

**Department of Electrical and Computer Engineering****Electrical Resistance Tomography Using Adaptive Compactly Supported Radial Basis Functions**

Electrical Resistance Tomography (ERT) is one of the most challenging inverse problems in Geophysics. In this technique the subsurface structures are estimated from electrical measurements made at the surface or by electrodes in different boreholes. The nonlinear and ill-posed nature of this problem increases its complexity and numerical computation cost.

Different methods have been presented in the literature to stabilize the inverse problem algorithms and reduce their sensitivity to interfering parameters such as noise. Diverse regularization methods enforce stabilizing constraints on the problem to enhance the reconstruction process. Despite most conventional methods, the high dimensionality of the problem still results in low resolution answers after applying the reconstruction algorithms.

One of the methods which has recently shown to be more stable encompasses the idea of level-set functions to estimate the characteristics of the desired structure. The drawback with this method is still the computational cost which results in a very slow reconstruction process. Accordingly we introduce a new class of level-set functions, which can significantly reduce the dimensionality of the problem and guarantee a promising reconstruction. The method is based on using compactly supported radial basis functions (CSRBF) as basis of an adaptive level-set function. This function is capable of highlighting the most significant characteristics of the subsurface structure and result in a significant difference in the resolution of reconstructed answers. It also enables estimation of regions which are not in direct line of sight with the sensors, which is an important problem according to the limitations in sensor positions. The method is applicable to both 2D and 3D scenarios and in theory can be generalized to higher dimensional spaces.

**Department of Child Development****How knowing about a 'bear' bears on reading and comprehension: Exploring the complexity of vocabulary knowledge and its relation to reading**

The multidimensionality of vocabulary knowledge and its contribution to the reading process has been relatively neglected in research on dyslexic children. The present study examined the relationship among several measures of vocabulary knowledge and word reading and comprehension skills. We asked whether those measures probing greater depth of word knowledge would be more predictive of word reading and comprehension than those probing less elaborated word knowledge. A battery of standardized and experimental language, reading, and cognitive measures was administered to second and third graders with reading disabilities. The vocabulary measures assessed different aspects of word knowledge, including receptive word recognition, polysemous word knowledge, and decontextualized word definitions. Reading measures included single word reading and comprehension. Results from a series of regressions revealed that the measures of decontextualized definitions and polysemous word knowledge each significantly predicted single word reading, polysemous word reading, and comprehension, beyond any variance explained by decoding ability and by the receptive recognition measure. These results attest to the significant role of rich semantic knowledge in reading and comprehension and specifically highlight the importance of the ability to think deeply and flexibly about word meanings. These results have important implications for both assessment and intervention for children with reading disabilities.

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**Department of Chemical and Biochemical Engineering**

**Metabolic engineering for sustainable well-being: multi-scale engineering of a Taxol<sup>®</sup> precursor in *Escherichia coli***

Natural products are compounds isolated from natural terrestrial and aquatic environments. Many of these natural products are made by exotic organisms and plants only found in certain areas of the world, therefore creating a limited supply and creating a high cost for the compounds. For example, paclitaxel (marketed as Taxol<sup>®</sup> by Bristol-Myers Squibb), a potent anticancer compound is natively produced by *Taxus brevifolia* (the Pacific yew tree), only found in the northwest United States. Early production efforts relied on sacrificing a 100 year old tree, which yielded about 3 kilograms of bark, and contained approximately 300 milligrams of Taxol<sup>®</sup>, only a single dose. To overcome the economical and environmental drawbacks of such production methods, my research aims to improve on these industrial processes through the utilization of technically convenient microorganisms, such as the standard lab bacterium *Escherichia coli*. By transplanting the genetic material required for making natural products from the native organism to *Escherichia coli*, we use enabling technologies (known as metabolic engineering) to improve the production of these products beyond the capabilities of the native organism. The efficient engineering of *E. coli* to improve the production of these compounds will result in the less expensive drugs, particularly for the treatment of diseases in developing countries where the cost of most drugs prohibits their widespread use.

I will present a series of studies spanning the arenas of chemical engineering, molecular biology, and computer science which have been utilized to first introduce and subsequently improve the production of a chemical precursor of Taxol<sup>®</sup> (taxa-4,11-diene) in *E. coli* over two orders of magnitude. First, plasmid-borne expression of two heterologous, synthetic genes enabled taxadiene production in *E. coli*. Modulating the expression of a variety of native *E. coli* genes improved the production titer further. Through varying the plasmid background harboring the heterologous genes and the genetic background of the *E. coli* strain, we improved the specific production of taxadiene approximately 25-fold (from 0.02mg/gram dry cell weight (gDCW) to approximately 0.50 mg/gDCW). Bioreactor kinetic studies revealed that taxadiene was volatile; therefore, we sought to capture taxadiene *in situ* to prevent evaporation throughout the production process. Overlaying the culture with a non-volatile, non-toxic organic phase allowed for further improved specific production approximately 6-fold (to approximately 3 mg/gDCW). In parallel with these studies, we developed a computer program utilizing convex analysis and thermodynamics to determine metabolic fluxes (reaction rates) within *E. coli* and then employed a genetic algorithm to optimize the *E. coli* metabolic network for producing taxadiene without significantly sacrificing cell growth. Further work will be on: 1) experimentally conducting the gene-knockouts predicted by our program to improve production, 2) protein engineering of some of the enzymes involved in taxadiene biosynthesis for improved production, and 3) cloning and expression of genes further downstream in the Taxol<sup>®</sup> biosynthetic pathway.

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**Department of Classics and Classical Archaeology**

**NoDictionaries.com: a new approach to reading Latin**

Latin authors, in prose and poetry, use the majority of their vocabulary under five times, so the presentation of infrequently-used vocab in a text significantly affects the reading experience. NoDictionaries.com, a new free website, presents texts with adjustable interlinear vocabulary, and students tested reading from it have read 2 to 3 times as fast with no loss in comprehension.

Above the beginning levels, most Latin readers use a dictionary. But which to choose? The Oxford Latin Dictionary, which documents every usage of every single word we know of, would be a mistake for an author as popular as Vergil. A smaller Cassell's would be better, because the lookup time is faster, but these both miss the mark: the concentration required, to alphabetize, turn pages, and hold open the plain Latin text, easily breaks a reader's flow. Clyde Pharr knew this, and his Aeneid has every uncommon word defined in the footnotes of each page. Such a large difference in degree of dictionary size becomes a difference in kind: a reader can focus entirely on a self-contained text. And Pharr's Aeneid has been so popular that they're still printing from the original plates from 1930, and the Amazon reviews are all five stars.

