

Paper Title: Three Educational Experiments with Potential Application in Global Network

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Abstract:

Three educational experiments associated with our Local Societies Initiative program yield experience that should be useful to similar programs during the building of a global network to serve the religion-and-science dialogue. This paper gives a summary report of opportunities and challenges that we have encountered in the experiments.

First, our GOOD STAR LSI program has continued its coordinated interaction with a computer software prototyping project that we described for this conference in a paper and presentation last year. Work in the Computer Science Department at Oklahoma City University (OCU) has now progressed to early stages of user experimentation with its prototype agent-based social simulation tool named "THAIST" (Theological Artificial Intelligence Simulation Tool). Association of this project with the GOOD STAR program is appropriate, for THAIST is intended to enable improved dialogue among the scientists and the members of religious communities who view altruistic behavior from notably different perspectives.

Educational opportunities that have emerged in our collaboration with the THAIST project are interesting at more than one level. Locally, the prototype is giving the OCU students in an altruism course some valuable "hands on" experience with social simulation. Global distribution potential for this tool also marks an area of educational opportunity represented by THAIST. Although costs of the software work have been borne by the OCU Computer Science Department, GOOD STAR's website soon will furnish an appropriate vehicle for widespread freeware distribution of the THAIST package.

Our second educational experiment emerged as one of the derivative benefits of video-conferencing activity that had been enabled by the Supplemental Grant Prize we received last year. In the course of preparing our planned "initial intrastate" video-conferencing event, we noted opportunity to capture video and PowerPoint graphics from the presentations for later use. The video-conferencing link between Oklahoma City University and Phillips Theological Seminary (Tulsa) was intended principally to support distributed discussion of the presentations, but the event permitted us to produce a useful educational package on DVD, as well. Although technical difficulties with the video-conferencing link ultimately managed to frustrate its intent, they furnished some useful "lessons learned" that we shall discuss in this paper.

GOOD STAR's third educational experiment has involved so-called "distance education" (DE). Also a derivative opportunity that we recognized in our initial video-conferencing event, this ongoing project capitalizes upon, and is funded by, resources already available

at Oklahoma City University for producing instruction of this kind. An eight-week Internet-based course currently is being developed as an expansion from the presentations given at GOOD STAR's intrastate video-conferencing event. Inasmuch as the two speakers for the event represent universities in New Hampshire and Oklahoma, respectively, their subsequent collaboration in development and presentation of the DE course furnishes additional networking experience.

Biography:

Ted Metzler's B.A. degree in mathematics (with philosophy minor) was followed by an M.S. in computer science and an M.A. and Ph.D. in philosophy. The consistent motivation in this educational path was his fascination with relations between traditional notions of the human person and new alternatives introduced by artificial intelligence (AI) and robotics. Appropriately, most of Ted's work experience in computer software development, between 1976 and the present, has involved AI applications. Several years ago—sensing a personal calling to help mediate dialogue between the communities of AI and religion—he returned to school and earned an additional M.A. degree in theology. Ted currently is an adjunct professor in philosophy and religion at Oklahoma City University, where he also serves as program coordinator for the LSI program named "GOOD STAR" (Growing Open Oklahoma Dialogue in Science, Technology, and Religion). GOOD STAR is hosted by the Wimberly School of Religion at OCU, and is chaired by Dean Mark Y. A. Davies.

Paper:

Introduction

The name of the conference for which this paper was prepared—"Science and Religion: Global Perspectives"—immediately indicates that the gathering engages an important subject from a viewpoint affording wide scope. Aspects of both the subject and the scope are to be addressed in this paper. We address the *subject* by explaining how the three educational experiments associated with our Local Societies Initiative program foster science-and-religion dialogue regarding specific topics. The educational content of these experiments arguably responds to a question posed in the Metanexus Call for Papers by illustrating types of dialogue that can "cut to the heart of liberal, humanistic education" (*Science & Religion*, par. C). In addition, the paper speaks to the global *scope* of this conference by reporting technological opportunities and challenges that we have encountered in our experiments. Inasmuch as they each display potential for application in global educational enterprises, the experiments may support partial response to a further question presented in the Metanexus Call for Papers: "Can new and innovative educational programs be delivered via a global network?" (*Science & Religion*, par. C). As a final introductory comment, the author records that he wishes to offer critical, but balanced, assessments of the various communication media discussed in this paper. Current technologies do promise impressive gains in global networking—realizing their full promise, however, can sometimes require us to "push the envelope" of their capabilities with a measure of patience.

