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Article

Feminine Sin and Female Scientists

E. Janet Warren

The words sin and science are seldom mentioned in the same sentence. However, I suspect that sin, both individual and societal, is a contributing factor to the fact that male scientists outnumber female ones. This suggestion is not intended to produce the guilt and shame that is already so common in women, but intended rather to illuminate an issue and perhaps guide strategies to change. The gender gap in science has been addressed primarily in feminist and sociological literature; there has been little discussion from a Christian perspective. In this presentation, I first review the literature on the gender gap in Science, Technology, Engineering and Math (STEM), and then summarize the biblical/theological literature on gender equality. I next turn to the biblical/theological concept of sin (typically construed as pride and arrogance, which tend to be associated with men) and discuss how considering so-called "feminine" sin (neglecting responsible dominion and undervaluing oneself) can contribute to both our understanding of and our response to the gender gap in STEM.

My high school physics teacher told my parents during teacher interviews that I would never succeed in science. Perhaps a C– in a recent test had given rise to this judgment, although my grade was one of the highest in the class. I do not remember being too perturbed at the time, but now that I have a BSc and an MD, I think that he has been proved wrong.

Since the rise of feminist studies in the 1960s, there has been much discussion on the equal status of women in all areas of life. And, in most areas, there has been a concomitant reduction in gender inequality. Science, technology, engineering, and math (STEM), however, is one area in which there is still a gender gap. This issue has been addressed primarily in scientific and sociological literature; there has been little, if any, discussion from a Christian perspective, although gender equality in general has been much debated in biblical and theological literature.

In this article, I first review the general literature on the gender gap in STEM and then the biblical/theological literature on gender equality. I next turn to the Christian concept of sin in all its complexities and consider how an understanding of so-called "feminine" sin can contribute to both our understanding of and our response to the gender gap in STEM.

Women in Science

Historically, reason and rationality (assumed to be male attributes) were esteemed, and emotions and sensuality (assumed to be female attributes) were deemed inferior.[1] Because of this, and likely a multiplicity of other reasons, women were excluded from academic studies and universities in general, and

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from scientific enterprise specifically. Notable exceptions include Hypatia, a mathematician in ancient Greece; Hildegard of Bingen, distinguished natural scientist and theologian; physicist Laura Bassic, the first female professor; Florence Nightingale, a pioneer in public health and nursing education; and Marie Curie, a winner of the 1903 Nobel Prize in physics. There are many stories of women lecturing behind a curtain or disguising themselves as men in order to study science. By contrast, in nonacademic cultures, wise women were revered for their herbal medicine, and midwives were responsible for obstetrical care. The suffragette movement in the late-nineteenth century led to increasing university enrollment, and forty percent of university teaching posts were held by women in 1946. However, there appeared to be a re-masculization of science post-WWII. This changed again with the feminist movement of the 1960s, which led to an increased number of women in STEM.[2]

In the past few decades, research has shown a slow but steady decline in the gender gap, although men still far outnumber women in STEM academic fields. A recent article in *Nature* highlighted some discrepancies.[3] According to 2008 US government statistics, the median salary of male scientists was $84,000, and that of female scientists was $60,000; 1,794,000 men were employed in academia, versus 934,000 women. The US National Science Foundation reports that although women earn half the doctorates in science, they make up only 21% of full science professors and 5% of full engineering professors. On average, they earn 82% of the salary of male scientists. Interestingly, a survey of engineering programs (2003–2012) reveals that the number of female students in Christian colleges is about seven percent lower than the national average.[4]

Canadian statistics are similar. A 2010 report from the Natural Sciences and Engineering Research Council of Canada (NSERC) highlights a number of gender discrepancies in academic science.[5] Examining the so-called pipeline from 1985 to 2007 reveals that the odds of a first-grade girl receiving a PhD in STEM are approximately 1 in 286; the odds for a boy are 1 in 167. In 2007, 647 females and 1,198 males received doctoral degrees in science. Interestingly, the ratio of women to men in STEM at the bachelor's level is approximately 0.6 and has been stable over the past decade. This ratio drops to 0.48 at the doctoral level. The number of males and females enrolled in science studies has grown in absolute numbers in the past decade; in 2008–2009, women comprised 37% of Canada's undergraduate students in science and engineering. A survey of data from other countries reveals similar trends.

There are also stories and studies demonstrating discrimination against women in STEM. Francis Bacon described science as "masculine philosophy."[6] Rosalind Franklin's research on the structure of DNA is reported to have been stolen by Watson and Crick, who later received the Nobel Prize.[7] Pharmacologist Candace Pert details her career in science, including having her research stolen.[8] A recent study found that science professors, given identical CVs, would offer a student applicant identified as female $3,730 less per year than one identified as male.[9]

Not surprisingly, there has been much discussion regarding the reasons for the gender gap in science, and many theories have been proposed. The most obvious theory relates to biological differences between male and female brains. Although this theory is old, based on conjecture (for example, it was thought that mathematical ability was X-linked) and limited research, recent neuroimaging research has indeed demonstrated sex differences in both brain structure and function and in both architecture and activity.[10] Note that results represent averages.

