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CURR 599: Directed Study Dr. Morgan

From Unwoven Rainbows to the Omnipresent Amygdala:

Theories about the Relationship between Literature and Science

Due to popularized black-and-white perspectives – like left-brained and right-brained individuals due to hemispheric lateralization and its supposed clear-cut division of labor – and conventions – like the designation of separate time blocks for the Age of Enlightenment (1650-1784/1804) and the Romantic Era (1800-1850) in history textbooks, and the segregation of college graduates into morning and afternoon ceremonies based on the whether they are majors in the arts or the sciences – we have been taught to disassociate emotion from rational thought and the heart from the brain, thereby polarizing the fields of literature and science. But even with C. P. Snow’s 1959 “two cultures” classification still haunting the relationship of the two disciplines, a combination of historical figures, classical authors, researchers, educators, and even comedians illuminate how coexistence between science and literature is both timeless and up-and-coming. Therefore, despite a “mortal enemy” reputation (Sundaralingam, 2011b), ancient and contemporary overlaps between the two fields indicate not only common ground, but “fertile ground” (Sundaralingam, 2011a), which, in turn, gives way to the reality that “our reality exists in plural” (Lehrer, 2007, p. xiii).

**Nonexistent, but Prevailing, Black and White Divisions**

Upon closer examination, coexistence between the two disciplines appears in the aforementioned black-and-white perspectives and conventions that contribute to society’s automatic inclination to think of science and the arts as mutually exclusive options. The underlying coexistence challenges the notion that there are two kinds of people in this word – “artist” or “scientist” – and points to man’s composite identity: we are all emotional and rational beings, even if we are not homogeneously so. Even authors Mitch Albom and Maya Angelou discussed, in an interview, the sad absurdity of confining people to one talent and society’s “[insistence] that if you are in X category, you can’t appreciate people in Y category” (2008-2014, 0:44-0:52).

For example, in terms of cerebral lateralization, every task activates both hemispheres to some extent, with the exception of language tasks, which do seem to be generated predominantly from the left side of the brain according to brain imaging research (Balajthy & Lipa-Wade, 2003, p. 5). And even that exception does not mean that the right hemisphere is entirely nonverbal. Both hemispheres can figure out the meaning of words and sentences (Lombrozo, 2013). This lack of complete hemispheric specialization results from the corpus callosum, an oversized, dense fiber tract that connects the hemispheres. It does pale, however, in comparison to the richness of the neutral connections within each hemisphere. Therefore, as cognitive neuroscientist Dr. Kara D. Federmeier explained, while the two brain hemispheres may not function in a “fully unified fashion,” they also only ever operate “semi-independently” (Lombrozo, 2013).

Not only presenting Federmeir’s understanding in 1819, but in a Romantic poem, John Keats opens “Ode to Psyche” with a scene that casts Psyche (the Greek goddess of the mind) and Cupid (the Greek god of love) in an in-between state not of complete separation but also not one of full unification: The narrator “saw two fair creatures, couched side by side” with “their arms embraced, and their pinions too” but “their lips touch’d not” (Keats, ll 9, 16, 17, p. 223). Although it is unlikely that Keats deliberately concocted the scene from knowledge of the emotional right hemisphere’s relationship with the rational left hemisphere– especially since the seminal work on the subject dates back to only 1985 with Michael S. Gazzaniga’s book, *The Social Brain: Discovering the Networks of the Mind* – it is perhaps another instance of an artist’s “imagination [foretelling] the facts of the future” (Lehrer, 2007, p. ix), allowing Keats to join the ranks of Gertrude Stein, Walt Whitman, Virginia Woolf and five other artists who anticipated neuroscience discoveries (Lehrer, 2007), as well as Erasmus Darwin, whose poem – “The Temple of Nature” – “fore-shadowed” evolutionary science and H. G. Wells who described an atomic bomb thirty years prior to the Manhattan Project (Clarke, 1987, p. 718, 716).

