

# How Do We Know: The changing culture of knowledge<sup>1</sup>

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*The creation of knowledge can no longer be restricted to the exclusive, privileged purview of universities and other officially sanctioned research institutes. As useful as it may be, evidentiary-based research is but one source of knowledge, reflecting only one way of knowing. It is, by its nature and design, deterministic. In contrast, the world – and especially humanity within it – is complex. Thus, more complex approaches to the construction of knowledge and knowledge authority must be undertaken. Complex problems need approaches that acknowledge and account for the complexity of interactions within both biological and human systems. We must begin by reconsidering how we understand the nature of knowledge itself. A modest proposal to change the context of the conversation: rather than a compendium of proven facts, consider knowledge as a process of creating emergent meaning and collective understanding from amongst complex, interacting contexts. The implications of this shift include rethinking our approach to authority, truth, compliance, applicability, politics, relationships of power, and the approach to creating new knowledge itself.*

## Placebo Workouts

I'd like to share a little research with you this morning:

In a study testing whether the relationship between exercise and health is moderated by one's mind-set, 84 female room attendants working in seven different hotels were measured on physiological health variables affected by exercise. Those in the informed condition were told that the work they do (cleaning hotel rooms) is good exercise and satisfies the Surgeon General's recommendations for an active lifestyle. Examples of how their work was exercise were provided. Subjects in the control

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<sup>1</sup> This essay was originally presented as the keynote address to the biennial conference of SEARCH Canada, held June 15, 2007, in Edmonton Alberta. "SEARCH Canada is a not-for-profit, member-funded organization that helps health organizations create, choose and use research evidence in innovative practice settings to enhance decision-making capacity. SEARCH Canada facilitates partnerships with academic institutions to advance applied learning and research. SEARCH Canada and its programs are funded by its founding member organizations: the Alberta Heritage Foundation for Medical Research (AHFMR), Alberta's nine health regions, and the University of Calgary." For more information on SEARCH Canada, visit <http://www.searchca.net>.



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group were not given this information. Although actual behavior did not change, 4 weeks after the intervention, the informed group perceived themselves to be getting significantly more exercise than before. As a result, compared with the control group, they showed a decrease in weight, blood pressure, body fat, waist-to-hip ratio, and body mass index. These results support the hypothesis that exercise affects health in part or in whole via the placebo effect.

This is the abstract from an article entitled “Mindset matters: Exercise and the placebo effect,” by Harvard psychology professors Alia Crum and Ellen Langer.<sup>2</sup> It is a perfectly good example of evidence-based research, published in a peer-reviewed, scholarly journal. It has been perfectly added as a contribution to knowledge in the field. And, it is perfectly wrong in a way that cannot be detected in the dominant knowledge paradigm by those who have knowledge authority.

How did we as a culture come to decide that certain things are to be considered as knowledge and others are not? How did those that decide such things acquire that very privileged position of knowledge authority? The fact of the matter is that our dominant knowledge paradigm has existed for a very long time – since the 17<sup>th</sup> century. But the world has changed considerably since then, so I’d like to suggest to you this morning that perhaps it is time to consider some changes to what we consider as knowledge, and who gets to decide, in a way that is consistent with today’s reality.

### **A Brief History of Western Civilization**

To answer the questions I have posed, we need to review a little bit of history – about 3,000 years worth, or so. This line of reasoning comes from the Toronto School of Communications, a school of thought that is primarily associated with classicist, Eric Havelock, political economist, Harold Innis, and a name who is likely familiar to most people in the audience today, Marshall McLuhan. The Toronto School holds that the dominant mode of communication employed in a society or culture creates an environment from which the defining structures of that society emerge. These structures might include those institutions that define the way commerce and economics are conducted, the ways in which the people govern themselves, the forms and expressions of religion, how the populace are educated, and most important for our purposes, what is accepted as knowledge, who is considered as knowledgeable, and who decides and arbitrates such considerations.

Let us go back about 3,000 years, back to the heart of Western civilization nestled on the shores of the Mediterranean, namely, to Ancient Greece. We’re going back to a time before Aristotle, before Plato, and just before Homer. In that ancient time, who was considered educated? What was valued as knowledge and wisdom?