- The male brain is about ten percent larger than the female one and has a higher percentage of white matter (tissue connecting the nerve cells, which constitute gray matter).
- Peak brain volume is attained earlier in girls (median age, 10.5) as compared with boys (median age, 14.5).
- Women have a larger caudate and hippocampus (associated with memory and emotions) and a smaller corpus callosum (connecting the two hemispheres of the brain).
- In terms of function, on average, women utilize approximately ten times more white matter than men (men use more gray matter).
- Women have better verbal skills, and men have better visuospatial abilities.
- Women excel in decoding emotional messages, or empathy, and interpersonal relationships, whereas men excel in spatial tasks and systematizing.

- Women tend to acquire knowledge through observation, experience, and intuition, whereas men are generally systematic, logical, and rational.
- Women also tend to use both hemispheres when performing a task, men only one.

A recent imaging study revealed connectivity differences between genders: male brains appear to facilitate connectivity between perception and coordinated action (primarily intrahemispheric); female brains show easier communication between analytical and intuitive processing (interhemispheric).[11] There are also differences in emotional processing, executive function, and spatial processing, although findings are not always consistent. Overall differences between male and female brains are small, and there is much variability.

This research has gained attention in the popular media,[12] but the interpretation of it, or how brain differences relate to behavioral differences, is unclear. For example, less activation of certain brain structures does not necessarily mean that those areas are less efficient. Some studies have also demonstrated a lack of correlation between brain and behavior; for example, there are gender differences in neural networks responsible for language, but no corresponding difference in language abilities. Gender differences in the brain are likely a result of the interplay of biological, psychological, and social factors. Given the brain's neuroplasticity, giving a boy construction toys to play with, for example, may lead to an increased development of spatial parts of the brain.[13] Ultimately the old nature/nurture issue remains unresolved, and, of course, we only have access to a "post-Fall" brain; therefore, we cannot know how much effect a corrupt world has had on neurological development. In sum, although there is a general male/spatial/analytic/logical and female/verbal/intuitive/emotional dichotomy, appealing to brain differences between men and women to explain the gender gap in STEM is inadequate. In fact, contemporary science is increasingly recognizing the value of nonanalytical processes in discovery, and there are many examples of revolutionary insights through intuition.[14] Indeed, "feminine" neurological attributes are no longer viewed as inferior.

Sociocultural theories have also been proposed to explain the gender gap in STEM. Historian Margaret Rossiter suggests two ideas: hierarchical segregation (fewer women participate at higher levels in academia) and territorial segregation (women's careers cluster in specific areas such as nursing and teaching). The hierarchy problem implies a top-down approach (women are prevented from attaining high ranks due to social barriers and discriminatory practices), but another approach looks at the problem from the bottom-up, as in the "leaky pipeline."[15] As mentioned, the gender gap increases during the transition from high school to university undergraduate programs to masters and doctoral programs. Reasons for this include educational inequality, effects of isolation, lack of role models, and difficulties balancing family and career. Jill Bystydzienski and Sharon Bird note that the pipeline model focuses on supply, not demand; it gives little insight into how institutions themselves need to change in order for women to join the ranks. Masculine values of hierarchy, independence, and competition, which dominate the field of science, are not welcoming for women who perhaps work more collaboratively.[16]

Sociocultural theories provide some explanations for the paucity of women in science, but they tend to focus primarily on men, and they consider the problem only at a societal level, not at an individual level. I now consider a Christian perspective for offering further insight into the gender gap in STEM.

Women and the Bible

The Bible's overarching views on men and women can be found in its opening few chapters.[17] First, both women and men are created in the image of God (Gen. 1:27). This declaration has been variously interpreted, but a primary aspect of it is our capacity and calling to be in relationship—to God, self, others, and creation. The Trinitarian God is intrinsically social; as relationships within the Godhead are mutual, so should ours be. (Note that relationality, typically a strength in women, not rationality, typically a strength in men, is stressed. Furthermore, it is increasingly being recognized in biblical and theological research that the Bible is primarily addressed to our nonrational faculties. It is filled with stories, parables, imagery, and other imaginative, intuitive, and emotional concepts—again generally female assets.[18])

Second, in another aspect of the *imago dei*, both women and men are commanded to care for creation, to "rule over … every living creature" (Gen. 1:28). This so-called cultural mandate includes being a responsible steward of God's creation, studying it (as scientists do), developing it, and caring for it and its creatures. This idea is reinforced in New Testament teaching: Peter encourages followers of Christ to use their gifts as faithful stewards (1 Pet. 4:10).

