Promoting Translational Research in Medicine through Deliberation

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Abstract

With the project of drawing upon principles and conceptual tools from argumentation theory to inform the maturing Evidence-Based Medicine (EBM) movement well underway, the time is ripe to consider the potential of deliberation to elucidate research pathways in translational medicine. While many "benchtop-to-bedside" research pathways have been developed in "Type I" translational medicine, vehicles to facilitate "Type II" translation that convert scientific data into clinical and community interventions designed to improve the health of human populations have received less attention. As these latter forms of translational medicine implicate social, political, economic and cultural factors, they require "integrative" research strategies that blend insights from multiple fields of study. This essay considers how argumentation theory's epistemological flexibility, audience attentiveness, and heuristic qualities yield conceptual tools and principles with potential to foster inter-disciplinary exchange, help research teams percolate cogent arguments, and cultivate physician-citizenship, thereby promoting Type II translational medicine.

KEYWORDS: translational research, argumentation, rhetoric, Isocrates, hypothesis-testing, evidence-based medicine, EBM, public health.
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The precarious state of the US health care system has stimulated much reflection on better ways to deliver high-quality, lower-cost care to more people. Medical science, in particular, has been looked to as a potential source of solutions in this regard. Indeed, the nation’s strong medical research infrastructure has an impressive track record of achievement in basic science. But in raw form, scientific data confer little benefit to physicians, patients, and taxpayers. To achieve full practical impact, scientific findings must be converted, consistently and sustainably, into concrete interventions that improve health outcomes.

Seeing a need for improvement in this challenge of converting growth of scientific knowledge into better quality health care, the US medical establishment has developed major initiatives designed to promote evidence-based medicine (EBM) and translational research. Both initiatives feature significant points of intersection with communication scholarship. In the case of EBM, a team of Canadian scholars has launched a significant research program designed to refine the EBM approach using argumentation theory, while leaders in the nascent field of translational research increasingly call for inter-disciplinary research teams pursuing translational medicine to integrate expertise in communication. With the U.S. health care system in a state of flux, the time is ripe for communication scholars to survey the landscape and assess how they might play a productive role in this important conversation.

Evidence-Based Medicine

As "the hard art of soft science," medicine faces a difficult juggling act. Its practitioners are expected to make decisions systematically, yet also adapt judgments to fit local exigencies. For much of human history, the medical profession sought to strike a balance between these twin objectives with a "practice makes perfect" approach. Physicians trained together, with the presumption that through multiple

repetition of joint case management, senior doctors' practical wisdom and clinical insight would transfer to their more junior colleagues. For the most part, this direct instruction model has served medicine well. Yet the development of modern science, especially branches of inquiry directly related to medicine such as biology and chemistry, has prompted calls for "evidence-based" approaches that would bring scientific findings to bear more directly on medical practice.

The incorporation of objective population-based evidence into western clinical care was initially advocated in prominent fashion by Pierre Louis (1787-1872), a Parisian physician who derived clinical insight from systematic patient observations.\(^2\) His pioneering work addressed the benefits and harms of the then standard practice of blood-letting, by examining the features and outcomes of groups of patients.\(^3\) Louis’ “numerical method” attracted numerous followers. Some of his students formed the Society for Medical Observation in Paris, others founded the Statistical Society in London, and another group helped establish the American Statistical society.\(^4\) Yet Louis’ approach remained controversial and did not gain a major foothold in the teaching and practice of medicine.\(^5\)

Public investment in health care research after World War II resulted in a surge in basic science that eventually yielded myriad randomized controlled trials, but still left a gap between evidence and practice. As a result, by the early 1990s, there was a pressing need to understand which potential interventions work, and how well.\(^6\) Stepping into this breach, a group of researchers at McMaster University launched in

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\(^4\) Best and Neuhauser, "Master of the Spirit."

\(^5\) Rangachari, "Old French Wine."

1992 a research program under the banner "evidence-based medicine." Concurrently, a group of British researchers formed the Cochrane Collaboration, "to prepare, maintain and disseminate systematic reviews of the effects of health care interventions." The new field of evidence-based medicine (EBM) gained traction rapidly, restructuring how clinical decision-making is taught and practiced across diverse disciplinary and geographic boundaries.

A recent search of the National Library of Medicine (NLM) database, focusing on “Evidence-Based Medicine” as a subject heading or keyword, shows a total of 35,205 articles meeting those search criteria, with a dramatic rise in published articles in the years between 1990 and 2008 (see Table 1). During this same time period, evidence-based medicine has been widely accepted as an important part of medical education, with educational curricula developed throughout the process of medical training.

The Common Program Requirements for the American College for Graduate Medical Education (ACGME), which governs US residency programs, includes the statement: “residents must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life-long learning.”

[Insert Table 1 about here]

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The McMaster group has worked extensively to promote evidence-based medicine as a key tool for clinical decision-making, by publishing books\textsuperscript{12} and convening workshops on teaching about evidence-based clinical practice.\textsuperscript{13} Because the McMaster approach is considered the standard in a number of teaching hospitals, we draw from it here to briefly describe how EBM may be integrated with clinical practice.\textsuperscript{14}

At the outset, it is important to realize that evidence-based decision-making encompasses three key elements: the best research evidence; clinical expertise; and patient values. Much of the public discussion around EBM has focused on the first of these elements, which comprises a broad array of data spanning basic science research, patient-centered clinical trials, evaluation of diagnostic tests or prognostic markers, and the safety of therapeutic, rehabilitative and preventive regimens. In the EBM approach, these data should be integrated with the clinician’s prior experiences and clinical skills, which allow him/her to identify a patient’s health state, risks and benefits of potential interventions, and personal values. Those values – the unique preferences, concerns and expectations that a patient brings to each clinical encounter – comprise the third key component of an evidence-based clinical decision.

