

Applying Humanized Physics to Penology: Parallels between the Natural and Social Realms

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Recently, I authored two papers that employed socio-physics to achieve a greater understanding of penal issues. The purpose behind these exercises was to determine if a common set of laws govern both the physical and social realms. These papers are respectfully entitled, *Thermodynamics, Newtonian motion, and the prison: The effects of energy, entropy and mass on rehabilitation*¹ and *Sub-atomic particles and prisoners: A novel examination of socio-physics and penology*.² These early efforts reinforced my belief that commonalities exist between all academic fields and that the explanatory and predictive ability of any specific discipline increases when knowledge from multiple fields are combined. I remain convinced that the lines that have traditionally separated the sciences must be crossed if we are to improve the human condition. Socio-physics, an emerging example of interdisciplinarity, applies physical concepts and laws to the social realm to obtain an increased understanding of human and institutional behavior.

In my most recent paper, I used energy, entropy and motion to analyze the prison. I concluded that the prison is gravitating toward a low energy state. For example, since rehabilitation is a proactive pursuit requiring a committed effort by officials and inmates alike, it is more energy-dependant than are other penal objectives. The contemporary movement curtailing treatment initiatives suggests that the amount of energy available within the prison is decreasing. Furthermore, it appears that the prison is moving toward an increased level of entropy as indicated by rising recidivism rates among ex-inmates (recidivism being a measure of the prison's ability to promote lawful behavior following release). And finally, it was observed that when an object/system gains or loses mass, its behavior is affected. A

¹ Blakely, C. (2013). *Prison service journal* (no. 206).

² Blakely, C. (2010). *International journal of criminal justice sciences* (vol. 5, iss. 2).

prison's mass was viewed as being equivalent to the size of its inmate population, and as this population has risen, the prison's actions have become less treatment oriented.

In my initial paper, I compared the prison to an atom's nucleus visualizing each as the unifying force through which interactions occur. The proton was compared to those inmates displaying a favorable or positive attitude toward treatment. Conversely, the electron was compared to those inmates displaying an unfavorable or negative attitude toward treatment. This position (reminiscent of Niels Bohr) was more recently endorsed by Richard Feynman (Nobel physicist) who stated that "there is nothing that living things do that cannot be understood from the point of view that they are made of atoms acting according to the laws of physics."³ I also observed that when opposite charges (or orientations) exist within a system, energy tends to flow in one direction - from a negative toward a positive state. If energy and peer influence are comparable, and if particles and prisoners are similar (as I assert), then it is the negatively oriented inmate that influences those inmates with a positive orientation. If this is the case, the current practice of housing amenable and nonamenable inmates together within the same correctional facilities perpetuates criminality and leads to unnecessarily high recidivism rates. To break this cycle, an insulator was proposed to protect amendable inmates from the corrupting effect of negativity.

Each of these papers revealed the ability of physics to provide insight into the complexities of social phenomena. Utilizing socio-physics in the present fashion requires that a determination be made about whether parallels exist between the natural and social realms, and if so, to what extent physics is able to provide insight into human behavior. The great educational philosopher Edwin Slosson, when studying America's universities, suggested that all institutions of higher learning create a "Department of Humanized Physics."⁴ While the precise meaning of Slosson's phrase is unknown, it is clear that he was a proponent of interdisciplinary cooperation. Furthermore, John Trumbour (an educational historian), when writing about scientific ideologies, observed that most fields including philosophy are indebted to

³ Brown, L. & J. Rigden (1993). Feynman quoted in *Most of the good stuff: Memories of Richard Feynman*, American Institute of Physics, New York, NY.