When we change from a physical text to an online text, we can do even better. Each word can have a definition marked under it, because the length of the page is effectively infinite. A reader can adjust the amount of vocabulary seen, because the text (as a webpage) can transform itself on command. We can add as many pages as we want of user-submitted texts, because automatic Word Sense Disambiguation processes the entirety of Latin Literature adequately. We can recommend similar texts based on users' reading behavior, because we can keep track of the nature and speed of every visitor's book-reading.

Knowing which word corresponds to which dictionary entry provides a number of exciting options: concordances of topical and/or grammatical similarity, instances of punning, and more.

NoDictionaries.com launched at the beginning of December 2008.

## Department of Drama

**Shakespearean Flow: Psychological Possibilities of an Improvisational Performance Technique at the Globe**

The International Shakespeare Globe Center presents the troubling concern of whether a theater built mainly as a historical reconstruction for tourists has a kind of obligation to experiment with more historically accurate performance methods. Both Tiffany Stern's research and the techniques of Patrick Tucker's Original Shakespeare Company indicate that rehearsals during the Elizabethan/Jacobean period were far less frequent than our contemporary Western theater, so why are Shakespeare's plays still rehearsed and performed in a contemporary manner? Does the historical tourism of visiting the Globe stop short at the architecture? Why can't performance techniques be part of the audience's destination towards a more historically accurate Shakespearean production?

Taking for granted historical accuracy, my paper focuses on the psychological benefits of a more improvisational approach to Shakespeare. Patrick Tucker's techniques have many similarities to Viola Spolin's work on improvisation, and it is in these commonalities that psychological advantages seem to favor performances that rely on actors' instincts. Through the categories of flow, non-conscious behavior, and even altered states of consciousness I prove that more historically accurate rehearsal/performance methods can reveal insights into Shakespeare's texts that can only be discovered by working in a less rehearsed and therefore more improvisational way. If our destination is a more historically accurate Shakespeare steps must be taken to make acting techniques and styles as factual as research allows.

## Department of Computer Science

**Convex Partitions with 2-Edge Connected Dual Graphs**

It is shown that for every finite set of disjoint convex polygonal obstacles in the plane, with a total of  $n$  vertices, the free space around the obstacles can be partitioned into open convex cells whose dual graph (defined below) is 2-edge connected. Intuitively, every edge of the dual graph corresponds to a pair of adjacent cells that are both incident to the same vertex.

Aichholzer *et al.* recently conjectured that given an even number of line-segment obstacles, one can construct a convex partition by successively extending the segments along their supporting lines such that the dual graph is the union of two edge-disjoint spanning trees. Here we present a counterexample to this conjecture, which consists of 16 disjoint line segments, such that the dual graph of any convex partition constructed by this method has a *bridge* edge, and thus the dual graph cannot be partitioned into two spanning trees. Counterexamples of arbitrarily larger sizes can be constructed similarly.

Questions about the dual graph of a convex partition are motivated by the still unresolved conjecture about disjoint compatible geometric matchings by Aichholzer *et al.* It has application in the design of fault-tolerant wireless networks in the presence of obstacles (e.g. tall buildings in a city).

## Department of Economics

### Cross Sector Subsidies in Electricity Prices in Maharashtra, India

*No power is as costly as no power - Homi Bhabha*

In recent years, India has witnessed unprecedented economic growth in its manufacturing and service sectors, accompanied by a rapid increase in energy demand. Currently ranked the fifth largest consumer of energy, the country's power consumption is further expected to grow at a rate of 4.7 percent per annum.

Power prices in India have been low compared to international standards and electricity tariffs have been set such that the industrial and commercial sector cross-subsidize the agriculture and residential sector. These cross sector subsidies have political appeal as they are viewed as a social transfer mechanism, intended to benefit the poor. However, the push away from market outcomes has led to inefficiencies in the power sector resulting in heavy losses incurred by the state electricity boards. This has restricted any investment in capacity addition, leading to supply constraints and heavy blackouts. Realizing the dire state of the power sector, there have been several reforms allowing private participation in generation and distribution of electricity. However, prices, are regulated and determined at the state level.

This paper tries to study the effectiveness of the cross sector subsidy and as efficient social transfer mechanism in the post reform era from 1991 to 2006. In my study, I will focus on the state of Maharashtra, which is one of the most economically developed states in the country, yet suffers from severe blackouts. In order to estimate the effectiveness of the cross subsidy, I develop a short run model to estimate the elasticity of electricity consumed to changes in sectoral prices and income. The stronger demand responds to a change in price, i.e. the higher the price elasticity of demand is, the more important it is to keep tariffs close to marginal cost in order to minimize efficiency loss from price distortions. The variables I control for are consumer income, common supply shifters and the price of substitutes. The results obtained from the statistical analysis show that the residential and agriculture sector are relatively more price inelastic compared with the industrial and commercial sector. I plan to estimate the long run elasticities using time series techniques like cointegration and vector error correction models in order to study consumer response to price change over a period of time. I expect short run elasticities to be smaller in absolute value than their long run counter parts.

## Department of Drama

### Theatre as a Superordinate Goal: The Power of Theatre to Decrease Negative Stereotyping and Promote Healing Amongst Groups in Conflict

In 1958, Muzafer Sherif published his groundbreaking study on superordinate goals, which he defined as something that, "involved goals that could not be attained by the efforts and energies of one group alone and thus created a state of interdependence between groups." He found that superordinate goals were the best way to reduce conflict, decrease negative stereotypes, and increase out-group friendship development. These findings have been replicated in numerous studies over the past fifty years. In this paper, I will explore the process of mounting a production as a superordinate goal, and the power it therefore has to promote healing and understanding between groups in conflict. To do this, I will examine a performance of *A Midsummer Night's Dream* put on in Hanoi, Vietnam by the Artist's Repertory Theatre of Portland, Oregon and the Central Dramatic Company of Vietnam as part of the Vietnam America Theatre Exchange. I will delve into the problems encountered during the production process and the ways in which they are representative of larger cultural issues that plague intercultural interactions. I will conclude by discussing the ways in which theatre as a superordinate goal is able to overcome these conflicts and mount a successful production while, at the same time, decreasing negative stereotypes and forming friendships between members of two previously warring nations.