Even if the divine embrace touched upon scientific accuracy coincidentally, Keats does purposefully embed science elsewhere. Further into the poem, “Ode to Psyche” alludes to synaptic plasticity and the strengthening of new neutral networks: “In some untrodden region of my mind, / Where branched thoughts, new growth with pleasant pain” (Keats, 1819, ll 50-51, p. 224). Therefore, “Ode to Psyche” capitalizes on scientific concepts and imagery to enhance poetic expression, even though it is officially classified as Romantic poetry, a supposedly clear-cut revolt against the Age of Enlightenment’s scientific thought. And not only does his poetry synthesize the two disciplines, but, as a Romantic poet who trained in medicine for six years (Sundaralingagm, 2011b), Keats himself was a living, breathing embodiment of the synthesis. Furthermore, the Romantic era – not the Age of Reason – gave birth to the novella often hailed as the pioneer work of science fiction: Mary Shelley’s 1818 *Frankenstein* (Clarke, 1987, p. 725; Seabury, 2001, p. 131). Shelly melded art and science through Victor Frankenstein. Frankenstein is both a Romantic hero who seeks emotional solace in nature and a mad scientist who dabbles in advanced science and technology to create life. Even with just these two examples, science’s presence in the products of the Romantic era, from imagery to characterization, reveal that the time period was not the clean break from the Age of Reason it is often made out to be. The absorption – rather than the expected exorcism – reveals how its opposition was actually working: not as opposition at all.

In a 2013 Commencement Address at the University of Western Australia during an integrated ceremony, comedian Tim Minchin supported what Albom, Angelou, Keats, Victor Frankenstein, and the corpus callosum hint at: we cannot label anyone one hundred percent accurately with just an “artist” or “scientist” label. Minchin explained:

“…p**lease don’t make the mistake of thinking the arts and sciences are at odds with one another. That is a recent, stupid, and damaging idea.** You don’t have to be unscientific to make beautiful art, to write beautiful things. If you need proof: Twain, Adams, Vonnegut, McEwen, Sagan, Shakespeare, Dickens. For a start. You don’t need to be superstitious to be a poet. You don’t need to hate GM technology to care about the beauty of the planet. **You don’t have to claim a soul to promote compassion**” (Universitywa, 2013).

In Minchin’s view, not only doesn’t a scientific interest need to be sacrificed to pursue art or even to make great art, but stereotypical artistic beliefs and traits do not need to be internalized. Minchin ends by arguing that the “arts and sciences need to work together to improve how knowledge is communicated” (Universitywa, 2013), but it is a contemporary goal too reminiscent of what C. P. Snow urged in 1959. Therefore, Minchin’s similar vision for the sciences and arts presents the possibility that we have made only minimal progress away from the 1959 problem Snow identified: “two cultures” who had “almost ceased to communicate at all,” so “we [were] making do in our half-educated fashion, struggling to hear messages, obviously of great importance, as though listening to a foreign language in which one only knows a few words” (Snow, 1959, p. 2, 4, 98-99). Therefore, the causes of this continuing polarization, despite verbalized acknowledgement of the need for convergence and successful classical collaborations, seem to be of utmost importance.

**Causes of the Chasm: Finger-Pointing with No Mutual Responsibility and Superficial Stereotypes**

The cause of literature and science’s separation is multifaceted, but most emerge from surmountable – even if they are stubborn – origins, like ego, learned helplessness, and narrow-mindedness. While Snow (2001) charged artists with the weight of the communication failure, Erren & Falaturi (2009) zoomed in on a particular reason why scientists may express reluctance to cross-curricular projects. Debates around whether the parts are greater than the whole, overshadowing superficial attempts at fusion, and the allocation of rigid adjectives to each discipline that are perceived to be incompatible with – and nonexistent within – the other discipline also promote hesitancy to bridge art and science.

**Communication Barriers in the Arts: Literary “Vanity”**

Coming down harder on artists than scientists, Snow’s (1959) heavy-handed attack on the humanities for the separation between disciplines should be seen in light of the lecturer’s occupation: a scientist. Nevertheless, Snow (1959) hypothesizes how artists are at fault. Snow (1959) charges writers with overt denial of “natural order” and the value of its exploration because they choose to believe that “traditional culture is the whole of culture” (p. 14). While it’s probably an exaggerated accusation, big literary names – like John Keats (1820) who denied the value of scientific investigation by labeling it as “unweaving” mystery in “Lamia”(l 237) and Edgar Allan Poe (1829) who followed suit in his sonnet, “To Science,” by describing how scientists negatively “alterest all things with thy peering eyes” (l 2) – show that scientific exploration has been questioned by the artistic mind. While only stating that scientists are discouraged by the mere thought of reading Dickens (p. 12), Snow (1959) criticizes artists further. He charges them with the hypocrisy of not knowing the scientific equivalent of Shakespeare (Second Law of Thermodynamics) and even worse, not knowing the scientific equivalent of reading (mass or acceleration) even though they judge scientists for not having read a major literary work (p. 14).