Third, men and women are called to be equal partners in marriage (Gen. 2:18–25). The Genesis 2 creation account describes Eve as a "helpmeet" (*ezer*) to Adam. Most other uses of this term refer to God; it is never used in a context implying subordination. Adam rejoices in her as "bone of my bones," suggesting similarity, not subordination. The creation of women leads to the completion of humanity (echoing Gen. 1:27, and reflected in Paul's description of woman as the glory or fullness of man, 1 Cor. 11:7). As Matthew Henry famously remarked,

> Eve was not taken from Adam's head—to top him. Not from his feet—to be trampled by him. Eve was taken from Adam's side—to be equal with him.[19]

Fourth, both women and men sin and share in the consequences of this sin (Genesis 3). It is clear that Adam was there with Eve when she ate the infamous apple; they are partners in the crime of disobedience. This will be discussed further in the next section.

Fifth, men and women are equally redeemed. Christ offers eternal life for all who believe (John 3:16) and a new creation for all (2 Cor. 5:17). In Christ, all are children of God; there is no male or female (Gal. 3:26–29). Jesus's earthly ministry demonstrated a respect for women (in keeping with his ministry to other marginalized persons) that clashed with a culture in which women were not even allowed to speak to a man in public. His birth was foretold directly to Mary (not through her father as would have been the custom) and was prophesied by a woman (Elizabeth, Luke 1:26–45). Jesus's followers included many women (Luke 8:1–3). He commended Mary for "sitting at his feet" (a phrase which suggested theological training, Luke 10:42), and his longest recorded conversation was with a Samaritan woman (John 4:1–40). Furthermore, the first witnesses to the resurrection were women, and they proclaimed this fact to male disciples (Matt. 28:1–10 and parallels).

Sixth, both men and women are commissioned to ministry, to go "forth and make disciples of all" (Matt. 28:18–20). They are also gifted with the Holy Spirit (Acts 2:17–18). Biblical examples of women ministers include the apostle Junia (Rom. 16:7; interestingly, her name was changed to the male version in a fourteenth-century translation), prophets (Philip's daughters, Acts 21:8, 9; women prophets in general, 1 Cor. 11:5), teachers (Priscilla, Acts 18:26; Lydia, Acts 16:14, 15; Phoebe, Rom. 16:1), and a host of women Paul describes as coworkers (Rom. 16:1–15, Phil. 4:2, 3). In addition, at Pentecost, inclusivity was emphasized since the sign of membership was changed from circumcision (exclusively male) to baptism.

Discussions on gender differences in the Bible often focus on a few Pauline passages which appear to subordinate women. However, these are filled with exegetical, linguistic, and contextual problems.[20] When God's revelation is considered within the entire Bible, it is clear that men and women are equally created, equally fallen, equally redeemed, and equally responsible. It is unfortunate that some Christian traditions use biblical texts inappropriately and discourage women from using their gifts both inside and outside the home, and from exercising responsible dominion and stewardship in all areas of life, including science. All things and *all people* hold together in Christ. However, this has not always been reflected in a world filled with sin.

Sin

"Sin," the word and the concept, is not popular. In contemporary media, it has often been trivialized or, indeed, celebrated. This prompted Karl Menninger to ask "whatever became of sin" in his eponymously titled book.[21] Perhaps in response to his challenge, the current literature on sin is large. Although most people have an intuitive knowledge of sin, understandings and definitions vary greatly. In fact, sin can be described using scientific metaphors: from chemistry, sin dilutes and disintegrates godly reality; from ecology, sin pollutes; and from medicine and psychology, sin can be viewed as sickness and psychopathology. Sin is a multifaceted and complex concept with various definitions, and can be considered from biblical and theological perspectives.

With respect to biblical studies, there is no exact Hebrew or Greek word for sin, but the words most commonly translated as such mean to miss the mark or to transgress a boundary.[22] Sin is a ubiquitous condition: all have fallen short of the glory of God (Rom. 3:23). It is both individual (for example, David, Ananias, Sapphira) and communal (for example, the apostate people of Israel). Indeed, the world is described as under the domain of sin (Rom. 5:12–14). There are many metaphors for sin: iniquity (Ps. 38:18), deceitfulness (Heb. 3:13), disobedience (2 Cor. 10:6), rebellion (Exod. 23:21), lawlessness (1 John 3:4), failure (James 4:17), wickedness (Gen. 6:5), impurity (Zech. 13:1) and idolatry (1 Sam. 15:23). It is often personified: sin is a "thing" that God can remove or put away (Mic. 7:19); it can be loaded onto a goat (Lev. 16:10); it is a snare (Prov. 5:22) and a crooked way (Prov. 2:12–15); it is like a weight (Isa. 1:4); it can enslave people (Rom. 7:14, 25) and is a superhuman power (James 1:15). The Bible contains frequent admonitions to repent and turn to God, as well as specific laws such as the Ten Commandments (Exod. 20:1–17; note that the first four involve behavior toward God; the last six, behavior toward others. Note also that Jesus emphasized loving God as the primary commandment [Matt. 22:37]). Ultimately, all sin is directed against God (for example, Psalm 51).

Although most people readily understand the teaching of the Ten Commandments, it is apparent from the multiple biblical metaphors that sin is both subtle and larger than life. It involves not only transgressing boundaries (disobedience, rebellion, idolatry, superhuman power) but also missing the mark (failure, a weight, a snare). It reflects an orientation away from God, a lack of love for him.

