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A New Member of the Family? The Continuum of Being, Artificial Intelligence, and the Image of God

NOREEN HERZFELD

Abstract

Are the scientific and religious definitions of life irreconcilable or do they overlap in significant areas? What is life? Religion seems to imply that there is a qualitative distinction between human beings and the rest of creation; however, there is a strong tradition in Christianity and in Eastern thought that suggests that the natural world also has a relationship with God. Human dominion over other parts of creation exists, but does not obviate this connection, nor give humans a circle unto themselves. The concept of humans being created in the image of God can be used to explain why we might believe humans are in a circle unto themselves, yet we can expand this concept to include artificially intelligent computers, a new potential member of the cognitive family. Our quest for artificial intelligence tells us both what we value in our humanity, and how we might extend that valuation to the rest of creation.

Key words: Image of God; Imago Dei; Artificial intelligence; Artificial life; Religion and Computers

What is life? The poet Wendell Berry entitled his most recent book *Life is a Miracle*. He intended this title as a rebuttal to both the field of artificial intelligence and the reductionist tendency of science toward life. Berry worries that reductive science sees no difference between "creature and artifice, birth and manufacture, thought and computation."[1] To the poet or the theologian, life is a miracle, a mystery, and a gift. Can we reconcile our scientific attempts to understand life with our intrinsic spiritual notions of life as a gift from our creator, as mystery, as something we know and value without definition? Are the scientific and religious definitions of life at odds, irreconcilable, as Berry believes, or do they overlap in significant areas? I believe there is more in common than meets the eye; and a good place to explore these commonalities is precisely in the field of artificial intelligence, our attempt to create a new member of the cognitive family.

How close are we to creating an artificial intelligence? In a famous article in the journal *Wired*, Bill Joy, chief scientist at Sun Microsystems, warned that self-replicating robots and advances in nanotechnology could result, as soon as 2030, in a computer technology that would constitute not only our progeny, the next step in evolution, but also an entity with the potential to replace our own species.[2] Hans Moravec, of the artificial intelligence (A.I.) lab at Carnegie Mellon, pushes the time back to 2040 but agrees that "by performing better and cheaper, the robots will displace humans from essential roles. Rather quickly, they could displace us from existence."[3] Moravec does not mind this idea; in fact, he calls these robots our "mind children." However, lest we begin to panic at the prospect of our imminent demise as a species, let me state at the outset that, since the beginnings of A.I. in the mid-1950s, achievements have lagged far behind both the

prognostications of scientists and the hopes and fears of the public.[4] Our fascination with and fears of A.I. are not rooted in the reality of results; even Moravec admits that the field has made relatively little progress in the last thirty years.

Still, now is the time for us to examine exactly what it is we hope to create. Whether computers, our "mind children," are positioned to replace humanity or to coexist with us could depend on which aspect or aspects of our own nature we try to copy in our attempt to create autonomous machines.

Mistaken assumptions

Would these machines, however intelligent, truly be thought of as our children? Where does life begin or end in the chain of being? Are there distinct cut-off points between life and non-life? It is often assumed that a religious view of the world separates things into three distinct, non-overlapping sets: non-life, life, and human life. This assumption underlies, for example, Lynn White's famous 1967 paper in which he locates the historical roots for the ecological crisis in the claim, common to the monotheistic faiths, that human beings are created in the image of God.[5] This image is a dividing line between human life and all else, with some lesser form of God's spirit animating non-human life. White blames Christianity for the devaluation of other living creatures and of the earth itself. He notes a Gnostic strain in the history of Christian theology, one that sees matter, at worst, in opposition to, and at best, irrelevant to concerns of the spirit. Such a worldview considers inert matter, non-human life, and human beings as distinct categories and gives each a different valuation. White notes that the religious tradition has assigned real value only to the category of human beings, oft viewing the rest of nature as a stage on which we play out our human drama.

By contrast, a scientific view sees the demarcation between humans, other animals, and material objects as blurry; the sequencing of the genetic code has shown us how little space there is between humans and our nearest neighbors on the evolutionary tree. The categorizing of RNA shows the blurry border between living and non-living matter. So, are science and religion at odds here? I contend that they are not; that the picture religion would paint of the world is far more complex than initially supposed.

