

THIOCYANATO RUTHENIUM(II) LINKAGE ISOMERS

Matthew Buck (Daniel Freedman), Chemistry

Reacting [(p-cym)Ru(bpy)Cl]Cl (p-cym = p-cymene, bpy = 2,2'-bipyridine) with excess SCN⁻ gives a 3:2 mixture of two new compounds. The ¹H NMR and IR spectra of this mixture are consistent with the products being the [(p-cym)Ru(bpy)NCS]⁺ and [(pcym)Ru(bpy)SCN]⁺ linkage isomers. The products are inseparable by chromatography on a cation exchange resin or alumina. The mixture of isomers reacts with excess Hg²⁺ to form a single product by ¹H NMR spectroscopy. We propose that this product is [(pcym)Ru(bpy)]-NCS-Hg(L)_n³⁺. Formation of this complex requires the S-bound isomer to rearrange to the N-bound isomer. We report on attempts to separate [(pcym)Ru(bpy)SCN]⁺ from [(p-cym)Ru(bpy)NCS]⁺ by chromatography on alumina in the presence of Hg²⁺.

ALTERNATIVE DIGITAL PRINTMAKING

Jeremiah Brown, Robert Capozzi (Jill Parisi), Printmaking

We will conduct a formal investigation of digital printing techniques in the Printmaking Department during the Spring 2007 semester. This study will explore the capacity of our present equipment for the production of digitally printed images on a variety of atypical substrates. An undergraduate and a graduate student will assist with this extensive research; both are well versed in digital printing and are interesting in a more in depth study. The knowledge gained through this study will enable the printmaking area and the art department in general to determine what the possibilities are in creating more diverse digitally generated art works both two and three dimensional, and how to incorporate these techniques in the courses offered. Until this point, the most successful printing here in our studio, and elsewhere from what we have observed, has been on papers specifically created for this purpose. While this can produce satisfying results for some artists, there are many others who are interested in using digital means in order to print on heavy weight papers, delicate handmade paper, or materials other than paper. Attempts at this in the past have resulted in unsatisfactory results. Some new research we have been looking into, indicates that it is possible to print on a variety of materials, either directly or by using a number of transferring techniques. With this project it is our intention to explore these alternative processes, and define the capabilities of our departments facilities.

CRYSTALLIZATION OF THE DAD-1 KINETOCHORE PROTEIN

Francis Carey, Saria Rani (Jennifer Waldo), Biology

An experiment to determine the variables that lead to the crystallization of the DAD-1 kinetochore protein was performed. The DAD-1 protein is important as a member of the DASH complex, which forms closed rings on microtubules. These rings help bind the kinetochore to the microtubules and thus are essential for the process of gene replication and cell division. Proteins rarely crystallize naturally, so various methods have been used to

facilitate the formation of protein crystals. Here we used the method of vapor diffusion to slowly increase the concentration of protein in a droplet of solution which can lead to the formation of crystals. A difficulty in this method is that it can take days, weeks, or months for quality crystals to form, so banks of commercial solutions were initially used to scan for conditions that would likely lead to crystallization. Results were recorded over several weeks with several candidates having promising results. This experiment will be followed up with refinement techniques to optimize the crystals, and prepare them for x-ray crystallography experiments to determine the DAD-1 protein's molecular structure.

CHARACTERIZATION OF CHEMICALLY MODIFIED SURFACES

Darren Ceckanowicz (Pamela St. John), Chemistry

A robust chemistry has been developed for covalent attachment of oligonucleotides to silica microspheres using an aminosilane derivatization followed by a cleavable disulfide linker. Using a chemical assay, the number of initial amines derivatized on the surface was determined. Use of the linker, covalently attached to the bead through the aminosilane, makes it possible to measure the number of fluorescently bound oligonucleotides in solution, rather than on the bead, since the disulfide linker could be cleaved readily. A similar derivatization scheme is being developed on gold-coated silicon wafers using an amine-terminated thiol for specular reflectance FTIR studies, along with ellipsometry to measure monolayer thickness.