It is helpful to consider sin broadly, and theological studies can be helpful in this regard. Historically, the early church focused on categorizing individual sins. Evagrius identified eight generic sinful attitudes: gluttony, fornication, avarice, sadness, anger, sloth, vainglory, and pride. These were more famously reduced to seven by Gregory the Great in the Middle Ages who combined some and inverted the order because he viewed pride as the root of all sin.[23] Sin can also be categorized into inherent sinfulness—our innate tendency to sin, or being in a state of sin (perhaps the best understanding of what is termed original sin)—and sinful choices, or actual sin—when we willfully rebel against God and his laws.

Original sin was emphasized by Augustine, who has enormously influenced our theological understanding of sin.[24] He believed that it is impossible to not sin. Humans are helpless apart from God, but we put ourselves above God, and are plagued by concupiscence (lust of the flesh) and idolatry. Augustine thus viewed pride as the primary sin. Although concepts of sin were expanded and perhaps viewed more optimistically in the Middle Ages (Aquinas, for example, thought humans were capable of greatness through the grace of God), Augustine's theology was revived in the Reformation period and consequently is still influential today, especially in Protestant Evangelicalism.

Following Augustine, the twentieth-century theologian Reinhold Niebuhr has expanded on the view of pride as primary, the overvalued self.[25] He explains original sin as a consequence of existential anxiety due to the tension between the limitations of our creatureliness and our spiritual ability to transcend and reflect on this finitude. We are all born into conditions which provoke anxiety. We seek to find means to relieve our anxiety apart from reliance on God; therefore sin is inevitable, if not necessarily inherited (thus taking a softer, more nuanced view than Augustine). Niebuhr believes that pride involves both rebellion against God and a disregard for other people. It involves power, but pride can also be intellectual, spiritual, or moral (self-righteousness). Self-exaltation is universal. Pride is ultimately refusing to trust in God. Note that the emphasis on pride largely involves the biblical metaphors of transgressing a boundary, thinking and acting as greater than God. It neglects the metaphor of missing the mark or failing to live up to God's standard.

Augustine's legacy is large, but he has received much critique. Hugh Connolly thinks that Augustine's views are too limited, narrow, and legalistic; the moral life is best seen as a gradual process.[26] Biblical scholar Mark Biddle notes that the juridical/forensic metaphor has been prominent since Augustine and others, especially in Western evangelical theology. Sin becomes crime, a deliberate violation of God's law. Yet this does not fully reflect the biblical teaching on missing the mark, and it ignores other metaphors for sin such as failure and ignorance.[27]

Feminist theologians have also challenged the Augustinian/Niebuhrian emphasis on pride, noting

that most theology has been written by men. The sin of pride (arrogantly viewing oneself as all right), accompanied by domination and aggression, is typically a male problem. However, many women struggle with poor self-esteem, the opposite of an overvalued self. "Female" sin, refusing to recognize one's worth as a child of God, is less obvious. Valerie Saiving in 1960 was one of the first theologians to draw attention to this. She pointed out that women have often been treated as secondary citizens, and have appropriated the message that they are weak and incapable; they lack an organizing center, have difficulty respecting boundaries (for example, gossiping) and depend on others for self-definition.[28] Women's primary sin is self-abnegation and an undervalued self. They "miss the mark" in believing that they are not worthy of divine calling or human authenticity; they hide within a false self and fail to be the self that they are created to be.

Sin involves much more than breaking the law. As Serene Jones remarks,

> one could conceivably live a fully moral, upright life—avoiding many of the acts we call "sin"—and still be fundamentally in a state of sin because one has not accepted the fullness of grace that God has bestowed upon humanity.[29]

Feminist theologians point out that these sins are both individual and structural, and that women and men are equally responsible. It is important to recognize that these observations are generalities (some women overvalue themselves and some men undervalue themselves)—the issue is complex.[30]

Psychologist Mary Stewart Van Leeuwen describes gender differences in terms of the effects of the Genesis 3 curse.[31] Because men and women are equally created (and meant to be in equal relationship) and equally responsible for exercising dominion over creation (fulfilling the creation mandate), they have an equal predisposition for sin. However, the results of their sin differ. The man's sin involves an abuse of dominion (he ate the forbidden fruit) and sociability (he valued the woman over God), which results in pain in exercising dominion and domination over the woman (the dominion runs wild), with neglect of relationship (distorted sociability). He exercises dominion apart from God (pride). The woman's sin also involves a neglect of responsible dominion and sociability (she gave the fruit to the man); this leads to social enmeshment (her desire is for the dominating man) with a neglect of dominion. By partaking of the fruit, the woman transgressed the bounds of responsible dominion; the preservation of relationship becomes an excuse for failing to fulfill the creation mandate. Note the similarities between her views and the ideas of feminine/masculine sin, between domination and pride, and social enmeshment and a poor sense of self.