A continuum of the spirit

First, the easy answer. Religion is obviously not limited to Christianity, nor is Christianity a monolithic entity. Just as there is no one scientific approach to understanding life, neither is there one religious approach, nor one approach within any given religious tradition. In many traditions we find a conception of material existence that is completely infused with the divine spirit. This is perhaps most easily seen in the traditions of the Eastern world. In the Rig Veda, one of the earliest religious scriptures of the Indian subcontinent (~1500 BC), one reads:

> At first there was neither Being nor Nonbeing
> There was not air nor yet sky beyond.
> What was its wrapping? Where? In whose protection?
> Was water there, unfathomable and deep?
> In the beginning Love arose,

Which was the primal germ cell of the mind.
The seers, searching in their hearts with wisdom,
Discovered the connection of being in Nonbeing.
Who really knows? Who can presume to tell it? (10.129.5)

Or in the Mundaka Upanishad (~700 BC):

The lord of Love is above name and form.
He is present in all and transcends all.
Unborn, without body and without mind,
From him comes every body and every mind. (2.1)

For the Hindu or Buddhist, the material world, both living and non-living, is a part of the divine. This is not to say that there is no hierarchy of being; they recognize the increasing complexity from inert matter to single-celled life, and on upward to humankind. A soul in its progression toward God moves up this chain in successive incarnations. My point here is that there are no distinct breaks on this chain of being; from their point of view one can indeed see life as a continuum.

Is such a view entirely foreign in the West? Not really. As Paul Santmire points out, the monotheist traditions are ambiguous, or, perhaps better stated, multivalent in their descriptions of the relationship between human beings and the rest of creation.[6] The Jewish writer of the Psalms describes our relationship with nature as one of dominion:

What are human beings that you are mindful of them,
Mortals that you care for them?
Yet you have made them a little lower than the angels,
And crowned them with glory and honor.
You have given them dominion over the works of your hands;
You have put all things under their feet. (Psalm 8:4–6)

On the other hand, the psalmist also declares:

Mountains and all hills,
Fruit trees and all cedars!
Wild animals and all cattle,
Creeping things and flying birds...
Let them praise the name of the Lord! (Psalm 148: 9–10,13)

Jesus speaks of the very rocks themselves praising him. What we have here are two points, in tension, but not contradictory. One is, perhaps, more observation than prescription, that human beings exercise dominion over the rest of the material world. The other suggests that the natural world indeed has a relationship with God. Human dominion does not obviate this connection.

Recognition of a continuum runs as a subtext through the history of Christian spirituality. We have only to think of St. Francis and his care for the animals, his canticle that includes brother Sun and sister Moon, to see its continuation. The mystic Julian of Norwich writes of seeing the whole world in a hazelnut and understanding that everything has its being in God, and God has

his being in every created thing. Julian writes, "He is the ground, his the substance, he is very essence or nature, and he is the true father and mother of natures. And all [matter] ... which he has made to flow out of him to work his will, will be restored and brought back into him."[7] Rumi writes, "For a time you were the elements, for a time an animal. Now you have been a spirit, so become the Beloved! Become the Beloved!" (*Kulliyyat* 22561).

Indeed, the concept of a spiritual permeation of the entire world is common to the mystical path within most religious traditions. The nature of that spiritual permeation is not our topic for today. I merely mention these to illustrate that the idea of all creation existing on a continuum of life is embedded in most of the world's religious traditions, including those of the West.

In the image of God

How we envision ourselves as human beings within or outside of that continuum will determine first, whether we feel comfortable in such a continuum of life or whether we feel threatened by it, and second, how we treat those on other parts of the continuum. To explore these two interrelated areas—our comfort and our ethics—I would like to return to the image so roundly criticized by Lynn White, that of human beings being created in the image of God. The problem with Genesis 1 is that it does not describe what this image is. Nor is the image described anywhere else in the Christian scriptures. So it has been a fertile field for theologians to play in. As a computer scientist, how we might be in the image of God is also of particular interest, since in the field of artificial intelligence computer scientists are attempting to create in our own human image. What is this image that we see ourselves sharing with God, and what is the image we would like computers to share with us? What we understand this image to be determines what we value most in ourselves and how we relate to the rest of creation.