⁴ Slosson, E. (reprint 1977). *Great American universities*, Arno Press/Macmillian Company, New York, NY.

the advancements in human thought brought about by Newtonian physics.⁵ *The Vienna Circle*, an early twentieth century group of scientists and philosophers took this idea further when they advocated a doctrine of unification in which all sciences would use the same language, methods and laws.⁶

In the following pages, the “*big bang*” is considered the natural equivalent to the creation of America’s prison system. Similarly, the expansion of the universe is considered a natural parallel to the expanded use of incarceration as a criminal sanction. While I refrain from suggesting that parallels always exist between the physical and social realms, those that do exist, promise to provide increased insight into human behavior. While the approach undertaken in this paper is admittedly unorthodox, it nonetheless permits us to think “outside the box”. This proves essential if one believes, as did Feynman, that social phenomena are more difficult to understand than are natural phenomenon.⁷ The quest for knowledge using socio-physics as a search-mechanism proves important to penologists since few institutions have a greater potential to affect human behavior or impact public safety than does the prison. To that end, I selected the *big bang* and *cosmic inflation* for inclusion in this paper for three reasons. First, each is easily recognized by most citizens. In fact, it is difficult to imagine an adult that hasn’t encountered these theories. Secondly, no single event has resulted in greater scientific conjecture and exploration than has the origins of our existence. And finally, this effort pays homage to U.S. Supreme Court Judge William Paterson (1795) who compared the social and planetary realms⁸ - the first recorded comparison of its kind by a criminal justice official.

The Big Bang and Inflation

Most of us, at one time or other, have wondered about the birth of the universe. For example, it is common for children to ask questions about where the stars and planets came from, and by default, where we come from. While humans have sought answers to the secrets of creation for millennia, it wasn’t until

⁵ Trumbour, J. (1989). *How Harvard rules*, South End Press, Boston, MA.

⁶ Blakely, C. & A. Walkley (2010). *Bio-penology: The protean approach*, L.A.E. journal, December.

⁷ Feynman, R. (2006). *Classic Feynman*, W.W. Norton & Company, Ltd., London, England.

⁸ Commission on the Bicentennial of the United State Constitution (1992). *The Supreme Court of the United States: Its beginnings and its justices 1790-1991*.

the early twentieth century that science had advanced to the point where natural phenomena were being explained through systematic observation, the use of testable hypotheses, and the development of theory. One early and widely accepted explanation for the existence of the universe was the *Steady State Theory*. This theory ignored the birth of the universe and instead held that it has always, and will always, exist. As such, the universe had no beginning and will have no end. Stephen Hawking, an internationally renowned physicist, refers to this theory as the “*it just is*” conjecture.⁹ However, advancements in physics, cosmology and astronomy increasingly challenged the notion of a static universe. As early as 1912, scientists witnessed celestial objects moving away from Earth, leaving them temporarily unsure of how to interpret their observations. Then in 1927, Georges Lemaitre, a Roman Catholic priest and amateur physicist, suggested that the entire universe was expanding. This theory implied that at some earlier time, all matter was compressed into an inconceivably small point of infinite density and temperature (called a singularity). Furthermore, an explosive event scattered this matter and as it did, space itself was created. Cosmic inflation, as it is now called, refers to the exponential growth of the early universe, with this expansion continuing even today. Paul Dirac (Nobel physicist) believed that this discovery may ultimately provide insight into the complexities of nature itself.¹⁰

During a 1949 radio broadcast, Fred Hoyle an English astronomer and an outspoken proponent of the *Steady State Theory*, coined the expression ‘*big bang*’. He used this phrase to refer sarcastically to Lemaitre’s suggestion concerning the universe’s origin. Despite his open opposition, other scientists including George Gamow, Ralph Alpher and Robert Herman, proceeded to systematically develop the “*Big Bang Theory*”. These scientists, and others, predicted that an explosion of such enormity would have produced residual radiation that should still be detectable today (even though it occurred 13.7 billion years ago).¹¹ And in fact, this radiation was discovered in 1964 by Arno Penzias and Robert Wilson (Bell Laboratories) earning each of them a Nobel Prize. Scientific models based on the *Big Bang Theory* suggest that the universe will follow one of these paths:

⁹ Hawking, S. (1993). *Black holes and baby universes*, Bantam Books, New York, NY.

¹⁰ Farmelo, G. (2009). *The strangest man*. Basic Books, New York, NY.

