

Entropy and Immortality

Charles Tandy
Fooyin University
Taiwan

Abstract

In part one (of two parts) I show that any purely physical-scientific account of reality must be deficient. Instead, I present a general-ontological framework that should prove fruitful when discussing or resolving philosophic controversies; indeed, I show that the paradigm readily resolves the controversy "Why is there something rather than nothing?"

In part two, now informed by the previously established general ontology, I explore the issue of immortality. The analysis leads me to make this claim: Entropy is a fake. Apparently the physical-scientific resurrection of all dead persons is our ethically-required common-task. Suspended-animation, superfast-rocketry, and seg-communities (Self-sufficient Extra-terrestrial Green-habitat communities, or O'Neill communities) are identified as important first steps.

Keywords: all/everything, biostasis/suspended animation, Nikolai Fedorovich Fedorov, Kurt Gödel, knowledge, mind, Gerard K. O'Neill, ontology, paradigm, time travel

Introduction: Caveat Emptor

Futures studies or futuristic studies (or futuristics) is a multidisciplinary and interdisciplinary enterprise. I myself happen to be both philosopher and futurist. Since most futurists and most readers of this article are not philosophers, I may need to briefly explain my style of presentation. Assertion, inference, and argument – used in a concerted, deliberative, disciplined way – are common tools of philosophers past and present. Accordingly, a philosopher may sound unusually sure of herself for the purpose of professional discourse. In such way two philosophers may seem to be bitter enemies in their published works. But outside the publication world, the two may in fact be the closest of friends.

Philosophers, when reading the works of others, tend to affix a "maybe" before each sentence and append a question mark after each word. This is good advice too when reading the present article! To be sure, I don't claim to have intimate, detailed knowledge of the relationships of the various realms of reality often visualized by us as ultimately one. But on the other hand, my article appears

to contain very few "maybes" and question marks! With this mea culpa in mind, my intent is to produce the following two-part philosophic argument:

In part one I intend to show that any purely physical-scientific account of reality must be deficient. Instead, I present a general-ontological paradigm. There is reason to believe that this paradigm is acceptable to most persons and philosophers. I believe this general-ontological framework should prove fruitful when discussing or resolving philosophic controversies; indeed, I show that the paradigm readily resolves the controversy "Why is there something rather than nothing?"

In part two, now informed by the previously established general ontology, I attempt to explore the controversy or issue of immortality; the focus is on personal immortality. The analysis leads me to make the following claim: Apparently the physical-scientific resurrection of all dead persons is our ethically-required common-task. Suspended-animation, superfast-rocketry, and seg-communities (i.e. O'Neill communities) are identified as important first steps toward the immortality imperative.

Part One

Frank Jackson (1982 & 1986) gave us a thought experiment now philosophic classic. He has us imagine that Mary the super-scientist was born and raised in a black-white room. We can imagine she was educated with the aid of a black-white library of books and a black-white television-computer; we can imagine that her visitors were dressed in black-white armor; etc.

Such a genius was Mary that she gained all physical-scientific knowledge, including complete knowledge of color vision. Jackson entitled his 1986 article "What Mary Didn't Know" to suggest that when Mary finally steps out of the black-white room for the first time (or is presented with a color TV) – she will utter or think "Wow!" despite her awesome scientific knowledge. For the first time she will know the **experience** of color.

Other similar thought experiments may be constructed to make the same point. Indeed, Jackson (1982) also mentions Fred. Fred sees an extra color unknown to normal humans. (A normal-sighted human person might nevertheless comprehend the science involved in Fred's unusual ability or the special sensory abilities of non-human animals, terrestrial or extraterrestrial.) In 1974, Thomas Nagel had asked "What Is It Like to Be a Bat?" Even if we had all physical-scientific knowledge, we still would not know what it is like to perceive something with the bat's sensory system.

