

Teaching Neuroscience at a Religious Institution: Pedagogical Models for Handling Neuroscience and Theology

William M. Struthers

Psychology Department, Wheaton College, Wheaton, IL 60187

The interdisciplinary nature of neuroscience makes it one of the most fascinating and complex subjects to address in the classroom. This can be compounded, however, by the addition of theology or a faith-related context at a religious institution (RI). The addition of theology and faith can enrich student appreciation and understanding of neuroscience and stimulate discussion in the classroom. This provides a practical way to make the course content relevant to students who may see neuroscience as antagonistic towards their faith. Over the past century questions of human experience and personhood that were long held to be under the authority of religion now can be addressed from findings in neuroscience. While there has been debate on a variety of topics which range from positions on origins to ethical questions about the nature of research (i.e. stem cells,

cloning), it is important that teaching faculty at RIs be prepared to deal with the hard questions faced by students of faith. Recommendations for faculty are given including: self assessment of personal position on matters of faith and science, framing a number of models for the integration of neuroscience and theology, 'Worldviews', and mentoring students who are struggling with reconciling their faith with neuroscience. While this paper is designed for teachers at RIs, it may also aid teaching faculty at other institutions who may benefit from an awareness of this framework and aid in teaching students of faith in a secular setting.

Key words: evolution, theology, creation science, intelligent design, worldview, teaching methods

It should come as no surprise to many scientists and faculty who teach neuroscience that there are some segments of the population who hold a rather negative view of the scientific community. Particularly, those in the biological sciences are quite familiar with the resistance they have met in the public school systems on the teaching of evolution. There is considerable pressure put on local school boards to restrict the teaching of evolution in biology classes or to include teaching of "creation science", "creationism", or "intelligent design". A number of recent illustrations can be cited (see the recent decision by the Kansas State Board of Education addressed by the American Association for the Advancement of Science Board of Directors Statement, 1999) to demonstrate this fact. While the scientific community has acted to speak out against these types of political attacks on the educational systems, for faculty at research institutions who teach undergraduates these problems may be viewed from a distance as unrelated to their day to day activities. However, for those faculty who teach at religiously-affiliated institutions (RIs) there is an increase in the number of students entering these schools who are home schooled and who may come from families where creation science, creationism, and intelligent design are held in high regard while the theory of evolution is held in low regard.

With the publication of recent books by scientists in the Christian community who are critical of evolution (i.e. Behe, 1996) and a longstanding adversarial relationship between the religious and scientific communities (Ratzsch, 1996) many individuals of faith have a negative view of evolution that extends to all of the biological sciences. This is especially true in neuroscience which has much to say about the brain, the 'organ of the soul' and our cognitive

processes. As a result of this view, many undergraduate students who come from these households or from churches with these views have a fundamental mistrust of the scientific community and the process of science. This is particularly true in the biological sciences and reaches a significant head in the neurosciences where questions of personhood (i.e. the 'soul') and ethics (i.e. stem cell research) arise. Faculty at RIs can find that there are a number of challenges that they encounter when teaching neuroscience to undergraduate students who come to college with preconceived notions that neuroscience falsifies their faith, that their faculty will be young earth creationists, that neuroscience is a human endeavor and inherently flawed, that their faith is against the use of animals in research, and a host of other issues which makes instructing these students challenging.

In addition to these complications with students, faculty at RIs may be required to sign a statement of faith that stipulates adherence to a theological doctrine that may dictate what scientific viewpoints they may or may not hold. There may be some schools in which holding to a purely evolutionary view on origins would disqualify a faculty member from receiving tenure or having their contract renewed. Clearly, these institutional factors complicate the already difficult task of instructing students in the techniques, findings and theories in neuroscience. Given this complex dynamic, faculty at RIs are forced to not only be neuroscientists, but philosophical and spiritual guides to their students (Hillstrom, 1995). In the process they must thoroughly explore their personal theological convictions and be aware of the potential pedagogical and professional landmines. As part of their responsibilities to be pedagogically competent they need to be able to present

the facts of neuroscience and effectively reach their students where they are theologically with respect to their faith commitments. This process involves addressing the issues facing students of faith, identifying frameworks for the integration of neuroscience and theology, and adopting a number of pedagogical strategies, which may be built into a course's structure. What is important is to recognize the importance of making sure that the scientific findings of neuroscience and its theoretical structure are properly presented to students as well as identifying potentially faulty theological and philosophical views so that they may be able to reconcile their faith with neuroscience.