## Department of English

**Ghosts in the Mirror: *Giacomo Joyce* and the Cinematic Gaze**

James Joyce's Trieste notebook—known to us as *Giacomo Joyce*—has garnered surprisingly little critical attention despite its pivotal place in the evolution of Joyce's work. Written sometime between 1905 and 1914 while Joyce was putting the finishing touches on *A Portrait of the Artist as a Young Man* and beginning to draft sections of what would later become *Ulysses*, *Giacomo Joyce* is a key transitional document, giving us a rare glimpse of an artist on the verge of an aesthetic revolution. The notebook contains a series of brief vignettes documenting Giacomo's infatuation with an unnamed Triestine girl pupil. As Joyce's only known work to be set outside of Ireland, the notebook is something of an oddity (which might account for the lack of substantial criticism since it was published posthumously in 1968). The unusual blank spaces between each vignette—sometimes half a page in length—seem to suggest an unfinished manuscript, a work-in-progress. However, as Joyce's biographer Richard Ellmann has noted, *Giacomo Joyce* was written and signed in the author's best calligraphy, leading one to assume that Joyce considered it a finished work.

The notebook is equally important as an indication of Joyce's early interest in film and cinematic montage. In 1909, Joyce and a group of Triestine businessmen went to Ireland to open the Cinematograph Volta, the first cinema in Dublin. Although the Volta went bankrupt after only a few months, the episode points to the ongoing significance of film in Joyce's life and work which was to find its fullest and most complex expression in the "reel world" of *Finnegans Wake*. With its unconventional vignettes, its alternation of presence and absence, and its emphasis on the Gaze, *Giacomo Joyce* evinces a variety of cinematic properties: montage, zoom, close-up, and dissolve. Moreover, the notebook's references to Percy Bysshe Shelley's verse drama *The Cenci* (1819) imply a thematic parallel with Mario Caserini's *The Tragic Story of Beatrice Cenci* (1909), one of the films shown on the Volta's opening night in Dublin. *Giacomo Joyce* is not only an invaluable record of Joyce's developing aesthetic but a unique response to—and appropriation of—early cinema by one of the foremost modernists.

## Department of Civil and Environmental Engineering

**Assessment of Risk Factors for and Prevalence of Urinary Schistosomiasis in a Rural Ghanaian Town**

In Adasawase, Ghana, urinary schistosomiasis is caused by *Schistosoma haematobium*, a parasitic blood fluke transmitted through skin contact with excreta-contaminated water. Local schoolchildren contract schistosomiasis by playing, bathing, and washing clothes at a local river. Novel methods of primary prevention of schistosomiasis are being explored for use in this location. As part of a baseline survey of disease prevalence, schoolchildren aged 8 to 16 years ( $n = 247$ ) submitted 4 urine samples for testing. 47 girls and 69 boys presented with eggs at least once. The majority of infected children in this population had mean egg counts lower than 50 eggs/10ml urine, but egg counts do not necessarily correspond to risk of morbidity or long-term sequelae. Only 5 of 247 children presented with both eggs and blood on all 4 test days, suggesting that accuracy in determining true infection status is improved by collecting and testing multiple urine samples. Of the 247 children tested 4 times for schistosomiasis, 234 (94.7%) were treated by Ghana Health Services with praziquantel during normal school hours. Local school heads and teachers communicated with parents regarding treatment, organized schoolchildren, and assisted with weighing children to ensure correct dosage. Treatment of all schoolchildren took place in June, 2008. Of the 116 schoolchildren who presented with eggs at least once, 105 were retested for schistosomiasis once in July 2008 to estimate treatment efficacy; 1 boy remained egg-positive. Program costs associated with urine testing and drug distribution will be reported. A logistic regression model was developed to predict likelihood of infection with *S. haematobium* based on a set of seven predictor variables; three predictor variables (age, sex, number of days with blood in urine) were found to be significant at the  $p < 0.05$  level.

## Department of Drama

**“As He Meant Them”: Shaw and Poel’s Approach to Shakespeare as a Musical Text**

As a director and practitioner of Shakespearean drama during the latter-half of the 19<sup>th</sup> century, William Poel was generally disdained by his contemporaries. Critics deplored the amateurish acting and mediocre production quality of his productions, and were especially wary of his theory of “Elizabethan Methodism.” One of the key features of Poel’s Elizabethan Methodism (or “Original Practices,” as it is referred to today) is the abandonment of the bombastic, declamatory style of acting of Edmund Kean, Henry Irving, and other Shakespearean leading men in the 19<sup>th</sup> century, in favor of reproducing the “skilled and rapid delivery” and “swift, musical speech” of the original Elizabethan players. Likewise, Poel emulated the simplistic set design and platform stage of Elizabethan theatres over the excessive scenery and elaborate set pieces used in modern productions. Above all, he was concerned with showcasing the beauty of the work itself without obfuscating it with glittery trappings and exaggerated acting.

Though most ignored or impugned him, Poel and his productions attracted at least one respected critic where they had repelled all others: George Bernard Shaw. While it seems bizarre that one of the most respected critics and celebrated dramatists of the 20<sup>th</sup> century should be alone in embracing Poel’s Original Practices, this fact is not so odd when one considers the unique way both men approached Shakespeare’s plays. By examining their biographies, theatrical practices, personal letters, and critical writings, I posit in this paper that Poel and Shaw treated Shakespeare’s texts, in production and critical interpretation, as if they were pieces of music. They believed that if Shakespeare was to be performed in a style faithful to the Elizabethans, it was necessary to cultivate and express the musicality of the poetry in an organic, unobtrusive manner. By placing the authority of Shakespearean performance squarely in the musical mindset, Poel and Shaw found themselves at odds with the rest of the theatrical community—and unlikely kindred spirits in one another.

## Department of Drama

**Vaudeville in America during the First World War**

Although the United States did not enter the First World War until 1917, popular entertainment from 1914 onward reflected the looming presence of the war in the American psychological landscape. Recent studies have focused on either film or lyrics and music of popular songs. Few studies have fully considered the performative context in which many of these songs were performed. Furthermore, the theatrical scene from 1914 to 1918, with the exception the exception of the Provincetown Players, has received scant attention.

Performers in vaudeville houses across America popularized many war songs, such as George M. Cohan’s “Over There” (1917). In addition to music, a typical vaudeville performance included acrobatics, dramatic sketches, and film. Dozens of other vaudeville acts, besides the popular anti-war play *War Brides* (1915), dealt with the war, from satires on current war conditions to patriotic spectacles. In between acts, audience members were urged to buy war bonds. Other studies often gloss over theatre in general, and vaudeville in particular, as mere propaganda. Nonetheless, war related vaudeville acts constitute important and undervalued sources that document how Americans viewed or were supposed to view the war.

