

# PERSPECTIVES on Science and Christian Faith

JOURNAL OF THE AMERICAN SCIENTIFIC AFFILIATION

***In This Theme Issue on  
Understanding and Helping Those with Alzheimer's ...***

Loving God with All Your Mind, and Alzheimer's

Quality of Life of Members of a Religious Community  
Living in Long-Term Care

Religious Coping While Providing Care for Someone  
with Alzheimer's Disease

***Bonus***

Recent Themes for Christians in Science Journals:  
A Centering Resonance Analysis

*"The fear of the Lord  
is the beginning of Wisdom."  
Psalm 111:10*

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James C. Peterson

# What Has Been Accomplished, and How Much More Needs to Be Done

The initial theme for this issue is neurology, experience, and care for those dealing with Alzheimer's. As our population ages and with no cure yet in sight, if we are not already caring for a relative with this condition, the odds are that we will, or will experience it directly ourselves. That is a daunting challenge, but not one that we face alone. Bryan Auday overviews the impact and current understanding of the condition. He also raises key questions for the Christian tradition as to how to live with such a challenge—whether as a patient or among those caring for them. Suzanne Cahill and Ana Diaz-Ponce tap the social sciences for insights into the experience of Alzheimer's in a worship-centered retirement community. Then Elise Eifert describes the difference that the Christian faith and others can make for caregivers.

As a bonus after the theme articles, three of our Brazilian colleagues—Jonathan Freitas, Matheus Salgado, and Guilherme de Carvalho—bring computational tools to analyze the article content of two journals addressing science and Christian faith. Specifically, they studied this journal, *Perspectives on Science and Christian Faith (PSCF)*, and the journal of the United Kingdom's Christians in Science titled *Science and Christian Belief*. The study categorizes the focus of articles in sometimes surprising ways. For example, two of the four articles of the *PSCF* animal theme issue did not fall under the category "Animal." By their analysis, one article in that theme issue was more focused on "Humanity" and another on "Broader Discussions." As an interdisciplinary journal, even the conversations of a theme issue are enriched and applied in a wider context.

It is noteworthy as well that, by definition, any sample has limits. The article surveys the five years from 2011–2015. The first issue published after the study period had four essays on the history of science and faith interactions. If that issue had fallen within the five years of the study, the proportion of historical articles would have been markedly different. Some

areas of investigation seem perennial, such as how to read the opening chapters of Genesis as we learn more from cosmology, genetics, anthropology, and hermeneutics. Yet, even within continuing topics, the study sees marked movement. Many ideas that were controversial when they first appeared in the journal have become routine as the discussion moves on to further questions.

What is most evident in the Freitas, Salgado, and de Carvalho article is that there is a striking breadth of investigation in *PSCF* from multiple disciplines. In the last issue of *PSCF*, the articles were written by a biologist, psychologist, historian, and physicist. Here, in this issue, we hear from the expertise of a neurologist, social scientists, and statisticians. Bringing into dialogue the best of the sciences with arguably the world's most global movement—the Christian tradition—raises countless points for interaction, challenge, and insight. With that breadth, this journal is unusually well positioned to tackle interdisciplinary challenges such as it does with Alzheimer's in this issue. Granted, it is a challenge for authors in *PSCF* to be true to the methods and insights of their own disciplines while, at the same time, speaking in a way accessible to readers expert in yet other disciplines—but it is well worth the effort.

Findings in one field can confirm or launch work in another. We have seen in these pages informative exchanges and expositions on creation care, teaching math, the nature of God, multiverses, the cognitive science of religion, fracking, science fiction as a tool of technology evaluation, phase transition from chaos to order, medicine and miracles, the possibility and role of chance in God's providence, open source software, bioethics, and more. In their article, Freitas, Salgado, and de Carvalho encourage us to reflect on what has been accomplished, and how much more needs to be done. ❖

**James C. Peterson**, editor-in-chief



Bryan C. Auday

## Article

# Loving God with All Your Mind, and Alzheimer's

Bryan C. Auday

*Alzheimer's, the most commonly diagnosed form of dementia, appears to be the result of our brains living beyond the period for which they were designed. The National Institute on Aging ranks dementia as the third leading cause of death for older people, behind heart disease and cancer. As the percentage of the world population over the age of 65 years continues to increase, a case can be made for focusing our attention on this devastating illness. The prospect of living with an incurable disease that in its late stages robs a person of traits that are inextricably linked to personhood is daunting. This article explores areas of Christian scholarship that will inform our understanding of this tragic disease.*

One of my all-time favorite books written on the topic of human memory is Daniel Schacter's *Searching for Memory: The Brain, the Mind, and the Past*.<sup>1</sup> In his chapter discussing amnesia and the brain, Schacter talks about his 55-year-old former patient, "Frederick," who had come to a memory disorders clinic at the University of Toronto. The clinic was set up to evaluate, investigate, and rehabilitate memory problems that came about as a result of traumatic brain injury or disease. This was the early 1980s and Frederick was referred to the clinic because he was suspected of being in the early stages of Alzheimer's disease (AD).

While there, Schacter learned Frederick had a passion for golf, so they soon made plans to hit the links together. Schacter turned the experience into a study by bringing along a tape recorder and asking Frederick a lot of questions about the jargon, etiquette, and rules of golf. He was amazed by Frederick's ability to access semantic memory (information concerning knowledge of the world, including

golf facts) as well as procedural memories (those involved in motor movements such as walking or playing a sport). However, on the tenth hole of the golf course, something bizarre happened. Frederick hit off the tee first and executed a wonderful shot over a creek, the shot landing on the fairway. Schacter then took his turn, struck the ball, and began to walk toward where it had landed. When he looked over his shoulder, he noticed that Frederick was teeing up another ball on the same hole, apparently having no memory of the previous shot he had struck just moments earlier. It was as though his memory of playing the hole had been wiped clean.

At the end of the round of 18 holes, Schacter was astounded to learn that Frederick had no specific memory for any stroke he had played during the entire day. He was not retaining any recent, episodic memories. This left Frederick with a memory disorder that robbed him of the capacity to form new personal, individual experiences. The next week Schacter took Frederick out for golf for a repeat performance. Frederick began to talk about his golf game with Schacter as though the two had never played together. Schacter did not have the heart to tell him about the previous week.

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This story serves to illustrate the importance of memory that we rely on every day in order to maintain active and healthy lives. When one encounters cases of memory failure, as seen with Frederick at the 10th hole, one might initially respond with a bemused laugh. But as one delves deeper into the ramifications of receiving a diagnosis of AD, the picture that emerges is no laughing matter. It is a devastating neurologically based disease that not only strips away short-term memories but progressively results in mental deterioration that takes away language and the ability to communicate, leaves one disoriented and confused, makes one unable to plan or manage activities of daily living, and can bring on personality changes that include anxiety and fear.<sup>2</sup> On some level, it came as no surprise that when Dr. Jack Kevorkian (aka “Dr. Death”) developed a lethal injection device as a means for assisted suicide, the first person to volunteer to be euthanized was a 54-year-old Alzheimer’s patient.<sup>3</sup> The prospect of living with an incurable disease that in its late stages robs a person of traits that are inextricably linked to personhood is daunting.

## Why Should We Care about Alzheimer’s Disease?

There is a plethora of questions, causes, passions, and notable topics that are all worthy of our attention. What makes AD worthy of our time over-and-above thousands of other diseases? One objective of this article is to argue that AD is so critically important to us as a species that it demands a vigorous and robust effort to learn how to treat not only its extensive symptoms, but, more importantly, its root causes.

In response to the question as to why we should care, currently we find that AD is recognized as a global issue of increasing significance. The World Health Organization reports that 47.5 million people have dementia with 7.7 million new cases being added each year. AD accounts for 60–70% of all dementia diagnoses.<sup>4</sup> In the US, it is the sixth leading cause of death with an estimated one in three seniors dying of some form of dementia.<sup>5</sup> The National Institute on Aging ranks it as the third leading cause of death (behind heart disease and cancer) for older people.<sup>6</sup> Since age is the strongest indicator of increasing one’s vulnerability to AD, it is critical to study trends in aging population demographics. Brains become more vulnerable to most forms of neurological dis-

ease and illness as one ages. Living into our seventh or eighth decade increases risks for neurological problems exponentially. People are now living longer than in past generations. The average life span for women living in the United States and Europe exceeds 81 years. If the current trend continues, more than half of the children born in these areas today will live past their 100th birthday.<sup>7</sup>

Michael Gazzaniga, an internationally recognized cognitive neuroscientist, writing about the disparity between body health being superior to brain health, states,

Now that we are able to live longer, we should pursue research that allows our brains to keep up with our bodies. Dementia may simply be the result of our brains living beyond what they were designed for.<sup>8</sup>

The World Health Organization predicts 75.6 million people will be living with dementia by 2030 and as many as 135.5 million by 2050.<sup>9</sup> Based on projections for 2050, the proportion of the population over the age of sixty-five will double from the current 8 percent to 16 percent, provoking an immediate need to better understand how to detect, diagnose, and treat AD. In addition to the personal indignities of living with a disease that strips one of memory, language, and, in late stages, the ability for self-care, many worry about the social and economic impact. Care for AD in the United States alone now exceeds \$600 billion each year. There is great concern that our global healthcare systems will become overwhelmed in the not too distant future.<sup>10</sup>

## What Is Known about Alzheimer’s Dementia?

In her book *Living with Alzheimer’s: Managing Memory Loss, Identity, and Illness*, Renée Beard extolls the boost that biomedical research into the brain received when George H. W. Bush declared the 1990s the Decade of the Brain.<sup>11</sup> Suddenly, the burgeoning discipline of neuroscience was given enormous public recognition along with significant financial incentives in the form of federal grants. This developed momentum for an ambitious agenda to discover what causes the massive cell death originally observed by German physician Alois Alzheimer. He published a case study in 1906 on a 51-year-old patient who possessed clinical and neuropathological findings no one had observed before.<sup>12</sup> In terms of where we stand now,



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there has been tremendous progress in diagnosing and documenting particular outcomes associated with AD. In the sixteen years that have passed since the end of the Decade of the Brain, however, there has been only incremental progress toward finding a cure or an acceptable treatment for the disease. At this particular time, there is no cure for AD and the treatment options are of questionable value, particularly for late stages of the disease.

AD is an irreversible brain disorder that is an acquired and persistent syndrome of intellectual impairment.<sup>13</sup> From disease onset, death occurs between two to fifteen years later.

When I teach neuroanatomy to my undergraduate students, I show them several examples of actual human brains which are kept under lock and key in my lab. Immediately, I hear the spontaneous “oohs” and “ahs” that invariably come when students observe actual brain tissue for the first time. Then the phones come out so they can take a selfie to show their Facebook friends. However, when I bring out a diseased adult brain from someone who most likely died from advanced AD, the mood of the room quickly changes. My students are awestruck by the stark visible differences in brain morphology between someone who has died from normal aging as compared to someone who suffered from AD. To even the casual observer—someone not trained in neurology or brain surgery—the brain tissue looks perverse. The normally bulbous gyri (the “bumps” that make up the cerebral cortex) are abnormally shrunk, while the sulci (the smaller grooves and creases between the gyri) are deep and wide. Overall, the students bear witness to a brain that has lost tens of millions (if not billions) of brain cells to an insidious disease evidenced by a staggering loss of volume. Next, my students' questions turn darker. How did AD contribute to this person's death? What kind of suffering did this person have to endure? Did the brain disease cause them to lose their sense of self-identity? Did AD strip them of their humanity?

### *Diagnosis of AD*

All dementias can be seen as falling into one of two categories: major or mild neurocognitive disorder (NCD).<sup>14</sup> For a person to be diagnosed with NCD, there needs to be evidence of substantial cognitive decline from a previous level of competency. The deficits must be significant enough to get in the way

of independent functioning. Since there are numerous conditions besides dementia that can diminish independent living skills, a diagnosis requires that the problem cannot be attributed to a mental disorder such as depression or schizophrenia.<sup>15</sup> Both major and mild NCD reside on a spectrum of cognitive and functional impairment. Mild NCD is seen as scores which are 1–2 standard deviations below the mean produced by standardized neuropsychological testing, while major NCD is assigned to declines that exceed two standard deviations. AD is a subtype of dementia.<sup>16</sup> For example, a diagnosis of AD is given when there is evidence of neuritic plaques. These plaques are found mostly in the cerebral cortex and result in the accumulation of tau proteins in neurons. Dozens of other dementias have all sorts of other causes. Lewy body dementia is caused by Lewy bodies forming inside neurons. Multi-infarct dementia is caused by injury to cerebral blood vessels which results in restricted blood flow and cell death. Infectious dementias are caused by a variety of bacteria and viruses which can harm brain cells.<sup>17</sup> AD is difficult to diagnose since there is a paucity of biomarkers available to test, and it is challenging to learn if neuritic plaques are present without doing a brain tissue biopsy (something that many people will not agree to). Brain-imaging technologies are still not recommended for routine clinical diagnosis.<sup>18</sup> Thus, until a technological advance surfaces that can reliably assess a biomarker of some kind, diagnosis of AD is best performed by assessing cognitive, behavioral, and functional symptoms.<sup>19</sup>

### *Risks Associated with AD*

Age remains the single most important risk factor for AD.<sup>20</sup> Researchers differentiate early-onset (acquiring symptoms at age 65 years or earlier) and late-onset (symptoms emerge after 65 years) forms of the disease. Early-onset familial AD is rare and accounts for less than 5% of all cases. There is an increase in risk for those who have had a family member with the disease. Molecular geneticists have found a common gene associated with late-onset AD called apolipoprotein E (APOE). However, age and genetics are not the only risk factors. Traumatic brain injury can increase the risk for mild or major NCD, and additional health factors which include vascular conditions such as heart disease, stroke, and high blood pressure can play a role. Also, metabolic conditions that lead to diabetes and obesity are correlated with AD decline of cognitive functioning.<sup>21</sup>

### *Clinical Symptoms and Progression*

Consistent memory loss (amnesia), particularly for recent memories, can be a frequent initial cognitive change that could signal the onset of AD.<sup>22</sup> Other early signs include having a difficult time finding words (naming objects), having difficulty following a conversation, and having changes in personality such as occasional episodes of confusion and disorientation.<sup>23</sup> The progression of the disease can be slow and insidious, in some instances lasting as long as a decade. Gradually, patients will transition from mild to major NCD with additional impairment to concentration, orientation, and social functioning.<sup>24</sup> Personality changes can include apathy, agitation, irritability, and in some instances, suspiciousness. In addition to the cognitive and personality changes, one can experience alterations in behaviors such as poor eating habits, hygiene issues, and the loss of initiating new activities.<sup>25</sup> In very late stages of the disease, one may become bed-ridden (it eventually attacks motor systems) and there is a total loss of speech and self-care.

### *Causes*

The cause of AD remains a mystery. More evidence is emerging that AD is not a single disorder. Given the early- and late-onset types, there is reason to believe that multiple genes could be involved in causing protein abnormalities. Several hypotheses are being investigated.<sup>26</sup> The amyloid cascade hypothesis, which has dominated the field, implicates increased amounts of beta amyloid in the development of AD. Yet, this hypothesis is not without its critics. Other investigations into causal mechanisms include looking at trace metals (e.g., aluminum salts) as being responsible for neurofibrillary degeneration, or considering whether the body may have an autoimmune reaction that can develop anti-brain antibodies that could incite neuronal degeneration. Also, poor circulation due to problems with blood flow is seen as part of the normal aging process between the ages of 30 and 60 years. However, in AD this decline is enhanced and there are no compensatory mechanisms which are initiated to counteract the change.<sup>27</sup>

### *Treatments in the Absence of a Cure*

In a 2016 review of the literature addressing pharmacological-based therapeutic strategies for AD treatment, Folch and colleagues agree that "there is no effective treatment capable of slowing down

disease progression."<sup>28</sup> During the past 30 years, over two hundred experimental drugs designed to treat AD have failed. With more than one hundred ongoing clinical trials, nothing has been found to stop the AD progression.<sup>29</sup> Despite the discouraging assessment, research using novel pharmacotherapies continues and in some instances is being used in clinical trials with humans.<sup>30</sup> Most of the therapeutics is based on the amyloid cascade hypothesis which states that the beta amyloid peptide is responsible for cognitive impairment. The goal is to develop drugs that can stop or minimize beta amyloid production or find a way to break up the clumps of beta amyloid plaques that have already formed.

Another approach to treating AD with drugs is to correct an apparent imbalance found in brain neurotransmitters. Most of the research has focused on cholinesterase inhibitors that inhibit enzymes from breaking down acetylcholine in the synaptic cleft. Several cholinesterase inhibitors have received United States Food and Drug Administration approval for treatment of mild-to-moderate AD (e.g., donepezil, rivastigmine).<sup>31</sup> Essentially, these pharmacological tools are used as neurocognitive enhancers in an attempt to improve memory, attention, and awareness. Unfortunately, the clinical outcomes have not been all that favorable for these drugs, particularly after one assesses the costs and benefits of taking these drugs for an incurable illness, potentially for many years. One should keep in mind that an important treatment outcome of any pharmacological intervention is to increase independence and to retain life skills.

Despite encountering roadblocks that have prevented the discovery of a drug cure, research into health psychology has given rise to mounting scientific evidence that lifestyle choices and psychological well-being (including religious belief and identity) can diminish the rate of AD later in life.<sup>32</sup> A recently published two-year randomized controlled study, which happens to be the gold standard of designs to investigate cause-and-effect links among variables, found that good diet, exercise, and an active social life led to significantly improved cognitive performance in people over 60 years, compared to a control group.<sup>33</sup> This study, as well as others, continues to collect more data in order to see if lifestyle choices can significantly impact the risk for developing AD or mitigating its affects once a diagnosis is made.

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### **Care for the AD Patient**

In the absence of a known cure, issues related to care for the AD patient are paramount. We must realize that persons living with AD—as well as their caregivers—are among the most disadvantaged and vulnerable people in our midst. The cognitive, emotional, and behavioral changes that occur over time can cause the person living with the disease agonizing emotional pain. In addition, the prospect (and eventuality) of losing one's mind can bring about debilitating anxiety and fear. A study by Sorensen and colleagues found that counselling and support groups for patients with mild AD improved general confidence (also self-esteem) and day-to-day coping skills.<sup>34</sup> It is essential to provide counselling that can promote coping skills early on in the progression of the disease. Otherwise, it might be too late for the person with AD to be capable of responding to the therapy.

When discussing care in AD, focusing on the person with the disease addresses only half the problem. Recent scholarship is now focusing on the caregivers, in part because a large majority (as high as 70%) tends to be family members (typically spouses and the adult children) who are witnessing the deterioration of someone they love and deeply care for.<sup>35</sup> Studies have shown that caregivers are overburdened and experience several adverse health outcomes such as anxiety and depression.<sup>36</sup> One reason the physical and mental health needs of care providers is so important is that they provide a critical role by delaying a transition to a long-term care facility. This enables the person with AD to remain in their home (a familiar environment) as long as they can.

### **Fertile Ground for Additional Scholarship**

The previous section was designed to serve as a brief introduction to some of the basic contemporary findings regarding AD. Now I would like to address an additional goal for this article, which is to lay the groundwork for identifying potential areas of scholarship that readers of *Perspectives on Science and Christian Faith* (PSCF) could find meaningful and profitable. Here are two questions that could guide our thinking: (1) What areas of AD scholarship should come into dialogue with our Christian faith? (2) As scientists who are informed by a Christian

worldview, what topics should we explore that will inform our understanding of this tragic disease?

### **Spirituality and Brain Function (or Dysfunction)**

In Kevin Seybold's insightful article, "Biology of Spirituality," he reviews some of the proposals of those who argue there is a biological basis for spiritual awareness.<sup>37</sup> One difficulty of this area of research lies in how to define the variables under study. In terms of "spirituality," Seybold understands "spirituality to be a property that emerges out of the brain; it is an embodied capacity which enables us to have personal relatedness."<sup>38</sup> If this is an acceptable definition—at least from a biological and psychological perspective—then one could speculate on how spirituality might be affected in an individual who possesses a brain ravaged by an insidious disease.

In the same article, Seybold goes on to cite David Hay's research that involved years of conducting interviews with both adults and children regarding spirituality. Hay came to the conclusion that spiritual awareness is an innate biologically structured component that is common to all of us.<sup>39</sup> Some examples of these universal components involve awareness of God's presence, awareness that prayers can be answered, awareness that God is present in nature, and awareness that God is involved in worldly events.<sup>40</sup> Whether Hay's observations are correct or not, his ideas could inspire one to explore new questions on the relationship between spirituality (*awareness* would be one of several possible dimensions) and brain dysfunction as found in AD.

It is my impression that the vast majority of available research on the underlying neurobiological processes of spirituality has occurred within the context of subjects who possess normal, healthy brains (as it should). Evidence for this can be found by perusing the literature from the discipline of neurotheology.<sup>41</sup> Studies from neurotheology often include participants from university subject pools, spiritual advisors, experienced practitioners of meditation, recent converts to a faith, members of different religious groups, atheists, among others.<sup>42</sup> What I am suggesting is that there appears to be rich and fertile soil for growing additional research that examines dementia (a dysfunctional, unhealthy brain) and the



clinical, theological, social, or neurobiological implications for spirituality. Spirituality, as one might assume, could include individuals who are attempting to maintain a relationship with God. In addition, the door appears wide open for looking at any of the areas just mentioned within a particular stage of AD. Since the disease contributes to cognitive, emotional, behavioral, and physical health changes in a progressive ever-worsening direction, new scholarship could take into consideration how a particular stage affects spirituality.

I do not want to suggest that there is little research into the brain and religious or spiritual experiences. I am simply suggesting that there appears to be a paucity of research that investigates these matters involving abnormal rather than normal brain functioning. One such example of someone who investigated spirituality and brain pathology is the late neurologist Oliver Sacks. In his book *Hallucinations*, Sacks addresses the “sacred” disease of ecstatic seizures that brings on a condition referred to as hyper-religiosity.<sup>43</sup> When some (not all) individuals experience seizures emanating from the temporal lobes, it may cause them to report a spiritual experience. Some describe the experience as an epiphany or a revelation of a deep reality. Still others mention deep emotional feelings of elation. The majority of those who experience hyper-religiosity report they wish to experience their seizures again.<sup>44</sup> It should be pointed out that there are critics who say there is scant evidence for temporal lobe epilepsy causing consistent changes in religious feelings or behavior; however, the fact that it has been reported in the literature raises some interesting questions regarding the intersection of spirituality and brain health.

Malcolm Jeeves, in his book *Human Nature at the Millennium: Reflections on the Integration of Psychology and Christianity*, included a discussion of a spiritual dimension to neural degeneration, specifically addressing AD. His lucid writing amplifies the problem I am attempting to address: What are the implications for the spiritual lives of people who suffer from AD? In Jeeves’s own words,

What is not so readily recognized is that within the Christian community there are those who are suffering spiritual distress because what begins as neural degenerations in the brain leads to psychological disordering of the mind and that this in turn may have profound spiritual consequences.<sup>45</sup>

Jeeves is addressing the clinical ramifications which result in distressing outcomes for the believer who wishes to maintain a close relationship with God. Once again, here is another area in which we could use additional scholarship. True, basic research into the specific neurological mechanisms that are involved in spirituality is important. But let us not forget the clinical implications of someone struggling to move forward in life—with their faith intact—while their brain is wasting away. Investigating the spiritual significance of losing one’s mind deserves more attention than it is getting. Imagine a person of faith with AD. How will their personal devotion and relationship with God be compromised? Will someone with AD believe that God is abandoning them because they are no longer fit to serve him as they had in the past? Would the distortion of mind cause them to believe that a previous sin has brought on this terrible condition? These are questions that span a number of academic disciplines.

## Religion, Resilience, and Health (Both Physical and Psychological)

In their chapter “Anchored by Faith: Religion as a Resilience Factory” in the *Handbook of Adult Resilience*, Pargament and Cummings point out that whereas the founding figures in psychology (e.g., William James) saw religion as a central factor in understanding human behavior, the discipline of psychology virtually ignored the topic through much of the twentieth century.<sup>46</sup> They argue that there has been a crucial shift over the past twenty years, and religion (seen as spirituality, religious behavior, etc.) is beginning to get the attention that it deserves. Religious behavior is no longer viewed as a source of pathology or explained away by psychological constructs that reduce it to more basic phenomena.<sup>47</sup> Investigators are now more often looking at religion as a source of strength rather than a source of weakness.

Since this new era makes it “acceptable” to investigate religion (for our purposes here, religion and spirituality will be interchangeable), one can ask the question: Can religion promote resilience for coping with a devastating illness? The literature on *resilience* grew out of the subdiscipline from positive psychology which was popularized by social psychologist Martin Seligman in the late 1990s. Resilience is one of several constructs that positive psychology addresses, since it fits its overarching

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goal of scientifically studying strengths that enable individuals and communities to thrive.<sup>48</sup> It is fair to ask the question: How might the study of resilience benefit someone battling an incurable brain disease? Granted, changing a person's psychological frame of mind may do nothing to stop the progress of AD; however, as we learned earlier, several of the deleterious outcomes fall on the psychiatric spectrum. These include anxiety, fear, loss of hope, depression, confusion, loss of confidence, among others. This treatment is similar to taking a medical approach that ramps up the immune system to fight off a virus. Healthcare providers working with religious patients suffering from AD would be able to suggest and reinforce coping mechanisms that could alleviate psychiatric suffering. In the absence of a pharmacological cure, the larger context of lifestyle-mind-body interactions needs to be explored.