Once a clinical problem is identified, the EBM approach recommends that the clinician use it to develop an answerable clinical question, then track down the best evidence with which to answer that question. Just finding data is insufficient – the clinician should also critically appraise the evidence, assessing its validity, impact, and applicability to the patient in need. The critically appraised evidence is then integrated with the physician’s clinical expertise and the patient’s personal health state, values, and circumstances. Finally the physician should reflect on the process, and consider possible ways to improve it the next time a similar question arises.

\textsuperscript{12} Sackett, Evidence-Based Medicine.
\textsuperscript{13} McMaster University, "How to Teach Evidence-Based Clinical Practice Workshop," http://ebm.mcmaster.ca/. Accessed May 24, 2009.
\textsuperscript{14} The following description of EBM is condensed from Sackett’s Evidence-Based Medicine, the authoritative source on this issue.
An important aspect of EBM is the recommendation that clinicians formally consider the quality of the evidence that they are incorporating into their decision-making process. Clinicians are asked to evaluate both the type of evidence (based on study design) and the methods used to carry out the specific study. Once relevant data are sorted by type, clinicians use the EBM hierarchy of evidence as a key to assign relative weights to the various types of data (see Figure 1). For example, for therapeutic studies, expert opinion and background information on a topic are considered the lowest quality of evidence. Next are case reports regarding a single patient, then stronger observational study designs, and in the more preferred category, randomized controlled trials (so placed as the randomization step is designed to remove potential areas of bias). Finally, systematic reviews or meta-analyses assessing the entire literature on a clinical topic are considered optimal in the choice of clinical evidence, and thus appear at the top of the EBM evidence hierarchy.

It is essential to note that study type is not the only feature involved in the assessment of evidence quality in EBM – clinicians are also asked to evaluate the specific features of an individual study (e.g., its internal validity), as well as assess the degree to which it applies to their patient (e.g., its external validity). Furthermore, the appropriate study design differs with the type of clinical question. For example, if the clinician faces a question on diagnosis and screening, the preferred evidence is drawn from cross-sectional studies comparing a new test with the best-established prior testing approach.

[Insert Figure 1 about here]

Argument-Based Medicine

The integration of EBM into clinical practice during the 1990s prompted substantial discussion in medical circles and beyond, much of it concerning what Canadian sociologist Harley Dickinson calls the "EBM paradox."\(^{15}\) According to

Dickinson, this paradox arises from a tension between two key tenets of EBM: 1) The normative privileging of RCTs and systematic reviews as evidence gold standards; 2) The principle that a physician’s clinical expertise serves as the ultimate authority for deciding whether and how practice guidelines should be applied to match an individual patient's clinical state. If, as Dickinson reasons, "information derived from RCTs and systematic reviews of RCTs is the 'gold standard' for making decisions about therapy then it is paradoxical to also maintain that such data must always be subordinated to clinical expertise in clinical treatment decisions."\(^{16}\)

Resolution of this paradox demands theoretical finesse, an account of the clinical decision-making process that acknowledges the salience both of scientific evidence and clinical expertise, as well as heuristics for determining how these inputs fit together, especially in applied contexts where they appear to be in tension. In a bid to develop such heuristics, Dickinson turns to argumentation theory, drawing from the work of British philosopher Stephen Toulmin, Canadian argumentation scholar Douglas Walton and German critical theorist Jürgen Habermas. Noting that key aspects of clinical decision-making mirror the types of reasoning prominent in argumentative "informal logic," Dickinson sees opportunities here to answer some of EBM's detractors by drawing from argumentation theory.

In particular, Dickinson suggests that Toulmin's structural model of argument provides valuable heuristic resources for theorists and practitioners seeking useful answers to the EBM paradox. Formal logic has only limited utility in this regard, because diagnostic decision-making tends not conform to the hypothetico-deductive or nomological-deductive models of reasoning.\(^{17}\) However, by charting the clinical decision-making process in terms of Toulmin's data-warrant-claim structure,\(^{18}\) it becomes possible to distinguish and identify "warrant-using" data (clinical

\(^{16}\) Dickinson, "Evidence-Based Decision-Making," 73.


examinations, interviews and diagnostic tests) from "warrant-establishing" data (systematic research into therapeutic efficacy of standard medical treatments).

In Toulmin's theory, the relative soundness of arguments can be assessed by determining on what basis their warrants link supporting data to overarching claims. When applied to clinical decision-making, Dickinson says this insight yields purchase on the EBM paradox, by providing for practitioners heuristics that facilitate sound abductive reasoning.

Around the time that Dickinson's article appeared, other conversations were taking place in Canada that would eventually strengthen EBM's link with argumentation theory. One particularly consequential, cross-disciplinary connection occurred at McMaster University in Hamilton, Ontario—the widely recognized site of EBM's North American birthplace and location where McMaster professors Milos Jenicek and David Hitchcock developed a collaborative research program. In a 2005 textbook, Evidence-Based Practice: Logic and Critical Thinking in Medicine (published by the American Medical Association), Jenicek, professor of clinical epidemiology and biostatistics, and Hitchcock, professor of philosophy, developed a full-blown treatment of EBM as an argumentative process.

Two introductory statements punctuate Evidence-Based Practice's interdisciplinary character. In a "physician's foreword," Harvard professor of ambulatory care Suzanne Fletcher says that with publication of the text, "clinicians, as well as medical researchers and health planners, can understand better the worlds of 'critical thinking' and 'evidence-based medicine' and how they relate to classic philosophical thought." In a "philosopher's foreword," renowned informal logician Robert Ennis applauds Jenicek and Hitchcock for their "pioneering detailed work," singling it out as one of a few rare works that pursue "explicit application" of critical thinking "in a field of study or practice."