I think, therefore I am: Image as reason

Historically, Christian theologians have located God's image in human beings' ability to think or reason, which of course fits nicely with the project of artificial intelligence. Theologian Paul Ramsey calls this a substantive interpretation because in it the image of God appears as "something within the substantial form of human nature, some faculty or capacity man possesses" that serves to distinguish "man from nature and from other animals."[9] Substantive interpretations of the image of God have been dominant within Christianity up until the twentieth century. Though the quality or set of qualities making up the image has varied over time, reflecting the concerns and preoccupations of each age, reason has generally been, if not the entire image, at least a strong component—so much so that David Cairns, in his historical survey *The Image of God in Man*, writes: "In all the Christian writers up to Aquinas we find the image of God conceived of as man's power of reason."[8] While this is an overstatement, the image is bound with the human intellect in some way by most writers up to the Reformation; which is no surprise given the influence, on both the early Fathers and the Scholastics, of Greek philosophy, in which reason is seen to be the "most godlike" of all human faculties, that which separates the human *animal rationale* (Aristotle) from other species. What is important for my argument is to note that a substantive approach views reason as a quality restricted to human beings and, supposedly, God. This is the interpretation of the image of God that Lynn White criticized, for it separates human beings from the rest of the creation, giving us a connection to the divine all else

lacks. It also seems to come dangerously close to the Islamic concept of *tashbih*, applying a creaturely attribute to God.

The good news is that substantive interpretations of the image of God have almost completely fallen out of favor among Christian theologians. While we find reason as a part of the image, though definitely not the whole, in the work of theologians such as Reinhold Niebuhr and Paul Tillich, the only current proponents of an image as reason, found only in humanity, are among Evangelical writers. Interestingly enough, most computer scientists have also moved away from an attempt to isolate reason or intelligence as a quality in and of itself. The philosophical movement of nonfoundationalism (W. V. O. Quine, Richard Rorty, the Frankfurt School) has made it clear that reason cannot be separated from language or action and that reason itself may not be the godlike characteristic the Greeks thought it to be. After all, reason can be applied to bad ends—Hitler and Stalin were reasonable men. Iblis uses reason to come to his decision not to bow down to mankind. Reason alone is a faulty tool; the Qu'ran notes that "humankind does indeed go too far in regarding itself as self-sufficient" (Surah 96).

To be is to do: Image as function

In a 1915 article "*Zum Terminus 'Bild Gottes'*," Johannes Hehn introduced a nonsubstantive way of looking at the image of God. Hehn suggested that the image of God be understood as a title or designation rather than as an attribute of human nature.[10] Old Testament scholar Gerhard von Rad was one of several scholars who extended Hehn's work into a dynamic, functional approach to the image, one that locates it not in a quality we possess, but in what we are called to do; and this approach has come to dominate the field of Biblical exegesis.[11] In his commentary on Genesis, von Rad argues for the translation "as the image of God" rather than the usual "in the image of God" thus implying that the whole person, rather than some quality of the person, is God's image.[12] Von Rad also notes that the noun *selem*, usually translated as image, connotes a material image, and is translated variously as "duplicate," "idol," and even "painting" in its occurrences in other Old Testament texts.[13] While such a translation could imply a physical interpretation of the image of God, von Rad uses it in support of a functional interpretation:

> The close relation of the term for God's image with that for the commission to exercise dominion emerges quite clearly when we have understood *selem* as a plastic image. Just as powerful earthly kings, to indicate their claim to dominion, erect an image of themselves in the provinces of their empire where they do not personally appear, so man is placed upon earth in God's image, as God's sovereign emblem. He is really only God's representative, summoned to maintain and enforce God's claim to dominion over the earth.[14]

The image as the human function of exercising dominion, in effect, acting as God's deputy on earth, has been in the ascendancy among Old Testament exegetes throughout the twentieth century. The same concept is also found in the Qu'ran. In Surah 2, the Lord told the angels "I am placing a representative on earth" and again in Surah 6, "It is He who hath made you his agents, inheritors of the earth."