Herbert Feigl (1958) had reminded us yet again of "the alleged advantages of knowledge by acquaintance over knowledge by description. We may ask, for example, what does the seeing man know that the congenitally blind man could not know."¹ P. F. Strawson (1985) discussed the mental and the physical by pointing out that human history can be recounted in two different ways.² A physical history might focus on the changing physical position of human bodies or their atoms. But a personal history might explain human action in terms of mentality (e.g. beliefs, desires, or perceptions). Strawson does not see any conflict between the two accounts. Indeed, in 1958 Strawson had written: "What I mean by the concept of a person is the concept of a type of entity such that both predicates ascribing states of consciousness and predicates ascribing corporeal characteristics...are equally applicable to a single individual

of that single type." ³

Mary the super-scientist is a human person; she has a sense of physical reality and of mental reality. In addition, she has a kind of sense of the totality of reality even though she has never seen or experienced the whole or entirety of everything. I will use this account (my account) of what Mary knows to develop one possible ontological paradigm or general ontological cosmology. Both before and after Mary's experience of color, we can say she would make the following distinctions: ⁴

1. Mental-Reality (mentality: consciousness, agency)
2. Physical-Reality (physicality: matter, energy)
3. All-Reality (allness: all that is)

We have also specified that Mary knew all physical-scientific knowledge both before and after her experience of color. But Descartes had attempted to begin developing his ontological paradigm by assuming no such alleged knowledge. We can say with Descartes: I think (in the sense that I am aware that I am thinking), therefore I am (mentality).⁵ Beyond that, as a practical matter it seems almost inevitable that any human person (e.g. Strawson) would posit some paradigm or other that included an external reality of physical entities: "objects" (physical nonmental entities) and "persons" (physical mental entities). (My own "actual mentality" has the agency to posit or believe or imagine "possible paradigms" such as this one, and to feel an imperative to act one way rather than another.)

Thomas Kuhn's (1962) historical analysis of the ongoing development of physical-scientific knowledge called our attention to the fact that sometimes we simply add new knowledge to an existing paradigm, and at other times we invent new paradigms. (Kuhn apparently wanted to limit his use of the term "paradigm" to matters physical-scientific.) Kurt Gödel had previously established that newer and newer systems of mathematical thought encompassing greater and greater insight are never-ending.⁶ I conclude that in the finite temporal world there can be no such thing as absolute and complete knowledge of all of reality. Moreover, I don't see how we could ever know in advance (for all time) that our latest paradigm (no matter how long-lasting and super-sophisticated) would never be superseded.

If Mary had been living for several centuries instead of several decades, she would know that our physical-scientific knowledge changes, sometimes in a revolutionary (new paradigm) way. For example, the Ptolemaic cosmology seemed to work well for a while, then Newtonian cosmology seemed to work better. Today we have Einsteinian cosmology but we now believe it could someday be superseded.

In general, human persons have rather stubbornly over many millennia held on to their "realities" of mentality, physicality, and allness. We find great variations in the details of their paradigms, however. For example, some have said that physicality is a reality of sorts – but is ultimately an illusion in the allness of things. Below I will assume the reality of the three realms without claiming that ultimately reality is an illusion! (On the other hand, I don't claim to have intimate, detailed knowledge of the relationships of the two, three, or more "realms" of "reality" often visualized by us as ultimately a "unity" of one.)

The mental-reality of professional mathematicians seems to tell them that mathematicians are discoverers rather than inventors, that they are dealing with a kind of

separate or discoverable reality as distinguished from "merely human-constructed theorems" alone. $1+1=2$. If there were no mathematical symbols, no human languages, no mathematicians, no persons, indeed no life at all – it is nevertheless the case that $1+1=2$. This is a part (realm or dimension) of all-reality. We human persons stubbornly maintain that $1+1=2$ despite it being falsified often. There are many facts against the hypothesis that $1+1=2$. One raindrop added to another raindrop results in (not two but) one raindrop. One unit of a particular liquid may be added to one unit of another liquid to give us something distinctly less or distinctly more than two units of liquid. (I am also tempted to mention the empirically tested and confirmed speed-of-light related "twins paradox" of Einsteinian theory.) To put it another way, in the words of Charles Hartshorne: "A statement [e.g. $1+1=2$] thus unfalsifiable absolutely is...incapable of being either true or false – unless it is true by necessity. Since it cannot in any significant sense be false, it also cannot merely happen to be true, but can only be necessary – or else nonsensical."⁷ To put it yet another way still, $1+1=2$ is not falsifiable, is not a scientific hypothesis, and is not a merely human-constructed theorem; rather, $1+1=2$ is a necessary part of all-reality.

