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'IMPROVING LIFE' AS A NORTH STAR FOR RESEARCH

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ABSTRACT

This paper evaluates the impact of research centered on enhancing the quality of life. It presents examples of research in which the essential question, pivoting around altruistic possibilities, set in motion long-term outcomes that extended beyond the life of the project. The examples listed occur across the disciplines, in engineering, science, social science, social action research, education, and communications technologies. The human processes that redounded to human progress pointed to the concept that research may matter most when it sustains life, improves the quality of life or otherwise enhances the cohesion and destiny of humans and other species, and that continually holding this as an ideal has the potential to shape the researcher, the research field, and human progress itself. Findings include the long-term outcomes accrued during and beyond the lifetime of the researchers involved. Conclusions are reinforced by transdisciplinary trends inaugurated as the result of research.

KEYWORDS: Research Improving Life, Semiotics, Altruism, Transdisciplinary Trends, Cybernetics, Goal Setting, Transformation.

INTRODUCTION

WHERE DO YOU WANT TO GO?

Seven minutes of terror – these words described the NASA space engineers' endurance of the Mars landing process just before their brainchild, a rover called the Perseverance, touched down on Mars, February 18, 2021. The Jet Propulsion Lab (JPL) engineers had designed innovations and rechecked calculations that would allow the rover to break away from the spacecraft and break through a lava-like heat barrier at an unimaginable speed. When it touched down without crashing, the team sent a message on behalf of the craft: "Perseverance will get you anywhere" [3] [24].

They might have asked the question, as a caveat: "…As long as you know where you want to go." What motivation propelled the researchers toward their goal: the mere challenge of the technological feat; the potential to extract knowledge from the resources of a new planet; or the implications for discovering or imp[1]roving life as a result? The rover assigned to accomplish this Herculean feat, powered by a tiny robot, would soon be called into service as a helicopter, using the same technology to whiz about like a gadfly on Mars and explore the Jezero Crater. Only a few short years ago, the research company that developed the technology for the Perseverance had designed its first robotics platform as a printable 3-D toy. Suddenly, this company's facsimile of the human brain had become the Informatics Toast of the Solar System. Science, as played out on the red planet's windy surface, suddenly synchronized its symbols with those of science fiction. A quote from Katherine Hayles on semiotics comes to mind: "Does the human create the altar by typing at the computer keyboard, or does the altar control the human's typing so that the inscription reflects the altar's will rather than the human's?" That question now becomes paramount. Is the rover driving the research or are the existential questions driving the rover? In her book *How we Became Posthuman*, [13] Hayles details the array of assumptions about subjectivity in the postmodern world, including the Hobbesian concept of freedom as "freedom from the will of others" or freedom from obligation to society.

This paradox has sometimes revealed "freedom" as a sinister misnomer with its feedback loops in the geo-political world, and yet we see often its opposite manifestations play out in the physiological world. In the darkness of space, we now peer into the lens of the telescope and observe the fractal patterns of newly discovered galaxies dancing in orbital agreement to avoid collision. In the darkness of inner space, the womb, we now see humans defined not so much by narcissistic grasping nor dedication to siloed identities nor even to a physical separateness or ideology or thought as much as to the value of *other lives.*

Consider a 2017 study designed to determine the awareness of unborn children. [35] Using laser technology, the researchers showed dot patterns to third-trimester fetuses. Random dot patterns evoked no response, but when arranged as the eyes, nose and mouth of a human face, the dot patterns evoked rapid heart rates in the fetuses. How might we interpret the emotions behind this innate biological response? Elation? Empathy? Anticipation of a lifetime of reciprocal attachments? Might we even regard

[1] Editing by Henry Wilson Lake.

this quickening heartbeak as the pulse of newborn relationships and eagerness to embrace societal roles?

The array of systems on this planet, whether linked through biology or technology or astronomy, weaves a vivid tapestry of cybernetic reaction—and also research topics.

One 2020 Nobel winner, Esther Duflo, the youngest laureate yet, shared the prize for her ground-breaking research on economic systems to end abject poverty. By varying the methods of data collection and the number and types of partners and countries, she and her partners succeeded in a process of randomized controlled trials not commonly used in this field. They made an impossible goal seem doable and designed a system for preventing the 8.8 million childhood deaths due to poverty. She anticipated only small triumphs and many setbacks, but she said to the Nobel committee:

This movement started with the conviction that it is possible to make significant progress against poverty in the world by focusing on well-defined questions, and being as rigorous as possible in answering those questions in the real world.