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19 Dickinson, "Evidence-Based Decision-Making," 78.
20 Milos Jenicek and David L. Hitchcock, Evidence-Based Practice: Logic and Critical Thinking in Medicine (Chicago: AMA Press, 2005).
21 Suzanne W. Fletcher, "Physician's Foreword," in Evidence-Based Practice, xv.
22 Robert H. Ennis, "Philosopher's Foreword," in Evidence-Based Practice, xiii.
The emphasis on critical thinking in *Evidence-Based Practice* reflects the mark of the Canadian school of argumentation scholarship, of which Hitchcock is a prominent member.\(^{23}\) Canadian informal logicians incorporate the pedagogical concept of critical thinking to elucidate how students and critics can operationalize Toulmin’s essential insights about argument as an exercise in moving from data to claims using warrants. *Evidence-Based Practice* catalogs numerous instances where modes of medical practice, such as doctor-patient communication and the rendering of expert courtroom testimony, match up with patterns of reasoning in informal logic. For each of these instances, Jenicek and Hitchcock explicate how concepts and terms from their respective fields overlap, then use these points of overlap to generate critical thinking heuristics adapted specifically to the medical context.

For instance, Jenicek and Hitchcock point out that medical diagnoses and treatment decisions involve distinct types of human reasoning. A diagnosis begins with "premises," such as "the results of a clinical examination" and leads to a "conclusion that the patient does or does not have the disease under consideration." Likewise, "the conclusion of the diagnostic process becomes a premise leading to the conclusion that the patient should or should not be treated, and by which therapeutic maneuver, such as drugs, surgery, support and so on."\(^{24}\) Since this pattern of reasoning closely resembles a categorical syllogism, Jenicek and Hitchcock propose that it can be profitably understood, practiced, and taught using theoretical concepts such as the Toulmin model of argument.

Given the strong tradition in Canadian informal logic scholarship of analyzing argumentation by focusing on fallacies, or errors in reasoning, it is not surprising that *Evidence-Based Practice* highlights how physicians attempting to execute the principles of EBM can make mistakes in reasoning. For example, Jenicek and Hitchcock warn against the *post hoc* fallacy (or fallacy of false cause) in diagnostic contexts (e.g.


\(^{24}\) Jenicek and Hitchcock, *Evidence-Based Practice*, 196.
"an embolism was caused by a transoceanic flight, because the victim was well on boarding the plane"). They also point out how the ad ignorantiam fallacy (some statement must be true because there is no evidence to disprove it) can produce medical treatment errors (e.g. regarding untested alternative medicines, "nobody has proved they do not work, so they must!"). In Evidence-Based Practice, Jenicek and Hitchcock frame their preliminary work in this area by observing, "a more complete compilation of a numerically open-ended list of fallacies in medical reasoning must still be worked up," a task that Jenicek would pursue in his next major monograph.

In 2008, Jenicek published the sole-authored, Fallacy-Free Reasoning in Medicine: Improving Communication and Decision Making in Research and Practice. Once again, this book used the Toulmin model of argument as a starting point for explaining medical reasoning from the vantage point of informal logic. But rather than isolating argumentative errors by relying exclusively on the catalog of classical Aristotelian fallacies (the so-called "standard model"), Jenicek theorized a smorgasbord of fallacies with clever names never before featured prominently in argumentation literature. For example, the "three men make a tiger" fallacy occurs "if an unfounded premise is mentioned and repeated by many individuals, the premise will be erroneously accepted as the truth." Jenicek draws the name for this fallacy not from ancient Greek and Latin (as in the standard model), but from a Chinese proverb about reports of a loose tiger circulating in King Wei’s capital city. According to the legend, King Wei remains skeptical of the first two reports about the loose tiger. But when a third civilian echoes the same report, the king changes his mind (erroneously, as it turns out). Jenicek sees parallel mistakes in medical reasoning, such as: "So many different authors recommend the benefits of repeated enemas that you should

25 Jenicek and Hitchcock, Evidence-Based Practice, 55.
26 Jenicek and Hitchcock, Evidence-Based Practice, 245.
27 Jenicek and Hitchcock, Evidence-Based Practice, 56.
29 On the "standard model" of argumentative fallacies, see C.L. Hamblin, Fallacies (London, Meuthen, 1970).
consider this procedure too." For Jenicek, such a breakdown in critical thinking entails "any uncritical and nonsystematic review of the literature or other information proclaimed as truth because of its repetition and its indiscriminate uses." Jenicek elaborates a whole menu of related, colorfully named fallacies in this vein, such as the "if-by-whiskey" fallacy, the "slothful induction" fallacy, and the "vague numberism" fallacy.

In introductory comments, Jenicek's shares a hope is that his monograph will contribute to "reducing errors in medicine" by promoting "fallacy-free clinical and community medicine reasoning and decision making in medical care and health care policy settings." This aim coincides with core tenets of EBM, since "even the best evidence in the world of evidence-based medicine may be wasted in fallacious argumentation."

Jenicek underscores this point by coining a new term (with help from internist G. Altbbaa), "argument-based medicine," to describe an approach to EBM made possible by integration of argumentation theory into modes of medical reasoning. According to Jenicek, argument-based medicine is the research and practice of

30 Jenicek, Fallacy-Free Reasoning in Medicine, 124.
31 Jenicek, Fallacy-Free Reasoning in Medicine, 124.
32 If-by-whiskey fallacy: "Presentation of an issue in such a way that the recipient of the message can agree with both sides of the issue. This type of opinion presentation was originally used to reflect upon whether the legalization of whiskey consumption might be considered during the Prohibition years in the United States." Medical counterpart: "If we consider morphine as an addictive substance leading to dependency, financial and social disruption of life, toxicity, and overdosing, we must ban it from use. If we find its use important as an analgesic of special interest in the treatment of myocardial infarction, pulmonary edema, dyspnea, and other problems in end-of-life care, we must support its availability and use" (Jenicek, Fallacy-Free Reasoning in Medicine, 58).
33 Slothful induction fallacy: "The proper conclusion is denied despite evidence to the contrary." Medical counterpart: "The patient we have just seen for his fifth work accident and ensuing injuries insists that this is just a coincidence (company's fault, his health, and so forth) and not his fault" (Jenicek, Fallacy-Free Reasoning in Medicine, 101).
34 Vague numberism fallacy: "Offering vague and often meaningless and exaggerating quantifications instead of real data." Medical counterpart: "A representative of a pharmaceutical company visiting a hospital says, 'We have worked on the development of this new drug for a number of years. We also assigned an unusual number of researchers to this project. The result, the new drug I am bringing to your attention today, is important for a number of reasons'" (Jenicek, Fallacy-Free Reasoning in Medicine, 103).
35 Jenicek, Fallacy-Free Reasoning in Medicine, x, xix.
36 Jenicek, Fallacy-Free Reasoning in Medicine, 105.
medicine in which understanding and decisions in patient and population care are supported by and based on flawless arguments using the best research and practice evidence and experience as argumentation building blocks in a structured, fallacy-free manner of argumentation.”