Experiment One

GOOD STAR contributed a paper to this conference last year (Metzler, Beyers, and Goulden 2004) explaining our interest in early software prototyping work at Oklahoma City University on an agent-based social simulation tool named “THAIST” (Theological Artificial Intelligence Simulation Tool). Although the OCU Computer Science Department has paid all expenses for this software work, we are continuing to encourage and to participate in the project. We plan, for example, to furnish the GOOD STAR website as an appropriate vehicle for widespread open source distribution of the THAIST package when it is sufficiently mature. A principal reason for such strong interest in THAIST—as explained in our prior paper—is the fact that the tool is being designed specifically as a new kind of vehicle to serve improved communication between religious and scientific communities. In particular, its social simulation capabilities are intended to enable more precise dialogue among theologians and scientists who share research interest in *altruistic* motivations and behavior—albeit, often from notably different theoretical perspectives. Some additional comment regarding those different perspectives may, at this point, help to establish the sense in which we view the aims of the THAIST project as objectives close to the heart of the “liberal, humanistic education” mentioned previously.

As modern science began to take form in seventeenth-century Europe, a profound cultural change occurred in the focus of intellectual attention. Ian Barbour has reminded us that, throughout most of the Middle Ages preceding this change, the goal “was not primarily ... the description, prediction, and control of a limited phenomenon but rather the understanding and contemplation of the meaning of the part in relation to the whole and to God” (5). Referring to the “new idea of what it means to explain something” that replaced this Medieval viewpoint, Barbour adds that interest “was being directed not to final causes operating toward the future or to formal causes in the essence of the object, but to efficient causes” (11). In effect, one might say that attention to action by purposive, intentional (and categorically “free”) agents faded steadily in the presence of progressively sharper preoccupation with the workings of purposeless (amoral) machines. Accordingly, we find students (even now, in the twenty-first century) receiving formal education in moral philosophy *or* the natural sciences—generally, a strong disjunctive choice that determines which of two *disjoint* cultural worlds they will subsequently inhabit professionally. Many of us—including the author of this paper—take the described transformation to be unhealthy. First-person accounts of purposive action must be *(re)integrated*, somehow, with third-person descriptions of a natural world *if* the ideal of a “liberal, humanistic education” is to be rescued from extinction.

In the foregoing context, it is certainly refreshing to see Nancey Murphy and George Ellis (*On the Moral Nature of the Universe*) bravely constructing a proposed “hierarchy of the natural and human sciences” that displays both natural and human branches *rejoined* at a *highest* level labeled “Metaphysics (Theology)” (204). Their commentary on this diagram notes modestly that “each branch of the hierarchy seems to call for some account of *purpose* for its completion” (204). Roll over, Galileo—roll over, monsieur Laplace; a coherent restoration of purposive agency to a structure describing human knowledge (including both natural *and* human sciences) has been described.

Murphy and Ellis offer also a structure in which the proposed integrative role for our THAIST tool can be located specifically. Reading their hierarchical diagram upward from *biology*, along the “human sciences” branch, we progressively encounter *psychology*, *social and applied sciences*, *motivational studies*, *ethics*, and *theology*. At a finer level of detail, the authors count *economics* among the *social and applied sciences* (89). And, in their exploration of the “ethical content of economics,” they are led to discussion of exactly the game theory formalism, Prisoner’s Dilemma, that is incorporated in THAIST. They also observe, in this context, that economists tend to “add one substantive assumption regarding human values: egoism” (92). This observation certainly describes accurately of the work by Robert Axelrod, whose *The Evolution of Cooperation*, in the mid-1980s, dramatically popularized use of social simulations of the sort THAIST supports, including its use of the Iterated Prisoner’s Dilemma (IPD). In the Introduction to his seminal work, Axelrod characterizes his approach very clearly with the following remarks:

