

THE ALTRUISTIC BRAIN: How We Are Naturally Good by Donald W. Pfaff. New York: Oxford University Press, 2015. 312 pages. Hardcover; \$27.50. ISBN: 9780199377466.

The Altruistic Brain offers an antidote for the assumed selfishness of human nature common in the biological sciences by describing the neural brain mechanisms predisposed for creating trust and empathy in human relationships. Its author, Donald W. Pfaff, is a neuroscientist at Rockefeller University in New York who has investigated neural processes involved in numerous types of behavior and is now turning his attention to altruism. His altruistic brain theory (ABT) is primarily a result of his own interaction with the evolutionary and neuroscientific literature. It reflects his belief that neuroscience now offers a comprehensive perspective on the neural circuits of the human brain that explains altruistic and prosocial behavior in the human species.

His theory describes a five-step set of neural processes through which persons act benevolently toward others. In step one, the altruistic action is unconsciously represented to the person prior to the action being carried out based on the neural process of corollary discharge. Corollary discharges are copies of neural signals sent by the brain and spinal cord to the muscles that also go to sensory systems "so that the brain knows what is about to happen" (p. 55). In step two, the person who will benefit from the altruistic act is represented in the visual cortex either as the actual person currently being seen or as a generic person representing a large group of persons; this representation is based on current evidence of the neural systems involved in visual processing. In step three, the images of the recipient of the benevolent action and the self are merged through a variety of neural processes such as increased "excitatory inputs delivering the neurotransmitter acetylcholine" as well as the functional properties of mirror neurons (pp. 87–88). In step four, the outputs of steps one and three arrive at the prefrontal cortex, which evaluates the moral significance of the potential action, and because of the merger that happens in step three, the other is seen as the self which increases the likelihood of the action. In step five, the action is carried out using basic motor control mechanisms.

Pfaff presents several lines of corollary evidence for ABT that are interesting for those not acquainted with the literature. He argues that the biological basis for concern for others lies in human sexuality and parenthood. There is evidence for this thesis especially in regard to attachment theory, which is foundational for certain types of concern for others. Sexuality may be a more difficult argument to support, given the ways in which mate selection and retention strategies are not necessarily concerned with the well-being of the other; a more nuanced account using contemporary evolutionary psychology would have been helpful. Pfaff cites several current research projects exploring moral behavior including Joshua Greene's work using fMRI analysis of ethical decisions, Michael Tomasello's work with moral behavior in children, and the role of oxytocin in generosity from Paul Zak. Much of this research contributes to a broader understanding of the role of various neural mechanisms in altruistic acts. However, this research does not necessarily support ABT directly; rather, it shows that certain brain mechanisms are important for altruism more generally.

Although ABT is based on neuroscience, the theory is highly speculative regarding the moral and altruistic aspects of the mechanisms employed during benevolent actions. Most of the mechanisms are not directly altruistic in any straightforward way; they are the same mechanisms that would be operative during any type of behavior. Most of the steps of ABT are plausible but not directly tested empirically on actual persons who are performing moral actions. Rather, the theory is given as a possible explanation for various moral behaviors. This is the major drawback of the book.

Although the author often claims that his theory is scientific, there is not enough evidence to fully endorse ABT as the underlying process involved in altruistic behavior. There is some evidence in social neuroscience of the importance of representing the other, which fits ABT's step three, but nothing conclusive. Social and affective neuroscience has explored many of the neural mechanisms involved in empathy and compassion, but no comprehensive theory similar to ABT has emerged. In fact, Pfaff's theory does not interact with several contemporary perspectives in social and affective neuroscience such as those of Ralph Adolphs, Tania Singer, Claus Lamm, or Christian Keysers. Pfaff focuses more on general neural systems rather than testing these neural systems during moral or social behaviors. He does little to interact with contemporary moral psychology as well. This is a consequence of his thoroughly reductionist approach, which argues that if we just understood the altruistic brain mechanisms, moral actions would easily follow.

According to Pfaff, these altruistic brain mechanisms provide the basis for a new scientific theory of altruism that can be used to encourage more benevolent behaviors among humankind. "If we understand how the brain works, we can design a rational system of ethics having more predictable outcomes, consistent with an actual human nature undistorted by outmoded ideologies" (p. 4). Pfaff argues that several philosophical

positions on human nature are not based on the data provided by neuroscience. This is particularly interesting in his critique of Patricia Churchland, who has done considerable work in relating neuroscientific research to several problems of human nature in philosophy. His dismissal of her work seems to indicate a deficiency in his understanding of relating the complexities of human nature to the neural mechanisms of the human brain, especially since Churchland and Pfaff seem to be involved in similar projects. Pfaff is also interested in replacing religious and theological positions that focus on human selfishness and wants to demonstrate that persons are "wired for goodwill" (p. 5).

In Pfaff's view, if a neural explanation of altruism can be described, it is no longer necessary to assume a role for religion in moral formation. If persons knew that they were "wired" for goodness, they could use this knowledge as a basis for changing their behaviors. "A kid could simply say 'I'm good and I know it,' that is, my brain naturally and instinctively produces my good behavior; any other type of behavior would seem unnatural and self-defeating" (p. 163). Statements such as this one indicate a naïve optimism that is present throughout his work without any real engagement with the obvious counterarguments that make his theory highly unconvincing. Pfaff's work demonstrates a cursory reading of the philosophical and psychological sources on human nature that would dispute his claim. His assumption of an easy inferential leap from neural mechanisms to humans "wired for goodwill" masks a multitude of historical, philosophical, and psychological problems with his theory.

Although Pfaff's theory is based on neuroscience, he draws from several areas to support his theory, including sociology, political science, and economics. In his final chapter, he proposes two primary strategies for allowing the altruistic brain circuits to function as they were designed: " ... we treat concerns over moral behavior as we would a problem of public health" and "the empowerment of women, lessening the effect of testosterone-driven behavior in society" (p. 251). Both of these suggestions seem plausible at the practical level, but it remains unclear whether ABT theory requires these kinds of solutions; persons who do not adhere to ABT could still endorse them. Is the solution really decreasing "testosterone-driven behavior" or is it decreasing dominant social structures and violence? There is no real evidence to demonstrate that focusing on neural structures involved in altruism will provide a better foundation for morality-as opposed to religion or philosophy.

Philosophers and theologians have often offered more positive perspectives on the altruistic aspects of human nature in comparison to a "selfish gene" perspective.

However, whether someone is thought to be good because they have a soul or an altruistic brain, the difficulties that often accompany and cause negative social behavior cannot be overcome so simply, because morality is more than neural function. It is a consequence of multiple layers of causative effects at several levels within the hierarchy of science, including economic, cultural, familial, and psychological. Pfaff offers many interesting descriptions of current research in cognitive neuroscience, which will be of interest to persons not familiar with the field, and his emphasis on the positive aspects of human nature is a welcome change from evolutionary accounts that emphasize human self-interest. However, his theory of how altruism works based on several brain mechanisms requires additional empirical support to be accepted as an accurate description of the more empathetic, benevolent, and compassionate aspects of human nature.