Anecdotal evidence suggests that Jenicek’s index of new fallacies represents a real advance in critical thinking pedagogy. Undergraduate students at the University of Pittsburgh studying argument responded with great enthusiasm when presented with some of Jenicek’s playfully named fallacies. They retained more information about the errors in reasoning underlying each fallacy, and were able to apply such theoretical insight more readily to practical arguments. Whether argument-based medicine can deliver on its promise to improve health outcomes in the medical context hinges on several factors, including whether medical professionals exhibit a similar degree of enthusiasm for learning fallacies, whether "fallacy free" reasoning actually reduces harmful medical errors, and the extent to which reduction in medical errors results in better overall quality care.

The previous two sections elucidated the origins and dynamics of EBM, and detailed how argumentation theory has been deployed in an effort to refine the EBM approach. On their own, these developments should pique the interest of argumentation scholars, as EBM has quickly emerged as a dominant paradigm for medical decision-making in under two decades. The fact that two book-length studies blending EBM and argumentation have been published in the past four years speaks to the theoretical fecundity of argumentation as a research program with strong potential for trans-disciplinary cross-fertilization. Might there be additional opportunities for similar sorts of collaboration in this research area? In looking for possibilities, the emergent program of "translational research" in medicine is a good place to start.

Translational Research

While evidence-based medicine made strides toward closing the gap between basic science research and clinical practice, the considerable depth of that gap became

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37 Jenicek, Fallacy-Free Reasoning in Medicine, 141.
apparent throughout the 1990s. In 2003, the National Institutes of Health announced its Roadmap Initiative, with a goal of “defin[ing] a compelling, limited set of priorities that can be acted on and are essential to accelerate progress across the spectrum of the institute missions.”38 The Roadmap includes three themes:

(1) New Pathways to Discovery, addressing the need to understand complex biological systems;
(2) Research Teams of the Future, recognizing the need for researchers to move beyond their individual disciplines and explore new organizational models for team science; and
(3) Reengineering the Clinical Research Enterprise, focusing on recasting the entire system of US clinical research.

As a part of this third theme, the NIH made the relatively new field of translational research a priority, allocating resources to promote training and develop a support structure for the field. The field of "translational medicine" focuses on the task of converting basic scientific data into practical applications that improve human health in applied settings.39

The NIH defines translational research by isolating two conveyor belts designed to bring basic science to applied contexts: “One is the process of applying discoveries generated during research in the laboratory, and in preclinical studies, to the development of trials and studies in humans. The second area of translation concerns research aimed at enhancing the adoption of best practices in the community. Cost-effectiveness of prevention and treatment strategies is also an important part of translational science.”40

The Institute of Medicine has described two “translational blocks” in the clinical research enterprise, which align with the two areas of translation (Type 1 or "T1," and Type 2 or "T2") described in the NIH definition. The first of these blocks (T1) hinders

the transfer of new understandings of disease mechanisms gained in the laboratory into the development of new methods for diagnosis, therapy and prevention and their first testing in humans. The second (T2), blocks the translation of results from clinical studies into everyday clinical practice and health decision making. Dr. Stephen Woolf of Virginia Commonwealth University argues that while the second block has been historically overlooked it is actually of critical importance. For example, most drugs and interventions produced by T1 research only marginally improve treatment efficacy. Furthermore, patients may benefit more (and more patients may benefit) if the health care system performed better in delivering existing treatments than in producing new ones. In addition, he points out that adequate investment in T2 is vital to fully salvage investments in T1 research.

Of note, T2 translation – which aligns closely with evidence-based medicine – includes both translation of knowledge into patient care (e.g., creating patient-specific evidence of clinical effectiveness, comparative effectiveness of different treatments, and the development of practice guidelines), as well as strategies to address more distal questions (e.g., how to reliably deliver evidence-based care to all patients in diverse health-care settings, in order to improve the health of both individuals and populations). Particularly in the area of obesity and diabetes prevention, the distal end of translation has increasingly focused on improving the health of the population, rather than specifically addressing individuals (patients) in contact with the healthcare system.

While many "benchtop-to-bedside" research pathways have been developed in T1 translational medicine designed to, for example, bring drugs to market following advances in basic science, vehicles to facilitate T2 translation that convert scientific data into clinical and community interventions designed to improve the health of

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\[\text{42 Woolf, "Meaning of Translational Research."}\]

\[\text{43 D. G. Marrero, "Translating the Diabetes Prevention Program," in From Clinical Trials to Community: The Science of Translating Diabetes and Obesity Research (Bethesda, MD: National Institutes of Health and Centers for Disease Control and Prevention, 2004), 49-52.}\]
human populations have received less attention.\textsuperscript{44} As these forms of translational medicine implicate social, political, economic and cultural factors, they require "integrative" research strategies that use cross-disciplinary communication to blend insights from multiple fields of study.\textsuperscript{45}

In this area of research, the centrifugal forces of professional specialization and horizontal knowledge diffusion scatter the pool upon which scholars and practitioners draw data. Simultaneously, centripetal forces oblige these same scholars and practitioners to synthesize vast sums of diverse information and render coherent arguments on complex and multifaceted issues. The task is different in kind from sheer information processing; it demands forms of communicative dexterity that enable translation of ideas across differences and facilitate co-operative work by interlocutors from heterogeneous backgrounds. Punctuating this point, "[Former NIH Director Elias Zerhouni] acknowledges that there is no 'right' model for translational research, but he is confident that the NIH will learn about the best ones by giving the CTSCs [Clinical and Translational Science Centers] the freedom to explore a diversity of approaches."