ANTIMICROBIAL ACTIVITY OF PINENE DERIVATIVES

Daniel Tzvi Cohen, Pui Yee Chan (Teresa Snyder-Leiby, Preetis Dhar), Biology and Chemistry

Alpha-pinene, a known antimicrobial compound is a rigid bicyclic monoterpene with a double bond that allows for a variety of functional and skeletal transformations. Testing and comparing the antimicrobial activity of each of the alpha-pinene derivatives obtained by either skeletal or functional group transformations, with alpha-pinene could help us better understand how the structure of alpha-pinene affects its antimicrobial activity. Earlier work from our lab focused on the functional group modification of alpha-pinene. Of all the groups tested, introduction of OH, NH₂ and halogens (Br and Cl) were found to increase the antimicrobial activity the most. We have now synthesized alpha-pinene derivatives with altered carbon skeleton. Some of these derivatives have been tested for their antimicrobial potential using TLC bio-autographic assays. The results of this study are presented.

REALIZING "KING LEAR": THE DRAMATURGICAL PROCESS IN

ACTION

Bradley Diuguid (Frank Trezza), Theatre Arts

This is a documentary project designed to reveal the critical, artistic, and scholarly challenges behind mounting a production of William Shakespeare's "King Lear." By taking an interdisciplinary approach to theatre arts, the dramaturg requires a strong grasp of the rigors of drama as well as close textual and historical analysis of the play as a work of literature. In this role, I have supported the recent on-campus performance of "King Lear" and its existential themes, as highlighted by previous productions. To these ends, my process has been to collect relevant resources for actors, designers, and the director, with a central focus on researching the play's history of performance on the stage. As traditional research in world history, period literature, fine arts, and anthropological sources is a vital part of dramaturgical protocol, this project will display my academic as well as creative work in the unconventional scholarship arena of the theatre arts. Resulting materials will include visual and textual research used to present production history, script conflation, table work, and rehearsal notes, especially those that defend the on-campus production's concept.

CRYSTALLIZATION OF MITOTIC PROTEINS

Patricia Ezenwa (Jennifer Waldo), Biology

In order for duplicated chromosomes to separate appropriately during the cell cycle, the kinetochore assembles on the centromeric region of each duplicated chromosome, and mediates the binding of the chromosomes to the spindle apparatus. Proper functioning of the kinetochore is essential in this regard. Several proteins are associated with the kinetochore. DAD4 and HSK3 are two such proteins. By elucidating the structure of the proteins that constitute the kinetochore, we gain insight into the design of the kinetochore. X-ray Crystallography helps determine the structure of a molecular body of interest; it is a joint effort of Crystallization and X-ray diffraction. In our study, we tested conditions influencing Crystallization, with the goal of optimizing this process, as it pertains to the study of the kinetochore. To meet this end, we induced replication of Escherichia coli cells that were genetically modified to express Saccharomyces cerevisiae DAD4 and HSK3 kinetochore proteins, extracted soluble proteins produced by E. coli, purified DAD4 and HSK3 proteins, concentrated these proteins, and tested conditions affecting crystal formation of DAD4 and HSK3. When an effective crystallization method is employed, X-ray diffraction can then generate a 3-D model of these proteins; thereby, providing further insight into the structure of the kinetochore, and its role in the regulation of the cell cycle.

COMPARISON OF PSORALEA AND HERACLEUM PHOTOTOXICITY

Igor Gembitsky (Preeti Dhar), Chemistry

Psoralea corylifolia, a plant native to India, has long been used in folklore medicine to treat skin disorders such as vitiligo by stimulating the production of melanin in the skin. The class of compounds known as furanocoumarins have been shown to be the source of this therapeutic effect. Furanocoumarins have also been found in significant concentrations in *Heracleum maximum*, a plant native to North America, although there has been no recorded use of the plant in skin-related treatments in folklore medicine. In order to understand this inconsistency, we prepared various extracts from the plants using a Soxhlet extractor. We used an *Artemia salina* (brine shrimp) bioassay, which first had to be standardized, to screen for compounds that are phototoxic (a characteristic of furanocoumarins). The brine shrimp bioassay is also a useful method for detecting general toxicity, thus we were able to compare the toxicity of both plants to render a possible explanation for their role in folklore medicine. This study showed that *Heracleum maximum* extracts had a higher concentration of furanocoumarins than the *Psoralea corylifolia* extracts, but were very toxic and therefore probably not used in folklore medicine.