Additionally, Pfaff makes the mistake of assuming that science is self-interpreting. He assumes that properly interpreted neuroscientific research leads directly to conclusions about its moral, philosophical, and theological relevance. Pfaff's theory contains many philosophical assumptions that are not "in the data" themselves, but part of a larger philosophical and at least partially antitheological worldview that goes largely unacknowledged. From a Christian perspective, I think this is the larger problem with the work. Although the science is at times very interesting, the philosophical and theological assumptions are not sufficiently discussed to allow the Christian theist to interact with the material in a critical way. For Christians interested in learning some of the perspectives in evolutionary science and neuroscience on altruism, this may be a helpful read, but for those wanting a more nuanced approach to how this area of science impacts morality and theology, a different source would be required.

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MAPPING YOUR ACADEMIC CAREER: Charting the Course of a Professor's Life by Gary M. Burge. Downers Grove, IL: InterVarsity Press, 2015. 138 pages, bibliography, index. Paperback; \$14.60. ISBN: 9780830824731.

Gary Burge has provided a valuable resource to those of us whose vocation is that of university or college professor. Drawing on decades working as a college professor, Burge has written a wise and easy-reading book full of sage advice for university faculty. Although professors are well prepared in their chosen disciplines, without a wise mentor, they are often unaware of the patterns that accompany the typical academic career. Burge identifies the three primary "stages" of development in a scholar's career as follows (p. 23): Cohort 1 is made up of people who have finished their terminal degree and are working toward tenure (typically ages 28–38). Cohort 2 represents midcareer faculty who have been tenured or promoted and have acquired job security (typically ages 34–55). Cohort 3 represents senior faculty near the end of their careers (typically ages 50–70).

Burge identifies some of the most common opportunities and risks that are present within each cohort. The book is replete with stories of professors that exemplify certain patterns found within each of the cohorts (albeit with the disclaimer that the personal details have been changed). The characteristics he describes ring true to me, as I could frequently picture faculty I have encountered along the way who reflect several of the postures and situations he describes.

Burge identifies the traits of cohort 1 as core identity formation, developing peer relationships as well as student and college validation. He identifies the classic risks to this cohort as failures in teaching or scholarship, failing to assimilate into institutional mission and culture, being influenced by cynical peers, anxiety and loss of confidence, and failing to cultivate friendships. Burge wisely emphasizes the importance of a good mentor for those in this cohort. He also acknowledges some of the unique issues that can arise for women in academics. He identifies the primary goal for professors in cohort 1 as finding "security," whether that be in tenure or in a multi-year contract.

Cohort 2 professors are marked by growing maturity and confidence. Burge identifies the traits for this cohort under the categories of developing as a teacher, evolving scholarship, and "finding your voice." The risks he identifies for this stage include the cessation of professional development, egocentric behavior, and institutional dissonance. He also mentions issues that can arise with "hero development," when certain professors are elevated by the college as marquee faculty while other faculty begin to feel less valued and excluded from the "inner ring." Ultimately, he identifies the main goal for cohort 2 to be a sense of well-being, success, and ongoing validation.

Burge suggests that the main question characterizing cohort 3 is "will I find significance?" Some of the traits he discusses in this cohort include core identity issues, competency, and becoming a mentor or sage. He also talks about the importance of "embracing descent" as we end our careers and enter the last stage of life. Some of the pitfalls he identifies for this cohort include disengagement or disinterest, self-absorption, reclusive behavior, and technology anxiety. Burge also describes the issue of the perpetual adolescent faculty member who never grows up—socializing with students as if they were one of them and dressing like a nineteenyear-old. He reminds us that students are seeking faculty to be friendly adults, not friends. He concludes that faculty in this cohort should endeavor to end well, content with our contributions and a sense that it has all been worth it. The chapter includes an addendum with some practical advice about retirement.

Burge's references draw heavily from the field of psychology as well as reports, journals, and books on higher education. Burge is insightful in how he maps general principles in adult developmental stages onto the career trajectory of a professor. One thing that I found disappointing was the minimal time spent discussing a Christian perspective on the vocation of a professor. I suppose I was expecting more theological insights on vocation from Burge, a professor of New Testament at Wheaton College. While he does reference a few resources on the vocation of a Christian scholar, these could have been woven much more explicitly into the insightful discussions throughout the book.

As a midcareer professor who recently faced unexpected twists and turns in my career, I found the book quite helpful. Some of the opportunities and situations he described are ones that seemed to speak to me directly. I could imagine this book being one of the resources in a new faculty orientation program. In addition to new faculty, I suspect many faculty from other cohorts may find this a helpful resource as they reflect on their own academic careers.

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BEYOND THE ABORTION WARS: A Way Forward for a New Generation by Charles C. Camosy. Grand Rapids, MI: Eerdmans, 2015. 207 pages. Hardcover; \$22.00. ISBN: 9780802871282.

In *Beyond the Abortion Wars*, Catholic ethicist Charles Camosy (Fordham University) looks unflinchingly at the apparent impasse in the US abortion debate between "pro-choicers" and "pro-lifers," and as a solution proposes what he calls the Mother and Prenatal Child Protection Act. Camosy takes the concerns of opposing camps seriously, gleaning insights and skewering falsehoods wherever they occur, and he finds large swathes of common ground that respects both women and their unborn children. In spite of occasional shortcomings in Camosy's arguments, I agree with reviewers who deem this short six-chapter book a "must read."

Chapter one discerns common ground between the pro-choice and pro-life camps by examining US abortion rates and public opinion on abortion. It turns out that merely 2% of America's 1.2 million yearly abortions are due to the hard cases of rape, incest, or when a mother's life is threatened, whereas the remaining 98% are "qualitatively different," that is, as Camosy later argues, they are due to the very real inconvenience/ burden of raising a child. (This inconvenience includes the shocking fact that 90% of children diagnosed with Down syndrome are aborted.) Significantly, polls reveal that many pro-choicers wish to restrict abortion in large measure, many pro-lifers are inclined to permit abortion in the hard cases, and both camps want to reduce social pressures on women to abort. In sum: "Though some find themselves on the extremes of the debate, more are in the complex middle" - a complex middle protective of women and prenatal children.

Camosy also shows that important US demographics favor this complex middle. More women than men are against legalized abortion. Hispanics (a majority ethnicity in California and growing in Texas and elsewhere) tend to be more pro-life than pro-choice. And the vast majority of Millennials are "trending" in the pro-life/pro-women direction. Contrary to abortion polarizations presented by popular political and news narratives, the "actual facts on the ground" are amenable to a more restrictive abortion policy protective of mothers and their unborn children. Camosy finds this hopeful. I do too.

Chapter two addresses the moral status of the unborn: what, or who, is the fetus? Camosy makes it clear that contemporary science-embryology, fetology, and biology-informs us that the human fetus is, in fact, a human being. The fetus is a genetically distinct, selfgoverning dynamic entity/individual organism that belongs to the human species. It is not feline or canine; it is human. It is not a cat or a dog; it is a human being. It is not a kitten or a puppy; it is a child. In addition, Camosy rightly points out, "it is simply biologically incorrect to say that [human fetuses] are 'mere tissue' or 'part of their mother.'" To pro-lifers, this is well known. For at least some pro-choicers and for newcomers to the abortion discussion, these facts need to be made clear. (In my native Canada, the Criminal Code mistakenly states that prior to birth the fetus is not a human being.)