\textsuperscript{46} The communication challenges in play here may help account for the fact that scholars advocating for a translational research agenda insist that "communication theory" inform efforts to implement the agenda.\textsuperscript{47}

The challenge of using communication to deal with tensions borne from the push and pull of countervailing centrifugal and centripetal epistemologies has ancient roots. As John Poulakos points out, "older" Sophists such as Protagoras taught Greek students the value of dissoi logoi, or pulling apart complex questions by debating two sides of an issue.\textsuperscript{48} The few surviving fragments of Protagoras' work suggest that his

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\textsuperscript{47} Woolf, "Meaning of Translational Research," 211-213.
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notion of dissoi logoi stood for the principle that "two accounts [logoi] are present about every 'thing,' opposed to each other;" and further, that humans could "measure" the relative soundness of knowledge claims by engaging in give-and-take where parties would make the "weaker argument stronger" to activate the generative aspect of rhetorical practice, a key element of the sophistical tradition. One important wrinkle in this comparison, however, is the fact that while Protagoras' dissoi logoi was dyadic in nature (two arguments opposing each other), manifold T2 translation projects tend to feature many-sided arguments—hence our adapted neologism polloi logoi.

In the following generation, Isocrates would complement Protagoras' centrifugal push with the pull of synérchesthé, a centripetal exercise of "coming together deliberatively" to listen, respond, and form common social bonds. Fourth-century B.C. Athens was a society in tumultuous transition. Early in the century, democratic reforms and widespread citizen training in public speaking infused the political realm with new actors, opening up channels of participation and transforming governmental institutions. But as the century wore on, this centrifugal wave of populism, swelling amid deteriorating economic conditions, threatened to overwhelm the Athenian polity. It was against this cultural backdrop that Isocrates opened the west's first professional school. The school's curriculum reflected the strong influence of Protagorean dissoi logoi, but Isocrates embedded argumentation within synérchesthé ("coming together deliberatively"), a broader concept that he used flexibly to express interlocking senses of 1) inquiry, as in groups convening to search for answers to common questions through discussion; 2) deliberation, with interlocutors

50 Schiappa, Protagoras and Logos, 117-133.
51 Schiappa, Protagoras and Logos, 103-116.
52 We are indebted to John Poulakos for this formulation.
gathering in a political setting to deliberate about proposed courses of action; and 3) alliance formation, a form of collective action typical at festivals, or in the exchange of pledges that deepen social ties. Isocrates contrasted his paideia with the approach of earlier Sophists, who taught eloquence as a neutral skill to be used for whatever ends students saw fit. Instead, Isocrates highlighted the centripetal qualities of synérchesthé as an educational antidote to the increasingly selfish and fractious nature of Athenian politics. His aim was to produce citizens and leaders with broad-based knowledge of human affairs, along with the political vision and communicative ability to express that knowledge for the greater good of the polis. In short, Isocrates taught and practiced the art of using deliberation as a kind of translation medium, capable of engendering mutual understanding by bringing people and ideas together through cooperative argument.

While the Canadian school of argumentation studies has a philosophical lineage, the older American tradition in argumentation draws nourishment from the taproot of forensics, specifically the applied activity of intercollegiate debating. In this respect, it is not surprising to see sophistic principles such as dissoi logoi and synérchesthé manifest prominently in the work of contemporary American argumentation theorists like David Zarefsky and Charles Willard. Consider, for example, Zarefsky’s notion of argumentation as "hypothesis testing," a view that sees argumentation as a "communication process in which people make, attack, and defend claims in order to


gain the assent of others or to justify their own beliefs and acts.\textsuperscript{60} During the 1970s and 1980s, the heyday of intercollegiate debate's "paradigm wars," hypothesis testing had its share of adherents, some in the judging ranks who applied the paradigm as a tool for adjudication of individual contest rounds, and others in the debating ranks, who used the paradigm to justify certain argumentative strategies (e.g. multiple, conditional and contradictory negative counterplans).

Lost in this process of reduction was Zarefsky's vision of academic debate as a vehicle to transport the theory and practice of argumentation to wider society.\textsuperscript{61} Hypothesis testing, in this wider frame, was a construct for establishing the gravitas and authority of forensics specialists in conversations about the nature of argumentation beyond the contest round setting. Here, Zarefsky's analogy linking debate to scientific hypothesis testing was not designed to show how debate itself was a scientific process, but rather to alert external audiences to the fact that academic debate, while deviating significantly from established patterns of scientific inquiry, features its own set of rigorous procedures for the testing of argumentative hypothesis. In published scholarship and in administrative leadership roles, Zarefsky continues to urge forensics specialists to contribute their wealth of experience in designing, executing, and studying debates to projects beyond the competitive tournament grid that require expertise in the art of deliberative design. Translational medicine represents precisely such an endeavor, as key leaders in the field have called for mobilization of multi-disciplinary research teams to surmount the


scientific, political, and communicative challenges involved in translating the findings of basic science into improved community health outcomes. Zarefsky's insight that the American, practice-oriented tradition of forensics constitutes a rich storehouse of practical knowledge regarding interaction of argument "fields" carries particular relevance here, since a key aspect of the T2 translation project entails facilitating communication and understanding across disparate fields of study, as well as between expert and lay communities.