¹¹ Farmelo, G. (2009). *The strangest man*. Basic Books, New York, NY.

- it will continue to expand, or
- it will continue to expand (for perhaps a few more billion years) but will eventually contract and return to a point of singularity, or
- it will undergo a never ending series of expansions and contractions.

While the first possibility lends itself to speculation about the ultimate fate of the universe, it is the second and third possibilities that prove valuable to the present effort. Whether the universe is engaged in a continuous cycle of expansion and contraction is debatable, what is of particular interest however is that two of these possibilities suggest that expansion is inevitably followed by contraction. Therefore, the second and third possibilities are, for all intents and purposes, treated herein as a single prospect.

Operating under the belief that expansion is evidence of a big bang event, we should recognize that the effects of expansion are numerous and potentially catastrophic. For example, as the universe was created and as matter was propelled outward from its point of origin, energy began to dissipate, being spread ever-more thinly. Moreover, as energy was being converted into matter, its availability decreased even further. And thirdly, expansion led to entropy. Entropy is the inability of energy to be used effectively or to be transformed from one of its forms into another. Collectively, these effects, which I refer to as the “*detriments of expansion*” result in a state of progressive decline. For example, as the universe expands, its temperature (a measure of its free energy content) will decrease, eventually subjecting it to “*heat death*.” Heat death denotes the process by which the energy content of the universe dissipates to such an extent that its temperature reaches absolute zero.

While the ultimate fate of the universe is unknown, expansion may have its limits. The general theory of relativity permits both the expansion and contraction of space, each being controlled by gravity. Respective models suggest that expansion may eventually slow, ultimately resulting in contraction. However, this is dependant on whether enough matter exists in the universe for its collective gravitational effect to result in a form of “*cosmic elasticity*.” Much like the resistance that is encountered when stretching a rubber band, the universe may eventually snap back, returning to its original state. While this

potentiality is often referred to as the *big crunch*, I prefer to call it the “*rubber band effect*”. If this occurs, a point of singularity would again be achieved, allowing the universe’s energy, temperature and denseness to return to their pre-inflationary levels. Since expansion is predicted to continue for at least another ten billion years, the cycle of expansion, contraction, and rebirth may take untold millennia.¹²

Social Parallel

Any parallel existing between the *big bang* and the creation of America’s prisons can be traced to the establishment of the Walnut Street Jail (1773). This facility served as both a jail and prison for the city of Philadelphia and is generally recognized as our earliest correctional institution of significance. While much of its history has been lost, it was originally a small and densely populated facility with limited capacity. To address this issue, it expanded in 1790, with its total capacity reaching perhaps 200 inmates - yet its size again proved inadequate. In response, the Pennsylvania legislature authorized the construction of two additional facilities, these being Western Penitentiary in Pittsburgh and Eastern Penitentiary in Philadelphia. Within a few decades of their construction, Pennsylvania’s prison population approached nearly 2,000 inmates¹³ - reflecting the growing national popularity of imprisonment as a criminal sanction. For example, from 1850 - 1870 the ratio of individuals incarcerated per 100,000 U.S. citizens tripled, and for most of the twentieth century, prison populations experienced a net gain of approximately 10,000 inmates per year.¹⁴ However, the prison would soon face an expansion event of unprecedented magnitude. By the end of the twentieth century, the nation’s prisons were experiencing a net gain of approximately 40,000 inmates per year.¹⁵ This has resulted in nearly 1 out of every 100 American adults being incarcerated, a rate that is 5 to 8 times higher than that of other nations.¹⁶ Currently, state and federal prisons hold about 1.6 million individuals (compared to about

¹² Hawking, S. (1993). *Black holes and baby universes*, Bantam Books, New York, NY.

¹³ *Historical corrections in the United States, 1850 – 1984* (1986). U.S. Department of Justice.

¹⁴ *Historical corrections in the United States, 1850 – 1984* (1986). U.S. Department of Justice.

¹⁵ Pew Center on the States (2012). *Time served: The high cost, low return of longer prison terms*.

¹⁶ Pew Center on the States (2011). *State of recidivism: The revolving door of America’s prisons*.