Camosy also addresses the important objection that the unborn child, though a human being, is not a "person." That is, the unborn human being lacks some specific developmental feature which confers the right to life. But, as Camosy well argues, this approach to personhood is problematic. The allegedly decisive features fail because they weaken the personhood of many human beings who clearly already have the right to life. For

example, if self-awareness and ability to make moral choices are the crucial criteria of personhood, then the right to life of newborn infants as well as sleeping, stunned, or mentally disabled persons is jeopardized. As a result, the equality in equal rights gets ungrounded. Or, if a "low" trait such as the capacity to feel pain is chosen, then, oddly, personhood gets conferred on rats and mice. Camosy's solution is to ground the equality of equal rights in the capacities to know and love (which fits well with the theological notion of being made in the image of God). Helpfully, Camosy sets out a distinction between "the potential to become a human being" (a potential that does not yet have these capacities to know and love, i.e., sperm and egg prior to fertilization) and "the potential for a human being to become" in its subsequent developmental stages (a potential that does have the capacities to know and love, i.e., the union of sperm and egg). Camosy acknowledges that fertilization involves a process; therefore there is some gray area in which Camosy wisely urges caution.

In chapter three, Camosy makes a case for permitting abortion in the few-but-difficult cases, for instance, when pregnancy threatens the mother's life or is a result of rape. Here Camosy's arguments seem weak. He distinguishes between "direct abortion," wherein the aim is to kill the fetus/child, and "indirect abortion," wherein the aim is to refuse aid to the fetus/ child, when one has no duty to aid, and so death is a foreseen but unintended result. He also distinguishes between the fetus's "formal" innocence and "material" innocence: the fetus may lack responsible agency (and thus have formal innocence) but be a threat causally (and thus not lack material innocence). For Camosy, these distinctions allow him to hold to the moral principle that "it is always wrong to aim at the death of the innocent" yet permit abortion to save the mother's life or, in the case of rape, cease to aid via an indirect abortion (here Camosy permits the abortifacient RU-486). The terms "direct" and "indirect" are a bit confusing (most abortions are pretty direct, it seems to me), but we can let that pass as Camosy's prerogative in setting out stipulative definitions. Nevertheless, serious problems remain. Doesn't the duty to aid a vulnerable person accrue to us – especially parents – from the very personhood of the unborn? And doesn't abortion violate this duty, intrinsically?

For Camosy's argument to work, the unborn person's alleged lack of "material innocence" requires an equivocation on the notion of innocence in the moral principle that "it is always wrong to aim at the death of the innocent." But, surely, the relevant notion of innocence in the moral principle is wholly "formal." A better way is to recognize the truth that abortion is an evil. Abortion destroys an innocent who is not a responsible agent and clearly is not at all morally ("formally") responsible for its material/causal threatening to the mother in the first place. I sympathize with permitting abortion as "self-defense" if the unborn's continued life materially threatens the mother's life. Still, even in this hard case, the unborn remains a person who is the epitome of innocence and vulnerability and whose deliberate destruction is wrong. So, contra Camosy, I think the above moral principle is violated when an abortion occurs to save a mother's life, but this abortion may (i.e., perhaps) be justified, if justified at all, as a lesser of two evils. A case-by-case assessment would be needed. Also, in the case of rape, it seems odd and unjust to punish an innocent for his/her violent conception by another party. It may be politically prudent to permit abortion in the hard cases in order to gain restrictions for the 98% of abortions (I understand and favor this), but we should also continue to think carefully about the lives of all innocents-for their sake and for the sake of truth.

Camosy addresses the challenge of public policy on abortion in chapter four. He argues that the criminalization of abortion in general need not lead to increased deaths of women due to illegal "back alley" abortions because abortion has become a relatively safe procedure (due to advanced medical technology) and there is evidence that previous high estimates of such abortions were fabricated (as admitted by ex-abortionist Dr. Bernard Nathanson, cofounder of the National Abortion Rights Action League). Moreover, because law serves as a teacher, public policy restrictions on abortion can encourage a culture (as illustrated in Ireland and Poland) in which prenatal children are protected, women seeking abortion are not punished as murderers, and illegal abortion providers are, for the sake of political prudence, found "guilty of something less than felony murder."

In chapter five, Camosy argues that "we should consider both prenatal children and their mothers as vulnerable populations," but, and significantly, current abortion "choice" favors neither. As mentioned, over 1.2 million prenatal children are killed annually in the US, whereas only 2% are due to the hard cases. But evidence also shows that large numbers of post-abortive mothers face guilt and increased health problems. Moreover, pregnant women face immense social pressures to "choose" abortion without real options to handle the inconvenience/burden associated with child-rearing. These pressures arise not only from the boyfriend/husband, parents, family, and friends, but also from larger social structures. Significantly, Camosy argues, workplaces are geared to treating all employees as men. Here all of us should take note: "Our social structures force women to choose between (1) honoring their roles as the procreators and sustainers of the earliest stages of human life and (2) having social and economic equality with

men." To protect prenatal children and their mothers, Camosy rightly argues, we should protect them from this dilemma.

In the last chapter and conclusion, Camosy proposes, as a way forward, his Mother and Prenatal Child Protection Act. This act would protect the vast majority of prenatal children, allowing abortion in the small percentage of hard cases; as well, it outlines support for women to enable them to keep and raise their babies. Readers from all political stripes, whether "pro-choice" or "pro-life," should consider Camosy's proposal. If the proposal does not end the abortion wars, it may at least reduce the number of casualties.

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CHRISTIAN BIOETHICS: A Guide for Pastors, Health Care Professionals, and Families by C. Ben Mitchell and D. Joy Riley, MD. Nashville, TN: B&H Publishing, 2014. 207 pages. Paperback; \$24.99. ISBN: 9781433671142.

Patients, their supporters, and their caregivers are regularly confronted with new ethical issues or new variations of older ones in the light of new medical technologies. A variety of professionals and academics engage in bioethical reflection, expressing their views through the language of their own expertise. Gifted professionals with differing expertise do a valuable service to nonprofessionals by translating and articulating those reflections and positions into language and themes helpful to nonprofessionals directly affected by these issues. Christian Bioethics is cowritten by a theologian and a physician who directs a center for bioethics and culture. Organizing most chapters according to a specific case, the authors lead the reader through multidimensional aspects of each case as they apply to more general ethical concerns and realities. In so doing, they open up these dimensions by showing how Christian theology, ethics, and modern medical science interplay in real-life decisions that need to be made in clinical medicine.

All but the first two chapters are grouped following the rubric of Nigel Cameron wherein he distinguishes bioethical issues as those involved in taking life, making life, or remaking/faking life. In an effort to appeal to a broad target audience, including pastors, family members, chaplains, physicians, students, and patients, the authors' case-focused approach risks losing "the roots that sustain the trees" by giving less attention to the underlying beliefs and theories that ground ethical reflections and decisions in their clinical situations. The authors are attuned to this risk to some extent, providing, in very basic terms, their worldview-level starting points. Both authors are committed to the basic

Christian beliefs codified in the Apostles' Creed. They affirm a Christian worldview that envisions the world as God's world, all aspects of which are intercompatible including faith and science and their expression in theology and medicine. The discussion section of most chapters is written as a dialogical exchange between the authors, a method that gives some down-to-earth character to the book but sometimes disrupts the flow of the reading when topics change from medical to theological and back. Each chapter also has excellent leading questions listed after the case. These are helpful starters for reflection and discussion about the case and about the authors' interpretive details that follow each case.