Accordingly (according to the ontological paradigm just proposed) it is impossible for (at least some part of) all-reality not to exist. The 19th century Russian, Nikolai Fedorovich Fedorov, criticized professional philosophers thusly:⁸ "How unnatural it is to ask, 'Why does that which exists, exist?' and yet how completely natural it is to ask, 'Why do the living die?' " "Our attitude toward history should not be 'objective', i.e., nonparticipating, nor 'subjective', i.e., inwardly sympathetic, but 'projective', i.e., making knowledge 'a project for a better world'." "In man nature herself has become aware of the evil of death, aware of its own imperfection." Fedorov's can-do attitude motivates us to look more closely at the issue of death and immortality in order to gain and use knowledge projectively for world betterment. Our general mentality-physicality-allness paradigm may assist us or Mary or me to projectively look more closely at the issue of mortality and immortality.

Part Two

We may identify several uses of the term **immortality**; here are some examples or possible paradigms:⁹

1. **Einsteinian Immortality.** The world is a time-space whole in which the past (including every human person) will always exist.
2. **Spiritual Immortality.** When my body dies I will nevertheless continue to live; my spirit (as a multi-staged life or career) will continue to have experiences.
3. **Cosmic Immortality.** We came from the eternal cosmos and upon death will return to the cosmic mind.
4. **Physical Immortality.** The pattern of components that constitute my body (e.g. my brain) may be disrupted to the extent that the pattern no longer physically exists; restoration of the pattern to functional physical existence would resurrect me.

We can add additional example paradigms. One may talk of memorial immortality via those who remember you after your death. One may talk of biogenetic immortality

via transmission of one's genes to offspring. Reincarnation immortality comes in many varieties but typically tends to be a variation on spiritual immortality or cosmic immortality or both. Christian immortality comes in many varieties but typically tends to be a variation on spiritual immortality or physical immortality or both. It is logically possible for several (all?) of the paradigms cited to be congruent or true concurrently; nevertheless, perhaps you will not find any of the examples personally appealing or motivating once you have removed from the list those you consider unlikely or infeasible. Let me give you my fallible (subject-to-change) take on the possible paradigms (informed by the ontology established in part one above):

Einsteinian Immortality

Einsteinian Immortality: The world is a time-space whole in which the past (including every human person) will always exist.

I (this writer) first read George Orwell's novel *1984* many years ago (many years before the year 1984). I read the novel because I thought it was science fiction – but found it to be much more. By the end of the dystopia, even Winston Smith has been thoroughly brainwashed. If his boss holds up his hands saying he has twelve fingers, Winston **actually sees** twelve fingers. Winston **clearly remembers** past events – but they are events that never **really** took place. This dramatic ending to the novel engrained in me both a sense of the difficulty of uncovering past truths and a belief in the actual existence of the past. (For a detailed philosophic argument that the past will necessarily always exist, see Catterson, 2003.)

Once I do X instead of Y, X will **always** be the case. Ontologically, it is impossible for the past to be annihilated; the past necessarily forever continues to exist. It is not just a linguistic convention when we sometimes speak of the past as presently existing. On the other hand, it is not immediately obvious to what extent we or future science-technology will ever be able to access such existences we call past. But in principle it does not seem to be altogether impossible; e.g. perhaps our local universe or zoo or region was produced (and is "recorded") by a Quasi-god (Super-person). Moreover, according to Tandy (2007), past-directed time travel-viewing capacity is "likely" in the very-long-run.

If we alter the Einsteinian Immortality paradigm so as to be an ontological (instead of physical-scientific) account of reality, then it seems to me that it must be true. Thus altered, let's call it **Ontological Immortality**; to this extent we can say that the prospect of immortality is not just a desirable desire – but that it has a firm rational basis beyond whatever the current physical-scientific paradigm may happen to be. Accordingly, we ought to desire and seek physical-scientific theories that seem to lead to, or connect with, the ontological immortality account of reality. Current ("Einsteinian") scientific theory here gives the appearance of leaning in the ontologically desirable direction (immortality). Nevertheless, as we seek to advance physical-science, it's worth reminding ourselves that only truth can be the standard of truth! For finite human scientists, generally the path to walk is one of proximate truths, as distinguished from jumping wildly to new conclusions about physical-reality which turn out to be false.