… An RCT allows a research to vary just what she is interested in, leaving the rest constant, and therefore be driven by the question she wants to ask

'We had two closely related ambitions. The first one was to contribute to improving the lives of the poor, here and now. The second was to build a better understanding of how they live their lives, from the ground up, by building a fuller picture, one question at a time.' [25]

SYMBOLOGY AND AGENCY

Claudio Paolucci (2020) referred to semiotic systems "not as the pre-existing thought located in our heads, but as forms that structure the way we think and know reality, or as cognitive scaffolding which represents the background of our perception of the world." [24]. Paolucci outlined the continually evolving nature of the semiotics movement, noting its progress toward and beyond an association of symbols that "does not exist to merely to *represent* the world but to create effective action through meanings based on tendencies and thus, habits." The habit of choosing words and symbols to create research topics and incentives can influence not only the researcher but the partners and those who stand to benefit from the research and to feel their lives enriched by the rigor, quality and intentions of the lives touched by the research. Perhaps a common visualization for the purpose and momentum of research will help us move beyond a simplistic understanding of the research path..

Polaris, commonly known as the North Star, illuminates the constellation Ursa Minor as its brightest pinnacle. Potentially as distant as 433 light-years away, its impact on human perceptions has proven poetic, pervasive, and sustainable over the centuries. As a result of its alignment with Earth's axis. this star gives the illusion of remaining in a fixed position while others change positions. This juxtaposition offers sailors, moonlight trekkers and even the nightbirds a beacon in the northern hemisphere, a nocturnal compass to guide their way. The slaves of the American South watched for the seasonal positioning of the North Star within the Big Dipper to direct their steps on the path to freedom, singing songs encoded with meaning, such as "Follow the Drinking Gourd." Long before that, Confucius (551 - 479 BCE) revived the spiritual traditions of the Far East by encoding a system of values, traditions and social norms. He expressed the instinct to act on behalf of others as an expression of true character—as the "North Star" that stays in place as other stars (social commitments) position themselves around it. The symbology of the North Star has thus suggested a destination of freedom, of virtue, of life-giving light across the continents and centuries [7] [8] [33].

In the world of research, the subliminal message of setting one's North Star to 'improving life' can generate a semiotic construct and cognitive scaffolding that both represents a clear perception of the world and initiates the habit of defining essential research questions that revolve around a central question: Whatever the subject, might the research improve life? Might it increase the quality, length, or meaning of life for humans or other species? I posit that the tendency for this North Star to bring greater personal meaning and altruistic impact to research holds true across transdisciplinary fields of study.

Table 1 depicts a semiotic chart developed by Wyeth [34]. Imagine a North Star as the symbol in the lower right. On the left, Improving Life, in this case, serves at the Referent, the quality of the world associated with the symbol. At the top of the chart, the Internal Representation will feature the specific research topic and its essential question: How will the study of this topic improve, enhance, harmonize, or extend life for the subjects? Whether human or of another species, whether readers, learners, technologists, participants in a cultural milieu, social construct or sustainable development experiment, the process should stand up to the same North Star scrutiny as a means by which to assess the context, meaning, habits and outcome of the research. At the top of the chart, the researcher assimilates an understanding of the social grounding and private understanding of the ultimate purpose for the research. By measuring the project against this standard of improving life, the research honors an evolving semiotic system unique to the agent's (researcher's) own context for relevancy. The examples herein speak to researchers across the disciplines.

CRAFTING THE ESSENTIAL QUESTION

Science may be values-neutral, but humans seek connections with other living things. Researchers have the

agency to align their North Star (the symbol) to an understanding of the quality of the world and a relevant "next question,", moving beyond perceived limitations.

Harari (2015) presented a moral dilemma in his discussions of the relationship between science, technology and problem-solving dilemmas. He offered the example of two research partners [12]. One biologist wanted to study a disease in the udders of cows that resulted in the decline of milk production. The partner wanted to study whether cows suffer mentally when separated from their calves. With limited funding available, and a community oriented toward the *economic* implications of the research, the second biologist decided she must link depression in cows with decreased milk production. Science itself does not have a preference, she reasoned, but research teams must act upon the constraints imposed by institutional value systems. Would circumstances change if mood versus production determined the value system, one wonders. Kimmerer (2013) observed that when the semiotic limitations of science, open up to the animist language patterns common in indigenous cultures, they shift the consciousness and the perceived value of life in all its forms. Suddenly a plant or animal becomes worthy for its role in the ecosystem as well as for the beauty of its existence as a life form [17].