The first chapter highlights key historical elements of biomedical ethics, starting with the role of the Hippocratic Oath in ancient Greece up until the present. The authors make important points about the transformation of the Oath into Christianized versions and into gutted, secular versions that reflect modern medical allowance for practices forbidden in the Oath. While mentioning claims that the Oath was likely influenced by polytheistic Pythagoreans, they fall short of acknowledging further suggestions by scholar Ludwig Edelstein and by Cameron that Pythagorean ideals may have characterized a reform movement against common practices of abortion, suicide, and having sexual relations with patients. In addition, the authors note covenantal aspects in the relations between the Oath-taker and his mentor, but they do not mention the contrasting codal nature of specified prohibitions. This distinction is important since ethical guidance for modern medical practice also tends to emphasize codal "dos and don'ts" rather than relational aspects that form the ethical core of practice. A number of formative twentieth-century bioethicists from different Christian traditions are also highlighted. However, the reader may have difficulty understanding why some positions of professed Christians may resonate more with biblical themes and teaching than others, due to the short text devoted to each bioethicist. For example, the authors allude to the important influence of Joseph Fletcher's thinking on contemporary changes in the Hippocratic Oath. However, his situationalist approach also contributed to a paradigm shift in bioethical thinking, deemphasizing the influence of basic ethical beliefs while attaching greater importance to individual conditions and contingencies of bioethical situations. The authors conclude by favoring the covenantal approach of William F. May and the virtue ethics of Edmund D. Pellegrino and David C. Thomasma, positions strongly supported and promoted by this reader as well. However, they could have given more substance to the cases and discussions by including more intentionally the impact of these favored approaches on their own positions in the chapters.

Chapter 2 brings the basic premises of the book and the perspectives of the authors into sharper focus, perspectives grounded in biblical hermeneutics. They review popular views on the role of scripture in ethical reflection, themselves understanding the Bible as "canonical revelation of God's commands and Christian virtues." But they also rightly appreciate additional interpretive nuances for gaining insights from scripture for ethics. Citing Kyle Fedler, they note that scripture is diverse in its historical and cultural contexts, and in its literary character. Laws and commands under the old covenant must always be interpreted in the light of the new covenant which fulfills the former. The chapter concludes with very helpful suggestions on fostering good communications between patient, caregiver, and support persons and on using good analytical judgment in making medical decisions. The authors point out that, if needed, ethical committees and consultants are available in most care centers today to assist in making difficult decisions.

The remaining six chapters deal with cases involving a broad range of topics including abortion, end-of-life decision making, assisted reproductive technologies, organ donation, cloning, and technologies applied to transhumanist aspirations of life extension and immortality. In chapter 5, the authors present the science of reproductive methods in terms understandable to most laypersons and pastors. Here they weave in their own views as well, such as their nonendorsement of freezing surplus embryos after in vitro fertilization. The chapter on cloning and hybrids is laid out with similar detail and care, though the discussion of triple genetic parenthood among embryos created to prevent mitochondrial disease may not, despite the authors' laudable efforts, be appreciated fully by laypersons due to complicated subject matter. It was disappointing that induced pluripotent stem cell technology – and its theological and ethical implications-was not discussed as a possible alternative to embryonic stem cells for developing therapeutic biological therapies; it received only a fleeting mention in chapter 2. This relatively new technology involves the formation of cells that have many molecular and physiological qualities of embryo-derived stem cells but are developed through the dedifferentiation of mature, adult cells. Such cells are very promising as sources of biological therapies but, for many Christians, are associated with fewer, if any, ethical concerns compared to the stem cell derived from the destruction of human embryos.

While there is a growing number of books on bioethical topics now available for use in Bible studies and other discussion groups, I think this is a particularly wellorganized book with a more focused application of the evangelical perspective of the authors than other books of its kind. The authors do a commendable job in leading their target audience of mainly nonprofessionals into topics whose technical and biological complexities are made far more understandable through the authors' sensitivities and interpretive skills. They show how scripture and science are complementary, yet both need to be understood and their nuances appreciated by Christians in order to develop biblically informed approaches to contemporary bioethical issues in the light of new technologies that affect medical care.

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FOUR REVOLUTIONS IN THE EARTH SCIENCES: From Heresy to Truth by James Lawrence Powell. New York: Columbia University Press, 2015. 384 pages. Hardcover; \$35.00. ISBN: 9780231164481.

In Four Revolutions, James L. Powell describes the very human process of introducing new ideas and the winnowing that occurs before general acceptance. Powell is a very accomplished geoscientist whose credentials include presidencies of Oberlin College, Reed College, and Franklin and Marshall College. He served at the request of both Ronald Reagan and George H.W. Bush on the National Science Board. Powell is a geochemist by academic training from a doctorate from MIT. He writes very well, and at a level suitable for scienceliterate high school graduates. The book's four sections cover the ideas of deep time, continental drift and plate tectonics, meteorite impacts (structures and ecological effects), and climate change. In each case, a compact but salient history is given, along with the names of key thinkers and the dates of importance.

In the initial section on time, we encounter the roots of the humorous (if one has a sense of humor), trite disregard that physicists, in particular, have for geology. Most attribute this disciplinary disdain to Ernest Rutherford, late in the nineteenth century. However, it actually goes back at least as far as the 1860s, when Lord Kelvin vilified the lack of temporal precision in geological arguments. Kelvin's 1868 "assault," in Powell's words, was rebutted by the then-current president of the Geological Society of London, T.H. Huxley: "Mathematics may be compared to a mill of exquisite workmanship, which grinds your stuff to any degree of fineness; but nevertheless, what you get out depends on what you put in …" Huxley also wisely stated that, "It is the customary fate of new truths to begin as heresies."

Powell continues to entertain us with tales of the efforts of succeeding geologists, physicists, and geochemists to

extract Earth ages from geological materials and processes. Approximations of earth age were scattered from hundreds of thousands to billions (from Kelvin's student John Perry) of years. The advent of using radioactivity as a clock for elapsed geologic time gave the scientific community one of its true pioneers and enduring stars, Arthur Holmes. Beginning about 1908, he developed a grand array of hypotheses and brilliant time-related concepts, wedding radiometric age determinations with observed geological phenomena. In my mind, Holmes became academically immortal when he published the geology text, Principles of Physical Geology in 1944, a text that has never been surpassed in scope or insight. After Holmes, various researchers extended the early techniques, producing more and more sophisticated estimations of geologic time. More recent studies have really only refined the excellent foundation established after Holmes. Note that among his other accomplishments was an amazing explanation for global tectonism, a "preview" of the greater confirmation of plate tectonics in the 1960s.