Translational Deliberation

It may be a stretch for those jaded by decades of verbal pyrotechnics commonly found in Crossfire-style political theater to grasp the notion that multi-sided argument can facilitate mutual learning across epistemological chasms. Since this is the load-bearing premise supporting Charles Willard's notion of "epistemics," at this point it may be useful to revisit his rationale for constructive argument as a bridging exercise. Here, it is important to stipulate that Willard's sense of argument stands in contrast to the vernacular notion of argument as mere quarreling or verbal jousting (what Isocrates called "wordy wrangling" and Jenicek terms "pimping"). Rather, Willard views argumentation as a "unique discourse event" that unfolds in the context of a "social relationship" between two or more people "sorting out what they construe to be incompatible positions." As arguments develop, "they display epistemic structure more vividly than normal discourse, for they bring to the surface assumptions that would ordinarily remain submerged." This is because "argument etiquette permits challenges and demands for clarification and support, and these in turn yield more explicitness."


As a structured "method" of inquiry, argument drives constructive interchange through a mechanism that Protagoras identified as crucial to dissoi logoi—that both sides of an argument be taken into account. This element contains a call to listen, to step outside one's settled perspective in an attempt to apprehend unfamiliar points of view. Argument generates "practice in making reflective judgments" while it "develops and disciplines the critical faculties," thereby developing agency in respect to making better decisions and communication "choices in the future." One significant outcome of this recursive process is that the cycling aspect of argument stimulates interlocutors to reflect upon, and innovate in their language usage, "by virtue of their claims being articulated outside the confines of their original disciplinary discourses." Building on Willard's theory, Steve Fuller suggests that joint enactment of this process orients academic scholars to the challenge of interdisciplinary translation by "spawning" so-called pidgin languages, "which reinforced and extended over time could develop into an interdisciplinary lingua franca."

Certainly, this type of integrative scientific research has impressive historical precedents. For instance, physicist Erwin Schrödinger and biologist Theodosius Dobzhansky deployed inventive rhetorical devices and strategies to forge conceptual bridges connecting multiple scholarly audiences. Dobzhansky's clever use of topographical maps to visually depict mathematical population genetics helped biologists and geneticists reach common understandings that eventually yielded the "modern synthesis" of evolutionary biology. In a similar fashion, Schrödinger deployed "polysemy," a rhetorical strategy of designing texts to be read in multiple ways by


different audiences, to inspire creative conversations between physicists and biologists that ultimately gave rise to the hybrid field of molecular biology.\textsuperscript{68}

Yet where rhetorical critic Leah Ceccarelli finds in this genre of "inspirational interdisciplinarity" a recurrent feature that such prose is issued by scholarly giants with transcendent personas, today’s translational medicine movement calls for institutionalization of translational research as a routine form of professional activity. Willard’s point that "differences among individuals and discourses put a premium on translation"\textsuperscript{69} highlights how the term "translational medicine" here carries double meaning. Its metaphoric dimension describes the process of moving basic science down the conveyor belt to applied settings. But since this process requires integrative, cross-disciplinary collaboration, the enterprise necessarily also entails translation in the literal sense, the invention of shared languages capable of bridging disparate epistemic communities. The contributions of American argumentation scholars such as Willard and Zarefsky indicate that deliberative argumentation ("synérchesthé" and "polloi logos" in the adapted sophistical lexicon) has potential to serve as a valuable translation vehicle for this task.

Deliberation and Argument Cogency

The previous section explored how contemporary forms of polloi logos can facilitate translational communication between distinct fields of scholarly inquiry. What about translation across the expert-public boundary? One important finding from philosopher William Rehg’s new book, \textit{Cogent Science in Context}, is that these two translation challenges can be viewed as two sides of the same coin. Rehg elucidates this connection by reconstructing the notion of argument "cogency," especially as it relates to the evidentiary dimension of argumentative practice. He begins by noting that cogency is a promising "boundary concept," by virtue of the fact that it has a commonly accepted general meaning (roughly synonymous with the


\textsuperscript{69}Willard, \textit{Liberalism and the Problem of Knowledge}, 309.
"strength or convincing quality of arguments"), and also possesses "the breadth and flexibility to cover a large territory of approaches to argument evaluation." Rehg then proceeds to develop a tiered model of argument cogency that explains how scientific arguments exhibit merit at the three levels:

- **Content merit**: The degree to which the structure of an argument adheres to domain-specific topical and logical requirements (at a minimum having a premise and a conclusion).
- **Transactional merit**: The quality of dialogic exchange between parties conducting an argument (especially when the argument spans disciplinary boundaries).
- **Public merit**: The ability of the argument to appeal to a wider reasonable public that finds it relevant, thought-provoking, or convincing.

Applied to T2 translational research, Rehg’s theory of cogency calls attention to the relationships between an argument's content, transactional and public merits. These nuances that are especially well suited to account for a key dynamic noted by Fuller, that when scientists from different fields gain opportunities for constructive inter-field argumentation,

Once provided with an incentive to interrogate each other's claims, the scientists themselves would be in a position to intensify the investigation, stripping away gratuitous jargon, overstatement and all-around obfuscation that might otherwise mystify non-experts. Thus, what originally appeared to be the incommensurable knowledge products of two disciplines—such as the theoretical benefits of a branch of physics and the practical benefits of a branch of biology—would be rendered comparable … Were disciplinary communities made to be routinely accountable to each other, then much of the aura of expertise

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and esoteric knowledge that continues to keep the public at a respectful distance from scientists would be removed.\textsuperscript{72}

Rehg’s theory of argument cogency thus provides one avenue for moving beyond the unidirectional, siloed model for translation, where a single expert field reaches out to an audience of citizens/policy-makers (see Figure 2).

\textit{[Insert Figure 2 about here]}

In contrast to this unidirectional model, the interdisciplinary transactions that facilitate translational research generate language that not only enables the sort of integrative research in the expert realm. Such "pidgin language," thanks to its "fungibility," has potential to bridge understanding between expert and lay audiences, as well (see Figure 3).\textsuperscript{73}

\textit{[Insert Figure 3 about here]}

The curious case of aspirin helps concretize Rehg’s concept of how deliberation in translational research can possibly generate cogent arguments with public merit. Gold-standard data establish that use of aspirin by patients who have previously experienced a stroke helps prevent recurrent strokes.\textsuperscript{74} Yet one study finds that this simple, inexpensive therapy is given only to 58\% of eligible patients.\textsuperscript{75} This gap between evidence and practice reflects the presence of complex T2 translational blocks that account for why a health care system is unable to realize substantial health care gains when compelling science clearly shows the way for just under 5 cents a

\textsuperscript{72} Fuller, \textit{Governance of Science}, 142.