The question of what it means to "improve life" remains sensitive to the fluctuating influences of public relations campaigns, sociopolitical influences, and increasingly, social media. As early as 2000, Chomsky [5] noted examples of developing Eastern European nations opening up to capitalism, where workers were persuaded that research supported the efficacy of "the spirit of the new age," meaning unbridled free-market independence. Entrepreneurs with small businesses struggled, along with hourly workers, and the World Bank reported that poverty more than doubled as incomes dropped 30 percent in the region. Public re-education efforts went so far as to reinterpret the position of theorists such as Adam Smith, who had equated sustainability not with individualism but with selfless commitment to society. The capability to target demographic groups through IC has made it ever more essential for honest evaluations of factors that improve the quality and quantity of life for the greatest number of constituents. According to one UNICEF worker, a developing community, when asked about their sustainable development need, claimed that all they needed was "more singing." Bhutan is also famous for measuring wellbeing not through GDP but GDH (Gross Domestic Happiness). One of the founding fathers of the European Union, Sicco Mansholt, coined the term Gross National Happiness in 1972.[16]. Since that year,

"Improving life" can also refer to enhancing the esthetic quality of life. From studies of aesthetics, some concepts relevant to this discussion have emerged: Beholders of beauty find rejuvenation, at the very least, and often seek deeper meaning in their observations; The sense of universal inspiration that aesthetic beauty also provides supports physical health. In a technology-rich society, we can turn to traditional cultures for metaphors that correlate beautiful actions with the beauty and reciprocity in nature; As we seek balance in postmodern society, we can take lessons from societies so collectively reliant on nature that they have strengthened their group intuition rather than compartmentalizing commerce and competition, science and mysticism [14].

METRICS FOR THE DIGITAL DIVIDE

Industry has an appetite for metrics that emphasize function, sometimes at the expense of outcome. (See Table 3.) A quick overview of the global ICT index offers clear examples of how to close the digital divide by increasing the *readiness* and *intensity* of computer and cell phone technologies across the nations, but measuring the third-stage indicator, the *impact* of ICT research, requires special attention to the Polaris factor associated with outcome.

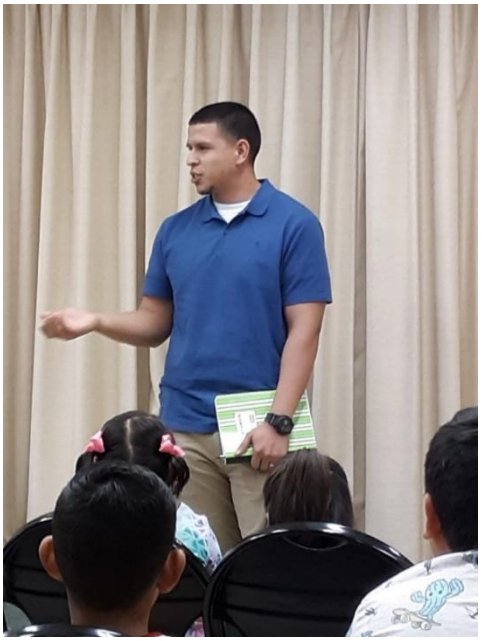
In the 1980s, as ICT research heated up, the financial markets' gauge of a company's worth veered increasingly toward shareholder value rather than "life improvements," confusing or even redefining the relative value of innovation. Today, in 2021, Harris polls show that 60% of Americans support minimum wage increases, suggesting that a living wage for all people exceeds the value of excessive profits for shareholders in the eyes of a public well accustomed to the vagaries of a market-based economy. One anonymous Silicon Valley entrepreneur and influencer confided that he and his colleagues now feel the ethical disconnect and try to redirect investors toward projects geared toward the betterment of humanity and the stability of workforces. Nobel economist Richard Thayler's work also emphasized helping employers use technology programs to streamline savings plans for employees, as one way to broaden the benefits of economic security. [25] Meanwhile, in the developing world, technologies such as cellphone-based cryptocurrencies make an impact, replacing the need for scarce bank accounts as solutions for shareholder farmers, offshore employees, entrepreneurs, and gig workers. This field could present more research opportunities, to create smoother functioning, with so many systems crashing due to increased usage and in response to the changing regulations of governments during the pandemic.

Satellite technology can also improve lives. An example occurred for a young engineer, Arturo, who grew up watching his father work hard in the citrus fields [19]. Although bright, his father never had the chance to move past fourth grade, so he could not help Arturo with his homework.