Part II of the book brings global tectonic ideas into a historical context. Early world maps constructed from ocean navigation inspired conjecture about the apparent fit of coastlines, Africa into South America as a prime example. This puzzle-piece matching remained whimsy until the early 1900s. The book gives us a summary of how science is a purely human enterprise, and ideal explanations are arrived at despite many limitations of methods.

Sin, though not explicitly stated, plays a big role throughout Powell's book, in exhibiting how personalities are barriers to intellectual progress. In the case of Alfred Wegener, astronomer turned atmospheric researcher and geology "amateur," there was demonstrated bitter opposition to his (and others') concept of continental drift, for both good and bad reasons. Wegener's publications from just before and after World War I, proposed many interesting and plausible explanations for the existence of joined continents in the past. Some scientists were immediately in agreement, but other prominent geologists and physicists were not only opposed, but rudely so. Ego, perhaps jealousy, the lack of collegial connectedness (not a geologist), and probably Wegener's German nationality all slowed the acceptance of the mega hypothesis. Some of US geology's biggest "guns," such as Stanford's Bailey Willis, were brutal in countering Wegener and the concept.

Powell writes of additional pros and cons, believers and unbelievers, concerning the mobile earth, but the Wegener episode is the most significant story until the early 1960s. A wonderful boom in post-war (WWII) technology and exploratory spirit built the background

for elevating the continental drift idea into plate tectonics as the geoscience paradigm. Many innovations, including paleomagnetism, sonar mapping, K-Ar geochronology, and submersible ocean-floor vehicles enabled the development of a plausible mechanism for "drift" beyond Wegener's "guess" and Holmes's 1929 almost-correct idea (p. 98).

The third topic (Part III), meteorite impact structures, was initially controversial because such features, as we now acknowledge them, were originally proposed as "crytoexplosives," a blast of igneous origin up from deep below. The counter interpretation of "astroblemes" or extraterrestrial impacts came from careful observation of Earth structures (notably by the USGS luminary Eugene Shoemaker and maverick Robert Dietz) in comparison with those discovered on the moon in the space race days (mid- to late-1960s). Back in 1933, Columbia University's Walter Bucher had followed the lead of G.K. Gilbert, essentially attributing all crater features as volcanic. The book goes on, as in the earlier sections, to show how the old and stubborn hypotheses were worn away by multiple lines of evidence. The stage was then set for a bigger revelation to hit in the 1980 Science article "Extraterrestrial Cause for the Cretaceous-Tertiary Extinction" by the Alvarez father and son team. Some researchers still have doubts, but the data in support of a meteorite impact of grand proportion in the Yucatan vicinity has grown to general acceptance as explanation for the close of the Mesozoic. Powell hides little of the rancor involved in opposition to the hypothesis. The sin of pride is all too evident among academic scholars.

As the final section, Part IV brings what I perceive as Powell's main interest into focus. His heading, Global Warming, is chosen instead of climate change. That in itself is telling. For the first time, the book covers a controversy significant beyond the scientific. This issue continues to rage today in the public realm, even though its great support from qualified scientists establishes the key hypothesis as firmly as any of the others described. Powell begins this section by introducing us to the brilliant G.S. Callendar, engineer and amateur meteorologist from the UK. His intuition and calculations involving the atmospheric system led to the first correct correlation between CO₂ abundance and temperature regulation in 1938. Svante Arrhenius, who won the Nobel Prize in Chemistry, 1903, had already played with the same idea. Neither the modest engineer nor the famous chemist was much remembered as the significance of an altered atmosphere became a huge ideological battleground.

Powell leads readers carefully through the ups and downs of technical advances in understanding the relationship between human activity, especially the burning of fossil fuels, and the effect on climate sys-

tems. Warming is but one result of the extremely rapid (in geological reference) disturbance of the linked atmospheric-oceanic mega-system. Unlike the other three "revolutions," that of global climate change is still developing, trying to overcome opposition from political and vested economic interests (not scientific opposition). There is strong scientific support for the conclusions of the Intergovernmental Panel on Climate Change. Plainly, human beings have caused to increase and continue to increase the amount of atmospheric "greenhouse" gases, such that Earth's climate is growing hotter, less predictable in terms of weather events, and more prone to spawn events of greater severity with risk to life and property. This last of four revolutions needs everyone's attention and willingness to act for reversing destructive lifestyles.

I am aware of many books that seek to popularize the stories behind great scientific advances. Powell's book is comprehensive but not overly long. It probes the personalities involved but without sensationalism. I learned many details that contributed to my understanding as an earth scientist, and am certain that others, scientists or not, will gain interesting and useful insights in the reading. I would recommend the book for general interest as well as a potential asset for a seminar course emphasizing the history of geologic thinking.

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MATHEMATICS WITHOUT APOLOGIES: Portrait of a Problematic Vocation by Michael Harris. Princeton, NJ: Princeton University Press, 2015. xxii + 438 pages, with endnotes, bibliography, and index. Hardcover; \$29.95. ISBN: 9780691154237.

Why should we encourage people to study mathematics, and why should scarce resources be allocated for mathematical research? Should mathematics be pursued because it provides a theoretical core for technological applications that make our lives easier and better, the Golden Goose argument? But while abstract theories may one day become practical (number theory gave us modern cryptography, the basis for secure online transactions), there is no guarantee that they will ever lay such an egg. Nor is this the express motivation given for the work pure mathematicians do. Furthermore, mining mathematics for commercial possibilities can be harmful instead of beneficial-recall the crash of 2008 engineered by greedy risk-takers wielding mathematically based financial instruments. (Harris was warned away from indicting the quants who promoted the widespread use of derivatives, but chapter 4 lays out the arguments against them as described in the mathematical press.)

Is mathematics rather to be valued because it provides access to absolutely true knowledge? The notions of truth and certainty, however, are no longer considered central to mathematics. Are arcane results in abstract algebra or topology true, or do they merely follow logically from the axioms and definitions we have chosen? Mathematicians still believe that they are exploring something meaningful, and they want their concepts to carve mathematical reality at its joints, but that reality is taken by many to be socially constructed by experts rather than given in any independent sense.

If we cannot appeal to the Greek ideals of the Good or the True as the ultimate rationale for mathematics, what about Beauty? Do mathematicians create mathematics because they find it beautiful? This ploy likely strikes nonmathematicians as odd – where is the beauty in long division or fraction calculations or in factoring polynomials? Yet those involved in mathematics, especially at more advanced levels, do experience beauty in the simplicity and elegance of certain proofs and in the unexpected ways seemingly disparate ideas combine to produce significant connections and generate meaningful insights. In fact, beauty was G.H. Hardy's main justification for doing mathematics in his well-known booklet *A Mathematician's Apology* (1940).