**Communication Barriers in the Sciences: Fear of Being a “Popularizer”**

Even though Snow (1959) assumed a softer stance toward scientists’ culpability in comparison to the blame he placed on literary minds, Erren & Falaturi (2009) suggest that Snow’s (1959) vision of interdisciplinary communication may be hindered by how jargon-filled communication within the discipline is the means by which everything desirable to scientists – like professional advancement and reputation-building – is accessible. Therefore, personal gain is prioritized over public service. Scientists learn via “intellectual osmosis rather than through textbooks or lectures” (Erren & Falaturi, 2009, p. 487). With scientists, therefore, not even having to pick up a pen to inform their colleagues – those who control their professional fates – writing for those who don’t (the literary minds) isn’t a pressing concern. However, something more blameworthy and inexcusable keeps scientists away from public interaction. A scientist who does reach out to the public is known as a “popularizer,” a derogatory term among scientists. The negative connotations of the label result from the prestige in being obscure and hard in understand among scientists, and a “popularizer,” by definition, is “somebody who explains what the issues are in ways people can understand” (p. 489). Creating self-sufficiency within the field is one thing, but creating self-imprisonment – for scientist’s today and to come by upholding a pejorative term – is another.

**The Drops of Ink in Cross-Curricular Studies: Superficial Literary Collaborations with Oversimplified or Demonized Science Content**

Not only are communication efforts hindered by predetermined failure and reputation fears, but superficial collaborations overshadow the potential for high-quality syntheses, acting as the discouraging drops of ink in the “ocean” that Snow claimed separated literary and scientific minds (2001, p. 2). Common offenses of superficial collaborations involve the misconstruing, oversimplification, or straightforward regurgitation of “the most accepted findings” with “humdrum platitudes” (Sundaralingam, 2011b). They do not tackle cutting-edge scientific advances in new ways. Snow (1959) also mentioned this offense, describing poetry that forcefully inserted scientific buzz words like “refraction” or “polarized light” instead of integrating the science “as naturally as the rest” (p. 16). The goal of such literature is usually money or attention, rather than beauty (Sundaralingam, 2011b). Through Josiah Haworth, Joon Shik Song, and Joon Soo Song’s animated short film, “Brain Divided,” and Nick Seluk’s reoccurring webcomic characters, Heart and Brain, in “The Awkward Yeti,” the two disciplines have come together to communicate brain hemispheric research as Snow (1959) and Minchin (2013) advocated. However, the way in which the animated short and webcomic do so differently acts as an ideal case study to showcase how the warnings of Sundaralingam (2011b) complicate Snow (1959) and Minchin’s (2013) plea.

Josiah Haworth, Joon Shik Song, and Joon Soo Song’s animated short film, “Brain Divided,” revolves around personified brain hemispheres – at first at odds with one another – who join forces to woo a blind date successfully (The Cybros, 2013). Initially, the short alternates between John the overly reserved and blunt nerd – who breaks down the food order’s nutritional content and admits the gaseous effects of cheese on his digestive system – and John the overly romantic charmer – who cuts up Scarlet’s dinner with fancy knifework, plays the flute, and dances on top of the table – as his logical left-brain and his emotional right-brain (personified through characters that resemble red and blue water droplets, respectively) fight over the controls in his cerebrum. The short, therefore, only portrays a realistic human demeanor when the two hemispheres agree to work together after Scarlet, the understandably repelled date, leaves. Therefore, the animated video culminates to the most current brain research, but first acknowledges the misconceptions by portraying the unrealism of being dominated by one side of the brain.