300,000 in 1980) and when jail inmates are included, this number approaches 2.5 million.¹⁷ The probability that a citizen will be incarcerated during his/her lifetime has tripled in the past four decades, suggesting a major shift in America's political and penal ideologies.

While it is inherently difficult to offer generalizations about prevailing ideologies, it is nonetheless necessary to the present undertaking. When we consider each decade since 1930 and compare its prevailing penal ideology to the capacity levels of its prisons, it becomes apparent that during eras characterized by a punitive rationale, both the number of prisons and inmates increased. Similarly, during those eras characterized by a rehabilitative rationale, expansion slowed and, during at least one decade, a period of contraction resulted as was the case from 1960-70.¹⁸ While poorly kept records and inconsistent data make it difficult to trace the history of the prison with precision, evidence clearly suggests that there have been numerous periods in which the prison has expanded and contracted. Further comparisons between the big bang, inflation, and incarceration require a determination to be made about the level of energy and entropy present within the contemporary prison.

Energy and Entropy

In my earlier paper entitled *Thermodynamics, Newtonian motion, and the prison: The effects of energy, entropy and mass on rehabilitation*, I offered the following observations:

- energy within the prison always seeks its lowest level,
- the amount of energy within the prison varies but tends to dissipate over time,
- the prison's ability to promote public safety (on a long-term basis) tends to decrease over time,
- fluctuations in the prison's mass and/or energy levels produce corresponding changes in behavior, and
- the prison's operating ideology, whether rehabilitative or punitive in nature, will remain static unless forced to act otherwise.¹⁹

¹⁷ Pew Center on the States (2012). *Time served: The high cost, low return of longer prison terms*.

¹⁸ Comparing data contained in *Historical corrections in the United States, 1850 – 1984* (1986) (U.S. Department of Justice) to correctional eras as determined by Schmalleger and Smykla (*Corrections in the 21st century*, 4th edition, 2009, McGraw Hill Publishing, New York, NY).

¹⁹ Blakely, C. (2013). *Prison service journal* (no. 206).

These observations suggest that the prison is governed by laws that are often associated with the natural sciences. To determine how energy, entropy and the prison are linked, one must begin by evaluating the amount of energy present within the contemporary penal environment, and the most logical way to do this is through an assessment of its involvement (or lack thereof) in rehabilitative pursuits. Such an approach is necessary since offender rehabilitation is the most energy-dependant objective of the prison, consuming large quantities of resources. Similarly, the only way to measure the prison's current level of entropy (as defined by its ability to apply energy in an efficient and effective manner) is to consider the recidivism rates of former inmates.

To assess rehabilitation, we must recognize that it has long been the guiding operational philosophy of the American prison. It was sanctioned by the puritanical principles of forgiveness and salvation, though at times its pursuit was admittedly inhumane.²⁰ As early as the 16th century, offender rehabilitation was viewed as critical for the advancement and continuing welfare of society. The significance of its pursuit and the prominence that it held within penology was repeatedly affirmed by political and correctional leaders. Its pursuit persisted for most of the prison's history, but as the 1970's approached, debate about the achievability of rehabilitation became a politicized topic, partly due to an increase in the frequency and magnitude of riots occurring within our nation's prisons. In fact, nearly 60% of all riots taking place in the twentieth century occurred during the 1970-80s with 40% occurring in the 1980s alone.²¹ The impact that these events had on the American psyche was profound, creating the perception that our nation's prisons were wholly ineffective at facilitating offender reform. Therefore, it was argued, that the prison should simply house inmates as cheaply as possible – providing few programs or provisions. To this end, most resources for treatment, education and rehabilitative initiatives were

²⁰ Blakely, C. (2008). *American criminal justice philosophy revisited*, Federal Probation (June).