The Cooperation Theory that is presented in this book is based upon an investigation of individuals who pursue their own self-interest without the aid of a central authority to force them to cooperate with each other. The reason for assuming self-interest is that it allows an examination of the difficult case in which cooperation is not completely based upon a concern for others or upon the welfare of the group as a whole.” (6)

It is compatible with the relations of ethics, science, and theology described throughout *On the Moral Nature of the Universe* to suppose that theologians might wish to borrow the social simulation resources used by Axelrod and *adapt* them—using THAIST—to express *their own* “Cooperation Theory.” Moreover, it is a fortuitous property of software tools like THAIST that they *can* be adapted to model different assumptions concerning motivational mechanisms, cognitive structures, beliefs, etc., of the individual agents—and to explore the implications of these hypotheses in complex social interactions. As Axelrod himself observes, “... the approach is to make some assumptions about individual motives and then deduce consequences for the behavior of the entire system ...” (6). THAIST, it seems, promises to occupy a location in the knowledge structure sketched by Murphy and Ellis that could allow it to make *contributions* to the health of “liberal, humanistic education.”

In fact, we have undertaken an educational experiment at OCU that challenges the prototype THAIST to begin facilitating modest contributions of just that kind. A course offered by the Wimberly School of Religion, titled “Moral Issues: Religious and Scientific Perspectives on Altruistic Love,” affords the opportunity for this experiment. Taught by the GOOD STAR Program Coordinator, the course initially has included reading of *Unto Others: The Evolution and Psychology of Unselfish Behavior* (Sober and Wilson 1999), as well as *On the Moral Nature of the Universe: Theology, Cosmology, and Ethics* (Murphy and Ellis 1996). While the class subsequently reads selections from *Evolution and Ethics: Human Morality in Biological and Religious Perspective* (Clayton and Schloss 2004), five of its students have volunteered to formulate, execute, and discuss simulation experiments with the THAIST prototype, as their term project. One of the students already has indicated his interest in using the tool to express the viewpoint of process theology (e.g.,

possibly modeling influence of “initial aims” upon the etiology of altruistic behavior). This intention is particularly interesting in view of the fact that the course previously introduced all of its students to the work of Robert Axelrod, and furnished them with a “demo” of the current THAIST executing IPD simulations of the kind he has popularized. Roll over *again*, monsieur Laplace—“the times, they are a’changin’,” and theological “hypotheses” *can* be included in agent-based social simulations on a *computer*. To be sure, the students’ results are not expected to constitute *proofs*, in the manner of artificially intelligent “theorem provers.” Rather, they are expected, in precisely the *same* manner as Robert Axelrod’s simulation tournaments, to *express*—i.e., *model*—some hypotheses (presumably *different* from his) concerning the nature of human beings and the universe they inhabit. Moreover, the software quickly can generate measurable *consequences* of those alternative hypotheses, in simulations of complex social behavior patterns that would otherwise remain inscrutable.

From these modest academic beginnings, the *scope* of the THAIST initiative could expand enormously. Some basic conditions for enabling its natural open source growth are already present; it is written in a portable software language (JAVA 2), and the source code is expected to be made available on the next enhancement of the GOOD STAR website (which, incidentally, will include also the first use of our recently-acquired domain name *goodstar.org*). With its compact community of scientific and religious resources, OCU furnishes a very suitable academic environment for bringing the *idea* of this new tool to the level of a working prototype. Ultimately, however, the potential scope of its contribution to religion-and-science dialogue will be realized only if we successfully meet the challenges involving its distribution and future evolution. Josh McHugh emphasizes the importance of these challenges in his recent *Wired* magazine comments regarding the popular new open source browser, Firefox: “Whatever success Firefox sees, it will come from social engineering as much as software engineering” (94). In this case, the “social engineering” that McHugh cites has included steps such as creation of a website that can host blogs addressing the subject software and serve as a clearinghouse for its growth *beyond* the initial release. In an analogous way, we view THAIST as the seed of a promising new idea for religion-and-science dialogue—GOOD STAR hopes to plant it in an online environment that fosters its global visibility and growth.