\textsuperscript{73} This dynamic brings to mind Isocrates’ dictum, "the same arguments which we use in persuading others when we speak in public, we employ also when we deliberate in our own thoughts" (Nicocles, 8).

\textsuperscript{74} Aspirin can reduce stroke recurrence by as much as 23\%; "Collaborative Meta-analysis of Randomised Trials of Antiplatelet Therapy for Prevention of Death, Myocardial Infarction, and Stroke in High Risk Patients," \textit{British Medical Journal}, 324 (2002): 71-86.

According to Stephen Woolf and Robert Johnson, overcoming these barriers requires more than just publication of clinical guidelines recommending aspirin prescriptions for stroke patients. Rather, Woolf and Johnson hold that surmounting such translational blockages requires macro-level approaches to enhance communicative cooperation and facilitate information flows between health care professionals and civic partners (paralleling the "alliance formation" function of Isocratic synérchesthē).77

Woolf and Johnson’s analysis points to the potential value of deliberative argument as a tool to facilitate translational strategies. In the aspirin case, one might imagine an interdisciplinary research team engaging in structured debate over the relative merits of competing approaches to overcome T2 translation blocks. To the extent that the team’s polloi logoi would exhibit what Rehg calls strong "transactional merit" (interlocutors argue cooperatively, take risks, and air suppressed premises), the exercise would be primed to percolate cogent arguments with public merit. According to Rehg’s theory, these cogent arguments would have potential to persuasively frame stroke prevention through aspirin treatment as a pressing and realistically achievable objective for wide audiences. As Willard puts it, "each stage of translation from esoteric to exoteric requires new simplifications and metaphors."78 Notably, this invention challenge differs in emphasis from the "fallacy-free" program of argument-based medicine outlined by Jenicek, where the focus lies on avoiding errors in reasoning, rather than production of cogent arguments to facilitate T2 translation.79
Deliberation and Physician-Citizenship

Woolf and Johnson’s blueprint for overcoming T2 translation blocks asks physicians to engage in modes of public advocacy that drift quite far from the traditional clinical setting. Their list of possible physician-driven public argument campaigns (e.g. pressing for universal health insurance, restructured delivery and reimbursement systems)\(^8^0\) may seem out of place to practitioners trained in a field where public advocacy skills receive little or no curricular coverage. Yet this call for physician-driven public advocacy is echoed by top leaders in the field.

Timothy Gardner, president of the American Heart Association (AHA), recently gave a major address to fellow physicians, health care providers and cardiovascular researchers, saying: "I want us to acknowledge our shared mission as citizen leaders and challenge ourselves to consider the implications of this rallying cry."\(^8^1\) Pushing his expert constituents to broaden their professional identities to include a political component, Gardner suggested, "As citizen leaders, we must also take a prominent public stance in support of policies that promote health in our communities."\(^8^2\)

Gardner’s call for health care professionals to embrace advocacy roles as "citizen leaders" harmonizes with an earlier statement by Russell Gruen, Steven Pearson and Troyen Brennan, who urged their peers in the medical professions to act on their ability to be "public witnesses" to socioeconomic determinants of patients' health and "provide the sort of information and professional authority that brings veracity and legitimacy to these concerns in public debate."\(^8^3\)

To illustrate modes of

\(^8^0\) Woolf and Johnson, "Break Even Point," 550.


\(^8^2\) Gardner, "Building a Healthier World," 1840. As Gardner explains further, "Each of us has our own unique and very important role to play in the work of building a healthier world, be that as a nurse, a researcher, a clinician, an allied health worker, a health system administrator, or an advocate against cardiovascular disease and stroke. But in addition to our specific role, each of us is a citizen in our community and society. Let the accomplishments to date of the antismoking movement inspire us to do more to ensure that risk factor reduction and the promotion of healthfulness are embedded in our culture and in our public policy" ("Building a Healthier World," 1841).

political engagement open to "physician-citizens," Gruen, Pearson and Brennan cited examples such as:

- Raising public awareness about a health or social issue by discussing it with family and friends or participating in a public forum.
- Writing a letter, signing a petition, or participating in another form of public advocacy and lobbying.
- Encouraging a medical society to act on an issue that concerns the public’s health.
- Organizing and forming a group for political advocacy.\textsuperscript{84}

It is notable how these suggestions reflect the Isocratic theme of collective action through synérchesthé. Gruen, Pearson and Brennan emphasize how their call for political engagement by health care professionals is designed to transcend particular political ideologies and promote the common good through public deliberation: "We have framed public roles as issues of evidence and professionalism, not as matters of individual political persuasion."\textsuperscript{85} This theme of evidence-based political advocacy undertaken by health care professionals as an expression of citizenship can be seen as an outgrowth of the EBM movement started in the early 1990s. But whereas EBM was developed as an approach to sharpen physicians' clinical decision-making, the calls for physician citizenship and T2 translational research differ in key respects. First, the latter forms of professional activity necessarily demand a unique level of integrative, interdisciplinary exchange (even more so than clinical practice). Second, since physician citizenship and T2 translational research entail

\textsuperscript{84} Gruen, Pearson and Brennan, “Physician-Citizens,” 97.