The stalwart of investigators into religion and health is Harold Koenig from Duke University Medical Center. His seminal review article on this topic, published in 2012, involved examining more than 3,300 studies published between 1872 and 2010.<sup>49</sup> It is important to note that 80% of the studies Koenig reviewed regarding the relationship between religion and health involved mental health as opposed to physical health. His overall conclusions reveal that religion exerts positive as well as some negative effects on mental health. When thinking about mental health, one should keep in mind that this consists of psychological, social, and behavioral aspects of life. In terms of positive relationships, overall, religion was found to help individuals to cope better with adversity. In terms of positive emotions, religion was found to increase hope, optimism, self-esteem, and sense of control; reduce anxiety; and reinforce meaning and purpose in life.<sup>50</sup> Relating some of these benefits specifically to a person with AD, Koenig found evidence that some changes in positive emotions could be responsible for improvements to cognitive functioning. Koenig states,

Furthermore, R/S (religious/spiritual) involvement may also engage higher cortical functions involved in abstract thinking (concerning moral values or ideas about the transcendent) that serve to "exercise" brain areas necessary for retention of memories.<sup>51</sup>

In terms of negative correlations between religion and mental health, a small percentage of individuals would experience an increase in depression, anxi-

ety, suicide, and substance abuse, particularly if they focused on the cause of their problems being due to sins they had committed. There is not sufficient room in this article to address all of the ramifications of research into religion and health. One area that is certainly in need of additional scholarship would be in the possible mechanisms involved that contribute to the impact religion has on health issues either directly or indirectly.<sup>52</sup>

Translating research findings into practical outcomes that can help people who suffer from illness or disease is critically important. Koenig elucidates several reasons for needing to move in this direction. For example, since learning about the positive effect that religion can have on health, we should educate people that nurturing their religious and spiritual beliefs can strengthen existing coping skills that could mitigate current health problems.<sup>53</sup> In terms of searching for areas that would benefit from additional conversation, here are a few of the possible questions to explore: How might a person's religious beliefs affect the medical decisions they make? How might the religious beliefs of a patient's physician or care provider influence the medical advice they make regarding the type of care they recommend? How might we integrate our Christian beliefs into patient care for those with AD? Numerous accreditation organizations for health care require that providers respect patients' cultural and personal values, beliefs, and preferences (which would include religious beliefs), so what mechanisms could be put in place that inform providers about the spiritual practices of the individuals they are trying to help? The bottom line is that we need to act on our knowledge that a positive correlation exists between religion and health so that millions of people who are struggling with AD might be afforded some additional relief.

## Self-Awareness, Self-Identity, and Memory

Anosognosia represents a condition in which a person lacks awareness for a particular deficit or illness. It is a neurological condition that is typically associated with parietal lobe lesions.<sup>54</sup> Although AD is caused by a different pathological mechanism, due to its ability to diminish complex reasoning skills and bring about confusion and profound memory loss, anosognosia-like symptoms can emerge. Research into lack of self-awareness has focused mostly on disease awareness; essentially, this is knowledge

about the *cognitive* and *behavioral* deficits the illness has caused the patient or family member.<sup>55</sup> Yet, far fewer studies have been conducted on the awareness of *personality* changes and still fewer on *spiritual* changes.<sup>56</sup> Rankin and colleagues found that when a group of AD and frontotemporal dementia patients were asked about their personality characteristics, both groups reported accurately from their memory prior to the onset of dementia.<sup>57</sup> Since their long-term memories were still intact, that is what they relied on for describing themselves. Unfortunately, the old memories were not being updated due to the changes brought on by dementia.

Another investigator, Glenn Weaver, has spent years trying to elucidate the changes in self-identity (which includes theists who see themselves in relation to God) brought on by AD.<sup>58</sup> His research reveals that changes in self-identity can have a profound impact on an individual's personal faith in God. Specifically, Weaver found that AD can bring about a loss of one's spiritual narrative due to memory-processing deficits. In addition, it can bring about a sense of spiritual emptiness, reduce participation in spiritual practices (attending church, reading scripture), and have difficulty experiencing God's presence for peace and comfort.<sup>59</sup>

A frequently cited autobiographical account of someone with dementia who describes how the disease impacted his self-awareness and eventually his spiritual life was written by Robert Davis, a Presbyterian minister who was diagnosed with early-onset AD at 53 years old. He decided to write a book about his experience. The early chapters are lucid, insightful, and revealing. As his disease progressed he lost the ability to form intelligent sentences and asked his wife to finish the book on his behalf.<sup>60</sup> His description concerning the loss of his spiritual life is remarkable and yet tragic. There was a time when he had a vibrant and mature Christian faith. He prided himself on being able to memorize long portions of scripture. Over time, the disease took away his ability to commune with God and he felt a sense of abandonment.<sup>61</sup>

Even the venerable Oliver Sacks, who had an extraordinary gift for humanizing people suffering from devastating neurological disorders, did not find the time (or will) to write very much about AD. Perhaps the task of humanizing someone who is in the late stages of AD is a bit too tall an order. How

do you bring dignity to someone who is being systematically stripped of every trait we associate with being human? Suffice it to say, there are many questions that still remain to be fully answered when it involves the interaction of complex constructs such as self-awareness (and identity), spirituality, and neurological disease.

## Soul Care for the Person with Alzheimer's Disease

In 2010 a position paper was put forth by the International Association of Catholic Bioethicists titled "Statement on Caring and Giving Hope to Persons with Progressive Cognitive Impairments and Those Who Care for Them." One aim of the paper was to provide "philosophical and theological grounds for valuing persons living with progressive cognitive impairments *as persons* and for committing to provide them with appropriate and loving care."<sup>62</sup> For our discussion, this raises the question: How should we provide care for the person with AD and how might our care change as the individual progresses from mild to more severe symptoms?

The Catholic bioethicists begin to answer this question with a theological statement: *All* human beings are persons with intrinsic dignity and worth.<sup>63</sup> This includes those with cognitive impairments regardless of the severity. In their words, the moral status of the person with AD cannot change. Their humanity is irrevocable. Those called upon to provide care to those with dementia are admonished to (1) encourage persons with AD to participate as they are able in their communities without stigma; (2) ensure that care is holistic by treating biological, psychological, social, and spiritual needs; (3) take a person-centered approach that best addresses their specific needs and accounts for past wishes and beliefs; (4) account for appropriate limits of treatment, given that no cure exists, so that the person's circumstances will be taken into consideration.<sup>64</sup> Weaver, mentioned earlier, makes the statement that dovetails nicely with the statement above by saying we "have an ethical responsibility to bestow personhood on dementia patients even into the last stages of the disease."<sup>65</sup> One implication of the second point mentioned above involves the need to conduct an assessment of the spiritual needs of the person with AD. Lauren Seifert and her colleague Melinda Baker provide several insights into the challenges associated with assessment of religious coping, in light of the fact

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that this is traditionally done through the use of self-report measures. Depending on the mental state of the person with AD, this might not be possible. One would need to look at pre-morbid strategies in order to determine how to move forward.<sup>66</sup>

Ultimately, soul care for a person with dementia involves addressing the physical, psychological, social, and spiritual (given that the individual is receptive to spiritual care; it should not be forced upon them) dimensions. Addressing many questions concerning soul care would be a tremendous benefit to the AD literature. As one possible example of a question arising from the spirituality area: How might we offer worship services to those who are in advanced stages of AD, yet need spiritual nourishment?

### Educating Future Care Providers

A study by Elaine Eshbaugh in 2014 investigated a group of 200 college students who completed an online survey that included the Alzheimer's disease Knowledge Scale. Despite the wide prevalence of the disease, she was interested in learning more about what college students actually understood about the disease.<sup>67</sup> Eshbaugh found that one area of insufficient knowledge for the college students concerned the risk factors involved in AD. The students were mostly unaware that factors such as high blood pressure or high cholesterol (both influencing blood flow to the brain) increase the risk of developing symptoms for AD. She goes on to say that "today's college students subscribe to many myths about the disease and these misconceptions may have negative consequences for individuals, families, and society."<sup>68</sup> Additional research has shown that caregivers (80% of whom are family members) generally lack knowledge in the areas of prevalence, symptoms, and causes of the disease.<sup>69</sup> The implication of this is that the lack of proper education regarding dementia could have an adverse impact on the implementation of treatment plans.

Currently, I serve on a task force for the Society for the Teaching of Psychology, whose aim is to put forth recommendations regarding how psychology (or in my case neuroscience) can be shared with the general public. The central goal is to look for ways that we can educate the public (at no cost to them) on relevant topics that will maximally benefit their circumstances. We are attempting to be as creative

as possible about how we can deliver the content of the education so that it captures the attention of people who have been out of school, in some cases, for several decades. I mention this because many *PSCF* readers are academics and would be considered highly skilled communicators, both in writing and in speaking. The AD literature clearly indicates the need for educating the general public, health professionals, and caregivers. The generation of ideas to provide educational programs to current and prospective care providers could be extremely valuable.

### Ethical Issues in Dementia Care

Numerous ethical issues are present from the initial point at which early signs of AD are detected to throughout the course of this multistaged disease. Beginning with early detection of AD, Niklas Mattsson and his colleagues raise several ethical questions regarding the potential benefits of someone receiving an early diagnosis against its possible disadvantages.<sup>70</sup> For many medical conditions, the earlier a problem is discovered the better the prognosis for recovery. This is common when a particular disease or illness has an effective treatment. In the case of AD, a cure does not exist and the availability of antidementia drugs has questionable value. So, what is the benefit of receiving an early diagnosis of AD? They point out that the lack of precise biomarkers (e.g., analysis of cerebrospinal fluid) makes it difficult to avoid an unacceptably high degree of misdiagnosis.<sup>71</sup> In the absence of disease-modifying treatment, one could argue that it would be more ethical to leave the choice "to know" or "not to know" to the patient. In other words, one should not assume that everyone should be told that they are suspected of being in the early stages of AD. Once a diagnosis is communicated, stigmatization can result and feelings of depression, hopelessness, and despair could set in.<sup>72</sup> However, one positive outcome of learning about an early diagnosis is that it allows a person time to discuss various options for treatment and care while they still have enough cognitive faculties to make an informed decision.

Turning attention to treatment options using antidementia drugs, Anna Huizing and colleagues discuss several ethical issues concerning the use of cholinesterase inhibitors. For example, the possibility exists that a new drug could create unrealistic expectations that a "magic bullet" for dementia is available, and this could divert attention away from noncognitive

care options that could be addressed. Also, another potential ethical problem proposes that drugs might simply prolong the earlier stages of dementia by providing a transient improvement in cognition. Since earlier stages are most often accompanied by worry, anxiety, and other psychiatric issues, it just might prolong the time during which more agonizing symptoms are experienced. Ethical issues abound when it comes to drugs and AD. Perhaps the one that is cited most often regards the use of drugs as a chemical restraint on behavior as institutionalized care facilities attempt to manage some of the more challenging behaviors such as agitation, aggression, and wandering off property grounds. Looking for more-acceptable alternatives to dispensing major tranquilizers would improve care.

## Conclusions and Invitation

The issues that surround AD are manifold. In this article I have attempted to throw some light on this topic, due to the significant implications it has for society. The current personal, social, and economic costs are staggering, and the best prognosticators tell us that the problems are only going to become greater. I have attempted to open a conversation on the subject of AD. In no way did I do justice to the myriad of topics that flow out of this complex disease. My hope is that scientists with deep convictions for Christ and his kingdom will be encouraged to join the conversation and contribute, in a meaningful way, to the current scholarship so that we might be able to offer insights that will benefit this desperate (and growing) population. ♦

## Notes

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- <sup>3</sup>Jack Kevorkian's reference comes from <http://www.biography.com/people/jack-kevorkian-9364141>.
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- <sup>6</sup>Dharma Singh Khalsa and George Perry, "The Four Pillars of Alzheimer's Prevention," *Cerebrum* (March 31, 2017), [http://www.dana.org/Cerebrum/2017/The\\_Four\\_Pillars\\_of\\_Alzheimers\\_Prevention/](http://www.dana.org/Cerebrum/2017/The_Four_Pillars_of_Alzheimers_Prevention/).
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- <sup>8</sup>Michael S. Gazzaniga, *The Ethical Brain* (New York: The Dana Press, 2005), 22.
- <sup>9</sup>World Health Organization, "Dementia: Fact Sheet."
- <sup>10</sup>National Center for Health Statistics, "Life Expectancy," <http://www.cdc.gov/nchs/fastats/life-expectancy.htm>.
- <sup>11</sup>Renée L. Beard, *Living with Alzheimer's: Managing Memory Loss, Identity, and Illness* (New York: New York University Press, 2016).
- <sup>12</sup>Cahill et al., "Technology in Dementia Care."
- <sup>13</sup>Kolb and Whishaw, *Fundamentals of Human Neuropsychology*, 7th ed.
- <sup>14</sup>American Psychiatric Association, *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed.
- <sup>15</sup>Ibid.
- <sup>16</sup>Kolb and Whishaw, *Fundamentals of Human Neuropsychology*, 7th ed.
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- <sup>18</sup>M. Filippi et al., "EFNS Task Force: The Use of Neuroimaging in the Diagnosis of Dementia," *European Journal of Neurology* 19, no. 12 (2012): 1487-501, <https://www.ncbi.nlm.nih.gov/pubmed/22900895>.
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- <sup>21</sup>Alzheimer's Association Report, "2015 Alzheimer's Disease Facts and Figures."
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<sup>39</sup>*Ibid.*

<sup>40</sup>*Ibid.*

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<sup>42</sup>Andrew Newberg and Mark Robert Waldman, *How God Changes Your Brain* (New York: Ballantine Books, 2009).

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<sup>45</sup>Malcolm Jeeves, *Human Nature at the Millennium: Reflections on the Integration of Psychology and Christianity* (Grand Rapids, MI: Baker Books, 1997), 61.

<sup>46</sup>Kenneth Pargament and Jeremy Cummings, "Anchored by Faith: Religion as a Resilience Factor," in *Handbook of Adult Resilience*, ed. John Reich, Alex Zautra, and John Stuart Hall (New York: The Guilford Press, 2010), 193–210.

<sup>47</sup>*Ibid.*

<sup>48</sup>Shane J. Lopez, Jennifer Teramoto Pedrotti, Charles Richard Snyder, *Positive Psychology: The Scientific and Practical Explorations of Human Strengths*, 3rd ed. (Washington, DC: Sage Press, 2014).

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<sup>51</sup>*Ibid.*, p. 10.

<sup>52</sup>*Ibid.*; Ralph W. Hood Jr., Peter C. Hill, and Bernard Spilka, *The Psychology of Religion: An Empirical Approach*, 4th ed. (New York: The Guilford Press, 2009).

<sup>53</sup>Koenig, "Religion, Spirituality, and Health"; Yaron G. Rabinowitz et al., "Is Religious Coping Associated with Cumulative Health Risk? An Examination of Religious Coping Styles and Health Behavior Patterns in Alzheimer's Dementia Caregivers," *Journal of Religious Health* 49, no. 4 (2010): 498–512, <https://www.ncbi.nlm.nih.gov/pubmed/18791891>.

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<sup>56</sup>*Ibid.*

<sup>57</sup>*Ibid.*

<sup>58</sup>Glenn Weaver, "Embodied Spirituality: Experiences of Identity and Spiritual Suffering among Persons with Alzheimer's Dementia," in *From Cells to Souls—and Beyond: Changing Portraits of Human Nature*, ed. Malcolm Jeeves (Grand Rapids, MI: Eerdmans, 2004), 77–101.

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<sup>60</sup>R. Davis, *My Journey into Alzheimer's Disease* (Wheaton, IL: Tyndale House, 1989).

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<sup>62</sup>International Association of Catholic Bioethicists, "Statement on Caring and Giving Hope to Persons Living with Progressive Cognitive Impairments and Those Who Care for Them," *The National Catholic Bioethics Quarterly* 10, no. 3 (2010): 554, [http://eprints.maynoothuniversity.ie/3516/1/ML\\_Statement.pdf](http://eprints.maynoothuniversity.ie/3516/1/ML_Statement.pdf).

<sup>63</sup>*Ibid.*

<sup>64</sup>*Ibid.* I listed only some of the aims, not all of them.

<sup>65</sup>Weaver, "Embodied Spirituality," 97.

<sup>66</sup>Seifert and Baker, "An Individualized Approach to Religious Coping in Alzheimer's Disease." See also the article by Eifert and Eddy, "The Role of Needs Assessments in Enhancing Support Service Utilization by Family Caregivers of Persons with Alzheimer's Disease."

<sup>67</sup>Elaine M. Eshbaugh, "Gaps in Alzheimer's Knowledge among College Students," *Educational Gerontology* 40, no. 9 (2014): 655–65, <http://dx.doi.org/10.1080/03601277.2013.863573>.

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<sup>69</sup>*Ibid.*

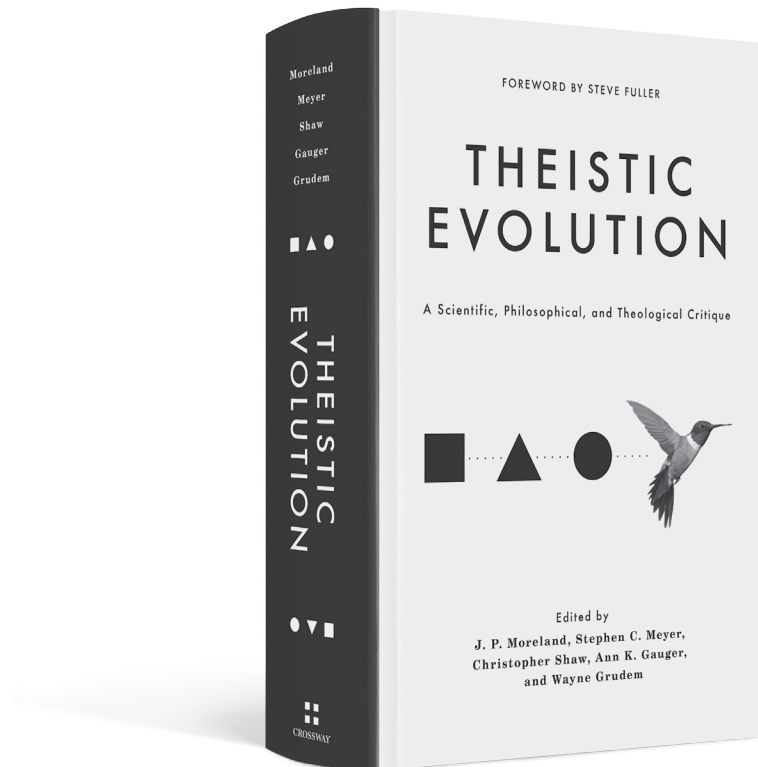
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# IS THEISTIC EVOLUTION A VIABLE THEORY?



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Suzanne M. Cahill



Ana M. Diaz-Ponce

# Quality of Life of Members of a Religious Community Living in Long-Term Care

Suzanne M. Cahill and Ana M. Diaz-Ponce

*This qualitative study investigated perceptions of quality of life among a small sample of elderly nuns (N=15) and one priest identified as having a cognitive impairment and who were residents in a religious nursing home. By using in-depth semi-structured interviews, it compared their self-reports of quality of life with those provided by the nurse manager. Following data analysis, four key categories linked to the overarching theme of continuity emerged. These were (1) religion, (2) belonging, (3) autonomy, and (4) altruism. Findings showed that most nuns claimed they enjoyed a good quality of life; however, their perceptions of a "good life" were often at variance with those of the nurse manager, whose appraisal tended to be based on residents' physical functioning, cognitive status, and age, and not on their religion, belonging, and altruism. This study generates new findings on the quality of life of members of religious orders with a cognitive impairment.*

By international standards, Ireland has a relatively young population. There are approximately 625,500 people aged 65 and over in Ireland, yet this figure is set to more than double over the next thirty years.<sup>1</sup> Like other Western countries, only a small proportion (circa 4.6%) of older Irish people are residents in long-term care.<sup>2</sup> While the topic of their quality of life (QoL) has received some recent attention,<sup>3</sup> less is known about the QoL of aging minorities, including nuns and priests who, because of chronic health conditions and disability, require long-term care. This study explores the

QoL of members of religious orders living in one particular religious-based nursing home operating exclusively for religious orders. Research into the needs of aging religious people is important because this is an international and multifaith issue.

## Literature Review

Using key terms such as religion, QoL, nursing home, cognitive impairment, and dementia, an extensive literature search was undertaken. Search engines used included Sage, PubMed, Scopus, CINAHL, PsycINFO, and ProQuest. No articles of direct relevance to the topic were found. Accordingly, while a substantive body of literature exists on the topics of QoL and dementia<sup>4</sup> and QoL and long-term care,<sup>5</sup> published works about the QoL of members of religious orders with dementia or cognitive impairment living in long-term care facilities are lacking. The much-cited Nun study,<sup>6</sup> which followed 678 Catholic nuns over a number of years, is one exception. While the latter showed how spirituality and faith appeared to influence these

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nuns' life expectancy and QoL, the main focus of the Nun study was not on QoL per se but rather on risk factors for Alzheimer's disease and the related dementias.

An existing body of literature on religion, spirituality, and dementia reveals how religion—through providing comfort, fostering strength, engendering hope, and relieving fears and anxieties—can confer positive coping mechanisms for both people with dementias and also their informal caregivers.<sup>7</sup> Faith, with a strong belief in God, has been shown to enable people with early stage dementia to face difficulties and uncertainties.<sup>8</sup> A conceptual distinction is made in this literature between the terms religiosity and spirituality. Religion has been defined as the process by which humans try to understand, experience, and communicate spiritual insights—a process that, it is argued, provides some aspect of institutionalization (e.g., sets of rules, rituals, language, and ways of interpretation).<sup>9</sup> Spirituality, in contrast, is all-encompassing and is not necessarily formal religion. It is noted that as cognition declines, the spiritual aspect of the person may become the only way to experience meaningful exchanges. Other experts argue that while religion most often refers to a particular doctrinal framework (guiding belief systems), spirituality (which may or may not be linked with a particular religion) is more focused on a search for meaning in life. It is these meaningful exchanges that are said to bring hope and purpose amid the devastation of dementia.<sup>10</sup> Propst and colleagues found that those who are more religious experience greater well-being and life satisfaction, especially if a religious perspective is introduced into their care.<sup>11</sup> They also revealed that, for some, the continuation of religious practice or some aspect of worship, through the course of their dementia, is important. This may include some of the principal values of the religious community, including submitting to authority.

In terms of proxy versus subjective QoL ratings, it is noted that people with dementia can be reliable informants of their own QoL and that proxy ratings (i.e., ratings done by others) generally differ from self-assessments.<sup>12</sup> People living with dementia tend to report their experiences in the here and now, whereas proxies usually report on both past and current situations.<sup>13</sup> Proxy ratings may be biased by the proxy's own expectations and belief system, by the burden of care, and by a prior or current relation-

ship.<sup>14</sup> When comparing both sources, patient/proxy agreement about the QoL in dementia has been shown to be only moderate.<sup>15</sup> One study showed that self-ratings on QoL by residents with dementia was significantly higher than nursing staff ratings.<sup>16</sup> The study concluded that if proxy ratings are used, primary nurses should perform them.

## Research Methods

### *Nursing Home Selection*

Fieldwork for this study took place in a Dublin nursing home operating exclusively for members of a Roman Catholic religious order. The facility was one of four nursing homes randomly selected for two other interrelated published studies. The first published study was on the topic of dementia prevalence in nursing homes,<sup>17</sup> and the second was on the QoL of people with different levels of cognitive impairment living in nursing homes.<sup>18</sup> In undertaking the data analysis for the QoL and dementia study,<sup>19</sup> it became obvious that QoL data of those belonging to religious orders was so different that the analysis warranted a separate write up. In this article, we report findings on QoL of these people who are members of the same religious order.

At the time of research, this private nursing home (a large single-story bungalow) had been in existence for some 27 years and accommodated 28 residents. Most residents had lived in community/convent settings prior to moving into long-term care and hence had prior experience of communal living. Many had worked on missions and/or in orphanages, teaching and nursing the sick and disadvantaged. Several were well acquainted with each other prior to nursing home admission, through earlier years spent in various mission/charity locations. The nursing home employed 35 staff: 18 health care attendants, 7 nurses, 3 domestic staff, 3 kitchen staff, 2 administrative staff, and 2 directors/nurse managers. It subscribed to a person-centered philosophy of care, was committed to staff training, and had a multi-sensory garden, a chapel, and separate bedrooms for all but three of the terminally ill residents.

## Data Collection Instruments

### *The Mini Mental State Exam*

The Mini Mental State Exam (MMSE) was used,<sup>20</sup> and we followed Folstein's recommendations for

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cognitive impairment (CI) severity, namely (1) normal cognitive function = 27–30, (2) mild CI = 21–26, moderate CI = 11–20, and (3) severe CI = 0–10.

### *Interview schedules*

An interview schedule containing fifteen simple open-ended questions was used to assess residents' QoL (see appendix 1). The questions asked were informed by the published literature on QoL and dementia.<sup>21</sup> Examples of these questions include "What makes you happy?" "What makes you sad?" "What do you like most about living here?" "What do you like least about living here?" and "What helps you enjoy your days here?" In addition, a short interview schedule, which asked questions about residents' demographic profile, was designed for the nurse manager (NM). The NM was also asked to rate each resident's QoL using a Likert scale with the response categories of (1) very poor, (2) poor, (3) fair, (4) good, (5) very good, and (6) excellent. No interview was audio-taped but extensive notes were taken throughout the interviews.

### *Inclusion criteria for residents*

To be eligible for this study, participants needed to (1) be a resident of this nursing home and (2) have a mild, moderate, or severe cognitive impairment as reflected in a MMSE score of less than 27.

## **Procedure**

### *Sampling*

All 28 residents of this Irish religious nursing home were invited to take part in the study, and the first 25 who agreed were initially included. Eight were later excluded because of blank interviews arising due to aphasia and to significant cognitive/communication problems. Among the remaining 17 and following screening for cognitive impairment, one nun was excluded based on her MMSE score, which indicated that she was still cognitively intact. The final sample consisted of fifteen nuns and one priest.

### *Data Analysis*

Data was scrutinized using a thematic analysis approach. Thematic analysis generally involves different steps in which the researcher identifies, analyzes, and reports on patterns of meaning or themes important to the description of the phenomenon.<sup>22</sup> The first step of the analysis involved familiarization with the data; it was performed by two different researchers who repeatedly and carefully read the 16 interview scripts and the NM data.

Subsequently, both researchers performed an initial coding of the data independently. At this stage, the researchers aimed to code the data, look for categories, and identify the key overarching theme

**Table 1: Thematic Framework for Analysis**

Overarching Theme	Categories	Codes
Continuity	Religion	<ul style="list-style-type: none"> <li>Fulfilling religious obligations (Mass, Holy Communion, etc.)</li> <li>Access</li> <li>Vocation and joining a religious order</li> <li>Presence of God in life</li> </ul>
	Belonging	<ul style="list-style-type: none"> <li>Getting on well, togetherness</li> <li>Knowing each other</li> <li>Part of the community</li> <li>Feeling at home</li> <li>Other relationships (family, friends, etc.)</li> </ul>
	Autonomy	<ul style="list-style-type: none"> <li>Physical independence</li> <li>Independence from others</li> <li>Privacy</li> <li>Choice</li> <li>Respect of rights</li> </ul>
	Altruism	<ul style="list-style-type: none"> <li>Compassion and acceptance</li> <li>Helping others</li> <li>Doing good</li> </ul>



observed in the data, focusing on residents' experiences and on the elements that were contributing to residents' lives positively or negatively. The results of this initial coding process were compared and agreement reached on the overall thematic framework. All interviews were analyzed using this framework. Any new codes emerging from the analysis were incorporated into the framework. Table 1 shows the thematic framework (i.e., theme, categories, and codes).