In contrast, Nick Seluk’s webcomic series, “The Awkward Yeti,” includes two reoccurring, flat characters, Heart and Brain. Suggesting only drastic measures could mediate man’s logical and emotional sides, “Shutting it Off” presents chloroform aesthesia as Heart’s tactic to silence Brain during a debate (Seluk, 2014b). And with Heart’s claim that only Brain experiences a specific mental process in “Worrying about the Future” (Seluk, 2014c), the comic portrays complete hemispheric specialization. Overall, most of the comics just highlight bickering between Heart and Brain, thereby “excreting simplified redescriptions” of the same idea over and over again (Sundaralingam, 2011b). And by never coming together to make decisions or perform tasks, the characters perpetuate the scientific myth of a rigid, uncompromising dichotomy between the right, emotional hemisphere and the left, rational hemisphere. Even worse, with an expanding online store and a self-conscious, eager-to-please author who compares himself to *The Oatmeal*, a more popular webcomic site (Seluk, 2014a), money and attention for self-validation seem to be behind the illustrations. And those were the two primary reasons Sundaralingam (2011b) cited for the production of superficial cross-curricular forms. In Sundaralingagm’s (2011b) view, such low-quality cross-curricular projects between science and art crowd out the high-quality fusions, as the bad often does to the good, and continues the illusion of incompatibility between the domains.

According to Clarke (1987), collaborations between science and literature often manifest negatively in another way: the demonization of the scientist (p. 720). It is one thing for scientists to be vilified in their field for their actual work (i.e. American scientists’ controversial work recreating a pandemic airborne virus has been labeled as the “crazy” experiment of “grossly ambitious people” (Sample, 2014)), but scientists’ negative reputation is often unjustifiably furthered by fictional pursuits that their literary incarnations engage in within works of science fiction. Since many “authors cannot shake off the infantile morality of blaming scientists for the Bomb” (Clarke, 1987, p. 720), science’s achievements – and sometimes, by unfortunate default, science’s intentions – become destruction, not discovery, when transferred to literature. In agreement, Derjani-Bayeh & Olivera-Fuentes (2011) pointed out that scientists of either the “mad or evil persuasion” dominate science fiction more than the average engineer (p. e103).

Clarke (1987) supports the literary trend of scientific demonization with many older works of science fiction, but since “dystopian novels generally fall into the science-fiction genre” (Gander, 2012, p. 28) and “dystopian literature has recently dominated the YA science-fiction and fantasy genres” (Chipman, 2009, p. 50), science dominates the proposed causes for global apocalypses in contemporary novels. Therefore, such collaborations – if taken to the extreme in their blame of science for the cataclysmic event - don’t even possess the only positive cited for the aforementioned oversimplified collaborations. The integration of science into literature to demonize it eradicates the possibility that the collaboration “celebrates science” (Sundaralingam, 2011b).

**Pigeonholing: Fiction v. Nonfiction**

Not only is fiction considered inferior to nonfiction for knowledge obtainment, but science fiction – the most common literary genre in which science and the arts do collaborate – is often not regarded as real literature. Underestimating both fiction and science fiction’s ability to hold scientific knowledge honorably and properly contributes to the gap between the sciences and arts. Convincing scientists to venture beyond their nonfiction default of journal articles and lab reports becomes difficult when the transition is perceived as a downgrade.

Award-winning author Rebecca Goldstein admitted that, during her childhood, she was taught that “fiction was just fun” and “real knowledge” resided in nonfiction (Lightman & Goldstein, 2011). The bias followed her into college. Goldstein avoided all literature and art courses, operating on the belief that she should not “squander” her education by studying a form that yielded nothing but “drunken joy” (Lightman & Goldstein, 2011). Poet Samuel Taylor Coleridge (1812) similarly verbalized the inferior effect of fiction, citing that the immediate reward of science was “truth” and that of poetry was “pleasure” (Rowe, 2000, p. 436). In his lecture, Snow (1959) even noted a scientist’s response – which insinuated fiction’s useless content – to the idea of fiction in science: “Books? I prefer to use my books as tools” (p. 13). Therefore, Kesler (2012) discourages the term “information book” for the labeling of nonfiction because when it is presented as the opposite of fiction books (which, as an aside, is what the Common Core State Standards is currently doing with its use of “informational texts” instead of “nonfiction”), “it misleads children into believing that….we do not read fiction books for information” (p. 341). A lot of research supports the idea that fiction holds genuine information (Kesler, 2012, p. 341; Czerneda, 2006, p. 39; Stewart, 2000, p. 17). And, in addition, through Lehrer (2007) and Clarke’s (1987) aforementioned examples of short stories and poems that foreshadowed scientific advancement – and NASA’s formal acknowledgment of such by its 2003 naming of the Apollo 11 mission’s space module, *Columbia*, after Jules Vern’s *Colombiad* in his 1867 space story – fiction content has proven its relevance to science.

