SYNESIS
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Editorial

The Mechanistic Paradox: On the Need for the Reciprocity of Science, Technology, Ethics and Policy

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It is with great pleasure that we inaugurate *Synesis: A Journal of Science Technology, Ethics, and Policy*. The decision to develop and implement this journal arose from a defined need to both explicate current trends and progress in science and technology, and address how such advances give rise to, and are impacted by ethical issues, questions, and their resolutions; in other words, how science and technology and ethics inform, shape and are affected by policy.

The mechanistic paradox

Science and technology do not occur in a social vacuum (1). Frequently social questions drive the impulse for experimentation and innovation, and the knowledge and implements achieved are then employed in various dimensions of the social milieu. One of the major characteristics of the Western scientific paradigm is the need to understand how and why things work before any credibility can be afforded to the fact that they do, indeed, evoke observable outcomes (2). Yet, we confront outcomes and effects without knowing precise mechanisms, and must both acknowledge these, and in many cases act upon, or in response to such outcomes, often with expediency.

However, an understanding of mechanisms allows insight to possible benefits, burdens, problems and risks, and can prevent so-called" tripping hazards"- unforeseen or unregarded consequences that can wreak considerable problems in the future. So, we confront the apparent paradox: the need to both *know* and *act*. We encounter this mechanistic paradox each and every time science and technology are to be used to affect some social change, whether through healthcare, environment, national defense, or public life writ-large.

Ideally, observed effects and outcomes will serve to guide subsequent inquiry, investigation, and experimentation to explore and elucidate underlying mechanisms, and in this way prompt innovation to develop new and improved techniques and technologies. However this is not always the case, and sometimes science and technology must be utilized without a complete understanding of mechanisms and/or effects.

Acknowledging these issues and the paradox they foster is therefore critical to the analyses that precede and inform guidelines and policy decisions, and any such analyses must address the ethical, legal, and social effects of science and technology in research and a variety of potential applications. To be sure, there is moral and legal responsibility to recognize and assess the (positive and negatively valent) trajectories of science and technology in order to evaluate- and predict- potential good, and/or harm. This mandates insight and appreciation of facts, and their relative contingency as science and technology advance. But it is equally important to recognize how science and technology are communicated to, perceived by, and provoke the opinions and reactions of various stakeholder communities.

As potential choices for advancement and use(s) of science and technology multiply, the obligation to understand the relative value of various new tools and methods increases concomitantly, as do the needs for economic and policy support to allow responsible use, as required. I argue that these choices also mandate further evaluation of where and how the needs of the public, and the science and technology communities intersect, and how more finely-grained ethics and policy could 1) elucidate research directions and applications in those areas and ways that can be translated into "best" practices; and 2) enable

just distribution of the technological resources arising from such research.

In the system of scientific advancement, ethical analysis and policy formulation require the temperance encouraged by Aristotle (3). I have claimed, and reiterate here, that imprudent use of any technology- old or new- can be problematic, if not practically and ethically erroneous (4). We should not simply accept (or reject) new(er) or high-tech innovations and approaches because of their novelty, or blindly discard old(er) or low-tech methods because they are, in fact 'not new'. Instead, it may be that we need to abandon an 'either/or' mentality, and adopt a more complementary orientation that favors a 'both/and' construct. Without doubt, this will require the ability to intuit existing economic infrastructure(s) so as to secure the resources necessary for progress, while at the same time, resisting extreme and/or unscrupulous financial incentives. Aristotle noted the wisdom and moral courage required to seek the moral high ground in his observation that "… anyone can take money, but to do (right), to the right extent, at the right time, with the right motive, and in the right way... that is not easy" (5). The articulation of science and technology in research and social utility must be practiced with the dexterity of prudence, and not be manipulated by the invisible, yet forceful hand of the market.

Yet, while we strive for objectivity in the scientific method, we cannot deny that values affect how science and technology are regarded, what science and technologies are subsidized, and the way(s) science and technology are employed. If science is to be genuine- that is, if it is to adhere to a classical definition and *telos* of acquiring information to generate knowledge for definable good(s), then it is essential to discern 1) the nature of such good, 2) for whom, 3) how science and technology can, and should be used to sustain these ends, and 4) how and why misuse could incur potential harm(s).

Information, and the Naturalistic Fallacy

This necessitates acknowledgement that scientific information is iterative and contingent, and thus can be considered as categorical, with distinct classifications of types of information that reflect its source, maturity, and validity (6). As well, it is crucial that various user communities not succumb to the naturalistic fallacy of mistaking 'what is' for 'what ought to be' (7). Scientific information and technologic progress must be viewed realistically, so as to depict the state-of-the-field (i.e.- 'what is'), and the viewpoints of various stakeholders must be appreciated if we are to engage this information toward the ethical formulation of guidelines and policy (i.e.- 'what ought to be'). Therefore, critical discerment of any such process is, by intent, discursive if not dialectical, and requires 1) working familiarity with concepts of information categorization, and 2) ongoing evaluation and analysis. The iterative nature of this process requires that new information and insights must be regularly provided. Multiple perspectives are critical if we are to create a multifaceted lens through which to view, and meaningfully scrutinize the foci, applications, effects and implications of any scientific and/or technologic enterprise.

Indeed, the sheer diversity of these aims and tasks would dicate multi-dimensional analysis. Thus, such a multiperspectival view and the scrutiny it affords are indispensable to inform, direct, and sustain policy to support scientific research, development, testing and evaluation (RDTE), guide its use, and uphold the fiduciary of science to the public. Perhaps this is more important now than ever, given the pace and extent of scientific and technological RDTE, and the breadth of effects and ease of access enabled by the information age and its technologies.

Providing a Forum and Nexus

It is our hope that this journal will provide a forum and nexus for this discourse, and we invite our readership to engage and fortify such discussion through their contribution. Each issue of the journal (winter/spring; summer/fall) will contain a thematic section that is devoted to a specific topic. We welcome suggestions for such themes, and encourage individuals to serve as guest editor to develop the focus, solicit and review manuscripts, and right editorial commentary to frame the contributed works in the contexts of both the journal and the field.

As well, general papers addressing the broad scope of science and technology, ethics and policy, both singularly and in relationship, are accepted throughout the year. Papers can be theoretical, speculative, empirical, or reviews. Additionally, we welcome short commentaries on papers and themes appearing in the journal, in addition to conference, meeting, and workshop reports that summarize, and provide timely overviews of such events.

In sum, the journal seeks to convey and further the reciprocity of science, technology, ethics, and policy.

To quote Albert Einstein:

> "... those who make use of the miracles of science and technology, without understanding more about them... should be ashamed of themselves." "Concern for man... and his fate must always constitute the chief objective of all technological endeavors, in order that the creations of our mind shall be a blessing and not a curse to mankind." (8,9).

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Conflict of interest

None.

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