Finally, emergent codes and categories from the respondents were compared against the NM data and with the international literature related to QoL in long-term care.

## Results

### *Socio-Demographic Characteristics of the Sample*

The mean age of participants was 88.6 years (range = 76 to 98 years). Mean length of stay in the nursing home was 3.3 years (range = 2 months to 12 years). Eleven (69%) had a secondary-level education and five (31%) had a third-level education. According to the NM, in twelve cases, admission was precipitated by dementia; and in another four cases, for medical reasons. Among the 16, and based on MMSE assessment, 5 had a mild cognitive impairment; 7, moderate; and 4 were severely impaired.

### *Continuity*

The overarching theme identified in this study is "continuity," which explains how the study participants constructed meaning to their everyday QoL. The categories forming the basis for this overarching theme are (1) religion, (2) belonging, (3) autonomy, and (4) altruism. As the data to follow show, the four categories embodied in the theme of continuity connect back to the biographies, life stories, behaviors, and experiences these members of a religious order had prior to their nursing home admission. In earlier years, most had lived in communal settings and had pursued religious lives not entirely different to the lives they were now leading in the nursing home.

### Religion

When asked to reflect on what was most important to them in their everyday lives in the nursing home and what made them happy, eight nuns identified religion. Most nuns stated that they looked forward to practicing their religion through attending Mass,

receiving Holy Communion, and reading the Bible along with their prayer books. Fulfilling their religious obligations was an integral component of their earlier years, and it was still something that continued to give their everyday life purpose and meaning.

*"[What is important to my life now is] my Mass, time for my prayers, the rosary." (Nun, aged 87, MMSE = 23)*

*"My prayer life [is most important]. I look forward to going to Mass, receiving our Lord every morning. It is something I look forward to. If I don't get our Lord, I am hungry; it is the biggest part of my life. It is the main part of my day." (Nun, aged 82, MMSE = 25)*

Another source of happiness for these nuns and the priest was having access to a chapel in the nursing home and being able to attend daily Mass. Those in poor health or with reduced mobility could follow Mass on television in their own rooms. The priest visited these nuns in their room to give them Holy Communion.

*"Well, I feel happy every day, I suppose prayers in the chapel." (Nun, aged 88, MMSE = 2)*

*"I like living here because I get Mass here every morning." (Nun, aged 91, MMSE = 25)*

Having a vocation linked to earlier lifestyle choices and the decision made by them to join a religious order was another important topic emerging in the interviews. Religion and joining a religious order was a salient aspect of their current lives and also something which helped them to cope with and enjoy their daily lives.

*"My vocation, I joined the convent to give myself to God. When I got the Holy Habit, I was sent out to England ..."* (Nun, aged 89, MMSE = 12)

Interviewer: *"What makes you happy?"*

Respondent: *"God."* (Nun, aged 94, MMSE = 2)

The omnipresence of God in the lives of these residents and the way in which religion provided a purpose and meaning to phenomena otherwise inexplicable was at times apparent in their words.

*"When I see people doing wrong, I read the papers and see murders and ... God is there for everyone." (Nun, aged 82, MMSE = 25)*

*"At the moment, I am the only one of a family of 9. My youngest brother died a few years ago. The most*

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*important thing [now] is being prepared to die. [I] think, why did God have me for so long, the last of the family?"* (Nun, aged 91, MMSE = 24)

### Belonging

A sense of belonging to a community of like-minded people was another relevant category emerging from the data, and this feeling of belonging was an aspect of living which conferred happiness. Reference to happiness was often couched in terms of meaningful relationships arising from positive interactions with other residents who shared similar values and beliefs and enjoyed belonging to the same religious "community."

*"[I like] living with other people who have the same idea of what life should be like for my status, the fact that I'm a member of a religious community and live with people who are anxious to live a religious life and to fulfil that."* (Priest, aged 87, MMSE = 15)

This notion of being part of the same "community," a group of like-minded people already familiar to them, emerged in virtually every interview as being a particularly gratifying aspect of life in the nursing home.

*"Everything that comes up regarding our community – being in the community. Well, I am part of the community."* (Nun, aged 90, MMSE = 9)

Many respondents talked about the importance they attached to their relationships with the other nuns in the nursing home, often referring to them by their religious title "sisters"; it was as if the religious community was their family. Overall, their narratives reflected a very strong sense of interconnectivity, togetherness, and social inclusion.

*"I enjoy living with the sisters from the (names the religious order)."* (Nun, aged 85, MMSE = 18)

*"I like the sisters to call in ... seeing the older sisters, seeing them happy, and having a chat with them."* (Nun, aged 89, MMSE = 22)

*"Yes, everybody is your friend."* (Nun, aged 90, MMSE = 12).

Analysis of the QoL data also showed a sense of social connectedness and interdependence between one another, and while relationships with others, including family members and staff, were deemed important, they were far less salient than relationships with one another. As stated, respondents'

accounts reflected their being accustomed to living in communal settings with other nuns prior to their nursing home admission. Indeed, often the nuns had already known each other prior to moving to live in this nursing home.

*"Oh yes, we are used to the sisters."* (Nun, aged 90, MMSE = 23)

There also was a strong feeling of being "at home" in the nursing home, feeling connected to what was happening in the nursing home, and a sense of familiarity, safety, and security.

*"It's home. Anything that happens, we hear about it."* (Nun aged 89, MMSE = 22)

*"It is the security of it really. It's home because it's security for us."* (Nun, aged 85, MMSE = 18)

### Autonomy: Independence and Right to Privacy

Based on data analysis, another topic which emerged and which was directly relevant to many of the residents was that of autonomy. Within this category, a relevant dimension related to continuing to be able to remain independent in daily life. This included (1) being free from physical pain and discomfort and (2) being able to continue to behave and act in a familiar way without requiring assistance from others. Several respondents seemed pleased, lucky, and grateful to God that, given their age and health decline, they were still reasonably independent and free from pain and discomfort.

*"I am grateful God has given me the strength to dress and walk around."* (Nun, aged 91, MMSE = 24)

*"I am lucky, I have my senses, I am 85."* (Nun, aged 85, MMSE = 12)

*"I live like a normal life, hold onto my independence for as long as I can."* (Nun, aged 85, MMSE = 18)

Conversely, a very small minority talked about their aging, health decline, reduced mobility, and restricted autonomy due to physical frailty.

*"I can't get up and do what I like. The legs bad and can't walk."* (Nun, aged 85, MMSE = 19)

*"I can't go out without someone with me; they are always afraid I would fall."* (Nun, aged 91, MMSE = 25)

*"I would like to be able to do more for myself."* (Nun, aged 90, MMSE = 23)

In one unusual case, a nun diagnosed with lymphoma, when asked what made her happy, stated that “after all that treatment my blood has improved.” She was the only participant who talked at length about her health complications. And when asked what saddened her, she referred to the discomfort and fear her symptoms caused: “still having a lot of air in my throat, and being frightened, feeling getting choked.”

Another relevant aspect relating to personal autonomy was that of privacy and choice but, interestingly, the concept of privacy had different meanings for different participants. For some, it meant the freedom to choose to be alone (generally to pray); for others, it meant choosing to be together with like-minded people in privacy, if one so desired.

*“Oh, yes, I like privacy. I like the sisters to call in occasionally.”* (Nun, aged 89, MMSE = 22)

And for others, what was most important was informational privacy; simply being in control of sensitive information about oneself. Another small minority understood privacy to mean geographical privacy, that is, having private bedrooms, a chapel, and a quiet garden—a phenomenon many were already familiar with, having lived in quiet convents prior to their nursing home admission.

*“I like to be away from the main road.”* (Nun, aged 98, MMSE = 21)

*“Oh, God, yes, I love my own room.”* (Nun, aged 82, MMSE = 25)

Another relevant aspect of QoL was the respect for dignity and privacy demonstrated by the nursing home staff. The fact that staff knocked on bedroom doors prior to entering was provided as an example of the staff respecting their privacy.

*“Privacy in my room, staff always knock when coming in.”* (Nun, aged 87, MMSE = 23)

*“Oh, yes [privacy] in every way really, they [staff] are very good like that here.”* (Nun, aged 85, MMSE = 19)

Interestingly, other relevant aspects of choice and independence—for example, being able to decide what to eat or when to go to bed, and, in general, following the rules imposed by the regime of life in a nursing home—did not emerge in the interviews.

This may be a result of the fact that the nuns and the priest were already accustomed to living in a convent or in a community where they had to respect rules and regulations and follow orders imposed on them by virtue of their being members of a religious order.

### Altruism

The final category that emerged following data analysis refers to altruism: this sense of being charitable and reflecting on other people’s needs rather than one’s own, being compassionate and being committed to a value system—already very familiar to them because of their religious vows. Several nuns talked about how they cared for each other and tried to help one another on a daily basis.

*“I do my best for everybody and help them if I can.”* (Nun, aged 90, MMSE = 12)

*“I can’t bear to see people less cared for.”* (Nun, aged 93, MMSE = 2)

A sense of security about oneself, arising from living with like-minded well-intentioned people who could be trusted and from living in a supportive compassionate environment where people helped each other, was identified in much of the interview data. Although all had a cognitive impairment and many are likely to have dementia, data show how a few attempted to distance themselves from those they perceived to be more cognitively impaired. This distancing, however, was done in a humane compassionate way.

*“Some are living in another world ... can’t even hold a conversation, but it’s okay, poor people.”* (Nun, aged 87, MMSE = 23)

*“Well, sometimes they [older nuns] are a bit funny, a bit strange, but I would know they are not responsible for what they are saying.”* (Nun, aged 89, MMSE = 22)

In response to a question that asked what made them sad, one third claimed they were never sad. Those who admitted to feeling sad were never self-indulgent but rather tended to attribute sadness to external factors and especially to other people’s tragedies: “looking at younger people and what they are going through,” “the downturn of the economy,” “the tragedies of life,” “friends losing their memory,” and “seeing people around me die.” Only one

nun claimed that her own health complications saddened her.

### Perceptions of Quality of Life

One of the two NMs who was a staff member of the nursing home and did not belong to a religious order was asked her views on each resident's QoL. Interestingly, based on her perceptions, most residents (N=10) were rated by her as enjoying only a fair to poor QoL. Close analysis of data shows that these proxy ratings were largely dependent on her perceptions of residents' cognitive status and/or physical health, including mobility and independence, or on challenging behaviors and not on religion, belonging, and altruism. Interestingly, when residents were assessed by her as enjoying a good QoL, reference to their cognitive functioning, physical health, mobility, visitors, and sometimes their age was made.

However, as described in the preceding sections and in contrast to the NM's assessment, when the nuns and priest referred to their lives in the nursing home, a strong sense of their enjoying a very good QoL emerged. This was mainly defined as living a life which was congruent and well aligned with the life they had lived prior to their admission to the nursing home. It was a life they had chosen many years earlier and one which they felt they could continue to pursue, now that they were living in residential care. Their earlier vocations and their life-long commitment to a religious life and its implications had ramifications for their current lifestyle and their understandings of key aspects of QoL, such as religion, belonging, altruism, and independence. Being able to fulfil all their religious obligations and living with like-minded people whom they trusted were also key aspects of the nuns' and priest's accounts of QoL.

Table 2 provides examples of the respective meaning and understanding of QoL of the residents as described by the NM and by the residents themselves. As table 2 shows, the NM ratings were often discordant with the respondent's own self-rating. In fact, congruence between the NM's assessment and the participant's self-assessment was found in only a minority of cases.

### Discussion

This religious-based nursing home is one of a small minority of nursing homes available exclusively to Catholic nuns and priests across Ireland. Due to a decline in vocations, these nursing homes are a fast dwindling feature of the Irish long-term care landscape. Our findings on the QoL of members of a religious order differ in part from the published literature on QoL, nursing home care, and dementia.<sup>23</sup> Key differences are that some well-established QoL domains for people with dementia in long-stay care, such as (1) the family, (2) freedom and choice, (3) self-esteem, and (4) feelings of usefulness were not salient aspects in the descriptions of QoL provided by these nuns and the priest. Instead, for them, what was most important was religion, including the omnipresence of God, Mass, prayer, the religious communities, and devout relationships between each other. Similarities include the fact that, as in other studies,<sup>24</sup> a sense of continuity with life, privacy, attachment and feelings of belonging, connectedness, independence, and, to a lesser degree, health (physical) were identified as sources of happiness.

It seems that religion, including an enduring faith in God, prayer, religious ritual and practice, and spirituality—as reflected in attributing meaning and explanation to behavior—may have protected these

**Table 2: Nurse Manager's and Respondents' Perceptions of Quality of Life**

Excerpt from the Interview with Nurse Manager	Excerpt from the Interview with Participant	Demographic Information
Poor due to the arthritis.	Very good, excellent, to tell you the truth.	Nun, aged 85, MMSE = 18
Not great, wandering and she doesn't know where she is.	I am always happy.	Nun, aged 89, MMSE = 12
Her QoL is fair, she goes to Mass but going out exhausts and upsets her.	I am quite happy, and I have no complaints.	Nun, aged 87, MMSE = 23
Severe [she has] osteoporosis and [her mobility] restricts her.	I can't get up and fix my own things, that's what makes me sad.	Nun, aged 85, MMSE = 19

nuns from everyday normal anxieties and fostered a sense of acceptance and resignation. "The community" not only provided stimulus for them but also allowed them to care for each other and tolerate each other's foibles: it enabled them to share aspirations, encouraged their silences, allowed them to celebrate accomplishments,<sup>25</sup> and, as their dependency needs increased, it seemed to nurture and support them. From the time they entered the convent, being members of such long-established congregations appeared to confer status, dignity, and connectedness. In fact, their strong faith and a belief in God's "holy will" may have protected them from negative emotions and from dwelling on their own health problems in that, unlike other studies on QoL and dementia, none spoke about their own memory/cognitive deficits and only a small minority (N=4) referred to their own physical health problems. Previous studies have shown the influence of "aging in place" (familiarity/continuity),<sup>26</sup> and other research has shown the influence of religion on QoL.<sup>27</sup> In this study, continuity with life and religion emerged as important contributors to QoL. While this was not a quantitative study in which a regression analysis would have enabled us to disentangle one variable from another, we deemed it appropriate to interpret "religion" to be a component of the overarching theme of "continuity" since all of these residents had led a religious life prior to their admission to long-term care. However, as researchers, we acknowledge the possible shortcomings in this narrow interpretation.

Regarding proxy versus self-ratings of QoL, our results are in accordance with the literature and show only a very modest to weak agreement between the residents' and the NM's ratings.<sup>28</sup> Interestingly, the NM's assessment was largely based on her perceptions of residents' health (cognitive and physical) and not on God, religion, faith, and a belief in the greater good. Nor did the NM's appraisal consider the joy these nuns derived from their devout relationships with each other. Accordingly, while a sense of familiarity and convergence with their previous lifestyle and principles was a finding in the nuns' accounts of their QoL, concerns about health, aging, challenging behaviors, and dependency were the main issues resonating in the NM's interview.

Best practice in dementia care suggests that the life of people in long-stay care should resemble, as much as possible, the life they would choose to live at home.<sup>29</sup>

For these nuns and this priest, life in a nursing home operating exclusively for religious orders was not entirely different from the lives they once led that were devoted to religion and prayer. Most were used to being confined to single bedrooms. Most were also used to moving around between convents—a fact which might explain why some, particularly those with a more severe cognitive impairment, believed they were still on retreat. Indeed, the majority knew each other prior to nursing home admission; they cherished the fact that they were living with like-minded people who shared the same values and beliefs, and this comradeship yielded comfort and gratification.

In a previously published paper on QoL and long-term care, based on a larger sample (N=61),<sup>30</sup> the category of attachment emerged as an important aspect of QoL. It was shown that some nursing home residents, particularly those with severe dementia, felt lonely and isolated, craved human contact, and wanted "to go home." In this earlier published work, home was part of these residents' identities and biographies and a place where they were in control. For these older people with dementia, living in a nursing home disconnected them significantly from their former lives and homes. In contrast, for the religious respondents in this study, data showed no emerging evidence of a similar disconnect or of these nuns craving home, since for these religious people, home was "the community." In fact, life in a religious nursing home was probably not that much different from the life they had led in convent settings.

The notion of "themed nursing homes" or clustering like-minded people (who share a similar history, experiences, lifestyle, and social standing) to live together in long-stay dementia care facilities is one model of long-term care now well established in the Netherlands. In the context of dementia care and personhood, there is scope to further develop such a model. This nursing home, which operated exclusively for members of a particular religious order, provides a good example of how person-centered care can be delivered in a purpose-built environment, complete with private bedrooms, separate rooms for separate functions including a chapel, and person-centered religious activities such as Mass and prayer available around the clock. Indeed, had care staff been more aware of the dominating impact religion had on the everyday life of these people, more



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attention could have been paid to this aspect of living to further promote their QoL.

This study has several limitations. First, the sample is small (N=16) and was recruited from only one nursing home. Therefore our findings must be interpreted cautiously and cannot be generalized. Secondly, due to aphasia and other severe cognitive problems, the views of those nuns with a very severe dementia were not included. Accordingly, it cannot be ascertained whether our exceptionally positive QoL results would have been found in people more severely cognitively impaired. A third limitation is that, while these nuns' extremely positive experiences can be interpreted against the backdrop of both their vocations and religious life and the similarities found between previous and current lifestyles and biographies, it could also be argued that, for them, voicing complaints about life in long-term care may have been difficult. Indeed, religion may have militated against their speaking out, lest by doing so, their commentaries would be perceived as unkind, ungrateful to God and to staff, and, at the extreme, even sinful. A final limitation of the study is that only the NM's views on the residents' QoL were sought. If nurse practitioners' views had been sought, a more valid and reliable assessment of QoL would probably have been obtained, since nurse practitioners are more likely to be in close contact with residents than would a NM and, therefore, may have a more accurate appraisal of residents' overall mood and well-being compared with a NM, whose workload tends to be more administrative.

## Conclusion

This study has generated new findings on the quality of life of one priest and fifteen nuns who have a cognitive impairment and are residents of one religious-based nursing home in Ireland. Overall, results show that the participants in this study enjoyed an extremely good QoL which was largely attributed to their religion, to remaining socially engaged, to being enabled to help others, to living with like-minded well-intentioned people, and to their not experiencing much physical discomfort. The overarching theme of "continuity," their sharing a similar ideology—values, beliefs, thoughts, and ideas—and commitment to a religious life, and their enjoying similar physical space both in the past and in the present, may further help to explain how

they experienced and constructed meaning to their everyday QoL. They were also surrounded by familiar activities, that is, prayer, Mass, receiving Holy Communion, and other religious devotion—all of which meaningfully connected their earlier years to their current everyday existence.

In conclusion, our results concur with findings from other studies and suggest that religion was a powerful force impacting positively on the QoL of these nuns and the priest. Religion provided a purpose and meaning to life in the face of adversity. It appeared to have a powerful protective effect and contributed very significantly to their QoL. Accordingly, while most people living in long-stay care are unlikely to share the same strong religious beliefs as this fairly unique sample, nonetheless, there are some universal religious/spiritual tasks particular to old age, such as connection, respect, appreciation, altruism, compassion, reciprocity, and hope,<sup>31</sup> which are not lost by dementia but, rather, may be more difficult for the individual to achieve and experience. The challenge for practitioners and family caregivers is to competently identify these aspects of QoL and respond to them by providing care that includes a spiritual and, when necessary, religious component. With advanced dementia, as memory and cognition decline, one's religious/spiritual well-being may, in fact, become a much more important aspect of one's life. Our findings would lead us to recommend that religiosity/spirituality should be included in all future dementia-specific QoL scales.

## Appendix 1:

### Interview Schedule for Residents with Cognitive Impairment

1. Can you tell me briefly what is it like for you living here in (name of nursing home)?
2. What is important to your life now?
3. What makes you happy?
4. What helps you enjoy your days here?
5. What makes you sad?
6. Do you see (name of nursing home) as "home"?
7. What helps you to see this nursing home as home?
8. What prevents you from seeing (name of nursing home) as your home?
9. Do you have your own private room and is privacy important to you?

10. Do you like the way staff in (name of nursing home) treats you?
11. Do you like the way other residents in (name of nursing home) treat you?
12. Do you like the activities that (name of nursing home) organizes for you?
13. What do you like most about living here?
14. What do you like the least about living here?
15. Is there anything that could be done to improve your life in (name of nursing home)?

### Acknowledgments

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Elise K. Eifert

# Religious Coping While Providing Care for Someone with Alzheimer's Disease

Elise K. Eifert

*Caring for a family member with Alzheimer's disease and related dementia has been recognized as a source of stress that can negatively impact the health and well-being of the caregiver. Coping strategies for the family caregiver may help him or her diminish this impact. Growing attention has been focused on the relationships between religious coping, stress, and health outcomes among family caregivers. For this article, the literature was examined in an attempt to understand religion as a source of support and means of coping among individuals providing care to a family member with Alzheimer's disease and related dementia.*

I have been surrounded by Alzheimer's disease (AD) most of my life. My great-grandfather was diagnosed with AD when I was in grade school, followed by my maternal grandmother who also had AD, and then by my paternal grandmother who had vascular dementia. Not to mention all the residents—most had some form of dementia—who lived in the nursing home that my father was the administrator of and where I visited frequently throughout my adolescence (mostly to play bingo). I am not sure any disease related to aging causes more fear than Alzheimer's disease and related disorders (ADRD). The slow descent into darkness that accompanies many progressive forms of dementia, such as AD, is devastating. For the person with ADRD, we can only hope that they are unaware, but what about the family members left behind?

For every person with ADRD, there is a caregiver, most likely a family member such as a spouse or adult child. In my family's case, there were multiple family caregivers stoically providing direct and indirect assistance. As a young person, I was mostly oblivious to the hardships that probably accompanied this role. As an adult, I recognize the toll this had to

have taken on individual family members. Watching a person you know and love disappear little by little until he or she is a shell of their former self had to be heartbreaking. I believe that these childhood experiences with ADRD shaped my career choices. My first job after college was as an ADRD educator for a local, not-for-profit in Florida. Later, I earned a PhD in public health education with a post-baccalaureate certificate in gerontology. I have been studying family caregiving ever since.

In my career, I hear a lot of personal caregiving stories. Although each experience is unique, there are similar threads. One such thread is the stressful, life-consuming nature of caregiving that often impacts the health of the person providing the care. Caregivers experience numerous stressful events that occur concurrently and continue over time. The impact of this stress is known as "caregiver burden." There is no single agreed-upon definition of caregiver burden;<sup>1</sup> however, caregiver burden can be

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thought of as a negative reaction to unchecked stress related to caregiving. Studies of family caregivers suggest that stress and burden has a relationship with negative health outcomes such as depression<sup>2</sup> and overall poor health, including a lowered immune system and higher blood pressure.<sup>3</sup> Even more alarming, family caregivers experience a higher mortality rate compared to noncaregivers, presumably due to caregiver burden.<sup>4</sup>

I believe that my great-grandmother faced an enormous amount of this stress and burden while she was caring for her husband. I was far too young to fully understand, but I do know that my great-grandfather was difficult. He was a former judge and professional boxer with a larger-than-life presence, especially next to my petite great-grandmother. Despite her best efforts to keep him at home, he was placed in a skilled nursing facility for his and her safety. She never spoke another word, and she lived for at least three years after that! I am confident that it was because of the guilt, a stress-induced emotion, she felt for placing him in a nursing home.

Unlike her father, my grandmother was quite calm when she developed ADRD. Her husband, my grandfather, cared for her in the most patient and gentle way for as long as possible. She had a tendency to wander, a common occurrence with ADRD, and that put her in danger which ultimately led to placement in a skilled nursing facility. My grandfather visited her daily in the nursing home, often for the entire day. Until her death, he was the most loving, considerate, and grace-filled caregiver.

When I began my research with family caregivers, my family's experience with ADRD and caregiving was front and center. I was particularly interested in the coping styles of the primary caregivers—my great-grandmother and my grandfather. I never had the opportunity to speak with my great-grandmother about her experience and how she dealt with the stress of caregiving. Conversely, I spoke with my grandfather at great lengths. When I asked him how he handled the stress of his wife's disease and providing care to her, he consistently responded—God's grace! My grandfather was a devoutly religious man who attended church services regularly. He sang in the choir and was a member of men's groups who served the community. His pastor and brothers and sisters in Christ provided spiritual support as well as emotional support throughout my grandmother's ill-

ness. God was the foundational rock he stood upon to deal with caregiving.

My grandfather's reliance on his religion and religious community is not uncommon among caregivers. Religion, as well as spirituality, serves as a coping mechanism for stressful times and life events. The power of this is particularly demonstrated during caregiving for a frail or sick family member, especially one with ADRD. According to a recent report on caregiving, religion/spirituality is one of the most important coping mechanisms for caregivers.<sup>5</sup> Kaye and Meier Robinson found a positive correlation between the criticalness of a care situation and the caregiver's reliance on religion.<sup>6</sup> In this article, I examine religion as a source of support and means of coping among individuals providing care to a family member with ADRD.

### Family Caregiving

According to the most recent Alzheimer's Disease Facts and Figures report, 15 million Americans provide unpaid care to an adult with ADRD.<sup>7</sup> This number is expected to increase in the next couple of decades due to a variety of factors, the most obvious being the growing baby boomer population of people 65 and older. Caregiving for someone with ADRD encompasses a wide range of activities from occasionally running errands to supervising regular activities to direct day-to-day care. Traditionally, responsibilities include assistance with activities of daily living, such as bathing, dressing, and eating, as well as instrumental activities of daily living, such as money management and transportation.<sup>8</sup> Caring for a person with ADRD is often complicated by symptoms of the condition, including a lack of judgment, communication difficulties, and behavioral symptoms such as aggression or wandering.