Experiment Two

The *subject* of GOOD STAR’s second (and third) educational experiments probably has not yet captured as much attention as some of the more “established” topics of dialogue between religion and the natural sciences. It is already quite visible and important, however, among individuals with backgrounds resembling those of the invited speaker and commentator at a recent GOOD STAR event titled “Artificial Intelligence and Robotics: Implications for Theology and the Religious Community” (Lewis and Metzler 2005). Some discussion of their relatively new subject may be useful, therefore, before we address technical and methodological issues concerning the *scope* of the two educational experiments that have been derived from the event.

Implications of AI and robotics for the *religious* community appear often to resemble the implications that they hold for *legal* conventions. The sense and importance—as well as current status—of such implications are concisely suggested in the following comments from a recent issue of *AI Magazine*:

At the moment, there is no artifact of sufficient intelligence, consciousness, or moral agency to grant legislative or judicial urgency to the question of rights for artificial intelligence. But some AI researchers believe that moment might not be far off. And as their creations begin to display a growing number of human attributes and capabilities—as computers write poems and serve as caretakers and receptionists—these researchers have begun to explore the ethical and legal status of their creations. (“AI in the news” 112)

Computers *write poems* and serve as *receptionists*? Indeed, they do. Consider the following haiku “written by Ray Kurzweil’s Cybernetic Poet after reading poems by Wendy Dennis”:

*Sashay down the page
through the lioness
nestled in my soul.* (Kurzweil 163)

Again, consider Honda Motor Company’s pint-sized (4’ 3”, 120 lb.) robot, ASIMO, who walks, talks, and can learn to recognize you by “sight.” At IBM Japan and at the National Museum of Emerging Science and Innovation in Tokoyo, ASIMO reportedly *has* been employed—i.e., “contracted”—as a *receptionist*, “greeting guests and leading them around the facilities” (Obringer 2005).

It is emphatically not the point of the foregoing examples to argue that artificially intelligent artifacts are now fundamentally “just like us”—or that they ever *will* be or *could* be. (Disputes regarding the latter theoretical possibility have raged for decades around topics such as Turing Machine Functionalism, Kurt Gödel’s discoveries in logic, the Halting Problem, etc.—and if your granddaughter displays much talent for mathematics or philosophy, she shall probably someday argue about them, too.) Actions, however, speak louder than words. A robot who can greet you by name, look you in the eye when you speak to him, and respond intelligibly to what you have said, is an artifact likely soon to be *treated* as a peer—*regardless* of any “ground truth” concerning formal differences between neural activity in your cranium and algorithmic processes in his circuitry. This is not simply a private opinion of the present author; one encounters similar observations repeatedly in the literature of robotics. The following comments by roboticist Hans Moravec are representative:

... we might grant a conscious soul to a robot by interpreting its behavior as expressing the action of such a soul: the more humanlike its interaction with us, the easier the attribution. (76)

So, it may be appropriate to say “God” has granted a soul to a machine when the machine is accepted as a real person by a wide human community. (77)

The ease with which Moravec executes these fascinating “inferences” may even reflect properties of ordinary human psychology that most of us share—properties that seem also to have caught the attention of theologian Philip Hefner. In his compact *Technology and Human Becoming*, Hefner states the kernel of our present point regarding implications of AI and robotics for the religious community with the following brief observations:

[Alan] Turing and his colleagues and their descendants have created a significant mirror of ourselves. What we want and who we are coalesce in this mirror. Whether we think this mirror is adequate or not is another question. (31)

Indeed, creating robots “in our own image” could increasingly become a remarkably simple task if our interactions with these artifacts manage to transform our own image into that of *machines*. The subject of GOOD STAR’s second and third educational experiments is one that *deserves* (and probably shall receive) growing attention in future religion-and-science dialogue. Moreover, if it does *not* illustrate a type of dialogue that can “cut to the heart of liberal, humanistic education,” it seems difficult to imagine what can.