A similar shift occurred in the 1980s in the field of A.I. We have noted the lack of progress in developing a general intelligence through symbolic programming methods. This does not mean, however, that A.I. produced no results at all. If we view the computer in functional terms, i.e. in

its capacity to act as a human deputy, carrying out tasks previously accomplished by humans, there has been quite a bit of success. Rather than trying to replicate the human process of reasoning, functional A.I. builds on the strengths inherent in computer technology and measures success in practical terms. As Jerry Felman succinctly states, "A.I. no longer does cognitive modeling. It is a bunch of techniques in search of practical problems."[15] If results are what matters, then it is possible to exploit the speed and storage capabilities of the digital computer while ignoring parts of human thought that are not understood or easily modeled, such as intuition. This is, in fact, what was done in designing the chess-playing program Deep Blue. Deep Blue does not attempt to mimic the thought of a human chess player. Instead, it capitalizes on the strengths of the computer by examining an extremely large number of moves, more than any human could possibly examine.[16] Deep Blue does not use intuition, nor can it learn. To know anything of its opponent's style, it must be reprogrammed for each opponent. As the IBM programming team puts it, Deep Blue "doesn't think, it reacts . . . using speed and brute force."[17] When Moravec states that "computers will displace humans from essential roles," he is looking at the problem functionally. Indeed, computers already have displaced humans from many roles, though we tend not to think of these as "essential" once a machine can accomplish them. This points out the first problem with a functional definition of A.I., namely that it is difficult to determine what falls into the category of A.I. and what is simply a normal computer application. A functional definition that includes any program that accomplishes some function human beings normally do would encompass virtually all computer applications, but it would be ludicrous to consider all programs to be artificially intelligent. Nor is there agreement among computer scientists as to what sorts of programs should fall under the rubric of A.I. Once an application is mastered, there is a tendency to no longer define that application as A.I.[18]

Secondly, for a functional approach to result in a full human-like intelligence it would be necessary not only to specify which functions make up intelligence, but also to make sure those functions are suitably congruent with one another. Functional A.I. programs are rarely designed to be compatible with other programs; each uses different techniques and methods, the sum of which is unlikely to capture the whole of human intelligence.[19] Nor are many in the A.I. community satisfied with a collection of task-oriented programs. The building of a general, human-like intelligence, as difficult a goal as it may seem, remains the vision for many. According to John Haugeland, the A.I. community "wants only the genuine article: machines with minds, in the full and literal sense."[20] A functional approach, while it produces saleable results and viable careers, fails to meet the hopes and dreams of many in the A.I. community and much of the public at large.

I am because you are: Image as relationship

An African saying "I am because you are" exemplifies a third approach, being in relationship as that which we share with God. According to Christian theologian Karl Barth, the image of God "does not consist in anything that man is or does" but is identified with the fact that the human being is a "counterpart to God."[21] Like the functionalists, Barth roots his argument in a textual exegesis of Genesis 1:26 – 27. He focuses, however, on two very different portions of the text: "Let us make man in our image" (Gn 1:26) and "male and female he created them" (1:27). As is typical for Barth, he begins in a top-down manner, not with observation of the qualities or functions of human beings, but with God.[22] He interprets the plural in "Let us make man" as

referring not to a heavenly court but to the nature of God himself, a Trinity that contains both an "I" that can issue a divine call and a "Thou" capable of a divine response.[23] This I – Thou confrontation, existing within the Godhead, forms the ground of human creation, thus rooting our very nature in relationship with an other. This relationship can take two forms, the human – God relationship and the human – human relationship. The image is in the relationship itself, not the capacity for relationship. Thus the *imago Dei* is not a quality for Barth, nor is it held by humans as individuals. It exists first in our relationship to God and secondarily in our relationships with each other.