Therefore, in examining cultural aspects of the First World War, vaudeville is perfectly situated for considering the American experience and how it is reflected in the popular theatre of its time. From enlistment sketches with singing soldiers to melodramas with German spies, vaudeville contributed to and reflected an American vision of the war.

**Department of Electrical and Computer Engineering****Hyperspectral Image Reconstruction for Diffuse Optical Tomography**

Diffuse optical tomography (DOT) has emerged in the last decade as a new and exciting tool for functional medical imaging with applications in a range of areas including breast cancer detection and diagnosis. DOT employs observations of near infrared (NIR) light that has propagated through tissue to reconstruct the spatial distribution of various chromophores present in the region of interest. In the case of breast cancer, oxygenated and de-oxygenated hemoglobin are of particular interest in identifying and characterizing tumors.

It is well known that the DOT reconstruction process can be quite sensitive to noise and other un-modeled effects due to the diffusive nature of the underlying physics as well as the limited aperture over which data can be acquired in many practical systems. While there exist a wide array of mathematical techniques for stabilizing the reconstruction, ideally one would like a richer data set. Most DOT instruments employ no more than five NIR wavelengths to probe the tissue; however recent work in Prof. Fantini's lab has led to the development of a hyperspectral system in which hundreds of wavelengths can be acquired. With the increase in data however comes an associated rise in the complexity of the image formation process. In this poster, we explore the development and performance of algorithms for hyperspectral DOT.

We detail an efficient method for forming the images based on the use of iterative algorithms applied to a linearized measurement model. Simulation results will be provided with details for future work involving phantom studies.

**Department of Computer Science****Automated Detection of Intracranial Aneurysms**

The detection of brain aneurysms plays a key role in reducing the incidence of intracranial subarachnoid hemorrhage (SAH) which carries a high rate of morbidity and mortality. An intracranial aneurysm is a localized pathological dilatation of a blood vessel. It is reported that up to 2% of the general population harbors aneurysms. Most of these aneurysms are asymptomatic and remain undetected with only a small proportion proceeding to rupture and consequent SAH, with an annual incidence of approximately 1%. The majority of non-traumatic SAH cases is caused by ruptured intracranial aneurysms and accurate detection can decrease a significant proportion of misdiagnosed cases.

Although aneurysm detection is currently performed visually by experienced diagnosticians, there is an increasing interest in computed-aided diagnostic (CAD) systems for automated detection of intracranial aneurysms with the hope of improving the diagnostic accuracy and limiting missed detection.

A scheme for automated detection of intracranial aneurysms is proposed in this study. Applied to the segmented cerebral vasculature, the method detects aneurysms as suspect regions on the vascular tree, and is designed to assist diagnosticians with their interpretations and thus reduce missed detections. In the current approach, the vessels are segmented and their centerline is computed. Small regions along the vessels are inspected and a new surface descriptor is introduced to quantify how closely any given region approximates a tubular structure. Aneurysms are detected as non tubular regions of the vascular tree. The robustness of the method was investigated analytically and validated experimentally. The method was tested on 3D-rotational angiography (3D-RA) and computed tomography angiography (CTA). In our experiments, 100% sensitivity was achieved with average false positives rates as low as 0.66 per study.

## Department of Child Development

## Examining the Differential Influences of Coursemates and Friends in Adolescent Academic Achievement

The majority of secondary schools in the United States utilize academic tracking procedures. A major criticism of school tracking policies is that grouping low achieving students together leaves these youth without peer models for attaining higher academic functioning. This concern is amplified when coupled with research that suggests environmental proximity is a key factor for initiating and maintaining friendships. As such, tracking procedures may have an additional indirect influence on school functioning through the friendships they encourage. A large body of literature suggests that during adolescence, friends can influence individual school achievement. Given that many friendships may evolve from the proximity resulting from being placed in the same academic track, it is important to distinguish between the influence of friends who do and do not share classes with an individual. Understanding this distinction will allow researchers to identify the full impact of tracking procedures and the unique role different types of friends may play in influencing academic achievement.

**Method:** The current analyses combine data from Wave 1 (1994) of the National Longitudinal Survey of Adolescent Health (Add Health) and the Adolescent Health and Academic Achievement (AHAA) study. Add Health indices include participants' friend nominations, and biological sex. Data from AHAA, which was obtained from students' high school transcripts, includes participants' overall GPA, the overall GPA for participants' friends, and what year (1-6) of high school each individual completed in 1994. Of the 20,745 Add Health wave 1 participants, 41.9% (N=8,698) of individuals had 1994 GPA data available from the AHAA. Of these, 22.6% (N=1,970) had at least one friend for whom 1994 GPA data were available. Individual friends were identified as a "coursemate/friend" or a "friend only" (i.e. not a coursemate). The average GPA for "coursemate/friends" and the average GPA for "friend only" were then calculated separately.

**Results:** Two linear regression models were conducted using Stata version 9.0, which accommodates the stratified study design of Add Health data. These models examined the impact of "coursemate/friend" and "friend only" GPA on individual GPA. In Model 1, ( $F(5, 70) = 40.61, p < .001, R^2 = .26$ ) results suggested being male ( $\beta=.283, p < .001$ ), "coursemate/friend" GPA ( $\beta=.512, p < .001$ ), and a greater number of coursemate/friends ( $\beta=.041, p < .001$ ) were significantly associated with adolescents' higher GPA scores. Interestingly, there was no effect of "friend only" GPA. In Model 2, ( $F(6, 69) = 181.12, p < .001, R^2 = .27$ ), the interaction between number of "coursemate/friends" and "coursemate/friend" GPA was tested. Results from Model 1 were replicated, and the additional interaction term was significant ( $\beta=.093, p < .001$ ), suggesting that for individuals with higher GPAs, as the number of friend/coursemates increases, so does the influence of friend/coursemate GPA.

**Conclusions:** Results from preliminary analyses suggest that friends who are coursemates may have a significantly larger impact on individual achievement than friends who are not coursemates. Additional analyses will incorporate data from Wave II of the AddHealth dataset to confirm the current results and consider whether these relationships act similarly for school engagement.

## Department of Drama

The Once and Present *King Richard II*

Shakespeare's *Richard II* conflates the history of a monarch's humiliating defeat with themes that mirror the shifting sociopolitical struggles of Early-Modern England. Focusing on the manipulation and power of words and ritual to defend the received tradition of the British throne, *Richard* undermines authority by highlighting the differences between the man and his position, the facade of royalty and the practical political realities of kingship. As a result of this division, the subject of the monarch disintegrates into symbolic fragments reconstituted by Henry Bolingbroke, his usurping successor. By reinventing the nature of royal office, the text disrupts normative conceptions of authority and subject identity, both documenting and creating radical changes in perceptions of social power.