Biddle comes to similar conclusions. He recognizes that biblical texts contain ideas of both pride (typically masculine) and sloth (typically feminine). Sin can be viewed as both rebellion or arrogance and as underachievement or despondent passivity.[32] There is an overstepping of an upper boundary (trying to be God, not accepting the limits of humanity) and a failure to exceed a lower boundary (not being what God has created us to be, abdicating responsibility and hiding). Biddle believes that we need to embrace both poles of humanity: being made in God's image and being finite creatures. Sin occurs when these are out of balance. He suggests that pride and sloth can be reconciled through something more basic underlying both: mistrust of God. There is a violation of our relationship with God and a failure to embrace our authentic freedom. Against Augustine, Biddle claims that the primary sin is not pride and rebellion but underachievement, an unwillingness to place our ultimate trust in God as revealed in Christ.[33] We all miss the mark.

In a similar attempt to reconcile pride and sloth, Terry Cooper, drawing upon the work of psychoanalyst Karen Horney, argues that pride, if properly understood, underlies both the overvalued self and the undervalued self.[34] Pride and self-contempt, or the Niebuhrian and feminist perspectives, can be integrated. In fact, both perspectives are needed for a proper theological understanding of sin. People often are unconsciously proud of being humble, or of having low self-worth. There are differing forms of pride and differing responses to existential or ontological anxiety, which is a precondition for sin. These include moving against others (pride, arrogance), trying to be superior to others (narcissistic in its extreme form), and moving toward others in self-effacement. Cooper suggests that pride always involves a lack of trust in God; self-abnegation is one's own solution to a problem, not God's solution. We distrust God by trying to be either more or less than what we are meant to be. Life is ordered around one's own insecurities. Egoism, or self-preoccupation, underlies

both egotism (self-inflation) and self-deflation. Self-hate can be the flip side of pride; if we chronically feel guilty and insecure, we sometimes externalize it so that the problem becomes someone or everyone else's problem—paranoia manifests as pride. Pride is a defensive posture; lurking behind it is low self-esteem. Both the overvalued and undervalued forms of pride lack a healthy self-acceptance.

Feminist scholars provide an important corrective to the long-dominant view of sin as pride and arrogance. Sin needs to be considered in all its dimensions. It involves both overvaluing and undervaluing, both self-aggrandizement and self-effacement, both pride and passivity, both arrogance and acedia, both doing wrong and failing to do right, both being more and being less than God intends for us. Sin involves turning away from God, rejecting the one who creates, redeems, and sustains us.

Another important concept in our understanding of sin is its corporate/communal nature, which is emphasized in the Bible. Social structures (such as academic institutes) are tainted by sin; prevailing attitudes perpetuate sinful societies. Specific sins occur in the context of a sinful world. All have sinned and all are predisposed to sin. It is important to consider sin as neither exclusively individual nor exclusively social, but simultaneously both.[35] Biddle comments that the individualism and legalism of much contemporary Christianity overlook the systemic and dynamic nature of sin. In the biblical view, individual and corporate sin are intertwined, as are sin and its consequences (he describes it as one organic continuum).[36] It is easy to blame either other individuals or anonymous institutions, but it is important to recognize the symbiotic connection between individual sin and its structural embodiment.[37] It is possible that societal pressures on women have led to or have encouraged a collective sin of undervaluing the self. This does not preclude individual responsibility but adds another dimension to it.

Finally, it is essential to understand that sin cannot be understood apart from grace.[38] The world apart from God does not consider sin because it does not know grace. Sin and grace are intertwined. We are all born with a propensity to mistrust our Creator, to undervalue or overvalue ourselves in relationship to God. We can be honest about our sin because we have hope in grace. It is only through grace that we can restore relationships marred by alienation. Grace brings us out of hiding into the light.

The Way Forward

It is time to complete the circle and consider how a biblical/theological understanding of sin can inform the problem of the lack of women in STEM. There is now a large body of literature on the topic of women in science, although little from a Christian perspective.[39] As noted above, sociocultural explanations offer some helpful insights into the gender gap in STEM; Christian theology can add another perspective. The concept of feminine sin points to a tendency for women to neglect their responsible dominion over creation. With respect to science, failure to utilize one's God-given gifts and to accept one's worth in God's eyes is one possible factor explaining the paucity of women in science. This is true perhaps for the lack of women entering science fields as well as for the lack of advancement for women already in scientific careers. (I have encountered many Christian women who are insecure regarding their abilities, or who defer to men on certain issues, or who have inconsistent views regarding gender equality.)

From the research on women in science, suggestions have been made for decreasing the gender gap in STEM. A symposium in 2000 advised selecting science students using broad criteria, looking for single-mindedness and assertion, and being aware of unconscious discrimination.[40] In 2011, NSERC devised a policy statement on gender, science, and engineering which included the following proposed strategies:

- encourage female students in elementary and secondary schools to consider careers in science and engineering,
- increase the enrolment of women in undergraduate and graduate programs in science and engineering in all Canadian universities and colleges,
- increase the profile and retention rate of women in science and engineering positions,
- eliminate barriers for women who wish to pursue careers in science and engineering,
- promote the integration of female students and professionals both within and outside academia [and]
- provide female role models who are accomplished, successful, and recognized researchers in science and engineering.[41]

These are helpful strategies and are not necessarily incompatible with a Christian worldview. However,

these solutions focus on institutional and societal changes, and are thus primarily "top-down" approaches. It is also helpful to consider individual issues and a "bottom-up" approach. The above discussion on both the biblical equality of women and the "feminine" aspects of sin can provide insight in this regard. From the perspective of Christian theology, we also need to consider the neglect of responsible dominion as a factor in the gender gap in STEM. Whether women have been discouraged from fully participating by society or by the church, this is not what the Bible teaches.