In Islam, relationship to God is also of paramount importance. In a haddith, God addresses himself to David, saying: "I was a hidden treasure and I wanted to be known." Rumi writes:

> Listen to the story told by the reed, of being separated.
> 'Since I was cut from the reedbed, I have made this crying sound.
> Anyone apart from someone he loves understands what I say.
> Anyone pulled from a source longs to go back.' (*Mathnawi*, 1,1)

The Qu'ran defines the highest duty of human beings as "seeking the Face of the Lord" (13:22).

A relational approach exists in A.I., too. As we have seen above, a functional definition of intelligence as the ability to accomplish a task or set of tasks is problematic in that it is difficult to determine which tasks demonstrate intelligence, or more broadly, provide a convincing image of ourselves. This difficulty was recognized by the British mathematician Alan Turing before the advent of the computer. In his landmark paper "Computing Machinery and Intelligence," published in 1950, Turing addresses the question of which actions are essential for a true artificial intelligence with a proposal for what has come to be the generally accepted test for machine intelligence. This test is based on a parlor game called the imitation game, in which an interrogator questions a man and a woman and tries to tell from their written responses which is which. In Turing's version, an interrogator is connected by terminal to two subjects, one a human, the other a machine. If the interrogator fails as often as she succeeds in determining which was the human, and which the machine, the machine could be considered as having intelligence.[24] Turing predicted that by the year 2000, "it will be possible to programme computers ... to make them play the imitation game so well that an average interrogator will not have more than a 70 percent chance of making the right identification after five minutes of questioning."[25] This, like most predictions in A.I., was overly optimistic. No computer has yet come close to passing the Turing Test.[26]

The Turing Test, as it is generally called, is based, not on the completion of any particular task or the solution of any particular problems by the machine, but on the machine's ability to relate to a human being in conversation. Discourse is unique among human activities in that it subsumes all other activities within itself, at one remove. If we accept the Turing Test, as many in the A.I. community have, as the ultimate arbiter of intelligence, then we have defined intelligence relationally.[27]

One A.I. researcher taking this approach is Rodney Brooks of MIT. Brooks' lab has constructed the well-known robots Cog and Kismet. The Cog project is described and analyzed by Anne Foerst, so I will not spend much time on it here.[28] Cog represents a new direction in A.I., first in

that being embodied is crucial to Cog's design. Second, Cog is designed to learn those tasks associated with newborns, such as eye – hand coordination, grasping an object, and face recognition through social interaction with a team of researchers.[29] Although Cog has developed abilities such as tracking moving objects with its eyes and withdrawing an arm when touched, the Cog project is much too new to assess at this point. It may be no more successful than any previous work in A.I. in producing a machine that could interact with humans on the level of the Turing Test. However, Cog represents a movement toward Turing's opinion that intelligence is socially acquired and demonstrated.

In attempting to create machines with some degree of intelligent behavior, A.I. researchers model, theorize about, predict, and emulate the activities of people. Because people are quite apparently social actors, and also because knowledgeable machines will increasingly be embedded in organizations comprising people and other machines, A.I. research needs to consider the social aspects of knowledge and action.[30]

Functional or relational? Implications of each

The move away from a substantive approach, both in theology and in A.I., implies that the center of our being is dynamic and cannot be isolated from the bodies, societies, and natural world in which we are embedded. The real debate, both in theology and A.I., is now between the functional and relational camps. Each of these approaches has an implication for how we see ourselves in relationship to the rest of creation.

Contemporary American society strongly supports a functional approach, in which we are defined by what we do or are capable of doing. Such functionality is easy to measure and produces results that can contribute to our quality of life. However, our fears of being replaced by machines and our unthinking use of the rest of creation are also rooted in a functional paradigm. A functional view works with the understanding of life as a continuum, for everything has its function. It also supports the idea of human dominion of the rest of creation. But if such dominion is taken alone, as the sole component of the image of God, and the center of our being, we have no reason to see the rest of creation as anything other than raw material. And we do have reason to fear, as recent writers have suggested, that computers may some day function more ably than we do.