Readers who pick up Harris's Mathematics without Apologies (hereafter: MWA) will immediately recognize the allusion to Hardy's classic. While the title's use of negation rightly leads us to expect that Harris will take a somewhat different approach to answering "Why mathematics?," each book is, as C. P. Snow noted in his foreword to Hardy's work, "the testament of a creative artist." In Harris's case, the term testament may connote a more settled form than he would prefer. As he says in the preface, "this book pieces together fragments found in libraries, in the arts, in popular culture, and in the media, to create a composite picture of the mathematical vocation." Harris wants to give the reader a sense of what it is like (for him) to be a mathematician in the early twenty-first century. His area of specialty, for which he was awarded a prestigious Clay Research Award in 2007, is in a part of number theory connected to abstract algebra: in 2001, he and a colleague proved the local Langlands conjectures for certain general linear groups. As you might expect, little of this can be explained in a work aimed at the general reader, as MWA is. Harris attempts, nevertheless, to discuss key aspects of number theory (solving polynomials in two variables) that underlie his work, presenting this in a series of five interspersed chapters titled How to Explain Number Theory at a Dinner Party. He undoubtedly succeeds better here with a mathematically trained

reader than with his partly fictitious performing artist, but the mathematical community might benefit from more mathematicians explaining the basics of their research work to the public, at least to their colleagues in academia.

In chapter 9 Harris describes the creative process that produced some of his mathematical results. In addition to talking about the sequence of events, collaborators, and mathematical ideas that moved him away from the topic of his doctoral dissertation into the area in which he contributed to the Langlands program, he describes how a number of key ideas came to him and were further clarified over time, beginning with a mathematical dream that activated his unconscious in an unusual way. Readers familiar with Hadamard's pioneering 1945 *Essay on the Psychology of Invention in the Mathematical Field* will find this autobiographical narrative quite fascinating, as I did.

MWA is a wide-ranging idiosyncratic nonapology for mathematics. A whole chapter is devoted to "An Automorphic Reading of Thomas Pynchon's Against the Day (Interrupted by Elliptical Reflections on Mason & Dixon)," and Harris also discusses a number of films (e.g., A Beautiful Mind and Pi) and plays (e.g., Proof) that touch on mathematics. These references exhibit the author's familiarity with literature and art and allow him to discuss the extent to which mathematics might be an art as well as or instead of a science. Harris also riffs on various themes (oh, yes; he explores connections between mathematics and music, both classical and rock) pertaining to the sociology and morality of knowledge, philosophy of mathematics, foundations of mathematics, history of mathematics, Eastern metaphysics, twentieth-century Russian mysticism (the mathematical "name-worshippers"), the etymology and significance of words such as charisma and tricks for mathematical practice, and more. Other reviewers have termed his treatment of such matters "erudite," but Harris insists his approach is more personal than scholarly.

Before I summarize his nonapology for mathematics, I would like to make a few comments about foundations and philosophy of mathematics, which may be of interest to readers of this journal. Given Harris's background in category theory, one might expect him to promote Homotopy Type Theory (Voevodsky's Univalent Foundations of Mathematics) as an alternative contemporary foundation for mathematics. He says only a few things about this in the book, explaining on the book's companion website, https:// mathematicswithoutapologies.wordpress.com/, that he is not well versed in homotopy theory. But he does entertain the possibility (pp. 65, 219) that this may eventually become a new implicit foundation of mathematics

by providing the conceptual tools and a unifying language for talking about and organizing a broader range of mathematical matters than the present set-theoretic foundation does.

Standard logical Foundations of mathematics (Harris capitalizes this to suggest imperial overreach) was the central focus of Philosophy of mathematics (ditto) for about the first half of the twentieth century. In the last quarter or so of the century, however, philosophy of mathematics (lowercase) has begun to take greater notice of mathematics as it is actually practiced by mathematicians. Harris terms this the philosophy of mathematical practice, and he clearly appreciates what has been accomplished here by Imre Lakatos, David Corfield, and others. Some see this new trend as turning away from Platonism in mathematics and toward postmodernism; not all readers will find this development as welcome as Harris does. Harris thinks philosophy/ foundations of mathematics should not be so focused on truth or epistemology or on trying to construct the firm bedrock for grounding all of mathematics. Mathematics is a fully human activity done collectively under the elite leadership of those who have earned their charismatic stripes through successfully introducing and pursuing significant research programs. As such, it is a fallible and not fully rational enterprise, involving ethical motivations, conjectures, and intuitions about dimly perceived realities; disruptive shifts in focus and methodology; changing connections to what is considered central; and so on. Proof and rigor still have a place in confirming mathematical intuitions, but they should not be viewed as the essence or main task of mathematics.

MWA is not Harris's first attempt at answering "Why mathematics?": his twelve-page essay in the highly regarded Princeton Companion to Mathematics (2008) under this title introduced some of the same themes. MWA greatly expands these ideas within the context of a personal portrait of a working mathematician. And while MWA may not be a conventional apology for the existence of mathematics, it does explore why people do it, most pointedly in chapter 10. Mathematics, Harris says, is a free creative activity, subject only to certain social constraints as a tradition-based/tribal activity and (eventually) to the strictures of logical consistency and proof. It may lead to practical applications (one of the reasons why mathematicians should still be employed by universities), but mathematical research is best pursued as a "relaxed field"-for its own sake, unconstrained by utilitarian demands, akin to play. The clearest thing one can say about why mathematicians do mathematics is simply that they experience deep pleasure in uncovering abstract patterns and in solidifying intuitions about conceptual entities that intimate (are "avatars" of) still further realities to be explored. On this note, Harris's nonapology elaborates and refines Hardy's apology in the context of contemporary research mathematics.

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A NEW HISTORY OF LIFE: The Radical New Discoveries about the Origins and Evolution of Life on Earth by Peter Ward and Joe Kirschvink. New York: Bloomsbury Press, 2015. 400 pages. Paperback; \$10.97. ISBN: 160819907X.

A New History of Life is a natural history that stands out because of its large timescale (4.567 billion years, to be precise) and broad intended audience. Overall, it delivers on the promise of its title adjective, describing new findings and hypotheses connecting paleontology and geology, and offering genuine but grounded scientific speculation for future work. For the general reader, it provides a wealth of new information, but because its overall scientific narrative lacks momentum and internal connection, it may be most appropriate for a scientifically literate audience.

It is impressive to watch the authors address the central challenge of this genre, which I have faced myself in my writing for a general audience: How do you filter oceans of information and translate it into general terms? Ward and Kirschvink set up their filter by emphasizing physical evidence, and rocks and bones in particular. Their geological and paleontological emphasis gives this story a different tone and tempo than other natural histories that start with the Big Bang (physics) or the characteristics of life (biology). My own discipline, chemistry, is not as deeply integrated as a result – here, chemistry plays a role in dating the rocks and bones, and in transforming the environment, but the authors focus their attention on the change and flow of continents (and other aspects of geology) and body plans (developmental biology).

The flip side of the authors' emphasis is their de-emphasis. They deemphasize evidence from genetic clocks and other results from molecular biology, leading them to a chain of reasoning that is mostly geological in nature. For example, they favor a very late evolution of water photosynthesis. Personally, I trust the genetic clocks that show how many forms of photosynthesis, including water photosynthesis, evolved much earlier than Ward and Kirschvink allow. But this is a moot point – a few hundred million years one way or the other does not change the story much for the general reader.

A New History of Life reads at the level of an undergraduate science text. Ward and Kirschvink recount the back-and-forth narrative of scientific discovery and rebuttal as hypotheses are set forward and discarded. If the reader already understands how science works, these sections depict the drama of science in enjoyable detail. Sometimes the details seem superfluous, as when some sections list other scientists in the field but without enough detail to make them distinct characters. A surprising number of the images in the book depict scientists working in the field, but they do not convey much information to the nonspecialist.