\textsuperscript{85} Gruen, Pearson and Brennan, “Physician-Citizens,” 98. "Physicians must realize that they also share goals in common with other members of the profession and that, although individual action is laudable, collective action is a hallmark of professionalism. Physician groups have been particularly effective agents of change in institutional issues, local community matters, legislative action, and much broader issues, such as civil and human rights, prevention of nuclear war, and the banning of landmines. These larger movements have shown physician advocacy to be most effective when it has a specific goal, a clear message, good supporting evidence, collective action, and participation in the political process" (Gruen, Pearson and Brennan, 97). "Physicians should be reassured that even small actions can be influential, that political involvement is more than just voting in elections, and that these activities are important and admirable aspects of citizenship" (97).
public engagement, they require translation not only across disciplinary boundaries, but also across barriers that divide expert and public communities.

Conclusion

Dilip Gaonkar’s sharp attack on the rhetoric of science research program charges that scholars such as John Campbell, Lawrence Prelli, and Alan Gross commit a translation error by utilizing concepts from classical Greek rhetoric as a hermeneutic metadiscourse for interpreting scientific texts. In Gaonkar’s telling, the "hegemonic" project to "globalize" rhetoric by bringing all textual artifacts (even hard science) under its scope is an ill-fated exercise in supply-side epistemology. The stakes are high, since as Gaonkar warns near the close of his landmark essay, "globalization severely undermines rhetoric's self-representation as a situated practical art."

Gaonkar’s broadside hits close to home, as this too is a rhetoric of science essay, one that leans heavily on the concept of translation. Yet elements of the foregoing analysis reverse the thrust of Gaonkar’s critique. Leading medical scholars shape the agenda of translational research by openly foregrounding the communication challenges inherent in the kind of integrative, trans-disciplinary research necessary to overcome T2 translational blocks. They also call for scholarly contributions from the field of communication, not for help with the interpretive task of criticizing scientific texts, but rather for support in synérchesthé, the performative task of coming together deliberately for the purpose of joint inquiry, collective choice-making, and renewal of communicative bonds.

Here is demand-side rhetoric of science, where scientific actors seek enlistment of rhetoric’s expertise. Rather than rhetoric pushing its epistemology on science, we have science pulling rhetoric into its interdisciplinary orbit. The "thinness" of the productivist classical Greek lexicon, supposedly a liability in rhetorical criticism, here


87 Gaonkar, "Idea of Rhetoric," 76.
becomes a strength supporting the type of practice-oriented scholarship that Zarefsky envisioned growing out of his theory of argumentation as "hypothesis testing."

In fairness to Gaonkar, it should be stipulated that his 1993 critique challenged the way rhetoric of science had been done to date, not the universe of ways rhetoric of science might be done in the future. And to his partial credit (he did this in a footnote), Gaonkar did acknowledge the promise of a performance-oriented rhetoric of science, especially one informed by classical thinkers other than Aristotle. In fact, one would expect Gaonkar to hold such a nuanced position, given his intellectual background. Mentored at the University of Pittsburgh by founding rhetorician of science Trevor Melia, as well as legendary forensics director Robert Newman, Gaonkar wrote his Ph.D. dissertation on "Aspects of Sophistic Pedagogy." In that dot-matrix tome, Gaonkar documents how the ancient sophists were "the greatest champions" of "socially useful" science, and also how the sophists essentially practiced the art of rhetoric in a translational register:

The sophists could not blithely go about their business of making science useful, while science itself stood still due to lack of communal support and recognition. Besides, sophistic pedagogy was becoming increasingly dependent on the findings of contemporary speculation in philosophy and science. Take for instance, the eminently practical art of rhetoric. As taught by the best of the sophists, it was not simply a handbook of recipes which anyone could mechanically employ to his advantage. On the contrary, the strength and vitality of sophistic rhetoric came from their ability to incorporate the relevant information obtained from the on-going research in other fields.

Of course deep trans-historical differences make uncritical appropriation of classical Greek rhetoric for contemporary use a fool’s errand. But to gauge from Robert

Hariman's recent reflections on the enduring salience of Isocrates, "timely, suitable, and elegant appropriations" can help us post-moderns "forge a new political language" suitable for addressing the complex raft of intertwined problems facing global society.\textsuperscript{92} Such retrospection is long overdue, says Hariman, as "the history, literature, philosophy, oratory, art, and political thought of Greece and Rome have never been more accessible or less appreciated."\textsuperscript{93}

Fortunately the project of re-connecting with our field's sophistic roots is leveraged immeasurably by the presence of a few sophos in our midst whose intellectual lineage can be traced, albeit circuitously, to the original sophists—Protagoras and Isocrates. The inter-generational connector, in this case, is forensics—the practical enterprise of cooperatively competitive speech-making. One finds early instantiations of forensics in Protagoras' pedagogical method of dissoi logoi, as well as precursors to what we now think of as public debate in Isocratic logos politikos. In the early 20th century, luminaries such as Wayland Maxfield Parrish, Frank Hardy Lane, and even Herbert Wichelns (himself a debate coach at the University of Pittsburgh), re-animated the sophistic tradition by developing new forms of public debate and public speaking, activities that served as a fulcrum that the nascent field of communication would use to split off from English. David Zarefsky descends from that same line of intellectual forebears. The best of the sophistical tradition is evident in his performances as a champion debater and coach, his professional leadership of an academic field, and his scholarly writings on argumentation theory and practice.

\textsuperscript{92} Robert Hariman, "Civic Education, Classical Imitation, and Democratic Polity," in Isocrates and Civic Education, 228.
\textsuperscript{93} Hariman, "Civic Education," 217.
Appendix: Tables and Figures

**Table 1.** Results of a NLM search for articles focusing on Evidence-Based Medicine in selected years between 1990 and 2008*

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* search performed 5/24/2009
Figure 1. Evidence-Based Medicine Hierarchy of Evidence Types. Permission pending.
Figure 2. Unidirectional model for translation of evidence from siloed expert fields to wider publics and policy makers.
Figure 3. Translation through polloi logoi. Argumentation between expert scholarly fields generates bridging language that supports cogent evidence. This facilitates integrative research and supports translation efforts designed to communicate findings to wider publics and policymakers (adapted from Rehg, *Cogent Science in Context*).