Since there was no phonetic alphabet at that time, knowledge had nothing to do with reading and writing. In fact, all of human history had to be memorized, and

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<sup>2</sup> Crum, A., & Langer, E. (2007). Mindset matters: Exercise and the placebo effect. *Psychological Science*, 18(2), 165-171.

passed from generation to generation by word of mouth. An educated person was he who could recite that history. Knowledge comprised the accumulated history of the civilization; wisdom, the ability to draw from that memorized corpus of knowledge. Of course, relatively little of that legacy has survived to modern time. In fact all that has survived was that which was written down at the very end of the pre-literate era of that primary oral society. The epic tales that were scribed and attributed to men like Homer came to us in a form that many throughout the modern era associate with mere aesthetics, allegory, metaphor and myth. They came as poetry.

As such, Homer's recounting of tales of the fall of Troy, and of Odysseus's fantastic voyages were easily dismissed as fiction, since – to the modern scholar, at least – prose is the form in which history and knowledge is recorded. Poetry is for something else. Yet consider a work such as the Iliad, for a moment. If you can remember back to your days perhaps as a humanities undergraduate, you may remember that the Iliad is immensely long, remarkably intricate in its construction, and reasonably complex. As a work of written, albeit poetic, fiction, it could have made a great movie, Brad Pitt notwithstanding. In fact, until relatively recently, the Iliad was considered just that – a work of fiction, since we modern literate folk perceive all of the subtle literary cues that envelope the work – colourful descriptions, metaphors, allegorical constructions – as subliminal signals that our literate minds interpret as fiction.

Based on relatively recent, archaeological evidence, we now know that the battle of the fall of Troy, for instance, occurred much in the same way as described by Homer in his epic poem. In the absence of a means to physically record the history of the culture, those who were considered as educated men preserved and ensured the continuity of knowledge by passing the history from generation to generation by word of mouth. The government of the society was based on the city-state, essentially defining how far word of mouth could accurately travel. All aspects of society were conducted either person to person, or small group to small group, based upon what could be memorized and conveyed entirely through oral interchange. To be considered educated, that is, to have acquired the skill, techniques, and corpus of knowledge and wisdom, took about twenty years of study – interestingly, not unlike today. What was valued as knowledge, what sets of skills and capabilities were considered necessary to be regarded as an educated person, and how new knowledge was added to the cultural compendium of wisdom, were defined entirely within the context of the dominant mode of communication – that being primary orality, and the oral narrative tradition.

The predominant traders of the time – the ancient Phoenicians, who plied their trade throughout the Mediterranean – not only brought amphoras of oil and bags of grain to the shores of Ancient Greece in commerce; they also brought an accounting system. This system consisted of small clay disks that had symbols imprinted upon them that represented the commodity contained in the large clay vessels and sealed sacs. After a short time, these symbols began to stand for the name of the commodity itself, and a short time later, for the initial sound of that word. Thus, a new medium –

the phonetic alphabet – arrived on the Grecian shores and within a short time society began to feel the disruption of a new communication form that seemed to threaten the very structural foundation of the culture.

Phonetic literacy is a very ingenious invention. It takes what is integral – the words coming from someone’s mouth – and fractures them, separating sound from meaning. That sound is then encoded into what are otherwise semantically meaningless symbols that we call letters. Those letters are then build up *hierarchically*, from letters into words, from words into sentences, from sentences into paragraphs, and from paragraphs into scrolls, and later books. With phonetic literacy, the emperor or dictator could utter a command or edict and have his words recorded onto a scroll. That scroll could be given to a messenger whose chariot could carry both him and the message to the far reaches of the empire. The recipient of that scroll could then accurately reproduce the precise words of the emperor at a location far removed from the central seat of control, such as Rome.