If our center is in our relationships, then we need not fear replacement. A relational vision of the world sees human beings as one part of a world in which everything is inextricably linked with everything else. Nor is the web of relationality exclusive to human beings. Barth writes that all creatures exist, insofar as God is with them and they are with God. However, he concludes that, while the rest of creation also stands in relationship with God, we cannot say exactly what the nature of this relationship is for any creature but humankind.[31]

So how are we to treat the rest of creation? Here I turn to the Rule of St. Benedict, a handbook written in the sixth century for those who wished to devote their lives to God. In describing the qualifications of the monastery cellarer, Benedict states that he should treat his brothers with humility and respect, and treat the sick, children, guests, and the poor with "every care and concern." This is immediately followed with the injunction to "regard all utensils and goods of

the monastery as sacred vessels of the altar, aware that nothing is to be neglected."[32] Benedict's counsel suggests two points that might form a beginning toward an ethic for our interaction with the rest of creation. First, we should recognize that relationships with either an artificial intelligence or with other created beings or things are no substitution for relationships with other men and women, nor for our relationship with God. Those with whom we are called to be in encounter, our fellow men and women, must be our first priority and be shown "every care and concern." In particular, we must never let the novelty nor the possibly lesser challenge inherent in relating to the non-human pre-empt the hard work it sometimes takes to be in relationship with each other.

This, however, does not mean that we are free to treat the non-human cavalierly in any way we choose. Benedict asks the cellarer to regard all tools and goods as sacred and to treat them with the respect he would afford to the vessels of the altar. Here is, again, an echo of Barth. All creation stands in relationship with God; though we may not know the nature of that relationship, we are bound to hold it in respect. Just as the vessels of the altar are treated with respect, mindful of their nearness to the presence of God in worship, so should all things be treated with care, used mindfully. Benedict's monks are asked to eschew the possession, manipulation, and exploitation of things. To engage in a careless manner, whether with goods or with other persons, would be detrimental to one's own spiritual growth. The vessels of the altar hold in Christianity the same dignity as the Qu'ran in Islam. And we find a similar injunction on how to treat non-living things in Islam. Seyyed Nasr notes: "We must tread carefully upon the earth, treating it with the same respect that we show to the Book of Allah ... Nothing is farther removed from traditional Islamic spirituality than the raping of the earth in the name of man's earthly welfare and without consideration of the welfare of the whole of creation."[33]

Conclusion

What is life? If the divine spirit infuses all things, perhaps we will never find a hard-and-fast definition. There is a strong tradition in Christianity, as well as in Eastern thought, that suggests that the natural world indeed has a relationship with God. Human dominion over other parts of creation exists, but does not obviate this connection, nor does it give humans a circle unto themselves. Function and relationship must be paired.

Could a computer be a new member of the family? Not presently; perhaps not ever. Our quest for artificial intelligence tells us more about our need to relate, not only to one another, but to the world around us as well.

How does this matter in our daily lives? I will give the last word to the poet Wendell Berry, with whom I began:

> So, friends, every day do something
> that won't compute. Love the Lord.
> Love the world.
>
> Ask the questions that have no answers.
> Invest in the millenium. Plant sequoias.
> Say that your main crop is the forest

that you did not plant,
that you will not live to harvest.

Say that the leaves are harvested
when they have rotted into the mold.
Call that profit. Prophesy such returns.
Put your faith in the two inches of humus
that will build under the trees
every thousand years.

Listen to carrion—put your ear
close, and hear the faint chattering
of the songs that are to come.
Expect the end of the world. Laugh.
Laughter is immeasurable. Be joyful
though you have considered all the facts.

As soon as the generals and the politicos
can predict the motions of your mind,
lose it. Leave it as a sign
to mark the false trail, the way
you didn't go.