(a,w)-DERIVATIVES

Anna Haensch (Diego Dominici), Mathematics

When calculating derivatives using the classical method, students of Calculus are often left with undefined derivatives. Using the (a,w) -derivative, we are able to take these previously undefined derivatives and provide viable solutions for them. The definition of the derivative differs from the classical definition by two terms, alpha and omega. The purpose of this project was to test the viability of this new method by applying it to all the theorems of classical differentiation (i.e. Rolle's, Lagrange's, Mean Value Theorem, etc.) In doing so, we were able to prove that (a,w) -differentiation holds, and can be used as a simple new way to compute derivatives.

ELEMENTS OF THE SOCRATIC IN J.S. MILL

Emily Hallock (Jeff Miller), Political Science

The question of individual liberty is central to political theory; recommendations as to the nature of the relationship between the individual and the state proceed from a normative position on the necessary extent of individual liberty. In *On Liberty*, J.S. Mill argues for broad individual liberty from a utilitarian, practical perspective, in an attempt to avoid problematic metaphysical assertions; arguably, he fails in his stated objectives. The question this paper seeks to answer is whether that failure ultimately condemns his entire project to theoretical obsolescence - can an argument that rests on assumptions about progress, rationality, and truth be the basis for viable political theory in the face of postmodern critiques to those assumptions? This paper is an exploration of Mill's arguments for individual liberty and the resemblance between his conception of truth and the Socratic view, and an analysis of the theoretical viability of Mill's argument.

DETERMINATION OF EQUILIBRIUM CONSTANTS FOR THE AQUATION OF [(p-cym)Ru(acac)Cl], [(p-cym)Ru(Facac)Cl], AND [(p-cym)Ru(Phacac)Cl].

Kenneth R. Hassler (Daniel A. Freedman), Chemistry

We have measured the equilibrium constants for the aquation of [(p-cym)Ru(acac)Cl], [(p-cym)Ru(Facac)Cl], and [(p-cym)Ru(Phacac)Cl] (acac = CH₃COCHCOCH₃, Facac = CF₃COCHCOCF₃, Phacac = CH₃COCHCN(Ph)CH₃). Solutions with a constant concentration of a ruthenium complex were prepared with concentrations of chloride ranging from 0.1 to 1.0 M. The pH was maintained at a value of 6.0 with a 0.1 M KHP buffer. Constant ionic strength was maintained using KNO₃. The equilibrium constants were extracted from Scatchard plots prepared from the UV-Vis spectra of the solutions. The correlation between the aquation equilibrium constants and the Ru-Cl bond lengths determined by x-ray crystallography will be discussed.

WATER QUALITY OF THE WALLKILL RIVER

Renee Jones, Colin Mills (Shafiul Chowdhury), Geology

It is critical to understand water quality problems in our communities, and the Wallkill River affects many communities in Ulster County. The purpose of this study is to establish a database of water quality data for the Wallkill River against which we can compare water quality standards and future water quality data to observe trends and changes, and which we can use to correlate water quality to land use along the river. Samples were collected at 15 sites where conductivity, pH, temperature, and dissolved oxygen were measured in the field with portable Oakton and YSI meters, and the samples were analyzed in the lab using a Dionex Ion Chromatograph and Hach spectrophotometer. This has resulted in 5 months of data with some correlation of land use and its effect on water quality at specific locations. For example, sodium concentrations ranged from 9.84 to 40.78 ppm, with the greatest concentrations occurring downstream of farmland which could increase salinity of the river from sodium build-up in the soil. Total organic carbon concentrations ranged from 2.9-13.6 ppm, and the location generally having the highest concentration is the most industrial, likely contributing the most contaminated runoff at a sampling point. Continued analysis along with better study and delineation of land use will yield further conclusions. The data collected could be used to learn more about water quality in our communities and how we can protect our watershed.

THE ANARCHA PROJECT: SIMS & THE MEDICAL PLANTATION

Jessica Maxwell (Anita Gonzalez), Theatre Arts

The Anarcha Project is a theatrically based investigation into J. Marion Sims, known as “the father of gynecology”, and his medical experimentation on slave women in 1840’s Alabama. Sims performed surgery, without the use of anesthesia, on black, disabled women