But, there was an additional aspect that was transported via scroll along with the words. The recipient of the scroll, say the governor of a distant province, also received the *proxy authority* of the emperor – the authority to carry out whatever orders those words conveyed in the name of the emperor. Thus, the written word became an excellent choice for expanding empires, spheres of influence, and spans of control across vast geographies. The written word travelled well, alleviating the necessity for transporting the person along with his ideas or pronouncements. More important, the phonetic alphabet produced a cognitive shift in the culture concerning not only what was known, but what could be known. Instead of knowledge being a direct experience that was passed from person to person, in a sense of the story-singer<sup>3</sup> reliving the experience for his audience, literacy meant that what was to be known was only a written representation of the actual, visceral experience that comprised knowledge. Literacy separates the knower from that which was to be known, and inserts both a proxy representation in the form of words, and an author who asserts his authority with respect to that representation, between the knower and the known.

This, of course, changes everything! To be truly literate means that a person would somehow ascribe attributes of reality to these proxy representations that are ink marks on linen or papyrus or sheepskin. To be truly literate means that a person would be able to call into existence the power and authority of an unseen, and often unknown, author by uttering the sounds represented by these ink marks. Moreover, in the eyes of the illiterate masses, who received all of their knowledge in masses (the first “mass media”) that literate person would somehow inherit aspects of that author’s authority by the proxy vested in those written words. It is easily understood how this almost magical transference of authority and power led to the dominance of what can only be considered as the greatest and most successful bureaucracy of all time, the

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<sup>3</sup> The term “story-singer” is a reference to the discoveries of Milman Parry and Albert Lord in the primary oral society of South Serbia in the early 20<sup>th</sup> century. See Parry, A. (1971). *The making of Homeric verse: The collected papers of Milman Parry*. Oxford: Oxford University Press; and Lord, A. B. (2000). *The Singer of Tales, Second Edition*. Cambridge, MA: Harvard University Press.

Catholic Church. Its leaders not only had literate ability, they had command of the capital-W, Word of God himself. In the New Testament – a work of early literacy – the book of John begins with, “In the beginning was the word, and the word was with God, and the word was God.” And those who were literate – the priests, the monks, and the scribes – had command of the word, and thus became, in the eyes of the people, God’s proxy.

Such tremendous power is invested in the written word and in the command of the written word – that power being a cultural construction that has survived for nearly two thousand years. When we invoke knowledge that we obtain through the proxy of an author’s book, we assume some of that author’s patina of authority. So imagine the devastating effect that Johannes Gutenberg had on the authority of the Church when, in 1455, he began the mass printing of the bible on a moveable type press. The relative availability of printed books enabled an environment of increasing literacy, the ability of a person to have command of the Word itself, away from the influence and power of the Church. Suddenly, people could contemplate and think about these representations of experience on their own. Perhaps they might even develop heretical ideas, such as those that led to the most famous – if only legendary – home renovation in history, when Martin Luther took his hammer and nails, and renovated the doors of Wittenberg Church by posting his 95 theses in the year 1517.

Luther, questioning the authority of the Vatican regarding the sale of indulgences, ultimately led to the Reformation, and nearly two hundred years of bloody religious wars throughout Europe. But at the end of that period, the growth of literacy – the separation of the knower from the known through the intermediation of proxy representation and inherited authority – and its cognitive effects of restructuring of how knowledge was created, enabled the emergence of the Age of Reason and the Enlightenment. It enabled the emergence of science and philosophy in Europe.

Knowledge soon became institutionalized, with institutions such as universities defining the means through which new knowledge could be added to the cultural compendium of wisdom by authoritative authors. From where did an author obtain such authority? The literate world emerged in such an ingenious way so that authors could inherit the authority of other authors, and both stand on and contribute to the aggregated authority of institutions of authors. When I write a scholarly paper, I cite other authors whose works have been deemed to be knowledge by an authority called a publisher. In that case, my work has been reviewed by other authors who are deemed to be my peers, and some of their authority is transferred to me. If I repeat that exercise sufficiently well, an institution of authors, otherwise known as a university, will confer one or more designations of authority. Thus the Bachelor of Arts, the Master of Science, the Doctor of Philosophy becomes the proxy representation of institutional authority. Just as the written word was an easily transportable conveyance of a person’s ideas without the necessity of dragging along the person, so too is the university degree an easily transportable conveyance of knowledge authority without the necessity of dragging along a senate of authors.