Of growing concern is the increasing complexity of providing care. Many caregivers report performing medical/nursing tasks of the kind and complexity once provided only in hospitals such as medication management, including administering IVs and injections, wound care, operating specialized medical equipment, and physical or medical therapies or treatments.<sup>9</sup> Much of the advanced care provided is done with little to no training.<sup>10</sup> The amount of time spent on caregiving can be a few hours a week to 24 hours/7 days a week, depending on the needs of the person with ADRD and/or the presence of other



caregivers. On average, a family caregiver of someone with ADRD spends 21.9 hours per week carrying out care-related responsibilities.<sup>11</sup> Moreover, caregivers of people with ADRD provide care for a longer time than do caregivers of older adults with other conditions; the majority provided care for six or more years.<sup>12</sup>

The large quantity of care needs and the amount of time required to carry out this care can be a major influence on the caregiver's life and health. Although there are many positive aspects of caregiving such as companionship, fulfillment, enjoyment, and the satisfaction of meeting an obligation and providing quality of life to a loved one,<sup>13</sup> caregiving often takes a toll. Studies have linked family caregiving to a variety of long-term health problems.<sup>14</sup> For this reason, learning to cope as a caregiver is essential for survival. An array of coping strategies used by family caregivers, including religious coping, emotional coping, acceptance, becoming engaged in leisure activities, and the use of traditional healing, can be utilized.<sup>15</sup> However, religious coping may be particularly relevant and adaptive for dealing with the stress and burden of caregiving.

## Religious Coping

Religion is a prominent force in many people's lives. Recent data estimate that 89% of American adults believe in God.<sup>16</sup> In a Pew research poll, 75% of people indicate that religion is very important in their lives, 49% attend religious services at least once a week, 74% pray daily, and 50% read scripture at least once a week.<sup>17</sup> Most importantly, 71% had feelings of peace and well-being because of their belief in God.<sup>18</sup> In caring for a family member with ADRD, caregivers continually assess their resources and coping abilities. Thus, it is not surprising that individuals would utilize their religious beliefs, practices, and relationships during this time.

Pearce described religious coping as the "particularly sacred means one uses to find significance in difficult situations"<sup>19</sup> whereas Pargament defined it more broadly as "the use of religious beliefs or behaviors to facilitate problem-solving to prevent or alleviate the negative emotional consequences of stressful life circumstances."<sup>20</sup> These definitions both imply that coping is a conscious attempt to address stress or manage stress in times of crisis. Whereas Pearce suggests that religious coping is finding

meaning in that stress, the more frequently used definition by Pargament suggests that religious coping is related to stress management. Pearce's definition is one-dimensional and falls under the auspices of Pargament's definition.

Religious coping can be separated into two patterns: (1) positive religious coping or turning to religion during stressful times (e.g., forgiveness, collaborative problem-solving with God, religious purification, benevolent religious reappraisals, spiritual connection with others) and (2) negative religious coping or turning away from religion during stressful times (e.g., punitive religious appraisals, demonic reappraisals, spiritual discontent, self-directing coping efforts). Positive religious coping is more common.<sup>21</sup> Coping, in general, refers to adaptive or constructive strategies. In addition, negative strategies are typically unproductive. For these reasons, positive religious coping is more extensively addressed in the literature and promoted in practice. Positive religious coping is emphasized in this article. Any reference to religious coping from this point forward will relate to positive religious coping unless otherwise stated.

Religious coping is multidimensional. Pargament, Koenig, and Perez identified six dimensions of religious coping:

1. *Spiritually based*—the degree to which one copes through a personal relationship or connection with God and one's faith;
2. *Good deeds*—the degree to which one copes by committing oneself to living a more religious life;
3. *Religious avoidance*—the degree to which one copes by using religious behavior or God to divert attention away from the stressor;
4. *Discontent*—the degree to which one copes by expressing anger at God or one's religious community;
5. *Interpersonal religious support*—the degree to which one copes by receiving assistance from one's religious community; and
6. *Pleading*—the degree to which one copes by questioning or bargaining with God, including requests for miracles.<sup>22</sup>

In Harrison and colleagues' examination of the epidemiology of religious coping, they identified several studies that indicate the prevalence of religious coping, or at least religious activities that could be construed as religious coping, within populations

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facing stressful health crises.<sup>23</sup> Koenig found that 73% of medically ill, hospitalized patients use religion as a coping strategy,<sup>24</sup> whereas Ayele and colleagues found 86% of hospitalized and long-term care patients used religious activities to cope.<sup>25</sup> In a study of cancer patients, 75% said that they spend time in private religious activities.<sup>26</sup>

Several studies suggest that a crisis increases religious activities; for example, Kirov and colleagues found that 30% of psychotic inpatients reported an increase in religiousness from the onset of their disorder,<sup>27</sup> and Roberts and associates found that 50% of gynecological cancer patients reported becoming more religious since being diagnosed.<sup>28</sup>

Among family caregivers, several studies have indicated the use of religious coping strategies. Rammohan found that 97% of caregivers for relatives with schizophrenia believed in God while 50% considered religion a source of strength and guidance.<sup>29</sup> Stolley and associates found that 61% of caregivers for relatives with AD “trusted in God” as a way to cope.<sup>30</sup> Another study with AD caregivers found that 96% considered themselves religious and reported high levels of religious coping.<sup>31</sup> Cohen and colleagues found that 21% of caregivers for someone with dementia named religion as the most important determinant of quality of life.<sup>32</sup>

### Forms of Religious Coping

To better understand religion's role in the coping process of family caregivers, it is important to examine the multiple ways in which people utilize their religion. Pargament and colleagues identified distinct broad approaches in which caregivers look to God for help—all centered on seeking control of the caregiving situation.<sup>33</sup> Their premise was that optimal coping is the coordination of primary (i.e., internal resources) and secondary (i.e., external resources) control processes that increase the caregiver's ability to handle stress-inducing problems related to caregiving. The approaches include the following:

- *Self-directing*. In this approach, caregivers seek the knowledge, abilities, tools, and resources given to them by God to gain control of the situation through the self.
- *Deferring*. In this approach, caregivers surrender to God, acknowledging that ultimate control and responsibility belong to God.

- *Collaborative*. In this approach, caregivers are in a partnership with God. Caregivers seek the knowledge, abilities, tools, and resources given to them by God, but also acknowledge that ultimate control and responsibility belong to God.

An individual can use any of the approaches to manage life stressors, but the *collaborative* approach has been shown to be the most common and effective.<sup>34</sup> Wong-McDonald and Gorsuch suggest that religious coping strategies vary according to an individual's degree of religious commitment.<sup>35</sup> Logically, less-religious individuals tend to use the *self-directed* approach while more-religious individuals utilize the *deferring* and *collaborative* approaches.

Specific religious coping methods vary—from a general religious orientation or belief in God to actual religious practices and behaviors. Generally speaking, just believing in God has been shown to affect a caregiver's appraisal of the caregiving situation<sup>36</sup> and give the caregiver purpose.<sup>37</sup> Specifically, in order to cope caregivers may attend religious services; pray; read religious material; meditate; participate in prayer groups, study groups, or religious education programs; or seek support from members and clergy of their religious institution. An instrument that may be helpful in understanding specific forms of religious coping is the Ways of Religious Coping Scale (WORCS).<sup>38</sup> WORCS was developed to assess internal and external religious coping cognitions and behaviors. Internal forms of religious coping were considered to be activities done privately, such as prayer, while external forms of religious coping were more social, such as asking clergy for counsel. WORCS provides a comprehensive list of religious activities that caregivers may participate in to cope with caregiver burden and may be helpful in understanding exactly what falls under the umbrella of religious coping.

To understand the function of religious coping rather than specific behaviors related to religious coping is critical. For example, it is not enough to know that a caregiver prays or attends religious services. The content of the prayers and the types of support sought from religious services is more meaningful in understanding the significance of religious coping.<sup>39</sup> Pargament, Koenig, and Perez developed the Religious Coping Activities Scale (RCOPE) to measure religious coping methods in depth.<sup>40</sup> RCOPE was based on five general functions of religion:

(1) finding meaning, (2) gaining control, (3) gaining comfort and closeness to God, (4) gaining intimacy with others, and (5) achieving a life transformation. Under each function, multiple items and subscales were created to assess how the person sought that specific function and the meaning he or she ascribed to it. The authors intentionally made the instrument comprehensive to capture active, passive, and interactive coping methods as well as problem-focused and emotion-focused approaches. Additionally, the RCOPE covers cognitive, behavioral, interpersonal, and spiritual domains of religious coping. RCOPE provides a more nuanced picture of religious coping and may be useful to researchers and practitioners interested in a comprehensive assessment of religious coping.

## Benefits of Religious Coping

As with other coping strategies, religious coping has been found to mediate and moderate the relationship between stress and health. Interest in this relationship, especially among family caregivers, has increased dramatically in the past several decades. For this reason, there is a great deal of literature concerning religious coping. Researchers continue to explore which aspects of religious coping influence health and the mechanisms for the observed relationships.

Stress generally refers to two things: (1) the psychological perception of stressors, and (2) the body's biological response to the stressors, which involves multiple systems from metabolism to muscles to memory.<sup>41</sup> Over time, repeated activation of the stress response takes a toll on the body. Research suggests that chronic stress contributes to high blood pressure, promotes the formation of artery-clogging deposits, and causes brain changes that may contribute to anxiety, depression, and addiction.<sup>42</sup> For the aged, stress has the potential to be especially overwhelming.<sup>43</sup> Older adults have a tendency to be less resilient to stress. Heart fitness and lung capacity decline with age; these conditions keep elders from adequately accommodating the body's natural stress response. This may be exacerbated by the presence of a chronic disease, which is already a burden on the body.

Broadly speaking, religious coping has two distinct roles in the stress-health relationship. In the first role, the presence of religious coping helps buffer, or

shield, a caregiver from the negative impact of stress. In other words, as stress levels increase, caregivers who use religious coping are better protected from the harmful effects of stress than are their less-religious counterparts. In the second role, stress exerts its negative effects on health, but religious coping works in the opposite direction, acting as a deterrent to stress. These roles are not exclusive to each other but actually work in tandem, so Pargament suggested the *Religious Moderator-Deterrent* model.<sup>44</sup> According to the model, religious coping

serves a moderating function in that as stress levels rise, religious coping increasingly protects religious people from the harm of stress; concurrently, religious coping performs a deterring function because it is a reliable predictor of more favorable outcomes no matter how intense stress is.<sup>45</sup>

Because of this dual function, religious coping is considered to be both a mediator and a moderator for the relationship between stress and health.

Several comprehensive literature reviews have been conducted to identify studies that elucidate the concept of religious coping.<sup>46</sup> A few have specifically focused on religious coping among family caregivers.<sup>47</sup> These literature reviews outline the science linking religious coping, stress, and health of family caregivers (not necessarily specific to ADRD) in the past 30 years. For brevity, positive religious coping has been found to have a significant relationship with mental health (e.g., depression, psychological distress, grief, self-esteem),<sup>48</sup> social functioning and support,<sup>49</sup> quality of life and life satisfaction,<sup>50</sup> health-promoting behaviors (e.g., diet, physical activity, sleep, healthcare engagement),<sup>51</sup> happiness,<sup>52</sup> and adjustment and satisfaction with caregiving among family caregivers.<sup>53</sup>

Despite the ample amount of scientific data linking religious coping to stress and health, there are still significant gaps and limitations in our understanding of the exact role of religious coping. The aforementioned studies all found a favorable link between religious coping and stress or health of family caregivers; however, some studies have yielded nonsignificant or mixed findings.<sup>54</sup> This can mostly be attributed to studies not using valid and reliable measures of religious coping and participants using other forms of coping in addition to religious coping. Some studies generally asked about religious coping and counted anything remotely spiritual as religious

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coping. Other studies did not control for non-religious forms of coping and their influence in the stress-health relationship. Furthermore, little information is provided regarding “how religious coping works for caregivers, for whom and what outcomes it is most effective, when it may be harmful, or how it changes over time.”<sup>55</sup> The difficult questions, “What type of religion, what effect, what circumstances, via what mechanisms, and for whom?” are still being determined.<sup>56</sup>

### Limitations to Religious Coping

As mentioned previously, caregivers have a range of coping strategies to choose from but not all caregivers will choose religious coping. Religious coping is dependent on personal factors (e.g., demographic, personality, or religious), characteristics of the challenge (e.g., types or numbers of stressors, or time since a stressful event), or characteristics of the wider context of the stressful event.<sup>57</sup> Among some groups, particularly the elderly and minorities, religious coping is cited more frequently than any other form of coping.<sup>58</sup> Additionally, differences in likelihood of use and significance of religious coping can be found among those with lower education, higher levels of social support, or more stressful life events.<sup>59</sup> It is important to recognize these differences when assessing and making decisions regarding religious coping. Furthermore, much of the research on religious coping has been conducted with western, Christian populations. Findings from scientific literature and information presented here may not be applicable across all Christian denominations or with non-Christian religions. Religions come in many “shapes and sizes” and these differences have tremendous impact on values, morals, behavior, and culture that make the universality of religious coping unknown.

This article focused on positive religious coping, but it is also important to acknowledge negative religious coping by family caregivers. Much less research on negative religious coping has been conducted with family caregivers.<sup>60</sup> That is not to say it does not occur. For some family caregivers, feelings of anger and resentment and wondering if God has forsaken them are understandable. It is difficult not to ask why God allows ADRD to happen. For caregivers, the real issue may not be why something like ADRD happened, but how to respond to it in a godly way. Religious communities need to be prepared

for this negative reaction to ADRD and caregiving. Another roadblock for many religion-centric caregivers is the time and energy required for religious practices. Many caregivers are consumed by caregiving, leaving little time to attend a religious service or read religious material. Even if the caregiver did find the time to participate in their religious community, the care recipient perhaps cannot be left alone or be expected to sit through a long religious service. This may lead to the caregiver becoming isolated and without their main avenue to connect with their religion, possibly reinforcing or supporting negative coping. Finally, religious coping is not always associated with an active approach to dealing with stress or health issues. An argument could be made that some people delay asking for help or support because they are waiting on miraculous divine intervention that may never happen. Much more research on the prevalence and impact of negative religious coping on family caregivers, and how clergy and churches can respond to negative religious coping, is needed.

### Implications for Supporting Caregivers

For anyone who knows, loves, or works with family caregivers, it is important to acknowledge the role religion may have in their lives.

#### *Clinicians*

According to Harrison and colleagues, clinicians should ask caregivers if and how they use religion to help them cope.<sup>61</sup> If the caregiver is currently using forms of religious coping in a healthy manner, the clinician should support and encourage the behaviors. However, if the caregiver is not currently utilizing religious coping, it is best that the clinician avoid “prescribing” forms of religious coping. Additionally, it may be helpful for clinicians to work with an individual’s clergy to address caregiving issues.

#### *Clergy and Other Religious Leaders*

For clergy who play a significant part in many caregivers’ religious coping, it is important to give increased attention to their spiritual needs and active participation in the religious community of family caregivers. Veroff, Kulka, and Douvan found that when personal crises occur, people are more likely to seek assistance from clergy than from a mental health professional.<sup>62</sup> Clergy can provide support and assistance to the members of their congregation in a number of different ways including counseling or

introducing initiatives such as meal delivery, respite, or home maintenance provided by other members of the religious community. In particular, clergy need to welcome and encourage caregivers and care recipients to attend religious services even if the care recipient may be disruptive. This includes reminding other members of the religious community to be understanding and supportive. Just as most religious communities have learned to accept a crying baby during services, religious communities must learn to accept their elders who are struggling with ADRD.

### *Congregation Members and Church Ministries*

For congregation members looking to be of assistance to family caregivers, consider initiating or leading initiatives in your own religious community. Something as simple as a friendly visit or weekly phone call to a caregiver can prevent the caregiver from feeling isolated and alone. It can also alleviate frustration from a caregiver who feels forgotten by the religious community to which he or she gave years of service.<sup>63</sup>

As the population of older adults increases due to increased longevity and the aging of baby boomers, religious communities will need to learn how to address the unique needs of their aging members. Large religious communities or, at least, religious communities with large aging populations may want to consider a ministry dedicated to elders or family caregivers. Caregivers may be able to provide better care for a longer time when their religious communities surround and support them. From a biblical perspective, religious communities are called to show love and mercy (John 15:13), provide hospitality (Mark 6:37–44), and help those in need of assistance (Job 29:12), especially the marginalized (Matthew 25:40). From a societal perspective, very few social institutions are as well placed to “care for the caregiver” as is the church. Public and government assistance is not available or not enough for family caregivers. The church may be the only source of support available. Considering that family caregivers provide \$470 billion worth of care services and are the largest source of long-term care in the United States, we should support them.<sup>64</sup>

### **Conclusion**

Caregiving for a family member with ADRD can be a stressful experience that takes a toll on the health

and well-being of the caregiver. In an effort to ameliorate this stress, caregivers rely on a variety of coping strategies including religious beliefs and practices. This article attempts to summarize the scholarship behind religion as a source of support and means of coping among individuals providing care to a family member with ADRD.

Religion can provide family caregivers with a sense of control through human initiative and divine power. Paul states in Romans 8:35–37, NABRE:

What will separate us from the love of Christ? Will anguish, or distress, or persecution, or famine, or nakedness, or peril, or the sword? As it is written:

“For your sake we are being slain all the day;  
we are looked upon as sheep to be slaughtered.”

No, in all these things we conquer overwhelmingly through him who loved us.

Although ADRD is a frightening disease and caregiving is a struggle, nothing can separate us from the love and grace of God. My grandfather believed it, and scientific evidence supports his claim. Through religious coping, caregivers of individuals with ADRD can be strengthened spiritually, physically, and mentally. In all the uncertainties that caregiving brings, God’s love is steady—“It bears all things, believes all things, hopes all things, endures all things” (1 Cor. 13:7). If caregivers can hold on to this, their caregiving experience may be less stressful and burdensome. ❖

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# Recent Themes for Christians in Science Journals: A Centering Resonance Analysis

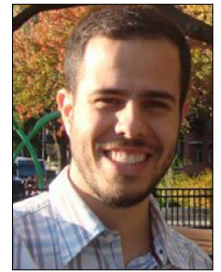
Jonathan Simões Freitas, Matheus Nogueira Salgado, and Guilherme Vilela Ribeiro de Carvalho

*This paper identifies the main themes discussed from 2011 to 2015 by the articles published in Perspectives on Science and Christian Faith (PSCF) and Science and Christian Belief (S&CB). Centering Resonance Analysis (CRA) was used to analyze the content of the 113 abstracts. The resulting word networks were agglomerated in twenty groups of articles by Hierarchical Clustering Analysis (HCA). Each discursive cluster was then characterized and its main theme labeled in terms of its most important words. The thematic emphasis of each journal and their combined publishing trends over time were identified. Suggestions of other possible contributions from text analytics are pointed out, as an encouragement to further technical work in this field. Thus, this paper contributes both as an introductory resource for the recent academic discourse on science and Christian faith, and as a starting point to an informed discussion about the future of this evolving research area.*

In most fields of study, periodic bibliometric analysis is conducted to update the state of knowledge in the area and identify its trends. This kind of analytical study is helpful to give an overview of research directions in a way that would be otherwise difficult to do—that is, without computer assistance. Therefore, quantitative literature analysis adds value to more in-depth qualitative bibliographical reviews and helps researchers position themselves in the field and identify knowledge gaps.<sup>1</sup>

Nevertheless, in the “science and faith” (sci/faith) field of study, there seem to be no computer-assisted analytical reviews. Indeed, there is a lack of literature review articles in general in this area. Most of the state-of-the-field overviews are published in textbooks and are usually quickly outdated because of the constant publication of new relevant articles in specialized journals. This is especially true for the

dialogue between science and Christian faith. We could not find a single sci/faith literature overview article in any of the two main journals of Christians in science associations: *Perspectives on Science and Christian Faith* (PSCF) of the American Scientific Affiliation (ASA) and *Science and Christian Belief* (S&CB) of Christians in Science UK (CiS).



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Thus, this article aims to address this gap, by presenting an initial bibliometric study of the article abstracts recently published in these two journals. We hope to provide a preliminary picture of the contemporary Christian sci/faith academic dialogue as an encouragement for newcomers and for others interested in mapping the state of this research area—and its main trends. Therefore, in what follows, we present the data, analytical procedures, and results of this initial attempt to depict recent discursive clusters for Christians in science journals.

### Data

We analyzed the abstracts of the 113 articles published in *PSCF* and *S&CB* from 2011 to 2015. We have focused the analysis on abstracts, since they are supposed to competently present a summary of the content of the paper and its highlights. Moreover, it would be unfeasible to include the complete papers due to the time required to manually preprocess the texts in order to appropriately analyze them using the analysis method that was chosen.

We did not analyze any document type other than “article.” Editorials and letters to the editors were excluded since they tend to replicate content highlights from the corresponding articles. Correspondences (or debates) do the same, repeating each other—and, thus, could duplicate content importance in the analysis. Book reviews represent content that is external to the journal’s own research.

*PSCF* and *S&CB* were selected because we were interested in peer-reviewed academic journals specifically focused on the relation between Christian faith and the sciences. Therefore, we did not include journals that relate science and religion in general, or that include faiths and beliefs other than Christianity, as for example, *Zygon* and *Theology and Science*.

We chose the five-year time span from 2011 to 2015 because, by the time of data collection (mid-2016), it corresponded both to the “recent issues” of the *PSCF* homepage and to the “subscribers only” *S&CB* content. During this period, *PSCF* published quarterly with an average of 4.05 articles per issue, while *S&CB* published semi-annually with 3.20 articles per issue. The result was 81 *PSCF* and 32 *S&CB* article abstracts in our database. Extending the time span further into the past would have compromised our emphasis on “recent” themes and would have added more

texts—it would have been impracticable to manually preprocess these in a timely fashion.

### Analysis

Centering Resonance Analysis (CRA) was used to analyze the data. CRA is an innovative text analysis method<sup>2</sup> based on Centering Theory.<sup>3</sup> This prominent linguistic theory posits that discourse coherence is built through the connection of “centers,” which are taken to be the utterances’ subjects and objects that have either a forward or a backward referent in the text. According to this perspective, only noun phrases (i.e., nouns and their qualifiers, such as adjectives) are unambiguous enough to enable this weaving of meaning in a discourse. In contrast, verb phrases are context dependent and, thus, are ambiguous semantic elements.

This theoretical background provides CRA with the operational rules used to select conceptually relevant words from a text and link them in a theoretically informed way. Specifically, the technique’s algorithm first selects the noun phrases of a text; next it connects all the words pertaining to each noun phrase; and then it connects the last word of a noun phrase with the first word of the subsequent noun phrase. For example, “this sentence shown between double quotes would result in the following connections”: sentence-double-quotes-following-connections, and the noun phrase “science and Christian faith,” would result in a triangle of undirected connections: science-Christian, science-faith, and Christian-faith.<sup>4</sup> The underlying premise is that this method of linking words reflects the coherence-oriented centering process done (consciously or unconsciously) by the speaker or writer.

Moreover, recurring words are merged into a single network node that inherits all the word’s connections. For example, if we analyzed the previous sentence, we would receive the following results: a single node labeled “word”<sup>5</sup> would be connected to “recurring” (same noun phrase of its first occurrence), to “single” (first word of the next noun phrase), to “node” (last word of the noun phrase that precedes its second occurrence), and to “connections” (same noun phrase of its second occurrence). Hence, different from other content analysis procedures, the construction of word networks is not restricted by typical software limitations (e.g., size of the software window used to analyze each excerpt



of the text) or subjective choices of words and links. On the contrary, given an input text, the Natural Language Processing (NLP) extension of the *visone* network analysis software creates the word network, using the embedded CRA theoretical rules and the Stanford Lexicalized Parser,<sup>6</sup> and automatically identifies the noun phrases of each sentence.

However, as the parser is stochastic in its semantic classification of each term in a sentence, it can make mistakes. Therefore, the process is not completely automated, since various kinds of text preprocessing procedures may be needed for the parser to be able to correct its initial misunderstandings. Pronoun disambiguation (e.g., “we” may correspond to “biologists” in an abstract) and plural stemming (e.g., “biologists” could be changed to “biologist,” in order to merge both its singular and plural forms) are examples of common preprocessing requirements.<sup>7</sup> These examples illustrate the fact that, although there is computer assistance to execute the procedures, human interpretation and choice are fundamental parts of the analysis and, more clearly, of the inferences drawn from the results.

Nevertheless, the most distinctive feature of CRA is that word importance is measured, not simply as word occurrence, but as word “betweenness”—that is, the discursive coherence-building power of each word in a word network context.<sup>8</sup> In other words, “betweenness” indicates the importance of a word in connecting each pair of words in a word network and, thus, it is a measure of the centrality of a word in the flux of meaning of a discourse. As occurrence is not necessarily highly correlated to importance, CRA corrects the main problem of earlier frequency-based content analysis procedures. It enables the researcher to identify truly influential terms in a text, based on a consistent discourse coherence theory. Therefore, it provides a more precise depiction of the text message by showing the discursive connections between the most important words chosen by the speaker or writer.

Since these networks of words are constructed for the texts of interest, they can be compared for their “resonance.” Resonance is an index of text similarity, calculated as a (standardized) sum of the product of the influences of each word that co-occurs in different texts.<sup>9</sup> So, for instance, two texts that share many influential words will have a high resonance, indicating their similarity. On the other hand, texts

that do not share the occurrence of many words (or that share the occurrence of mostly non-influential words) will have a low resonance and, thus, will be considered relatively dissimilar. Therefore, CRA’s resonance index compares not only lists of words but also networks of words, by considering their relative influence. As such, it is a true innovation in relation to previous content analysis comparative methods.

Using this methodological framework, we analyzed all of the 113 abstracts separately. We first preprocessed each text so that the software could correctly transform them into CRA networks. Then, we calculated word influence for each word in each text, and text resonances between every pair of texts. Based on the resonance matrix between texts, we conducted an agglomerative Hierarchical Clustering Analysis (HCA)—using the Ward method and MiniTab software—to identify the main clusters of articles in the resultant dendrogram. This well-established statistical technique automatically analyzes a similarity matrix in order to calculate a measure of relative distance between the observations. Based on these distances, it can progressively (i.e., step-by-step) cluster observations, seeking a clustering solution that will render the final clusters as internally homogeneous, and as externally heterogeneous, as possible.

Having identified these groups of abstracts, we generated a word network for each discursive cluster, congregating all the texts of the corresponding group. From interpreting these networks, we derived the label and description of the theme that seemed to characterize each cluster. A final visual analysis was conducted by depicting a bubble plot to represent the number of articles published per journal, per theme, and per semester. Based on this integrated chart, some observations were made for thematic concentration differences among the journals and theme publication trends over time.