Be like the fox
who makes more tracks than necessary,
some in the wrong direction.
Practice resurrection.[34]

Endnotes

1 Wendell Berry, *Life is a Miracle* (Washington: Counterpoint, 2000).
2 Bill Joy, "Why the Future Doesn't Need Us," *Wired*, April 2000, 1 (online version).
3 Hans Moravec, *Robot: Mere Machine to Transcendent Mind* (Oxford: Oxford University Press, 1998), 3.
4 For example, in a 1970 article in *Life*, Marvin Minsky predicted that "in from three to eight years, we will have a machine with the general intelligence of an average human being." Marvin Minsky, *Life*, 20 November 1970, quoted in John Kelley, *Artificial Intelligence: A Modern Myth* (New York: Ellis Horwood, 1993), 104. A.I. researcher Thomas Binford kept a sign over his desk at MIT that read "We shall overclaim." Thomas Binford, "The Machine Sees," in *Robotics*, ed. Marvin Minsky (New York: Doubleday, 1985), 99.
5 Lynn White, "The Historical Roots of our Ecological Crisis," *Science*, 155 (10 March 1967): 1203 – 1207.
6 Paul Santmire, *The Travail of Nature: The Ambiguous Ecological Promise of Christian Theology* (Minneapolis: Fortress, 1985).
7 Julian of Norwich, *Showings*, trans. Edmund Colledge and James Walsh (New York: Paulist, 1978), 302 – 303.
8 Paul Ramsey, *Basic Christian Ethics* (New York: Charles Scribner and Sons, 1950), 250.

9 David Cairnes, *The Image of God in Man*, with Introduction by David E. Jenkins, Fontana Library of Theology and Philosophy (London: SCM, 1953; reprint, London: Collins, 1973), 60.

10 Johannes Hehn, "Zum Terminus 'Bild Gottes'," in *Festschrift Eduard Sachau zum siebzigsten Geburtstag* (Berlin: G. Reimer, 1915): 36 – 52.

11 Wilhelm Caspari also deserves credit for advancing a theory similar to von Rad's in his 1929 article, "Imago divina Gen I," in *Festschrift R. Seeberg: Zur Theorie des Christentums* (Leipzig, 1929).

12 Gerhard von Rad, *Genesis: A Commentary*, trans. John H. Marks, The Old Testament Library (Philadelphia: Westminster, 1961), 56. While the translation of *beth* as "as" is rare in Hebrew, it is accepted by most grammarians. See, for example, Wilhelm Gesenius, *Hebrew Grammar*, ed. E. Kautzsch (Oxford: Clarendon, 1910), 119i.

13 Von Rad, *Genesis*, 56. See I Sam 6:5, Num 33:52, II Kings 11:18, Ez 23:14 for other uses of *selem*.

14 Von Rad, *Genesis*, 58. Von Rad cites Wilhelm Caspari, who was the first to suggest this interpretation. This interpretation is supported by a 1979 find, at Tell Fekheyre in Syria, of an inscription in Akkadian and Aramaic on a statue of Hadadyis'i, ruler of Guzan, and which refers to the statue twice using the Aramaic *salma* and twice as *demuta*. See A. R. Millard and P. Bordreuil, "A Statue from Syria with Assyrian and Aramaic Inscriptions," *Biblical Archeologist*, 45 (1982): 135 – 141.

15 Quoted by Hubert Dreyfus, "Response to my Critics," in *The Digital Phoenix*, ed. T. Bynum and J. Moor (Oxford: Blackwell, 1998), 193.

16 Deep Blue calculates 200 million moves per second, giving it the ability to look fourteen moves ahead.

17 "Frequently Asked Questions," www.chess.ibm.com/meet/html/d.3.3.html, 28 March 1999.

18 Rodney Brooks, "Intelligence without Representation," in *Mind Design II: Philosophy, Psychology, Artificial Intelligence*, rev. ed., ed. John Haugeland (Cambridge, Mass.: MIT Press, 1997): 397.

19 Terry Winograd and Fernando Flores agree with Brooks on this point, cautioning against the "naïve optimism" that mistakes local success for a more global understanding.

20 John Haugeland, *Artificial Intelligence: The Very Idea* (Cambridge, Mass.: MIT Press, 1985), 2. See also Michael Arbib, "On Being Human in the Computer Age," in *Impacts of Artificial Intelligence: Scientific, Technological, Military, Economic, Societal, Cultural, and Political*, ed. R. Trappl (Amsterdam: North-Holland, 1986), 59.