One day in summer school, at age 12, Arturo received a piece of graph paper, challenged to draw a diagonal line across the paper in response to stories that challenged him

to tally the number of lives he could touch over a lifetime in his chosen profession. By the time he tallied the number of people he could potentially serve as an engineer, his line had moved off the page. He decided to apply for a scholarship—the first in his community to attend a state school—and then earned his masters degree and was tasked with a special assignment, to design satellites for space-based drought observations, helping abate drought-based hunger. While his father still works in the fruit-basket of the world on the ground, Arturo followed his North Star and fills the fruit basket from space.

(Arturo Luna returned to speak to summer school students at his alma mater in 2019.)



PREVALENCE OF RESEARCH THAT REVOLVES AROUND A NORTH STAR

Bregman cites, in his 2020 work *Humankind*, cited the many cases in which researchers' own cynicism prevented them from advancing human progress by designing essential research questions to support life-expanding motivations. He offered his own positive reinterpretations of the findings of the Robber's Cave and Stanford Prison experiments and offered his discovery of the social cohesion of shipwrecked boys, overturning the misanthropy behind the classic novel *Lord of the Flies*. He countered research attempt to prove the dark side of humanity, rather than to present a schematic for uplifting the possibilities for humanity. Regardless of whether the reader agrees with any one point, the ultimate goal of improving life rarely occurs by settling for only answers to the darker questions. [1]

For example, an innovation associated with pesticides became far more innovative when the question shifted toward saving life rather than taking life. The anticoagulant coumadin was discovered in 1933 when a farmer approached a research Department at the University of Wisconsin. Some sweet clover in his field had begun to decompose into dicoumarol. A calf died in the field after eating it. The researcher, Karl P. Link, thought about potential agricultural applications and developed rat poison from the substance. It took another 20 years for scientists to determine that if used as an anticoagulant to *save* lives instead of a pesticide to kill rats, coumadin could dissolve blood clots and prevent strokes. By reversing the question, researchers eventually presented coumadin as the substance that has preserve the quality and length of more lives than any drug except penicillin. The research may have initially contributed to food security, but the real potency of the innovation lay in its life-saving properties. As Proust would say, the field research did not need to move the researchers to new places but to "give them new eyes." Saving life became their North Star [25 [27].

Ryan Campbell, (2016) documented the trend among engineers to choose humanitarian projects, when given a choice, writing, "… technical solutions are not the value-neutral panaceas we might imagine them to be. If we engineers are unaware of the values driving our efforts, we are unlikely to create lasting solutions to the problems we hope to address." [4].

In areas of social action research, the same trend has surfaced. Pirroni cited growing awareness in the development community to move beyond outmoded emphasis on work programs alone, toward dignified work conducive to social cohesion and civic engagement that can advance the quality of life, particularly in conflict-affected countries such as Colombia [26]. The paradigm shift in the global south has moved a growing number of scholars and practitioners to explore "capability approaches to technical and vocational education that elevate conceptions about the world of work." She notes. "This research explores…the development of capabilities that can enhance livelihood opportunities of youth populations and their engagement in positive social action."

Among an even greater number of countries, researchers addressing United Nations sustainable development goals, strive to articulate questions that will improve life rather than meet a minimum standard. Harwell wrote: "The greatest barrier to achieving the Millennium Development and Education for All … by 2015 is the inability of public education systems in the poorest countries to adequately reach and educate large segments of their populations… This failure has enormous consequences for national education systems, for countries' human resources and economic development." He then set out to pursue "ongoing research that explores how it is that complementary education models organize and deliver

primary schooling that assures children's learning," and to examine "policy implications for achieving quality basic education for all children." [10] Instead of recreating the status quo, the researcher honestly assessed and re-envisioned the impact of current policies on the actual lives of families, communities, and nations.

THE RIPPLE EFFECTS OF RESEARCH

The search for ways to improve life resists the forces of competition and inertia, creating new patterns of thought, of speech and a shifting momentum of transdisciplinary research – a new cybernetic wind around a common North Star -- just as cells in a petri dish or particles in a pond vibrate in response to one another even without knowledge of one another.

For example, a transdisciplinary project in the 1990s, conducted by Sam Oliner and the late Pearl Oliner connected behavioral health, organizational management, and altruism studies. While the altruism studies emerging at major universities mostly monitored the innate other-directed behaviors of children, [9] [31], this Humboldt University study reversed the question, seeking to support the common good by asking, What normative values and common early life experiences motivate lifelong altruists? The implications of their research, if implemented in multiple contexts, could both measure and produce a profound effect across cultures and research domains, increasing the number of altruistic leaders in the world. [23]

The Oliners' study identified and interviewed 1,000 diverse adult leaders. They had founded organizations to assist concentration camp victims or to improve race relations or to thwart homelessness or a strata of other life-reviving, life-enhancing causes. The range of their arenas of civic engagement affected vastly different demographics groups. These heterogenous subjects engaged in private interviews, to identify any common childhood experiences that had contributed to their altruistic leadership in adulthood. From the interviews, the questioners synthesized indicators that suggest a human being will contribute to a society in ways that improve life for its members.