## Results

The result obtained from the HCA of the resonances between the abstracts is depicted in figure 1. This standard dendrogram format shows a vertical black line for each of the 113 observations (i.e., abstracts) and a horizontal black line for each clustering step, traced at the Euclidian resonance-based distance calculated between the respective clustered observations (i.e., the two corresponding vertical lines).

For instance, the first two abstracts (represented by the two vertical lines more to the left in fig. 1) were clustered at approximately 0.7, while this cluster was itself clustered with the four subsequent abstracts at approximately 0.9 (see dotted lines in fig. 1). Thus, the lower the horizontal line, the higher the internal homogeneity (“similarity”) of the corresponding cluster; the higher the horizontal line, the more heterogeneous the clustered abstracts.

Using two distinct and statistically validated quantitative indexes for supporting the decision on which cutting-off level of the clustering procedure to use (i.e., the Cindex and Silhouette criteria<sup>10</sup>), we decided to stop clustering at approximately the 1.1 distance level, since both criteria recommended 20 clusters as the optimal balance between internal cluster homogeneity and total number of clusters. These clusters are represented by the 20 red boxes in figure 1. This unusually large number of clusters points to the fact that these journals publish a very broad scope of heterogeneous thematic discourses, as could be expected, since they include researchers with diverse interests in Christianity and science.

Each of these discursive clusters was thematically labeled based on its respective aggregate word network (fig. 2) and abstracts. As the legend of figure 2 implies, a word that appeared in all abstracts of the cluster was positioned in the very center of the corresponding concentric circles (e.g., “animal”). Conversely, a word that occurred in only one abstract of the cluster was positioned in the outer circle of the graph. However, as previously noted, a frequent word may not be influential in building the text’s discourse coherence. Therefore, the aggregate word influence of a word in a cluster was represented by its label size. For instance, “animal” was the most influential word (i.e., biggest label) of the bottom cluster in figure 2. Nevertheless, a word may have been very influential in some abstracts, but not in others. Thus, the node area represented this influence’s standard deviation in such a way that, for two equally influential words, the one with the smallest node area would be the most consistently influential among them. Moreover, some words may be highly and consistently influential, but too generic—in the sense of being influential in many different clusters (i.e., not a cluster-specific topic). Hence, the lighter

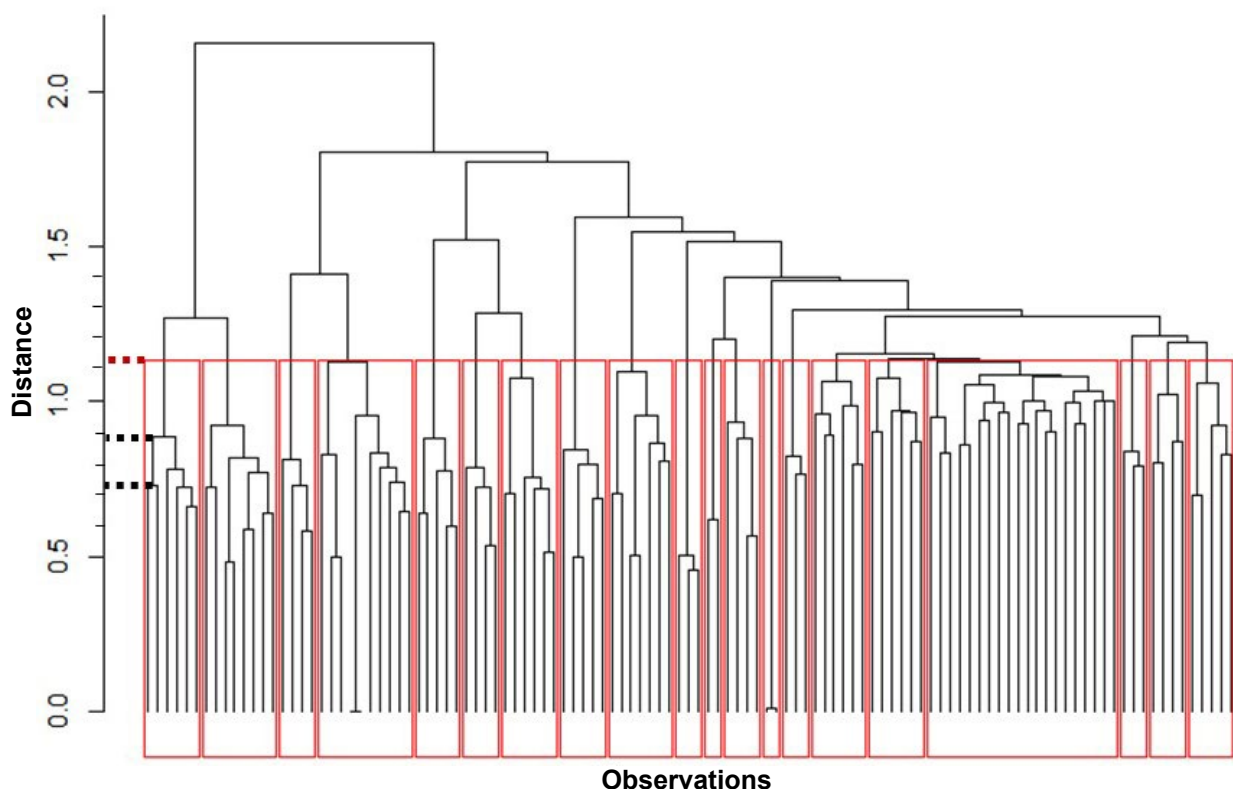


Figure 1. Dendrogram with 20 discursive clusters from the 113 abstracts.

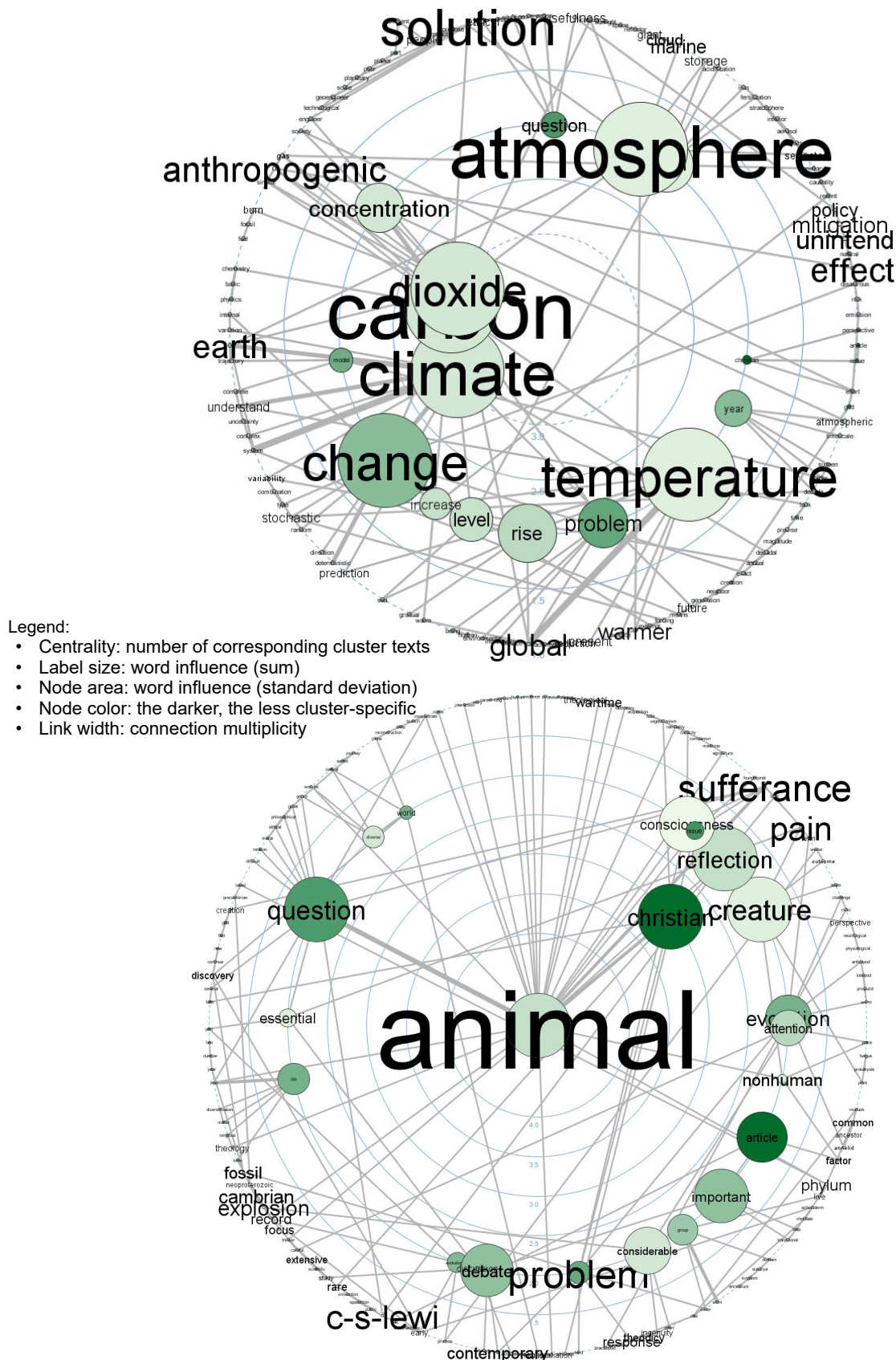


Figure 2. Word networks of the clusters labeled “climate change” (top) and “animal” (bottom).

the node color, the better the corresponding word to help distinguish the cluster's theme from other themes. Finally, the width of the connections in figure 2 helps the analyst to see which words were more directly connected in the CRA's linking procedure—that is, were closely related in the way in which the original text was written.

Considering all these criteria, we can observe, for instance, that the word network represented in the top cluster of figure 2 has some influential and cluster-specific words related to climate change. More specifically, the most important words are related to temperature effects of carbon dioxide in the atmosphere—that is, anthropogenic global warming. Thus, this cluster was labeled “climate change.” On the other hand, in the bottom cluster of figure 2, there is a word network that is basically characterized by a single frequent, influential, and cluster-specific word: “animal,” which was, therefore, chosen as the cluster's label. The lack of other words with similar characteristics indicates a diversity of specific animal-related topics tackled by the articles that were clustered around this core theme—which could be defined as “debates, problems, and questions concerning nonhuman animal creatures, from a Christian point of view.”

One of the original 20 HCA clusters corresponded to the “exception group” of the model, because it clustered all the articles for which the method could not find another cluster to merge them into without significantly impoverishing the quality of its solution. Indeed, the 20 articles from this cluster had very little to do with one another. Based on the results of running an alternative Complete-Linkage Clustering Analysis (CLCA), we observed, in a two-step process, that it was possible to re-allocate these article abstracts into other existing HCA clusters which had clear correspondents in the CLCA solution. Checking the title and abstract of each of these articles, we proceeded with the re-allocation, which was qualitatively consistent. Only three papers remained isolated, even in CLCA, and, therefore, were not clustered with any other article. Indeed, each of them deals with a specific topic with no correspondent among the other analyzed abstracts. As a result, they were the only ones that remained labeled “exceptions.”

Table 1 summarizes the final 20 discursive clusters, their themes and exemplary works.<sup>11</sup> As table 1 shows, themes were labeled as specifically as possible. For instance, although almost all papers dealing with animal issues took an evolutionary stance, they were not labeled “evolution,” because many other clusters also took this perspective in analyzing other sci/faith topics. They were, instead, labeled “animal,” because almost none of the other clusters tackled this specific theme. Moreover, the adherence of the model to the data can be seen, for example, in the “mathematics” cluster, which agglomerated all the articles published in the *PSCF* special issue dedicated to this academic discipline.

To give a full example, cluster 5 clustered seven abstracts and was labeled “universe and its natural laws” (especially, cosmology-related papers). As table 1 indicates, Bussey provides a review of the Kalam Argument of God as the first cause,<sup>12</sup> and Chan asks whether natural laws could create our universe or not.<sup>13</sup> Bussey, in another article, distinguishes between mystery and ignorance, by considering Einstein's view that contemplation of the physical universe and its laws can generate exceptionally strong feelings of mystery.<sup>14</sup> Gingerich uses Kepler's three laws of planetary motion to discuss the relation between the belief in deep ontological laws and a theistic understanding of the universe.<sup>15</sup> Larson denounces anthropic reasoning and acknowledgement of apparent design as metaphysical considerations that were undesirably brought into mainstream science by the multiverse hypothesis.<sup>16</sup> Saudek explores a set of eschatological options related to an overall perspective of a not completely deterministic universe.<sup>17</sup> Finally, Wall explores the Christian concept of resurrection in its relationship with natural laws and with the need for a transformation of the universe if life is to survive.<sup>18</sup>

Of course, not all clusters are as thematically homogeneous as the best groupings (such as this cluster 5), but, in general, the solution was satisfying. The relatively high heterogeneity level inside some clusters (not allowing them to be labeled in a more specific way) only reflects and reinforces the fact that, indeed, the Christian sci/faith dialogue still has been diverse in its discursive scope, hindering any attempt to systematically classify it in an exhaustive manner.

Table 1. The 20 Clusters, Ordered according to the Time Series Plot Coordinate

#	Label	Brief description	Examples
1	Broader discussions	Broader questions informed by the sci/faith dialogue	Miller relates the nature of science to the public debate over anthropogenic global warming. <sup>1</sup> Srokosz discusses scientific attitude using the broader ethical framework of virtues and vices. <sup>2</sup>
2	Historical <sup>3</sup>	History of science, church history, and their interplay	Knight presents historical perspectives on the relation between science and the Eastern Orthodox church. <sup>4</sup> Spelda highlights the importance of the church fathers for early modern astronomy. <sup>5</sup>
3	God	Implications of God's nature (especially as Creator)	Turl explores the assumptions held about God's nature when blaming him for disasters. <sup>6</sup> Bradley argues for the compatibility between the scientific concept of randomness and the historical Christian understanding of God's nature. <sup>7</sup>
4	Role	Role of specific ideas in the sci/faith dialogue	Contakes and Johnson point to the role played by soviet ideology in motivated anti-mainstream science efforts in chemistry. <sup>8</sup> Chappell presents the role of F. R. Tennant's thinking on discussions about historical fall. <sup>9</sup>
5	Universe and Natural laws	The universe and its natural laws (especially cosmology)	Bussey provides a review of the Kalam Argument of God as the first cause. <sup>10</sup> Chan asks whether natural laws could create our universe or not. <sup>11</sup>
6	Theologies of evolution	Divine action in the evolutionary process	Kim contrasts Peacocke's and Pannenberg's theologies of evolution. <sup>12</sup> Bissen compares theologies of evolution with respect to randomness in evolutionary processes. <sup>13</sup>
7	Theories	Implications of various specific theories and models	Murphy explores implications of Einstein's theory of relativity to the question of whether the earth really moves or not. <sup>14</sup> Silva tracks the evolution of Polkinghorne's theories on divine action. <sup>15</sup>
8	Mathematics	Mathematics from a Christian perspective (especially education issues)	Mainly, papers from the corresponding <i>PSCF</i> thematic issue—for example, Zonnefeld presents examples and techniques of various frameworks and approaches to integrate Christian faith in mathematics classroom. <sup>16</sup>
9	Animal	Issues related to animal creatures (nonhuman)	McFarlane explores how Christians think about and relate to animals. <sup>17</sup> Gilmour tackles the issue of animal experimentation in C. S. Lewis's writings. <sup>18</sup>
10	Human	Human nature and origin (especially genetic)	Wilcox asks if genes made us human. <sup>19</sup> Suarez sustains the teaching of original sin and atonement even after giving up a primal couple as the origin of humanity. <sup>20</sup>
11	Technology	Technology from a Christian perspective (especially environmental)	Touryan advocates a proactive engagement of Christian individuals and institutions with renewable energy resources. <sup>21</sup> Beaver asks whether we should or should not use hydraulic fracturing for natural gas production. <sup>22</sup>
12	Science and Theology	Relation between science and (Christian) theology	Woudenberg discusses the limits of science and their implications for the Christian faith. <sup>23</sup> Tenneson, Bundrick, and Stanford propose a new surveying instrument for relating science and theology. <sup>24</sup>
13	God's creation	The created order and God's work in it	Miller reflects on the issue of death and pain in creation and the goodness of God. <sup>25</sup> Hore-Lacy argues for viewing nuclear power as a providential resource for energy sustainability. <sup>26</sup>
14	Scientists and Christians	Scientists and Christians as people (especially their beliefs)	Curry asks if being a scientist leads to being an atheist. <sup>27</sup> Berry points out the contribution of a great scientist (David Lack) for Christians who want to make sense of evolution. <sup>28</sup>
15	Climate change	Climate issues (especially carbon dioxide effects)	Papers from the <i>PSCF</i> "environmental sciences" thematic issue: for example, Ackerman calls Christians to lead the efforts to reduce carbon dioxide emissions, due to their unpredictable effect on Earth climate in the long run. <sup>29</sup>
16	Christian research	Christian research (and development) in different areas	Mann invites a further sci/faith dialogue in five of the main themes raised by contemporary physics. <sup>30</sup> Crisman discusses the relation between open source software development and Christian values. <sup>31</sup>
17	Assumption-practice	Assumptions and their consequent practices (especially in psychology)	Mainly, papers from the <i>PSCF</i> "psychology" thematic issue: for example, Kauffmann offers a response to Heather Looy's critique of the assumptions and practices of psychology. <sup>32</sup>



18	Darwinian theology	Theological insights from Darwin's ideas	Two sequential papers (Part I and Part II) from Lamoureux on Darwinian theological insights. <sup>33</sup>
19	Information	Information, intelligence and origins	Mainly, papers from the corresponding <i>PSCF</i> thematic issue: for example, Watts explores the relation between biological information, molecular structure and the origins debate. <sup>34</sup>
20	Exceptions	Abstracts that did not fit into any cluster	Helble analyzes the Coconino sandstone as a test on flood geology. <sup>35</sup> Smith puts Nancey Murphy's physicalism into question. <sup>36</sup> Faries tackles the issue raised by randomness in quantum physics to the belief in a personal God. <sup>37</sup>

### Notes

<sup>1</sup>Keith B. Miller, "The Nature of Science and the Public Debate over Anthropogenic Global Warming," *Perspectives on Science and Christian Faith* (hereafter *PSCF*) 64, no. 4 (2012): 220–29, <http://www.asa3.org/ASA/PSCF/2012/PSCF12-12Miller.pdf>.

<sup>2</sup>Meric Srokosz, "Humility: A Neglected Scientific Virtue?," *Science and Christian Belief* (hereafter *SCB*) 25, no. 2 (2013): 101–12.

<sup>3</sup>As noted by one of the anonymous reviewers, just after our 2015 cutoff date, *PSCF* published an issue edited by James C. Peterson and Christopher M. Rios with four history-oriented articles [*PSCF* 68, no. 3 (2016)], a fact that exemplifies possible refinements of table 1 clusters in future updated analysis.

<sup>4</sup>Christopher C. Knight, "Science and the Eastern Orthodox Church: Historical and Current Perspectives," *SCB* 25, no. 1 (2013): 37–52.

<sup>5</sup>Daniel Špelda, "The Importance of the Church Fathers for Early Modern Astronomy," *SCB* 26, no. 1 (2014): 25–51.

<sup>6</sup>John Turl, "Theodicy and Geodesy: Who Is to Blame?," *SCB* 23, no. 1 (2011): 49–66, [https://www.scienceandchristianbelief.org/serve\\_pdf\\_free.php?filename=SCB+23-1+Turl.pdf](https://www.scienceandchristianbelief.org/serve_pdf_free.php?filename=SCB+23-1+Turl.pdf).

<sup>7</sup>James Bradley, "Randomness and God's Nature," *PSCF* 64, no. 2 (2012): 75–89, <http://www.asa3.org/ASA/PSCF/2012/PSCF6-12Bradley.pdf>.

<sup>8</sup>Stephen M. Contakes and Garrett Johnson, "Suggestions for Thinking and Talking about Science and Religion from the Soviet Resonance Controversy, a Chemical Counterpoint to Lysenkoism," *PSCF* 65, no. 4 (2013): 219–32, <http://www.asa3.org/ASA/PSCF/2013/PSCF12-13Contakes.pdf>.

<sup>9</sup>Jonathan W. Chappell, "Rethinking the Historical Fall in the Light of Evolution: F.R. Tennant and After," *SCB* 25, no. 2 (2013): 131–54.

<sup>10</sup>Peter J. Bussey, "God as First Cause—A Review of the Kalam Argument," *SCB* 25, no. 1 (2013): 17–35.

<sup>11</sup>Man Ho Chan, "Can Natural Laws Create Our Universe?," *PSCF* 66, no. 1 (2014): 35–39, <http://www.asa3.org/ASA/PSCF/2014/PSCF3-14Chan.pdf>.

<sup>12</sup>Junghyung Kim, "Naturalistic versus Eschatological Theologies of Evolution," *PSCF* 63, no. 2 (2011): 95–107, <http://www.asa3.org/ASA/PSCF/2011/PSCF6-11Kim.pdf>.

<sup>13</sup>Diane Bissen, "Is Evolution Truly Random? Chance as an Ideological Weapon in the 'Evolution-Creation' Debate," *SCB* 26, no. 2 (2014): 120–42.

<sup>14</sup>George L. Murphy, "Does the Earth Move?," *PSCF* 63, no. 2 (2011): 109–15, <http://www.asa3.org/ASA/PSCF/2011/PSCF6-11Murphy.pdf>.

<sup>15</sup>Ignacio Silva, "John Polkinghorne on Divine Action: A Coherent Theological Evolution," *SCB* 24, no. 1 (2012): 19–30, <https://www.scribd.com/publication/2568262/John-Polkinghorne-on-Divine-Action-a-Coherent-Theological-Evolution>.

<sup>16</sup>Valerie Zonnefeld, "Practical Applications of an Integrally Christian Approach to Teaching Mathematics," *PSCF* 67, no. 2 (2015): 124–34, <http://www.asa3.org/ASA/PSCF/2015/PSCF6-15Zonnefeld.pdf>.

<sup>17</sup>Keri McFarlane, "Living Relationally with Creation: Animals and Christian Faith," *PSCF* 67, no. 4 (2015): 235–44, <http://www.asa3.org/ASA/PSCF/2015/PSCF12-15McFarlane.pdf>.

<sup>18</sup>Michael J. Gilmour, "C. S. Lewis and Animal Experimentation," *PSCF* 67, no. 4 (2015): 254–62, <http://www.asa3.org/ASA/PSCF/2015/PSCF12-15Gilmour.pdf>.

<sup>19</sup>David L. Wilcox, "Our Genetic Prehistory: Did Genes Make Us Human?," *PSCF* 66, no. 2 (2014): 83–94, <http://www.asa3.org/ASA/PSCF/2014/PSCF6-14Wilcox.pdf>.

<sup>20</sup>Antoine Suarez, "Can We Give Up the Origin of Humanity from a Primal Couple without Giving Up the Teaching of Original Sin and Atonement?," *SCB* 27, no. 1 (2015): 59–83.

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<sup>23</sup>René van Woudenberg, "Limits of Science and the Christian Faith," *SCB* 24, no. 2 (2012): 129–48.

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<sup>25</sup>Keith B. Miller, "'And God Saw That It Was Good': Death and Pain in the Created Order," *PSCF* 63, no. 2 (2011): 85–94, <http://www.asa3.org/ASA/PSCF/2011/PSCF6-11Miller.pdf>.

<sup>26</sup>Ian Hore-Lacy, "Nuclear Power and Energy Sustainability," *SCB* 23, no. 2 (2011): 159–76.

<sup>27</sup>Eugene A. Curry, "Do the Polls Show That Science Leads to Atheism?," *PSCF* 65, no. 2 (2013): 75–78, <http://www.asa3.org/ASA/PSCF/2013/PSCF6-13Curry.pdf>.

<sup>28</sup>R. J. (Sam) Berry, "Divining Darwin: Evolving Responses and the Contribution of David Lack," *SCB* 26, no. 1 (2014): 53–78.

<sup>29</sup>Thomas P. Ackerman, "Christian Action in the Face of Climate Change," *PSCF* 66, no. 4 (2014): 242–47, <http://www.asa3.org/ASA/PSCF/2014/PSCF12-14Ackerman.pdf>.

<sup>30</sup>Robert B. Mann, "Physics at the Theological Frontiers," *PSCF* 66, no. 1 (2014): 2–12, <http://www.asa3.org/ASA/PSCF/2014/PSCF3-14Mann.pdf>.

<sup>31</sup>Karl-Dieter Crisman, "Open Source Software and Christian Thought," *PSCF* 67, no. 1 (2015): 3–13, <http://www.asa3.org/ASA/PSCF/2015/PSCF3-15Crisman.pdf>.

<sup>32</sup>Duane Kauffmann, "Biological and Environmental Constraints on Knowing the Self," *PSCF* 65, no. 3 (2013): 156–62, <http://www.asa3.org/ASA/PSCF/2013/PSCF9-13Kauffmann.pdf>.

<sup>33</sup>Denis O. Lamoureux, "Darwinian Theological Insights: Toward an Intellectually Fulfilled Christian Theism—Part I: Divine Creative Action and Intelligent Design in Nature," *PSCF* 64, no. 2 (2012): 108–19, <http://www.asa3.org/ASA/PSCF/2012/PSCF6-12Lamoureux.pdf>; Denis O. Lamoureux, "Darwinian Theological Insights: Toward an Intellectually Fulfilled Christian Theism—Part II: Evolutionary Theodicy and Evolutionary Psychology," *PSCF* 64, no. 3 (2012): 166–78, <http://www.asa3.org/ASA/PSCF/2012/PSCF9-12Lamoureux.pdf>.

<sup>34</sup>Jonathan K. Watts, "Biological Information, Molecular Structure, and the Origins Debate," *PSCF* 63, no. 4 (2011): 231–39, <http://www.asa3.org/ASA/PSCF/2011/PSCF12-11Watts.pdf>.

<sup>35</sup>Timothy K. Helble, "Sediment Transport and the Coconino Sandstone: A Reality Check on Flood Geology," *PSCF* 63, no. 1 (2011): 25–41, <http://www.asa3.org/ASA/PSCF/2011/PSCF3-11Helble.pdf>.

<sup>36</sup>Scott R. Smith, "Could We Know Reality, Given Physicalism? Nancey Murphy's Views as a Test Case," *PSCF* 64, no. 3 (2012): 179–89, <http://www.asa3.org/ASA/PSCF/2012/PSCF9-12Smith.pdf>.