²¹ Montgomery, R. & G. Crews (1998). *A history of correctional violence: An examination of reported causes of riots and disturbances*. American Correctional Association, Lanham, MD.

significantly curtailed.²² This resulted in at least half of all states drastically reducing or eliminating educational curriculum.²³

As the prison increasingly began to discard its rehabilitative ideology, the judiciary took note. As such, the California Court of Appeals ruled that “conditions” of confinement could be used, at times, to justify escape.²⁴ It appeared that in the absence of the humanizing effects long associated with treatment and education, the prison’s environment deteriorated. Similarly, growing cynicism (endorsed by such noted penologists as Robert Martinson, James Q. Wilson and David Fogel) was legitimized when Ronald Reagan assumed the presidency (1981). As a staunch conservative, Reagan wasted little time in promoting incarceration absent a rehabilitative ideology. Nonetheless, rehabilitation as a penal objective is currently supported by 90% of all American citizens.²⁵ Similarly, offender rehabilitation is still mentioned in nearly half of the mission statements of our nation’s prisons. Even the word “corrections” suggest that while rehabilitation has lost its political support, it nonetheless remains an objective of incarceration.²⁶ Yet, it proves difficult to locate information about the effects of treatment on pre and post-release behavior (perhaps because so few programs have survived and little funding is forthcoming). Consider that in 1983, approximately 63% of all ex-inmates were re-arrested within three years of their release, increasing to 68% by 1994.²⁷ Furthermore, about 70% of all ex-inmate’s are now re-institutionalized within 3 years of release²⁸ up from about 33% in the early nineteen-eighties.²⁹

It is important to recognize that the current ideology that promotes incarceration strictly as a punitive tool has significantly contributed to the prison’s increased mass. When the prison gains or loses mass, the amount of energy (which is always decreasing) fluctuates. In essence, as mass increases, a

²² Blakely, C. (2008). *American criminal justice philosophy revisited*. Federal Probation (June).

²³ Blakely, C. & A. Walkley (2010). *A physicist, a philosopher and a politician: What penologists can learn from Einstein, Kant and Churchill*, Internet journal of criminology.

²⁴ *People v. Lovercamp*, 1974; also see *People v. Harmon*, Michigan, 1974 and *People v. Unger*, Illinois, 1977).

²⁵ Warren, R. (2007). *Evidence-based practice to reduce recidivism*. U.S. Department of Justice.

²⁶ Blakely, C. & A. Walkley (2010). *A physicist, a philosopher and a politician: What penologists can learn from Einstein, Kant and Churchill*, Internet journal of criminology.

²⁷ Langan, P. & D. Levin (2002). *Recidivism of prisoners released in 1994*. U.S. Department of Justice.

²⁸ Silk, E. (2011). *70% of state’s released inmates return to prison*. Peninsula Press, Stanford University (CA).

²⁹ *Historical corrections in the United States, 1850 – 1984* (1986). U.S. Department of Justice.

rerouting of energy becomes necessary to meet the supervision, nutritional and health care needs of a large and growing population. This leads to a decrease in therapeutic initiatives which have recently functioned as a makeshift *battery* from which needed energy and resources have been drawn. Conversely, a decrease in mass could reverse this process and free-up energy and resources, permitting their use for therapeutic undertakings. Furthermore, for comparative purposes, consider gravity and an interest in rehabilitation to be functional equivalents since each can be described as a unifying and attractive force. While *gravity* can be visualized as a force that exists between objects, *interest* can be visualized as a force that binds individuals (and groups of individuals) to a common objective. In the case of rehabilitation, correctional personnel have historically sought to promote pro-social attitudes, impart knowledge, and assist offenders in developing those skills necessary for meaningful citizenship. This transaction required the full interest and cooperation of all parties, and when successfully achieved, it maximized the constructive aspects of incarceration (thereby, minimizing recidivism rates). This suggests that an interest in treatment and the process of contraction may be closely related - both contributing to and being somewhat dependant on the other. For example, a broad and pervasive interest in offender rehabilitation (regardless of why it exists) would hypothetically discourage expansion and possibly even produce a contraction event; similarly, contraction (regardless of why it begins) might encourage increased interest in rehabilitation.