Recall that men and women are created equal in God's image. Recall the creation mandate given to both men and women: to care for, cultivate, and study the divinely created order, science being one way in which this can be fulfilled. It is interesting to consider gender differences in brain function and how this may inform a response to the gender gap in STEM. The "male," "scientific" rationality once revered, and a likely explanatory factor in the subordination of women, is not prioritized in biblical teaching. Furthermore, "female" nonrational faculties, such as imagination and intuition, are valued not only in the Bible, but also in science. Christian women are perhaps uniquely gifted to study creation in obedience to God's calling by pursuing STEM careers.

Men and women are also equally commanded to Christian ministry, including teaching. Also recall the Fall, the "curse," and its results. The man can be viewed as abusing his dominion and dominating women; the woman can be seen as neglecting her responsible dominion and idolizing relationships. From a theological perspective, this "feminine" sin of missing the mark and not living up to one's potential is just as significant as the "masculine" sin of pride. Note that this is not an issue only for women, not another way of denigrating women. It is also a concern for the entire Christian community, and it applies to all areas of life, not just STEM. Sin is a problem and a product of both individuals and societies.

What, therefore, is a Christian response? In general, I suggest that it needs to begin in our homes, in our Christian schools, and in our churches. We need increased awareness of the prevalence and sinfulness of underachievement and self-abnegation, and encouragement to not "miss the mark." Then we need teaching, counseling, and modeling about our value, worth, and responsibility through the eyes of Christ. As Jean Vanier notes,

> All humans are sacred, whatever their culture, race or religion, whatever their capacities or incapacities, and whatever their weakness or strengths may be. Each of us has an instrument to bring to the vast orchestra of humanity and each of us needs help to become all that we might be.[42]

Both men and women are beloved children of God who are called to shine as lights in the world, exercising faithful stewardship and leadership, as God works in us through our gifts (Phil. 2:12, 13). We need encouragement to reorient ourselves toward God. We need to accept his mysterious and magnificent love, accept the gifts he has given us (regardless of our gender) and use them responsibly, and surrender ourselves and our insecurities to our Lord. I suggest that change involves both internal and external processes; both individual and communal processes. We are one body in Christ (Rom. 12:5). Many Christian women have allowed their gifts to lie dormant, yet Paul teaches that all—men *and* women—are alive in Christ (1 Cor. 15:22) and have freedom through Christ to exercise our gifts (Gal. 5:1). In Christ there is no longer male and female (Gal. 3:28), and we need to stop acting as if there is.

With respect to Christian women in STEM, the challenges may be greater as a result of the long history of reverence of "male" rationality, as well as a historic antagonism between science and religion. However, Christian communities can help by teaching on scientific aspects of creation, including research and care for the environment, as well as teaching on the compatibility between science and faith. When young girls in homes, church, and school are given equal opportunities, they may be more inclined to choose a career in engineering, for example. Girls can be encouraged to help in building projects, not just kitchen ones. When girls see women scientists as role models, when children are valued and their gifts encouraged regardless of gender, we will be working toward fulfilling the creation mandate as well as the great commission. ♦

Notes

[1]Sarah Coakley, "Introduction," in *Faith, Rationality and the Passions,* ed. Coakley (Chichester, Suffolk: Wiley-Blackwell, 2012), 1–12; Charles Taylor, "Reason, Faith and Meaning," in *Faith, Rationality and Passions,* ed. Coakley,

13–27; Thomas Dixon, "Revolting Passions," in *Faith, Rationality and the Passions,* ed. Coakley, 181–95. A recent study in Europe demonstrated the persistence of beliefs that men are more rational and women more intuitive; Gerd Gigerenzer et al., "Stereotypes about Men's and Women's Intuitions," *Journal of Cross-Cultural Psychology* 45, no. 1 (2014): 62–81.

[2]Londa Schiebinger, *Has Feminism Changed Science?* (Cambridge, MA: Harvard University Press, 2001), 21–32.

[3]Helen Shen, "Inequality Quantified: Mind the Gender Gap," *Nature* 495 (2013): 22–24; see also Schiebinger, *Has Feminism Changed Science?,* for some older statistics.

[4]Gayle E. Ermer, "A Christian Response to Under-Representation of Women in Engineering Degree Programs" (paper presented at the Annual Meeting of the ASA/CSCA/CiS, McMaster University, Hamilton, Ontario, July 25–28, 2014). Information based on statistics from ASEE "Profiles of Engineering and Engineering Technology Programs."