<sup>37</sup>Dillard W. Faries, "A Personal God, Chance, and Randomness in Quantum Physics," *PSCF* 66, no. 1 (2014): 13–22, <http://www.asa3.org/ASA/PSCF/2014/PSCF3-14Faries.pdf>.

The number of published articles per cluster and journal was depicted in a time series plot (fig. 3). This chart shows that, discounting the difference in the number of publications per year between the two journals, there are observable distinctions of emphasis between the two academic outlets. *PSCF*, for instance, tended to concentrate on topics 8–20, whereas *S&CB* tended to emphasize more general themes (1–7). Finally, although we cannot speak of statistical significance with such small clusters, we can grasp initial trends—that is, whether their publication has been decreasing, increasing, or steady over time. It seems, for example, that discussions on human nature and origin are gaining force, since related publications (i.e., cluster 10) are much more concentrated on the right side of figure 3 (i.e., from semester 6 to 10) than on the left side (i.e., from semester 1 to 5). On the other hand, articles about “information,” “climate change,” and “mathematics” were concentrated in thematic special issues. Finally, generic themes such as “Science and Theology,” “Technology,” “God,” and “Universe and Natural laws” remained relatively stable over time. Once again, this evidence points to the fact that, in general, sci/faith publications are still being framed and

grouped in terms of broad traditional overarching themes, showing a slow pace in regard to moving toward the clear emergence of more topic-specific discussions.

## Conclusion

This paper shows that the Christian sci/faith dialogue in academic journals is very heterogeneous in its discursive structure. Many diverse thematic clusters were found from the analysis of the 2011–2015 article abstracts published in *PSCF* and *S&CB*. Some of the 20 clusters were still relatively heterogeneous (i.e., internally), reinforcing this observation of an unsystematic diversity among the publications.

Nevertheless, consistent discursive clusters were circumscribed from some of the articles published in these journals in the beginning of this decade. Some groupings reflected thematic special issues, as could be expected. But others emerged from different journal issues released over time. These specializations inside the broader field could indicate the development of expert communities for topical discussions, which, in turn, could lead to even greater accumulation of specialized publications—for example,

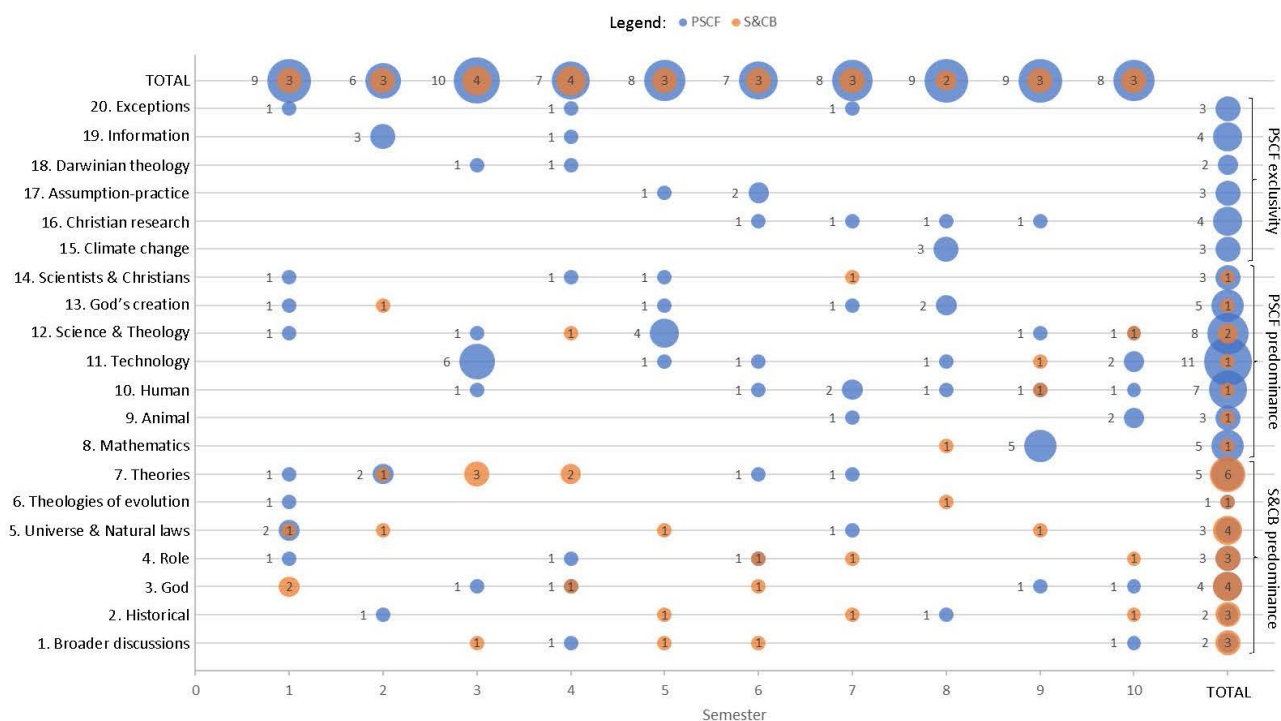


Figure 3: Articles over time, per theme and journal, ordered per journal predominance and from newer to older theme.

helping to establish cohesive subgroups inside ASA and CiS.

These specific themes also helped to distinguish both outlets, showing differing patterns of emphasis in these last years. Maybe the two journals could more clearly differentiate themselves over time, strategically representing different (though complementary) expert discursive communities for potential authors. Moreover, tracking publications over time in a time series plot may help editors to better observe the trends in the field and to note themes that should be brought in (or back) to discussion in their journals.

Undoubtedly, despite these possible benefits, the results presented in this paper should be considered introductory and exploratory. Other content analysts could replicate the study using a simpler method, a larger time span, and a broader journal selection. Future work could also analyze the complete texts (i.e., not abstracts only) of a specific theme of interest. Other statistical methods (e.g., multidimensional scaling, factor analysis) could be employed using word importance and text resonance values as input data.

Nonetheless, this paper may already illustrate the promising contribution of text analytics in sci/faith and theological studies in general. Biblical content analysis, for instance—which is usually dominated by frequency-based characterizations of book/passage thematic emphasis—could be greatly enhanced by word networks and “betweenness” as a better measure of word importance. Resonance between biblical books/passages (or even between biblical authors’ literary corpus) could be calculated to explore biblical clusters. Moreover, apologetic recorded debates, for example, the Lennox-Dawkins “God Delusion Debate,” could be modeled to see how the discourse is held coherent by each person over the unfolding of the discussion.

In sum, we would be glad if this article were to encourage more creative text analytical work and literature reviews in the sci/faith community. A critical mass of discourse seems to have been reached over these last decades. Let us use interesting available techniques to make the best of this rich literature, in order to better inform new entrants and to consolidate (or refine) the wisdom of experts.

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### Notes

<sup>1</sup>See, for instance, the many interesting contributions given by the papers published in the multidisciplinary *Scientometrics* journal.

<sup>2</sup>Steven R. Corman, Timothy Kuhn, Robert D. McPhee, and Kevin J. Dooley, “Studying Complex Discursive Systems: Centering Resonance Analysis of Communication,” *Human Communication Research* 28, no. 2 (2002): 157–206, <https://doi.org/10.1111/j.1468-2958.2002.tb00802.x>; Kevin J. Dooley, Steven R. Corman, and Robert D. McPhee, “A Knowledge Directory for Identifying Experts and Areas of Expertise,” *Human Systems Management* 21, no. 4 (2002): 217–28, <https://content.iospress.com/articles/human-systems-management/hsm515>; Jonathan S. Freitas, Jéssica Ferreira, André Rennó, Júlio Melo, Lin Cheng, and Carlos Gonçalves, “Mapping Methodological Innovation: A Study of Centering Resonance Analysis,” *RAUSP*, forthcoming.

<sup>3</sup>Barbara J. Grosz, Aravind K. Joshi, and Scott Weinstein, “Centering: A Framework for Modeling the Local Coherence of a Discourse,” *Computational Linguistics* 21, no. 2 (1995): 203–25, <http://nrs.harvard.edu/urn-3:HUL.InstRepos:2562369>; Marilyn A. Walker, Aravind K. Joshi, and Ellen F. Prince, eds., *Centering Theory in Discourse* (New York: Oxford University Press, 1998).

<sup>4</sup>A more detailed step-by-step example can be found at <http://visone.info/wiki/index.php/CRA>.

<sup>5</sup>Disregarding the difference between its singular and plural variations, for the purposes of this example.

<sup>6</sup>The Stanford Parser: A Statistical Parser, <https://nlp.stanford.edu/software/lex-parser.shtml>.

<sup>7</sup>David D. Lewis and Karen Sparck Jones, “Natural Language Processing for Information Retrieval,” *Communications of the ACM* 39, no. 1 (1996): 92–101, <https://pdfs.semanticscholar.org/d51e/f575fe2317411b1395dc823a7d1625626864.pdf>.

<sup>8</sup>See Corman, Kuhn, McPhee, and Dooley, “Studying Complex Discursive Systems,” for a complete presentation and discussion of CRA’s indices and their formula.

<sup>9</sup>Ibid.

<sup>10</sup>Lawrence Hubert and James Schultz, “Quadratic Assignment as a General Data Analysis Strategy,” *British Journal of Mathematical and Statistical Psychology* 29,

no. 2 (1976): 190–241, <https://doi.org/10.1111/j.2044-8317.1976.tb00714.x>; Peter J. Rousseeuw, “Silhouettes: A Graphical Aid to the Interpretation and Validation of Cluster Analysis,” *Journal of Computational and Applied Mathematics* 20 (1987): 53–65, <http://www.sciencedirect.com/science/article/pii/0377042787901257?via%3Dihub>.

<sup>11</sup>At a first glance, cluster 6 and 18 seem to be closely related. However, we did not merge them because we found no analytical support to proceed with this combination. That is, the results from the HCA applied to the CRA outputs did not indicate a sufficient relative similarity between the word networks of these two clusters. Going back to the data, the reason for this becomes clear. Cluster 18 was formed by only two sequential papers (Part I and II) written by the same author. If we check their abstracts, we note that they are virtually identical (only two slight changes). Thus, with such a distinctive internal cluster homogeneity, it would be indeed almost impossible for this cluster to be merged with any other cluster, because the slightest difference between these two identical abstracts and another text would already imply a relatively high (and undesirable) heterogeneity in the clustering solution. Thus, it would not be technically correct to merge these two groups.

<sup>12</sup>Peter J. Bussey, “God as First Cause—A Review of the Kalam Argument,” *Science and Christian Belief* (hereafter, *S&CB*) 25, no. 1 (2013): 17–35.

<sup>13</sup>Man Ho Chan, “Can Natural Laws Create Our Universe?,” *Perspectives on Science and Christian Faith* (hereafter, *PSCF*) 66, no. 1 (2014): 35–39, <http://www.asa3.org/ASA/PSCF/2014/PSCF3-14Chan.pdf>.

<sup>14</sup>Peter J. Bussey, “Mystery and Ignorance,” *S&CB* 23, no. 1 (2011): 3–21.

<sup>15</sup>Owen Gingerich, “Kepler and the Laws of Nature,” *PSCF* 63, no. 1 (2011): 17–23, <http://www.asa3.org/ASA/PSCF/2011/PSCF3-11Gingerich.pdf>.


<sup>16</sup>Ronald Larson, “Design or the Multiverse?,” *PSCF* 63, no. 1 (2011): 42–47, <http://www.asa3.org/ASA/PSCF/2011/PSCF3-11Larson.pdf>.

<sup>17</sup>Daniel Saudek, “Science and Eschatology in the Open Universe,” *S&CB* 23, no. 2 (2011): 133–57, [https://www.scienceandchristianbelief.org/serve\\_pdf\\_free.php?filename=SCB+23-2+Saudek.pdf](https://www.scienceandchristianbelief.org/serve_pdf_free.php?filename=SCB+23-2+Saudek.pdf).

<sup>18</sup>Timothy Wall, “Resurrection and the Natural Sciences: Some Theological Insights on Sanctification and Disability,” *S&CB* 27, no. 1 (2015): 41–58.

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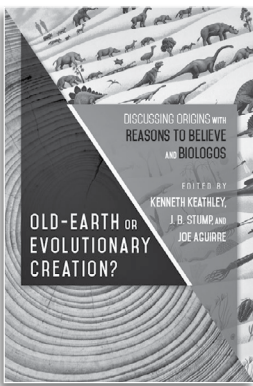
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## ENVIRONMENT

**ON EARTH AS IT IS IN HEAVEN: Cultivating a Contemporary Theology of Creation** by David Vincent Meconi, ed. Grand Rapids, MI: Eerdmans, 2016. 332 pages, index. Paperback; \$35.00. ISBN: 9780802873507.

This book is a part of the Catholic Theological Formation Series sponsored by the Saint Paul Seminary School of Divinity, the graduate school at the University of St. Thomas in Saint Paul, MN. As stated in the preface, the focus of this series is to prepare priests, teachers, and leaders within the Roman Catholic tradition. While the series is designed to be academic in its tenor, it also aims to promote a form of discourse that is “not only professional in its conduct but spiritual in its outcomes.” Theological formation is to be more than an academic exercise as it is also about the development of a spiritual capacity to discern what is true and good. This series, then, aims to develop the habits of the mind required of a sound intellect and the spiritual aptitude for the truth of God’s living Word and God’s church.

In the summer of 2014, a group of scholars gathered at the Saint Paul Seminary in Minnesota to examine what the Christian tradition might have to say about caring for creation. The fifteen essays that are included in *On Earth as It Is in Heaven* are the product of these discussions. Collectively, they defend environmental responsibility and provide the basis for the development of an ecological spirituality. Although the essays preceded the 2015 release of *Laudato Si’*, Pope Francis’s encyclical on the environment, they closely parallel the major concerns, themes, and figures put forth by the Holy Father. They agree that any proper theology of creation must resist sacralizing nonhuman creatures. At the same time, they refuse to reduce creatures to merely natural objects to be exploited only for human gain.

Rather than reviewing all of the fifteen essays that are included in the book, I will briefly summarize four of them as representative examples. The fourth essay in the collection was written by Marie George, a professor at St. John’s University in New York who has received several awards from the John Templeton Foundation for her work in science and religion. Her essay, entitled “Kingship and Kinship: Opposing or Complementary Ways of Envisaging Our Relationship to Material Creation?,” argues that both kingship and kinship, when rightly understood, significantly inform our understanding of the role of humans in relation to creation. Our kingly responsibilities stem from the special status we have as the

only earthly creatures created in the image of God. However, kingship does not imply tyranny, but ensures a just use of creation which protects biodiversity and forbids the hoarding of resources. Although kingship implies human superiority in a certain sense, the kingship concept, found in Benedictine and Franciscan spirituality, fosters an attitude of respect and appeals to the goodness of God’s creatures as a reason to treat them gently.

The fifth essay, written by Matthew Levering, professor at Mundelein Seminary in Chicago, is entitled “Be Fruitful and Multiply, and Fill the Earth: Was and Is This a Good Idea?” In the first section of this essay, Levering examines God’s command to Adam in Genesis 1:28, which is repeated to Noah in Genesis 9:1. The second section explores a very different perspective on human multiplication, found in the Christian environmentalist Bill McKibben’s “Maybe One: A Case for Smaller Families.” McKibben argues that Americans need to limit family size to one child or face imminent, catastrophic ecological disaster. Having set forth this tension, Levering seeks in his third section to develop a theological framework for approaching the command to “be fruitful and multiply” in a manner open to concerns about population growth, while mindful of the divine pattern identified in Genesis and the church’s affirmation of life. Several interesting conclusions are presented in the fourth and final section of this essay.

The tenth essay was written by Christopher Franks, who teaches in the Department of Religion and Philosophy at High Point University in North Carolina. He is also a clergy member of the United Methodist Church. His essay, entitled “Knowing Our Place: Poverty and Providence,” focuses on the speeches of God in the Book of Job, chapters 38–41, which provide the most extended treatment of creation in the entire Bible. After examining the writings of Bill McKibben, Norman Wirzba, William Brown, and Richard Bauckham on this passage, Franks concludes that all four interpreters encourage us to share Job’s displacement, so that we too can be “put in our place” and learn humility and wonder at the incredible diversity of life. Franks then reflects on the poverty of Christ, which illustrates the qualities of self-offering love toward which the story of God’s providence summons us. Christ enacted a form of divine poverty that calls humanity toward a universal love that aims to encompass all of creation. To aim at poverty is to be free of the compulsion of felt needs. Instead, one interrogates one’s needs for the benefit of others.

The thirteenth essay, entitled “Rethinking Gluttony and Its Remedies,” was written by Chris Killheffer,

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a writer and activist who has worked on small organic farms in Ireland and Connecticut. Among patristic and medieval theologians, it was fairly common to refer to gluttony as the first sin, the one committed by Adam and Eve when they ate the forbidden fruit. Killheffer first summarizes the writings of two theologians who made the most influential contributions to the Christian understanding of this sin: John Cassian in the early fifth century and Gregory the Great in the late sixth century. Writing for a monastic setting, Cassian classified three distinct ways that gluttony is expressed, while Gregory, who moved the concern of gluttony outside the ascetic ideals of the monastery, made a couple of alterations to Cassian's classification scheme. Killheffer then discusses gluttony from a contemporary perspective and concludes his essay with some possible remedies. Citing modern writers such as Michael Pollan, he summarizes his argument with the following rules: "Always eat with other people. Always eat at a table. Don't eat food with ingredients you can't pronounce. Eat food, not too much, mostly plants." These guidelines mirror those of John Cassian whose teaching regarding food consumption can also be summarized in a few words: eat communally, eat simply, and eat moderately.

Topics addressed by some of the other essays include the following: sustainability from a Franciscan perspective; land use and household stewardship; animal flourishing and suffering; evolutionary theory and the promise of restoration for all creation; and liturgy as the space in which all creation is consecrated before the cross of Christ. Finally, David Vincent Meconi, who edited this book and teaches at St. Louis University, has included his own essay, entitled "Establishing an I-Thou Relationship between Creator and Creature."

While a few of the essays are more philosophical in nature, most of them combine theological wisdom with practical application. The majority of the authors teach at Catholic seminaries and universities, so environmental concerns are mainly addressed through the lens of Catholic theology. The Bible is referenced in most of the essays and an index of scripture references is provided at the end of the book. This book should be required reading for those in leadership positions within the Roman Catholic church. Anyone with an interest in environmental ethics from historical and contemporary Christian perspectives will also benefit from reading this book. Hopefully, by reading it, more Christians will strive to become better stewards of God's creation.

*Reviewed by J. David Holland, Department of Biology, University of Illinois at Springfield, Springfield, IL 62703.*



**ETHICS**

**VORACIOUS SCIENCE AND VULNERABLE ANIMALS: A Primate Scientist's Ethical Journey** by John P. Gluck. Chicago, IL: The University of Chicago Press, 2016. ix-xx + 313 pages. Hardcover; \$27.50. ISBN: 9780226375656.

"'It's just a rat, for God's sake'" (p. 36). So spoke a surprised lab supervisor to John Gluck at Texas Tech University in the 1960s. At the time, Gluck was an undergraduate student whose clumsy first attempt to remove brain tissue from a living rat resulted in the animal's death. It surprised him to learn that the rat's death mattered so little in that place (it was "an extra"), that there was no interest in determining the actual cause of death, and that the only thing remaining to do after the botched experiment was to throw the corpse into a garbage bin. His initial assumption that nonhuman subjects mattered was misguided, in the opinion of this supervisor. What else did he expect? It's just a rat.

This philosophical memoir (my term, though, cf. pp. 284–85) includes many such episodes. *Voracious Science and Vulnerable Animals* is the story of the author's evolving relationships with other creatures and his emerging awareness of the researcher's moral responsibility to them. He begins with his childhood fascination with wildlife and love for family pets, but he then charts the steady "erosion" of an instinctive abhorrence at causing harm to other living things. His own development of an "it's-just-a-rat" attitude was gradual, and he describes several small steps that, in time, wore down his childlike revulsion at cruelty. Among them is an account of hunting rabbits with friends—often maimed, not always killed "cleanly"—and another of temporary work on a ranch that included the brutal castration, branding, and dehorning of cattle (pp. 25–29). In both cases, the acceptance of others proved intoxicating and encouraged him to stifle any squeamishness about inflicting pain on defenseless animals. A similar craving to belong and gain the respect of others occurred while at university, especially from professors whose research, they insisted, required the sacrifice of some for the sake of a higher good. Their approval of the young scholar further steeled him against sentimentalism (see, e.g., p. 33).

But chinks in the logical armor defending against emotional attachment to research animals gradually emerged during his long career and much of the book documents how justifying deprivations, electric shocks, and more on monkeys and rats proved problematic. He builds that case in a variety of ways

(see esp. chaps. 5 and 6), but one poignant turning point in Gluck's "ethical journey" serves to illustrate the kinds of dissonances with which he grappled. He credits a stray dog with bringing "warmth and a focus of care beyond my self-centered attention" into his home and marriage, and further describes the extraordinary efforts he and his wife took to care for this German shepherd mix. The costs in time, money, and convenience were considerable, even to the point of buying a house with a yard to accommodate the new pet. He admits that the sharp contrast between domestic and professional behavior, between his efforts to keep a dog contented and healthy and his daily treatment of animals in the lab, proved startling. Beyond providing clean cages and fresh food, the comfort of those animals was "not an issue" (pp. 131–32). Other pangs of conscience would follow.

The use of animals for scientific advancement is a polarizing subject, of course, and frequently those invested in the debate one way or the other speak past one another. One thing made clear in the book, however, is that altruism motivates those on both sides. Those wanting to empty the laboratory cages altogether often insist that any knowledge gained by experimenting on living animals is ill gotten. But Gluck reminds us that compassion motivates many working in research facilities too. He writes movingly about his father and the "life-destroying repercussions" of early onset Parkinson's disease that transformed his life and the lives of other family members caring for him (p. 21). Watching his father's struggle "weighed heavily" on his mind, contributing to his interest in neuroscience (p. 171). He also refers to the anxiety and depression that "plagued" his sister and grandmother, which also explained in part his career choices (p. 40). This insider's account of his educational formation, and professional and personal motivations, is potentially a bridge builder by helping those on opposite sides of the animal ethics question to find common ground in compassion. He writes knowingly of the concerns of both. One stated aim is to help protectionists better understand what he calls "the scientists' plight" and to thereby encourage more effective dialogue with them (p. xiv). Gluck writes as a scientific insider, as a one-time practitioner of the animal research methodologies he now critiques.

Gluck worked as a behavioral scientist from the 1960s through to the 1990s but eventually left this work to devote himself to the complexities of animal research ethics. This was no easy decision. (To illustrate his intellectual reservations, see, e.g., pp. 157–60, regarding his first response to Peter Singer's seminal work *Animal Liberation*). Some colleagues were suspicious

of the "turncoat" who changed sides (pp. 280–81), but this double perspective is what makes this book so fascinating. It is easy for scientists to mock the emotional outbursts or sentimentalism of sometimes-shrill advocates who, they insist, do not understand the importance of scientific inquiry and the costs of progress. At the same time, those advocates often caricature all those working in laboratories as insensitive sadists. What we find here is a beautifully told story of one who sees the issues from both sides, who challenges both stereotypes, and in the process, presents compelling reasons to consider the animal's point of view, which is a key concern in the unfolding argument (e.g., pp. 38, 147–50). His extensive work with laboratory animals, which he describes with often-disturbing detail, assures him an audience with others doing similar work. At the same time, what he describes as his "ethical awakening" (pp. xiv; cf. 143–52) is a remarkable turn toward animal compassion sure to inspire advocates.

The book urges animal welfare reform. Gluck has much to say about institutional animal care and use committees (IACUCs), and he puts forward ways for them to improve how they operate (xiv; chap. 7). He argues that philosophical analyses of animal ethics and political and institutional regulations alone do not result in significant protections for animals unless certain conditions inform the work of IACUCs. Heading a list of eleven such conditions (pp. 279–80) is the crucial need for committee members to value animal lives "at least as much as they value animals' usefulness in research." This captures well the argument put forward in the book.

*Reviewed by Michael Gilmour, Associate Professor of English Literature and New Testament, Providence University College, Otterburne, MB R0A 1G0.*



## HISTORY OF SCIENCE

**GOD IN COSMIC HISTORY: Where Science and History Meet Religion** by Ted Peters. Winona, MN: Anselm Academic, 2017. 356 pages, index. Paperback; \$39.95. ISBN: 9781599828138.

History is getting "bigger" these days. To be sure, universal history, the attempt to provide a single overarching story of the past, received considerable popular attention in the mid-twentieth century with massive multivolume projects by the likes of Arnold Toynbee and Will and Ariel Durant. Dismissing such universalist approaches as too speculative, academic historians focused instead on monographs dealing with much smaller chunks of the past. So many historians became enamored with increasingly smaller-scale, even microhistorical, studies that the



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story of the past became fragmented. Fortunately, some historians recognized that larger-scale historical narratives were needed to make sense of the past. In the 1960s and 1970s, world history, which examined the five or six thousand years of recorded human history, emerged as a distinct subdiscipline. Large-scale historical analysis gained further momentum in the 1980s and 1990s with attention given to varieties of global history. Then, in the 2000s, a new approach to the past emerged that dwarfed all others: so-called “big history” – the grand unified story of natural and human history. This amounts to situating human history in the context of the vastness of nature’s history. Big historians engage in breathtaking syntheses that tell the story of everything from big bang cosmology, the formation and drift of galaxies, the origins of Earth, the origins and evolution of life and the biosphere, human evolution, prehistory, the emergence of agriculture, settled communities, agrarian civilizations, global networks of exchange, the birth of the modern world, and the “great acceleration” of the twentieth century.

Big history would seemingly be the most expansive approach imaginable. However, theologian Ted Peters now advances something even grander: cosmic history. This is big history with God added or, more accurately, with the human quest for God front and center. For Peters, the central question is whether God is the author of the cosmic story. Consequently, he interrogates history from a theological perspective in order to “illuminate dimensions of reality missed by other historians” (p. 18). He pointedly asks supra-cosmic questions of ultimacy that world and big historians avoid or answer only in the limited manner warranted by their allegiance to naturalism and scientism.