Predictions/Conclusions

When considering incarceration rates since 1890, it becomes obvious that contraction events tend to be relatively short (usually lasting about 10 years), whereas periods of expansion tend to be much longer (usually lasting about 42 years). Past trends suggest that we may soon experience a contraction event (assuming that the most recent period of expansion began in 1970). While current signs suggest that expansion may be slowing and that the average length of time being served by inmates is decreasing³⁰ it is too early to determine the cumulative effect of these developments on the size of the inmate

³⁰ Pew Center on the States (2012). *Time served: The high cost, low return of longer prison terms.*

population. For example, while prison admissions are slowing, commitments still outnumber releases. If the prison were to experience a contraction event similar to the one that occurred from 1960-70 (a 12% decrease in the inmate population), the number of inmates would shrink by 300,000 individuals, saving approximately \$7.5 billion per year (using a conservative figure of \$25,000 per year to house an inmate).

If the *big bang* and inflation are comparable to the creation and growth of America's prisons, then it stands to reason that during contraction events, those observations previously offered about the prison will likely work in reverse. For example, during periods of contraction:

- energy levels within the prison will gradually shift, moving toward the higher end of the energy spectrum - this will, in turn, result in an increase in the number and diversity of treatment programs being offered as well as in the intensity by which rehabilitation is pursued,
- similarly, as contraction occurs, energy levels within the prison will build, reaching their highest levels before the commencement of yet another expansion event, and
- rising energy levels will result in decreased entropy as evidenced by the prison's growing effectiveness at facilitating offender reform.

The causes of the next contraction event will likely be numerous and multifaceted, and may result from political and/or economic changes, an official recognition that mass incarceration proves ineffective, or the acknowledgement that incarceration without treatment is socially irresponsible. Whatever the reason(s), I remain confident that contraction will occur within the near future and that it will help return some ideological balance (albeit temporarily) to a system that has increasingly proven itself unbalanced, ineffective and costly. It continues to appear intuitively unwise to pursue punishment to the exclusion of rehabilitation.³¹ By its very nature, contemporary forms of punishment (largely absent a desire to educate and treat offenders) demand incremental intensification - meaning that punishments tend to become more expansive and harsh over time. The harshest punishment currently available (execution notwithstanding) is imprisonment, suggesting that in the absence of a contraction event, our use of the prison will remain a popular sanction with future expansion events being both likely and significant.

³¹ Blakely, C. & A. Walkley (2010). *A physicist, a philosopher and a politician: What penologists can learn from Einstein, Kant and Churchill*, Internet journal of criminology.

At the cosmic level, expansion can be equated to coldness, entropy and death - while contraction is analogous to heat and an abundance of energy. If we were to apply this same observation to the prison, we would conclude that its expansion has similarly resulted in a form of institutional coldness, rendering it ineffective at promoting the long-term interests of society. Conversely, contraction would help increase the prison's energy levels and its ability to promote offender reform. In essence, contraction would result in a partial/complete reversal of the "*detriments of expansion*". If *interest* is equivalent to gravity, and if gravity can cause contraction, then the next contraction event may be brought about by the social equivalent of the *rubber band effect*. It is simply too early to determine whether an interest in rehabilitation will lead to a contraction event or whether a contraction event (brought about by some other factor/s) will contribute to an increased interest in rehabilitation.

Knowing that we may be approaching a contraction event serves to notify correctional practitioners and penologists alike, that they should begin to prepare. While past contraction events have been short in duration, their longevity might be increased through a more complete understanding of historical trends and the intelligent and deliberate application of penal theory. Overall, we still know very little about human and institutional behavior. While the fields of psychology, sociology, organizational and business management provide insight, it would prove beneficial for all scholars to consider the possibility that natural laws and processes can and do shed light on social dynamics. Penologists should increasingly turn their attention toward the study of energy-flow, its relationship to the promotion of public safety, and how entropy, expansion, contraction and ideology all affect operational effectiveness. While the number of socio-physicists is small, their collective influence facilitates the linking of ideologies, theoretical perspectives and disciplines that have, hitherto, existed in a virtual state of self-imposed isolation.