to further his understanding of the female anatomy and used his findings to establish the field of gynecology. The stories of these women, who persevered through years of brutality at the hands of Sims, fell into oblivion as he went on to acclaim as a surgical pioneer and medical innovator. The Anarcha Project resurrects the forgotten memories of three of the slave women Sims operated on, Anarcha, Lucy and Betsy, and draws attention to the inequities suffered by marginalized groups in health care practices today as a direct result of these medical atrocities. The project has achieved this through touring performance workshops based in spoken word poetry, music and dance. It has drawn collaborators from the artistic, disability and African American communities and academia. The workshops seek to give voice to Anarcha's experience through a lens other than that of Sims and the patriarchal medical establishment and in a way that does not merely denote a victim narrative. The performance workshops synthesize with theatrical laboratories, academic lectures, and historical site investigations during each artistic residency. This research portion of the project has served in reaching out to a larger community in addition to developing performance material, the culmination of which will be a theatrical production slated for early 2008. Previous artistic residencies have occurred at The University of Michigan Ann Arbor, Davidson College and The University of California at Berkeley and previous historical site investigations have been conducted in Montgomery, Alabama. The presentation *The Anarcha Project: J. Marion Sims and the Medical Plantation* is the product of a dramaturgical analysis of The University of California at Berkeley March 2007 artistic residency. While the scope of *The Anarcha Project* will be presented, the focus will be placed on shared visceral reactions of workshop participants and the resulting symbolic imagery that manifested from their interaction with the abstract notion of Anarcha and her experience. The concept of the "anti-archive", a non-linear assemblage of records that serve as a counterpoint to the archives of Sims and the patriarchal medical establishment, will be examined.

HOOKING UP: LIBERATION, OBJECTIFICATION OR RAPE?

Regina Musicaro (Melanie Hill), Psychology

"Hooking up" is the ambiguous term used by college students to describe intimate, noncommittal sexual experiences that range from kissing to sexual intercourse (Boswell, 1996). Current standards for the sexual behavior of young adults in their twenties seem to separate into two categories: sex in long-term monogamous relationships and random sexual encounters with acquaintances or strangers. Whereas traditionally women have been stigmatized for engaging in casual sexual encounters, now it is the norm (Caruthers, 2006). Often, "hooking up" is experienced negatively for women. This may be due to multiple factors. Firstly, the double standard that shuns women for casual hook-ups remains largely intact causing a contradictory expectation. Furthermore, the act of hooking-up is mostly reported as being a service to men rather than a mutual engagement (Paul et al., 2000). After hooking up, some women are afflicted with negative emotions such as loneliness, inadequacy and depression. Even more concerning is the ambiguity some women report in distinguishing hooking up experiences from date rape. A qualitative analysis of 16 hookup stories (9 women) showed that 5 of these stories met the legal definition of rape. However, only two participants described their experience as rape. Thus, it appears that "hooking-up" may sometimes be a form of harmful objectification under the veil of female sexual

liberation. This research investigates why women report rape as hooking up.

PURIFICATION & REFOLDING OF YEAST PROTEIN NKP2

Eric J Neuberger (Jennifer Waldo), Biology

Nkp2 is a component of the central kinetochore, which mediates the attachment of the centromere to the mitotic spindle during mitosis. A plasmid containing the gene for the yeast kinetochore protein nkp2 was incorporated into E. Coli cells in order to induce production of nkp2. Once the gene is expressed the protein can either fold properly into a soluble protein or fold improperly into an insoluble protein. In order to perform crystallography a protein must be soluble. This experiment looked at various procedures to enhance soluble protein expression in order to crystallize nkp2 and determine its 3 dimensional structure. A culture of E coli cells incorporating the nkp2 plasmid were grown and protein expression was induced by adding IPTG. The cells were then lysed, centrifuged and the soluble fraction loaded onto a nickel column and then eluted from the column. The proteins were then analyzed using an sds page gel. Nkp2 was found to be insoluble and attempts were made to solubilize the protein by loading the insoluble fraction onto a nickel column using a urea buffer. The gel results reflected a large amount of nkp2 expressed but there was now the problem of removing the protein from the urea. Two methods were used to try and remove the protein from the urea, dialysis and an on column protein refolding method. Both methods were largely unsuccessful at producing large amounts of pure soluble protein for crystallographic purposes, though a low yield of recovery was observed.