21 Karl Barth, *Church Dogmatics*, ed. G. W. Bromiley and T. F. Torrance, trans. J. W. Edwards, O. Bussey, Harold Knight (Edinburgh: T. & T. Clark, 1958), 184 – 185. Barth lists and denies the variety of substantive interpretations in vogue at his time: "The fact that I am born and die; that I act and drink and sleep; that I develop and maintain myself; that beyond this I assert myself in the face of others, and even physically propagate my sperm; that I enjoy and work and play and fashion and possess; that I acquire and have and exercise powers; that I take part in all the work of the race; and that in it all I fulfill my aptitudes as an understanding and thinking, willing and feeling being—all this is not my humanity" (*Church Dogmatics*, III/2, 249).

22 Barth considers reasoning about human nature through self-observation as bound to result in a vicious circle: "How does he [man] reach the platform from which he thinks he can see himself?" (*Church Dogmatics*, III/2, 75). Pannenberg criticizes Barth's top-down approach for

purporting to begin with God's nature, while actually projecting a "quasi-Buberian anthropology of I – Thou personalism" onto God. Wolfgang Pannenberg, *Anthropology in Theological Perspective* (Philadelphia: Westminster, 1984), 16.

23 Barth, *Church Dogmatics*, III/2, 182. Of course an I – Thou relationship within the Godhead does not imply more than two entities. Barth writes specifically of the relationship between the Father and Son as prototype for the *imago Dei*. The Spirit receives little attention.

24 Alan Turing, "Computing Machinery and Intelligence," in *Mind Design II*, 29 – 32.

25 Ibid., 38.

26 In 1991, Hugh Loebner began funding a yearly competition that offers $100,000 for the first program to pass a Turing Test. The first four years of the competition allowed the area of questioning to be restricted. Since 1995, the areas of questioning have been unrestricted. Judgements on the relative success of various programs differ; however, Loebner has yet to part with his money. Turkel seems to feel that several programs have been remarkably successful in limited domains. Sherry Turkel, *Life on the Screen: Identity in the Age of the Internet* (New York: Simon and Schuster, 1995), 94. Epstein is less optimistic. Robert Epstein, "Can Machines Think?: Computers Try to Fool Humans at the First Annual Loebner Prize Competition Held at The Computer Museum, Boston," *A.I. Magazine* (Summer 1992): 80 – 95. Having conversed with some of the Loebner contestants myself, via the Internet, I agree with Epstein. These programs are remarkable easy to fool through the use of metaphor, simile, or a sudden change of topic. Still, optimistic predictions continue to be made. Kurzweil fully expects computers to have mastered the Turing Test by the year 2030.

27 While most in the A.I. community accept the Turing Test as sufficient, an opposing view can be found in John Searle, "Minds, Brains, and Programs," *The Behavioral and Brain Sciences*, 3 (1980): 417 – 424.

28 Anne Foerst, "Cog, a Humanoid Robot, and the Question of the Image of God," *Zygon*, vol. 33, no. 1 (March 1998): 91 – 111.

29 Ibid., 101 – 102.

30 Les Gasser, "Social Conceptions of Knowledge and Action: DAI Foundations and Open Systems Semantics," *Artificial Intelligence*, 47 (1991): 107 – 108.

31 Barth, *Church Dogmatics*, III/2, 138.

32 Benedict of Nursia, The *Rule of St. Benedict in English*, ed. Timothy Frey (Collegeville, Minn.: Liturgical Press, 1980), 54 – 55.

33 Seyyed Hossein Nasr, "The Cosmos and the Natural Order," in *Islamic Spirituality: Foundations*, ed. Seyyed Hossein Nasr (New York: Paulist, 1991), 348.

34 Wendell Berry, "Manifesto: The Mad Farmer Liberation Front" in *The Country of Marriage*, (New York: Harcourt, Brace, Jovanovich, 1973).

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