assimilation of the world-building dimension encountered in the outer space.

Undoubtedly, it is the world projected inside the brain that poses a considerable challenge to the reader's cognitive models. Unimaginable as it sounds at first, prior to becoming host to the Eleutherians, Chrys learns, to her bafflement, that she will carry a civilization of million microbes scattered "beneath her skull, in the arachnoid, a web of tissue between the outer linings of the brain" (BP 17). From the microbial perspective, we are transported into Eleutheria, a "cerebrospinal fluid" space located within "the arachnoid layer, just outside the cortex" and concentrated around "an arachnoid [capital] cityscape" called "the Cisterna Magna" (BP 23, 32, 89). Notwithstanding its unfamiliar setting, the internal arrangement of THE CITY in THE BRAIN resembles the human world: the Eleutherians build houses, schools and governmental buildings. However, the lay-out of the microbial city is by no means accidental. Indisputably, frequent references to four central spaces in particular indicate that the spatial organization in Eleutheria is attuned to the fulfillment of the two aforementioned main functions—the regulatory and reproductive ones. On the

one hand, numerous “chambers for breeding” and “nightclubs flashed with light-producing enzymes” (BP 26, 36) foster the development of the brain. Within THE BRAIN conceptualized as A CITY and SOCIETY, this growth may be sustained on the condition that there has been instituted control¹. Hence, for the sake of stimulating and protecting the production of new cells, the Eleutherians “tap the capillaries for harvesting vitamins and minerals” (farms) and put asocial rebels behind dendrimers, “the remotest cistern of the arachnoid”² (prisons). These direct analogies to the human world foster the reader’s understanding of the brain as a place adapted to facilitate the maintenance of internal homeostasis. It may be then concluded that the function of the BRAIN IS A CITY metaphor in *Brain Plague* does not go beyond the educational sphere³.

Conclusion

Brain Plague uncovers a sequence of conceptual cross-mappings. Firstly, as a work of hard science fiction, it seeks to integrate scientific and popular discourses into a reader-friendly narrative embedded in expository prose. Simultaneously, it attempts to blur the boundaries between biology and society. Admittedly, the latter observation coincides with the basic premise that underlies *Brain Plague*: to perform educational and critical functions. As the analysis has shown, it does so by means of a double parabolic projection. Offering two concurrent, yet interlinked perspectives, Slonczewski’s work mediates between three cognitive models (the reader’s actual world, its extrapolated version and the world inside the brain) and employs two main literary devices (cognitive estrangement and conceptual metaphor). Although focalizing the story through double vision may hinder the process of reading, in view of the above considerations, it still appears that if readers approach *Brain Plague* from the “inside” and the “outside,” they are given a broader overview of Slonczewski’s vision. By mapping the extrapolated world of human beings and the brain world onto one another, Slonczewski both educates us about the workings of the human brain and provides a critique of the world as we know it. Firstly, utilizing such conceptual metaphors as THE BRAIN IS A CITY or THE UNDERNOURISHED BRAIN

¹ Clearly, this example shows that Eleutheria fulfills at least one of Foucault’s four rules of exercising power through discipline: “the spatial distribution of individuals” (Latham 2004: 136).

² BP 26, 235.

³ Remarkably, in this *Brain Plague* echoes *Il était une fois . . . la vie*, an immensely popular French cartoon comparing the human body to a cellular metropolis.

IS AN IMBALANCED SOCIETY, she presents the brain as a self-regulatory system constantly striving to maintain internal homeostasis. Secondly, interpreting her vision of the future humanity through the prism of the world of microbes, Slonczewski hints at three main issues: (1) the fact that she parodizes human beings and microbes as, respectively, gods and devoted believers points to “a challenge to the ethics of God’s authority” (Mendlesohn 2003: 270); (2) the feudal, but receptive and fairly stable microcosm of microbes far outweighs the democratic, liquid, hedonistic, stratified, heterogeneous and ravaged by the brain plague world of human beings; and (3) when stripped of their metaphorical labels and reduced to biological phenomena, concepts such as love, death or pain signify that “our emotions are regulated by chemicals” (Schellenberg 2000).

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