Spiritual Immortality

Spiritual Immortality: When my body dies I will nevertheless continue to live; my spirit (as a multi-staged life or career) will continue to have experiences.

Accepting this view at face value without further alteration or embellishment seems difficult to me. Current experts (scientists in the fields of cosmology and biology) tell us that the developmental order (in our local region or this local universe) was from energy to atoms to life to basic-mentality to human-mentality. The human person seems to be (both) body-and-mind (together) instead of a body (or a body with a mind) or a mind (or a mind with a body). Alternatively, one may be able to combine two or more other views of immortality to arrive at results roughly simulating this view.

Cosmic Immortality

Cosmic Immortality: We came from the eternal cosmos and upon death will return to the cosmic mind.

Although I can see possible merit in this view, I'm not sure I am motivated to strongly defend it. My interest is not just in the immortality of all-reality (a necessary truth) or of cosmic mind but of my own personal immortality and the immortality of all persons. My attitude is that all-reality or that cosmic mind wants me, or should want me, to be interested in the immortality of all persons.

Physical Immortality

Physical Immortality: The pattern of components that constitute my body (e.g. my brain) may be disrupted to the extent that the pattern no longer physically exists; restoration of the pattern to functional physical existence would resurrect me.

I am motivated by this view and it seems to be supported by the ontological immortality perspective I advocated above as certainly true. If we combine an ethical interest favoring the immortality of all persons with the ontological immortality paradigm, then we get (or so I think) an ethical or categorical imperative to develop scientific theories, technologies, and techniques for the ultimate purpose (sooner rather than later!) of physically resurrecting all persons no longer alive. Let's call this the **ontoresurrection imperative** (or, alternatively, our **common task**). Jacques Choron notes that:¹⁰ "The main difficulty with personal immortality...is that once the naive position which took deathlessness and survival after death for granted was shattered, immortality had to be proved. All serious discussion of immortality became a search for arguments in its favor." "In order to be a satisfactory solution to the problems arising in connection with the fact of death, immortality must be first a 'personal' immortality, and secondly it must be a 'pleasant' one."

Entropy Is a Fake

Note that the "dismal" theory of thermodynamics in the form of its second law (the so-called "entropy" law) applies to closed systems. But given the context of part

one above, we can now say: Gödel showed us that all-reality is **not** a closed system (see again endnote 6). "The entropy concept," according to Kenneth Boulding, "is an unfortunate one, something like phlogiston (which turned out to be negative oxygen), in the sense that entropy is negative potential. We can generalize the second law in the form of a law of diminishing potential rather than of increasing entropy, stated in the form: If anything happens, it is because there was a potential for it happening, and after it has happened that potential has been used up. This form of stating the law opens up the possibility that potential might be re-created..."¹¹ Again I emphasize that the second law does **not** really say that (all-reality's) potential is finite. Instead, let me suggest that the second law may be related to the arrow of time or to my statement above that "Once I do X instead of Y, X will **always** be the case."

Our Common Task: The Onto-Resurrection Project

Work beginning in the 20th century has laid the foundation for eventual realization of the onto-resurrection imperative. Developments have already taken us to the threshold of what has been called "practical time travel" – or what, loosely speaking, we may call "time travel". Once time travel becomes feasible in the 21st century, then we can proceed to more fully implement our common task of resurrecting **all** persons no longer alive, rather than merely resurrecting **some** persons via current techniques such as CPR. The first steps (beyond CPR) occurred in the 20th century on several fronts, including steps in the direction of suspended-animation, superfast-rocketry, and seg-communities.¹²