TRANSFER HYDROGENATION OF ACETOPHENONE

Tara Passik (Daniel Freedman), Chemistry

Four [(p-cym)Ru(L2)Cl] complexes (p-cym = h6-p-cymene, L2 = CH₃COCHCOCH₃ (acac), CH₃COCHCOCH₃ (Facac), CH₃COCHCN(Ph)CH₃ (Phacac), CF₃COCHCN(Ph)CF₃ (Phfac)) were test for catalytic activity in the transfer hydrogenation of acetophenone by formic acid. The fluorinated complexes exhibited no catalytic activity while the non-fluorinated complexes gave turn over numbers (TON's) of 12-16 over 72 hours. The acac complex was studied in more depth by varying the reaction time and pH. We also describe attempts to synthesize a diketonate ligand with a pendant hydroxyl group that is expected to enhance the catalytic activity.

PURIFICATION OF IML3 OF THE YEAST KINETOCHORE

Saira Rani, (Jennifer Waldo), Biology

The iml3 protein is a part of the kinetochore complex of Saccharomyces cerevisiae. The purpose of this research was to purify a sample of iml3 protein so that it can be crystallized and analyzed for its function in the kinetochore complex. Prior to the purification process of

the *iml3* protein, the *iml3* gene was successfully cloned in a plasmid. The *Escherichia coli* cells were transformed with the vector containing the *iml3* gene. The *E. coli* cells were induced to express the *iml3* gene. The purification process involved using fast protein liquid chromatography (FPLC). The expression of the protein in different fractions of the FPLC was confirmed with Sodium dodecyl sulfate (SDS) polyacrylamide gel electrophoresis. After many attempts, it was concluded that the *iml3* protein cannot be successfully purified. *Iml3* appears to form a complex with *E. coli* proteins which cannot be separated by conventional chromatography. Therefore, the purification of *iml3* protein is not likely to be pursued in the future. In future research, attention will be directed to other proteins associated with the kinetochore complex to gain a better understanding of the kinetochore complex.

ISOLATION AND EXPRESSION OF KINETOCHORE GENES

Michael Scherrer (Jennifer Waldo), Biology

The kinetochore is a eukaryotic protein structure upon which the chromosomes are attached to the microtubules of the mitotic spindle during mitosis. Numerous proteins are involved at this juncture in cell division which are essential for the continuation of mitosis and the correct distribution of the sister chromatids to the daughter cells. Presently, the three-dimensional structures of most of these proteins in the yeasts *Saccharomyces cerevisiae* and *Candida albicans* are unresolved. In successfully determining the structures of the kinetochore proteins from these two organisms and comparing them to the other identified structures, we will gain a better understanding of their function in the mitotic process. In addition, more evidence will be provided for the similarities of kinetochore function in eukaryotic cells. As a starting point, the genes were isolated using the Polymerase Chain Reaction (PCR) and spliced into a plasmid used for transforming engineered competent strains of *Escherichia coli*. The genes of interest were then expressed by these transformed cells from which protein can be harvested and purified. At this time numerous yeast kinetochore genes have been isolated and expressed and are awaiting further purification and analysis.

ORTHOGRAPHIC PROCESSING IN NATIVE ENGLISH SPEAKERS

Cristina Sanchez (Giordana Grossi), Psychology

When people learn to read, they become familiar with letter combinations that characterize orthography or correct spelling rules of that language. This familiarity is indexed by higher accuracy in identifying single letters when they are embedded in real words compared to pseudowords (e.g., *lape*) and when they are embedded in pseudowords compared to nonwords (e.g., *cvbs*). These effects are named word and pseudoword superiority effects, respectively. The aim of this study was to investigate superiority effects for Welsh and English stimuli among native English speakers. Twenty native English speakers were asked to identify single letters in words, pseudowords, and nonwords in both languages. Based on previous research, it was predicted that English monolingual participants would

demonstrate word and pseudoword superiority effects for English stimuli but not for Welsh stimuli. The results supported the hypothesis. Follow-up experiments will investigate how English and Welsh, which are characterized by different orthographies, are processed in early and late English-Welsh bilinguals.