ISSUES FACING STUDENTS

Many students who attend a RI do so because they value the importance of faith in every dimension of their lives. Many RIs offer a faith-oriented education and this extends into the sciences, with neuroscience providing a unique opportunity for the combination of behavioral and biological methodologies with the more abstract and sensitive topics of mind, consciousness, ethics, and origins. While historically Science and Religion have often been conceptualized in a 'warfare' manner, it is neither necessary nor beneficial in the classroom to do so. Students may carry this warfare view into their studies along with a number of other questions and issues which a faculty member may be challenged with. Some examples of these include:

1. *What is a 'Soul' or 'Spirit', and how do we account for our spiritual nature?*
2. *Are mind/brain/consciousness/spirit/soul the same? What are the spiritual implications?*
3. *Does neuroscience require a belief in naturalism and determinism, which might imply I deny God's existence?*
4. *Can I be a Christian and believe in evolution?*
5. *Is there a 'Christian' neuroscience (i.e. intelligent design, creationism)?*
6. *What should a Christian's view of the ethical treatment of animals in research be?*
7. *Is there a neural basis of morality?*
8. *Is there a module in the brain that produces religious experiences and, if so, does this deny God?*

These questions and issues can provide considerable barriers to students and provide another dimension to in-class discussion. It is important for faculty to be aware of these tensions and to prepare for them. While faculty at RIs may encounter these issues more frequently than those at secular institutions, it is helpful for these faculty to be aware that these issues may be of importance to students of faith in their courses as well.

INTEGRATION FRAMEWORKS

One way to break down some of the barriers that students face and is a valuable tool for students is to frame a number of positions that they can hold to when dealing

with neuroscience and issues of faith. It is important for them to clearly understand the problems that each faces and what alternatives exist. One way of conceptualizing these frameworks is listed here.

A. Non-Overlapping Magisteria (NOMA): Science and Theology work in two separate realms: the natural world and the world of ethics. They may meet each other at a number of points, but they do different things. As Gould (1999) has eloquently articulated, with the NOMA position science deals with the question of 'How' the world works, and religion deals with the question of 'Why'. This position is common in mainstream society, and holds to a rather dual view of science and religion. When one attempts to cross over the line and answer a question that falls under the magisterial or boundaries of the other, it is out of bounds and should not be seen as having any legitimate say so on whatever the matter may be. This framework is held by many and provides a helpful model, but maintains that students' faith should be dealt with in a 'hands-off' manner in classrooms where science is being dealt with. Not all students are willing to do so because they believe that their faith should, in fact, influence their science.

B. Triumphalism: Scripture and Theology 'trumps' Science (i.e. *Sola Scriptura*, or: Scripture alone). Whenever there is a disagreement between the science and theology, theology is the default position. The findings of science are either rejected or their interpretations modified to make them fit with pre-existing theological positions. This position leads students to sacrifice and/or reject neuroscience in order to maintain their faith positions and it is students who hold to this framework who are the most skeptical about neuroscience and resistant to the teaching of evolution. This position would be consistent with those in the Creation Science communities, and what is paramount to this framework is maintaining literal interpretations of scripture (especially the Book of Genesis). This framework leaves the Neuroscientist very little room in which to adequately teach students. When dealing with students falling under this framework, it is necessary to familiarize them with this mindset, then deal with the theological conclusions they can come to (i.e. if the earth looks like it is millions of year old, and it really is only 10,000 years old, how do we deal with the fact that we have a truthful God guilty of creating a lying world?).