Thus, the entire process of peer-review is not so much a verification of truth as a conveyance of authority – imprinting the “good science-keeping seal of approval,” as it were. If I were to imagine what such a good science-keeping seal of approval might look like, I think it may read something like this:

We who have knowledge authority hereby declare that the methods and techniques employed in this investigation conform to the established and accepted principles of knowledge discovery, and by the authority we have vested in ourselves, bestow the designation of Accepted Knowledge upon the results.

In peer review, the results of any investigation are not explicitly validated; it is the *process* that is. However, the good science-keeping seal of approval has some fine print: “This process is validated within a paradigm that we, as holders of knowledge authority, have ourselves defined.” In other words, the process is self-defining, self-referential, self-reinforcing, and self-reproducing within the confines of the dominant knowledge paradigm.

There is one other aspect of the construct of authority that informs evidence-based research that has not yet been explained – objectivity. That which is to be considered as new knowledge must be obtained objectively, with a distance or separation maintained between the knower and that which is to be known. The idea of separation began with phonetic literacy, that is, separating the integral experience of language in a way that enabled both distance and proxy. The earliest examples come from literature, with the emergence of an all-seeing, all-knowing author with his own distinct narrative voice, apart from the voices of the characters in the tale. Over the centuries, distance came to be valued in almost every aspect of human endeavour, from art (perspective) to philosophy (Kant’s *Critique of Pure Reason*) to architecture (Italian piazzas) to science (the supposedly neutral, objective observer). But the requirement for objectivity created a theological and ethical dilemma in the early 17th century, when scientists were beginning to study anatomy by dissecting animals in order to discover what animated them. The human body, unlike those of animals, was divinely created, in the image of God. Cutting into the divine, human body would be a sacrilege. In order for the body to be studied scientifically, a theological work-around, or metaphysical hack, needed to be devised. Since the divine part of humanity – the soul – was considered to be resident in the mind, a metaphysical separation was created between the divine mind and the corporeal body so that the body could be objectified and dissected. I call this “putting Descartes before des hearse.”

Cartesian principles formed the basis of what we call *positivism*. This is the idea that the social or human world is the same as the material world and can be known in much the same way, via the scientific model based on causal hypothesis, experimentation, measurement and statistical analysis and the principle of falsifiability. Falsifiability states that whatever is to be proven true must be able to be shown to be false, and then demonstrated that it is not false. The positivist model assumes a detached, supposedly neutral observer who collects objective data that can be measured mathematically and analyzed statistically. These principles of what has become the

gold standard of knowledge discovery in evidence-based research were laid down in the 17<sup>th</sup> century.

Coming forward in time, through the Industrial Age with the acceleration of mechanization into industrial processes, we enter the modern period. In communications terms, however, we can consider ourselves to be in the era of electric communication, heralded by the demonstration of the telegraph by Samuel Morse in 1844. The transition from cultural epoch to cultural epoch does not happen overnight. For the transition to be complete, it takes about three hundred years. By “complete,” I mean that the society perceives whatever defining structures emerge from the environment created by the dominant mode of communication have always existed, that people have always conducted themselves accordingly, that these behaviours are human nature, that “it’s just the way people are.” The time span is relatively easy to understand: for the transition to be complete, there cannot be anyone left alive who remembers someone, that remembers someone, who was socialized and acculturated in the prior system of knowledge. It took about three hundred years to complete the transition from primary orality to phonetic literacy in Ancient Greece. It took about three hundred years to complete the transition from the manuscript culture to the mechanized print culture after Gutenberg, and it is taking about three hundred years currently.

At some point during the transition, there is sufficient change to the environment that the effects of the new, emerging structures become noticeable to the members of the society or culture. In the current nexus period, if we take 151 years – just past the half-way point – and add it to the time marker of 1844, we come to the year 1995. Perhaps coincidentally, or perhaps not, 1995 is the year of the initial public offering of the Netscape company, the year in which the Internet suddenly burst onto everyone’s consciousness. That year and that event signify an epochal break boundary, a generation gap of literally historic proportions, since it is only the third time in Western history that such an occurrence has happened. We have a generation alive who were socialized and acculturated in what has been a predominantly mechanized, industrialized modernist world. And, there is another generation alive who were socialized, at approximately ages eight to ten, in the year 1995 and later, who are today twenty-two years of age and younger.