Experts tell us that the results of the population explosion (i.e. the size of the human population) will level off sometime in the 21st century (perhaps mid-century). Experts also tell us that current and ongoing industrial-technological activities are dangerously polluting our planet and causing global warming; global warming, in turn, can very easily lead to unprecedented injustices and upheavals in a terror-filled global-village of weapons of mass death and destruction. Presumably we should take global action against global dangers along the lines suggested by Al Gore (2006), Jared Diamond (2005), and other experts; see the Gore-related website about the practical generation of carbon-free electricity: <www.RepowerAmerica.org>; also see the Diamond-related website about "the world as a polder": <www.mindfully.org/Heritage/2003/Civilization-Collapse-EndJun03.htm>. But certainly we can and should engage in additional terrestrial and extraterrestrial activities to prevent doomsday and improve the human condition. If we are not balanced and careful in our actions, myopia can provide us with badly-needed near-term clarity while preventing us from the broader vision required for survival, thrival, and the common task.

Terrestrial Implementation of Our Common Task

Perfection of future-directed time travel in the form of suspended-animation (biostasis) seems feasible in the 21st century.¹³ I believe it even seems feasible to eventually offer it freely to all who want it. Jared Diamond has pointed out that: "If most of the world's 6 billion people today were in cryogenic storage and neither eating, breath-

ing, nor metabolizing, that large population would cause no environmental problems."¹⁴ This might allow them to travel to an improved world in which they would be immortal. Since aging and all other diseases would have been conquered, they might not have to use time travel again unless they had an accident requiring future medical technology.

Extraterrestrial Implementation of Our Common Task

But the onto-resurrection imperative demands more than immortality for those currently alive. In extraterrestrial space we can experiment (e.g. via Einsteinian or Gödelian past-directed time travel-viewing) with immortality for all persons no longer alive. Seg-communities (Self-sufficient Extra-terrestrial Green-habitats, or O'Neill communities – e.g., see O'Neill, 2000) can assist us with our ordinary and terrestrial problems as well as assist us in completion of the onto-resurrection project. Indeed, in Al Gore's account of the global warming of our water planet, his parable of the frog is a central metaphor. Because the frog in the pot of water experiences only a gradual warming, the frog does not jump out. I add: Jumping off the water planet is now historically imperative. Indeed, it seems unwise to put all of our eggs (futures) into one basket (biosphere).

I close with these words from Jacques Choron: "Only pleasant and personal immortality provides what still appears to many as the only effective defense against...death. But it is able to accomplish much more. It appeases the sorrow following the death of a loved one by opening up the possibility of a joyful reunion...It satisfies the sense of justice outraged by the premature deaths of people of great promise and talent, because only this kind of immortality offers the hope of fulfillment in another life. Finally, it offers an answer to the question of the ultimate meaning of life, particularly when death prompts the agonizing query [of Tolstoy], 'What is the purpose of this strife and struggle if, in the end, I shall disappear like a soap bubble?' "¹⁵

Summary

Above it was shown that mental-reality and all-reality are dimensions of reality which are not altogether reducible to any strictly physical-scientific paradigm. A more believable (general-ontological) paradigm was presented. Within this framework, the issue of personal immortality was considered. It was concluded that the immortality project, as a physical-scientific common-task to resurrect all dead persons, is ethically imperative. The imperative includes as first steps the development of suspended-animation, superfast-rocketry, and seg-communities.

Who Mary Is and What Mary Knows

So this is who I am,
and this is all I know.

.....
You are my only.

.....

We don't say goodbye.
We don't say goodbye.
With all my love for you.
And what else may we do?
We don't say goodbye.

– *Immortality* by the Bee Gees

Acknowledgements: I would like to thank Ser-Min Shei and his philosophy department at National Chung Cheng University (Taiwan) for their assistance. I would also like to thank the following for their comments on an earlier draft: Giorgio Baruchello, Ben Best, Tom Buford, Aubrey de Grey, William Grey, John Leslie, J. R. Lucas, Mike Perry, Edgar Swank, and Jim Yount – as well as the anonymous JFS referees. Adapted from Charles Tandy, ed., *Death And Anti-Death, Volume 6* (Ria University Press, 2008).