C. Scientism: Science 'trumps' Theology and Scripture. This may be considered the polar counterpart to Triumphalism. Whenever there is a disagreement between the two, scientific theory is the default position. This position leads students to sacrifice and/or reject theological positions in order to maintain the integrity of the findings of neuroscience. While few students at RIs hold this view, there are students who will see this as the only possible alternative to the NOMA or Triumphalism frameworks. This position can be viewed as 'the enemy' by students of

faith and, in many cases, may carry over to a skeptical view of neuroscience. With these students, neuroscience requires that they 'lose their soul' and humanity. They maintain that Scientism logically descends into determinism, reductionism, and moral relativism. All of these are particularly distressing to students of faith.

D. Value-Added: Theology supplements science. Anything Theology or scripture has to say about the natural world is a nonessential, religious addition to scientific theory. Examples of this model might include drawing on scripture references to animal husbandry in the book of Exodus when describing genetics or mating behavior, or the sacrifice of animals and the ethical treatment of animals. Similarly, a discussion of the nature of mindedness and moral accountability may be connected to Descartes' pineal gland. The connection between neuroscience and theology is largely manufactured and this model maintains the theoretical duality of the NOMA model, but in practice tries to bridge the two together with the functional and pragmatic aspects of neuroscience made relevant through theology. It is here that the theology is added on to, or connected to, neuroscience.

E. Integration: Theology informs the underlying assumptions of scientific theories. Any influence that theology may have on the ontological or methodological aspects of neuroscience must be done at the first-level assumptions of the theory and less so at the level of empirical observations. In this model theology acts to influence neuroscience at its philosophical roots. The theological system establishes the foundations of the methodology and epistemology of neuroscience and directs it at a practical level by setting the limits of what is permissible with a special emphasis on ethical considerations of research. In the same way, the findings of neuroscience inform our understanding of scripture and give further insight to the nature of our humanity and provide additional historical insight to the text and the human condition. The point of the integration model is that there is a dialog between neuroscience and theology that occurs at a philosophical level.

F. Cartography: Science and Theology are two methods of mapping reality. It rejects the duality of NOMA and Value-Added approaches and places an emphasis on a holistic worldview incorporating both. While science and theology aim to investigate the created order via different methods, the natural world and the ethical (or spiritual) world are not separable. Theology adds a necessary teleological, or purposeful, component to neuroscience. Students are not required to make their religion scientific nor must they adopt science as their religion. The framework is similar to that proposed by Ziman (1991) who argues that the scientific process is similar to cartography whereby we are involved in the process of taking our experiences (data) and developing a map of the world. In

this model, science and theology are two techniques of the mapmaker, although the object is the same. The 'How' and the 'Why' are inseparable and to restrict them to their own magisteria results in a variety of problems. For example, if someone held a position on abortion that would make the destruction of a fetus an unethical act, it would certainly influence their views on the use of fetal stem cells in research regardless of the potential medical treatments. It is here in the cartography framework that many of these types of questions of neuroethics can be introduced (Marcus, 2002).

While these six positions are neither a complete nor exhaustive list of frameworks, they have proven useful when introducing students to the complex philosophical and scientific responses to the various questions that they raise in and out of the classroom. The NOMA, Integration and Cartography frameworks have been particularly effective in reaching students of faith and meeting their need to keep their faith and honor the discoveries of neuroscience. Triumphalism appears to be the most difficult view when held by students (for obvious reasons) and relatively few students at RIs hold a Scientism view.