Guy Murchie [20] **[**wrote about waves and their paradox, and the upper swell followed by the lower swell. When research explores the negative impact – the corrosive, corruptive, diseased part of a system—the answers may focus on what to remove. The elegance of this research design lay in its system of elements to include in the life of diverse, nascent altruists and the society they build.

The Humboldt research generated new outcomes for social programs and educational projects that swayed in its cybernetic breeze over the following two decades. For example, it added new layers to the planning of Full-Circle Learning (FCL) education programs around the world [18]. The FCL curricula began to incorporate new teaching expectations based on the altruism research implications suggesting that: a. Evolving young altruists experience hardships as problem-solving opportunities and as chances to develop resiliency, compassion, and life skills (and this holds true whether the hardship is authentic or experienced vicariously through service-learning projects); b. Such children improve their skills at conceptualizing solutions not through homogeny but, rather, when frequently exposed to diverse rationales, through opposing perspectives, cultures, or nationalities; and c. The budding altruists, in the long run, feel perhaps even more influenced by adult role models in the adoption of normative values than in the acquisition of knowledge.

Many other research variables also influenced the development of Full-Circle Learning programs as well, but this one study influenced curriculum development in ways unbeknownst to the original researchers. A 2017 community impact study, in particular, reflected the linguistic similarities of interviewees in the FCL interviews with those in the earlier study. Schools—mostly among vulnerable populations—in six different nations participated in the 2017 long-term community impact study. (Locations included Djamena, Chad; Hanghzou, China; Piru, California; Mohkotlong, Lesotho; Monrovia, Liberia; and Lusaka, Zambia.) The study compared "best practices" of educators, factoring in diversities and complexities while cataloging school leadership assets and setbacks in regions where teachers had emphasized societal and personal transformation and contribution to the well-being of the broader society. The Oliners' three priorities of altruists had featured largely in the planning process and in the twenty marks of an evolved Full-Circle Learning school. In the private interviews, educators, students and parents mentioned 22 life skills and 17 academic benefits of their project participants. The six nations' interviews generated spontaneous participant comments aligned with the semiotic symbols of life and social cohesion of altruistic communities. For instance, subjects named *purpose, awareness of how to solve the world's problems, harmony building, transformative decision making, community impact, intergenerational bonds, and relevant applications of practices the learning (citing examples such as Ebola mobile schools and electricity projects in Zambia and Chad).* Clearly, where driven by essential questions about improving life for others, year after year, children and teachers had risen to the challenge of improving life together despite their level of hardship. They had proven the effectiveness of the Oliners' research unique research methods of defining the ideal (the multi-faceted altruistic society) rather than researching for a singular research question in a world of hurt. The question clearly mattered [17].

MOVING EVERYTHING BUT THE STAR

If indeed a growing number of academicians set out to act on the positive interests of a sustainable society, what barriers inhibit the humanitarian objectives of the remaining researchers? Why do we see industries split in the way they use research to justify unfair practices or to ignore injustices or to maintain neutrality in milieus which could celebrate and improve life? We might assume the answer lies in the research itself-- in both the diverse and complex factors that beset a study, the need for social action research that supports a career goal, or the need to achieve answers within a funding period, before a tight deadline or within the parameters of an institutional partner's interests. Beyond that, it may be difficult to fully expand our imagination--to grapple with the fact that the legacy left by difficult research, and thus, the value of the question, may unfold in outcomes experienced ultimately only by future generations. Yet one more complexity emerges in the transformation process itself. If improving life holds the position of North Star and all other factors revolve around it, the researchers must return again to the narrative in their own minds to see whether it supports the transformation they seek in society.

Mezirow [2000] noted the difference between changing our causal assumptions about how the world works and changing our ideas about a given situation, referring to transformation as a "movement through time of reformulating reified structures of meaning by reconstructing dominant narratives." These shifts in paradigm often occur as the result of a disorienting dilemma, followed by a series of steps involving reexamination, exploration of new options, planning a course of action, building additional competencies and new relationships and finally, reintegration of one's life based on the transformed conditions and perspectives [19].