The DVD that constitutes the medium of our second educational experiment owes much to impressive “rescue” work supervised by OCU faculty member, Joe Magrini. The OCU facility in which our video-conferencing event was conducted is equipped with a Polycom system featuring automated cameras that separately track the presenters and the audience members who ask questions. In addition, Professor Magrini supervised students operating a third camera on which video of the presentations was captured, for later transfer to DVD. Unfortunately, the opening presentation by our guest speaker, Professor Lundy Lewis, bore the brunt of technical difficulties that we encountered with the video conferencing technology. Despite tests of the equipment on the Friday preceding our Monday evening event, introduction of new software over the weekend resulted in a condition, at “show time,” marked by repeated failures of our link with the Phillips Theological Seminary in Tulsa. Each break in the link precipitated sidebar efforts to restore the connection that occasionally became distracting. The lesson learned from this outcome is, of course, no surprising discovery—when you have a system working reasonably adequately before an event, do *not* introduce new software. A subsidiary lesson learned from these difficulties with the video conferencing concerns software “firewalls”; in particular, we discovered cases in which the firewalls protecting the respective schools from various kinds of software infection were responsible for interrupting the video conference communication. We also encountered what are currently believed to be deficiencies in the routers used with transmission via IP protocol, which frequently have degraded both video and audio performance. Movement to dedicated connections supporting T1 data rates has been recommended as a solution to this problem. All of these difficulties notwithstanding, careful “rescue” editing has managed to yield acceptable video of the presenters for our DVD. In addition, material from the speakers’ shared PowerPoint presentation has been edited into the video to produce a DVD offering sharply focused text, as well as suggested readings and discussion questions that enhance its utility as an educational package.

Experiment Three

The DE course that comprises our third educational experiment essentially speaks to the same *subject*—implications of AI and robotics for the religious community—as GOOD STAR’s DVD-based educational package. Inasmuch as the importance of this subject has already been addressed, it is more properly the opportunities and challenges of the DE *medium*, in the context of potentially global networking, that remain to be considered at this point.

At first blush, it should seem that the DE medium presents golden opportunities for religion-and-science dialogue *on a global scale*. Start-up costs for participation should be more widely affordable, for example—after all, personal computers are generally less expensive than classroom buildings and laboratories. Again, an online teacher based in the state of Missouri, USA, observes “The successful online classroom uses collaborative learning processes and outcomes” (Hollerbach 41). This much certainly sounds compatible with the spirit of religion-and-science dialogue. Moreover, the medium seems immediately to promise increased availability of outstanding teachers. The author of the present paper recalls wondering years ago, as a graduate student, about the travel costs involved in flying Alvin Plantinga regularly from Arizona to South Bend to make possible his Religious Epistemology course at The University of Notre Dame—today, DE might be expected to enable comparable instructional benefits at a fraction of the cost.

Global communication technology, however, can also be a double-edged sword. Zachary Finney, in recent comments assessing DE for the *Phi Kappa Phi Forum* quarterly, observes that “information transmitted by DE has the potential to reach millions of people across the world in a very short time” (42). Citing, then, another author’s essay titled “Distance Ed – The Enemy of Academic Freedom,” Finney immediately adds that “many schools [as a result] now prohibit faculty members from putting controversial material online” (42). The need for patience with DE technology also deserves recognition. We have already confessed our experience of technical difficulties in the process of learning to use video-conferencing technology; Finney suggests that we can expect similar experience with DE. In fact, he cites a study (Perreault *et al.*) claiming “80 percent of DE professors asserted that they had endured technology problems while attempting to teach their classes” (42). On the other hand, of course, one might reasonably ask what percentage of drivers could be said (at least sometimes) to have “endured technology problems” while attempting to drive their automobiles. In fact, it could also be observed that science and religion—a field already characteristically “cutting edge” in its *subject* interests—should hardly be expected to avoid “pushing the envelope” with some cumbersome new technologies as it enlarges its *scope* through a global network.

Conclusion

The three educational experiments associated with our Local Societies Initiative program involve dialogue between science and religion concerning two very important subjects.

Both altruistic love and the creation of artificially intelligent artifacts present questions regarding our own nature and place in the universe that cry out for attention in a healthier educational culture—a culture that has moved beyond tiresomely repetitious conflict between the perspectives of morally responsible agency and nihilistic mechanism. Fortunately, we live at a time in which technology offers opportunities for that healthier culture to emerge and flourish on a global scale.

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