PEDAGOGICAL STRATEGIES

Focus on the Methods – the methodological assumptions of neuroscience are fundamentally different from those in systematic theology and biblical studies. These differences can be highlighted to make students aware of how they lead to conflict between neuroscience and theology. While highlighting how science works from a post-positivist perspective and emphasizing on the process of hypothesis deduction and the inductive process of using data, observations and inferential statistics, many students of faith better appreciate the philosophical underpinnings of the scientific method. In addition, hermeneutics, exegesis, and understanding linguistics and cultural context when interpreting Scripture are qualitatively different from the scientific method. However, a parallel can be drawn to the rational and logical process of systematic theology, showing that while there are significant differences in much of the practice of these two fields, they do share a common thread in the value placed on logical processes.

Personal Narrative/Student Narrative – by sharing your personal experience in sorting out tensions between neuroscience and theology, faculty model their chosen framework. Some students at RIs may not have been exposed to individuals of faith who maintain views that in fundamentalist communities would be described as heretical. It is important for students to see and hear from faculty who have wrestled with these issues in an intellectually honest manner. By sharing (when and where appropriate) how you have dealt with or avoided these issues, your worldview, and position on the nature of integration of science and theology, students will be less willing to demand a philosophical or theological endpoint and see the value in the process of exploring these

questions. Even if one adopts a position of NOMA or Scientism, students at RIs value hearing how their faculty have arrived at their worldviews.

Students may also find it beneficial to write on an issue or question and come to their own conclusions with respect to how they interpret neuroscience and theological claims. This process forces them to become familiar with the philosophical and methodological foundations of neuroscience. In the process, many misconceptions about what neuroscience does (and does not) say can be shed.

Hermeneutic Awareness – many students find that their interpretation of Scripture is incorrect. The tools of hermeneutics can be helpful when dealing with tensions between biblical text and scientific theory. While many neuroscientists are not trained in the techniques of hermeneutics or are fluent in Hebrew and/or Greek, it is good for faculty to be informed about the linguistic nuances and problems of translation which may be at the root of some students problems. Of particular note are the Hebrew terms which are translated as ‘soul’ and ‘spirit’ (Jeeves, 1997).

Emphasis on Worldview – a worldview is the fundamental set of assumptions that gives meaning to the world and one's thoughts. Sire (1997) and Naugle (2002) have eloquently explored the concept of worldview and have illustrated its importance in developing a view of how the world works. By showing how a student's worldview can be informed by both neuroscience and Theology, students do not feel that they need to read Scripture as a science text. In essence, it allows them to approach their studies of science with the mindset that they do not have to live their day-to-day lives treating each other as biological agents. Indeed, it allows them to view themselves along a number of levels, none of which disproves or disallows explanations across the other. A Neuroscientific explanation of what the neural processes are during the act of praying, does not negate the psychological or theological explanation of why we pray. By including the worldview concept, students of faith (and students who would not call themselves students of faith) approach the findings of neuroscience with considerably less trepidation.

It is with the concept of worldview that one can address the matters of disagreement between those in the scientific community and those in communities of faith who are hostile towards science. The difficulty in reaching out to those who hold to either a Triumphalism or Scientism worldview is that history has shown that they have great difficulty hearing each others' arguments. To the creationist evolution is just plain wrong. All of the scientific evidence brought to the discussion is trumped by scripture. In the same way, to a staunchly naturalistic scientist all disagreements about evolution or research ethics are the resulting chorus of superstition and backward thinking. By framing the issues as worldview in nature, students (and scientists) can remove themselves from the strict mindset

of conflict and have a better understanding of where (and why) each other are coming from.

Faculty at RIs are in a unique position to guide of communities of faith and to avoid unnecessary conflict with the scientific community. They should note, however, that not all conflict is avoidable. For example, a theological position that life begins at conception will undoubtedly lead to tension with someone who believes that life begins at birth (i.e. the use of stem cells taken from aborted fetuses).

Christian Neuroscientists and Historical Figures – it is helpful to direct students to contemporary Christians in neuroscience and to illustrate the importance of historical figures who have been influential in the history of science (i.e. Newton, Bacon, Galileo) to assure them that they can be individuals of faith as well as scientists. Inclusion of these figures enhances lectures looking at the historical development of neuroscience by providing insight to the context under which a majority of scientific discoveries took place prior to the 20th century. There are several notable scientists of faith (i.e. Malcolm Jeeves and Francis Collins) who may be used as contemporary exemplars. By showing that it is not only possible to exist as a person of faith and a scientist, but that one may excel at both, students at RIs are more comfortable with pursuing careers in neuroscience.