Think of the researcher as a mariner, whose navigation path must matter not only for self but for society—whose path aligns more with that of the mystic than the merchant. Now consider the significance of transformation as it relates to the life of the researcher. The Internal Representation portion of the semiotic graphic in **Table 1** continually stirs with new possibilities, in subtle movements that parallel those of the Big Dipper in **Table 2.** .[14] As the seasons pass, the constellations move, but the North Star remains in place. The rotating star pattern serves as a metaphor for gathering experiences that change the structure of meaning for the agent, or referent. A disordering dilemma gives way to 1) a shift in awareness, 2) new explorations, 3) emerging semiotic systems or habits of thought, and 4) new collegial relationships, perspectives and concepts—all elements that evolve and revolve from season to season in concert with that fixed, primal point of light, the commitment to a clear definition of life-enhancing research.

In the following examples, we see this pattern undulate across time periods and disciplines:

1. Radia Perlman, always a bright student, did not consider herself a hands-on practitioner. She did not think of herself as someone who dismantles gadgets. Because necessity acted as the mother of invention, however, she became the "Mother of the Internet," earning the title after her employer, Digital Equipment Company, challenged her to find a way to bridge its internal computing systems. What started out as a thoughtful approach to a research question set her on a new path, launching many patents that have revolutionized the world of work and changed the nature of personal and professional computing. Her 1980 solution for bridging systems still provides the platform for digitally uniting the world community. She once said, "The kind of diversity that I think really matters isn't skin shade and body shape, but different ways of thinking." [28]

2. Logging and land use exploitation were considered standard conservation practice when Richard St. Barbe Baker began forestry school at Cambridge in 1918. He later rose to a position of authority as a would-be colonialist in Kenya. Instead, he observed the negative impacts of centuries of nomadic farming, where the Romans had bartered land for food, creating a dust bowl where once a forest had once stood. He experienced an existential crisis. When a member of his company was about to flog one of his valued indigenous workers, he stepped in and took the beating himself, losing his job but deepening his relationships with indigenous peoples. He devoted the rest of his life to developing reforestation programs around the world, inspiring the work of Wangari Mathai and founding the Men of the Trees (now the International Tree Foundation) [9].

3. Agronomist Norman E. Borlaug grew up in a one-room schoolhouse. When the immigrant Norwegian and Czech children united to sing the Iowa Corn song, casting aside their ethnic and linguistic and differences to survive, he began to understand agriculture as the universal lexicon of survival. He studied wheat production across the latitudes in Latin America and Asia to reduce famine in the world, integrating various research streams into new technologies and social movements and launching the Green Revolution. He was credited with saving more lives than anyone alive by the time he won the Nobel peace prize in 1970 [2]

4. 2020 Nobel laureate Jennifer Doudna grew up in a small town in Hawaii. She and Emmanuel Charpentier won the prize in chemistry for research on genome sequencing. Their

groundbreaking long-term discovery of DNA nucleotide patterns and gene editing has implications for the treatment of inherited genetic diseases such as genetically inherited cancers. Douda grew up in Hawaii, observing evolution in the natural world. Her father challenged her to match this interest with a sense of purpose, asking, "What are you doing and why are you doing it?'" [22]

5. Many have heard the death-bed doubts of scientists who contributed to war technology, but one researcher, Sweden's Alfred Nobel, eventually found his North Star in a way that reversed his earlier decisions. He developed a heart condition late in life, and his physician prescribed nitroglycerin. Alfred knew the properties of nitric oxide and did not want to put it in his body, so he refused the pills. One night he suffered a heart attack, and the horse and buggy came ringing their bell, to take him to the hospital. A nearby journalist submitted his obituary when he saw the ambulance carry Nobel away. When the scientist awoke in his hospital bed the next morning, he read the headlines calling him a merchant of death and a master of destruction because he had used his father's gunpowder factory as a laboratory to invent dynamite, which rewrote the death toll of the Franco-Prussian War.

   Nobel recognized with deep remorse that he had embraced research purely for the sake of science and had to reverse direction. He quietly called his attorney and set up a trust ensuring that after his death, each year for a century, prizes would award those whose research could bring about the "greatest benefit to humankind." His will designated 10 million Swedish kroner each to researchers in the fields of: physics, physiology, chemistry, literature, and later peace. He designated a separate institution to secretly research and grant each annual award, not on the basis of campaigning nor on the fame of their institutions but on the altruistic impact of those who had followed their North Star.