An investigation of the restrictive social norms of early modern culture, the domestic instability of Elizabeth's reign, and the subversive nature of theatre in the early modern period provides a hermeneutic framework for viewing the play text and its ideological construction. Using this hermeneutic as an analogue for its possible uses in the present makes the play a site for the production of meaning in current politics and subjectivity.

While the Duke of Essex made use of Shakespeare's play as a blunt tool to rally dissent against Elizabeth I, the play now serves to undermine authority through its attachment to Shakespeare's authorial body. Instead of a simple rallying tool used in an Elizabethan context, Richard's deposition from the throne now carries all the weight of Shakespearean authority and discourse. That discourse buoys his words and meanings, forcing contemporary audiences into a position of respect while also providing analytical models for interrogating our own dialogues of power and authority.

## Department of Psychology

**Neural Correlates of Gaze-directed Reappraisal in Younger and Older Adults**

Evidence suggests that as we age, our capacity to regulate the emotions we feel increases, while cognitive control decreases to some degree. As mechanisms that regulate emotion range in function from attention-based modulation to processes demanding greater cognitive control, it is unclear how older adults gain ability to regulate emotion. In light of recent evidence suggesting that eye gaze pattern shifts account for a large portion of brain activation variance during a form of cognitive emotion regulation known as "reappraisal", we examined age-based differences in both neural correlates and self-report ratings of experienced trial intensity using a gaze-directed reappraisal paradigm. We showed college-aged and older adults a series of pictures derived from the International Affective Picture System (IAPS) in a functional magnetic resonance imaging (fMRI) environment. We asked participants to increase or decrease the emotions that each picture made them feel, while we directed their gaze to an area of the presented picture that was either relevant or irrelevant to the emotional content of the picture. We found age related differences in brain areas medial Prefrontal Cortex, Anterior Cingulate Cortex, and left Inferior Frontal Gyrus: Younger adults exhibited significant activation when increasing or decreasing their emotions, while older adults did not exhibit significant activation. Age differences were also apparent in self-report ratings of experienced trial intensity, although neither age group appeared able to decrease their emotions. We conclude that directing gaze may affect participants' ability to regulate negative emotional responses elicited by picture stimuli, and that older adults may employ different, more attention-based strategies than younger adults when regulating negative emotion.

## Department of Art and Art History

**Shifting Iconography in Seventh and Tenth Century Armenian Architecture: The Ideological Significance of the Zvart'nots and Gagkasen**

Constructed in the seventh and tenth centuries respectively, the Zvart'nots and Gagkasen are nearly identical structures, both built to convey specific political messages within the context of Armenia. The Zvart'nots was the first and most celebrated Armenian Church built in the ambulatory tetraconch style. Distinctly separate from Armenian architecture, this style was utilized along with the Zvart'nots iconography to create a unique structure, which specifically demonstrated Armenian ties with the Byzantine Empire and Orthodoxy. These elements were incorporated for political ends in response to the rising Arab threat in the seventh century.

The Arab conquest of Armenia in the seventh century marked the end of Armenian independence until the Bagritid dynasty formed the new Kingdom of Armenia in the tenth century. Due to the political instability of their rule, the Bagritid kings used various arts to differentiate themselves from their rivals the other lower Armenian nobles. King Gagik's church the Gagkasen represents a pinnacle of this political building program. Furthermore, surviving textual evidence from the tenth century indicates that the Gagkasen was built to emulate the Zvart'nots. While the two structures share nearly identical form and iconography, their architectural elements communicated very different political meanings for each of their societies. In the Gagkasen, the ambulatory tetraconch and iconography were both used to demonstrate the independence of the newly established Kingdom of Armenia and the legitimacy of the Bagritid dynasty. Thus, while the two structures both demonstrate the use of architecture for political ends, together they show the shifting nature of political iconography, which changed and was re-appropriated even within a single cultural tradition.

**Department of Urban and Environmental Policy and Planning****Towards Spatial Justice: Tales of Two Cities and the Mission for Just, Sustainable Communities**

Over the last several decades, social justice and environmental justice have risen from inside cities and all across human communities as powerful movements that bring attention to unjust conditions most often caused by oppression, discrimination, and greed. While equity and human rights lie central to both movements, they often function in disjunction or even opposition to one another. By failing to recognize their common ground, proponents of the social and environmental justice movements not only miss valuable opportunities to gain collaborative traction, they also face the risk of unintentionally sabotaging their own goals.

'Sustainable development' has gained considerable attention as a broader force which emphasizes the need to maintain a dynamic balance between economic, social, and environmental considerations. Unfortunately, this concept has earned itself a reputation as being chiefly concerned with environmental issues, often in isolation of the social issues that cause them. Similarly, social justice and environmental justice have both seen themselves marginalized in the political process as activists' agendas and lacking mainstream relevance and teeth. Although sustainable development alone offers a comprehensive and tangible set of guidelines to maximize the strength of relationships between environment, society, and economy, it is empty of a common, unifying element needed to systematically challenge the deeply-seated status quo (ie. neoliberal capitalism).

Literature from the disciplines of geography, policy, politics and planning increasingly support that space is that unifying element. Citing observations that space is a socially constructed product, that it is continually created and recreated, and that it can both manifest and reproduce injustices, scholars have argued the merit of pursuing a new concept for achieving justice in our communities. Asserting that common principles of justice leave social and spatial differences out of the equation and fail to discuss *where* such shared notions of justice would be established and activated, many of these scholars have arrived upon a relatively new concept called "spatial justice".

Because space, like justice, is never created arbitrarily, and both are socially produced, experienced and contested, I argue that the two should work hand in hand in the form of this new concept, spatial justice. By revealing the connections between justice and space, inseparable from environment and economy, this thesis will present spatial justice as an empowering tool for policy-makers, planners and activists/community members alike to move toward just sustainable communities.

**Department of Biomedical Engineering****Silk Microspheres for Controlled Release Applications**

Despite the many potential advantages, there is currently no implantable, fully degradable system capable of delivering drugs in a controlled, sustained site-specific manner. Silk fibroin is a novel, biologically derived protein polymer with unique properties that make it particularly well suited to drug delivery. Silk is biocompatible, biodegradable, mechanically strong and can be processed into a wide range of useful material formats. Silk microspheres in particular show great promise as a drug delivery vehicle for numerous applications, including treatment of neurological disorders and cancers and release of growth factors from tissue engineering scaffolds.