The exploration of the spiritual is not exclusively theological in nature. There are several examples of neuroscientists who have written on spiritual experiences. Santiago Ramon y Cajal (1937), Charles S. Sherrington (1941), Antonio Damasio (1999), and Roger Sperry (1980) have all provided meaningful treatments of the biology of human experience.

Praxis of Ethics and Paradox – the teleological nature of all faith systems is invested in the appropriate treatment of human and animal subjects. These systems have a considerable amount to offer with respect to the care and use of animals as well as a variety of other topics in bioethics (i.e. cloning, stem cell research, and genetic engineering). Paradox also stimulates students to more clearly understand the science and doctrine to critically evaluate the material. It is important in the process of exploring ethical dimensions of research methodology to keep students grounded in the concept of worldview and to develop critical thinking skills to make sure that they are coming to logically consistent and proper conclusions about what their theological system promotes.

Research as Worship – by framing the act of research as a process of worship, students have remarked that they derive a greater appreciation of the function of the nervous system. One of the advantages that a faculty member at a RI has is that many students will be open to exploring the possibility that research in the sciences can be viewed as worship when that research is being conducted from a position of faith. By adding the teleological element to

neuroscience, students of faith have indicated that they are freed to not just pursue neuroscience as an end in and of itself, but as a means to deepening their faith. There is an awe when evaluating the complexity of how our nervous system works and when they consider that we are ‘...fearfully and wonderfully made,’ (Psalm 139:14).

RECOMMENDATIONS

An outcome assessment of the effectiveness of this approach can take a variety of forms. Some examples of in class tools which have been used to address the usefulness of integrating theology and neuroscience include: 1) exam essay questions on ethical/theological issues, 2) term papers on the biological basis of religious experience, 3) reviews of books on neurotheological issues (see reference section), and specific questions on course evaluations. It is in the course evaluations that the effectiveness of the framing of the integration approaches.

Students commonly report that they appreciate being forced to go beyond the sheer rote memorization of information and enjoy seeing the ‘bigger picture’ of how the scientific process impacts everything from medicine to education to public policy. Additionally, many students have indicated that they were relieved to find out that they did not have to sacrifice their faith in order to be a respectable neuroscientist. Students have also expressed that they have a better appreciation for those suffering from neurological and psychopathological/clinical disorders (schizophrenia and bipolar depression specifically). By avoiding a Gnostic disdain for the physical world, students adopt a more reverent view of the material world.

It is important to be sensitive to the mindset of students of faith and be able to frame the various ways to connect neuroscience research and faith in a manner that gives proper respect to both. By being able to present these models (usually in the beginning of a course) some of the obstacles that students of faith encounter may be averted and their appreciation of neuroscience enhanced. It is also important to recognize that faculty at secular universities may also face these problems. When encountering students of faith in their classrooms the context is considerably different. Most state sponsored schools operate in a climate which makes it difficult to talk about spiritual issues in class, and this is particularly true in courses related to our science. There is an understanding that only the scientific will be addressed in the lectures and that matters of faith have no place in the classroom which is indicative of the prevailing NOMA view at many secular schools. If this is true then the number of opportunities for handling faith sensitive questions in the classroom may be limited. However, faculty may find that these questions come up outside of the classroom or during office hours. In order to adequately communicate to students of faith the models that they may use to integrate their beliefs and the content of neuroscience, it is the role of the faculty at to discover their own worldview and integration position.

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Address correspondence to: Dr. William Struthers Assistant Professor of Psychology, Wheaton College, 501 E College Ave, Wheaton, IL 60187
Email: William.M.Struthers@wheaton.edu