[5]Women in Science and Engineering in Canada; Corporate Planning and Policy Directorate, Natural Sciences and Engineering Research Council of Canada, Ottawa, ON, 2010, http://www.nserc-crsng.gc.ca/_doc/Reports-Rapports/Women_Science_Engineering_e.pdf.

[6]See discussion in Schiebinger, *Has Feminism Changed Science?,* 67–91.

[7]Anne Sayre, *Rosalind Franklin and DNA* (New York: Norton, 1975).

[8]Candace B. Pert, *Molecules of Emotion: The Science behind Mind-Body Medicine* (New York: Scribner, 1997).

[9]The study involved 127 science professors at six US universities who were asked to evaluate two fictitious CVs of students applying for a job as a laboratory manager; C. A. Moss-Racusin et al., "Science Faculty's Subtle Gender Biases Favor Male Students," *Proceedings of the National Academy of Sciences* 109 (2012): 16474–79.

[10]For example, Simon Baron-Cohen, *The Essential Difference: The Truth about the Male and Female Brain* (New York: Basic Books, 2003); Melissa Hines, *Brain Gender* (Oxford: Oxford University Press, 2005); Donald W. Pfaff and Yves Christen, eds., *Multiple Origins of Sex Differences in Brain: Neuroendocrine Functions and Their Pathologies* (Heidelberg: Springer, 2013). For a critique on brain gender studies, see Rebecca M. Jordan-Young, *Brain Storm: The Flaws in the Science of Sex Differences* (Cambridge, MA: Harvard University Press, 2010).

[11]Madhura Ingalhalikar et al., "Sex Differences in the Structural Connectome of the Human Brain," *Proceedings of the National Academy of Sciences* 111 (2014): 823–28.

[12]For example, Daniel G. Amen, MD, *Unleash the Power of the Female Brain: Supercharging Yours for Better Health, Energy, Mood, Focus, and Sex* (New York: Harmony Books, 2013).

[13]A. M. Beltz, J. E. O. Blakemore, and S. A. Berenbaum, "Sex Differences in Brain and Behavioral Development," in *Neural Circuit Development and Function in the Brain,* ed. John Rubenstein and Pasko Rakic (San Diego, CA: Academic Press, 2013), 467–99; Jeffrey Derks and Lydia Krabbendam, "Is the Brain the Key to a Better Understanding of Gender Differences in the Classroom?," *International Journal of Gender, Science and Technology* 5, no. 3 (2013): 281–91; Schiebinger, *Has Feminism Changed Science?,* 159–79.

[14]The very small (particle physics) and the very large (astrophysics) both require imaginative access. A classic work on the nature of scientific discovery is Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago, IL: University of Chicago Press, 1967). Examples of discoveries include Newton's insights about gravity when watching an apple fall and Kekulé's dream of a serpent eating its tail, which helped him discover the structure of the benzene ring.

[15]Schiebinger, *Has Feminism Changed Science?,* 54–64.

[16]Jill M. Bystydzienski and Sharon R. Bird, "Introduction" in *Removing Barriers: Women in Academic Science, Technology, Engineering and Mathematics,* ed. Bystydzienski and Bird (Bloomington, IN: Indiana University Press, 2006), 1–19.

[17]For example, Aída Besançon Spencer, *Beyond the Curse: Women Called to Ministry* (New York: Thomas Nelson, 1985); Mary Stewart Van Leeuwen, *Gender and Grace: Love, Work and Parenting in a Changing World* (Downers Grove, IL: IVP Academic, 1990); Alan G. Padgett, *As Christ Submits to the Church: A Biblical Understanding of Leadership and Mutual Submission* (Grand Rapids, MI: Baker Academic, 2011).

[18]For example, Garrett Green, *Imagining God: Theology and the Religious Imagination* (San Francisco, CA: Harper & Row, 1989); Paul Avis, *God and the Creative Imagination: Metaphor, Symbol and Myth in Religion and Theology* (New York: Routledge, 1999). Sallie McFague suggests that previous views of God have been male dominant in *Metaphorical Theology: Models of God in Religious Language* (Philadelphia, PA: Fortress, 1982).

[19]Matthew Henry, *Commentary on Genesis*, public domain, http://biblehub.com/commentaries/mhcw/genesis/2.htm.

[20]For example, the word *kephalé* in 1 Cor. 11:2–16 is commonly translated "head" but can have multiple meanings, including "origin"; see Padgett, *As Christ Submits,* 70–71.

[21]Karl Menninger, *Whatever Became of Sin?* (Toronto: Bantam, 1973). He notes that sin has been reduced to either an illness or a crime, and that we tend to confuse the issue with semantic tricks or relativize it.

[22]Hebrew *ḥaṭṭāt* ; Greek, *hamartia*. As Mark E. Biddle notes, the multiplicity of terms is inadequately represented by the one English word (Biddle, *Missing the Mark: Sin and Its Consequences in Biblical Theology* [Nashville, TN: Abingdon, 2005], xiv).