This detrimental perception extends into the common accusation that science fiction is not serious literature. Cartoonist Tom Gauld captures the opinion in his work for *The Guardian.* One of his cartoons shows a pack of old-fashioned gentlemen, labeled “proper literature” scoffing at a jet pack-wielding astronaut, labeled “science fiction” (Gauld, 2013). However, the opinion disregards the complexity in science fiction writing, since “science fiction in many ways is the most difficult form of writing, precisely because it demands so much more of both its writers and readers” (Stewart, 2000, p. 17). Passionate readers of the genre are well-informed and picky, necessitating extensive science research from the author and, thus, demanding a high standard for science and technology incorporation (Stewart, 2000, p. 17).

Overall, the qualitative difference between fiction and nonfiction - the reality that “reading a novel is a far different experience from reading a book on history or astrophysics” (Lightman & Goldstein, 2011) – is actually the very reason why Snow (1959) and Minchin (2013) argued that science and the arts need to come together to communicate. Since important information lies in both disciplines, but “there are some readers who would not touch fiction with a ten-foot-dictionary” and vice versa (Lightman & Goldstein, 2011), making science, for example, at the disposal of literary minds as much as literature is by putting scientific information in a more palatable form – fiction –allows more universal access to information “comparable in intelligence,” and thus comparable in necessity (Snow, 1959, p. 99, 2).

**Science’s Disassembly & Dissection: The Whole is Greater than the Parts?**

Just as literature is labeled unsuitable for science content, science is often deemed unfit for poetry. Because science boils phenomena down to numbers and predictable systems and cycles, popular belief holds that “poetic imagination is inevitably destroyed by the sterility of the cold, quantitative formal methods of science” (Sundaralingam, 2011b). The Polish poet, Czelslaw Mitosz believed that humans possess a “universal longing for liberation from what is cold as two times two is four, harsh and pitiless” and, of course, he offered his literary style as the gateway to that freedom, situating science and the arts at opposite sides of the cultural spectrum (Sundaralingam, 2011b). However, this perspective neglects the reality that just as science experiments are locked into the Scientific Method, poems are often locked into syllables, iambic pentameter, and rhyme schemes (i.e. haiku, Petrachan/Shakespearian sonnet, etc). In that respect, poetic forms may structure and limit diction even more than procedures limit science experiments, so scientific inquiry is arguably more open than such literary expression. Furthermore, Sundaralingam (2011b) brings up the oppressive role of propaganda in literature. Often due to political domination (i.e. Hitler and the Nazis, the Fascist regime in Italy, etc), the dominant culture becomes the only acceptable subject for literature. Therefore, perceptions that literature grants man independence from the rigidity of science overlooks the rigidity in literature itself, perpetuating the gap between science and the arts.

Similar to the claim that the coldness and structure of science extinguishes literary imagination, another view poses that “in attempting to explain the world around us, science robs it of its mystery” (Sundaralingam, 2011b). As the notorious creator of the assertion, poet John Keats wrote, in his 1820 poem, *Lamia*:

“Do not all charms fly
At the mere touch of cold philosophy?
There was an awful rainbow once in heaven:
We know her woof, her texture; she is given
In the dull catalogue of common things.
Philosophy will clip an Angel's wings,
Conquer all mysteries by rule and line,
Empty the haunted air, and gnomèd mine—
Unweave a rainbow, as it erewhile made
The tender-person'd Lamia melt into a shade” (ll 229-238, p. 187-188).