This younger generation are living in a world in which the Internet never didn’t exist. They are living in a world in which Google never didn’t exist. They are living in a world in which everyone who matters is either a click away, or text message away, or a speed-dialled-call away, or a posting on a Facebook wall away, among a variety of devices, all of which – regardless of what they look like, or how they functionally behave, or what they are called – are all precisely the same: they are connection devices. Unlike we who were socialized and acculturated in a primarily literate societal ground, in which our experience with technology and media is primarily within a hierarchical, instrumental, mechanized, industrialized context, today’s youth and tomorrow’s adults live in a world of *ubiquitous connectivity and pervasive proximity*. Everyone is, or soon will be, connected to everyone else, and all

available information, through instantaneous, multi-way communication. This is ubiquitous connectivity. They will therefore have the experience of being immediately proximate to everyone else and to all available information. This is pervasive proximity. Their direct experience of the world is fundamentally different from yours or from mine, as we have had to adopt and adapt to these technologies that create the effects of ubiquitous connectivity and pervasive proximity (abbreviated to UCaPP).

### Effects of the UCaPP World

What does all of this mean to society? Perhaps more important for our consideration is, what does this mean to us as researchers and as scientists? What does it mean for those who would aspire to contribute to the cultural compendium of wisdom that we call knowledge? One major effect of the UCaPP world is that, suddenly, it seems, context matters. Context matters because in a UCaPP world, diverse contexts now interact in ways that were undoubtedly improbable fifty or one hundred years ago, and most certainly impossible before that.

I would like to introduce you to a researcher from the U.K. by the name of Alan Foster. Foster researches researchers. In particular, Foster looks at researchers who are engaged in what he calls “non-linear, information seeking.”<sup>4</sup> He finds that there are significant differences between those who engage in research that is framed in the traditional, literate constructs, and those who frame their research in terms of emergent, inter-disciplinary knowledge seeking. In the latter case, there is tremendous value placed on including multiple, interconnected and overlapping contexts that create a rich and multi-dimensional picture of whatever is being investigated. Foster goes on to describe the contexts that the researcher her/himself includes and incorporates into their process of knowledge discovery. First, there is a significant importance placed on the researcher’s social knowledge network and organizational support for their specific endeavour and approach. Second, Foster emphasizes the importance of the researcher’s ability to navigate amidst the unknown in diverse fields without bringing the preconceptions and predispositions of their own disciplinary training, or the restrictions of disciplinary frames in foreign disciplines. Navigating amidst the unknown also includes the ability to cope with paradox and apparent inconsistencies that are introduced when a given phenomenon is interpreted through the meaning and sense lenses of multiple, seemingly incompatible, disciplinary contexts.

One application of Foster’s approach is employed by Kathy Charmaz. Charmaz has spent the last thirty years studying people with chronic illness, disabilities, and chronic pain. She looks beyond the specific symptoms and the strictly biological mechanisms of chronic pain to consider and investigate the entire life context of her participants in order to integrally understand not only the mechanisms of pain but also its complete effects on the lives that are affected by the pain, both directly and indirectly. Charmaz maintains that we cannot know a world by

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<sup>4</sup> Foster, A. (2004). A non-linear model of information-seeking behavior. *Journal of the American Society for Information Science and Technology*, 55(3), 228-237.



describing it from the outside. To understand what living in this world means, we have to enter it, start from the inside. She writes: “We enter the phenomenon to discover what is significant from the viewpoints and actions of the people who experience it. We cannot assume that we already know what is significant.”<sup>5</sup>

Charmaz and Foster’s work suggest two profound implications for the assumptive basis of evidence-based research. First, this type of research begins with an assumption of knowing what is significant and what is not – defining the experimental hypotheses suggests a foreknowledge of what is significant; setting up controls suggests what is not significant; defining the measurements and statistical tests according to what is to be found, defines that which is effectively to be ignored. Such practices seems to be exactly the opposite of what Foster and Charmaz suggest might be an appropriate contemporary research practice. Second, the contextual foundation upon which evidence-based research is constructed is a 17<sup>th</sup> century worldview, that is, a mechanistic world that functions according to deterministic causality, in which both human systems and inanimate, non-sentient, physical systems behave in precisely the same ways.