[23]Based on Sirach 10:15; Evagrius of Pontus, *Eight Logismoi,* public domain, http://www.earlychurchtexts.com/public/evagrius_of_pontus_eight_logismoi.htm; see summaries in James Taylor, *Sin: A New Understanding of Virtue and Vice* (Kelowna, BC: Northstone, 1997), 25–31; Hugh Connolly, *Sin* (New York: Continuum, 2002), 41–61.

[24]Found mostly in *Confessions*, but also in *City of God*, book 14; both public domain. Augustine's theology was informed by his own guilt in relation to sinful past behaviors, as well as his arguments against Pelagius, who had a high view of the goodness of humanity. The concept of original sin is uniquely Pauline; it is not found in the Old Testament, although is hinted at (e.g., Psalm 51, Job 31:33; 1 Corinthians 15). This concept has been much criticized recently, e.g., Biddle, *Missing the Mark*, 3–8; Taylor, *Sin: A New Understanding,* 183–93.

[25]Reinhold Niebuhr, *The Nature and Destiny of Man*, vol. 1 (New York: Charles Scribner's, 1964), 178–240; see also discussion in Terry D. Cooper, *Sin, Pride and Self-Acceptance: The Problem of Identity in Psychology and Theology* (Downers Grove, IL: IVP Academic, 2003).

[26]Connolly, *Sin*, esp. 41–81.

[27]Biddle, *Missing the Mark,* e.g., viii.

[28]Valerie Saiving, "The Human Situation: A Feminine View," *Journal of Religion* 40 (1960): 100–12; See also Judith Plaskow, *Sex, Sin and Grace: Women's Experience and the Theologies of Reinhold Niebuhr and Paul Tillich* (Lanham,

MD: University Press of America, 1980). Interestingly, this concept has appeared in nonfeminist literature. Søren Kierkegaard thinks that the despair of weakness, or the need for external approval, is characteristic of women, whereas the despair of defiance, or self-reliance, is primarily a male tendency (*The Sickness unto Death*, trans. Walter Lowrie [Princeton, NJ: Princeton University Press, 1954], 195–208). Humanist psychologies (exemplified in Carl Rogers's well-known idea of unconditional positive regard) also claim that the undervalued self is the primary problem. Contemporary Catholic contemplative, Henri Nouwen, suggests that the greatest temptation common to humanity is not money, sex, or power but self-rejection, a fear of never being good enough; this contradicts the sacred voice that calls us God's beloved (Nouwen, *Discernment: Reading the Signs of Daily Life* [New York: HarperOne/Harper Collins, 2013], 30–37).

[29]Serene Jones, *Trauma and Grace: Theology in a Ruptured World* (Louisville, KY: Westminster John Knox Press, 2009), 102.

[30]Andrew Sung Park argues that so-called feminine sin is not really sin but what he calls *han*, suffering from being sinned against (Park, *From Hurt to Healing: A Theology of the Wounded* [Nashville, KY: Abingdon, 2004], 32). I agree that much low self-esteem results from being a victim rather than a perpetrator of sin, but I still think that the concept of sin as self-abnegation is helpful. Certainly helping women recover their sense of worth in God's eyes is part of the healing process for sufferers of abuse.

[31]Van Leeuwen, *Gender and Grace*, esp. 42–48.

[32]Biddle, *Missing the Mark*, 32–76, 136.

[33]David L. Smith in his biblical theology, *With Willful Intent: A Theology of Sin* (Wheaton, IL: Bridgepoint, 1994), comes to a similar conclusion. He concludes that sin transcends selfishness and idolatry, and has at its root the rejection of God as God, which includes rejection of Christ. Idolatry is a form of rejection of God, which seeks to replace him with an object of one's own choosing (pp. 301–26). Underlying both is an unwillingness to place one's ultimate trust in God as revealed in Christ.

[34]Cooper, *Sin, Pride and Self-Acceptance*.

[35]For example, Jones, *Trauma and Grace*, 102–25.

[36]Biddle, *Missing the Mark*, 115–19, 138–39.

[37]Connolly, *Sin*, 103–24.

[38]For a psychotherapeutic conception of this, see Mark McMinn, *Sin and Grace in Christian Counseling* (Downers Grove, IL: IVP Academic, 2008).

[39]The *International Journal of Gender, Science and Technology* began in 2009 and is peer reviewed; McMaster University (Hamilton, Ontario) has an organization called the Women in Science and Engineering Initiative (WISE) which includes mentoring and educational programs. The newly formed "Christian Women in Science" affiliate of the ASA also aims to mentor young women scholars and is a good start in this regard.

[40]National Research Council, *Who Will Do the Science of the Future? A Symposium on Careers of Women in Science* (Washington, DC: The National Academies Press, 2000).

[41]NSERC policy statement, Oct. 2011, http://www.nserc-crsng.gc.ca/Professors-Professeurs/CFS-PCP/Wcurrent-Factuelles_eng.asp.

[42]Jean Vanier, *Becoming Human* (Toronto, ON: Anansi Press, 1998), 14.

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