ANALYSIS OF LOGISTIC EQUATION IN FREQUENCY DOMAIN

Robin Augustine Thottungal (Diego Dominici), Mathematics

One of the major problems in scientific research is the analysis of time series that is composed of experimental data. Such a sequence is obtained by successively sampling over and observable quantity, which characterizes the dynamical system under investigation. When dealing with linear dynamical systems, obtaining information from the time series is relatively easy. However when the dynamical system under consideration is nonlinear, difficulty arises. As a first step towards understanding the nonlinear behavior of dynamical system, we are transforming the nonlinear time series data which is in time domain to frequency domain by using Discrete Fourier transform. In the study we are using logistic equation which is a formula for approximating how populations of animals change over time. This equation measures how populations respond to predators, availability of food, land, and other changes in their environment. The logistics equation was created by biologist Pierre Verhulst in 1845. The equation looks as follows: $X_{n+1} = aX_n(1 - X_n)$ where a is some constant which represents the growth rate. The presentation will be about the results obtained by transforming the logistic equation into the frequency domain.

PURIFICATION OF HUG 1 PROTEIN

Nicole Vitillo (Jennifer Waldo), Biology

Hug 1 is a small soluble *S. cerevisiae* yeast protein, 68 amino acids long. It has a similar sequence to that of Ubiquitin, which is a protein that had been studied in greater depth. Ubiquitin-like proteins are involved in several cell functions, DNA repair being one. These proteins have the ability to covalently bind to other cellular components. Due to the similarities in sequence, it is hypothesized that Hug 1 is an ubiquitin-like protein. Therefore, it is thought to have similar cellular functions. Hug1 is induced when there is DNA damage to the cell. Damage to DNA can arise from UV damage, chemical damage, or mutations. It is important to fix the damage before the genetic information is passed on to the next generation. Therefore, it is important to understand the function of Hug 1 to further understand the overall process of DNA replication. The purpose of this research is to determine the structure and function of the Hug 1 protein through x-ray crystallography. First, the Hug 1 gene was cloned using PCR and put into a plasmid. The plasmid was then put into an *E. coli* cell to be expressed. The addition of IPTG to growing *E. coli* cells induces the production of the Hug 1 protein. The protein must then be purified. The cells are physically broken apart using a dounce. The solution is then run over a nickel column. The 6 Histadines that have been added to the protein allow Hug 1 to bind to the nickel. With the

addition of imidazole, HgI₂ is eluted.

EXPLORING GENDER DIFFERENCES IN INTERNET BLOGS

Stacie Walker (Maryalice Citera), Psychology

This project examined communication differences in Internet blogs posted by males and females. Previous research on face-to-face communication showed gender differences in many areas, including self-disclosure, affiliative and agentic language, expressions of uncertainty, hostility levels, topics discussed, and amount of emotional expressions. This study was conducted to determine if these same gender differences occurred in Internet blogs. At issue is whether or not the Internet allows users the freedom to escape from prescribed gender roles. We hypothesized that females would self-disclose, be uncertain, use affiliative language, and discuss feelings and relationships more than males. Males were hypothesized to exhibit hostility, use agentic language, and discuss work, plans, and future goals more than females. Ten male and ten female blogs were picked at random and coded for instances of these behaviors. The hypotheses received mixed support. Females tended to self-disclose, discuss feelings, and write about their families more than males. Males were found to have significantly more instances of general uncertainty (including more hedging and indirect statements) and used affiliative language more than females. These findings suggest that for some behaviors perhaps the Internet does foster an environment free from the pressure of prescribed gender roles.

THE SIGNIFIED IMMANENT IN SHAKESPEARE'S DISCOURSE

Lea Weiss (Sarah Wyman), English

In a semester-long independent study, various literary critical modes were employed in the analysis and interpretation of William Shakespeare's tragedies. Specific passages were closely read to reveal implicit or coded relationships within texts. Using semiotic theory, in particular, Julia Kristeva's theories concerning the symbolic and semiotic, Hamlet, King Lear, Macbeth, Othello, Romeo and Juliet, and Timon of Athens were considered, with attention to uncovering the manner in which Shakespeare's plays demonstrate the playwright's efforts to depict the ineffable and immanent. To examine and discuss cogently such attempts and resulting syntagmatic textual relationships, it was necessary to construct a critical term capable of intimating concepts existing beyond language's ability to signify. The term created, "signified immanent," signals that which precipitates when many meanings, possibilities of experience, and coexisting and interdependently arising realities converge. As suggested by his plays' material, Shakespeare incorporates songs, adages, parables, and other non-traditional semantic arrangements to imbue his texts with the supra-textual information suggested and facilitated by the signified immanent. The playwright's frequent employment of ambiguous or polysemic language intimates his endeavors to evoke conceptual, symbolic, and semiotic dissonance in his audience.