### The World is a Complex Place

In an environment of human engagement that is ubiquitously connected and pervasively proximate, I would suggest to you that the world is a complex place. It is especially complex when we consider anything involving people – from the biological and biochemical level all the way up to people in the context of a society. These are the very types of environments that influence everything in medical and healthcare decision-making from compliance with prescription medications, to national health policy, to what happens when physicians retire. It is the principles of complexity, not those of Cartesian logic and Newton’s third law of motion – for every action there is an equal and opposite reaction – that apply. If the objective of research is to discover what exists in the world and to make sense of what happens, it is crucial that the contextual framing of that research is consistent with the contextual framing of the world, and that means the application of principles of complexity.

For those who are unfamiliar with complex systems and their vocabulary, here is a brief primer.<sup>6</sup> Complex systems are comprised of a large number of elemental components, any (or all) of which may be simple. These elements exchange information via interactions, the effects of which propagate throughout the system. Because complex systems – and in particular, systems that are interconnected via a chemical, biological or electronic communication network – contain many direct and indirect feedback loops, interactions are nonlinear with non-proportional effects. This means that seemingly small interactions may have quite substantial effects throughout

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<sup>5</sup> Charmaz, K. (2004). Premises, principles, and practices in qualitative research: Revisiting the foundations. *Qualitative Health Research*, 14(7), 976-993.

<sup>6</sup> For a concise introduction to the nature of complex systems, see Cilliers, P. (2005). Knowing complex systems. In Richardson, K.A. (Ed.), *Managing organizational complexity: Philosophy, theory and application* (pp. 7-19). Greenwich, CT: Information Age Publishing Inc.

the system, and what appear to be substantial interactions may have quite insignificant system-wide effects.

Complex systems also possess memory – a history of interactions, exchanges and effects – that is distributed throughout the system, and influences the behaviour of the system. This memory is significant: the behaviour of the system overall is determined by the nature and effects of the interactions, not by the content or individual actions of the component elements. Hence, the overall system's behaviour is unpredictable based on an understanding of the components' individual behaviours alone.

This has important implications with respect to the way evidence-based research is currently constructed: Systemic controls are all but impossible in a complex system because of the multiplicity of influencing factors that are massively interconnected via network effects and the resulting direct and indirect feedback loops. This is especially true in human systems in which there is the additional process of feedforward or adaptive anticipation. One cannot control for a systemic memory that is distributive and collective among the system's component elements. What's more, when one tries to control, or apply deterministic methods, one cannot help but change the dynamics of the complex system, thereby tainting the results. Further, the statistical analysis that is the basic instrumentation of evidence-based research also must be called into question when dealing with complex, human systems. People have free will; there may be influences that act on people that may have a certain predictability or expectation of outcome. But this is not the same as deterministic causality.

This is not to say that forming hypotheses and using statistical analysis is wrong in every case. The problem is one of framing: When we cast our evidence in a positivist frame based on deterministic causality and the scientific method, there is no mechanism to detect when a statistical analysis of data will provide a useful insight or a misleading insight. Even the concept of "statistical significance" does not account for the non-proportionality and non-linearity of complex systems. In fact, it's likely quite the opposite: what might be actually significant with respect to systemic change in a complex human system – small perturbations creating large systemic effects – are likely to be found to be not *statistically* significant.

Writing in the journal *Public Library of Science – Medicine*, John Ioannidis published an essay entitled simply, "Why most published research findings are false."<sup>7</sup> This essay followed a detailed and rigorous study, originally published in *JAMA*<sup>8</sup> that examined all the original clinical research studies published in three major general clinical journals or high-impact-factor specialty journals from 1990 to 2003, and cited more than one thousand times in the literature. His major conclusions are startling for

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<sup>7</sup> Ioannidis, J. P. A. (2005). Why most published research findings are false. *Public Library of Science - Medicine*, 2(8).

<sup>8</sup> Ioannidis, J. P. A. (2005). Contradicted and initially stronger effects in highly cited clinical research. *Journal of the American Medical Association*, 294(2), 218-228.

those who hold fast to positivist methodologies as the gold standard for evidence-based research. He found first, that most research findings are false for most research designs and for most fields. Second, he discovered that claimed research findings may often simply be accurate measures of the prevailing bias in the field.