Correspondence

Charles Tandy
Senior Faculty Research Fellow in Bioethics
Research Center for Medical Humanities
Fooyin University
Taiwan 831
E-mail: tandy@ria.edu
www: segits.com

Notes

1. Feigl (1958), p.431.
2. Strawson (1985), chap. 3.
3. Strawson (1958), p.340.
4. Compare: Penrose (2005), chaps. 1 & 34.
5. Descartes (1637), pt.IV.
6. Gödel (1931); Lucas (2008). J. R. Lucas has kindly suggested these additional references: Bronowski (1965); Bronowski (1966); Nagel (1958); Penrose (1989); Penrose (1990). Also see: Chaitin (1982).
7. Hartshorne (1962), p.88.
8. Quotation one: <http://www.iep.utm.edu/f/fedorov.htm>;
Quotations two and three: "[Section:] 3. On History" at <http://www.quantium.plus.com/venturist/fyodorov.htm>.
9. Compare: Leslie (2007), chap. 4.
10. Choron (1973), p.638. (Both quotations).
11. Boulding (1981), p.10.
12. Time-travel (2009); Seg-communities (2009).
13. Drexler (1986); Perry (2000); Tandy (2007); Time-travel (2009).

14. Diamond (2005), p.494. This may be an exaggeration in that the production of liquid air/nitrogen requires energy; even so, Diamond would appear to be mostly correct here. But it is also conceivable that all or almost all power plants and related technologies will become carbon-neutral or even carbon-extracting; for example, see one of "Al Gore's websites" related to the practical generation of carbon-free electricity: <www.RepowerAmerica.org>. (Whether practical carbon-extraction techniques would or would not require advanced molecular nanotechnology is not immediately obvious to me.)
15. Choron (1973), p.638.

References

- Boulding, Kenneth E. (1981). *Ecodynamics: A new theory of societal evolution*. Beverly Hills, CA: Sage.
- Bronowski, Jacob. (1965). *The identity of man* (pp.78-80). New York: Natural History.
- Bronowski, Jacob. (1966, March). The logic of mind. *American Scientist*, 54(1), 1-14.
- Catterson, Troy T. (2003). Letting the dead bury their own dead: A reply to Palle Yourgrau. In Charles Tandy (Ed.), *Death and anti-death* (Volume 1, pp.413-426). Palo Alto, CA: Ria University Press.
- Chaitin, Gregory J. (1982). Gödel's theorem and information. *International Journal of Theoretical Physics*, 21, 941-954.
- Choron, Jacques. (1973). Death and immortality. In Philip P. Wiener (Ed.), *The dictionary of the history of ideas* (Volume 1, pp.634-646). (1973=vols.1-4; 1974=index vol.). New York: Charles Scribner's Sons. Available at <<http://etext.virginia.edu/DicHist/dict.html>>.
- Descartes, René. (1637). *Discourse on the method*. (Various translations available).
- Diamond, Jared. (2005). *Collapse: How societies choose to fail or succeed*. New York: Viking.
- Drexler, K. Eric. (1986). *Engines of creation*. New York: Anchor/Doubleday.
- Fedorov, Nikolai Fedorovich. (2008). Retrieved December 15, 2008, from <http://www.iep.utm.edu/f/fedorov.htm> & <http://www.quantum.plus.com/venturist/fyodorov.htm>
- Feigl, Herbert. (1958). The 'mental' and the 'physical'. In Herbert Feigl, Michael Scriven, & Grover Maxwell (Eds.), *Minnesota studies in the philosophy of science: Volume II: concepts, theories, and the mind-body problem* (pp.370-497). Minneapolis, MN: University of Minnesota Press. (See especially section "V.c." on pp.431-438).
- Gödel, Kurt. (1931). Über formal Unentscheidbare Sätze der *Principia Mathematica* und verwandter Systeme [Part: I]. *Monatshefte für Mathematik und Physik* (Volume XXXVIII, pp.173-198). (Reprinted with English translation in *Kurt Gödel: Collected Works*, Volume 1, New York: Oxford University Press, 1986, pp.144-195).
- Gore, Al. (2006). *An inconvenient truth: The planetary emergency of global warming and what we can do about it*. Pennsylvania, PA: Rodale. [This is the first book in history produced to offset 100% of the CO₂ emissions generated from production activities with renewable energy; this publication is carbon-neutral.]
- Hartshorne, Charles. (1962). *The logic of perfection*. La Salle, IL: Open Court.