The reader may find the organization of the book to be challenging, despite Peters’s several attempts to state his main themes. Chronological (in the broadest sense of the term) and thematic discussions interpenetrate his analysis. The first part of the book ranges widely over typical big history topics: big bang cosmology, the origins of our universe and planet, the evolution of life on Earth, prehuman and human ancestors, and ancient myths of origins. Then, rather abruptly, Peters shifts his attention to a number of thematic topics: models of nature, the anthropic principle, design, determinism vs. contingency, and multiverses. The main point of this first half of the book is to argue that the big historians’ strictly scientific account of natural and human history fails to render a full account of reality—even though the “question of God is unavoidable, even within science” (p. 159).

In the second part of the book, Peters explores selected topics in world history that reveal how our predecessors engaged the question of God. He draws heavily on the work of three eminent scholars: sociologist Robert Bellah, philosopher Eric Voegelin, and systematic theologian Paul Tillich. Peters emphasizes the notion of an axial age breakthrough introduced by psychiatrist-philosopher Karl Jaspers in *The Origin and Goal of History* (1949) and developed more recently by Bellah in his monumental *Religion in Human Evolution* (2011). The axial age is a conceptual label given to the emergence of several great religious/intellectual traditions in China, India, and the Mesopotamian-Mediterranean region between 800 and 200 BCE. The axial breakthrough involved revolutionary insights into a mysteriously transcendent reality that gave rise to a reordering of “self, society, and the cosmos” (p. 20). Peters correctly maintains that in bracketing out the God question, big historians fail to appreciate that the axial breakthrough constituted an epochal “leap in human self-understanding” that fundamentally altered human consciousness.

In this second half of the book, Peters examines axial answers to the God question in the light of contemporary challenges such as astrobiology and the search for extraterrestrial life, transhumanism, and the global eco-crisis. He discusses a dizzying array of topics ranging from war and models of God to the evolution controversy and a just and sustainable future for the planet.

Peters concludes with a provocative Afterword in which he summarizes his case for cosmic history. It is well worth listing several of his key points: the cosmos comes to us as a divine gift; humans have a “built-in ontological thirst that can be slaked only by ultimate reality” (p. 328); asking the God question is justified even though it is not addressed by world and big history; history from the cosmic perspective is “the stage on which the drama between God and creation is played, a drama still awaiting its final act” (p. 330); and historians need to pay heed to God’s grace.

*God in Cosmic History* is a curious book. It appears to be a textbook (complete with review and discussion questions at the end of each chapter) for an expansive, upper-division interdisciplinary course. Though it is surely historical, the book really cannot be categorized as history in its traditional academic sense. It raises, however, profound methodological issues that most historians (“big” or otherwise) ignore and that even believing historians generally consider to be beyond their warrant as historians.

*God in Cosmic History* is probably best understood as a manifesto for a comprehensive story of reality that goes beyond big history to include the God question. Whether cosmic history has the potential to develop into a robust new field remains to be seen. If that is the goal, the project of cosmic history might find a receptive audience among those historians—few in number, perhaps—who question the rigid materialism and anti-supernaturalism of an academic history that cannot countenance the notion that “the transcendent has broken into time.” At the least, cosmic historians would do well to draw from the considerable literature of believing historians who have wrestled with variations of the God question for decades.

Regardless of how one categorizes the book or assesses the potential of cosmic history, it is an ambitious undertaking from which scholars and general readers will benefit.

*Reviewed by Donald A. Yerxa, Editor of Fides et Historia and Professor of History Emeritus, Eastern Nazarene College, Quincy, MA 02170.*



**DARWINISM AS RELIGION: What Literature Tells Us about Evolution** by Michael Ruse. New York: Oxford University Press, 2017. 310 pages. Hardcover; \$34.95. ISBN: 9780190241025.

Given the title *Darwinism as Religion*, we expect Michael Ruse’s latest book to provide a critical, historically based assessment of how Darwinism has, since the publication of *On the Origin of Species*, taken on the forms and roles inhabited by religion—as a source of meaning and a guide to human morality, as a lens through which to view the “big” questions of meaning in life. In his preface, Ruse suggests that he wants to examine “evolution through the lens of literature, fiction and poetry,” noting that he is “not using evolutionary thinking to analyze literature but seeing the influence of evolutionary thinking on literature and from this drawing conclusions” (p. x–xi). Later, Ruse asserts that this “is a story about evolution in opposition to religion, the Christian religion” (p. 36). Further, “Darwinian evolutionary thinking ... became a belief system countering and substituting for the Christian religion: a new paradigm” (p. 82). While Ruse includes chapters on God, Morality, Sex, and Sin and Redemption, what is meant by “religion” is never entirely clear, although he seems to have in mind some rather generic form of evangelical Protestantism, which is, at times, reduced to caricature. Even so, “religion” frequently goes missing from the discussion for pages at a time, leaving

one to wonder: “And what exactly does all this have to do with religion?”

The subtitle, *What Literature Tells Us about Evolution*, adds to the confusion. Does the author mean to suggest that literature can actually help us understand the science of evolutionary theory? Does he want to assess the historical reception of evolutionary theory as evidenced in literature? Or does literature itself provide evidence of an evolutionary process as the human mind comes to grips with the random, pointless nature of existence? The reader is never quite sure. The author apparently feels no obligation to make his argument clear in what he aptly terms a “collage” (p. x) but instead leads his reader on an idiosyncratic journey through the “writings that have filled [his] life with joy and inspiration” (p. xi). His joy seems to have been found primarily in the work of Thomas Hardy, one of the bleakest literary translators of Darwinism, whom Ruse sees expressing

something in the world without the Christian message of hope. And time is an essential part of this. We are of the Earth. We came from it. We go back to it. That is all there is. Time goes on. There is no meaning, at least not in any conscious, Christian sort of way. (p. 105)

The breadth of Ruse’s reading is clearly epic: it appears that he has intimate familiarity with most popular fiction and poetry written in the nineteenth century (in both Great Britain and America), and to a large extent with the transatlantic literature of the twentieth and twenty-first centuries. He admits,

I am absolutely staggered at the amount of material I have found pertinent to my inquiry and hugely impressed at the sophistication and sensitivity of the massive corpus of secondary material. (p. xi)

If nothing else, Ruse leaves the reader feeling similarly overwhelmed. While he does provide frequent plot summaries (which can sometimes seem reductive), in general, Ruse assumes that the reader has a similarly encyclopedic understanding of this material. He dips in and out of novels and poems continually—Browning, Dickinson, Yeats, Huxley, Eliot, Stevenson, Meredith, Norris, Kipling, Twain, Kingsley, Rossetti—returning frequently to major figures, especially Thomas Hardy, in the various subchapters. The result is that we receive no coherent analysis of any one text in its historical context, but instead we find scattered notes, which presumably are connected to the topic named in the chapter title. This constant oscillation among authors adds to the incoherence of the book.

Another persistent fault of the book lies in its inadequate grasp of the principles and conventions of literary analysis. At the most basic level, this involves



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providing a context for quotations, especially lengthy block-style quotes, and then following them with an explanation of how the language of the source material supports the claim the critic is making. Unfortunately, not only is Ruse's argument seldom clear, but he frequently fails to provide even minimal introduction to quoted materials. The reader is often at a loss as to whose words and from which source was intended. And then the text is left to stand for itself, as if its meaning clearly supports the obscure argument without further effort from the author.

The prose style is chatty and familiar in tone, as if the author and reader are old friends who share the same opinions and ideas—this may be why the author failed to make a pointed, rigorous argument. An example of his many asides occurs when he treats the work of Marilynne Robinson, noting, "Somewhat ironically, given themes in her fiction, one of her greatest admirers is Barack Obama, the first black president of the United States" (p. 274). Ruse never defines these themes, leaving the irony ambiguous. One is left to assume that he considers Robinson's novels racist, although the plot summaries and quotations he offers do not really support such a view. The reader, it appears, is supposed to accept the opinion uncritically.

The reader occasionally wonders if Ruse feels a vague sympathy with some of his "religious" authors, but by the end of his compilation, it is clear that he finds them deluded. Again, it is unclear whether he is paraphrasing their thoughts or articulating his own. Discussing Amy Clampitt's poetry as an example of an attempt "to make the case for Christianity in a Darwinian world," he notes, "One has another intimation of the theology of Job, of a God who allows and perhaps even commits what we judge evil" (p. 266), and then interjects two stanzas from a Philip Appleman poem which opines, "God has the morals / of a Babylonian butcher" (p. 268). Near the end of the book, he references "Pattiann Rogers, one of America's leading Christian poets," presumably because Rogers uses the term "god" in her poetry, certainly not because she makes any claim to that title (p. 260). While he nods at Marilynne Robinson's neo-Calvinism, a consideration of Annie Dillard is mysteriously absent. By the last page, it seems reasonably certain that Ruse views religion primarily as a set of outdated myths that serve alternately as a panacea for human anxieties and as a spur to meaningless violence: "Finally, will people see the damage that religion does? Will they recognize the evil that lurks at the heart of every faith system?" (p. 268). Of course, such pernicious ideas are best replaced by an acceptance of Darwinian realities suggested to the author by the Book of Job.

To his credit, Ruse occasionally recognizes that both Christianity and Darwinism are complex fields of thought: "It is important to stress these ambiguities in the Christian position, because they are echoed in Darwinism and in the literary responses and interpretations" (p. 129). The book as a whole suggests that Ruse maintained an inadequate critical distance from his materials, the result being more polemics than well-crafted persuasion.

*Reviewed by Ann E. Lundberg, Professor of English at Northwestern College, Orange City, IA 51041.*



## SCIENCE AND BIBLICAL STUDIES

**CHANCE IN EVOLUTION** by Grant Ramsey and Charles H. Pence, eds. Chicago, IL: The University of Chicago Press, 2016. vii + 359 pages. Paperback; \$45.00. ISBN 9780226401881.

Those following the literature on theological responses to the natural sciences will be aware that there is a small industry of books that has appeared in the last few decades responding to the notions of chance and randomness operative in the evolutionary history of the world. On the one side are those in the Wesleyan-Arminian and, more recently, open theistic and process traditions that have advocated a theological vision of divine providence working in and through the chanciness of creation's processes; on the other side are, usually, Reformed thinkers, especially conservative (often Westminster confessional) theologians, who have labored to insist on God's sovereignty sometimes despite but more often over the appearances of fortuitousness and haphazardness in the nature of things. The book under review is by and large unconcerned with adjudicating the theological debates, although there is plenty of historical and scientific analysis here that will be pertinent to theologians devoted to engaging the issues.

The three parts of the book explicate, respectively, historical developments (five chapters), biological processes (three chapters), and history-of-life perspectives (four chapters) related to chance in evolution. The first section is quite interdisciplinary, starting with a historical overview of notions of contingency, chance, and randomness from the ancient through medieval periods and as received in modern biological science (authored by a historian of rhetoric who has focused much of his life's work on the history of biology). The focus then shifts to chance in the development of Darwin's thinking, and its reception since (by a historian of science), and then chance in the modern (neo-Darwinian) synthesis (co-authored by four philosophers). It then segues into Christian

theological responses (written by a theologian) and concludes with an analysis of chance in relationship to Darwinian evolution (by a philosopher of science).

The cumulative effect of these chapters is the realization that with respect to the theological issues at stake, historical attentiveness and transdisciplinary engagement will clarify misunderstandings and situate the concerns in contexts that invite reconsideration of contested variables otherwise often locked into parochial frames. For instance, even across the evolutionary sciences, there is no such thing as absolute chance; whether in terms of contingency, randomness, or probability, chance always unfolds in connection with other determined aspects or variables so that we do not need to turn to theology to elucidate such relationships.

The chapters in the second part will be most relevant to those with interest in biological evolution but, commensurately, will be most challenging for theologians or others without training in this field. The fundamental questions regarding genetic mutations are explored in relationship to natural selection and evolutionary drift (in which the frequency of gene variations shifts over generations) and in regard to parallel evolution (thus comparing and contrasting lineages that diverged in the past from a common ancestor), noting variously that mutation is random and adaptation is probabilistic. Helpful here is the clarification of “strong” versus “weak” randomness, with the former involving stochastic (causal) processes constituted by indiscriminate and hence probabilistically equivalent processes of elemental replacements that are invariant over time (so that mutations are no more or less likely to occur at any site of that process), and with the latter involving same processes that are either discriminate (hence probabilistically un-equivalent) or variant over time, or both. The discussions in this part of the book invite theologians to be clear about how biologists are understanding and using notions of chance in their work.

The four chapters at the end of the book each take as their point of departure the work of paleontologist Stephen Jay Gould, not least his renowned theory that if we were to replay the tape of evolution all over again, we would observe very different creatures than we have now. Two of the essays delve into the details of contingencies related to the Cambrian era (the period that is most pertinent to Gould’s thesis), tracking the progression of research in the last three decades or engaging the counter argument of Simon Conway Morris and others, that niche environmental constraints suggest that such replay would inevitably lead to creatures much like we have now (due

to selection factors). The other two chapters focus on the famous *E. coli* Long-Term Evolution Experiment, which traced the evolutionary histories of twelve initially identical populations of the bacteria, in varying environments, over (by now) sixty thousand generations in order to explore the implications of such for comprehending evolutionary contingency. Consequently, siding with or against Gould is not only complicated but begs considerations in multiple directions, given the advance of knowledge at this stage.

In a prior generation, chance explanations related to the unpredictability of development or the obscurity of causal histories, thus having a more epistemological character indicative of a lack of scientific knowledge in certain areas. In the current climate, given the consensus that quantum randomness pertains at the ontological level, views of chance have shifted toward being naturally intrinsic to the way life processes are. Yet even here, historicity is crucial, particularly—as many of the essays highlight—that historicity of the pathways related to evolutionary speciation. There is no getting away from the stochastic contingencies related to gene flow and mutation but there also is no denying that such unfold amidst the selective and adaptive pressures exerted by nature and the environment. Theologians open to thinking further about the nature of chance and randomness in relationship to divine providence will benefit from, and be updated by, this wide-ranging volume.

*Reviewed by Amos Yong, Fuller Theological Seminary, Pasadena, CA 91182.*



## SCIENCE AND RELIGION

**SCIENCE AND CHRISTIANITY: Foundations and Frameworks for Moving Forward in Faith** by Tim Reddish. Eugene, OR: Wipf and Stock, 2016. 190 pages, bibliography, index. Paperback; \$25.00. ISBN: 9781498296045.

“What, another book on science and Christianity?” Such were indeed the initial thoughts of this reviewer. In fact, these are the introductory words of the author himself. Tim Reddish goes on to explain part of the motivation behind the book: the backdrop of the numerical decline of established churches. The author then answers his own question by explaining that the target for this work is primarily ministers and seminary students.

Reddish himself is a relatively recent seminary graduate (MDiv, 2015), from Knox College in Toronto, one of three seminaries operated by the Presbyterian

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Church in Canada. This may explain, in part, his ability to reach his target audience. He is also a physicist (PhD, Manchester, UK). After spending time at the Newcastle University, Newcastle upon Tyne in the UK, he moved to Canada, and was a professor of physics at the University of Windsor. He commenced his Knox College studies in 2011.

The subtitle of the book is *Foundations and Frameworks for Moving Forward in Faith*. As a Knox graduate myself, I would note that Reddish was paying close attention to the preaching class that covered the topic of alliteration! The phrase does reveal, however, the well-structured nature of the book, although there are some refreshing alterations to usual approaches on this well-covered topic. For example, while many books tend to handle the topic of Genesis in earlier sections, the author saves this for the final chapter, which is entitled “Revisiting Science and Scripture: Creation Texts in the Old Testament.” There are also two short appendices covering theistic arguments for the existence of God and metaphysics.

The first two chapters focus on Scripture. In addition to a historical overview, a primary topic of chapter 1 is the “Galileo Affair” (author’s quotes). We see another of the author’s propensity for alliteration, as he summarizes the complexities of the affair as concerning “power, politics, patronage, popes, precedents, principles, polemics and personalities.” The chapter concludes with a useful section entitled “Galileo: Lessons for Today,” noting that, “Sadly, some Christian traditions are simply fighting an outdated war with the wrong tools.”

The second chapter continues the focus on scripture, particularly its inspiration and interpretation. Amongst the theologians cited is Bradley McLean, who is professor of New Testament Language and Literature at Knox College. Reddish makes extensive and appropriate use of McLean’s book *Biblical Interpretation and Philosophical Hermeneutics*, and cites the utility of two types of meaning of a text: the original founding sense event, and a reinterpretation of its significance in every subsequent generation.

The next two chapters then focus on the nature of science (chapter 3) and relating science and Christianity (chapter 4). Like others, the author uses the classifications of Ian Barbour (Conflict, Independence, Dialogue, and Integration). In this case, the author makes considerable efforts to review the strengths and weaknesses of each classification. This chapter is worthy of (and requires) several reads, but provides a useful backdrop for the remainder of the book.

This reviewer found the last four chapters of the book the most intriguing. Chapter 5 is entitled “On Chance, Order and Necessity.” It builds upon two opening quotes, one from Ecclesiastes 9:11 concerning the ubiquity of both time and chance, and the other from Stephen Hawking who admits that those who believe in predestination still look both ways before crossing the street. Reddish states: “In reflecting upon points of possible tension and potential connection between science and faith, I have become convinced that one key issue is that of chance.” He goes on to build his case for the importance of both contingency and necessity by extensively citing a number of scientist-theologians, including Peacocke, Polkinghorne, and Barbour, amongst others. He concludes, “I advocate that the quest for modernism’s certainty, which is embodied in physical and theological determinism, needs to be abandoned.” Encouraged by 2 Corinthians 5:7, he supports the contention that the opposite of faith is not doubt, but certainty.

Reddish follows this up with two related chapters, more theological in emphasis: chapter 6 “On the Nature of God,” and chapter 7 “On Miracles and Prayer.” As with the previous topic (and others covered in the book), the author notes at the start of chapter 6 that “even the nature of God is not as straightforward as Christians think.” Topics covered include the Trinity, immutability, omnipotence, and omniscience. On the topic of miracles and prayer, Reddish builds upon the relational nature of God and notes that any serious dialogue between science and Christianity “must recognize God’s covenantal commitment to humankind (and indeed the whole creation).”

As mentioned, Reddish uses the final chapter of his book to review aspects of science and Scripture through various creation texts. This includes not only early chapters of Genesis, but the creation texts of the Psalms, Job, etc. Of particular note are the references to chaos. Reddish builds a case for order and chaos as being “inseparable,” both necessary in sustaining life.

Four of the book’s chapters contain a specific “Summary and Conclusion” section. There would have been value in carrying this on throughout the book. As a minister, I appreciated the pastoral approach that Reddish took in handling complex subjects, as he shared in detail all sides of the issue. As a former geologist, I appreciated his review of the nature of science itself, and the interpretations concerning the role of chaos in creation (including such things as plate tectonics. I also appreciated the



opportunities taken by Reddish to share his own views, which will resonate with many ASA/CSCA members. In his conclusion to his final chapter, for example, he encourages his readers to embrace the biblical stories on their own merits and (following Barbour) advocates for an independence stance between science and scripture, while endorsing a dialogue perspective between science and theology. There are those who may wish to push further toward a more concordist position. However, Reddish argues in chapter four that one must be careful about making the text say something it never said, and that while concordism's hermeneutic is well meaning, "it is ultimately flawed."

In David Livingstone's book *Dealing with Darwin* (Johns Hopkins University Press, 2014), there is a chapter entitled "Toronto, Knox, and Bacon's Bequest." The "Knox" refers to the aforementioned college, and Livingstone notes that in the mid to late 1800s, the intellectual leadership at the college displayed "a notable willingness to engage in a creative conversation with evolutionary theory." Tim Reddish carries on with that tradition. He has delivered to his target audience well, but I would happily recommend the book for more general use also.

*Reviewed by Bob Geddes, a retired Presbyterian pastor, former geologist, and secretary-treasurer of the CSCA.*

**FINDING GOD IN THE WAVES: How I Lost My Faith and Found It Again through Science** by Mike McHargue. New York: Convergent Books, 2016. xiv + 274 pages, notes, index. Hardcover; \$24.00. ISBN: 9781101906040.

*"The first gulp from the glass of natural sciences will turn you into an atheist, but at the bottom of the glass God is waiting for you." (Werner Heisenberg)*

A more fitting epigraph could not have been chosen for this book. Mike McHargue, who goes by "Science Mike" these days, has been on a wild ride for the past few years. A college dropout turned autodidactic marketing VP, McHargue is now a full-time writer, speaker, host of the podcast *Ask Science Mike*, and co-host of *The Liturgists Podcast*. Readers of *PSCF* are likely to be familiar with his work with *BioLogos* in addition to his contributions to various magazines and blogs. *Finding God in the Waves* weaves these projects together into two parts that are essentially interleaved. The first functions primarily as a memoir of McHargue's conservative Southern Baptist upbringing, his slide into atheism, and his subsequent rediscovery of faith. The second explores how McHargue understands the intersection of science and faith today.

While he makes it clear that he is not a trained or working scientist, McHargue nevertheless possesses a unique ability to synthesize the literature into a form that is accessible and engaging to laypersons and scientists alike. With highly visible science popularizers like Tyson and Nye sometimes demeaning the religious, McHargue's ability to convey scientific concepts accurately from a radically inclusive posture is a breath of fresh air.

Regardless of one's position on where McHargue ends up theologically, it is hard to deny the power of his journey. As a self-described nerdy kid with a learning disability, bullying was a constant companion throughout his childhood. In a particularly emotional passage, he tells of how he hid amongst the trees during recess to avoid physical abuse, spending the entire time talking to his only friend—Jesus. Discovering that computers could help him overcome his learning disabilities, as well as experiencing a rock star streak in his teens, led McHargue to a place where he could develop healthier social ties. The church played no small role in this; he was ordained as a deacon at the age of 25.

McHargue's story of an unraveling faith departs from familiar accounts here. It was not Big Bang cosmology, or evolution, or the problem of evil that sparked doubt; it was reading the Bible itself. McHargue was blindsided by his father's intention to seek a divorce after nearly thirty years of marriage. Intent on helping his father see the gravity of this sin, McHargue tackled the problem by throwing himself into the scriptures. Having never read the Bible from cover to cover before, McHargue read it through four times in one year. Apparent contradictions that he had overlooked before and troubling passages that he had been able to explain away began to rear their heads anew; paradoxically, constantly steeping himself in the text made these harder to ignore. Clearly a voracious reader, McHargue sought insight from apologists and atheists alike as his faith continued to erode—until reading Dawkins's *The God Delusion* finally tipped him over the edge.

McHargue spent the next two years as "the world's least interesting secret agent—an atheist under deep cover in the Baptist church" (p. 74). He was eventually found out by his wife, and his "secret" nearly destroyed his own marriage. They managed to work it out and McHargue became, by all accounts, a well-adjusted secular humanist. However, at a conference on creativity hosted by Rob Bell, McHargue had a series of profound mystical experiences that culminated in a moment on a Californian beach in the middle of the night where he "felt connected to the Source of Life and the Source of All" (p. 127).

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It is from these notably *unscientific* experiences that McHargue launches the second half of the book, which expounds his *prima facie* case for the core tenets of the Christian faith using scientifically grounded premises that even the most ardent atheist would have to concede as valid. These “Axioms about Christian Faith” have gained some degree of notoriety in the blogosphere and are aggregated in an addendum. While each is a soft argument in comparison to traditional doctrinal statements, his goal is simply to make the case that belief itself is reasonable.

While McHargue draws upon physics, he leans most heavily on Andrew Newberg’s work in neuro-theology and Tanya Luhrmann’s anthropological work with evangelicals. He interacts with their work admirably, but the set of beliefs he constructs are constrained to a bare-bones natural theology by necessity.

In this regard, those unsatisfied by Einstein’s God may be disappointed with McHargue’s specific conception of prayer, the members of the Trinity, the Bible, et cetera. It is worth reiterating that McHargue consciously chooses *not* to construct a systematic theology in this particular undertaking. Rather, his goal is to demonstrate that Christian beliefs are not merely benign but that they are functionally beneficial both to the individual and to society. There is value in creating an irreducible scaffold on which to frame the beliefs one finds indispensable. This may prove especially true for those struggling to hold on to faith or those seeking faith for the first time. The project is meant as an aid in doing the “good kind [of pretending], where the pretense leads up to the real thing” that C. S. Lewis argues for in *Mere Christianity*.

Putting the weight of the argument on neuroscience, anthropology, and social psychology of belief is a boon for some and a potential pitfall for others. McHargue’s emphasis on contemplative practices as opposed to strict adherence to doctrine will be liberating to those who find themselves incapable of intellectually assenting to particular beliefs, while others might question the point of engaging in spiritual practices that can be reduced to mere brain states. On the other hand, scientists know better than most that understanding the underlying processes of a system can often lead to a deeper appreciation of the subjective beauty of the whole.

Ultimately, *Finding God in the Waves* is a product of the zeitgeist. Readers comfortable with the work of Barbour may find McHargue’s open posture to be radical, even troublesome, especially his full embrace of even the most troublesome scientific findings (viz.,

the Benson et al. and Swinburne intercessory prayer studies). Those looking for robust theology may criticize McHargue for failing to bridge the gap between the god of the mystics and the God of Christianity, a charge he concedes. Nonetheless, as the epigraph’s author might surmise, the ability to accommodate uncertainty is necessary even in the face of protests that “God does not play dice.” In an age of unprecedented scientific advancement, this is a book for those crying out, “I believe; help my unbelief!” (Mark 9:24).

*Reviewed by Gabriel Harder, Infinite Campus, Minneapolis, MN 55449.*



## SOCIAL SCIENCE

**CONFIDENT PLURALISM: Surviving and Thriving through Deep Difference** by John D. Inazu. Chicago, IL: The University of Chicago Press, 2016. 176 pages. Hardcover; \$29.00. ISBN: 9780226365459.

The American society that steps from the pages of *Confident Pluralism* is diverse indeed, composed of bikers and Baptists, lesbians and xenophobes, occupy protesters and labor unions, *Big Mama Rag* and Bob Jones University. Pluralism is real, apple-pie American, but as partisan polarization and violent confrontations across deep differences forcefully demonstrate, America embraces it only with reluctance and resists its implications. American history also attests to this reluctance, which the reader meets in the story of Lily and Taizo, the author’s grandparents, whose Japanese ancestry earned them internment after Pearl Harbor, despite their being American citizens who had never set foot in Japan.

To address these challenges, Inazu argues for a set of constitutional principles and civic practices that he dubs “Confident Pluralism.” For each of these Inazu presents a triad of imperatives. The constitutional principles include freedom of association, protection of public and private spaces for the exercise of this right, and the guarantee of equal treatment by government. Civic practices include tempering free speech by softening its tone; practicing tolerance, humility, and patience in boycotts, strikes, and protests; and seeking to bridge deep differences in search of common ground.