The scientific detail is both an advantage and disadvantage. For example, the first chapter is all about geological nomenclature, which is too dry for a general reader. Throughout the book, the authors provide precise biological and geological terms for organisms and places, but a better description of these would make the story more relevant. A photo of a fossil skull is not clearly connected to the chapter around it, and lists of details on dinosaur names and the shapes of lagoon habitats provide detailed "dots" of data, but they do not seem connected.

At such points, the book becomes more like a required course assignment than the flowing story it could be. On page 80, the authors write, "We apologize for the complex chemistry necessary in the preceding section. But to get this story right requires complexity." If this statement had been placed before the section it described, the general reader would read that section differently – as it is, it amounts to locking the barn door after the horse is gone.

These narrative nits having been picked, this book is indeed new and interesting, both substantial and helpful for the prepared reader. In the chapters on the origin of life, the authors focus on the "RNA world" hypothesis, and include new findings that support this hypothesis, such as the nucleotide synthesis discovered half a decade ago by Sutherland and colleagues, but fail to cover recent experiments that point to "metabolism-first" explanations. The "new" hypothesis in this section is that life started on Mars, which is interesting and possible, but given the difficulties and distances, more speculative than other new proposals in the book.

Another "new" hypothesis the authors develop in several places is that major events such as the Cambrian explosion and particular extinctions were started by "true polar wander" events. One true polar wander event coincided with the Cambrian explosion, but my enthusiasm is tempered by the fact that there have been thirty or so of these events throughout history, which is a number large enough that the timing may be more coincidence than cause. A graph of the thirty events would have addressed my own skepticism but was not included. The hypothesis I am most attracted to appears throughout the book, but may have been deemphasized by the authors because it is not all that "new." Ward and Kirschvink frequently allude to the power of oxygen, both at and after the Cambrian explosion. They connect oxygen to animal diversification and extinction more intimately than any other general text, and oxygen's influence is found in nearly every chapter. This is an exciting and intriguing thread to follow throughout the narrative, but it could have been emphasized more.

Curiously, in a section on dinosaur morphology, they downplay the power of oxygen. On page 266, they begin a paragraph with the statement, "No evolutionary history can ever be pinned on one factor." The paragraph ends, "Nevertheless, oxygen levels must have played a part." This apparent underselling of the organizing chemical power of oxygen brought to my mind the stories of how Einstein resisted the Big Bang because of its implication that the universe had a beginning. But, as is common for popular science, philosophical and theological implications are kept implicit.

Another major theme of this book that is powerful (but not really new) is the generative power of past extinction events. As Ward and Kirschvink put it, "Over and over, however, it really looks like a dominant theme in the history of life is that times of crisis promote new innovation." Many scientists from many fields, including myself, have converged on this finding, and it deserves to be repeated many times. What does that tell us about what kind of universe we call home?

The authors close the book by extrapolating the billionyear trends of change in carbon dioxide and oxygen levels into the distant future. This is an obituary for the future earth in which CO_2 runs slowly out of the atmosphere like air running out of a balloon.

In a book that tends to avoid large metaphors, this section stands out: "The fate of the nautilus is a metaphor for all animal life. Sooner or later evolution, competition, and the natural changing of our Earth and sun as they age will make any body plan obsolete." The authors describe a bleak future that gives the sense of the universe running down and flickering out, which is accurate as far as science goes, but philosophically and theologically truncated.

In summary, this book is an excellent example of recent evidence in the history of life, with special emphases on geology and paleontology. Anyone with an interest in those two sciences will find new ideas and directions in these pages. The most powerful conclusions—the emerging consensus on the driving role of oxygen and the creative power of even the most devastating extinctions—give a sense of the vitality of life and the

orderliness of creation that is somewhat at odds with the deflating final chapter. Here, new evidence is presented well, and its ultimate implications are left for the reader to ponder.

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STATE OF AFFAIRS: The Science-Theology Controversy by Richard J. Coleman. Eugene, OR: Cascade Books, 2014. xii + 272 pages. Paperback; \$32.00. ISBN: 9781625647016.

If the title of Richard Coleman's first book at this intersection, Competing Truths: Theology and Science as Sibling Rivals (Bloomsbury, 2001), highlighted the contrasts but worked toward synthesis, the main title of the present book, almost fifteen years later, suggests a status quaestionis, but actually urges that whatever synthesis might be previously either promoted or achieved is premature given the disparate methodologies. Perhaps this is in part because in the intervening period, Coleman's Eden's Garden: Rethinking Sin and Evil in an Era of Scientific Promise (Rowman & Littlefield, 2007) scrutinized the sciences from a theological vantage point and observed that scientific inquiry, no less than any other human venture, is not less susceptible to overreaching in its pursuit of inquiry and knowledge, and hence he has become much more sanguine and realistic about the scientific enterprise. State of Affairs thus suggests that while the value of science should not be underestimated, we ought not to overlook the differences between it and the theological disciplines.

Now Coleman is advocating neither the classical "conflict" thesis nor the two-truths or independence model of more recent provenance. Instead, he engages more specifically and most extensively with what he calls the movement of "new rapprochement" (NR) between theology and science represented in the last generation by the contributions of Ian Barbour, Arthur Peacocke, and John Polkinghorne, among others. Coleman's argument is that NR, while helpful in various respects, also has been too accommodating to science, its constraints and empirical methods, and thereby has both minimized theology's distinctiveness and subjected its work to scientific frameworks and presuppositions. Along this latter route, theology subordinates its task of clarifying the deposit of revelation to that of "keeping up with the sciences" (my colloquialism), so to speak, and thereby forgets its prophetic stance of readiness to confront critically the shortcomings inherent in all human undertakings.

Note that Coleman writes not as a scientist for scientists but as a theologian for his peers. From my own vantage point as a theologian looking to engage the sciences, I am grateful for this timely reminder about the differences between both endeavors. Yet insofar as the modern sciences are driven in principle by the quest for ever-expanding knowledge, they have threatened, if not dethroned, theology from her status during the medieval period as "queen of the sciences." Hence, if science can overreach, part of the question is whether theology has its own realm and, if such, is anything less than all-there-is. It should not be surprising that if the extent of science's reach is contested even among those working in that arena, the scope of theologyfor example, whether it concerns the existential depth of the human experience or the eschatological horizon of the cosmos or the transcendent dimensions of the world, or any and everything at all! - might itself not be amenable to clear definition. The extent to which theologians disagree about these matters will incline them to engage with Coleman's thesis divergently.

In the end, what Coleman wants, charitably put, is for theologians to take a more appropriately disputational, even prophetic approach to the sciences, with such contesting and disrupting capacities understood as theology's gift to scientific inquiry. Yet as the scientific method is itself designed to continually question what we know, theologians do not have a corner on the disputational market. This is not to say that theologians ought not to pose hard questions to science, or even that theology might not make a difference in the scientific domain. It is to say that the stance recommended by Coleman might be less confrontational than intimated. Here the carefully developed proposals over the last two decades plus those of Robert John Russell-to whom Coleman refers in passing on a few occasions but does not engage in any depth-deserve to be carefully studied.