Although also pegging science as “cold” and rigid – “conquer…by rule and line” – just like the previous argument (ll 230, 234), Keats (1820) criticizes science for its “[unweaving],” or its custom of investigating nature and by doing so, breaking it down into its component parts in order to explain the mysterious whole that artists want preserved (ll 237). Theoretical physicist Richard Feynman’s eloquent rebuttal came in a 1982 BBC interview so revered that it has since been immortalized in various artistic mediums (Davidson, 2012; Than, 2013). In the interview, “The Pleasure of Finding Things Out,” Feynman confronts Keats’ proposed effect of scientific deconstruction through the lens of a flower, rather than *Lamia’s* rainbow. Accused of making the flower “this dull thing” through scientific “unweaving” (Feyman, 1820, 0:18-0:19; Keats, 1820, ll 228), Feynman frames his response around the artist’s acknowledgement of the flower’s beauty only by its external aesthetics. He raises awareness about the flower’s “beauty at a smaller dimension” – like its cellular processes and its pigmentation’s relationship to bees – which only “adds to the excitement, mystery, and awe of a flower” (0:48-0:49, 1:20-1:23). Due to Feynman’s point that artists’ confine beauty to an object’s consistent physical appearance, artists may subject nature’s beauty and mystery to the “anesthetic of familiarity” which, according to Dawkins (2000) in his own response to Keats, is actually what “dulls the senses and hides the wonder of existence” (p. 6). Meanwhile, as a complete reversal, science continuously expands that familiar, outward beauty, through deconstruction, to “[demonstrate] that even the most mundane structures are stuff that dreams are made on” (Sundaralingam, 2011b). Artists’ narrow equation of untouched nature with beauty and mystery overlooks the multilayered, microscopic, unfamiliar dimensions of nature that hold just as much, if not more, beauty and mystery and that can be revealed if put in – not kept away from – scientists’ hands.

**The Illusion of Snow’s “Ocean”: Compatibility between Science and Literature**

To break down the tensions as they were presented, small counterarguments followed many of the proposed reasons for incompatibility. Opposing opinions were even found in single sources, like the poetry of Keats. And he is not even the only hypocrite to be found on the topic. Russian novelist Vladimir Nabokov envisioned a “high ridge where the mountainside of scientific knowledge joins the opposite slop of artistic imagination” (Sundaralingam, 2011a), but also maintained that “there can be no science without fancy and no art without facts” (Lewis, 2001, p. 11-12). Furthermore, just like Keats, zoologist and prose writer Nabokov was also a human vessel for the integration between the arts and sciences (Sundaralingam, 2011a). Therefore, the more self-standing, well-developed arguments for compatibility between the disciplines that are not diluted by intrinsic hypocrisy, did not depend on a counter-viewpoint for their materialization, and will never depend on a counterargument for their poignancy deserve larger spotlights than afforded above.

 **Common Goals**

Despite the polarizing view that literature seeks to please while science seeks to inform (Lightman & Goldstein, 2011; Rowe, 2000, p. 436; Kesler, 2012, p. 341), the two disciplines do strive toward common goals: to discover something new and to make the familiar unfamiliar. Both authors and scientists design “honest experiments” to learn something new about either human emotions or the natural world (Lightman & Goldstein, 2011). Discouraging predetermined plots in favor of unforeseen insights scattered throughout the writing process, Lightman & Goldstein (2011) emphasize that good writers, “after putting [their] characters in a difficult situation, stand back and wait and listen, and eventually [their] characters will react in an authentic and sometimes surprising way.” They don’t write with the end in mind, and instead, learn about and adapt their characters as they go.

British children’s author, David Almond, substantiates the power in, and desirability of, such a writing style. In a BBC interview, he describes how he wrote his 1998 novel, *Skellig:*

“A big moment for me when writing the book was the moment when Michael puts his hand across Skellig’s back and I remember writing the sentence….he felt something there springy and flexible, and I thought, ‘Oh no, this guy’s got wings.’ And until I wrote that sentence, I didn’t know” (Naughtie & Almond, 2012, 6:06-6:25).

With *Skellig* being Almond’s breakout success and a winner of the Carnegie Medal, the unplanned writing process may not only be behind the story, but behind its quality just as Lightman & Goldstein (2011) suggest. Almond’s belief in the power of writer flexibility is so strong that he even goes on to communicate it through his vibrant, rebellious protagonist in *My Name is Mina* (“I was told by my teacher Mrs. Scullery that I should not write anything until I had planned what I would write. What nonsense….when I started to write, the story wouldn’t keep still, wouldn’t obey…[The words] flew off in strange and beautiful directions and took my story on a very unexpected course…” (Almond, 2012, p. 10-13)).