Inazu finds the legal-constitutional infrastructure for confident pluralism wanting in the American constitution. The Constitution contains no explicit right of association, whose protection relies instead on the First Amendment’s free speech clause, from which the courts have fashioned twin rights of intimate and expressive association. The first is so restricted that Inazu finds it “almost meaningless,” while the



second makes a group's right to associate dependent on proving a religious, social, educational, or similar purpose. Thus the Top Hatters, a motorcycle club, failed to qualify as an expressive association, while the Minnesota Jaycees found that even a successful demonstration of that status guaranteed no protection against the state's interest in eradicating discrimination, forcing the group to admit women. Religious groups at public universities have discovered that expressive association is no protection against "all-comers" policies that require them to admit as members or even leaders any student who wishes to join. Against these restrictions, Inazu insists that government demonstrate a compelling interest before interfering "with the membership, leadership, or internal practices of a voluntary group."

Time, place, and manner restrictions have weakened the Public Forum Requirement, while the court's insistence that these restrictions be "reasonable," "neutral," and make available "ample" alternative venues for communication places few restraints on government in practice. Here the examples stretch from Ferguson, Missouri, to sidewalk protests outside abortion clinics. Alongside the parks or city streets that comprise traditional public forums are the private-public forums such as shopping malls, social networks, and online commerce sites. Here the right to occupy such a forum—or in the case of New York's privately owned Zuccotti Park, to occupy Wall Street—faces significant restriction from the private property right.

For traditional forums, Inazu again argues for a compelling interest standard for restricting the Constitutional protection for voicing dissent, and would extend that standard to private-public forums in some cases. "Confident pluralism does not allow us to exclude from generally available resources those groups that we don't like." For Inazu, the Supreme Court's 1983 decision to uphold the IRS's action revoking Bob Jones University's tax exempt status because of its ban on interracial marriage, violates pluralist norms. This third, most controversial, precept is the public funding requirement, which declares that "When the government offers generally available resources (financial or otherwise) to facilitate a diversity of viewpoints and ideas, it should not limit those resources based on its own orthodoxy." Inazu, of course, is no friend of the ban on interracial dating, but he is a friend of a pluralist public square.

In a mirror image of the first part of the book, the author's exploration of confident pluralism's civic aspirations yields three imperatives, one each for speech, collective action, and common ground. Inazu juxtaposes the permissiveness of the First

Amendment to the many attempts to limit it, via the "hurtful insult," the "conversation stopper," and the deploying of stigmas, insisting that we embrace a commitment to "soften our tone," and embrace "living speech, even in the midst of real and painful differences, [which] can be one of our most important bridges to one another."

As for collective action, "boycotts, strikes and protests," their legitimacy should be weighed against "the civic aspirations of tolerance, humility and patience." This section closes with a brief chapter on the search for common ground—the third civic practice imperative—in which the author features unexpected friendships that have formed, such as that between Larry Flint and Jerry Falwell, that underscore an important reality that "we're stuck with this difference," or as one might say, our deep differences flow from the most cherished liberties of the American republic.

"One might think," muses Inazu in his introduction to the Constitutional principles section of the book, "that increased awareness of religious diversity that includes nonbelievers would be reflected in Establishment Clause doctrine. But that has not happened." The rest of this section is devoted to explaining how it might happen. However, readers should pause a little longer than the author does to consider why a broader pluralism of confessions, religious and otherwise, has not taken hold. For though Inazu's prescriptions for achieving confident pluralism seem eminently reasonable and fair, confident pluralism comes into sharp, perhaps debilitating, conflict with the American public philosophy of natural rights liberalism. That public philosophy purports to form sufficient common ground for a free, equal, and diverse society. But there's a catch: natural rights liberalism protects its privileged status, leaving genuine pluralism vulnerable to restrictions on groups and viewpoints seen as threatening its norms. Confident pluralism's American challenge is that it must overcome political and cultural instincts that resist its principles—a tall order to say the least.

What may secure these principles? Individualist public philosophies cannot do so because individual liberty reflects at best a partial vision of what it means to be human. The social and transcendent character of human beings that scripture describes, and that traditions such as the neo-Calvinist and Roman Catholic affirm, seems capable of supplying the full three-dimensional view.

Consider Abraham Kuyper's pluralist vision that endures via its contribution to twentieth-century Christian democracy. Taking as his point of depar-

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ture the sovereignty of God, Kuyper sketched out a society-wide structure of obedience to his sovereign. He distinguished the government's obligation to do public justice from nongovernmental tasks such as raising children, creating prosperity, or doing works of charity—tasks no less God ordained than doing justice. Alongside this “sphere sovereignty,” and the limited government it recognizes, Kuyper asserted a robust conception of religious liberty writ large so as to encompass the traditionally religious, those who reject traditional religion, and everyone in between. This confessional pluralism recognizes that, for example, parents are the primary educators of their children, whom they will raise in accordance with their basic beliefs. Government's task is to extend support and deference to those beliefs, regardless of their content. But Kuyper's pluralism put roots down into an already socially pluralist soil—Inazu must contend with the thin soil of American individualism.

Christian sensibility and the public justice that its moral imperatives call forth lend their influence to *Confident Pluralism*, albeit Inazu eschews an expressly religiously grounded appeal. Even so, his is a persuasive argument, well organized and very clearly written. Students of our contemporary struggles, from Ferguson to Charlottesville and on university campuses, will be the wiser for considering its merits.

*Reviewed by Timothy Sherratt, Department of Political Science, Gordon College, Wenham, MA 01984.*



## TECHNOLOGY

**THANK YOU FOR BEING LATE: An Optimist's Guide to Thriving in the Age of Accelerations** by Thomas L. Friedman. New York: Farrar, Straus and Giroux, 2016. 486 pages. Hardcover; \$28.00. ISBN: 9780374273538.

Thomas Friedman continues his series of books identifying mega trends that influence living at both a personal and global scale. *Thank You for Being Late* establishes the year 2007 as the epoch of titanic alterations in our social, political and environmental structures. That was the year the iPhone emerged, the Android operating system appeared, IBM's Watson super computer began making its mark, personal DNA sequencing costs had a precipitous decline, and a host of other technologies matured further and faster. Friedman describes how these ignited an overwhelming change in our world through a journalistic style of writing that includes interviews, second-hand research, and personal reflection. In addition to a historical analysis of how these changes

came about, Friedman also offers solutions for the negative consequences.

After an opening chapter, in which he uses the vehicle of a personal story to explain his journalistic style and the source of his personal values, Friedman discusses three forces that have changed and will continue to change our future: Moore's Law, Globalization of Marketing, and “Mother Nature.” He advocates that there are links between these forces. Succinctly, the pace of innovation has dramatically driven our ability to organize at a global scale. That expansion of industry has exacerbated the consumption of our earthly resources, which ultimately accelerates global climate change. The increased pace of innovation presents unprecedented challenges from personal privacy to global warming. The foundation of the problem is the inherent inability of humans to adapt to changes in a timely way. Friedman's quote of Jeremy Grantham succinctly sums up the problem: “we humans are wickedly bad at dealing with the implications of compound math.”

His observations about the benefits and penalties of accelerating technologies seem well balanced. For instance, he points out new opportunities created by technology. These include the use of data mining for more efficient agricultural production and the use of robotics leading to an expansion of careers, even though the initial impression is one of only displacing workers. Yet, the technology that has made marketing more efficient has potentially sinister implications: for instance, the unique identifier of any computing device (known as a MAC address) can be exploited through cell phone usage to make one's personal habits known to the entire world.

Friedman explores the accelerations from a faith perspective in the chapter “Is God in Cyberspace?” Friedman begins by considering Jewish teachings interpreted by a favorite rabbi. This discussion about good versus bad boils down to the claim that God is in those places where we let him in. While this can invite an extensive theological discussion, the main point Friedman makes in this chapter is that goodness is possible through a community effort (local or global). Beyond that, the book encourages a healthy discussion about stewardship and the ethical considerations of technological progress (i.e., technology is not neutral).

For me, the book became disappointing as it transitioned from exploring and explaining the nature and impact of the forces to his contemplation on reconsidering historical values. His vehicle for this is a reflection on his formative years in St. Louis Park, Minnesota, contrasted to the current nature of his

hometown. Based on the background of accelerated forces and his trip down memory lane, he provides a recommended 18-point platform for a hypothetical political party closely aligned with Mother Nature. Each point could justify its own chapter, but each has limited analysis on the pros and cons.

In conclusion, *Thank You for Being Late* is an informative up-to-date read about the state of information technology and the historical background to the globalization of markets, especially in the first half of the book. However, its editorial nature and lack of a bibliography and research notes would not make it a primary resource for research. For me, it bogged down in the latter portion.

*Reviewed by Patrick M. Bailey, Associate Professor of Information Systems, Calvin College, Grand Rapids, MI 49506.*

**THE TECH-WISE FAMILY: Everyday Steps for Putting Technology in Its Proper Place** by Andy Crouch. Grand Rapids, MI: Baker Books, 2017. 224 pages. Hardcover; \$13.99. ISBN: 9780801018664.

When I first heard that Andy Crouch had a new book about living wisely with technology, I knew I had to get a copy. I have read several of Crouch's previous books including *Culture Making*, *Playing God*, and *Strong and Weak* and greatly appreciate his insights and friendly writing style (he is also an engaging speaker). His latest book does not disappoint and applies his wise and winsome style to the perplexing issue of "putting technology in its proper place."

The book opens with a delightful forward by Crouch's 16-year-old daughter. In it she writes articulately and thoughtfully, indicating that the lessons her parents taught have been taken to heart. In the following section Crouch states "[t]his book is about how to find the proper place for technology in our family lives—and how to keep it there" (p. 16). The book is sprinkled throughout with results from surveys of parents with children ages 14–17 years, carried out by the Barna Group. These survey results reveal the extent to which technology has impacted home life and how parents have been wrestling with the resulting challenges. One such survey reveals that most parents believe technology and social media make it "more difficult to raise kids today" (p. 27).

Crouch begins by laying the ground work for establishing the need for "nudges" (pp. 33–35) and "disciplines" (pp. 35–37) to help keep technology in its "proper place." Crouch then introduces "Ten Tech-wise Commitments" which include items such as to "create more than we consume," to remember the "rhythm of work and rest," to avoid screens

before double digit ages, to "learn to sing together," and to "show up in person for the big events of life" (pp. 41–42). These commitments form the structure for the rest of the chapters of the book. The last chapter deals with the commitment of "being there" in which Crouch shares his own profound experience—sitting bedside with a dying friend.

All these commitments are indeed wise, but I admit to being surprised by the commitment to "learn to sing together." Crouch is a musician and comes from a musical family, so perhaps this suggestion reflects his own family and background. I suspect your mileage will vary with this particular commitment, depending on the musical abilities of your family. However, Crouch also ties this point to the issue of music in worship and makes some excellent points about the importance of congregational singing and what can be lost with amplified music and praise bands.

I must confess, at times his "ten commitments" made me uncomfortable, as they reminded me of the myriad ways I have fallen short in keeping technology "in its place" in my own life. However, each chapter ends with a Crouch family "Reality Check," wherein Crouch confesses frankly some of the ways his own family has struggled with these commitments and has fallen short. I found many of these "reality checks" to be refreshingly candid and helpful.

I have only small quibbles with a few sentences in the book. At one point Crouch suggests that "the problem isn't with our devices themselves—it's with the way we use them" (p. 148). Elsewhere he writes that "technology is at its best a neutral factor in what is most important in our families" (p. 66). Statements like these under-emphasize or miss the point that technology is not neutral and that technology is value laden. Media ecologists like Marshall McLuhan or Neil Postman have helped make the case that although we shape our tools, our tools always shape us. Indeed, many of the points that Crouch makes in the book are evidence that digital devices are not neutral and that we need to be aware of their built-in biases and nudges. In fact, near the beginning he writes, "The makers of technological devices have become absolute masters of the nudge" (p. 34).

At another point Crouch suggests that "technology emerges from the amazing success of modern science, and the hard work of scientists, but it's not like science at all. Science is hard. Technology is easy" (p. 51). While technology does utilize science, I would argue that science and engineering are distinct cultural activities. While I acknowledge that Crouch is talking here about how using technology



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is easy, the engineer in me is quick to add that the work of designing and developing technology is also difficult, just as science is.

As a computer teacher, I have been invited on a few occasions to speak to parents at schools about navigating a world of digital devices. The truth is, I have only limited practical guidance to offer, and as a parent I have had struggles with this in my own family as well. However, if I should be asked again to speak to parents on this topic, I will heartily recommend this book. Besides parents, this book is suitable for anyone who is seeking ways to “put technology in its place” in their own lives.

*Reviewed by Derek Schuurman, Professor of Computer Science, Calvin College, Grand Rapids, MI 49546.*

**DISRUPTED: My Misadventure in the Start-Up Bubble** by Dan Lyons. New York: Hachette Books, 2016. 259 pages. Hardcover; \$27.00. ISBN: 9780316306089.

What do you do if you are a 52-year-old journalist who has been laid off because *Newsweek* is reducing its workforce? If you are Dan Lyons, you find out that there are few non-entry-level jobs in journalism and you end up in a tech start-up.

*Disrupted* chronicles Lyons’s uncomfortable journey through this transition. In the book, he describes his shifting emotions as he navigates the transition and turns his journalistic training toward observing the company (and industry) he has joined.

He finds a job at HubSpot, a start-up that is selling marketing software, primarily to small and mid-sized businesses. The company offers ways to get potential customers to contact the business, as opposed to cold contacts or unsolicited advertising.

HubSpot hires him as a high profile journalist/blogger, but once he arrives, the executives who hired him never actually meet with him. He is placed under a manager who is quite young and who has little experience in industry. In fact, the average age of employees is 26—half his age. The company hires many white, middle class workers straight out of college at low wages but with a promise of a fun place to work and a mission to make the world a better place. Lyons characterizes the culture of HubSpot, and many similar companies as (quoting former Zillow employee Rachel Kremer) “the culture of a frat house” (p. 55): free beer and candy, parties and costumes at work, and lots of effort to generate enthusiasm for the company. Lyons likens it to “a cult based around marketing” (p. 48).

It quickly becomes clear that there is a huge cultural divide. Lyons is old and feels ignored by his coworkers. His lack of fit in other ways exacerbates the age difference. He describes himself as a reporter: “Reporters are trained to hate corporate jargon and to eliminate it, not to engage in it. We’re expected to be cynical and skeptical, not to be cheerleaders” (p. 56). It does not take long for his cynical, snarky personality to confuse and then alienate him from pretty much everyone else at the company. (Readers who are not comfortable with periodic profanity may find parts of the book disconcerting.)

The book follows his series of misadventures, eventually leading him to leave the company for something more suitable. In the process, he highlights a number of issues that he regards as serious problems in both the company and the tech start-up world. He also has unflattering comments about his managers and coworkers (all but the two company founders are given pseudonyms—such as Cranium, Wingman, Trotsky, and Spinner).

The reader will need to decide whether some of the author’s difficulties are self-inflicted or if his coworkers are vindictive and hyper-sensitive. Of greater importance are issues such as the following (he does not limit these issues to HubSpot, but that is the source of his observations):

**AGEISM:** He takes exception on both moral and business grounds to the dramatic scarcity of workers over forty. Lyons gets into trouble by criticizing, via social media, the following public statement by one of the founders: “In the tech world, gray hair and experience are really overrated. We’re trying to build a culture specifically to attract and retain Gen Y’ers” (p. 146).

**A LACK OF DIVERSITY:** Besides one of the two founders, there are almost no employees who are not white. There are many women, but few of them in executive or board positions (p. 153).

**SILICON VALLEY <THE TECH WORLD>:** This is “a world where older employees are not wanted, where people get tossed aside when they turn forty. It’s a world where employers discriminate on the basis of race and gender, where founders sometimes turn out to be sociopathic monsters, where poorly trained (or completely untrained) managers abuse employees and fire people with impunity, and where workers have little recourse and no job security” (p. 115).

**THE START-UP BUSINESS MODEL:** Some of Lyon’s harshest criticism targets the business model of tech start-ups. HubSpot and many of its peer companies have never made a profit. This does not matter as long as they



keep growing revenue. Once HubSpot has an IPO, the founders and venture capitalist investors will make a lot of money. Even before the IPO, these people at the top are making millions (their personal profits are greater than the hundreds of millions that the company is losing). The company may never make a profit. If there is another tech bubble burst, the mom-and-pop investors in the company and the young employees will lose. Many of those at the top will have already cashed in (pp. 115–17).

This is the New Work, but really it is just a new twist on an old story, the one about labor being exploited by capital. The difference is that this time the exploitation is done with a smiley face. Everything about this new workplace, from the crazy décor to the change-the-world rhetoric to the hero's journey mythology and the perks that are not really perks—all of these things exist for one reason, which is to drive down the cost of labor so that investors can maximize the return. (p. 121)

HUBSPOT: Lyons makes several pointed criticisms specifically about HubSpot (pp. 42, 97, 103, 113). The founders responded to some of these criticisms in a statement made after the book was published.

After Lyons left ("graduated" in HubSpot speak) and he was close to completing this book, there were news reports about the HubSpot board firing Cranium and Trotsky, and censuring one of the founders. The FBI opened an investigation, but Lyons was unable at that time to find out any clear details, except that the firings related to illegal activities relating to "a book" about the company. One of the company's self-proclaimed core values is transparency. The firing incident highlighted the selective implementation of that value. Lyons eventually obtained a redacted copy of the FBI report. It appears that some bosses resorted to hacking and extortion in a failed attempt to obtain a pre-release copy of the book.

After publication of this book, the two founders of HubSpot held a press conference to discuss the issues raised by Lyons in the book, mostly skirting the issues. One can find transcripts on the Internet.

The epilogue raises one other issue. Many companies, such as HubSpot, have our data even if we have never given it to them. In the case of HubSpot, they store the data generated by the companies who are HubSpot's customers. What is to stop them from mining that second-hand data? (p. 255).

There's an adage in Silicon Valley that people who use online services are not the customers. We're the product. As far as companies in Silicon Valley are concerned, we exist solely to be packaged up and sold to advertisers. (p. 257)

One motivation for the behaviors Lyons finds objectionable has been a part of the human psyche since the Fall in the Garden of Eden. The Apostle Paul has this to say:

But those who want to be rich fall into temptation and are trapped by many senseless and harmful desires that plunge people into ruin and destruction. For the love of money is a root of all kinds of evil, and in their eagerness to be rich some have wandered away from the faith and pierced themselves with many pains. (1 Tim. 6:9–10, NRSV)

The majority of readers of this review are neither venture capitalists nor tech start-up founders. We may appear to be exempt from all the problems described in the book. A deeper look shows there may be more overlap than we wish to admit. Early in the book Lyons writes:

*Drinking the Kool-Aid* is a phrase everyone in Silicon Valley uses to describe the process by which ordinary people get sucked into an organization and converted into true believers ... Believing that your company is not just about making money, that there is a meaning and a purpose to what you do, that your company has a mission, and that you want to be part of that mission—that is a big prerequisite for working at one of these places. (p. 51)

Those of us who work in academia also tend to think that we are engaged in work that is life- and world-changing (presumably we are). It is important that we periodically measure how well we are accomplishing those goals. Does our work really change lives and make the world a better place, or are we just earning a paycheck? Do we treat our students disrespectfully? Do we look down our noses at staff and other non-academics? Are we in perpetual war with administration? Or, do we truly seek to love and serve all whom we encounter?

*Reviewed by Eric Gossett, Department of Mathematics and Computer Science, Bethel University, St. Paul, MN 55112.*

**IRRESISTIBLE: The Rise of Addictive Technology and the Business of Keeping Us Hooked** by Adam Alter. New York: Penguin Press, 2017. 354 pages. Hardcover; \$27.00. ISBN: 9781594206641.

For over twenty years, I have been exploring rat models of excessive behaviors—animal parallels to what in humans are now called behavioral addictions. At the same time, I have acquired a number of technological devices—computers (desktop and laptop), iPods, iPads, and smartphones (both BlackBerry and iPhone)—but I have not developed much of a technological presence. I use my computers for work and my mobile devices for email, texting family, and keeping my schedule (I do have one app—a local

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bus scheduler that tells me when my next bus will arrive). I do not tweet, have no access to Netflix, am not on Facebook, do not have a Fitbit, and am not familiar with many of the programs and games that Adam Alter describes in this easy-to-read book.

The topic of this book is timely. Our local paper recently re-ran an editorial (from the *Dallas Morning News*) entitled “Stopping smartphone zombie children,” suggesting that smartphone sales should be banned for children under thirteen. Concern about distracted students in the classroom is leading some instructors to suggest a tech-free zone for their classes. Alter makes the argument that these devices and their daily usage lead to a behavioral addiction that parallels drug addiction. Canada and some American states are in the process of legalizing cannabis and, like alcohol and cigarettes, sales to minors will be prohibited. In the prologue to his book, Alter points out that many tech giant founders restrict or prevent their own children from using these mobile devices. Alter recommends in his last section that early access to this technology should also be limited.

This book explores the addictive nature of the new digital technology broadly defined. After a prologue laying out the main argument, the book divides into three sections. The first section explains what the author means by behavioral addictions: for example, excessive gambling is one of the first recognized behavioral addictions. Alter describes how the new mobile, web-connected presence of smart phones, tablets, and the apps available are leading to harmful and excessive usage of these devices to the exclusion of other activities. In a chapter on the biology of addiction (chapter 3), I came across a reasonably accurate list of researchers working with human and rat models whose work I have followed for most of my professional career.

Part Two of the book follows the introduction, reviewing a set of techniques that increase the addictive nature of behavioral experience. These interrelated ingredients include the need for goals and the nature of the feedback provided by software as one progresses through escalating levels of difficulty. Also included are older techniques such as cliffhangers, used in Dickens’s time to sell newspapers. The section ends with a chapter on the importance of social interaction as a reward.

In the final section, Alter suggests some possible solutions for these behavioral addictions. One suggestion is restricting and structuring access for children, as they seem to be more vulnerable to the negative effects of this technology. He suggests that environmental factors, such as where to put one’s

smartphone (especially at night), might help reinforce good habits. Finally, Alter argues that some of these addicting techniques might be put to good use by increasing learning, for example, in a process of gamification (making learning more of a game).

This is a book written by a secular author for a secular community. Sin is not mentioned in the book, and there are no references to the Book of Proverbs and its concerns about excessive alcohol consumption and sloth. Christians have long had a complex understanding of addiction and this complexity is expanded as the definition of addiction broadens. Is the medical model of addiction sufficient? Is it a failure of willpower? Does addiction emerge out of the structure of our lives, and how does it relate to the notion of sin or the brokenness of creation? What this book highlights well is how the design of the apps and the technology itself make it easy for people to fall into bad habits.

In the Prologue the author writes, “Tech isn’t morally good or bad until it’s wielded by the corporations that fashion it for mass consumption.” An exploration of this awareness, that large corporate interests push these irresistible objects for their own benefit rather than for their consumers’ good, would have been helpful. We talk about government regulation of the financial industry to protect individuals in areas with huge power imbalances, but what is happening in the tech area to reduce the potential harm that can occur? Should there be regulations about email usage by companies, similar to labor laws concerning work hours?

This leads to one suggestion that I was surprised not to see mentioned in the book: the idea of a digital Sabbath, an idea that both Jewish and Christian communities have raised. While people can use digital devices for good, often their use imposes a work burden on the user: unrelenting job-related emails and messages that demand response. Thus, a day-long break without any technology (as part of one’s lifestyle) seems like a good suggestion for Christians to make, in light of the notion of a Sabbath rest as mandated (for our good) in the fourth commandment.

The rapid advance of technology in our society is having profound effects on many aspects of our lives, and it appears that the rate is only increasing. It is not clear to me that all aspects of this advance of technology can be subsumed under an addiction model. As the technology advances, we are engaging in a one-way social experiment with both good and bad outcomes. The advances in technology make it possible for remote doctors to see our medical information and make recommendations for treatment.

We can plan and confirm a complex vacation from the comfort of our home. The job market is changing—many retail jobs are disappearing in favor of online merchants (with driverless delivery coming). I can probably order all the books reviewed in the last year of *PSCF* with only a few clicks of my mouse. Wikipedia and Google searches give me instant access to all the information I need immediately. I can download academic articles from thousands of journals through our library.

Thus, the strength and weakness of this book is that it focuses on one aspect of technology to the exclusion of other important interlinked issues. The ability to use phones and video chats to keep contact with family and friends from far away is generally a positive. The use of a Fitbit device by an obese couch potato may not be harmful, so we must see situations in context. Can these tools be abused by individuals (the topic of this book) and by corporations (not covered in this book)? Certainly, but the real question is, how can we use them wisely? For this, the command of love for God, our neighbor, and ourselves becomes the critical issue: how can we live and love better with the technology?

Reviewed by Roelof Eikelboom, Department of Psychology, Wilfrid Laurier University, Waterloo, ON N2L 3C5. ❖

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## Letter Supporting Emergent Transitions

The conceptual framework of using emergent transitions to deal with order from chaos was well done in Scott Bonham's article entitled "Order from Chaos" (*PSCF* 69, no. 3 [2017]: 149–58). I enjoyed reading it and was reminded of Gerald Schroeder's book *The Science of God* (Free Press, 1997). There, Schroeder, who is a physicist and a Hebrew scholar, has an interesting interpretation of the terms used in Genesis 1, evening and morning. Schroeder claims that evening (*erev* in Hebrew) and morning (*boker* in Hebrew) have a secondary meaning as well. According to him, *erev* can stand for chaos and *boker* for order. If so, that dovetails nicely with Bonham's interpretation of the disorder-order transition framework.

Ken Touryan  
ASA Fellow ❖

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# ASA 2018 CALL FOR ABSTRACTS



ASA 2018 – 73rd Annual Meeting

## BIOETHICS AND BIOTECHNOLOGY

July 27–30, 2018

Gordon College in Wenham, MA

Genesis 1:28, NIV – God blessed them and said to them,  
“Be fruitful and increase in number; fill the earth and subdue it.  
Rule over the fish in the sea and the birds in the sky and over  
every living creature that moves on the ground.”



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Canadian Scientific and Christian Affiliation, PO Box 63082, University Plaza, Dundas, ON L9H 4H0. Website: [www.csc.ca](http://www.csc.ca).

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