Silk microspheres were fabricated using a lipid template protocol, which bypasses the need for harsh chemical solvents or high temperatures. Aqueous processing of the microspheres circumvents denaturing conditions, making it possible to incorporate sensitive drugs like proteins without activity loss. A silk fibroin and drug solution was applied to a lipid film to form microspheres and the microspheres were then repeatedly freeze-thawed, diluted and lyophilized. Following lyophilization, microspheres were treated with either methanol or sodium chloride (NaCl) to induce beta sheet formation in the silk spheres and remove the template lipid. Release studies were carried out by suspending microsphere samples in phosphate buffered saline (PBS) at 37°C with shaking. At predetermined time points, the samples were centrifuged to separate the microspheres from the buffer, the supernatant was removed and the microsphere pellet was resuspended in fresh buffer. The removed buffer was then assayed for drug content.

The resulting microspheres are small (less than 2 microns in diameter) and exhibit controllable release kinetics (modulated via beta-sheet content and coating of the spheres). Microspheres were tested alone as well as incorporated into other silk-based delivery systems. Multiple drug types (including small molecules, proteins, growth factors and chemotherapeutics) were studied to assess drug loading capabilities and characterize release profiles. Linear release rates were observed in hydrophobic and protein drugs.

The ability to load and deliver different therapeutic molecules via silk microspheres demonstrates their versatility as a delivery system, while the controllability of the release profiles via manipulation of the loading parameters and materials formats suggests the system could be customized to suit a broad range of applications.

## Department of Child Development

### Phoenix – a student-run program for underprivileged children

*Not being able to do everything is no excuse for not doing everything you can.* Asleigh Brilliant

Ukraine is a developing country and like many developing countries has its own unique challenges. Unfortunately, the challenging political and economic situation limits the amount of time citizens can devote to volunteering. Student involvement and volunteering with underprivileged children in Ukraine is still rare. However, a program called Camp Phoenix aims to set a new direction for university student involvement, and serves as a model for social change in Ukraine.

Camp Phoenix is a pilot program created and run by university students at one of the village orphanages in Ukraine. The program is based on the belief that moderate student involvement in children's lives is beneficial for their development and can have a positive impact on their lives. Some of the goals of the program were to increase children's motivation to learn and pursue higher education, promote healthy life-style and establish positive role models. Another equally important set of program goals was connected with university students, notably, to involve them in a sustainable (long lasting) community work and establish a dialog between university students and children at the orphanage.

The Phoenix program consists of two parts. During the first part, a 6 day summer camp, Ukrainian and international university students held various classes and organized group and team activities for around fifty five children ages 5-16 from the orphanage and local village. The second part, a post-camp program created by students, will last until May 2009 and consists of a series of activities and seminars designed to support communication between students and children. Evaluation of the first part of the program revealed that the camp awakened the children's interest in learning a foreign language (i.e. English) and motivated them to pursue secondary education. The program also had positive influence on the student staff as it had altered the way children were perceived by them.

One of the goals of this program is to serve as a model for university student involvement in service learning. University students are an untapped resource for social change in Ukraine and there are benefits to be gained by students as well as for those they serve.

The project was implemented with the support of Active Citizen Summer Fellow grant from the Tisch College of Citizenship and Public Service, an NGO International Outreach Coalition (USA) and Petro Mohyla University in Mykolayiv (Ukraine).

## Department of Urban and Environmental Policy and Planning

### Misunderstanding Soil Ecosystems: Consequences for Land, Water and Climate Policy

Without functioning soil ecosystems, life on Earth as we know it would not exist. The condition of soil ecosystems affects global warming, carbon sequestration, the quantity and quality of fresh water, the productivity and nutritional value of plants growing in soil, the success of invasive organisms, the health of bays and estuaries and the availability of new medicines for human health. Soil ecosystems are key drivers of the global cycles of carbon, water, nitrogen, phosphorus and sulfur.

Few policy makers or scientists outside soil-related fields understand or acknowledge the complexity and extent of the ecosystem services supplied by soil ecosystems. The Environmental Protection Agency (EPA) has a legal mandate to protect air and water but no legislative directive to protect soils or soil life. United States Department of Agriculture (USDA) spends the bulk of its funding on strategies, research and price supports that ignore or actively harm soil life and soil water. The Natural Resources Conservation Service (NRCS) formerly the Soil Conservation Service acknowledges the existence of soil ecosystems and has a historical commitment to erosion prevention but it has conflicting missions and no legal mandates to enforce protections.

Flawed conceptual models of soil functions have been cited by soil ecologists and others as contributing to missing policy and inadequate research on soil ecosystems. Although new soil research methods and tools have provided much greater detail on the functioning of soil ecosystems, U. S. soil policy and commonly accepted models of soil systems do not reflect that knowledge. My research investigates the dominant conceptual models of soil underlying existing policy. Diverse and interdependent drivers of often, flawed models and policy are also investigated. These include historical U. S. soil policies driven by economic considerations and limited scientific models of soil that have become embedded in law, regulation and funding priorities. Also influential are lobbying organizations and laws that perpetuate the conflicts of interests that continue to drive soil researchers and policy makers.

The thesis presents five conceptual models of soil (some widely-held), connecting each model with associated language, stakeholder interests, soil policy history and current policy. A cross-disciplinary, integrated, scientific, soil conceptual model is offered as a first step to inform policy makers and the public of the importance of understanding soil ecosystems. The consequences of building soil, water and climate policy based on each of these models is evaluated.

The final chapter looks ahead and abroad for alternative approaches to existing U.S. policy to raise awareness of soil ecosystems and develop policies to preserve soil ecosystem services.

## Department of Art and Art History

## Blind Collaboration-- Exploring the Child Within

When looking critically at art in the context of humankind, it is evident that some of the greatest artists—children—are often overlooked or disregarded. My fascination with children inspires me to explore their spontaneous gestures and stylistic forms in order to discover a type of communication that is characterized by freedom and honesty. For children the *act* of creation is supreme.

Working collaboratively with children can certainly be a successful venture if done in a provoking and intentional manner. A child's vision can invigorate and revive an adult's artistic perspective and approach. My studio practice thrives off of the art of children, mostly through a *blind* collaborative process. "*Blind*" because children are often *unaware* of their powerful influence in my art. Their strong correlation is not merely inspiration, but it is of central importance. My process is twofold: First, I encourage children to make interesting and meaningful drawings while I intensely observe their creations. Second, concurrently or afterwards in my studio, I relive the visceral childhood experience through my personal work.