Similar to the artistic crime of predetermined stories, Lightman & Goldstein (2011) reveal the parallel crime in the sciences: scientists who manipulate experiments until they confirm their original hypotheses. It is common practice in the sciences to avoid, not follow, the footsteps of the abhorred “physicists who measured the wrong number for the speed of light for decades because they thought they knew what the number should be” (Lightman & Goldstein, 2011). Proving that there is a literary manifestation of such rigged experimentation, J. K. Rowling became the equivalent of those physicists when she admitted wedding Ron and Hermione only “as a form of wish fulfillment…for reasons that have very little to do with literature and far more to do with [her] clinging to the plot as [she] first imagined it” (Rowling & Watson, 2014). Therefore, scientific accuracy and story plausibility both result from each discipline’s belief in the element of surprise and openness to “finding out something new” (Lightman & Goldstein, 2011). Both scientific and literary minds pursue advancement within their discipline with particular attention to the latter notion of “teach and be taught” and receive criticism for losing sight of it.

The second common goal is defamiliarization, and it was touched upon previously in the counterargument to the claim that science robs the world and poetry of mystery. English poet Percy Bysshe Shelley (1821) wrote in her essay, “A Defence of Poetry,” that “poetry lifts the veil from the hidden beauty of the world, and makes familiar objects be as if they were not familiar.” And with scientific discoveries revealing how commonplace, overabundant objects – like dust and stars and plants – are more than meets the eye, that literary goal is not far from what the best of science achieves (Sundaralingam, 2011b). Even better, science can add to poet’s ability to reach this goal by “renewing [their] stock of metaphors” (Sundaralingam, 2011b). Linking abstract or cutting-edge science concepts to common poetry subjects through imagery or metaphors illuminates those revisited topics in a new, unfamiliar light (interestingly enough, even more so due to the communication gap between the disciplines: i.e. Snow’s (1959) claim that literary minds are not aware of the most basic science).

**Verse: An Ideal Medium for Fast, Memorable Science Communication**

Integrating science information into a poetic form grants it several new abilities that liberate it from what Erren & Falaturi (2009) described as scientist’s inclination to be “hard to understand” and “obscure” (p. 489). In Alexander Pope’s (1732) preface to *An Essay on Man*, the English poet stated three reasons for his seemingly unusual choice to write the essay in verse and rhyme rather than prose: poignancy; memory; and brevity and conciseness (Rowe, 2000, p. 437). All three properties would make science communication more palatable and less intimidating to the non-scientific. As an early, incredibly successful example of this in practice, the Roman poet, Lucretius, in his poem, “De Rerum Natura (On the Nature of the Universe),” preserved the theory of Greek atomists for three thousand years until data could finally prove their hypotheses (Sundaralingam, 2011b). Even with the poem filling six books and therefore not capitalizing on poetry’s ability to convey information “more shortly” (Rowe, 2000, p. 489), Lucretius’s “vivid lines [that] portrayed these early scientific ideas so powerfully that they lingered in the human collective memory and imagination for centuries” indicate that verse can indeed be what Pope claimed - poignant and memorable – for the sciences (Sundaralingam, 2011b).

**The Omnipresent Amygdala**

Similar to Balajthy & Lipa’s (2003) findings that every task activates both brain hemispheres (the emotional right and the rational left), Lightman & Goldstein (2011) argued that “the amygdala, the part of our brain that deals with emotions...is probably involved at some level with every thought we have.” This idea of an omnipresent amygdala suggests that there are no “purely intellectual themes” (Lightman & Goldstein, 2011), and therefore, no topic unsuitable for fiction writing. Snow (1959) claimed that artists are disinterested in learning science and the danger in that arises from the fact that we live in a world where “science is determining much of our destiny” (p. 14, 98). Informing the public about science, therefore, is a high priority. Fiction offers a potential solution because “if you want a person to really care about something, intellectual or not, you have to hit him or her in the amygdala” (Lightman & Goldstein, 2011).Andfiction’s main edge over nonfiction is its ability to make the reader feel, to leave an emotional impression, through its characters, scenes, and words (Lightman & Goldstein, 2011; Kesler, 2012, p. 349). Therefore, the key to making people care about scientific issues may be to put them into the literary medium, the medium that humans experience at a visceral level.