Ironically, on the 100th anniversary of the Nobel prize, in 2001, laureate Lou Ignarro won for research on the properties of nitric oxide in the blood stream. Imagine the number of Nobel laureates who would never have funded their continuing work if Alfred Nobel had understood the potential of nitroglycerin a century earlier and avoided heart failure. His transformation proved advantageous to human life in countless ways. By finding his own his North Star at last, he recalibrated the rest of his constellation around it, for more than a century past his death, and scattered stardust for the rest of humanity [2] [22].

We do not have to wait for deathbed opportunities. Each of us can cast such a light, every time we contemplate the mysteries of the universe and the mysteries latent in our own minds.

FINDINGS

An embryonic instinct to connect with life aligns research trends imbued with meaning, through values that enhance life and its quality and sustainability. The definition of "improving life takes on the normative values of the society, bears continual self-reflection, and can encompass aesthetic values. It may embrace all species and life forms.

Across the disciplines, researchers participate in semiotic systems that help them consistently aim their research projects at ultimate impacts to support this goal. Examples include Pirroni in redesigning work project goals in Colombia, Hartwell in evaluating UN development goals in Africa, and Campbell in evaluating engineers' motivations. Examples in ICT include economic systems that value the worker as well as the outcome and impact of the technology.

By choosing the standard of "improving life" as a North Star, researchers have not only generated influence through their specific research topics but have stirred movement within systems and across disciplines, toward more global altruistic outcomes. This cybernetic breeze occurred in the case of the coumadin researcher Professor Link, in St. Barbe Baker's reforestation efforts and Borlaug's agronomy movement, through Perlman's wave of digital pioneers, and in Nobel's inauguration of research devoted to the benefit of humanity.

This effect amplifies when the researcher presents a question by studying an "ideal" for systems to replicate rather than presenting a "problem" to correct. Such an impact occurred both in the case of the coumadin use reversal, which saved untold lives, and in the case of the Oliners' altruism study and its backward design approach, whose cybernetic breeze traveled across six known nations.

While a North Star remains fixed, presenting a focal point for the researcher (referent) and setting new norms across disciplines, that referent, still experiences agency due to the diverse and complex world conditions and semiotic systems that shift from season to season. Disordering dilemmas may actually enlarge or expand the spheres and movement within semiotic systems, set in motion new areas of exploration, generate or renew collegial relationships and mount new life-sustaining research. Each of the examples above at some point revealed such a moment.

CONCLUSIONS

Altruistic purpose can generate a pivot point that holds constant as a North Star, even in semiotic systems such as transdisciplinary research systems.

Agreement on what constitutes an enhanced life will influence an agent's North Star. Longitudinal studies about benefits for humankind offer ideal reference points.

New research opportunities in ICT and across all the disciplines exist to enhance equity, aesthetics, and life in all its forms. Looking beyond the metrics of industry standards to the ethical merit and potential outcomes will help define essential research questions and the level of rigor needed to address them.

Variables determining specific world needs shift, as do the disordering dilemmas and conditions affecting an agent's personal transformation and potential research options, while the fixed point in the constellation—to improve life—if it remains constant, can inspire shifts in trends as constellations of thought, habit and technology carry potentialities from one plane or discipline to another, based on that common Polaris – to support and improve life.

Transformation results when disordering dilemmas and orbits of consciousness stir semiotic systems. Research may become more profound as it crosses cybernetic pathways and extends beyond a lifetime.

Perchance the mere symbology of the "researcher as mariner" will create new momentum around a luminous[2] fixed objective of improving life for the researcher in any field of endeavor. Continuing research may, indeed shed starlight on this topic.