By merging children's artistic characteristics with my own experience and influences, I generate compositions that provoke contemplation and debate about *who* the work was actually created by—a child or an adult? The questioning of sophisticated techniques juxtaposed against "childish" forms and figures is my aspiration... to visualize the two displayed inter-changeably with no precise frontier that separates the extremes. This collaborative practice brings into question all of the set assumptions about the art of children and "art" itself.

While contemporary art is constantly shifting to reflect our changing values and popular culture, children's art operates within a stylistic language that remains relatively constant, as similar images could be found in historical records dating back hundreds to thousands of years.

By paying close attention to child art, adults can focus on the origins of their own creativity. Why then is child's art frequently overlooked and devalued and how can we reestablish its' significance today? This presentation focuses on a fresh perspective on how to redefine the ordinary through collaboration with children.

## Department of English

## Written in Blood: AIDS and the Subversion of Elegy

While exploring the implications of genre, Susan Stewart, in her book *Poetry and the Fate of the Senses*, explains that the regulation of both the physical senses and generic classifications are inextricably linked by social decorum, "with who may do and say what in the presence or absence of whom on what occasions" (27). She goes on to say:

The notion of poetic *kinds* is tied to the specificity of their use and occasion: the epithalamion, the elegy, the aubade are at once works of art independent of their particular production and use and social acts tied to specific rules of decorum. Poems are in this sense acts of social intent and consequence and not things in a world of things. (27)

While it goes without saying that regulation of the body governs our social lives and has very real impact on our laws, our religious beliefs and even the ways we love and relate to other humans, the regulation of our *genres*, of our poetry, also has an incalculable effect on the boundaries of our social lives. For AIDS writers (as I will refer to those men and women who, during the early years of the epidemic, tried desperately to carve out a place in public consciousness for the dead and dying) the decorum of genre was precisely the problem of representation that they faced in their work.

In the preface to his collection *Love Alone: 18 Elegies For Rog*, Paul Monette, writing in 1987, berates public officials not only for their lack of action in the face of the devastating loss caused by AIDS, but also for the manner of their speech. "Decorum," he says, "is the contemptible pose of the politicians and preachers, the hypocrite slime whose grinning hatred slicks this dying land like rotten morning dew" (xi). In Monette's mind, the crime of these "hypocrite slime" is not just their discriminatory regulation of the body—who may fuck whom, who has access to disease treatment, which diseases are stigmatized—but also the *decorum* with which the slime speak of these regulations. Their sanctimonious talk of "risk groups," their euphemisms and their hollow words of comfort are attempts to cover the stench of the dead and dying. The poetic genre most concerned with the dead, elegy, has historically done the decorous work of mourning: attempting to "move past" loss. Peter Sacks famously mapped the most popular tropes of English elegy onto a Freudian framework of "healthy" mourning, concluding: "acceptance is the very price of survival" (8). Early AIDS elegies, however, suggest that acceptance has not aided survival, but impeded it. Monette in particular does not wish to cover up (or recover from) the horrors of disease, but instead tries to expose those horrors at a time when people could not (or would not) hear the screams of the marginalized. The generic conventions of elegy, which Sacks characterizes as working toward "successful mourning" (6), would be nothing short of murderous for those facing the AIDS epidemic in the late 80s and early 90s. In this paper, I argue that early AIDS elegists' resistance to genre was a call to halt the mourning process—the deadly decorum that encourages acceptance—and channel rage into political action.

**Department of Biology****Modeling Plant Sectoriality and Root Foraging**

When comparing nutrient foraging among plant species, proliferation of roots into a nutrient patch is a common response variable. Reasons for interspecies differences in sectoriality are not well understood. It has previously been suggested that sectoriality – the restriction of long distance resource transport to specific vascular pathways – could constrain this proliferation. Alternatively, sectoriality might instead enhance proliferation if increased nutrient supply to shoots directly connected to roots in a patch results in increased photosynthesis and thus higher carbon supply to those roots. Surprisingly, the relationship between sectoriality and proliferation has not been critically evaluated. To address this relationship we extended existing plant growth models to include sectoriality, as represented by the resistance to transport between two sectors. We simulated plants with the roots of one sector in a nitrogen patch sixteen times the background concentration, paired with one of three aboveground scenarios: 1) high light to both sectors (=“uniform light”), 2) high light on the leaves of the high N sector and low light (50% as high) on the opposite sector (=“same sector light”), and 3) low light to the high nitrogen sector and high light to the other (=“opposite sector light”). Across all simulated light treatments, higher sectoriality resulted in decreased root proliferation. This effect was strongest under “opposite sector light” and weakest under “same sector light”. High sectoriality also constrained whole plant growth. For all treatments, proliferation rates varied with time, with the strongest allocation into the patch occurring early in the simulation period. Our results indicate that sectoriality will constrain root proliferation, and that the strength of sectoriality effects on plant performance in patchy soil depends on aboveground conditions. Additionally, model output indicates that proliferation rates will change over time. We argue that understanding interspecies differences in sectoriality will elucidate the basis for variation in root proliferation, and provide insight into experimental design for root foraging studies.

**Department of Psychology****Essentialist Beliefs about Religious Identities**

As a social identity, religion is unique because it contains a spectrum of choice. In some religious communities, individuals are considered members by virtue of having parents of that background, and religion, culture, and ethnicity are closely intertwined. Other faith communities actively invite people of other backgrounds to join, expecting individuals to choose the religion that best fits their personal beliefs. This aspect of choice may influence beliefs about the essentialist nature of religious identity. Essentialism is when social groups are considered to have deep, immutable, and inherent defining properties. In this study we examine college students' (N=52) perceptions of eight different religious identities and several filler groups by asking them to rate these groups on a number of traits associated with essentialism. A principal components analysis on the results produced three unique factors which we refer to as natural kind-ness, entitativity, and deep reality. As expected, there were significant differences between religious groups in the degree to which they were essentialized along these three factors. Implications for inter-faith relations, stereotyping, and violence, as well as directions for future research, are discussed.