### **What Should Be Valued as Knowledge?**

How, then, do we approach this problem of determining what should be valued as knowledge in a way that is consistent with the reality of complexity in the context of a UCaPP world? I suggest that it might be a good idea to begin to rethink what we consider as valid research, and the framing that provides the parameters for that research. We need a frame that is designed to detect and account for the sorts of systemic contextual influences that act on both what, or who, we are researching, as well as those that are acting on the researcher her/himself. Such influences might include: Where does the funding come from? What sorts of research are publishable in which sorts of journals? What specific training did the researcher have – in other words, what sorts of questions does the researcher know how to ask? What are the political and cultural predispositions of the researcher, the institution, the funder, and the intended audience? All of these, and hundreds of other similar considerations, are part of the human system that contextualizes the research, and therefore will have their own effects. Ironically, to answer the questions that we must ask of a complex world, we need a frame that we might consider to be decidedly not scientific, in the traditional Cartesian sense of that word, to be added to what we already consider as evidence that contributes to knowledge.

We must start by admitting that we cannot know an objective reality, if an objective reality outside of ourselves truly exists, because we are inextricably part of that reality. Thus, the first step to reframe our approach to research is to acknowledge and declare the influences that work on us and influence our ability to ask questions, listen to the answers, and to interpret what we hear and observe. A man will hear and see differently than will a woman. An affluent and privileged researcher will tend to ask different sorts of questions than one who comes from a marginalized background. A Caucasian person will interpret answers differently than will a person of colour. Emergency room personnel will consider a case of overdose differently than would a street worker, and differently again than someone who is, or has been, addicted to meth or heroin. Context, history, socialization all matter.

We must then move on to the notion that there is no one right way to know the world. In fact, everyone creates their own meaning constructs based on their individual lived experiences, and social and cultural histories, even if that history is dominated by a Cartesian, positivist worldview. There is no one “right construct.” The purpose of a reframed research is to allow participants and researchers to create a mutual understanding of the world that incorporates multiple contexts. This paradigm provides us with the richest and most diverse opportunity to uncover knowledge that is wrapped up in complex interconnections and dynamics. Any knowledge that is differentiated by gender, sexual orientation, socio-economic class, indigenous culture, national origin, urban/rural divide, family situation or any other essentially human

condition can perhaps best be investigated first through a *constructivist* paradigm. This allows researchers to begin to understand how our research participants experience the world in the way that they actually live it, and to be explicit about how the researcher's own situation and circumstances informs how they hear, see and indeed, how they touch their participants.

Finally, we must acknowledge that in today's world, it is an unfortunate reality that certain groups construct the world for their own benefit, and in doing so, oppress others, either wittingly or unwittingly. Research in this complex and complicated circumstance can be used to discover the contexts that create situation of power, control, and discipline, and to do the research *with* these marginalized people for their benefit, and ultimately for the benefit of society as a whole.

As we examine what we consider as evidence, what is valued as knowledge, and who decides, it is of paramount importance to understand not just what is being asked, but what is *not* being asked, or worse, actively being prevented from becoming known. As the questions we ask shape the answers we find, how much more so are the answers shaped by the questions we do not ask?

Recall the research results that I shared with you at the beginning of my talk this morning, the conclusion that exercise benefit works in whole or in part via the placebo effect. A constructivist paradigm would encourage the researcher to delve more deeply into the lived experiences of the housekeepers, not making the objective assumption from the outside that those who were informed about the exercise aspect of their work did not, in subtle ways, change the effort or exertion that they applied to vacuuming, dusting and changing linens. I would suggest that it was the small systemic perturbation of whispering in their ears that created the large systemic effect in their overall health.

Aside from a relatively small set of physical facts, we collectively create our world from the emergent knowledge of complex dynamics, human interactions and networks of relationships that ultimately become our empirical reality. It is incumbent upon us as researchers and scientists to expand our 17<sup>th</sup> century epistemological frame to be able to ask 21<sup>st</sup> century types of questions.



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