TABLE 1. WYETH'S CHART AS A POINT OF REFERENCE

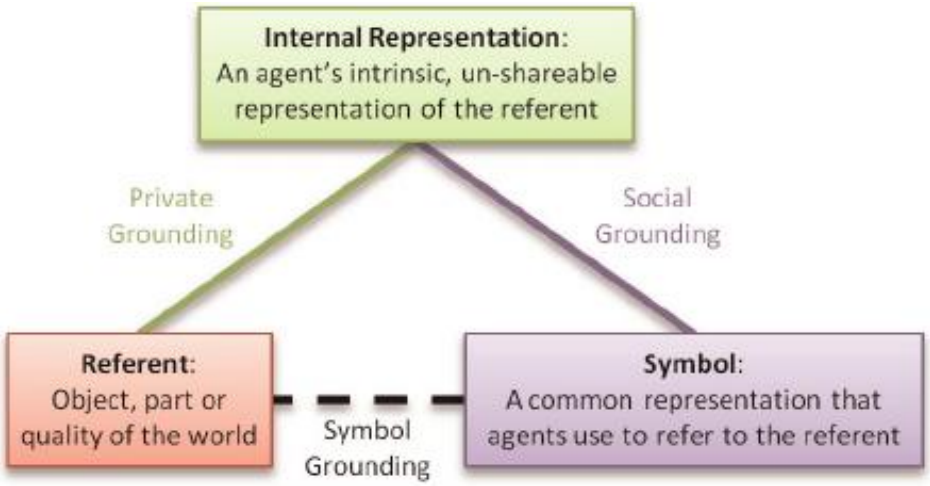


TABLE 2. THE BIG DIPPER

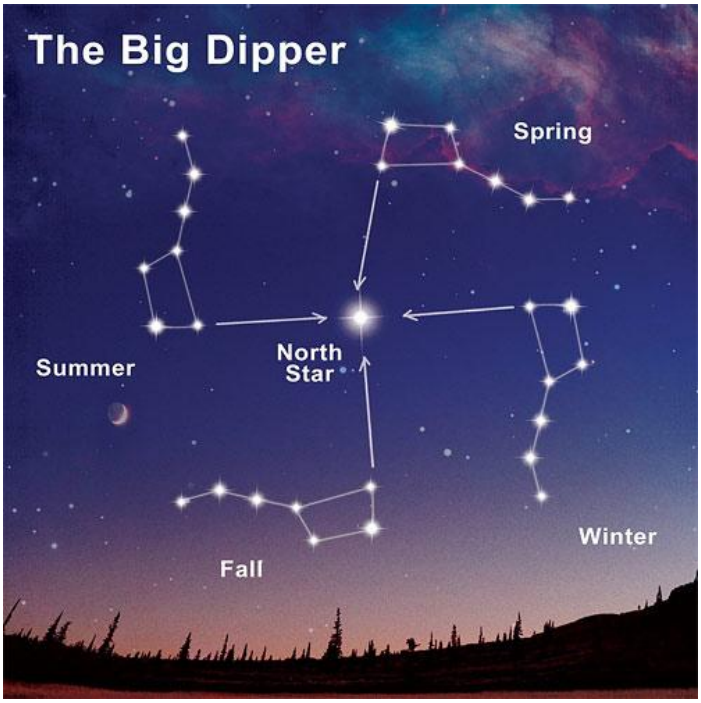
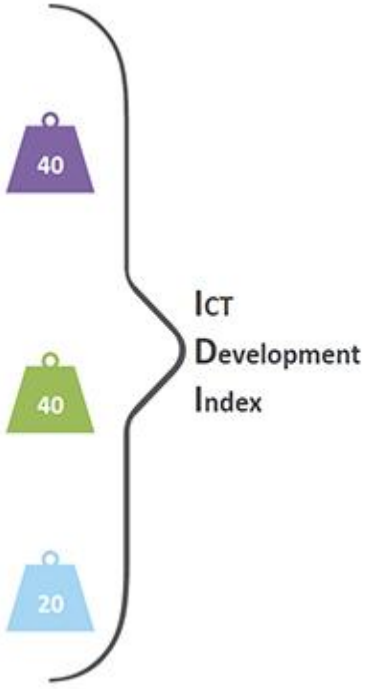


TABLE 3. DO WE ENVISION MERELY CLOSING THE DIGITAL DIVIDE OR OPENING UP POSSIBILITIES? *

- **Stage 1: ICT readiness** – reflecting the level of networked infrastructure and access to ICTs;
- **Stage 2: ICT intensity** – reflecting the level of use of ICTs in the society; and
- **Stage 3: ICT impact** – reflecting the results/outcomes of more efficient and effective ICT use.

ICT access	Reference value	(%)
1. Fixed-telephone subscriptions per 100 inhabitants	60	20
2. Mobile-cellular telephone subscriptions per 100 inhabitants	120	20
3. International Internet bandwith (bit/s) per internet user	976'696*	20
4. Percentage of households with a computer	100	20
5. Percentage of households with Internet access	100	20
ICT use	**Reference value**	**(%)**
6.Percentage of individuals using the Internet	100	33
7. Fixed-broadband subscriptions per 100 inhabitants	60	33
8. Active mobile-broadband subscriptions per 100 inhabitants	100	33
ICT skills	**Reference value**	**(%)**
9. Mean years of schooling	15	33
10. Secondary gross enrolment ratio	100	33
11. Tertiary gross enrolment ratio	100	33



*Goals Developed by the Telecommunication Development Sector (ITU-D), a Specialized United Nations Agency

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