 Just as Lightman & Goldstein (2011) suggest the omnipresence of art in man, Howes, Hamilton, & Zaskoda (2003) indicate comparable findings for science. On a survey, middle school students were required to finish the following sentence: “Science is…” (p. 499). Although it came in several versions, the most common answer was, “Science is everywhere” (p. 500). Secondary students independently realize that, in the words of one student’s response, “we deal with science every day” (p. 499). So between the inescapable emotional component of human thought and man’s inescapable interaction with science, due to its omnipresence in his world, science and art may already be naturally overlapped, so man must only acknowledge that.

**The Most Promising Pair of Detectives**

 The disciplines’ common goals and omnipresence, and science’s need for poignancy, memorability, and brevity and verse’s ability to deliver that provide multiple reasons why collaboration between literature and science would work well. In the necessary supplement to those theories, Sundaralingam (2011b) and Lightman & Goldstein (2011) agree about when collaboration would be most beneficial: when contemplating life’s mysteries. Despite the tremendous modern advancements in technology and medicine, there still exists “tricky intellectual terrains of questions that appear to have answers….but where the answers don’t seem to be forthcoming from all empirical information at our disposal” (Lightman & Goldstein, 2011). While science tries to boil man down to nothing but an advanced machine of electrical impulses and synapses, it is undeniable that “we feel like the ghost, not like the machine” (Lehrer, 2007, p. xii). Therefore, “by expressing our actual experiences, the artist reminds us that our science is incomplete, that no map of matter will ever explain the immateriality of our consciousness,” an undeniable mystery (Lehrer, 2007, p. xii). Even the television series, *The Big Bang Theory,* acknowledged science’s inadequacy in such circumstances.

In the episode, “The Friendship Algorithm,” friendship stumps Dr. Sheldon Cooper, since social bonding is a mystery to the theoretical physicist who lacks social skills. After Sheldon forces his friends to complete a 200-item questionnaire to assess why his current friends like him, Leonard enlightens Sheldon about why he isn’t making headway: “What I’m trying to say is that maybe you can’t approach this as a purely intellectual exercise” (The Big Bang Theory, 2010, 3:01-3:06). Leonard even goes on to equate the ridiculousness of the one-sided attempt to Sheldon’s online –and thus floor-based rather than pool-based – swimming lessons. Although the fictional simulation doesn’t deal with a heavy mystery – like free will or the grounds of morality – it still taps into the idea that science can fall short and, interestingly, employs the same phrase, in virtually the same way (it doesn’t exist), as scholars Goldstein & Lightman (2011): there is no so thing as “purely intellectual” fields of study.

 Since mysteries are, by definition, answerless, “when [people] think about them…[their] entire temperament, which is just as much emotional as it is intellectual, is brought into play” (Lightman & Goldstein, 2011). We learn and live as products of both science and art. Therefore, in Sheldon’s disregard of the emotional facets of friendship through his “purely intellectual” approach (The Big Bang Theory, 2010, 3:05-3:06), he wasn’t implementing that key idea. By recognizing that we naturally pull from our emotional and rational selves to contemplate mysteries, consciously and purposefully doing the same will yield “perhaps the most profound symbiosis” that can occur between literature and science (Sundaralingam, 2011b). When art and science come together to contemplate a mystery, they are cast as equals – in power, in interest level, and in dedication to the cause - because it is a common problem and both know they are equally helpless in solving the problem alone.

**Conclusion**

 It is just a switch in grammatical conjunction – “or” to “and” – to label the world as both stories and atoms and humans as both emotional and rational. But, convincing society to believe those dual descriptions is the challenge. Our most crucial responsibility, therefore, will be to continue believing in the necessity of art in today’s increasingly digital and scientific world and to never surrender to the tempting assumption that that progress brings with it: the assumption that science, one day, will just solve everything. Science and literature may never be as close-knit as the default content area pairings – science/math and literature/history – but it is important to take Keats’s angel wing clippers away from science, acknowledge the truth to be found in fiction, and begin to chisel away at Nabokov’s “high ridge” with high-quality, meaningful collaborations between the two disciplines.

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