- Jackson, Frank. (1982, April). Epiphenomenal qualia. *Philosophical Quarterly*, XXXII(32), 127-136.
- Jackson, Frank. (1986, May). What Mary didn't know. *Journal of Philosophy*, LXXXIII(83), 291-295.
- Kuhn, Thomas. (1962). *The structure of scientific revolutions*. Chicago: University of Chicago Press. (Second edition enlarged, 1970).
- Leslie, John. (2007). *Immortality defended*. Oxford: Blackwell.
- Lucas, J. R. (2008). "[Section:] Gödelian Arguments" at his <<http://users.ox.ac.uk/~jrlucas/reasreal/reaschp6.pdf>>. This Section is in chapter two of his forthcoming book, *Reason and Reality* (Palo Alto, CA: Ria University Press, 2009).
- Nagel, Ernest, & James R. Newman. (1958). *Gödel's proof* (pp.100-102). London: Routledge. (First edition, 1958; this edition, 2002).
- Nagel, Thomas. (1974, October). What is it like to be a bat? *Philosophical Review*, LXXXIII, 83(4): 435-450.
- O'Neill, Gerard K. (2000). *The high frontier: Human colonies in space* (3rd edition). Burlington, Ontario, Canada: Apogee. Also see: <<http://www.space-frontier.org/HighFrontier/testimonial.html>>.
- Orwell, George. (1949). *1984*. New York: New American Library. (First edition, 1949; this edition, 1961).
- Penrose, Roger. (1989). *The emperor's new mind*. New York: Oxford University Press.
- Penrose, Roger. (1990). Précis. *Journal of Behavioral and Brain Sciences*, 13(4), 643-654.
- Penrose, Roger. (1994). *Shadows of the mind*. New York: Oxford University Press.
- Penrose, Roger. (2005). *The road to reality: A complete guide to the laws of the universe*. New York: Alfred A. Knopf. (First edition, 2004; this edition, 2005).
- Perry, R. Michael. (2000). *Forever for all: Moral philosophy, cryonics, and the scientific prospects for immortality*. Parkland, FL: Universal.
- Seg-communities. (2009). Retrieved February 14, 2009, from <http://www.ria.edu/seg-communities>. [Or see these six websites about seg-communities (Self-sufficient Extra-terrestrial Green-habitats, or O'Neill communities):]
- (1) <http://en.wikipedia.org/wiki/Space_colonization>;
 - (2) <<http://www.nas.nasa.gov/About/Education/SpaceSettlement>>;
 - (3) <<http://www.nss.org/settlement/space/index.html>>;
 - (4) <<http://www.segits.com>>;
 - (5) <<http://www.spaext.com>>; and,
 - (6) <<http://www.ssi.org>>.
- Strawson, Peter F. (1958). Persons. In Herbert Feigl, Michael Scriven, & Grover Maxwell (Eds.), *Minnesota studies in the philosophy of science: Volume II: Concepts, theories, and the mind-body problem* (pp.330-353). Minneapolis, MN: University of Minnesota Press.
- Strawson, Peter F. (1959). *Individuals: An essay in descriptive metaphysics*. London: Routledge. (1959, 1964, 1990).
- Strawson, Peter F. (1985). *Scepticism and naturalism: Some varieties*. New York: Columbia University Press.
- Tandy, Charles. (2007, February). Types of time machines and practical time travel. *Journal of Futures Studies*, 11(3), 79-90.

Time-travel. (2009). <<http://www.ria.edu/time-travel>>. (Retrieved 14 February 2009). [Or see these websites (retrieved 14 February 2009) about (1) time-travel; (2) suspended-animation; and, (3) superfast-rocketry:]
(1) <<http://www.jfs.tku.edu.tw/11-3/A05.pdf>>;
(2) <http://en.wikipedia.org/wiki/Greg_Fahy>; and,
(3) <http://en.wikipedia.org/wiki/Twin_paradox#Resolution_of_the_paradox_in_general_relativity>.