Coleman's constructive way forward is complicated on two fronts: first, by the long history of fundamentalist, creationist, and intelligent design voices that understand themselves as disputational interventions vis-à-vis the sciences; and second, by the fact that in the twenty-first century, Christian theology's voice in the religion-science interface is one among other religious traditions engaging and even challenging the sciences. So the question is how to promote a disputational stance that is constructive for the wider conversation (as opposed to being merely reactive as on the former trajectory) and that is distinctive in a pluralistic world (as opposed to being perceived as merely attempting to get a leg up in a crowded field). When understood diachronically and historically in light of the last millennium of Christian theology's love-hate relationship with the sciences, the question can be expanded: what kind of theology or theological method can be an appropriate "queen" - on the one hand, being bold and prophetic while on the

other hand, also humble in recognizing its self-limitations (limitations that are pertinent to all human efforts, which Coleman grants: p. 245) vis-à-vis other bodies of knowledge?

My own proposal (developed elsewhere) has been that such a theological approach should be distinctively pneumatological, following out of the Day of Pentecost metaphor that understands the many tongues inspired by the Spirit as also heralding the witnesses of the many faiths and the many scientific disciplines. This allows both the possibility of honest engagement with others from the standpoint of difference and also the capacity to receive from them in turn. If this is correct, then the way forward involves an enrichment of NR, not its curtailment, and this itself might open up to a healthier, even if no less controversial, "state of affairs" for the next generation of theology's engagement with the sciences.

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THE WAR ON LEARNING: Gaining Ground in the Digital University by Elizabeth Losh. Cambridge, MA: The MIT Press, 2014. 240 pages, notes. Hardcover; \$32.95. ISBN: 9780262027380.

The battle lines are being drawn with faculty and students on opposing sides. Students are armed with weapons of mass distraction – cell phones, social networks, and all sorts of digital media at their fingertips. Faculty members are ready to fight back with PowerPoint slides, online quizzes, and plagiarism detection software. But are these truly the forces in opposition in higher education today? That is the central question within Elizabeth Losh's *The War on Learning: Gaining Ground in the Digital University.*

One does not need to look far to find examples of how educational technologies are being deployed throughout higher education. From classroom response systems ("clickers") to flipping the classroom (i.e., moving the lecture portion to video viewed outside of class time), from social media back-channels in large lecture courses to Massive Open Online Courses (MOOCs), there is a wide array of technologies being implemented in universities today. Some faculty members decry these as mere novelties, or even as impositions signaling the end of academia as we know it; others embrace these types of innovation as the salvation of higher education in a world where the stuffy stodginess of the Academy is becoming less relevant to the needs and interests of the students it is purported to serve. The truth is perhaps—as it so often lands—between these poles. And while arguments about the value and impact of technology integration can be made across the spectrum, for those striving to teach Christianly in higher education, or even articulate a distinctively Christian approach to tertiary education, we need to recognize the competing worldviews of both poles. Thus, we must explore the contrasts of the philosophical and the pragmatic, the historical and the contemporary in university culture. And, most of all, we must wade into the murky middle ground where overlapping and contrasting interests are most likely to come into conflict.

This messy intersection of the historic Academy and the digitally infused twenty-first-century life is home territory for Losh, who serves as director of the Culture, Art, and Technology Program at Sixth College at the University of California, San Diego. This innovative program sits at the intersection of historic liberal arts academia and contemporary media and technology. The Culture, Arts, and Technology Program is a required interdisciplinary course sequence for first-year students at Sixth College; it might best be described as a "digital humanities" program, aimed at developing research, writing, and communication skills in the context of twenty-first-century digitally enhanced culture. Among her research interests, Losh lists media theory, digital rhetoric, democracy and media culture, and critical theory. In The War on Learning, she draws these interest areas together in an examination of contemporary academic culture in higher education.

Her opening chapters are expository, and concern the nature of today's university students and how their attitudes and practices stand in contrast with the mindsets of college faculty and administrators. Faculty may eye students as "cheaters" or "hackers"; this attitude prompts, at best, a defensive posture on the part of instructors and, at worst, a mindset of "get them before they get us." As Losh puts it, "This book explores the assumption that digital media deeply divide students and teachers and that a once covert war between 'us' and 'them' has turned into an open battle between 'our' technologies and 'their' technologies" (p. 25). And it certainly seems that these two groups might be "at battle" in a high-tech arms race in the classroom, but Losh calls into question what battle is truly being fought. She argues that "each side is not really fighting the other ... both appear to be conducting an incredibly destructive war on learning itself by emphasizing competition and conflict rather than cooperation" (p. 26).

It is through this lens that Losh goes on to examine a variety of technological interventions in higher education, offering illustrations of real-life tales of technology integration gone wrong. She uses these vignettes of failure to provide commentary on the context of the

innovation; she also critiques the assumptions being made about the students, the instructors, the technologies, the nature of learning, and the view of education as exemplified in each example. Specifically, she devotes a chapter to exploring each of the following educational technologies: online lecture videos, course podcasting, open courseware, plagiarism-detection software, widespread distribution of handheld devices (e.g., tablet computers) to students, and the gamification of education.

Her final chapter, "Gaining Ground in the Digital University," provides direction and encouragement for the future. Here Losh provides helpful principles to guide effective pedagogy and decision making, such as, "The Golden Rule should dictate decisions about instructional technology" (p. 224), meaning that faculty should not subject students to pedagogies or technologies that they themselves would not like to have used 'against them." Likewise, she suggests that "old" technologies still matter, and she cites a digital rhetoric specialist who lists "paper, crayons, scissors, tape, the Web, their smartphones" as essential tools for teaching computational media (p. 229). It is encouraging that Losh admonishes faculty and administrators that, when considering which technologies to implement, "the novelty should have worn off. The worst reason to implement a new instructional technology is because it is new" (p. 236).

Overall, Losh meets the objective she provides in the introduction: "This book tells the story of initiatives that fail because they treat education as a product rather than a process" (p. 8). Her storytelling and analysis of how and why things went wrong emphasize this point, and invite the reader to consider application to his or her own institution. *The War on Learning* would be valuable reading for all university personnel who have a hand in technology decision making – from administrators, to faculty members, to instructional designers, to those providing technical support. Losh's work gives much fodder for discussion among university personnel who are considering various technologies as part of their own teaching and learning environment.

For Christian educators, there is much wisdom that can be gleaned here, although Losh is not writing for a distinctively Christian audience. If education is not primarily about information, but rather about formation, as James Smith indicates in Desiring the Kingdom (Baker Academic, 2009), the way we teach students truly matters. The technologies we select, and the way we integrate them with the pedagogies we practice, will have an impact on this formation. Educational technologies, like all tools, are not neutral; they in fact embody a worldview in their design. Carefully considering the fit of a particular tool with one's preferred pedagogy, and its harmony with one's beliefs about teaching and learning is the first step in improving our use of educational technologies. Rather than acting as combatants in a war on learning, perhaps faculty and students can collaborate to explore how technology can be used in ways that improve both teaching and learning.

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