**Department of Economics****Social Network Effects on Health and Health Related Behaviors**

Social networks, which describe the topology of social interactions, have proven to be a rich field of research in economics. The idea that individuals make decisions in a social context provides valuable insight into many economic phenomena, including labor market outcomes, criminal activity, urban development, and education, to name but a few. More than simply interesting, the presence of measurable network effects has important public policy implications for issues ranging from classroom composition to criminal rehabilitation. This is especially true in the case of individual health and health related behaviors. The scope and implications of economic analysis on an individual's health and health related behaviors was demonstrated by the attention received by a recently published paper which concluded that network phenomena are relevant to the trait of obesity. More controversially, the authors propose that obesity may actually spread through social ties, a conclusion that has since been challenged on the basis of technical econometrics. This scholarly debate points at important complexities in the network related aspects of individual health, and is the motivation behind this project. I use data from the Longitudinal Survey of Adolescent Health (Addhealth) to investigate the impact of social ties and the social networks they imply on health related behaviors and health outcomes. Adopting a modified linear – in – means model of social interaction, which models individual outcomes as a function of average group outcomes, I measure the effect of an adolescent's position within her network (her centrality) and the characteristics and behaviors of her immediate neighbors (those she most admires), on her own behaviors and outcomes, including general health, smoking, drinking and drug use. Centrality is a particular interesting variable as previous results have shown it to be directly proportional to Nash equilibrium outcomes. I find that an individual's centrality in their social network has a positive effect on individual health outcomes, and that this effect varies by gender. Results also point to immediate neighbors playing a particularly large role in determining behaviors such as smoking, drinking, drug use, and also general health.

**Department of Mechanical Engineering****A Thermoelectric Module (TEM)-Variable Conductance Heat Pipe (VCHP) Assembly for Reduced Power Precision Temperature Control**

Thermoelectric modules (TEMs) are used to provide precision temperature control of photonics components in telecommunications circuit packs over a wide range of ambient temperatures. They are cooled by fixed thermal resistance (air cooled) heat sinks and require no power at a particular ambient temperature within the prescribed range. As the ambient temperature deviates above and below that corresponding to zero TEM power, the TEM is required to operate in cooling and heating modes, respectively. In cooling mode and heating modes, relatively low and high thermal resistance heat sinks, respectively, increase efficiency. Thus the efficiency of a TEM may be increased by replacing a fixed thermal resistance heat sink with a variable one in the form of a variable conductance heat pipe (VCHP).

I show by example that there exist unique values of the height of the semiconductor pellets in a TEM and (fixed) thermal resistance of the heat sink attached to it that correspond to minimum TEM power consumption at the extremes of a prescribed ambient temperature range. Then we replace the fixed thermal resistance heat sink by a passively-controlled VCHP. The "flat front" model is used to appropriately modify the relevant boundary condition on the TEM and a significant reduction in maximum TEM power consumption is predicted. This enables an increase in the component density within telecommunications circuit packs as each is allotted a fixed amount of power. We note that a VCHP in the absence of a TEM is not a viable precision temperature control solution as it may not respond sufficiently fast to changes in component power dissipation and, even if sub-ambient cooling is unnecessary, may not accommodate the hottest ambient temperature conditions due to space limitations constraining its minimum thermal resistance.

## Department of Urban and Environmental Policy and Planning

### “Nudging” towards sustainability: How behavioral science can inform policies promoting pro-environmental behavior at the household level

Depletion of global natural resources and growing threats to ecological processes has dominated environmental research for decades. More recently, evidence of global climate change has magnified the interconnections - and disparities - between economic prosperity, social equity, and environmental viability. In response, anticipated threats based on scientific research have gained credence and a new consensus towards pursuing “sustainability” has taken hold. As the challenges escalate, strategies to confront them must come swiftly but with precision and efficacy to meet current needs and affect long term change. Innovative approaches to decades-old environmental issues will require the efforts of a range of players including advocacy groups, non-profits, business, industry, government, and affected communities. An essential, though partial, element in the transition to “sustainable communities” will depend upon changes in lifestyles and human activities - a shift from the reckless to the responsible consumption of resources.

In this thesis I focus on the role of local government in developing initiatives to “green” our urban communities. I introduce Thaler and Sunstein’s (2008) concept of “policy nudging”, and encourage its application to enhance the effectiveness of initiatives designed to reduce direct and indirect energy consumption (energy use and personal transportation) at the household level. Interested in exploring the established (though often overlooked) connections between human behavior and environmental problems (Gardener & Stern, 1996; Cone & Hayes, 1984) I closely examine research from behavioral science (i.e. environmental psychology, ecological sociology, etc.) to identify motivating factors, strategies, and contexts found to contribute to pro-environmental behaviors. I argue that policies – which have been known to play a large role in influencing individual actions – should be informed to a reasonable extent by what we already know about human behaviors.

Though scientists have been studying human behavior as it relates to environmental concerns for decades, there remains a disconnect between this research and policy development. Given the urgent need to reduce environmental impacts – on a local and global level - policymakers can and should play an active role in what will surely be a long and arduous shift towards more socially just, economically durable, and environmentally sustainable communities. I postulate that through a greater understanding of the conditions that promote environmentally responsible actions, policymakers will be better equipped to respond effectively to human-induced environmental threats. Utilizing findings from environmental psychology and human behavioral research will assist policymakers facilitate needed transitions now and into the future such as reduced dependence on fossil fuels, and increased conservation of resources. An analysis of previous interventions and a set of recommendations for future policy development are presented and discussed.

## Department of Urban and Environmental Policy and Planning

### Youngstown 2010 and Beyond: Smart Decline as a Remedy for the Shrinking City

Indicators of growth, typically increases in population, have been the dominant paradigm for measuring the success or failure of a city. However, over the past half-century many urban industrial centers (particularly) in western nations have undergone steady population decreases as a result of their dominant industry scaling back or moving elsewhere. Many cities have watched their populations dwindle in half while citizens that remain have trouble finding work. For many of these cities a sustained growth strategy that relies upon courting a replacement industry to regain the cities’ former population and economy is unrealistic. Further, population decline has left these cities with burgeoning infrastructure designed for a larger city. Many housing lots, storefronts, roads, and utility lines have gone abandoned. These abandoned structures are costly to the city, create safe havens for illicit activity, make urban centers unattractive for residents and businesses, and are a roadblock to greater environmental quality.

This paper further elaborates on problems facing shrinking cities and offers the case study of Youngstown, Ohio as an alternative approach to revitalization plans that focus only on growth. Youngstown has accepted its fate as a smaller city and developed a strategy of “Smart Decline” as its city plan. This plan, entitled “Youngstown 2010”, draws from community based methods of smart growth along with a unique municipality wide focus on clearing abandoned infrastructure.

The paper concludes by asking what standards of success should be used to assess the Youngstown 2010 plan. As Youngstown’s plan draws near its 2010 “completion” timeline other cities facing similar dilemmas, such as New Orleans, will be looking to evaluate how successful Youngstown 2010 has been and determine if it is a viable model for their own (un)development. With traditional methods of measuring population increase and economic growth not telling the entire story what other qualitative and quantitative measures ought to be given significant weight?